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Achieving the Aichi 2030 Declaration Goal 1c Air Pollution: Policy Action Recommendations

(Background Paper for Plenary Session 4: Review Goal 1c: Air pollution)

Final Draft

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Executive Summary

The transport sector significantly contributes to air pollution in Asia, causing severe health impacts. The Aichi 2030 Declaration, adopted by 21 Asian countries, aims to address this issue. Goal 1c specifically targets reducing transport-related air pollution, aligning with Sustainable Development Goals 3.9 and 11.6.

The transport sector significantly contributes to air pollution in Asia, emitting pollutants like particulate matter, nitrogen oxides, and volatile organic compounds from tailpipe emissions, tire and brake wear, and resuspended dust. These pollutants have severe health consequences. Transport air pollution increases the risk of respiratory and cardiovascular diseases, cancer, and adverse birth outcomes, leading to an estimated 800 premature deaths globally per day in 2019, with Asia bearing a disproportionate burden. Recognizing this, 21 Asian countries adopted the Aichi 2030 Declaration, aiming to reduce transport-related air pollution, aligning with Sustainable Development Goals 3.9 and 11.6.

Key Findings

- **Stagnant Emissions:** The transport sector in EST countries contributes 7% of total economy-wide PM2.5 emissions and 30% of NOx emissions. These emissions have stagnated or slightly decreased since 2020.
- **Shifting Mode Share:** Road transport emissions have decreased due to vehicle emission standards and fuel quality, while inland waterway emissions have risen, highlighting the need for data and policy focus on this sector.
- **Policy Landscape:** Policies increasingly address air pollution indirectly through climate change mitigation efforts. However, domestic waterways and aviation sectors require more targeted policies. The analysis indicates that the transport air pollution has a diverse landscape with emission standards, vehicle restrictions, infrastructure investments, economic incentives, etc.
- **E-mobility Targets:** Many countries are setting ambitious electric vehicle targets with air pollution reduction as a co-benefit.

Achieving Aichi 2030 Goal 1c requires comprehensive strategies and coordinated action. By implementing these recommendations, EST countries can effectively reduce transport-related air pollution, improve public health, and contribute to sustainable development.

Policy Recommendations

1. **Develop Sustainable Urban Mobility Plans (SUMPs):** Enable strategic mobility planning focusing on accessibility, quality of life, and emissions reduction.
2. **Promote Shift-Oriented Measures:** Invest in public transport, cycling, and walking infrastructure to encourage reduced car dependence and sustainable travel behaviour.
3. **Implement Active Transport Programs:** Prioritize cycling and walking infrastructure to achieve quick low-carbon wins and promote public health.
4. **Implement a Global Sulphur Strategy:** Adopt stricter emissions limits and fuel quality standards, aiming for Euro 5/V by 2025 and Euro 6/VI by 2030.
5. **Facilitate Low-Sulphur Fuels for Maritime Transport:** Address the growing emissions from shipping by promoting low-sulphur fuels and supporting infrastructure upgrades.
6. **Expand EV Charging Networks:** Accelerate the shift to electric vehicles by strategically planning accessible charging infrastructure and incentivizing private investment.

Background

The transport sector is a significant contributor to outdoor air pollution, with tailpipe emissions, tire and brake wear, and resuspended dust generating a complex mixture of pollutants like particulate matter (PM), nitrogen oxides (NO_x), and volatile organic compounds (VOCs). These pollutants have severe health consequences, increasing the risk of respiratory and cardiovascular diseases, cancer, and adverse birth outcomes.

Globally, transport-related air pollution led to an estimated 800 premature deaths per day in 2019 (McDuffie et al., 2021). Asia bears a disproportionate share of this burden, with lower and middle-income economies accounting for 96% of premature regional deaths and 92% of global premature deaths due to transport-related air pollution (McDuffie et al., 2021). PM_{2.5} and ground-level ozone from road transport are the primary culprits, responsible for 79% of the health burden in Asia (McDuffie et al., 2021).

Recognizing the urgent need to address the health impacts of transport-related air pollution, 21 Asian countries adopted the Aichi 2030 Declaration. Goal 1c of this declaration specifically targets reducing air pollution from transport, aligning with the Sustainable Development Goals 3.9 (by 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination) and 11.6 (by 2030, reduce the adverse per capita environmental impact of cities).

This background report synthesizes information from the Asian Transport Outlook (ATO), combining official national and regional statistics with data from reputable international sources. While this analysis provides a crucial baseline, it is important to note that no new data has been generated, and challenges related to data consistency and comparability remain. We acknowledge the diverse national circumstances and aim to enhance data availability and quality in future monitoring reports.

I. Headline Indicator – Transport Air Pollutant Emissions

Currently, the transport sector in EST countries contributes approximately 7% of total economy-wide PM_{2.5} emissions and 30% of total economy-wide NO_x emissions. While other regions have demonstrated progress in curbing transport emissions, EST participating countries have experienced a concerning stagnation (Crippa et al., 2023). From 2000 to 2020, the EST share of global transport emissions steadily increased across various air pollutants. A potential turning point may have been reached since 2020, as this share has stagnated or slightly decreased.

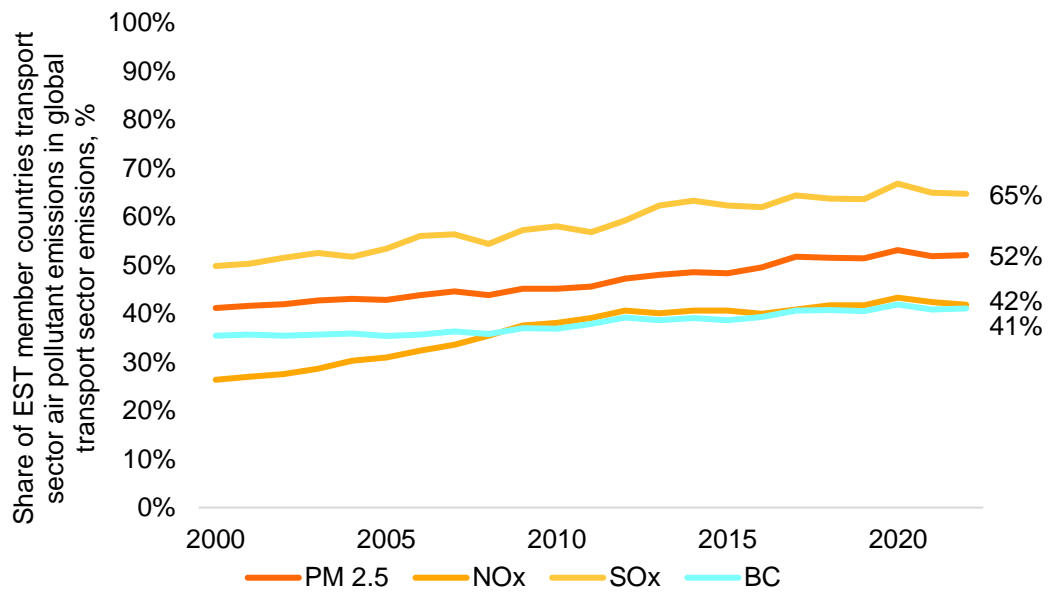


Figure 1. Share of EST participating countries in global transport sector emissions, by air pollutant

Source: (Crippa et al., 2023)

Transport sector efforts to reduce air pollutant emissions within the EST region have lagged other sectors. Notably, transport PM_{2.5} emissions in 2022 were 9% higher than 2015 levels, whereas other sectors achieved a 13% reduction during the same period (Crippa et al., 2023). This disparity highlights the urgent need for accelerated action to mitigate the environmental impacts of transport, particularly air pollution, in line with the Aichi Declaration goals.



Figure 2. PM_{2.5} air pollutant emissions in EST participating countries, transport sector vs. other sectors

Source: (Crippa et al., 2023)

II. Transport Air Pollutant Mode Share

Despite the poor overall sectoral performance, the road sector - a major contributor to pollution - has shown considerable progress. The share of road transport in total transport emissions has decreased across all pollutants, while the inland waterway share has risen. For instance, within transport PM_{2.5} emissions, the share of roads decreased from 35% in 2010 to 23% in 2022, while inland waterways increased from 46% to 65% during the same period (Crippa et al., 2023). This trend indicates the growing significance of inland navigation as a source of air pollution in the EST region. However, it is worth noting that data for transport emission modelling remains limited, particularly for domestic vessel activity in inland waterways and domestic shipping.

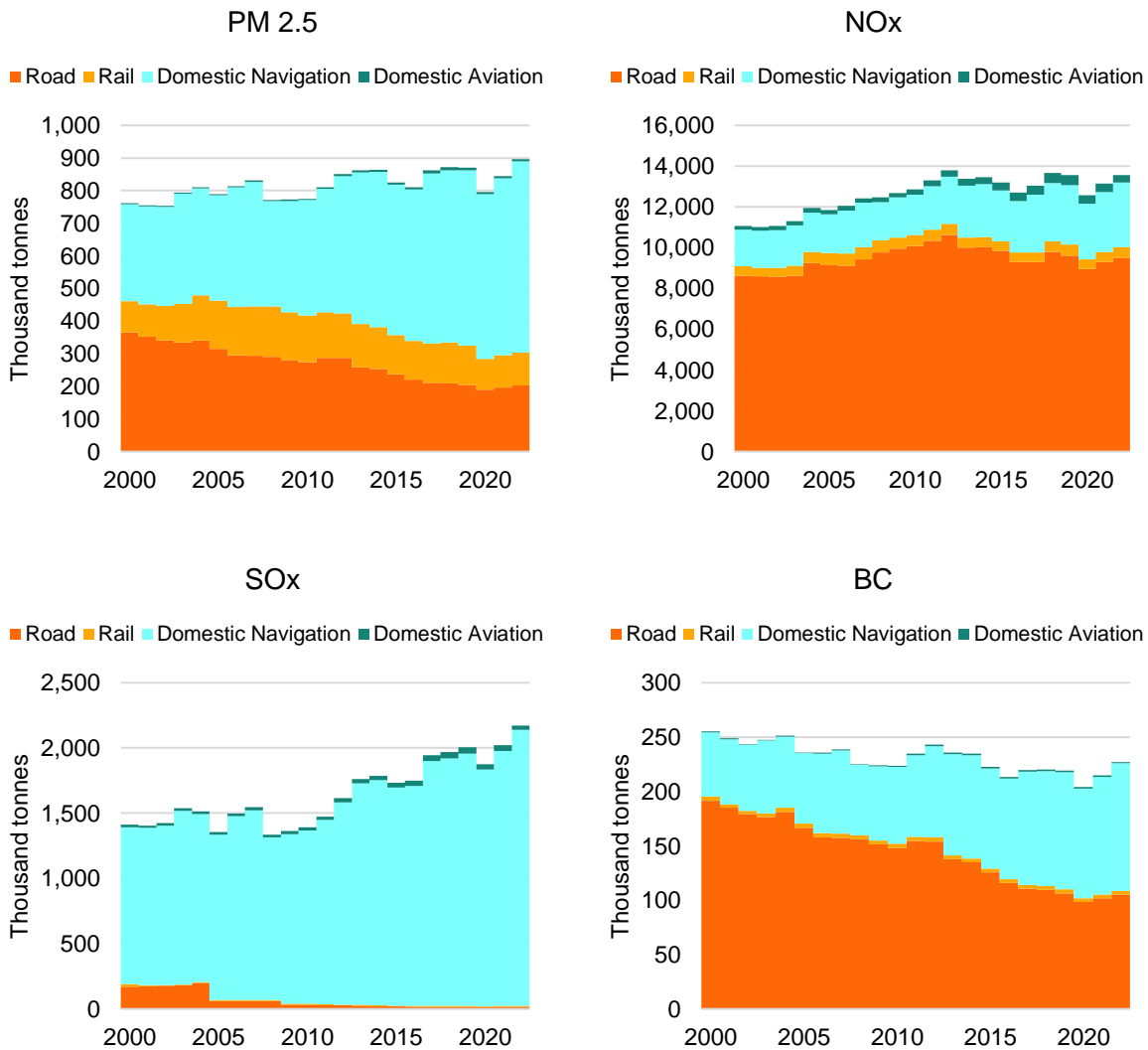


Figure 3. PM 2.5, NOx, SOx, and BC emissions in the transport sector of EST participating countries, by mode

Source: (Crippa et al., 2023)

The road sector's performance in reducing air pollutants, particularly PM_{2.5}, SO_x, and BC, is noteworthy considering the addition of a billion vehicles in the EST region since 2000. These improvements can be attributable to continuous vehicle and fuel technology advancements, stricter vehicle emission standards,

and regulations on vehicle imports in Asian countries. The proportion of registered vehicles in EST countries adhering to Euro 4 or better emission standards rose significantly from 3% in 2010 to 86% in 2023 (CAA, n.d.). However, it is essential to acknowledge that substantial variation exists among individual countries within the region.

III. Transport Related Air Pollution Policy Landscape

Since adopting the Sustainable Development Goals (SDGs), the Paris Agreement, the Aichi Declaration, and the increased awareness of transport externalities, the policy landscape in Asia has undergone a significant transformation. The focus has shifted from infrastructure and connectivity-driven ambitions towards a more holistic policy paradigm that addresses externalities. This shift has led to an inherent synergy between climate change and air pollution policies. Consequently, air pollution is now being indirectly addressed in various policy documents.

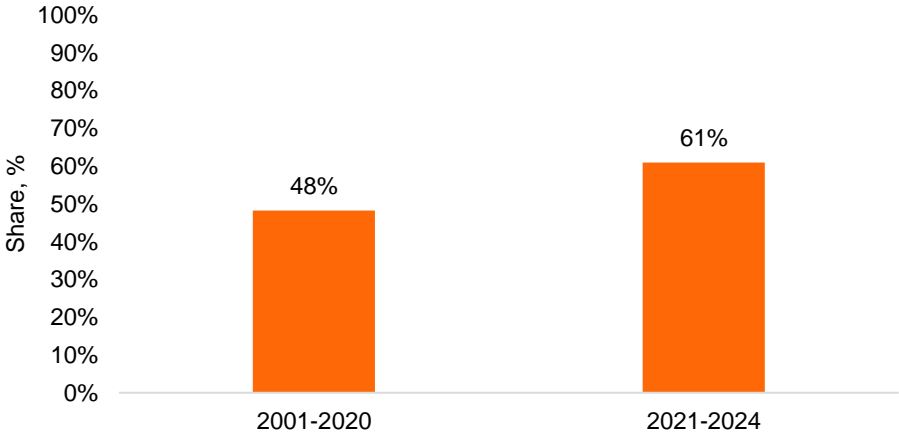


Figure 4. Share of policy documents in EST participating countries with explicit air pollution policy measures

Source: (Asian Transport Outlook, n.d.)

In contrast to the road sector, domestic waterways/shipping and domestic aviation sectors receive less policy focus. Nearly three-fourths of policy measures are directed towards surface transport, specifically roads and railways. To effectively contribute to air pollution reduction, it's imperative to increase policy coverage and consideration for these other modes of transport. In the railway sector, modal shift and electrification are key strategies for reducing air pollution and carbon emissions.

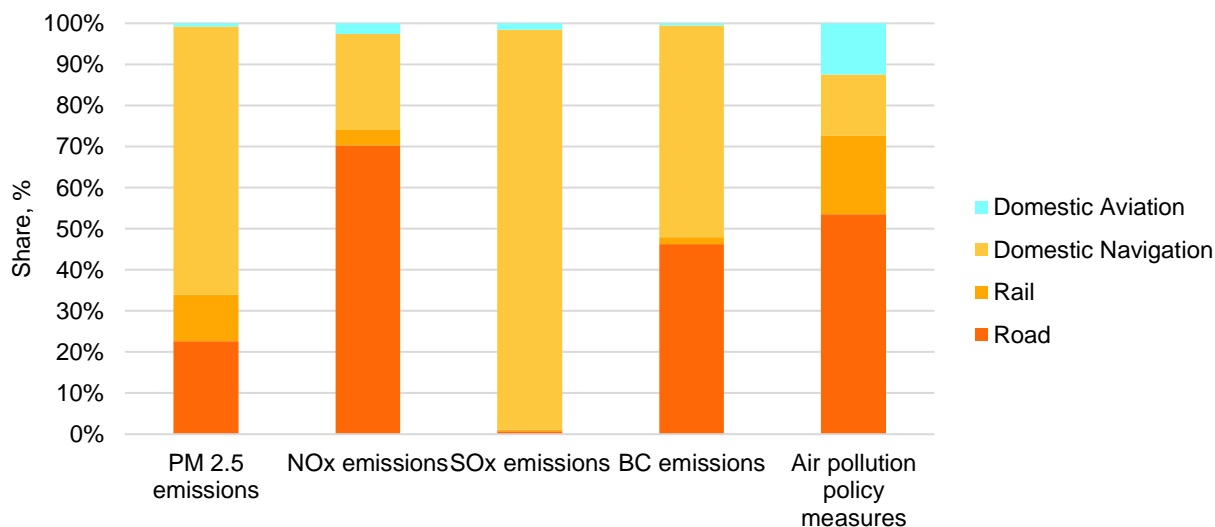


Figure 5. Share of air pollutant emissions (2022) and policy measures with air pollution element (2000-2023) by mode

Source: (Asian Transport Outlook, n.d.; Crippa et al., 2023)

IV. Air Pollution Related Transport Sector Targets

Direct air pollution reduction targets for the transport sector are uncommon, and countries often establish indirect targets to reduce transport air pollution. For example, Brunei Darussalam, Thailand, and Mongolia have proposed direct transport air pollution reduction targets¹.

1. Brunei Darussalam aiming to reduce transport's CO₂ emissions by 40% and NO_x by 32% compared to minimum levels by 2035 (National Transport Policy 2014)
2. Thailand targets air pollution (PM_{2.5}) and GHG emissions from the transport industry decrease by 4% per year until 2027. (The Thirteenth National Economic and Social Development Plan 2023-2027)
3. Mongolia aims to reduce the dust by 50% by building sidewalk, bicycle paths, children's playground and green areas in accordance with international standards (Action Plan of the Government of Mongolia 2020-2024)

In-direct targets established to reduce transport air pollution include vehicle emission standards and fuel quality.

Table 1. Vehicle emission standards and fuel quality targets in EST participating countries

Source: (Asian Transport Outlook, n.d.)

COUNTRY	POLICY MEASURE	POLICY DOCUMENT	YEAR PUBLISHED
BHUTAN	Implement BS-VII/ Euro VII by 2026	Low Emission Development Strategy (LEDS) - Surface Transport	2021
CAMBODIA	Imported cars to meet Euro V in 2027	Clean Air Plan of Cambodia	2022
CAMBODIA	Sulphur level to meet Euro V level by 2024	Clean Air Plan of Cambodia	2022

¹ Refer to Asian Transport Outlook Policy Tracker (Asian Transport Outlook, n.d.)

COUNTRY	POLICY MEASURE	POLICY DOCUMENT	YEAR PUBLISHED
MALAYSIA	Update regulations requiring new vehicles meet Euro 5 requirements for all petrol engine vehicles in 2026.	Low Carbon Mobility Blueprint 2021-2030	2021
MALAYSIA	EURO 5 RON 95 & 97 by 2025	Green Technology Master Plan 2017-2030	2017
MONGOLIA	Meet up to 100 percent of the national demand for main fuels from domestic production meeting the Euro-5 standards by 2030	Mongolia Sustainable Development Vision 2030	2016
PAKISTAN	Implement fuel quality standards in transport to comply with Euro-5 or Euro-6 leading to complete shift to minimum Euro-5 by 2025, or Euro-6 by 2030	National Clean Air Plan	2022

V. Growing E-mobility Related Targets

EST countries increasingly establish electric vehicle targets where air pollution reduction is a significant co-benefit.

Table 2. Sample of e-mobility targets from EST participating countries since the adoption of Aichi 2030 Declaration

Source: (Asian Transport Outlook, n.d.)

COUNTRY	POLICY DOCUMENT	YEAR PUBLISHED	TARGET	TARGET YEAR
BANGLADESH	Mujib Climate Prosperity Plan	2021	Shift at least 30% of the transportation fleet to electric by 2030 We will ensure 100% of the rideshare fleet is green/electric.	2030
BHUTAN	Low Emission Development Strategy (LEDS) - Surface Transport	2021	100% light vehicles and buses imports to be EVs by 2045	2045
CAMBODIA	Long-Term Strategy for Carbon Neutrality	2021	Moderate penetration of electric vehicles – 70 percent for motorcycles and 40 percent for cars and urban buses by 2050	2050
LAO PEOPLE'S DEMOCRATIC REPUBLIC	Updated Nationally Determined Contribution - LAO	2021	Conditional: 30% Electric Vehicles penetration for 2-wheelers and passengers' cars in national vehicles mix	2030
MALAYSIA	National Energy Policy 2022-2040	2022	Percentage of electric vehicle (EV) share = 38% from <1% in 2018	2040
NEPAL	Nepal LTS	2021	Increase e-vehicle sales to 90 percent of all private passenger vehicle sales (including two-wheelers) and 60 percent of all four-wheeler's public passenger vehicle sales by 2030. (excluding electric-rickshaws and electric three-wheelers).	2025

COUNTRY	POLICY DOCUMENT	YEAR PUBLISHED	TARGET	TARGET YEAR
PAKISTAN	Pakistan Updated NDC 2021	2021	By 2030, 30 % of all new vehicles sold in Pakistan in various categories will be Electric Vehicles (EVs).	2030
PHILIPPINES	Comprehensive Roadmap for the Electric Vehicle Industry	2022	achieve at least a 5% EV share in corporate and government fleets, public transport operators, and industrial and commercial companies at the end year of the Medium Term (2034) and increasing to 10% by 2040	2034
SRI LANKA	Climate Prosperity Plan	2022	Fifty percent of new road vehicles are electric or hybrid 50% of public transportation, including suburban railway, is electrified including through retrofitting.	2030
THAILAND	Mid-century, Long-term Low Greenhouse Gas Emission Development Strategy	2021	increase the share of electric vehicles to be at least 30% by 2030	2030
VIET NAM	Approving the Action Program for Transition to Green Energy and Mitigation of Carbon Dioxide and Methane Emissions from Transportation	2022	achieve at least 50% vehicles using electricity and green energy; use electricity and green energy for 100% new taxis.	2030
BRUNEI DARUSSALAM	Second Voluntary National Review - BRN	2023	The country aims to increase EV share up to 60 per cent of total annual sales by 2035 as per the current ambition of the BNCCP.	2035
SINGAPORE	Singapore Green Plan	2021	All vehicles to run on cleaner energy by 2040	2040

VI. Transport Air Pollution Related Policy Measures

Policymakers in the EST countries have deployed a diverse array of instruments to mitigate the environmental impact of transport. These measures span a wide spectrum, including regulatory interventions like emission standards and vehicle restrictions; infrastructure investments such as public transport systems, electric vehicle charging, and economic incentives like electric vehicle subsidies, congestion charges or tax breaks for low-emission vehicles.

Table 3. Air pollution policy measures from EST participating countries since the adoption of Aichi 2030 Declaration

Source: (Asian Transport Outlook, n.d.)

TYPOLOGY	MEASURES
VEHICLE AIR POLLUTION EMISSION STANDARDS	<ul style="list-style-type: none"> • Implement BS-VII/ Euro VII by 2026 (Bhutan Low Emission Development Strategy (LEDS) - Surface Transport) "Imported cars to meet Euro V in 2027 (Cambodia Clean Air Plan of Cambodia) • Update regulations requiring new vehicles meet Euro 5 requirements for all petrol engine vehicles in 2026. (Malaysia Low Carbon Mobility Blueprint 2021-2030) • Update regulations requiring new vehicles meet Euro 5 requirements for all diesel engine vehicles in 2026. (Malaysia Low Carbon Mobility Blueprint 2021-2030)"
FUEL QUALITY	<ul style="list-style-type: none"> • Sulphur level to meet Euro V level by 2024 (Cambodia Clean Air Plan of Cambodia) • Meet up to 100 percent of the national demand for main fuels from domestic production meeting the Euro-5 standards by 2030 (Mongolia Sustainable Development Vision 2030) • Implement fuel quality standards in transport to comply with Euro-5 or Euro-6 leading to complete shift to minimum Euro-5 by 2025, or Euro-6 by 2030 (Pakistan National Clean Air Plan)
BAN OF ICE SALES	<ul style="list-style-type: none"> • To step by step limit to stop the production, assembly and import of cars, motorcycles and mopeds using fossil fuel for domestic use. (Viet Nam Decision 876/QD-TTg in 2022 approving the Action Program on green energy transformation, reducing carbon and methane emissions of the transport sector issued by the Prime Minister)
ROAD-SIDE VEHICLE TECHNICAL CHECKS VEHICLE INSPECTION AND MAINTENANCE	<ul style="list-style-type: none"> • Increase of vehicle inspection checkpoints for the operational condition of the vehicles (Cambodia Truck Modernization Strategic Plan) • Conduct annual and random inspection of Motor Vehicle Inspection System (MVIS) facilities and Private Motor Vehicle Inspection Centres (PMVICS) ensure system Integration of MVIS and MVRs Conduct inspection of PUV and private fleets (Philippines Philippine Road Safety Action Plan 2023-2028)
VEHICLE LABELLING	<ul style="list-style-type: none"> • Establish vehicle labelling system to link to the vehicle registration information and distinguish cleaner and newer vehicles from dirtier and older ones. (Indonesia Mitigation Action Outline on Truck Fleet Modernization Scheme in Indonesia)
VEHICLE RESTRICTIONS (IMPORT, AGE, ACCESS, SALE, TAXATION)	<ul style="list-style-type: none"> • Ban the import of second-hand trucks, trailers, and other key truck parts older than five years (Indonesia Mitigation Action Outline on Truck Fleet Modernization Scheme in Indonesia) Reducing import of used cars 30% in 2030 (Cambodia Clean Air Plan of Cambodia)
VEHICLE SCRAPPAGE SCHEME	<ul style="list-style-type: none"> • Introduce plan for gradual phasing out of obsolete technology in engines (Pakistan National Clean Air Plan)
VEHICLE TAXES	<ul style="list-style-type: none"> • Change the existing vehicle emission charging system from the present vehicle based to vehicle type, fuel used and emission-based system plus the total km travel (Sri Lanka Updated Nationally Determined Contributions)

VII. Policy recommendations

1. **Develop sustainable urban mobility plans (SUMP) to enable countries, cities, and metropolitan regions to plan mobility strategically, focusing on improving accessibility and quality of life.** SUMPs can help different governance entities assess the requirements for moving goods and people using targeted sets of indicators that measure emissions, access, safety, equity, and economy. Mobility frameworks of SUMPs consider the existing political, social, and cultural contexts – empowering governance entities to promote clean and affordable options. Diligent data monitoring of important indicators like air quality, modal share, transportation cost, and job generation can equip decision-makers to compare different transport projects they desire to pursue, particularly proposals from the private sector.
2. **Promote shift-oriented measures in transport as an integral part of cities' long-term decarbonization plan** to reduce car dependence and promote sustainable travel behaviour. These measures offer significant traffic reduction and various co-benefits. Despite the substantial investment required, prioritizing mass public transport, such as railways and road-based transit, is crucial to address urban mobility challenges. This investment can increase the efficiency of existing public transport systems, improve public transport modal shares, and stimulate local economies. To overcome barriers like inadequate infrastructure, lack of intermodal integration, insufficient funding, and social stigma, key measures include dedicated road space for public transport, behaviour change initiatives, and equitable access through fare subsidies and incentives. Countries should establish reasonable shift targets to guide policies and programs that promote sustainable transport, including freight transport.
3. **Implement active or non-motorized transport (NMT) (i.e., cycling and walking) measures or programs for low-carbon quick wins.** Governments, however, need to develop supportive infrastructure that will enhance active mobility. Key efforts include creating dedicated road space for NMT activities, reclaiming space for pedestrians, transforming cities into low-emission zones, and piloting low-cost, scalable tactical urbanism interventions that enhance neighbourhood liveability. These initiatives focus on improving the safety of pedestrians and cyclists while empowering cities to create vibrant, safe, and accessible urban spaces. Co-benefits of active transport promotion align with various Sustainable Development Goals (SDGs), which include promoting physical activity (SDG 3: Good health and well-being), increasing access to jobs and opportunities by providing equitable transport options for all socioeconomic groups, including marginalized sector such as women (SDG 10: Reduced inequalities, SDG 5: gender equality), among others.
4. **Implement a Global Sulphur Strategy for Road Transport.** To reduce air pollution from transport vehicles, countries should adopt stricter emissions limits and fuel quality standards, aiming for Euro 5/V by 2025 and Euro 6/VI by 2030, as the Global Sulphur Strategy recommends. While less than half of the EST countries have committed to Euro 5/V by 2025, technical support and cost-benefit analyses can encourage the adoption of these standards. Such analyses often reveal that despite the initial costs of upgrading technology and fuel production, the long-term health and climate benefits significantly outweigh the expenses. These findings can also justify shifting financial support from fuel subsidies towards replacing heavily polluting vehicles. Regional cooperation, like the EU-ASEAN Business Council's recommendation for Southeast Asia to harmonize emission standards to Euro 6/VI, can further accelerate this process by boosting regional demand for cleaner vehicles, enabling exports, and phasing out older, more polluting vehicles.

Countries must also implement emissions standards for second-hand and imported vehicles to address the flow of end-of-life light-duty and heavy-duty vehicles from developed countries to developing countries.

5. **Facilitate the transition to low-sulphur fuels for domestic and international maritime transport** to address the growing contributions of emissions from shipping. As of 2024, around half of the member countries of the Regional EST forum ratified IMO MARPOL Annex VI. However, securing sufficient supply for low-sulphur fuels used for shipping remains a significant barrier to its implementation, especially domestic (in-land) shipping. Countries shifting to low-sulphur maritime fuel require to invest in upgrading or enhancing their bunkering capabilities as well as storage, pipelines, and tank facilities. Port authorities play a vital role in this transition by exploring potential partnerships with the private sector to help finance the development of the necessary infrastructure. Similarly, port authorities may help encourage the use of low-sulphur fuels. Port authorities may do so by incentivizing compliance through various measures such as differentiated dues, tax breaks, priority berthing for vessels that use low sulphur fuels. A more stringent measure may include the implementation of emission control areas (ECA) that mandates the use of ultra-low sulphur fuels for all ships, whether domestic or international, when entering these areas.
6. **Expanding EV charging networks** - Expanding charging infrastructure is crucial to accelerate the shift to electric vehicles, particularly in urban areas. This involves strategic planning of accessible public charging stations in densely populated EST cities with financial incentives to attract private investment and mitigate risks. While learning from successful models in Europe and North America, which integrate charging infrastructure with public transport networks, planners must also account for the unique characteristics of the Asian context, such as limited home charging options and the rising demand for light electric vehicles. Ultimately, cities need to enhance their capacity to design and implement charging infrastructure tailored to their residents' specific electric mobility needs.

References

Asian Transport Outlook. (n.d.). *Policy Tracker* [Dataset].

<https://asiantransportoutlook.com/transportpolicy/>

CAA (Clean Air Asia). (n.d.). Clean Fuels and Vehicles in Asia

Crippa, M., Guizzardi, D., Pagani, F., Schiavina, M., Melchiorri, M., Pisoni, E., Graziosi, F., Muntean, M., Maes, J., Dijkstra, L., Van Damme, M., Clarisse, L., & Coheur, P. (2023). *Insights on the spatial distribution of global, national and sub-national GHG emissions in EDGARv8.0.*

<https://doi.org/10.5194/essd-2023-514>

McDuffie, E. E., Martin, R. V., Spadaro, J. V., Burnett, R., Smith, S. J., O'Rourke, P., Hammer, M. S., van Donkelaar, A., Bindle, L., Shah, V., Jaeglé, L., Luo, G., Yu, F., Adeniran, J. A., Lin, J., & Brauer, M. (2021). Source sector and fuel contributions to ambient PM_{2.5} and attributable mortality across multiple spatial scales. *Nature Communications*, *12*(1), 3594.

<https://doi.org/10.1038/s41467-021-23853-y>