



2023 CLIMATE TRACKER FOR TRANSPORT IN ASIA & PACIFIC

AN INPUT TO COP28

Insights from the Asian Transport Outlook (ATO) The transport knowledgebase in Asia - Pacific region

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PART 1: HISTORIC TRANSPORT CO₂ EMISSION TRENDS

TRANSPORT FOSSIL CARBON EMISSIONS GROWTH



Asia currently contributes about 38% of global domestic transport fossil carbon emissions. Since 2010, Asia has added most transport-related CO₂ emissions, i.e., about 2/3 of the global increase in transport fossil CO₂ emissions. Recently, Africa has overtaken Asia in terms of annual growth rate of transport CO2 emissions

Source: EDGAR-2023

In Asia and the Pacific, the Transport sector's share in total fossil CO_2 emissions was 10% in 1970, 13% in 2000 and 11% in 2022.

Since 2015,

- GDP has increased at an annual rate of 6.5%,
- Total fossil CO₂ emissions by 2%.
- Transport fossil CO₂ emissions have only increased annually by 1%.
- Trends indicate that transport CO₂ emissions in Asia and the Pacific region are growing slower post-COVID when compared to other sectors.

TRANSPORT CARBON EMISSIONS GROWTH IN ASIA & PACIFIC



Source: EDGAR-2023, World Bank

SECTORAL CARBON EMISSIONS GROWTH IN ASIA & PACIFIC

- Between 2011-2015, the Carbon emissions from transport sector in Asia and Pacific was growing at 4% per annum
- It was the fastest growing sector in terms of Carbon emissions in 2011-2015.
- From 2015 onwards, the transport sector's Carbon emissions grew only at 1% per annum on average and ranked only 5th (out of 8 sectors) in terms of carbon emissions growth in the said period.



CARBON EMISSIONS GROWTH IN ASIA & PACIFIC

- The COVID lockdowns in 2020 has impacted the transportation sector more than the other sectors in terms of Carbon emissions.
- The non-transport sectors' Carbon emissions, on average, "recovered" faster in 2021.



Transport Fossil CO2 Emissions Annual Growth

■ Total Non-Transport CO2 Emissions Annual Growth

TRANSPORT CARBON EMISSIONS GROWTH IN ASIA & PACIFIC



Transport-related carbon emissions experienced substantial expansion between 2000 and 2018. However, this growth began to level off in 2018 and was further influenced by the disruptions caused by the COVID-19 pandemic. Across most Asian nations, the emissions from transport sector have yet to fully rebound and return to the levels observed in 2018.

Source: EDGAR-2023

TRANSPORT CARBON EMISSIONS WITH GDP



In 2022, there was a 3% reduction in carbon dioxide emissions from the transport sector compared to 2018. Concurrently, emissions from various other sectors in low- and middle-income countries increased. By 2022, Asian nations exhibited differing degrees of decoupling their GDP from emissions, with high-income economies achieving absolute decoupling, while upper and lower-middle-income and low-income economies saw relative decoupling.

Between 2018 to 2022, transport CO₂ emissions have <u>remained stable</u>:

- 0% in Australia, New Zealand & Pacific Islands
- 0% in South Asia
- Between 2018 to
 2022, transport
 CO₂ emissions <u>increased</u>:
 - 25% in Central & Western Asia
 - 3% in South-Eastern Asia
- Between 2018 to 2022, transport CO₂ emi ssions <u>decreased</u>:
 - -7% in Eastern Asia
 - -5% in Eastern Europe

TRANSPORT CARBON EMISSIONS GROWTH IN ASIA & PACIFIC REGION

Transport Fossil CO2 Emissions (Mt)



Source: EDGAR-2023

DECOUPLING OF TRANSPORT CARBON EMISSIONS WITH GDP

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

In the period 2019-2022 almost 50% of transport emissions was absolutely decoupled from GDP due to COVID and other factors.



Transport CO2 Emissions with GDP

SHARE OF TRANSPORT EMISSIONS





Share of Road Transport CO2 Emissions, 2022

Share of Road Transport CO2 Emissions, 2022 (W2W)



Transport CO₂ Emissions mode shares vary significantly among countries. Overall Heavy Duty Trucks contribute the largest share, followed by light-duty vehicles.

12 Source: Asian Transport Outlook, ICCT-2023



From 2015 onwards, the road and domestic aviation sectors slowed down in terms of CO2 emissions growth as compared to the prior decade. Emissions from shipping / inland waterways, on the other hand, has been exhibiting faster growth rates post 2015 than the prior decade.

PERFORMANCE OF DIFFERENT MODES



The People's Republic of China plays a significant role in influencing the transport trends in as it constitutes about 35% of Transport CO2 emissions

PART 2: TRANSPORT DEMAND



TRANSPORT DEMAND GROWTH- VEHICLE TRADE AND SALES

LDV& HDV SALES



- COVID resulted in overall disruption of trade due to restrictions in 2020, with limited recovery in some modes
- Bus Imports have decreased (28% below 2018 levels)
- Marginal increase in LDV and Goods vehicles (10% LDV and 12% Goods vehicle since 2018)
- High increase in Two-wheeler imports (41% since 2018) and cycle imports (30% since 2018)
- Overall LDV and HDV sales are still below 2018 levels by 5%

- By 2022, vehicle manufacturing is below 2018 level by
 - 4.5% for LDV

160

140

120

Assuming 201*5*=100 ⁸001

40

20

0

- 14% for Bus
- 28% for Bus
- Between 2018 to 2022, LDV + HDV manufacturing has increased by:
 - -5% in Australia, New Zealand & Pacific Islands
 - 77% in Central & Western Asia
 - <u>-7% in Eastern</u> <u>Asia</u>
 - -66% in Eastern Europe
 - 1% in South-Eastern Asia
 - 4% in South Asia

TRANSPORT DEMAND GROWTH IN ASIA & PACIFIC: VEHICLE MANUFACTURING

LDV + HDV Manufacturing



VEHICLE REGISTRATION



Between 2000 and 2020, the total vehicle ownership in Asia increased by about 1 billion vehicles. In 2000, Asia had 85 vehicles for thousand population. By 2020, Asia had 278 vehicles for thousand population. Every second vehicle in Asia is a two or three-wheeler. Passenger cars share in total vehicle ownership is close to 41%. 2000 it was 39%, indicating a marginal shift towards passenger cars.

Currently, only 1% of total vehicles are used for public transit. In contrast, in 2000, it was about 2%, indicating a marginal shift away from buses.

ITF-2023 estimates indicate that when compared to 2019, the 2022 transport demand in Asia and Pacific region increased marginally by

- 3% for passenger transport
- 4% for freight transport
- However, among modes
 - bus transport demand in 2022 was slightly lower than in 2019.
 - Domestic waterways and shipping were slightly lower in 2022.
 - Significant increase in non-motorized transport demand but from a very low base.



TRANSPORT DEMAND GROWTH (2019-2022): PASSENGER AND FREIGHT ACTIVITY



Source: ITF Transport Outlook 2023

PART 3: TRANSPORT AVOID-SHIFT-IMPROVE RELATED TRENDS & POLICIES



The ATO constructed a comprehensive policy tracker with 265 policy measures to map and understand the policy landscape and applied it in 15 economies, analyzing 294 transport policy and strategy documents.

Economies included - Bangladesh , Bhutan, Indonesia, Kazakhstan, Lao People's Democratic Republic, Malaysia, Maldives, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Timor-Leste, Uzbekistan and Viet Nam

Transport policy documents are increasingly focusing on climate and energy nexus. Considering that Asia lacks a proportional share of infrastructure access and connectivity, the interest in infrastructure especially multi-modal transport policy measures is growing.

In our survey, ATO does not yet consider policy "implementation" but only considers official policy recommendations, targets and policy instruments and guidelines.

FOCUS ON CLIMATE CHANGE IN TRANSPORT RELATED POLICIES IS GROWING

Transport Policy/Strategy Document Typology (Main Focus) – Number of Documents



<2015 ■2015-2023

Source: National Policies

GROWTH TRANSPORT RELATED CLIMATE CHANGE MITIGATION AND ADAPTATION POLICY MEASURES

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

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

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



NDC + LTS Transport Policy Documents

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



LINKAGE BETWEEN SUSTAINABLE DEVELOPMENT AGENDA AND CLIMATE CHANGE AGENDA IN TRANSPORT POLICY DOCUMENTS



Transport Policy Documents

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

rovemen

roa

fuel

DOLICY

NDC + LTS



When compared with nationally

determined contributions (NDC) and

Long-term strategies (LTS), transport

policy documents not only provide a

higher number of climate mitigation

measures but, more importantly,

related "sustainability" measures

associated with Paris Agreement i.e.,

a more diverse mix of solutions that

connectivity and employment while

pollution, road crash fatalities in

with the low carbon" measures

also aim to improve access,

reducing externalities – air

addition to carbon emissions.

policy measures that link SDG

MANAGING MOTORIZED TRANSPORT DEMAND IN ASIA & PACIFIC



- Evidence exists that point towards progress towards "avoiding" motorized transport demand. Fuel subsidies have significantly gone down in the region. In 2013 peaked at 132 billion USD, and in 2021, the estimated total is at 36 billion.
- Bike importation have also significantly gone up, as evidenced by the total bike imports index data.
- Digitalisation, and societal changes towards embracing more digitally-enabled activities is also on the rise in the region.

POLICIES RELATED TO REDUCING TRANSPORT DEMAND

Vehicle registration limit, Prevention of construction of roads, Road access restriction



Fossil fuel subsidy elimination, Fuel tax, Vehicle taxes



The South East Asian economies have generally advanced in eliminating the fossil fuel subsidies, introduction of a carbon tax, reform taxation of fuel, Feebates for fuelinefficient old vehicles and rebates for the purchase of new fuel efficient vehicles etc.



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

Passenger Mode Shift

TRANSPORT MODE SHIFT: PASSENGER AND FREIGHT



■ 2019 ■ 2020 ■ 2022 Source: ITF Transport Outlook 2023

Source: National Policies

Modal shares for passenger and freight transport have remained stable from 2019-2022, with slight decrease in shares of buses, 2-3 wheelers, and trains (passenger) and an increase of trucks (freight). 23 out of 51 ATO economies have established mode share targets at an economy level in various forms and shapes (e.g. demand, share, mode, investment, passenger vs freight)



TRANSPORT MODE SHIFT: URBAN TRANSIT AND RAILWAYS



In Asia and the Pacific region, out of 10 urban residents, only about 4 have convenient access to urban public transit. Over the last decade, Rapid public transport infrastructure in Asia and the Pacific region has increased faster than in other global regions. This growth in Asia and the Pacific was almost exclusively in urban rail infrastructure lines, while rapid bus transit system growth has stagnated. Rapid urban transit infrastructure in Asia mainly consists of metro systems with 82% share.

Since 2015, 80% of global railway route kilometer expansion has occurred in Asia & Pacific region.

Since 2000, the average railway infrastructure investment in Asia and the Pacific as a share of GDP was estimated to be about 1% (regionally), while road sector infrastructure investment was about 1.5% of GDP. However, since adopting the SDGs, the railway construction pace has increased, but railway construction (2.4% growth) still lags road construction rates (3%).

TRANSPORT FUEL ECONOMY



■2000 **■**2015 **■**2020



RENEWABLE ENERGY AND ALTERNATIVE FUELS



Asian

Outlook

Transport



In 2000, 2015, and 2020, the share of renewable energy in the Asian transport sector was 0.5%, 1.6%, and 3.4%, respectively. Since adopting the SDGs, the renewable share in the transport sector has nearly doubled (from 1.7% in 2015 to 3% in 2020). However, 87% of transport is still powered by gasoline and diesel

Asia & Pacific Transport Energy Consumption

TRANSPORT ADAPTATION AND RESILIENCE

Regional Distribution of Potential Damages to Transport Infrastructure



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

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

TRANSPORT ENERGY CONSUMPTION SHARE



Outlook





Domestic Maritime Energy Consumption Fuel Share 100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0% 2018 2019 2020 2021 2022 Biomass Ammonia Natural Gas Electricity Oil

Source: UNSD 30

RENEWABLE ENERGY AND ELECTRIFICATION

Grid Emission Factor (gCO2/kWh)

700 600 500 400 300 200 100 0 Global Europe and Sub-Saharan Asia-Pacific Latin America and Northern Africa Northern America the Caribbean and Western Asia Africa Source: Ember **Grid Electricity Price** Upper Middle Income High Income Lower Middle Income Low Income 0.20 0.50 0.60 0.10 0.30 0.40 0.70 USD/kWh electricity 31

Recent years have seen fast deployment of Renewables in electricity generation across all regions, with renewables meeting 90% of global growth in electricity demand.

This transition involves shifting from coal and fossil fuels towards renewable energy sources such as solar, wind, and hydroelectric power.

From 2000 to 2015, the grid became more carbonintensive at an annual rate of 0.4%. However, since 2015, the grid has been decarbonizing at a rate of -1.2% (improvement).

Grid decarbonization and the proliferation of electric vehicles are intricately linked in Asia

Asian Transport Outlook

Source: Ember



Share of Electric Vehicles in the Fleet with Projection (BEV,FCEV,PHEV)

Approximately 77% of the global electric vehicle stock is in Asia.

Asia is leapfrogging in terms of electric two- and three-wheeler sales. Approximately 94% of all EVs sold in Asia are electric two-wheelers and three-wheelers. The majority of electric two-wheelers and three-wheelers are in Asia.

In terms of sales, 49% of global two-wheeler sales in 2022 were electrically powered

5% EV sales is considered the tipping point for mass EV adoption by BloombergNEF. Estimations suggest that Asia crossed 5% of electric vehicles in the fleet in 2022

TRANSPORT ELECTRIFICATION



TRANSPORT ELECTRIFICATION



RENEWABLE ENERGY AND ALTERNATIVE FUELS



17 out of 51 ATO economies have established renewable energy targets (excluding electrification). The targets are mainly renewable energy share in mode or fleet, biofuel, LPG and LNG oriented.



TRANSPORT INVESTMENTS



Since 2000, Asian economies have spent about 2.4% of GDP on surface transport infrastructure. While most of the investments were allocated to road infrastructure,

urban and regional rail sector investment share has increased.

Asian Transport

Outlook

The private sector and climate finance are minor in total transport investments. However, their share is slowly increasing.

PART 4: TRANSPORT CO2 EMISSIONS OUTLOOK



OUTLOOK PASSENGER AND FREIGHT ACTIVITY – CURRENT AMBITION/POLICIES



Domestic Freight Kilometer Travel (Billions)



With current policies, ITF estimates that domestic passenger and freight demand in Asia and Pacific could grow by about 100% and 200% over 2020 to 2050. Asia would add about **50%** of total global transport demand increase.



OUTLOOK – TRANSPORT BAU CO2 EMISSIONS IN ASIA PACIFIC

Business-as-usual transport CO2 5% 4% Clean Air Asia-2008 2019-2050 ICCT-2012 ITPS-201 3% ICCT-2017 IEA-ETP,2017 Emissions, IEA-SMP Transport-Databank GCAM-Paris 2% ****** ICCT.2023 C02 Slocat (avg) ITF-Outlook-2021 APEC-Energy Outlook AAGR,Asia Transport Remap-Planned Energy 1% Plannes Scenario ATO- Reference Projections ITF Outlook - 2023 0% GECO-2020 DNV-2022 DNV-2021 -1% GECO-2022 DNV-2020 -2% 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 Source: Various (see labels in the chart)

Recent business-as-usual transport CO_2 emission projections in Asia have diverged significantly from the transport- CO_2 estimates conducted in the 2000s.

The average 2050 Asia transport BAU CO₂ emissions have gone down from ~7 Gt, to 4 Gt, and 3 Gt when studies over 2006-2015, 2015 to 2020 and 2020 to 2023 are considered

> Asian Transport Outlook

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

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

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

> Asian Transport Outlook

OUTLOOK – TRANSPORT BAU EMISSIONS IN ASIA PACIFIC



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

PART 5: SUMMARY OF KEY TRENDS



SUMMARY OF KEY TRENDS - 1

- Considering the overall scale of contributions and growth rates, the transport sector in Asia remains to be a key sector when it comes to addressing climate change.
- Recent evidence, however, shows signs of the slowing of the growth of emissions in the transport sector in Asia. Moreover, BAU emissions scenarios for the transport sector in Asia, are also being revised downward by multiple expert organisations.
- Asian economies have started to exhibit varying degrees of decoupling of the growth of transport emissions against the growth in the economy. In High-income economies in the region transport emissions have stabilized since the turn of the century. On average, GDP has been growing faster than transport CO2 emissions in the region. The transport sector -which was the fastest growing sector in 2011-2015, has also been shown slower growth rates in terms of emissions as compared to other sectors in the region from 2015 onwards.



SUMMARY OF KEY TRENDS - 2

- Road transport sector remains to be the most significant mode in terms of CO2 contribution in the region.
 Between 2000 to 2020, 1 billion road vehicles had been added in Asia.
- Heavy duty trucks are estimated to contribute at least a third of transport CO2 emissions in the region.
 Heavy duty trucks, light duty vehicles, and light commercial trucks contribute 75% of transport CO2 emissions in Asia.
- Shipping and inland waterways have also shown increasing growth rates in terms of CO2 emissions.
- COVID-19 has had disruptive impacts in terms of transport demand in the region, as evidenced by the decreased bus imports, and increased two-wheeler and bike imports.



SUMMARY OF KEY TRENDS - 3

- Asia has seen exponential growth in transport-related policy recommendations and targets, although policy implementation remains challenging. We demonstrate that NDCs and LTS are poor indicators for measuring the transport sector's climate ambition. We find evidence to conclude that transport policies emphasize sustainability and link low-carbon measures with broader goals such as improved access, connectivity, and employment.
- The region faces infrastructure and climate resilience challenges, with a significant share of potential multihazard damages. In recent years, Climate resilience in the transport sector is slowly gaining importance, and investment in sustainable infrastructure is increasing.
- Despite progress, Asia's transport emissions projections still fall short of the Paris Agreement's ambitious climate goals. The average 2050 Asia transport CO2 emissions are projected to be just below 4 Gt, indicating a positive shift but falling short of Paris Agreement targets. Achieving the Paris Agreement's goals will require further efforts to reduce transport CO2 emissions in Asia.







Armenia













Brunei Darussalam





Cambodia







India





Iran (Islamic Republic of)



Japan







160

140

Assuming 2015=100



Kyrgyz Republic



Lao People's Democratic Republic



Malaysia



Maldives









Nepal





Pakistan



Palau









Philippines





160

140

120

100

80

60

40

20

0

GDP

Infrastructure

Other Sectors

Fossil CO2

Emissions

Transport

Fossil CO2

Emissions

Vehicle

Ownership

Assuming 2015=100

Republic of Korea







Sri Lanka





Thailand





Transport Fossil CO2

Emissions

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