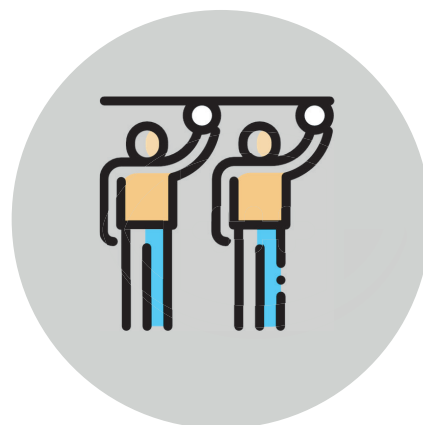


ASEAN REGIONAL STRATEGY ON SUSTAINABLE LAND TRANSPORT



one vision
one identity
one community



ASEAN Regional Strategy on Sustainable Land Transport

The ASEAN Secretariat
Jakarta

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Preface

The Regional Strategy on Sustainable Land Transport of the Association of Southeast Asian Nations (ASEAN) aims to help better put the region on the path of sustainable development, in which the transport sector plays an essential role. There are significant differences in national circumstances, such as the role of two-wheelers and informal transport, and levels of development between ASEAN Member States (AMSs). The present Strategy puts forward ASEAN's vision for sustainable land transport, and a set of recommendations and possible actions for ASEAN to implement regional cooperation on sustainable land transport as well as provides guiding principles for national action plans and strategies that AMSs may consider. It thereby aims to assist policymakers at the regional and national levels in the transport, energy and environmental domains in advancing sustainable land transport.

The vision, guidance and recommended actions in this Strategy are non-binding, and ASEAN and each AMS have the option to develop their own visions and policies.

This Strategy builds on the ASEAN Kuala Lumpur Transport Strategic Plan 2016-2025, implements its Sustainable Transport (ST) milestone ST-1.1.1 (regional strategy) and directly supports ST-1.4.2 (green freight and logistics strategy). In addition, it elaborates on and links with multiple other ST actions and milestones, most significantly on fuel economy (ST-1.3) and sustainable transport indicators (ST-2.3). It also supports the ASEAN Economic Community and other community pillars such as ASEAN Socio-Cultural Community on such issues as energy, connectivity, climate change, environment and science and technology.

The anticipated timeline for implementation is 2018-2025, with a longer-term view to 2030, in line with global agendas on sustainable development and climate change.

This document was developed during a two-year process from October 2016 to November 2018 led by the Expert Group on Sustainable Land Transport, facilitated by the ASEAN Secretariat and guided by the ASEAN Land Transport Working Group. It was supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) under the project titled Energy Efficiency and Climate Change Mitigation in the Land Transport Sector in the ASEAN Region (TCC). The process further involved coordination with the ASEAN Transport Facilitation Working Group, ASEAN Centre for Energy, and internal coordination within AMSs through the relevant agencies in charge of energy and climate change.

Accompanying this Strategy is a Background Report, which includes more information on: 1) sustainable transport policy concepts; 2) a review of regional cooperation on sustainable transport in ASEAN; 3) a review of other regional and global cooperation mechanisms; and 4) options for regional cooperation actions. This Strategy is built on Phase I of the TCC project.

Executive summary

Aim and scope

With rapidly rising greenhouse gas emissions, air pollution, oil consumption, congestion, and road crashes, trends in the transport sector are critically at odds with long-term objectives agreed in the Sustainable Development Goals (SDGs) and the Paris Agreement on climate change. Against the backdrop of those global circumstances, the ASEAN Regional Strategy on Sustainable Land Transport aims to help put ASEAN on the path of sustainable development, in which the transport sector plays an essential role.

The Strategy builds on the ASEAN Transport Strategic Plan 2016-2025 / Kuala Lumpur Transport Strategic Plan (KLTSPP) and implements its Sustainable Transport (ST) milestone ST-1.1.1 (regional strategy), directly supports ST-1.4.2 (green freight and logistics strategy), and links with multiple other ST actions and milestones, most significantly on fuel economy (ST-1.3) and sustainable transport indicators (ST-2.3). It also supports the ASEAN Economic Community (AEC) and other Community pillars, such as the ASEAN Socio-Cultural Community (ASCC), on such issues as energy, connectivity, climate change, environment and science and technology.

Overarching considerations and elements for national action plans

The Strategy includes three sets of domains, namely the overarching framework, policy domains, and enabling actions (Figure ES.1).

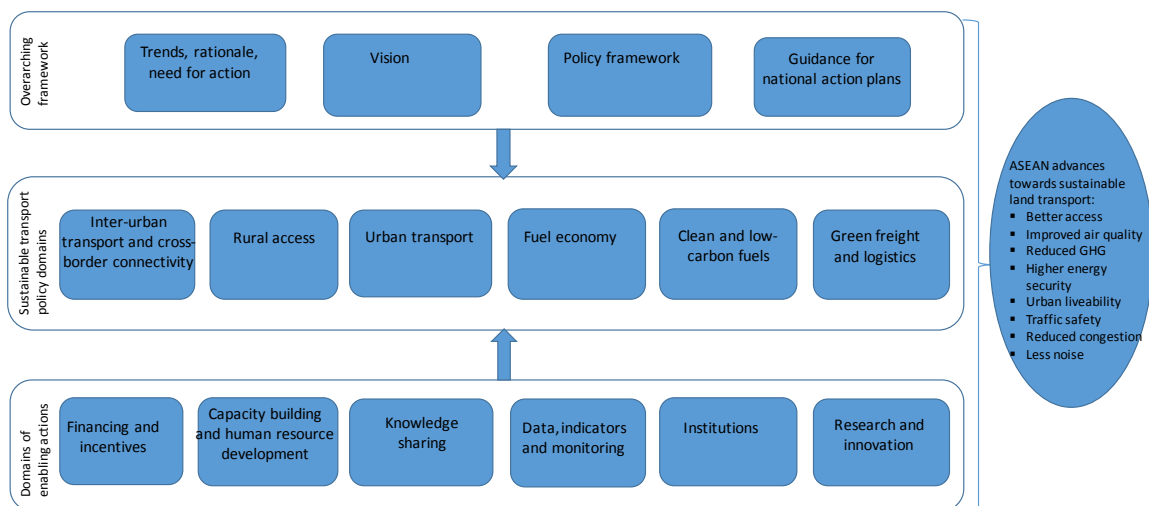


Figure ES.1 Key domains of the ASEAN Strategy on Sustainable Land Transport

This Strategy puts forward a vision for a sustainable land transport system in ASEAN:
ASEAN advances towards a transport system that is equitable, efficient, safe and clean, which is in line with global sustainable development and climate change objectives, and provides access to opportunities as well as fosters regional inclusive growth and development.

Building on this vision, a set of guiding concepts for policy development is suggested. These include: a focus on people’s access to transport, or moving people rather than vehicles; *avoid-shift-improve* (ASI) policies; and the need for transformational change.

In addition, AMSs may consider making use of the 16 recommended elements included within the ARSSLT domain “guidance for national action plans”, shown in Figure ES.1. These, together with strengthened regional actions in ASEAN, would help address barriers for AMSs in moving towards sustainable transport systems.

Recommended regional actions

Chapter 4 of this Strategy provides recommendations for actions in six (6) policy domains. Table ES.1 presents a selection of possible actions corresponding to each domain. Interurban transport and cross-border connectivity can be improved by greater focus on sustainable modes and infrastructure guidelines. Strengthening rural access by all-weather roads and better transport service will contribute substantially to economic and social development. Sustainable urban mobility policies require, *inter alia*, specific attention to non-motorised transport, two-wheelers (including the promotion of electric ones), transport demand management, intelligent transport systems, land-use integration, and national support programmes for urban mobility. To promote fuel economy improvements of vehicles, policies for labelling, standards and incentives are needed, which is supported by the ASEAN Fuel Economy Roadmap. Clean and low-carbon fuels can be promoted by sustainability criteria, life-cycle assessments, and harmonisation of standards for fuels, vehicles and infrastructure. Regional and national green freight and logistics programmes should target improving truck load factors, optimisation of logistics, modal shift from road to rail and water transport, and improving energy efficiency of truck fleets.

Table ES. 1 Examples of recommended regional actions for policy domains

Policy domains	Examples of recommended regional actions
Inter-urban transport and cross-border connectivity	<ul style="list-style-type: none"> ▪ Road design guidelines, laws and regulations to promote safety and accessibility improvements for all road users ▪ Support for action plans on modal shift from road to rail
Rural access	<ul style="list-style-type: none"> ▪ Mapping of existing rural access situation based on standardised methodologies and spatial datasets so as to apply SDG indicator 9.1.1 (“Proportion of the rural population who live within 2 km of an all-season road”) ▪ Develop a financing framework that prioritises rural roads based on appropriate key performance indicators that connect to the SDGs, and that includes considerations of climate change adaptation (resilience)
Urban transport	<ul style="list-style-type: none"> ▪ Development of guidance for sustainable urban mobility plans and national urban mobility plans, including a menu of options ▪ Rewarding of leadership, e.g. award schemes for cities that achieve key progress on sustainable urban mobility ▪ Development of planning and design guidelines for bicycle infrastructure such as cycle tracks and lanes and intersections in different urban and non-urban contexts, which can be included in national road design manuals

Policy domains	Examples of recommended regional actions
Fuel economy	<ul style="list-style-type: none"> Implementation, as appropriate, of the ASEAN Fuel Economy Roadmap for the Transport Sector 2018-2025: with Focus on Light-Duty Vehicles, which supports development and adoption of nationally appropriate policies
Clean fuels and low-carbon vehicles	<ul style="list-style-type: none"> Regional electric-vehicle platform to discuss and develop standards for charging infrastructure and environmentally sound methods to recycle and dispose of batteries Further study of vehicle emission and fuel quality standards, including impacts on human health and the environment and green growth
Green freight and logistics	<ul style="list-style-type: none"> National action plans: develop templates and exchange knowledge Logistics optimisation: Knowledge and good practice sharing on key options Modal shift: develop policy to enhance regional rail and waterway connectivity, e.g. infrastructure facilities, harmonising technical and operational standards, simplifying and harmonising documentation Greening of trucks: development of standards and policies to promote fuel efficiency measures for trucks, e.g. low rolling-resistance tyres, eco-driving, telematics

Actions that have an enabling role in developing and implementing such policies and actions at regional level include the examples given in Table ES.2. Shifting investments from unsustainable towards sustainable, low-carbon transport options can be enabled by applying principles such as polluter-pays in economic instruments, and an investment and project prioritisation framework based on sustainability criteria. Human capacity building to improve policymakers' skills is required, e.g. through training and knowledge-sharing events and platforms. A more comprehensive system for transport and emissions data, indicators and monitoring would support the reporting systems of the Paris Agreement and the SDGs, as well as the processes relating to transport policy development, decision, implementation and evaluation. A research and innovation strategy would help to develop and adapt low-carbon transport technologies and policies through protected spaces for innovation and stakeholder platforms. Finally, institutional development is needed to create more collaboration between government agencies that deal with transport, energy and climate change.

Table ES.2 Examples of recommended enabling actions at the regional level

Domains of enabling actions	Examples of recommended actions
Finance and incentives	<ul style="list-style-type: none"> Studies on internationalisation of external costs and land-value capture Development of tools and decision-support systems for policy, planning and budget allocation
Capacity building and human resource development	<ul style="list-style-type: none"> Develop regional, systematic approach for training development and delivery and integrate this in existing institutions Technical support for policy development in AMS and cities

Domains of enabling actions	Examples of recommended actions
Knowledge sharing	<ul style="list-style-type: none"> ▪ Dedicated website or portal on sustainable land transport in ASEAN, possibly further developed into an ASEAN Transport Observatory ▪ Establishment of a platform for sustainable transport knowledge sharing such as a community of practice or ASEAN Knowledge Network
Data, indicators and measuring, reporting and verification (MRV)	<ul style="list-style-type: none"> ▪ Usage, as appropriate, of the Guidelines on Sustainable Land Transport Indicators on Energy Efficiency and GHG Emissions in the ASEAN, and moving forward with the adoption of its recommended actions plans
Research and innovation	<ul style="list-style-type: none"> ▪ Inclusion of technologies that enable sustainable transport systems, e.g. intelligent transport systems, electric 2-, 3- and 4-wheelers and vehicle sharing, in the strategic action plans of relevant ASEAN sectoral bodies ▪ Regional research partnerships and exchange of academics/scientists, under the ASEAN University Network, particularly on sustainable land transport policy aspects
Institutions and events	<ul style="list-style-type: none"> ▪ Establishment of a regional centre to support ASEAN sustainable land transport cooperation, within an existing institution ▪ ASEAN sustainable mobility events, either stand-alone or in coordination with other international conferences (as part of or in parallel to) ▪ Securing of funds to ensure the continuation of the recommended events

Implementation

For further development and implementation of the regional cooperation options, the existing institutional structure in ASEAN transport cooperation can be used, and supported by AMS, dialogue partners and international organisations. In addition, coordination and collaboration with other sectors is required, such as energy and connectivity under the AEC, and climate change and environment under the ASCC. Further mechanisms for implementing the actions, including the resources for such mechanisms, would have to be considered. Links between ASEAN regional and national strategies on sustainable transport and climate change need strengthening to ensure policy coherence and implementation at the national level. Finally, existing processes can be used to monitor this Strategy and track the progress of sustainable transport in the region.

1. Why land transport in ASEAN should be sustainable

1.1. Transport and sustainable development

Transport is a key enabler of social and economic development. However, the existing transport system in AMSs has negative impacts on air quality, climate change, energy security, city liveability, congestion, social equity, traffic safety, economic competitiveness and community coherence, while there is a lack of access in rural areas which inhibits social and economic development. Without action, the situation is likely to worsen. Thus, the business-as-usual scenario is critically at odds with sustainable development in the region, a key objective of the ASEAN Charter.

The global agenda on sustainable development also recognises the key role of transport, with transport-related directly related to seven out of seventeen Sustainable Development Goals¹ (SDGs). Indeed, sustainable transport is essential to achieve SDG targets related to urban and rural access, increased agricultural productivity, reduced health impacts from air pollution and road traffic crashes, clean energy, inefficiency of fossil fuel subsidies, resilient infrastructure, climate change measures, and sustainable cities and communities.

In addition, transport is a substantial source of greenhouse gas emissions. In the Paris Agreement under the UNFCCC, ratified by all AMSs, countries need to contribute to mitigating climate change through their respective National Action Plans. Globally, actions proposed for the transport sector², particularly in freight³, fall short of the required change to avoid dangerous climate change, including those put forwards in countries' Nationally Determined Contributions. However, there is potential to decarbonise the transport sector in line with a 1.5-degree temperature target⁴.

In the New Urban Agenda⁵ (NUA) that supports the SDGs, adopted in 2016, sustainable transport and mobility play a key role. The Agenda calls for the establishment of urban transport infrastructure funds at the national level, the development of national urban mobility plans, and the promotion of walking and cycling, public transport and of new technology that enables shared mobility.

1 Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3: Ensure healthy lives and promote well-being for all at all ages

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 9: Build resilient infrastructure, promote sustainable industrialisation and foster innovation

Goal 11: Make cities inclusive, safe, resilient and sustainable

Goal 12: Ensure sustainable consumption and production patterns

Goal 13: Take urgent action to combat climate change and its impacts

2 Paris Process on Mobility and Climate (2015) *Emission reduction potential in the transport sector by 2030*. <http://ppmc-transport.org/wp-content/uploads/2015/08/Emission-Reduction-Potential-in-the-Transport-Sector-by-2030.pdf>

3 Mulholland, E. et al. (2018) The long haul towards decarbonising road freight – A global assessment to 2050. *Applied Energy* 216, 678–693

4 Gota, S., et al. (2018). Decarbonising Transport to Achieve Paris Agreement Targets. *Energy Efficiency*, in press

5 <http://habitat3.org/the-new-urban-agenda/>

According to a definition developed by the European Conference of the Ministers of Transport in 2004⁶, a sustainable transport system is one that fulfils the following functions:

- It allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations.
- It is affordable, operates fairly and efficiently, offers a choice of transport mode, and supports a competitive economy, as well as balanced regional development.
- It limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimising the impact on the use of land and the generation of noise.

1.2. The need for action and benefits of ASEAN cooperation

Due to economic growth and rapid motorisation, demand for transport in ASEAN is set to increase by 60% from 2013 to 2040. The transport sector, which is over 90% dependent on oil, was responsible for 29% of the region's total energy consumption in 2015, and this share is rising⁷. Increasing mobility, while still relying on a limited public transport infrastructure, is expected to lead to annual energy consumption growth of 2.6% in a business-as-usual (BAU) scenario, from 124 million tonnes of oil equivalent (Mtoe) in 2015 to 238 Mtoe in 2035⁸. The bulk of this needs to be imported, affecting energy security and balance of payments, with the annual import bill set to reach USD 280 billion in 2040 in the absence of any additional action⁹.

Key impacts of transport on human health, quality of life and economic productivity include air pollution, traffic crashes, and congestion. Through emissions of particulate matter, nitrogen oxides, sulphur dioxide and volatile organic compounds, the transport sector contributes substantially to the 175,000 deaths attributed to ambient air pollution in ASEAN in 2012¹⁰. Traffic crashes were further responsible for 177,000 deaths in the region in 2013¹¹. Urban liveability, public space and quality of life is affected by noise, pollution and fragmentation of neighbourhoods by infrastructure, affecting mobility and accessibility, particularly for vulnerable groups. Transport policy often focuses on moving private vehicles, rather than public and non-motorised transport, which are cleaner and important modes for the poor, raising issues of social equity. Finally, transport is a significant sector in terms of direct and indirect provision of employment.

6 Marsden, G. (2007) Defining and Measuring Progress towards a Sustainable Transport System. TRB Sustainable Transportation Indicators (STI) Discussion Paper. http://www.vtpi.org/sustain/Marsden_STI.pdf

7 ASEAN Centre for Energy (2017) ASEAN Energy Outlook 2017 <http://www.aseanenergy.org/resources/the-5th-asean-energy-outlook/>

8 Ibid.

9 OECD/IEA (2017) Southeast Asia Energy Outlook 2017. Paris

10 Fifth ASEAN State of the Environment Report, 2017, based on data of the World Health Organization (2016, 2015triple16) of the total emissions 2015: 1264 Mt (transport 27%) Asia)ths attributed to ambient air pollution in the region).

11 World Health Organization, 2015. Road safety. Estimated number of road traffic deaths 2013. http://gamapserver.who.int/gho/interactive_charts/road_safety/road_traffic_deaths/atlas.html

Total greenhouse gas (GHG) emissions from the transport sector in the ASEAN region were estimated to be approximately 342 million tonnes of CO₂ equivalent (MtoCO₂e) in 2015¹², i.e. about one-quarter of total energy-related CO₂ emissions. In a BAU scenario, this could increase by 3.3% per annum to 870 million tonnes in 2050¹³.

Without sustainable transport policy, these impacts and associated costs will increase, moving the region further away from sustainable development. Action on comprehensive sustainable transport policies and investments is therefore justified and can counter these trends. In fact, investing in sustainable transport appears to yield net economic benefits as compared with the BAU scenario. Globally, investments in improving the energy efficiency of transportation could ultimately lead to economic, social and environmental savings of up to USD 70 trillion¹⁴.

An ASEAN regional approach to sustainable land transport is justified for a number of reasons:

- Transport systems efficiency and related issues such as climate change, energy security and air pollution are at least partly of a transnational nature¹⁵.
- Compared to action at Member State level, cooperation and common approaches at the ASEAN level can leverage mutual expertise in e.g. capacity building, research, information and data gathering, monitoring/MRV, best practice, knowledge development, training and policy learning.
- A single-market approach can lower costs; lack of action or individual actions by individual AMSs alone may hinder the development of the single market, such as non-tariff trade barriers in multi modal movement of goods or differences in standards for vehicles and their parts. Regulatory convergence among ASEAN countries is useful to market integration, within the region as well as for attracting foreign direct investment (FDI).
- Setting common standards reduces the regulatory burden by avoiding duplication of work e.g. a common fuel efficiency label would require only one type approval for each vehicle model. Coherent or common policies and positions of AMSs on sustainable transport issues can boost FDI and give AMSs more leverage in the relevant industries. A common position of ASEAN may help in establishing a more predictable environment to support the development of sustainable transport.
- Regional approaches, e.g. implementing regulatory measures in a collective manner, reduces the problem of one country taking advantage of more stringent regulations in neighbouring countries, which can lessen incentives to strengthen environmental protection policies at home.

12 IEA, 2017. CO₂ emissions from fuel combustion by sector in 2015. CO₂ highlights 2017 – excel tables, available from <http://www.iea.org/publications/freepublications/publication/co2-emissions-from-fuel-combustion-highlights-2017.html>. Note: Lao PDR's transport emissions are estimated at approximately 1.5 million tonnes based on country inputs

13 ITPS & Clean Air Asia (2014) A Study on a Long-term Transport Action Plan for ASEAN. <http://cleanairasia.org/study-of-long-term-transport-action-plan-for-asean-region-lpa-project/>

14 The United Nations Secretary-General's High-Level Advisory Group on Sustainable Transport, 2015. Position Paper on Financing Sustainable Transport. <https://sustainabledevelopment.un.org/content/documents/7618AdvisoryGroupTransport.pdf>

15 As acknowledged in the ASEAN Action Plan on Joint Response to Climate Change (2012), the ASEAN Petroleum Security Agreement (2009) and the ASEAN Agreement on Transboundary Air Pollution (2012)

- It presents an ASEAN response to global challenges, and thereby helps in setting the regional agenda.

1.3. Scope of this Strategy

This Strategy on Sustainable Land Transport builds on the ASEAN Transport Strategic Plan 2016-2025 (Kuala Lumpur Transport Strategic Plan). One of the KLTSP's strategic goals is 'Formulate a regional policy framework to support sustainable transport which includes low carbon modes of transport, energy efficiency and user-friendly transport initiatives, integration of transport and land use planning'. The first specific goal of the sustainable transport chapter (ST-1) of the KLTSP is: 'Intensify regional cooperation in the development of sustainable transport-related policies and strategies'.

Within this goal, milestone ST-1.1.1 is 'Develop "Avoid", "Shift" and "Improve" (ASI¹⁶) strategies at the regional and Member State level'. The current Strategy responds to this milestone. It also aims to implement milestone ST-1.4.2 'Develop green freight and logistics strategy'. It links directly with ST-1.3 'Initiate and support the development and implementation of fuel economy policies and standard as well as policies towards cleaner fuels and vehicles and vessels', and ST-2.3 'Develop monitoring framework and harmonised approach for indicators on energy and GHG emissions in the transport sector'.

In addition, the Strategy aims to provide a comprehensive framework and set the direction for other actions and milestones in the KLTSP, in particular those in the Sustainable Transport chapter. Other KLTSP chapters predominantly deal with connectivity in the context of economic, and to some extent, social development (see Section 2.1), although there are no actions on rural access.

This Strategy supports the ASEAN Economic Community (AEC) and other community pillars, such as the ASEAN Socio-Cultural Community (ASCC), particularly on issues such as energy, connectivity, climate change, environment and science and technology.

The Strategy focuses on land transport, and only touches upon maritime or inland waterways when relevant to modal shift. Issues on sustainable transport relevant to maritime and air transport are covered in the KLTSP and addressed by other ASEAN working groups. As for the sustainable development dimensions, the main focus is on environment, whereas social and economic issues are covered to a limited extent. Key issues include the energy efficiency of transport, climate change mitigation, and air quality. Other issues such as health, urban liveability, accessibility, social equity, energy security, noise and road safety are discussed where necessary. It should be noted that climate change mitigation measures will help in addressing some of the latter issues, e.g. electric vehicles improve energy security, noise reduction and urban liveability. Assessment of environmental impacts of infrastructure development is excluded from this Strategy.

¹⁶ This policy framework to sustainable transport emphasises the need to 1) avoid the need for travel if possible by shortening or reducing trips e.g. through land-use planning, pricing and telecommuting, 2) shift to more sustainable modes of transport such as public transport or rail freight, and 3) improve the sustainability of transport modes by increasing energy efficiency, reducing air pollution and noise and reduce the carbon-efficiency of the fuels used (see e.g. GIZ (2011) The Avoid-Shift-Improve Framework)

Chapter 2 of this Strategy takes stock of sustainable land transport at the ASEAN regional and national level, and discusses barriers that AMS are facing. The main domains of the Strategy are presented in the subsequent chapters. Chapter 3 discusses those in the overarching framework, and Chapter 4 recommends regional actions in six SLT policy domains and six domains of enabling actions. Chapter 5 addresses the implementation arrangements.

2. Taking stock

2.1. Role of sustainable transport in existing ASEAN cooperation strategies

Transport cooperation in ASEAN has been and still is focusing predominantly on improving physical connectivity as well as trade and transport facilitation, in order to create an efficient and integrated transport system that supports economic development and integration. We can observe a gradual increase in attention to environmental topics between the publication of the first transport action plan in the 1990s and the ASEAN Strategic Transport Plan 2011-2015. The regional goals and actions have been focused on the exchange of experiences, carrying out studies, and capacity development, and AMSs have been encouraged to implement policies and projects in certain actions and milestones in these plans. However, coverage of key sustainable transport topics such as fuel economy, electric vehicles, green freight and logistics, and non-motorised transport has been limited.

The post-2015 vision adopted by the ASEAN transport ministers is as follows: 'Towards greater connectivity, efficiency, integration, safety and sustainability of ASEAN transport to strengthen ASEAN's competitiveness and foster regional inclusive growth and development'. The KLTSP, which serves as a guiding regional policy document, outlines 30 specific goals, 78 actions and 221 milestones in the domain of air transport, land transport, maritime transport, sustainable transport and transport facilitation. On sustainable transport (ST), which is included for the first time as a dedicated chapter in an ASEAN plan, there are three goals:

- ST-1: Intensify regional cooperation in the development of sustainable transport-related policies and strategies: This includes actions on *avoid-shift-improve*, fuel economy, green freight and logistics, sharing of knowledge on finance, and capacity building.
- ST-2 Identify and implement the key measures on sustainable transport: This includes e.g. actions to review and monitor actions, develop indicators, public-private partnerships, and integration with land-use.
- ST-3 Enhance human resource activities and institutions for sustainable transport systems.

Table 2-1 shows the key actions laid out in the ST Chapter as well as goals and actions relevant to social and environmentally sustainable transport from other chapters.

Table 2-1 Goals and actions in the KLTSP relevant to environmental and social sustainability of land transport

Goal / action	Topic	Notes
ST-1.1	Promotion of non-motorised and public transport, based on <i>avoid-shift-improve</i> strategies	LTWG ¹
ST-1.2	Enhanced sharing of knowledge and experience on sustainable transport, e.g. on capacity building, finance and tax incentives	LTWG, TFWG ² , MTWG
ST-1.3	Policies on fuel economy and cleaner vehicles and vessels	LTWG, TFWG for vehicles, MTWG for vessels
ST-1.4	Green and efficient freight and logistics	LTWG, TFWG
ST-2.1	Identification, development and adoption of policies on sustainable transport, and review of the implementation	LTWG, TFWG, MTWG
ST-2.2	Best practices on PPP for sustainable transport infrastructure	LTWG, TFWG, MTWG
ST-2.3	Development of a monitoring framework and harmonised approach for indicators on energy and GHG emissions	LTWG, TFWG, MTWG
ST-2.5	Promotion of the integration of transport and land-use planning	LTWG
ST-3.1	Education, training and knowledge exchange to enhance human resources and institutions	LTWG, TFWG, MTWG
LT-1	Implementation of the Singapore-Kunming Rail Link	Can support modal shift
LT-3	Intelligent Transport System master plan	Enables public transport information and ticketing, reduces searching for parking
LT-4	Network of ASEAN dry ports	Can support modal shift
LT-5, 7	Reduction of road fatalities by 50% in AMS by 2020; improvements to transport safety	ASEAN Road Safety Strategy
MT-1 to 5	Policy and infrastructure goals to facilitate and improve efficiency of inland and maritime transport	Can support modal shift, particularly in freight
TF-3	ASEAN Framework Agreement on Multimodal Transport	Can support modal shift

Note: ST: sustainable transport; LT: land transport; MT: maritime transport; TF: transport facilitation

The KLTSP can be considered a significant improvement in addressing sustainable transport issues compared to earlier plans, as it includes many of the relevant elements and provides for more ambitious action. Nevertheless, there is benefit in covering more comprehensively sustainable transport issues and enhancing their monitoring. In addition, there would be benefits in having a cooperation mechanism with relevant entities outside the realm of transport, and a comprehensive, long-term vision for sustainable transport. This regional Strategy on sustainable land transport therefore helps to advance action and address these gaps.

In addition, strengthened cooperation on sustainable transport in ASEAN supports other regional policies and strategies, including but not limited to:

- ASEAN Economic Community Blueprint
- ASEAN Socio-Cultural Community Blueprint
- ASEAN Plan of Action on Energy Cooperation
- ASEAN Action Plan on Joint Responses to Climate Change
- Master Plan on ASEAN Connectivity
- Kuala Lumpur Declaration on a People-Oriented, People-Centred ASEAN
- Regional Action Plan on Healthy ASEAN Lifestyles
- Bangkok Resolution on ASEAN Environmental Cooperation
- Declaration on ASEAN post-2015 environmental sustainability and climate change agenda
- ASEAN Road Safety Strategy
- ASEAN ITS (intelligent transport systems) Policy Framework
- ASEAN Standards and Conformance Strategic Plan
- ASEAN Petroleum Security Agreement

2.2. Where is ASEAN now?

Noting there are significant differences between the national circumstances of the individual AMSs, as well policy approaches, the following common elements across most of the AMS have been observed in a sustainable transport policy review (references to relevant KLTSP ST actions are given in brackets).

A variety of national plans and strategies are in place relevant to sustainable, low-carbon transport besides transport development plans. This includes those related to energy efficiency, renewable energy, the vehicle industry, clean air, climate change, green growth and sustainable development.

The concept of sustainable transport appears to support various high-level national development objectives and principles, such as inclusive growth, the sufficiency economy¹⁷, people-oriented or people-centric society, low-carbon society, etc.

Each country has a set of objectives and targets related to sustainable transport (e.g. public transport modal share, energy self-sufficiency, emission reductions). However, these objectives, indicators and targets vary in nature from one country to the next, as do the ways they are formulated and monitored (ST-2.3).

There has been some progress with regards to sustainable transport policy identification, development, adoption, implementation and review of implementation (ST-2.1). However, in general more action is needed to be in line with the agreed goals in the Paris Agreement, the SDGs and the New Urban Agenda (NUA). More specifically:

- *Avoid-shift-improve* policies (ST.1-1): The components of *shift* and *improve* are emphasised in all countries, whereas the *avoid* part is much less well developed.

¹⁷ A development philosophy from Thailand, which focuses on reasonableness, moderation, and prudence; it emphasises risk management, maximising the interests of all stakeholders and long-term sustainability rather than short-term success. Table 4-1.1 of NUPs in Indi Such as transport demand management, public transport, rail / maritime transport

In particular, integration of land-use planning with transport (ST-2.5) is at an early stage; this includes first- and last-mile connectivity with public transport.

- Public transport is emphasised in all countries, although level of development and implementation varies from country to country. However, non-motorised transport is not prioritised (ST-1.1).
- Motorised and electric two-wheelers play a limited role in policymaking, despite being the prevalent and space-efficient mode of transportation in dense cities. They represent a large opportunity for improvement of energy efficiency, local air pollution, and road safety.
- Biofuels are important, with many countries having adopted blending targets, along with some other incentives for production and consumption.
- Freight and logistics (ST-1.4) need more policy attention because of their substantial and increasing share of energy consumption in the transport sector.
- Progress is limited in most AMS for the following key policies and measures:
 - o Private-vehicle restrictions or disincentives
 - o Transit-oriented development and land-use planning (ST 2.5), including for metropolitan regions that extend across multiple jurisdictions
 - o Parking management and pricing
 - o Truck empty-hauling reduction
 - o Non-motorised transport
 - o Electric two-wheelers
 - o Logistics optimisation
 - o Hybrid vehicles, including buses
 - o Energy-efficient tyres
 - o Incentives or standards for truck energy efficiency

The climate change issue including the Paris Agreement and NDCs have helped to put sustainable transport on the agenda in several AMSs. Six of them (Indonesia, Lao PDR, Malaysia, the Philippines, Thailand and Viet Nam) are developing at least one nationally appropriate mitigation action in the transport sector. All countries include the transport sector in their respective NDCs, even though the level of ambition and detail varies strongly (see Annex I). In support of the NDCs, the Biennial Update Reports (BURs) and their national climate change policy, countries are carrying out initial mitigation potential analysis and developing scenarios (e.g. for 2020 or 2030). In AMSs, there are policy processes and stakeholder dialogues on which changes in the transport systems are required, desirable and feasible, and those dialogues are documented in national strategies. However, AMS national governments have not yet developed long-term (e.g. 2050), ambitious scenarios to achieve deeper carbon reduction in line with global climate change goals, or any visions regarding low-carbon transport, or regarding possible technologies and transformations in the transport systems.

Moreover, climate change provides an additional policy driver for developing sustainable transport measures and bringing together different policymakers across departments and ministries to coordinate and develop action plans. Such collaboration is important as ministries of transport often focus on planning and investments, and on the regulation and

organisation of transport services, predominantly in the realm of *avoid* and *shift*¹⁸, with improved accessibility and congestion reduction among the main objectives; whereas other government agencies, notably those related to energy, industry, and environment, are developing economic and regulatory instruments for efficient and cleaner vehicles, i.e. in the *improve* domain. Most AMSs have improved the coordination between government institutions, and have in some case appointed or established lead agencies to deal with transport and climate change, e.g. in the ministry of transport or in climate change committees. However, the technical capacity and mandate of these institutions could be strengthened.

The SDGs and the NUA on the other hand, have not yet been referred to in transport policy documents¹⁹.

Key differences between AMS include the following:

- Wide margin in variation of fuel prices, from heavily subsidised prices to substantial taxation.
- Public transport service systems and presence of urban public transit authority (ST-1.1).
- On fuel economy (ST-1.3), some AMSs have implemented labelling and are implementing sometimes voluntary standards, with some other countries considering such policies. In some AMSs, policies incentivising fuel-efficient vehicles are focused on segments of vehicle fleet rather than based on efficiency metrics to support an overall move towards improved energy efficiency (and thus lowered emissions and improved fuel savings) for the whole transport fleet.
- Vehicle taxation levels and systems, as well as production of different car market segments (e.g. pickup trucks, eco car, energy-efficient vehicles and low-cost green car).
- Incentives for electric vehicles (EVs): the Philippines is developing a replacement programme for electric three-wheelers and jeepneys, Thailand is developing policies for production of EVs, Malaysia is focused on the production of energy-efficiency vehicles and has developed an EV blueprint, Singapore has an electric car sharing programme and a feebate scheme.
- Malaysia has elements of a national urban mobility programme (NUMP), however the other countries do not have NUMPs in place yet.
- Involvement of NGOs and consumer organisations in transport policy and raising public awareness: This is relatively strong in Philippines and Indonesia, e.g. for non-motorised transport, clean air policy and fuel economy standards, while in some other AMSs, civil society plays a more limited role in transport policy.

Trends in other world regions

In most AMSs, transport CO₂ emissions per capita are significantly below OECD levels for example the EU average of 2 tonnes per year. Compared to China's 0.8 tonnes, some AMSs

18 This could be due to the fact that the SDGs and the NUA have been adopted relatively recently

19 WHO (2016) Ambient air pollution: a global assessment of exposure and health burden of disease

are higher but most are lower. Looking at the trends, it should be noted that emissions are stable in many OECD countries, with some achieving decreasing trends.

Notable policy developments in other rapidly motorising countries include substantial electric vehicle growth (two-wheelers, cars, buses, urban freight) and metro/rail construction in China, as well as development of NUMPs in India, Mexico and Colombia. The relatively high modal share of cycling in Tokyo, Japan of 26% of trips may also be noted.

Regarding fuel economy of passenger cars, many world regions are more efficient and improving quicker (with the exception of the US). Around 70% of the global car market is under jurisdictions with fuel economy standards in place. Fuel taxes are much higher in Europe than in ASEAN, and much lower in some Middle-Eastern countries.

Trends in urban air quality are cause for concern, in particular with respect to the density of airborne particulate matter with diameter of less than 2.5 micrometres (PM_{2.5}) or between 2.5 and 10 micrometres (PM₁₀). ASEAN cities in general have performed better in air quality than South-Asia, China, Africa and the Middle East, comparable to Latin America, yet worse than East Asia, Europe and North America²⁰. However, worsening air quality may soon become a serious public health issue in ASEAN cities²¹.

In the context of green freight, truck efficiency standards are in place in the US, China, Japan, and Canada, which together account for about 50% of the heavy-duty vehicle market. Other sizeable markets are developing standards, including jurisdictions that account for 80% of the light-duty vehicle market (mainly vans), notably the EU. Regarding modal split of transport, rail and water transport are important in the US and the EU. Green freight programmes have been established in multiple countries across the globe. Road freight activity is stabilising in EU in the last decade, and there may be signs of decoupling freight activity and economic growth.

In terms of monitoring systems, a notable development is the EU Transport and Environment Reporting Mechanism, which has been developed since the 1990s and now annually reports on progress using a large set of indicators.

Held annually since 2002, the European Mobility Week focuses on raising awareness in cities. In 2016, over 2200 cities participated.

2.3. What barriers are AMSs facing?

AMSs face a number of barriers towards development and implementation of sustainable transport policies. Section 3.2 and Chapter 4 recommend actions that can help addressing these barriers. Although there are substantial differences between the national circumstances and levels of economic development of the various AMSs, there are nonetheless some common barriers that some or most of them face:

- Policy development and political will: Development and adoption of policies in the SLT domain may be complex and time-consuming, and critically depends on political will. In addition, less sustainable transport measures are often the preferred

20 Fifth ASEAN State of the Environment Report, 2017; OECD/IEA (2017) Southeast Asia Energy Outlook 2017. Paris

21 Banister (2008) The sustainable mobility paradigm. *Transport Policy* 15 (2008) 73–80

policy options, e.g. those that facilitate private motor vehicles in the short term such as building urban highways and fuel subsidies, rather than essential sustainable measures such as parking management and fuel economy standards.

- Institutional barriers, including lack of cooperation and information sharing between agencies, overlapping mandates or lack of mandate to cover issues, for example an absence of key performance indicators related to energy efficiency within transport agencies
- Financial barriers: This includes budget constraints, but also priority setting, including the absence of a policy to allocate budget to transport and technical sector guidance, as well as a lack of financial instruments (e.g. land-value capture), access to capital (e.g. for small logistics companies), insufficient interest from the private sector, and the high cost of certain technologies.
- Limited human resources and technical capacity to analyse and develop solutions or provide the justification for implementing unpopular measures.
- Awareness and understanding of sustainable transport and its policy solutions, especially non-infrastructure measures, among policymakers and stakeholders is often limited, as is consensus among the related ministries on urban transport measures: Sustainable transport planning practices are often not sufficiently integrated in transport engineering and planning curricula.
- Lack of public acceptance of new technologies or sustainable practices such as active transport, or of safety issues in public transport: General preference for car travel, and negative perception of public transport and non-motorised transport, including electric two-wheelers.
- Incomplete implementation and limited enforcement of policies and standards.
- Data (quantitative and qualitative) is often limited and weak, and policy monitoring systems often absent.

3. Vision and policy framework

3.1. An ASEAN vision for sustainable land transport

As explained in Section 1.1, transport is related to a multitude of aspects of sustainable development (see Table 3-1), many of which are currently being addressed by transport authorities in AMSs. Sustainable transport ideally would meet all such objectives. In practice however, a balance needs to be found. A conventional notion in sustainable development thinking is that environmental sustainability is a boundary condition that needs to be met, within which social and economic objectives can be optimised. This is operationalised in the definition included in Section 1.1.

Table 3-1 Three pillars of sustainable development and the impact of transport

Environmental	Social	Economic
Energy / resource consumption	Accessibility	Development of the economy, including access to jobs
Climate change	Safety	Transport industry development
Air quality	Jobs and working conditions in transport	Financial sustainability of transport providers
Noise	Universal access (e.g. for the elderly and physically impaired)	Energy security and oil import dependency
Land grab / land use	Health and physical activity	Congestion
Biodiversity	Choice of transport modes	Logistics efficiency
Agricultural productivity	Equity and transport justice	Infrastructure investment and maintenance costs
	Quality of life	Technological innovation and competitiveness
	Gender	Infrastructure resilience to climate change
	Service quality and passenger rights	Transport costs for households and businesses

Source: adapted from various sources including the SDGs, VPTI Online TDM Encyclopaedia, Clean Air Asia, UNFCCC

For ASEAN cooperation on sustainable land transport, a new vision has been developed to help guide policies and set the direction for actions that clearly focus on sustainability, and that acknowledge the need to make significant changes in the transport system, so as to operationalise what has been agreed in global agendas:

ASEAN advances towards a transport system that is equitable, efficient, safe and clean, which is in line with global sustainable development and climate change objectives, and provide access to opportunities as well as fosters regional inclusive growth and development.

3.2. Sustainable transport policy guidance for national action plans

In order to make this vision a reality, changes in policy, planning and financing of transport systems are required. Building on the vision, the following guiding concepts for sustainable transport policy development can be used:

- Sustainability as an organising principle for transport policy and planning decisions²².
- Acknowledgement that transformational change is needed to reach long-term climate and sustainable development objectives²³.
- The *avoid-shift-improve* policy approach to sustainable transport (see Section 1.3 and the KLTSP).
- People-oriented transport planning, including offering a choice of modes, as well as a focus on 'access'²⁴ (the ease with which opportunities can be accessed by the population) rather than mobility based on vehicle speeds.
- Acknowledgement of the need to shift financing from unsustainable to sustainable modes²⁵.
- Integration of land-use and transport planning, required because spatial development and transport system strongly interact²⁶, and the success of policy in one domain depends on policy in others, particularly in the *avoid* and *shift* realms.
- Improvement of environmental performance of the vehicle fleet by using outcome-based metrics (e.g. efficiency in kWh/km or in gCO₂e/km) instead of technology-specific metrics (e.g. hybrid vs electric vs fuel cell vehicles), so as to cover the entire fleet (see ASEAN Fuel Economy Roadmap for the Transport Sector 2018-2025: with Focus on Light-Duty Vehicles).

In addition to these principles, Table 3.2 includes recommended components of national action plans. These broadly correspond to the action areas in Chapter 4²⁷, complemented by overarching considerations, and can be subdivided into: 1) general framework; 2) sustainable transport policy areas; and 3) crosscutting issues and enabling activities. This is not intended as an exhaustive list. References and links to information sources are given, as well as examples from AMS and other countries.

22 The European Environment Agency (2016) Transport and Environmental Reporting Mechanism (TERM) 2016: transitions towards a more sustainable mobility system. <https://www.eea.europa.eu/publications/term-report-2016>

23 See <http://www.vtpi.org/tm/tm84.htm>

24 See for example the Progress Report of the MDB Working Group on Sustainable Transport <https://www.adb.org/sites/default/files/institutional-document/211966/mdb-progress-report-2015-2016.pdf>

25 https://www.researchgate.net/publication/312024786_Understanding_land_use-transport_integration_a_literature_review_on_theories_and_practices_in_urban-transport_planning; Toolkit: <http://www.sutpindia.com/skin/pdf/Toolkits/Landuse%20Transport%20Integration%20Toolkit.pdf>

26 As well as the 2011 EU White Paper

27 It has been suggested that to be in line with sustainable transport, the ASI framework should be expanded with 'access' (Bakker et al. (2014) Transport, development and climate change mitigation: towards an integrated approach. *Transport reviews*, 34 (3) pp. 335-355)

Table 3.2 Guidance for national action plans on sustainable land transport: 16 recommended elements

	National action plan element	Remarks	References	Examples
Overarching framework	E.1. A clear long-term vision that links transport policy to the global and regional agendas on sustainable development and climate change. This should include acknowledgment of the need for a transition to sustainable, low-carbon transport, explicit references to those agendas, and considerations of related key performance indicators.	Transport is key to 7 of 17 SDGs Regional: the current ARSSLT can be used, as well as the KLTSP and other ASEAN policies (see Section 2.1).	UNSG high-level group's recommendations on Mobilizing Sustainable Transport for Development ¹ ² , Paris Agreement ³ on Climate Change (including Nationally Determined Contributions ⁴) and New Urban Agenda ⁵ .	Partnership for Sustainable, Low-Carbon Transport: INDC analysis ⁶ ; Global Decarbonization Roadmap ⁷ ; EU White Paper ⁸ targets 60% GHG reduction in the transport sector in 2050 compared to 1990
	E.2. A policy framework that promotes sustainable transport, e.g. based on <i>avoid-shift-improve</i> , taking into account the vision, elements and recommendations in this Regional Strategy.		David Banister's 'Sustainable Mobility Paradigm' ⁹ , <i>Avoid-Shift-Improve</i> factsheet ¹⁰ , sustainable transport framework ¹¹ (including 15 definitions); Multi-modal transport planning ¹² by Todd Litman.	Philippines' National Environmentally Sustainable Transport ¹³ policy adopts the principle of 'those who have less in wheels must have more in road'; there are also more references in transport policy documents from Indonesia, Thailand and Viet Nam ¹⁴ to climate change mitigation, quality of environment, energy saving and multi-modal transport
	E.3. Assessment of impacts of current transport system on energy security, climate change, air pollution, noise, congestion, cost of inactive living, etc.		Handbook ¹⁵ on external costs of transport.	ASEAN's oil import bill ¹⁶ may rise to USD 280 billion in 2040; Congestion in Metro Manila now costs P3.5 billion ¹⁷ (USD 27 million) in lost opportunities per day.
	E.4. Quantifiable objectives and medium to long-term targets and scenarios, e.g. by using a backcasting approach to clarify what changes in the transport system are required in 2030 and 2050.		Backcasting study ¹⁸ for low-carbon transport in ASEAN in 2050; SLoCaT Database ¹⁹ of 500+ low-carbon transport scenarios for 81 countries (2030 and 2050).	ASEAN countries ²⁰ are using a variety of mid-term targets related to public transport, energy efficiency, energy security, etc.: Many countries and cities are adopting targets for electric vehicles ²¹ , with some phasing out conventional vehicle sales by 2030-2040.

	National action plan element	Remarks	References	Examples
Sustainable transport policy domains	E.5. Prioritisation in planning of non-motorised or active transport (NMT) such as walking and cycling.	Most trips in cities are shorter than 5 km and NMT is essential for first- and last-mile access as well as for those without access to vehicles.	NMT planning guidance ²² ; 40+ countries' NMT policies ²³ and other material.	Policies promoting NMT in Singapore ²⁴ (including the Active Mobility Bill and 700 km of cycling infrastructure); policy and infrastructure developments in Thailand and the Philippines ²⁵ .
	E.6. A discussion and choices related to the role of electric and conventional motorcycles in the transport system.	Two-wheelers play a key role for accessibility in dense cities; electrification is key to make it a sustainable mode.	Table 6.7 in IEA ETP 2014 ²⁶ shows substantial CO ₂ benefits of electric two-wheelers in any electricity grid; literature review 2016 ²⁷ ; Factsheet ²⁸ on potential in Thailand; see also Section 4.3.	Some cities in Viet Nam, Malaysia and Myanmar have dedicated lanes for motorcycles; Yangon has banned conventional motorcycles but allows pedal-assisted electric two-wheelers and many Chinese cities have also banned conventional motorcycles; in the EU, 16-76% of e-bike trips replace car trips ²⁹ .
	E.7. National urban transport policy.	National government can set up support mechanisms, provide technical guidance, co-finance investments, create supportive regulatory frameworks.	Factsheet ³⁰ , Report ³¹ on financing low-carbon cities, and promotion of soot-free buses ³² .	Review ³³ of eight countries' national support mechanisms.
	E.8. Promotion of Sustainable Urban Mobility Plans.	SUMPs is key tool for the EU ³⁴ in urban transport.	EU guidelines ³⁵ , Guidance ³⁶ by GIZ on urban mobility planning, Toolkit ³⁷ on urban transport; review and training materials ³⁸ of 22 measures.	Database ³⁹ of European cities' SUMPs; examples from Dresden ⁴⁰ , London ⁴¹ .
	E.9. Green freight and logistics policies and programmes.	This should include actions to promote modal shift, optimise logistics, efficient trucks and a monitoring framework.	Global Logistics Emission Council ⁴² , Future of Trucks report ⁴³ , including fuel economy regulations for truck in the US, Japan and China, and see Section 4.6.	Ministry of Transport Indonesia is developing a Green Freight White Paper, expected to be launched by end of 2018.
	E.10. Fuel economy policies, including standards, labelling and incentives; these should be based on outcome metrics covering the entire fleet of a particular mode.	See ASEAN Fuel Economy Roadmap [under development, see Section 4.4]	ICCT reports ⁴⁴ .	Viet Nam, Thailand and Singapore have introduced mandatory vehicle labelling.
	E.11. Policies that address the current rapid motorisation rate to ensure it is line with what the country is able to absorb.	Options include vehicle taxation, quotas, road pricing, traffic calming, street design, access restrictions.	see e.g. TDM Encyclopaedia ⁴⁵ , and street design before – after pictures ⁴⁶ .	Singapore ⁴⁷ has restricted vehicle fleet growth to 0% per year.

National action plan element	Remarks	References	Examples
E.12. Use financial and economic instruments to provide incentives in accordance with sustainable transport and the polluter-pays principle.	E.g. fuel taxation, road pricing, vehicle taxation system based on CO ₂ emissions, parking pricing measures, and congestion pricing.	See also Section 4.12 and TDM Encyclopaedia ⁴⁸ , database ⁴⁹ of EU country transport measures.	Thailand's vehicle excise tax ⁵⁰ is based on CO ₂ emissions; database of up-to-date fuel prices ⁵¹ in over 100 countries.
E.13. Investment decision-making framework, including budget allocation system based on sustainable development objectives and the principle of moving people rather than vehicles.	The development and prioritisation process of transport projects needs to be based on transparent, objective and comprehensive appraisal of costs and benefits that cover sustainable-development priorities, and indicators agreed among stakeholders.	ECMT 2004 ⁵² ; Comprehensive transport planning ⁵³ .	Cost-benefit analysis and multi-criteria analysis, as well as consultation of stakeholders and the general public, are integrated in planning processes of many countries, e.g. the Netherlands and Germany.
E.14. Consider making use of alternative source of finance, such as development finance and climate finance, in addition to private finance.	Climate finance sources include the Green Climate Fund, the NAMA Facility, and the Joint Crediting Mechanism.	Database ⁵⁴ on transport projects in climate finance; report ⁵⁵ on climate finance including six examples.	Nationally Appropriate Mitigation Actions are being developed/implemented in Indonesia, Thailand, Viet Nam, the Philippines, Cambodia and Malaysia.
E.15. Data, indicator and monitoring system, including MRV.		Reference document ⁵⁶ on MRV in the transport sector ; EU TERM indicators ⁵⁷ ; SUM4All Global Mobility Report ⁵⁸ ; SLoCaT GHG methodology database ⁵⁹ ; see also Section 4.12 and ASEAN work on sustainable transport indicators ⁶⁰ .	Report ⁶¹ on MRV system development in Thailand; ADB Transport databank ⁶² .
E.16. Institutional development that promotes cooperation and reduces competition between agencies, and promotes the alignment of objectives (environment, industry, finance, mobility, liveability, energy security, etc.).	Options include inter-ministerial working group or task force on SLT and climate change, dedicated agency in MOT, integration of SLT objectives in decision-making processes, and multi-stakeholder events. A high-level mandate is essential.		Viet Nam's Department of Environment in the Ministry of Transport; Indonesia's climate action plan development process (RAN-GRK).

a [https://sustainabledevelopment.un.org/content/documents/2375Mobilizing Sustainable Transport.pdf](https://sustainabledevelopment.un.org/content/documents/2375Mobilizing_Sustainable_Transport.pdf)

b <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

c http://unfccc.int/paris_agreement/items/9485.php

d <http://www4.unfccc.int/ndcregistry/Pages/All.aspx>

e <http://habitat3.org/the-new-urban-agenda/>

f http://www.ppmc-transport.org/overview_indcs/

g <http://www.ppmc-transport.org/global-macro-roadmap/>

h https://ec.europa.eu/transport/themes/strategies/2011_white_paper_en

i http://www.transxte.net/wp-content/uploads/2011/09/Banister_2008-sustainable-paradigm-mobility.pdf

j http://www.sutp.org/files/contents/documents/resources/E_Fact-Sheets-and-Policy-Briefs/SUTP_GIZ_FS_Avoid-Shift-Improve_EN.pdf

k https://www.researchgate.net/publication/261582316_Transport_Development_and_Climate_Change_Mitigation_Towards_an_Integrated_Approach

l http://www.vtpi.org/multimodal_planning.pdf

m <http://www.officialgazette.gov.ph/2009/01/30/administrative-order-no-254-s-2009/>

n <http://www.mdpi.com/2071-1050/9/7/1217>

o https://ec.europa.eu/transport/themes/sustainable/studies/sustainable_en

p https://www.iea.org/publications/freepublications/publication/WEO2017SpecialReport_SoutheastAsiaEnergyOutlook.pdf

q <http://newsinfo.inquirer.net/970553/jica-traffic-congestion-now-costs-p3-5-billion-a-day-metro-manila-traffic-jica-cost-of-traffic>

r <http://cleanairasia.org/study-of-long-term-transport-action-plan-for-asean-region-lpa-project/>

s <http://slocat.net/docs/1891>

t <http://www.mdpi.com/2071-1050/9/7/1217>

u http://slocat.net/sites/default/files/e-mobility_overview.pdf

v [http://www.sutp.org/files/contents/documents/resources/A_Sourcebook/SB3_Transit-Walking-and-Cycling/GIZ_SUTP_NMT-Pedestrian-cycling-network-Windhoek_2016_\(2\).pdf](http://www.sutp.org/files/contents/documents/resources/A_Sourcebook/SB3_Transit-Walking-and-Cycling/GIZ_SUTP_NMT-Pedestrian-cycling-network-Windhoek_2016_(2).pdf)

w http://www.sutp.org/files/contents/documents/resources/F_Reading-Lists/GIZ_SUTP_RL_Cycling-Policies_EN.pdf

x <https://www.lta.gov.sg/content/ltaweb/en/walk-cycle-ride.html>

y http://transportandclimatechange.org/wp-content/uploads/2016/12/TCC_ASEAN-cycling_report_19122016_Version1.0.pdf

z <http://www.iea.org/publications/freepublications/publication/EnergyTechnologyPerspectives2014.pdf>

aa https://s3.amazonaws.com/academia.edu.documents/39219114/01441647.2015.1069907.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1523024710&Signature=5exltySEaf%2BWRw6vz5v%2Br3d9nYA%3D&response-content-disposition=inline%3B%20filename%3DE-bikes_in_the_Mainstream_Reviewing_a_De.pdf

bb <http://transportandclimatechange.org/wp-content/uploads/2015/03/Electric-two-wheelers-in-Thailand-02-03-2015-final.pdf>

cc <http://www.sciencedirect.com/science/article/pii/S0965856415301865>

dd http://mobiliseyourcity.net/wp-content/uploads/sites/2/2017/10/MYC_NUMP.pdf

ee <http://newclimateeconomy.report/workingpapers/wp-content/uploads/sites/5/2018/02/Building-Thriving-Low-Carbon-Cities-An-Overview-Full-Paper-1.pdf>

ff <http://theicct.org/publications/financing-transition-soot-free-urban-bus-fleets-20-megacities>

gg http://www.sutp.org/files/contents/documents/resources/J_Others/GIZ_SUTP_Financing-Sustainable-Urban-Transport_EN.pdf

hh https://ec.europa.eu/transport/themes/urban/urban_mobility/urban_mobility_actions/sump_en

ii <http://www.eltis.org/mobility-plans/sump-concept>

jj http://www.sutp.org/files/contents/documents/resources/B_Technical-Documents/GIZ_SUTP_TD13_Urban-Mobility-Plans_EN.pdf

kk http://sutp.org/files/contents/documents/resources/F_Reading-Lists/SUTP_GIZ_RL_on_Tools_for_SUT_Experts.pdf

ll <http://www.evidence-project.eu/index.php/resources>

mm <http://sumps-up.eu/sump-registry/>

nn https://www.polisnetwork.eu/uploads/Modules/PublicDocuments/dresden-sump_en.pdf

oo <https://tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/the-mayors-transport-strategy>

pp <http://www.smartfreightcentre.org/glec/glec-framework>

qq <https://www.iea.org/publications/freepublications/publication/the-future-of-trucks---implications-for-energy-and-the-environment.html>

rr <http://www.theicct.org/issues/fuel-economy>

ss <http://www.vtpi.org/tdm/index.php>

tt <http://www.urb-i.com/before-after>

uu <https://www.lta.gov.sg/apps/news/page.aspx?c=2&id=b010406e-6edf-4224-9cd1-928706cd6fe7>

vv <http://www.vtpi.org/tdm/index.php>

ww <http://www.measures-odyssey-mure.eu/query-energy-efficiency-policy-transport.asp>

xx http://www.thaiauto.or.th/2012/news/news-detail.asp?news_id=3198

yy <http://www.globalpetrolprices.com/benchmark/>

zz https://www.oecd-ilibrary.org/transport/assessment-and-decision-making-for-sustainable-transport_9789282113134-en

aaa <http://www.vtpi.org/tdm/tdm76.htm>

bbb <http://www.slocat.net/news/1447>

ccc http://transferproject.org/wp-content/uploads/2017/04/GIZ-Climate-Finance-Report_Final_newpic.compressed-2.pdf

ddd <http://transferproject.org/reference-document-on-measurement-reporting-and-verification-mrv-in-the-transport-sector/>

- eee <https://www.eea.europa.eu/data-and-maps/indicators>
- fff <http://www.sum4all.org/>
- ggg <http://www.slocat.net/news/1452>
- hhh <http://transportandclimatechange.org/news-events/asean-region-continues-progress-towards-harmonised-sustainable-transport-indicators/>
- iii https://www.researchgate.net/publication/309243035_Monitoring_Greenhouse_Gas_Emissions_in_Thailand%27s_Transport_Sector_Towards_a_measurement_reporting_and_verification_system_for_the_land_transport_sector
- jjj <http://transportdata.net/en>

4. Recommended actions to make the vision reality

This chapter provides recommendations for actions that can be taken at the ASEAN regional level. Sections 4.1 to 4.6 describe transport, energy and environmental policy domains, while Sections 4.7 to 4.12 cover enabling actions that support these policy domains (see Figure 4.1).

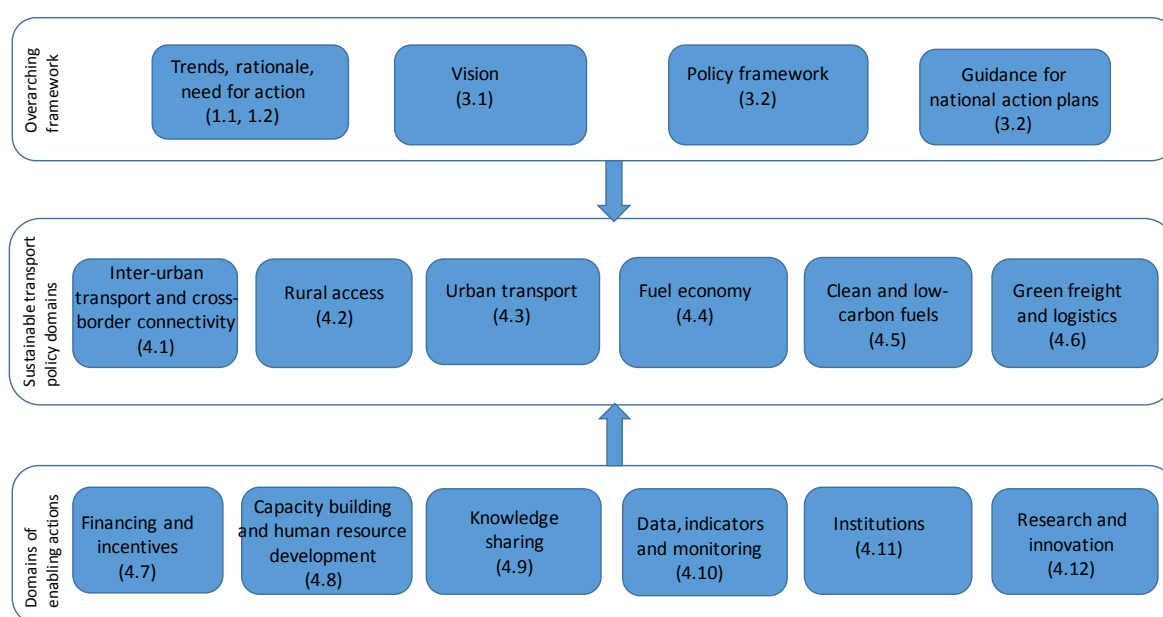


Figure 4-1 Key strategy domains of the ARSSLT, with section numbers.

Together with the recommended elements for national action plans (Table 3.2), these strategy domains address most of the barriers AMS are facing as discussed in Section 2.3. To illustrate this, Table 4.1 shows the most relevant linkages of the strategy domains and the elements to these barriers.

Table 4.1 Linking the ARSSLT domains and national action plan elements to identified barriers

Barrier	Regional strategy domains (Section number)	Elements of national action plans
Policy development and political will	4.1 – 4.6, 4.10, 4.11	All
Institutional	4.12	E.16 (institutional development)
Financial	4.7, 4.11	E.12 (financial instruments), E.13 (investment framework), E.14 (alternative sources of finance)

Barrier	Regional strategy domains (Section number)	Elements of national action plans
Human resources and capacity	4.8	E.7 (national urban transport policy)
Awareness of SLT issues and solutions	4.1 – 4.6, 4.9, 4.12	E.1 (vision), E.3 (current impacts), E.7 (NUMP), E.8 (SUMPs), E.15 (Data, indicators and monitoring)
Social barriers, public acceptance		E.5 – E.8 (NMT, two-wheelers, NUMP, SUMPs)
Implementation and enforcement	4.10	E.15 (Data, indicators and monitoring), E.16 (institutional development)
Data and monitoring	4.10	E.15 (Data, indicators and monitoring)

Some actions are closely related to, and build on, actions and milestones in the KLTSP, while others are additional. The actions under the six policy domains cover *avoid-shift-improve* strategies and support improved access and connectivity²⁸, as shown in Figure 4.2.

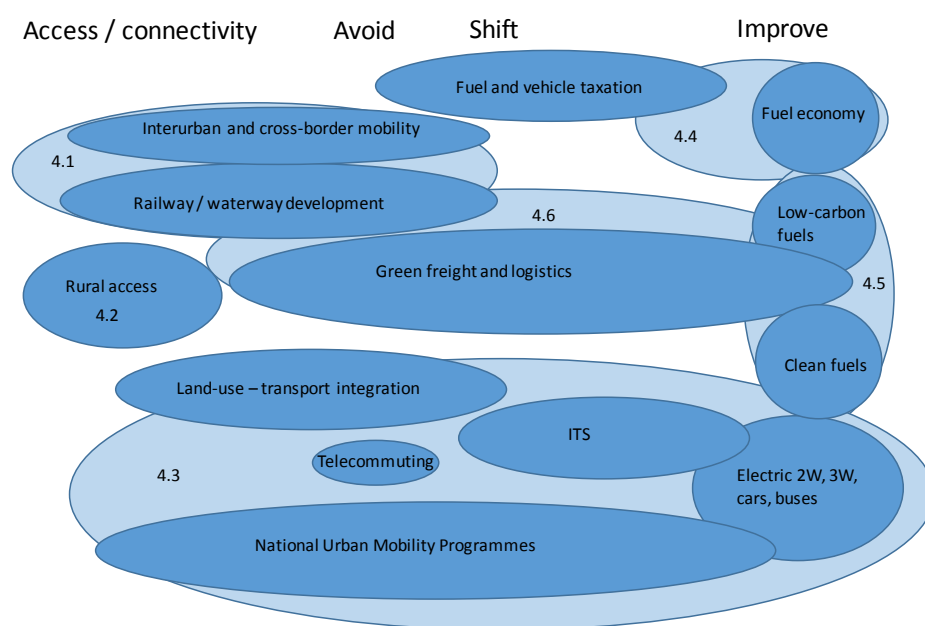


Figure 4.2 ARSSLT policy domains (Section numbers, light blue) and SLT topics (darker blue) organised according to the access + Avoid-Shift-Improve framework

28 This may include:
 Legislative framework, that e.g. defines priority criteria for investments in urban transport, sets technical regulations for bus procurement, etc

- Funding schemes that cities can access to improve public transport
- Capacity building for improved transport and urban planning and training of decision makers and planners
- Monitoring system for cities to assess transport sector's emissions and progress
- Measures improve the governance framework, e.g. to foster metropolitan coordination

4.1. Interurban transport and cross-border connectivity

Improving inter-urban and cross-border infrastructure and regulatory framework for transport by water, rail and road is essential for reducing environmental impact and traffic crashes. However, better infrastructure will also cause increased travel, referred to as induced demand. Thus, if interventions lead to more travel by unsustainable modes, the overall impact could be increased energy use and emissions.

Modal shift from road or air to rail or water, or an avoided future modal shift to unsustainable modes, is an important strategy for reducing energy consumption and emissions. For passenger transport, this requires convenient rail services, including high-speed rail, integration with other modes and convenient access to train stations. Modal shift in freight depends on interconnected infrastructure, efficient operations at modal interchange points and considerations regarding time, cost and flexibility.

These aspects are mostly covered in the KLTSF chapters on Land Transport, Transport Facilitation and Maritime Transport.

Additional actions could include:

- road design guidelines, laws and regulations to promote safety and accessibility improvements for all road users;
- support of action plans on modal shift from road to rail; and
- promotion of modal shift from cars to long-distance bus transport.

4.2. Rural access

Good rural road infrastructure and services promote connectivity and social cohesion and drive commercial activities as well as accessibility to the social and economic opportunities necessary to counteract poverty, isolation and social exclusion. They are also key to reducing food insecurity, hunger, and poverty, as well as improving access to markets, education, and promoting gender equality, thereby contributing to SDGs 1, 2, 3, 4, 5 and 9. More specifically, a rural access index is proposed under SDG indicator 9.1.1 ('Proportion of the rural population who live within 2 km of an all-season road').

Additional finance and commitment is required to both build and maintain rural roads and expand sustainable rural transport services. Rural areas often have a lower priority in transport policies compared with urban areas.

Many rural areas in AMSs are underserved by all-weather roads and transport services, especially in mountainous areas and in the rainy season. Improving this will contribute significantly to social and economic development.

In terms of environmental impacts, rural transport is responsible for a minor share of fuel consumption and GHG emissions, as compared with urban and inter-urban transport, although local air pollution impacts should not be ignored. The latter can be addressed by fuel quality and vehicle emission standards and maintenance.

At the regional level, it is recommended to:

- map existing rural access situation based on standardised methodologies and spatial datasets so as to apply SDG 9.1.1 ('Proportion of the rural population who live within 2 km of an all-season road');
- carry out studies on the impacts of improving rural roads on poverty reduction, education, gender equality, and market access;
- develop a financing framework that prioritises rural roads based on appropriate key performance indicator that connect to the SDGs, and which includes considerations of climate change adaptation (resilience); and
- share knowledge and best practices on vehicle inspection and maintenance policy and facilities in rural areas.

4.3. Urban mobility

ASEAN's urban population is growing rapidly and urban centres are important hubs for freight and logistics. Approximately 50% of transport emissions are attributed to urban transport. Local impacts of transport are often most severe in an urban context. Key *avoid-shift-improve* measures for promoting sustainable urban transport include transport demand management, transit-oriented development, parking management, appropriate pricing, provision of high-quality public transport (road or rail-based), public transport reform, non-motorised transport (walking and cycling), logistics optimisation, hybrid/electric vehicles, clean fleets, etc. All such measures have high social and economic benefits, and have been implemented at scale. These are enabled by sustainable urban mobility plans and can be further supported by national urban transport programmes²⁹. Other elements are institutional arrangements for urban transport planning (including urban transport authorities for metropolitan regions), data and monitoring systems, and decision-making processes on policy, planning and budget allocation.

Recommended regional actions to promote people-oriented urban transport are as follows:

- Developing a vision, goals and milestones for urban mobility (including urban freight).
- Development/adoption of guidance for sustainable urban mobility plans and national urban mobility plans, including a menu of options.
- Provision of tools and evaluation methods that consider all benefits and costs of planning and investment decisions and focus on accessibility rather than vehicular speeds.
- Reward leadership, e.g. award schemes for cities that achieve key progress on sustainable urban mobility.
- ASEAN-wide survey on the current user patterns, quality and user satisfaction of public transport.

²⁹ For a comprehensive set of recommendations for actions at the ASEAN regional level to promote cycling, see the report "Cycling as a Mobility Option for ASEAN cities. Developments in Bangkok and Manila and regional policy options" by GIZ/ASEAN (available upon request; public report covering national and local policy options available here: https://www.researchgate.net/publication/311844437_Cycling_as_a_Mobility_Option_for_ASEAN_Megacities_Developments_in_Bangkok_and_Metro_Manila)

- Study on costs and benefits of key policies and measures in ASEAN, including electric two and three wheelers and non-motorised transport.
- Development of technical standards for key technologies.
- Development of planning and design guidelines for bicycle infrastructure such as cycle tracks and lanes and intersections in different urban and non-urban contexts, which can be included in national road design manuals³⁰.
- Setting up and maintaining knowledge networks and/or working group on urban mobility, including policymakers, academia and other stakeholders.

Given the key role two-wheelers play in many ASEAN countries in providing convenient, affordable, equitable and space-efficient accessibility, as well as their contribution to air pollution and noise, electric two-wheelers should be promoted and barriers to their adoption reduced. It is a mature and cost-effective mobility option, and saves energy and CO₂ emissions compared to conventional motorcycles in any electricity grid, resulting in a substantial potential for savings in GHG and local air pollution in all AMSs. However, there is a lack of attention from policymakers, warranting specific focus on the topic in this Strategy. Policy options include technology regulations, financial incentives, access restrictions for conventional motorcycles, dedicated road lanes for two-wheelers and awareness raising. A shift from conventional two-wheelers to cars should not be promoted. Furthermore, road crashes are a key issue for two-wheelers, which the ASEAN Road Safety Strategy aims to address.

4.4. Fuel economy

Fuel economy improvements for vehicles have high benefits for the economy, individual drivers and the environment. The overall lower efficiency of vehicles in the ASEAN region compared with other markets essentially means drivers are paying more for fuel than necessary. Fuel economy can be promoted by labelling, standards and incentives, and some AMSs are developing such policies, with varying levels of ambition. While noting significant differences in national circumstances, a regional approach will save costs, improve competitiveness of industry increases attractiveness for investors, and help faster implementation of policies and higher realised savings. Higher standards also facilitate innovation. As of 2017, more than 85% of the global light-duty vehicle (LDV) market was subject to fuel economy regulation.

In addition to cars, a large potential for energy and cost savings exists in improving the fuel efficiency of motorcycles and trucks.

KLTSP action ST-1.3 includes the following milestones:

- Establish a platform to discuss matters related to fuel economy for the transport sector. It is suggested to continue the existing Fuel Economy Platform.

³⁰ Entitled "ASEAN Fuel Economy Roadmap for Transport Sector 2018-2025: with focus on Light Duty Vehicles". This paragraph will be updated to reflect the fuel economy roadmap final version

- A Fuel Economy Roadmap. In addition to presenting a global and regional overview, technical background, a policy toolbox, a barrier analysis, and an impact assessment, the Roadmap³¹ will include the following regional elements:
 - o A vision for a fuel-efficient ASEAN LDV market.
 - o Definition of an aspirational LDV fuel economy target.
 - o Definition of indicators and methodologies.
 - o Regional cooperation, national action and policy leadership.
 - o Regional alignment of fuel economy label information.
 - o Introduction or enhancement of fuel economy or CO₂ emissions based fiscal policies.
 - o Development of an ASEAN LDV fuel economy standard policy.
- Support for development and adoption of nationally appropriate policies for fuel economy policies. Such supportive actions can take the form of the six actions mentioned above, or be based on them.

4.5. Clean and low-carbon fuels

Clean fuels are considered to be those that contain low concentrations of substances that contribute to emissions of air pollutants such as particulate matter, nitrogen oxides, volatile organic compounds, carbon monoxide and sulphur dioxide. Clean fuels are required for the implementation of vehicle-emission standards such as the Euro standards. ASEAN countries currently have varying fuel quality and emission standards. Steps towards more harmonised fuel-quality standards would pave the way for vehicle-emission standards and thereby significantly contribute to better air quality, as well as supporting fuel distribution and automotive competitiveness. At a workshop organised by Clean Air Asia in 2016, it was acknowledged that for ASEAN, the benefits of harmonisation lie in increased cross-border trade, greater consumer confidence in fuel throughout the region, and a reduction in exhaust emissions and the accompanying health risks.

Several AMSs are using biofuels such as biodiesel and ethanol, to varying degrees. A regional approach to this topic is justified, given the potential role of biofuels in reducing emissions in various transport modes and vehicle types, and given the sustainability issues associated with biofuel production.

Recommended regional actions include:

- a study of fuel quality and vehicle emission standards, including impacts on human health and the environment and green growth;
- dialogues and meetings on options for harmonisation of fuel quality standards in the region;
- development of regional sustainability criteria for biofuels³²;
- guidelines for assessment of environmental and social impacts of alternative fuels;

³¹ This aspect was also touched upon in previous plans on ASEAN Cooperation on Science and Technology, and the ASEAN Plan of Action on Science and Technology 2016-2025 includes an activity “Capacity Building and Networking on Biofuels from Aquatic Algae”

³² Milestones ST-1.4.4 (best practices summary report) and ST-1.4.5 (checklist guide on green logistics), supported by AJTP, can be part of this strategy.

- promotion of second-generation biofuels, which do not compete with food production and have low life-cycle emission, e.g. by targets and convening policy dialogues; and
- a regional platform on electric vehicles to discuss and develop standards for charging infrastructure and environmentally sound methods to recycle and dispose of batteries.

4.6. Green freight and logistics

Transport of goods is responsible for a substantial – and in most ASEAN countries, growing – share of transport energy consumption. Globally, freight land transport CO₂ emissions could exceed that of land passenger transport by 2030, and heavy-duty vehicles are responsible for a large share of black-carbon emissions, a key air pollutant and short-lived climate pollutant. With their high fuel consumption, freight vehicles are attractive targets for policy action. A range of policies and measures can help to increase energy efficiency and reduce emissions. In other words, the concept of green freight and logistics can promote the right technologies, policies and practices for the freight sector to help cut costs, save energy and benefit the environment.

Green freight transport is a relatively new topic for the region and needs more attention in policymaking, and in terms of institutional responsibility it is often a fragmented and ‘homeless’ topic.

Regional cooperation for a greener freight system is vital because the transport of goods spans across borders. As AMS start and scale up their national green freight initiatives, coordination is important to avoid a scenario in which the differences in rules between countries inhibit efficient cross-border transport and the expansion of supply chains in an integrating ASEAN region. Furthermore, a regional perspective is required for building an integrated intermodal transport and logistics system that optimises the comparative advantages of each mode of transport and enhances regional connectivity. KLTSP milestone ST-1.4.2 is ‘develop green freight and logistics strategy’, which is here addressed³³.

Green freight policies and measures can be distinguished into three categories:

- Logistics optimisation, e.g. by reducing empty hauling, or implementing logistics centres and freight exchanges.
- Modal shift from road to rail and waterways and maritime transport.
- Greening of trucks, by improving efficiency, low rolling-resistance tyres, alternative fuels, and eco-driving.

These policies and measures can be enabled by national action plans and programmes.

The regional strategy on green freight and logistics could include the following recommended actions:

³³ <http://www.globalgreenfreight.org/action-plan>

National action plans and programmes

- Cooperation towards national green freight programmes or national action plans, or templates, that are aligned in terms of appropriate technologies, logistics practices, or financial mechanisms. This may include knowledge exchanges with other world regions, e.g. in the framework of the Global Green Freight Action Plan³⁴.
- Support for a consistent set of indicators, data collection systems and benchmarking to monitor progress towards green freight, based on existing methodologies such as those developed by the Global Logistics Emission Council (GLEC)³⁵.
- Provision of capacity building and training materials and programmes that can be used by the private sector, governments and academia.

Logistics optimisation

- Knowledge and best practice sharing on key options to optimise vehicle utilisation and routes.
- Identify key actors and leaders in private sector, government and academia, and promote partnerships.
- Develop measures to strengthen logistics in urban areas: Examples include last-mile efficiency measures, re-timing urban logistics, low emission vehicles including smaller electric vehicles, and urban consolidation centres.

Modal shift

- Starting from the ASEAN Framework Agreement on Multimodal Transport³⁶, identify regional policy options that further enhance regional connectivity based on rail and waterways. This could include infrastructure facilities, harmonising technical and operational standards, simplifying and harmonising documentation and formalities, and sharing best practices.
- Study financing options for multimodal transport infrastructure.
- Promote green freight corridors³⁷ that enhance multimodality and minimise impact of freight activity and infrastructure on the environment.

Greening of trucks

- Green freight labelling scheme that rates and recognises freight forwarders' environmental performance.

³⁴ The GLEC framework for GHG emission methodologies is a guide for shippers, carriers and logistics service providers on how to report emissions from logistics operations, see <http://www.smartfreightcentre.org/glec/glec-framework>

³⁵ And, where relevant, other agreements such as the ASEAN Framework Agreement of Facilitation of Goods in Transit

³⁶ Green freight corridors are characterised by a concentration of freight traffic between major hubs and by relatively long distances. Economic, environmental and social aspects are considered by: Promoting co-modality Adequate transshipment facilities at strategic locations, and supply points initially for bio-fuels and, later, for other forms of green propulsion Experimentation with environmentally-friendly, innovative transport units, and with advanced ITS application Fair and non-discriminatory access to corridors and transshipment facilities

³⁷ Metro lines in Hyderabad, India, have been financed entirely under a PPP scheme, with 50% of the revenues coming from property development (land value capture) and advertising ([link](#))

- Standards, policies and incentives to promote fleet modernisation and fuel efficiency measures for trucks, e.g. low rolling-resistance tyres, eco-driving, telematics, and anti-idling devices.
- Identification of key technologies and development of a regional technology roadmap that is appropriate for AMS, recognising differences in freight sector structure and resource availability.
- Provision of infrastructure for alternative vehicle and fuel technologies to complement action on energy efficiency.

4.7. Financing and economic instruments

Every year, governments, private entities and citizens make numerous transport investment decisions. This includes building, maintaining and redesigning roads, rail construction, acquiring clean buses or trucks, retrofitting old trucks, building vehicle production facilities, conducting research programmes into public transport improvements, or purchasing a new bicycle or motor vehicle. Choosing the low-carbon options for all these decisions would often bring cost savings, but various resistance factors mean that such a shift towards a low-carbon trajectory will in practice not happen without intervention. The challenge is to shift these larger and smaller choices away from investments that maintain an unsustainable transport system and towards one that supports sustainable development.

Focusing on the public sector, one should distinguish between infrastructure investments financed from the public budget, and economic instruments aiming to influence decisions by business and citizens, such as subsidies and taxes. The latter are justified based on the principle of internalisation of external costs, and is often a source of finance for infrastructure.

At the national or local level, shifting investments to sustainable transport and increasing financial resources may be achieved by the following:

- Setting priorities for allocation of public budget that favour investment in options such as public transport, active transport, rail and waterways. This can be justified based on sustainable development objectives.
- Application of the transport-finances-transport, or user-pays, principle, in which users of transport infrastructure pay for its use, e.g. through tolling, road pricing, congestion pricing, parking pricing, or the use of vehicle purchase or registration taxes for transport investments.
- Polluter-pays principle, in which the external costs of transport (air pollution, climate change, noise, land take, energy security, etc.), in particular private vehicles, are reflected in the cost of driving. In particular, vehicle taxation based on energy or CO₂ performance can be powerful, e.g. feebate schemes.
- Appropriate taxing of fuels. Currently many AMSs do not or hardly tax diesel and petrol, or provide subsidies, distorting the market and provide incentives for the development of unsustainable transport.
- Land value capture, e.g. from property development around planned mass transit stations.

- Public-private partnerships (related to ST-2.2.1), e.g. in urban rail infrastructure³⁸ or bike sharing.
- Use of green bonds, which can be used particularly for rail infrastructure, but also urban public transport or low-carbon vehicles.
- Climate finance instruments such as Nationally Appropriate Mitigation Actions, the Clean Technology Fund, the Global Environmental Facility, the Joint Crediting Mechanism, and the Green Climate Fund.

ASEAN could provide support by the following recommended actions:

- Studies on the external costs of transport and propose a common approach for internalisation of such costs (including air pollution and GHG).
- Studies on how land-value capture can be pursued for urban public transport projects (can be part of ST-2.5.2 on integration of land-use planning and transport).
- Studies on the extent to which current fiscal policies are compatible with sustainable transport, and guidance on how financial instruments, including public-private partnerships, can be used to advance sustainable transport.
- Development of tools and assessment methods, decision-support systems for policy, planning and for budget allocation.

4.8. Capacity building and human resource development

Lack of capacity and technical tools to develop and implement policies and plans, and in some cases lack of awareness of issues and solutions among decision-makers, inhibit sustainable transport development. Training for transport decision makers, professionals and engineers, and support for policy development, implementation and monitoring are required. KLTSP milestone ST-3.1.2 calls for trainings in the field of sustainable transport for representatives of transport-related agencies and ministries.

Further recommended regional actions include:

- A training needs analysis for key decision makers, given the challenges of ensuring high quality and reaching target group.
- A regional, systematic approach (e.g. train-the-trainers) for training development and delivery, and the integration of this into existing institutions.
- Technical support for policy development in the various domains of sustainable land transport (as described in Section 4.1-4.7).
- Enhancement of the theoretical basis and application of sustainable transport principles and planning in university curricula, particularly related to civil engineering and transport planning.
- Enhanced involvement of key universities and research institutions as regional training hubs.

³⁸ In the EU, www.eltis.org, is the main observatory for urban mobility, providing information, facts and figures, reports, training materials, good practices, tools, and communication channels. It is financed by the DG for Mobility and Transport.

4.9. Knowledge sharing

In addition to capacity building, a large potential exists for cross-country learning and development of appropriate solutions through knowledge sharing, and disseminating the large body of existing knowledge. While noting differences in national and local conditions, this can take place both between ASEAN countries and cities, as well as with non-ASEAN countries.

Recommended regional actions include:

- A platform for sustainable transport knowledge sharing (following KLTSP milestone ST-3.1.1) such as a community of practice or ASEAN Knowledge Network, where experts, policymakers and relevant stakeholders can exchange information on a voluntary basis on proposed topics. This can work through both online means as well as meetings.
- Best practice sharing programmes, which may involve publication of concise knowledge products on successful policies and programmes, utilisation of social media, and exchange of ideas between policymakers through events, online networks and site visits. Integration with training development (4.8) and regional events (4.12) is essential.
- A dedicated website or portal on sustainable land transport in ASEAN, possibly further developed into an ASEAN Transport Observatory³⁹. Such a website or observatory could collect and, if appropriate, make publicly available: basic transport data organised by key indicators (see section 4.10); transport policy documents and developments⁴⁰; key institutions in AMSs; best practice; ASEAN regional transport resources; training materials; international literature and guidance appropriate for AMSs; and relevant events.
- A journal or magazine, with attractive, well-illustrated short articles. This could cater to a broad audience including policymakers, industry, economists, environmental groups, general public, media etc., and include relevant developments and news.

4.10. Data, indicators and monitoring (MRV)

Within the public policy cycle, a key role is played by data, scenario development and monitoring at the stages of agenda setting, policy formulation and evaluation. Good data enables informed choices, which often involve large investments and/or significant impacts on different groups in society or the economy. Data and monitoring are essential for successful policies, and the costs involved are often low compared to the overall investments at stake. They are also critical for developing awareness among both the public and policymakers on issues of public interest. An informed public can be a starting point for the development of policies.

In addition, better data and monitoring systems help implementation of global agendas of the Sustainable Development Goals and the Paris Agreement on Climate Change, in both

³⁹ This can be aligned with KLTSP ST-1.2.1: Publish an ASEAN database of sustainable transport initiatives

⁴⁰ Guidelines on Sustainable Land Transport Indicators on Energy Efficiency and GHG Emissions in the ASEAN

of which transport is a key sector. Countries report progress towards these agendas in their Voluntary National Reviews and the Biennial Update Reports, (including Measurement, Reporting and Verification, MRV) respectively.

A common and harmonised approach across ASEAN would provide benefits for monitoring progress towards common goals related to transport and climate change, avoid duplicating research work for developing monitoring systems, and enable cross-country learning as regards the effectiveness of policies. In connection to KLTSP ST-2.3 ('Develop monitoring framework and harmonised approach for indicators on energy and GHG emissions in the transport sector'), it is encouraged for the ASEAN to develop guidelines⁴¹ and to adopt an action plan on sustainable land transport indicators.

A key point is that implementing such a monitoring system should not depend on having good data for all indicators. It is important to start building databases and carry out monitoring based on existing data and accept that many data may be lacking, and over time improve it.

4.11. Research and innovation

Clean technology and innovation are key in enabling sustainable transport policies. Transport currently features to a limited extent in ASEAN research programmes such as the ASEAN Science and Technology Network and the ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025. To improve the knowledge base and harness the potential for sustainable transport innovations and research, recommended actions include the following:

- Inclusion of technologies that enable sustainable transport systems (e.g. ITS, EVs, vehicle sharing) in the programmes and action plans under the Strategic Action Plans of relevant ASEAN sectoral bodies.
- Development of common standards for new technologies such as EVs.
- Promotion of policy research, notably to enhance the knowledge base on the relation between land-use and transport planning and policy, and the potential, costs and benefits of low-carbon transport options: The Eastern Asia Society of Transportation Studies could play a role here.
- Regional research partnerships and exchange of academics/scientists, e.g. by promoting sustainable transport under the ASEAN University Network.

4.12. Institutions and events

Integration of transport and climate change issues, and of sustainability more widely, through an effective institutional structure is essential. Various options exist for this at national level, and the institutional structure can be adapted to each country's situation. Allocation of sufficient dedicated staff to cover sustainable transport policies is key.

Implementation of the Regional Strategy is challenging in the current institutional structure for ASEAN transport cooperation, which is characterised by limited staff in the ASEAN

⁴¹ Following the example of e.g. the ASEAN Tourism Forum

Secretariat, and support by international organisations on a programme/project basis, which limits effectiveness, independence and the development of a long-term vision. A dedicated centre, including a number of dedicated staff, could carry out, coordinate or organise tasks in particular to deliver actions under 4.7-4.11, specifically:

- gather data and policy knowledge;
- carry out studies and analysis;
- organise events and trainings;
- provide support for ASEAN Working Groups, AMS and ASEAN cities;
- implement the regional framework for monitoring SLT; and
- support development of PPP projects.

Options include:

- A coordinating body or an entity within an existing institution. An example is the ASEAN Road Safety Centre, which is part of the Malaysia Institute for Road Safety. The Centre organises the conferences on ASEAN road safety, has developed the ASEAN Road Safety Strategy, implements a car assessment programme, and works with multiple AMS to support their strategies at national level.
 - Advantage: builds on existing institution, requires less funding, access to expertise.
 - Disadvantage: potentially limited mandate and capacity.
- A centre of excellence, e.g. in a university.
 - Advantage: no need to set up new institution, requires less funding, can link with training activities.
 - Disadvantage: lack of capacity and experience to implement actions, lack of mandate, risks becoming dysfunctional.

For enhancing knowledge sharing, strengthening regional networks and exchange of ideas between policy makers and other stakeholders, the following are options for regional events:

- Hold a dedicated ASEAN Mobility Conference, or use existing initiatives such as the annual ASEAN Connectivity Symposium, the biennial ADB Transport Forum, the UNCRD EST conferences, or the EASTS conferences.
- Hold an ASEAN Transport Week⁴², which could also include wider stakeholder groups, campaigns, media, awards for cities (e.g. ASEAN Transport Awards).

In order to ensure these regional events are held on a continuing basis, funding⁴³ will be required.

⁴² Under energy and tourism sectors, ASEAN funds have already been established.

⁴³ SLT is relevant to AEC and ASCC.

5. Implementation arrangements

5.1. Institutional structure

The implementation of this Strategy and its recommended actions at the regional level is guided and overseen primarily by the ASEAN Land Transport Working Group (LTWG), while the ASEAN Transport Facilitation Working Group (TFWG) has a key role particularly in the domain of green freight and logistics. The ASEAN Transport Ministers and Senior Transport Officials Meeting will provide further oversight.

Coordination and collaboration, where relevant and appropriate, may take place with other ASEAN bodies such as the Energy-Efficiency & Conservation Sub-Sector Network, the ASEAN Centre for Energy, the ASEAN Working Group for Environmentally Sustainable Cities, the ASEAN Working Group on Climate Change⁴⁴, the ASEAN Committee on Science and Technology, and the ASEAN Coordinating Committee on Connectivity.

Existing organisations, and a proposed entity within an existing institution⁴⁵ (4.12), can support implementation of specific actions, particularly on capacity building, knowledge sharing and data/indicators, as well as carrying out studies and organisation of events.

LTWG and members of the Expert Group on Sustainable Land Transport (EGSLT) are the link between the regional strategy and national policies and strategies. There needs to be translation of, and reference to, the relevant parts of the Regional Strategy in national policies, i.e. national actions need to be in line with the Strategy. Similarly, developments in national circumstances and policy can be reflected in the recommended regional actions.

5.2. Implementing the actions

For the regional actions recommended in Chapter 4, regional action plans can be made. Where actions are similar to or partially covered by KLTSP milestones, action plans can be integrated.

44 Following the example of the ASEAN Road Safety Centre

45 The following SDG indicators are directly or indirectly related to transport:

3.6.1 Death rate due to road traffic injuries

7.3.1 Energy intensity measured in terms of primary energy and GDP

9.1.1 Proportion of the rural population who live within 2 km of an all-season road

9.1.2 Passenger and freight volumes, by mode of transport

11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities

11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)

12.c.1 Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels

13.2.1 Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)

17.6.1 Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation

While we can consider making use of external sources, AMS will have to provide sufficient resources to ensure effective and continuing implementation of this Strategy.

External sources include dialogue partners and international organisations. There should be collaboration and coordination with existing and new regional initiatives and cooperation programmes, such as the ASEAN-Japan Transport Partnership (including ASEAN-Japan Experts Group Meeting on Logistics or AJ-EGML), UNESCAP, and the Asian Development Bank.

At the country level of AMS, development of national strategies on sustainable transport can be done using the guidance in this Regional Strategy, either for dedicated sustainable transport strategies or through integration into broader transport development strategies or climate change action plans.

5.3. Reporting, monitoring and review

Reporting and monitoring of this Strategy could be done using qualitative and quantitative indicators. First, progress and output indicators can track the implementation of actions, which are linked to the KLTSP monitoring system and the AEC Compliance Mechanism if possible. These can be reported in LTWG meetings, and/or at STOM and ATM. AMS may share progress on their monitoring of SDG targets and indicators⁴⁶ at the ASEAN meetings whenever relevant to the monitoring of the implementation of this Strategy.

Second, the quantitative indicators that are suggested for AMS SLT Indicators⁴⁷ can be used as well at the regional level for monitoring progress towards the vision.

This Regional Strategy could be reviewed and, if deemed necessary and appropriate, updated, prior to 2025.

46 See Guidelines on Sustainable Land Transport Indicators on Energy Efficiency and GHG Emissions in the ASEAN.

47 <http://transportandclimatechange.org/news-events/aseans-transport-sector-contributions-to-combating-climate-change-indc-analysis/>

Annex I. AMS Nationally Determined Contributions and transport sector actions (Source: 5th ASEAN State of the Environment; SLoCaT; TCC project⁴⁸)

Country	Base Year Data	Base Year Country CO ₂ e Emissions (Mt)	Projected Country CO ₂ e Emissions (MT) BAU	Projected Country CO ₂ e Emissions (MT) with Interventions	Economy Wide CO ₂ e Emissions Target			Transport Sector CO ₂ e Emissions Target	Interventions Proposed in Transport Sector
					Unconditional Reduction	Conditional Reduction	Any Other Target Mentioned		
					Reduction of Greenhouse Gas Emissions	Reduction of Greenhouse Gas Emissions			
Brunei Darussalam	2010	10.2 (7.4 nett)		63% reduction in energy consumption below BAU in 2035		10% renewable energy in power production; increase forest cover from 41 to 55%		Reduce CO ₂ emissions from morning peak hour vehicle use by 40% by 2035 compared to a BAU scenario	The country is 'considering setting fuel consumption targets for new vehicles that are similar to those in the EU, such as 17.2 km/litre by 2020 (EU 2016 target equivalent) and at 21.3 km/litre by 2025 (EU 2020 target equivalent). technologies such as electric, hybrid and more fuel-efficient conventional engine vehicles are also being promoted'. Increase of public transport from currently 1% to 22% modal share by BRT, increasing bus fleet, as well as walking, cycling and Urban Smart Travel Zone, parking management. Land-use transport integration, and a review of fuel subsidies are other key policies, as set out in the Land Transport Master Plan 2014. In a BAU scenario, transport emissions would increase from 1.17 MtCO ₂ e in 2010 by 178% in 2035.
Cambodia			11.60	8.50		27% below 2030 BAU		0.39 Mt or 3% reduction from 2030 BAU	Promoting mass public transport. Improving operation and maintenance of vehicles through motor vehicle inspection and eco-driving, and the increased use of hybrid cars, electric vehicles and bicycles.

48 <http://transportandclimatechange.org/news-events/aseans-transport-sector-contributions-to-combating-climate-change-indc-analysis/>

Country	Base Year Data	Base Year Country CO ₂ e Emissions (Mt)	Projected Country CO ₂ e Emissions (MT) BAU	Projected Country CO ₂ e Emissions (MT) with Interventions	Economy Wide CO ₂ e Emissions Target	Transport Sector CO ₂ e Emissions Target	Interventions Proposed in Transport Sector	
Indonesia	2010	1453	2896	1787 - 2034	26% below BAU scenario by 2020 and 29% by 2030	Up to 41% reduction of emissions by 2030, subject to availability of international support for finance, technology transfer and development and capacity building.	In the primary energy mix, new and renewable energy at least 23% in 2025 and at least 31% in 2050; and oil should be less than 25% in 2025 and less than 20% in 2050	Implementation of biofuel in transportation sector (Mandatory B30).
Lao PDR	2011					Cumulative energy sector reduction to 2025 of 1468 MtCO ₂ e; 'Lao PDR has identified a number of actions which it intends to undertake in order reduce its future GHG emissions, subject to the provision of international support.'	Reductions in Road network development is 33 ktCO ₂ /pa, and 158 ktCO ₂ /pa for public transport development	For transport fuels the objective is to increase the share of biofuels to meet 10% of the demand for transport fuels by 2025. In one NAMA feasibility study, road network development is identified as a first objective which will reduce the number of kilometres and GHG emissions by 33 ktCO ₂ /pa. The second objective is to increase the use of public transport compared to the business as usual (BAU), estimated emission reductions 158 ktCO ₂ /pa. In addition to a reduction in GHG emissions the activity will lead to a reduction in NOX and SOx emissions which will have significant co-benefits such as improvement in air quality which in turn will have positive impacts on human health.

Country	Base Year Data	Base Year Country CO ₂ e Emissions (Mt)	Projected Country CO ₂ e Emissions (MT) BAU	Projected Country CO ₂ e Emissions (MT) with Interventions	Economy Wide CO ₂ e Emissions Target	Transport Sector CO ₂ e Emissions Target	Interventions Proposed in Transport Sector
Malaysia	2005	288.66	n/a	n/a	35% emission intensity reduction compared to 2005 (0.531 tCO ₂ -e/1000 RM)	45% emission intensity reduction compared to 2005	The National Biofuel Policy 2006 already laid the groundwork for the development and use of biofuels. The National Biofuel Industry Act 2007 was put in place to regulate the biofuel industry and to promote the mandatory use of the B5 domestic blend of 5% palm biodiesel and 95% fossil fuel diesel. At the end of 2014, Malaysia had also introduced the bio-diesel B7 Programme; further mentions 'rail based mass transit systems' in the context of technology cost.
Myanmar						Myanmar would undertake mitigation actions in Section 2.1 in line with its sustainable development needs, conditional on availability of international support, as its contribution to global action to reduce future emissions of GHG	Policies such as the National Transport Master Plan and National Implementation Plan on Environmental Improvement in the Transport Sector are being developed. Cities, like Yangon, are studying options for sustainable transport development for example, and civil society organisations are engaged in proposing solutions to challenges for implementation.
Philippines					The Philippines 'Intends to undertake GHG (CO ₂ e) emissions reduction of about 70% by 2030 relative to its BAU scenario of 2000-2030.'		No Information

Country	Base Year Data	Base Year Country CO ₂ e Emissions (Mt)	Projected Country CO ₂ e Emissions (MT) BAU	Projected Country CO ₂ e Emissions (MT) with Interventions	Economy Wide CO ₂ e Emissions Target	Transport Sector CO ₂ e Emissions Target	Interventions Proposed in Transport Sector
Singapore	2005	40.90			Reduce its emissions intensity by 36% from 2005 levels by 2030, and stabilise its emissions with the aim of peaking around 2030	16% below BAU by 2020	no information
Thailand	2005		555		Intends to reduce its greenhouse gas emissions by 20% from the projected business-as-usual (BAU) level by 2030.	The level of contribution could increase up to 25%	At COP20 in Lima, Thailand pledged its pre-2020 contribution of 7-20% GHG emission reduction by 2020 below BAU in the energy and transport sectors. The Environmentally Sustainable Transport System Plan (2013-2030) also proposes ambitious actions to promote road-to-rail modal shift for both freight and passenger transport, which include extensions of mass rapid transit lines, construction of double-track railways and improvement of bus transit in the Bangkok Metro areas. A vehicle tax scheme based on CO ₂ emissions was also approved to become effective from 2016.
Viet Nam	2010	246.80	787	590	'With domestic resources, by 2030 will reduce GHG emissions by 8% compared to BAU'	25% below BAU in 2030	Emission intensity per unit of GDP will be reduced by 20-30% compared to the 2010 levels Develop public passenger transport, especially fast modes of transit in large urban centres; 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; Encourage buses and taxis to use compressed natural gas and liquefied petroleum gas (LPG); Implement management solutions for fuel quality, emissions standards, and vehicle maintenance.

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