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**DATA AND INDICATORS FOR ENVIRONMENTALLY SUSTAINABLE TRANSPORT
UNDER THE BANGKOK 2020 DECLARATION**

(EST Session 1 of the Provisional Programme)

Final Draft

This background paper has been prepared by Bert Fabian and Kaye Patdu of the Clean Air Initiative for Asian Cities (CAI-Asia) Center, for the Sixth Regional EST Forum in Asia. The views expressed herein are those of the authors only and do not necessarily reflect the views of the United Nations.

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UNCRD and CAI-Asia, 2011. "Data and Indicators for Sustainable Transport under the Bangkok 2020 Declaration". Pasig City, Philippines.

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About CAI-Asia

The Clean Air Initiative for Asian Cities (CAI-Asia) promotes better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors. CAI-Asia was established in 2001 by the Asian Development Bank, the World Bank and USAID, and is part of a global initiative that includes CAI-LAC (Latin American Cities) and CAI-SSA (Sub-Saharan Africa).

Since 2007, this multi-stakeholder initiative is a registered UN Type II Partnership with more than 200 organizational members and eight Country Networks (China, India, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, and Vietnam). The CAI-Asia Center is its secretariat, a non-profit organization headquartered in Manila, Philippines with offices in China and India. Individuals can join CAI-Asia by registering at the Clean Air Portal: www.cleanairinitiative.org. Its flagship event, the Better Air Quality conference, brings together over 500 air quality stakeholders.

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
ESCAP	United Nations Economic and Social Commission for Asia-Pacific
EST	Environmentally Sustainable Transport
GHG	Greenhouse gas
IEA	International Energy Agency
MC	Member countries
MRV	Measurable, reportable, and verifiable
NMT	Non-motorized transport
OECD	Organisation for Economic Co-operation and Development
UNCRD	United Nations Centre for Regional Development
UNFCCC	United Nations Framework on Climate Change Convention

EXECUTIVE SUMMARY

The Bangkok 2020 Declaration is a significant milestone for EST as it is the first time Asian governments and other stakeholders in Asia endorsed a declaration which incorporates a comprehensive set of goals (20 EST Goals) under different strategies concerning EST within a clear time frame (2010-2020). It is also the first regional policy declaration on EST in Asia that includes an initial list of performance indicators for each strategic goal as guidelines for governments to voluntarily benchmark progress towards establishing sustainable transport systems.

A well-designed set of performance indicators is critical to help member countries track its achievements under each goal of the Declaration. Such indicators also need to have a solid base in valid and consistent statistical transport data for it to be reliable and useful. However, recent studies that looked at data on transport in Asian countries generally conclude that transport data are limited in availability and quality, not regularly collected or maintained in central (public) databases, and inconsistent between countries and organizations that collect data.

Transport activity data are often not routinely collected, or if they are collected, are often limited in scope or outdated. To move towards addressing data issues, it is necessary to understand data sources and factors influencing availability of transport data. It is observed that the type of data generated or made available is primarily influenced by its intended use. Traditionally, policy, planning, enforcement and regulation have been the main drivers in data collection. Often, data needed for these purposes are routinely collected or by demand (policy and planning need).

An integrated and systematic approach to regular collection and maintenance of transport data is generally lacking in most of the Asian countries. One of the reasons is that the transport sector is highly fragmented and thus the investment needed to regularly collect and maintain data is high. It is important to know and understand the mandates, linkages, and inter-relationships of various national institutions, like ministries of transport, rail, energy, public works, environment, economic development and statistics offices, on the availability and quality of transport data. Many transport-related data are actually available but not consolidated and made publicly available.

Definitions and methodologies for data collection also greatly vary per country and as such it is also important to have some kind of harmonization in the region. And while the importance of reliable transport data is clear, the amount of investment allocated for data collection, processing and management is also often limited.

From the initial list of 102 indicators, the study conducted an initial short-listing process of the indicators primarily based on its measurability, leading to a reduced list of 75 indicators. These indicators were then assessed based on their data availability for the 22 Member Countries. Three factors were considered for this analysis: availability, accessibility and quality.

The UNCRD EST process and the Bangkok 2020 Declaration have clearly contributed to mainstreaming an integrated EST approach in Asia. The development and maintenance of indicators to track the progress of the implementation of the Bangkok 2020 Goals will be able to help individual countries in measuring their progress and also in learning from other countries.

The following recommendations were identified in the further development and adoption of EST indicators:

- **Establishment of a regional reporting mechanism** – can encourage countries to better maintain their transport databases, similar to reporting by OECD countries to IEA countries, and/or the requirement of countries in reporting to UNFCCC on their greenhouse gas emissions. The UNCRD in coordination with other UN bodies, like ESCAP, can take on the lead role of maintaining the indicators set forth under the Bangkok 2020 Declaration with appropriate support from participating countries.
- **Harmonized definitions, classification and methodologies** – can contribute to a more structured collection of transport related information, particularly for transport activity data, vehicle classification, and establishment of a national database. This includes a harmonized definition of relevant statistics.
- **Establishment of a national focal point on transport** – can facilitate the collation of relevant transport data from various government agencies and other organizations. Transport ministries are usually expected to take on this role but it is important that sufficient linkages with existing national processes like National Census Data collected by Statistical Departments or offices will be necessary. Including relevant transport questions in the national census can provide national transport activity data on a regular basis. The establishment of national transport household surveys as a supplement to national censuses should also be considered.
- **Thorough assessment of the indicators, including development of criteria and guidelines for their derivation and use** – can differ across countries, but adequate guidelines and some level of consistency can help facilitate the tracking of implementation and achievement of countries in operationalizing the Bangkok 2020 EST Goals.

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1. INTRODUCTION

At the Fifth Regional Environmentally Sustainable Transport (EST) Forum in Asia, which was held in Bangkok, Thailand on 23-25 August 2010, 22 countries from Northeast, Southeast, and South Asia¹ as well as international organizations, bilateral and multilateral agencies, nongovernmental organizations (NGOs), research organizations, and sustainable transport experts agreed on the Bangkok 2020 Declaration: Sustainable Transport Goals for 2010-2020 (“Declaration”).² Reflecting a regional political consensus, the Declaration is expected to influence the decisions of governments and various transport stakeholders in the region over the next decade (2010-2020).

The Bangkok 2020 Declaration is a significant milestone for EST as it is the first time Asian governments and other stakeholders in Asia endorsed a declaration which incorporates a comprehensive set of goals (20 EST Goals) under different strategies concerning EST within a clear time frame (2010-2020). It is also the first regional policy declaration on EST in Asia that includes performance indicators for each strategic goal as guidelines for governments to voluntarily benchmark progress towards establishing sustainable transport systems. The Annex of the Declaration provides an initial list of data and indicators for each goal.

A well-designed set of performance indicators is critical to help member countries track its achievements under each goal of the Declaration. These indicators also need to have a solid base in valid and consistent statistical data for it to be reliable and useful.³ Unfortunately, transport-related data and indicators in Asia are limited and have several issues with respect to quality, accuracy, transparency, comprehensiveness, frequency, and consistency of data and indicators exist. Efforts assessing availability and quality of transport data in several Asian countries by a number of regional and international organizations, including a research done by CAI-Asia and ADB (2010), found that transport data is still fragmented and the availability and level of detail greatly depends on the institution or organization carrying out data collection. Furthermore, while performance indicators are useful for the member countries, it is necessary to be aware of the inherent limitations of an indicator for its proper use and interpretation. For instance, indicators are greatly influenced by the data used to derive such indicators.

This study aims to assess the availability of transport and environment data and indicators relevant for the 20 EST goals for each member country, building on existing analysis transport data in Asia. The report on “Implementing the Bangkok 2020 Declaration” (2011) also provides a discussion on the current EST indicators and data availability and the need for a monitoring framework in the implementation of the Bangkok 2020 Declaration.⁴

¹ EST Member Countries: Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, People's Republic of China , Indonesia, India, Japan, Republic of Korea, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, the Philippines, Pakistan, Singapore, Sri Lanka, Thailand, and Viet Nam

² Bangkok 2020 Declaration: Sustainable Transport Goals for 2012-2020. Available online: http://www.uncrd.or.jp/env/5th-regional-est-forum/doc/bangkok_declaration.pdf

³International Atomic Energy Agency (IAEA), UN Department of Economic and Social Affairs, International Energy Agency, Eurostat and European Environment Agency, 2005. “*Energy Indicators for Sustainable Development: Guidelines and Methodologies.*” IAEA, Austria.

2. OVERVIEW OF TRANSPORT DATA IN ASIA⁵

There have been a number of recent initiatives and studies on the availability and quality of transport data in Asia. A list of these initiatives is provided below.

- 2009-2012: World Bank Development Grant Facility (DGF) and the Clean Air Initiative for Asian Cities (CAI-Asia). GHG and Air Pollutant Indicators for Transport and Energy Sectors in Asia. Project information available at <http://cleanairinitiative.org/portal/MeasuringAPandGHGEmissions>
- 2010: CAI-Asia. Transport Data in Asia Study. Conducted on behalf of ADB and included detailed assessment for China, P.R., India, Indonesia, Nepal, Philippines, Pakistan, Sri Lanka, and Vietnam. Project information available at <http://cleanairinitiative.org/portal/TransportDataInitiative>
- 2010. United Nations Department of Economic and Social Affairs (UNDESA) and Partnership for Sustainable, Low Carbon Transport (SLoCaT). The Improvement of Developing Country Transport Data Collection, Analysis and Dissemination. The report is available at http://www.un.org/esa/dsd/resources/res_pdfs/csd-18/csd18_2010_bp11.pdf
- 2010: Center for Clean Air Policy (CCAP). Data & Capacity Needs for Transportation NAMAs: Report 1: Data and Capacity Needs for Transportation NAMAs. The report is available at http://www.ccap.org/docs/resources/925/CCAP_Transport_NAMA_Data_Availability.pdf
- 2009: ADB and CAI-Asia. ADB Sustainable Development Working Paper Series: Transport and Carbon Dioxide Emissions: Forecasts, Options Analysis, and Evaluation. The report is available at <http://cleanairinitiative.org/portal/node/6775>
- 2009: ADB and CAI-Asia. ADB Sustainable Development Working Paper Series: Rethinking Transport and Climate Change. The report is available at <http://cleanairinitiative.org/portal/node/6774>
- 2008: Workshop on Statistics of Asian Traffic and Transportation in Japan, 10-11 March 2008. Presentations are available at http://www.kokudokeikaku.go.jp/wat2/ind_eng.html

These studies generally conclude that transport data are limited in availability and quality, not regularly collected or maintained in central (public) databases, and inconsistent between countries and organizations that collect data. A summary of the main observations on transport data in Asia is provided below.

2.1 Availability of Basic Transport Data in Asia

Data availability differs greatly across the data types

For most Asian countries, there is relatively good data availability for socio-economic, demographic, infrastructure, transport modes, fuel type used, and fuel prices. Emissions inventory data both for air pollution and greenhouse gas emissions are also moderately available but usually only for country and per

⁵ This section borrows from the 2010: Asian Development Bank (ADB) and CAI-Asia: Transport Data in Asia Study and the World Bank Development Grant Facility (DGF) and CAI-Asia GHG and Air Pollutant Indicators for Transport and Energy Sectors in Asia

sector total. To some extent, air pollution emissions inventories and source apportionment are generally available at the city level.

Transport activity data are often not routinely collected, or if they are collected, are often limited in scope or outdated. Most are collected on an *ad hoc* basis for project specific purposes. Aside from household and industries/commerce, energy utilization by sector has limited availability. It is also unclear how well transport-related energy consumption is accounted for. Among the transport modes, non-motorized transport has very weak data availability.

The table below shows the results of the CAI-Asia and ADB Study on the availability of transport data by mode and by specific attributes and sub-attributes depending on the type of transport mode, e.g. whether these type of information are recorded - type of fuel, type of vehicle and characteristics, operation characteristics, and purpose. The transport modes considered includes road, sea, and air. Fuel transported through pipelines was also included in the review. Results showed weakest availability of data for non-motorized transport and highest for international sea and air travel. These classification and attributes were based on a comprehensive database usually collected in developed countries.

Table 1. Data Availability by Mode and Attributes in Selected Asian Countries

MODE	Transport Fuel	Vehicle Type	Spatial Scope	Purpose	Vehicle Property	Operation	ALL ATTRIBUTES
Walk	-	-	13%	13%	-	-	13%
Bike	-	-	8%	13%	26%	-	16%
Road	64%	79%	92%	44%	66%	63%	68%
Rail	71%	81%	83%	34%	88%	50%	68%
Pipeline	100%	-	75%	-	69%	19%	63%
Conveyor	67%	-	38%	-	50%	13%	39%
Water Domestic	57%	75%	88%	-	71%	50%	68%
Water International	57%	88%	88%	-	88%	50%	74%
Air Domestic	100%	88%	100%	-	75%	69%	72%
Air International	100%	88%	88%	-	88%	63%	71%
ALL MODES	75%	83%	67%	26%	69%	47%	55%

Source: CAI-Asia and ADB. Transport Data in Asia Study (2011, Unpublished)

Note: Assessment included China, P.R., India, Indonesia, Nepal, Philippines, Pakistan, Sri Lanka, and Vietnam

2.2 Transport Data Flow and its Impact on Quality and Availability

Available and accessible data are usually presented at very high levels of aggregation

The type and number of government agencies and bodies that collect and maintain transport information affects the availability (public availability) and quality of data. Government agencies and organizations, such as research institutes, with a technical- or sector-focus generate data which is often of relatively high

quality but seldom made public for free. These data are then used by general agencies, often statistics bureaus, to generate compiled data or high level statistics, which are easily accessible but in the process of aggregation have become less reliable.

Figure 1 depicts this observation, such as data availability (or the number of parameters collected) usually resides with the technical agency, hence in this example from Sri Lanka, the Department of Motor Traffic usually collects the most parameters relevant for motor vehicles. Many information are then submitted or used by the Divisional Secretariat for annual revenue license, vehicle classes, fuel used, vehicle weight, others. Subsequently data is used by the Central Bank for Vehicle class information and also by the Department of Census and Statistics. Information is then made easily available to the public but only through these two government agencies. The more detailed information residing with the Department of Motor Traffic is usually more difficult to access. In terms of assessing data quality, the originator of the information is where you can conduct good assessment.

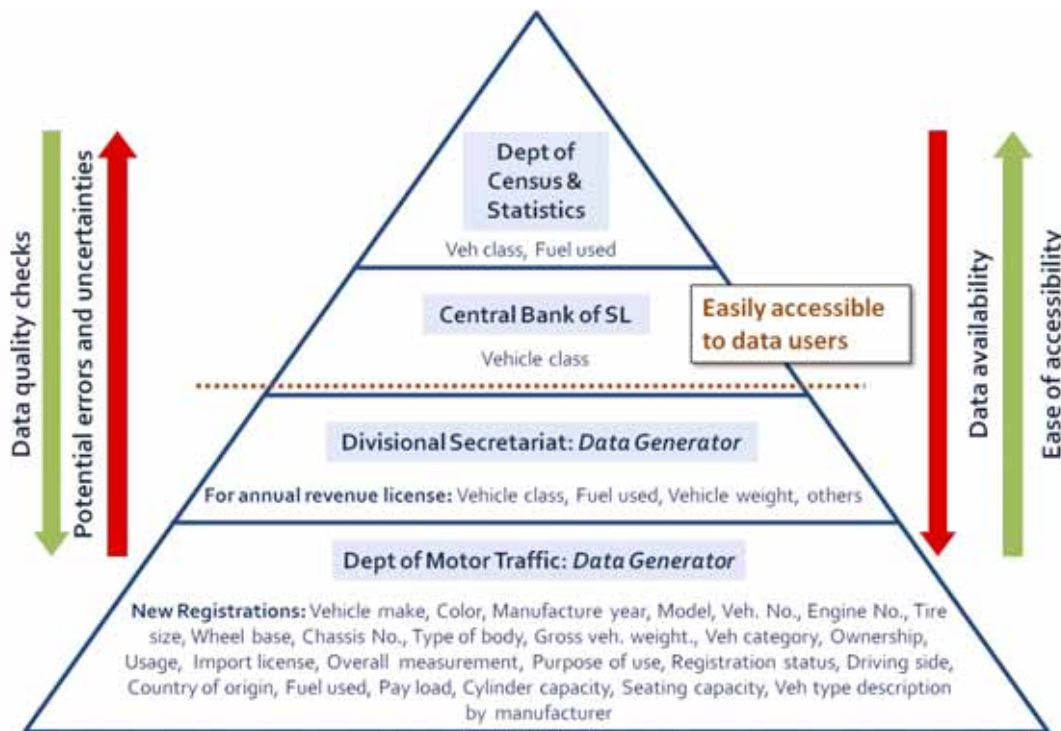


Figure 1. Overview of Data Availability and Quality in Typical Asian Developing Countries

Source: CAI-Asia. 2010. Availability, quality and use of transport and energy data in Asia: A regional case study. Presented by Patdu, K. at the Better Air Quality Conference 2010 held in Singapore, 9-11 November 2010. Available: <http://baq2010.org/node/1497>

2.3 System of Transport Data Collection and Maintenance

Type of data collected/generated is influenced by its need (driver) with different, sometimes overlapping, data requirements

Several international organizations and conventions have called for improved data availability and quality in the transport sector especially for Asia.⁶ This need for reliable transport data is also expected to increase considerably as climate negotiations call for a more regular and updated national communications by developing countries and for MRV (measurable, reportable and verifiable) mechanism to assess progress in climate change mitigation.

To move towards addressing data issues, it is necessary to understand data sources and factors influencing availability of transport data. It is observed that the type of data generated or made available is primarily influenced by its intended use (driver). For instance, in the Philippines, the Land Transportation Office collects vehicle registration data for regulation and enforcement purposes. Road accidents data is collected by the Department of Public Works and Highways for identification of accident black spots. The common drivers of data generation include–

- Regulation and enforcement
- Policy and planning
- Economic considerations/ investments
- Commercial considerations
- Compliance to international agreements
- Emission estimation (*recent*)

Traditionally, policy, planning, enforcement and regulation have been the main drivers in data collection. Often, data needed for these purposes are routinely collected or by demand (policy and planning need) (Figure 2). While data collection/generation for estimating emissions has become an emerging driver, it is still collected on an *ad hoc* basis.

⁶ The **2009 Ministerial Conference on Global Environment and Energy in Transport (MEET)**, for instance, called for “the improvement of the accuracy, adequacy and comparability of statistics on environment and energy for transport to support effective policy making and assessment of progress as one of the elements necessary in order to achieve their shared long-term vision of realizing low-carbon and low-pollution transport systems that also ensure sustainable development.”

URL: http://www.mlit.go.jp/kokusai/MEET/documents/Ministerial_Declaration.pdf

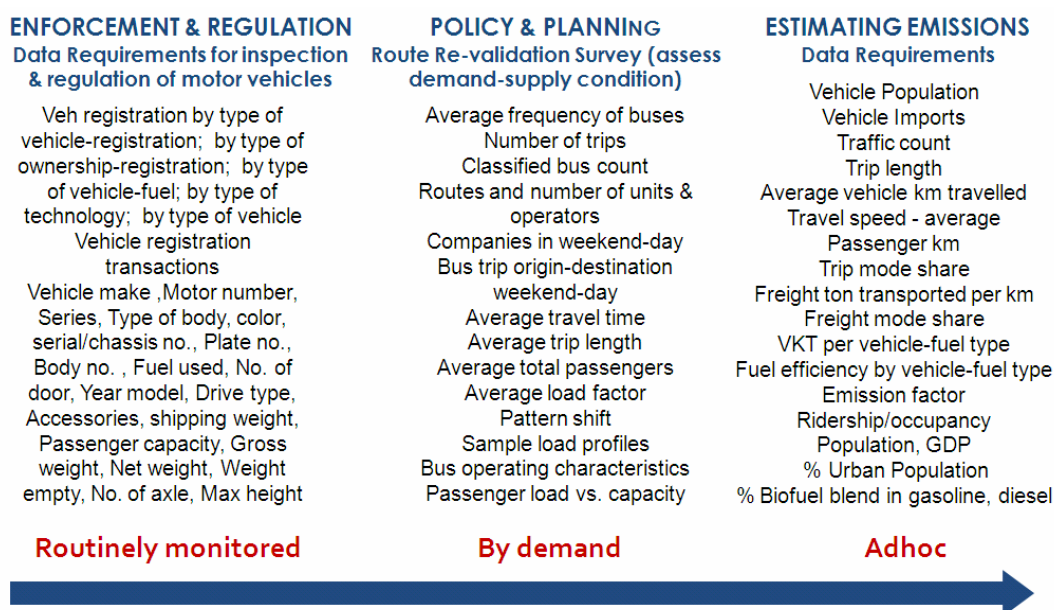


Figure 2. Drivers for data generation and corresponding frequency

Source: CAI-Asia. 2010. Availability, quality and use of transport and energy data in Asia: A regional case study. Presented by Patdu, K. at the Better Air Quality Conference 2010 held in Singapore, 9-11 November 2010. Available: <http://baq2010.org/node/1497>

Fragmented generation of transport data

An integrated and systematic approach to regular collection and maintenance of transport data is generally lacking in most of the Asian countries. One of the reasons is that the transport sector is highly fragmented and thus the investment needed to regularly collect and maintain data is high. In several cases, the Ministries of Transport act as the coordinators and compilers of transport-related data especially for domestic and international maritime and aviation services, however, efforts and systems in place are not enough and much information are not pulled together.

Fragmented responsibility for collection of different types of data and the absence of an organization with a mandate and organizational capacity to integrate different data sets

It is important to know and understand the mandates, linkages, and inter-relationships of various national institutions, like ministries of transport, rail, energy, public works, environment, economic development and statistics offices, on the availability and quality of transport data. Many transport-related data are actually available but not consolidated and made publicly available. Table provides an overview of data regularly collected by the various types of ministries.

The statistics office is usually one of the most accessible sources of general transport data. They are tasked to coordinate, collect, and maintain various socio-economic data including some transport-related data. These offices also maintain the publication of national statistics. The regularity of publishing national statistics varies per country. There are also separate publications from government and non-government organizations on specific transportation statistics and emissions. However, in several cases, such publications are the results of specific projects and are not meant to provide yearly or regular publication.

Table 2. Data Regularly Collected and Maintained by National Government Agencies in Asia

Ministry	Data	Remarks
Transport	<ul style="list-style-type: none"> • Motor vehicle registration • Licenses issued • Passenger and freight kilometers 	<ul style="list-style-type: none"> • Vehicle scrappage and re-registration consistency is questionable. • Usually includes sea and air ports, including cargo and passenger movement, maritime and aviation incidents.
Rail	<ul style="list-style-type: none"> • Length of railways • Passenger and freight kilometers 	
Public Works	<ul style="list-style-type: none"> • Length of roads • Surface type and paved roads • Number and length of bridges • Road accidents 	
Energy	<ul style="list-style-type: none"> • Fuel consumption by volume and by type of fuel • Fuel pump price 	
Environment	<ul style="list-style-type: none"> • Emissions inventories 	<ul style="list-style-type: none"> • Top down and based on total energy/fuel consumed by sector. • Greenhouse gases reporting mainly driven by UNFCCC process.
Economy/ Trade/ Customs	<ul style="list-style-type: none"> • Economic growth – GDP, etc. • Volume of trade • Vehicle imports 	
Finance	<ul style="list-style-type: none"> • Economic growth and infrastructure growth • Transport investment 	<ul style="list-style-type: none"> • Uses the data collected by the transport ministry to set targets for infrastructure growth, to evaluate the funding needs and to match the economic growth with infrastructure growth.
Census	<ul style="list-style-type: none"> • Population 	

Source: Based on author's research for Transport Data in Asia Study (2011, Unpublished).

Private sector is a relevant player in transport data collection but their databases are typically not openly shared to public

There also many organizations collecting and generating data but without a clear feedback mechanism and/or policy mandate to transfer information to government agencies hence such information usually only resides with the industry association themselves. In many cases, data is not made publicly available, except for vehicle sales data that vehicle manufacturer associations publish. Industry associations such as transport fuel suppliers associations, trucking operators, public transport providers (e.g. bus, para-transit, taxi, etc...) and as well as domestic shipping often keep their own databases that describe the operations of their industry like sales of vehicles and fuel, ridership and freight data. In addition, there are professional associations, academic, and research institutions that generate and collect transport data.

Information generated at the project/city/province level is usually stored at the local levels, unless required by the national government

Data collected at the project level is usually owned by the city authorities, funding agencies and other development institutions and does not necessarily flow to national agencies. As a result, most countries are faced with a disaggregated collection of data and databases within different organizations that are difficult to access. The implication is that national and local governments are unable to compile data and derive indicators that are needed for urban and transport plans and policies to make transport systems more sustainable and cities more livable.

Other transport-related data necessary for urban development, transport planning and emissions analysis are not collected and maintained by national government agencies and/or local authorities. Some of these data are modal split, vehicle-kilometers travelled by vehicle type at the city level, motor vehicle registration by fuel and vehicle type, etc. These are vital to effective urban and transport planning and emissions analysis, however, these are often not made public and left with consultants and/or reports. Perhaps in all national capitals and bigger cities, there are many studies conducted that includes these kinds of data.

Limited budget allocation for transport data collection, processing and management

While the importance of reliable transport data is clear, the amount of investment allocated for data collection, processing and management is often limited. Figure 3 typifies the investments provided for collecting and maintaining relevant transport data. It is generally acknowledged that the budget allocated for routine data collection necessary for transport are higher for general information that are submitted to national agencies like Statistics Offices. Also, relevant transport data necessary for urban planning are most often done on an ad-hoc basis and conducted as part of major transport infrastructure projects.

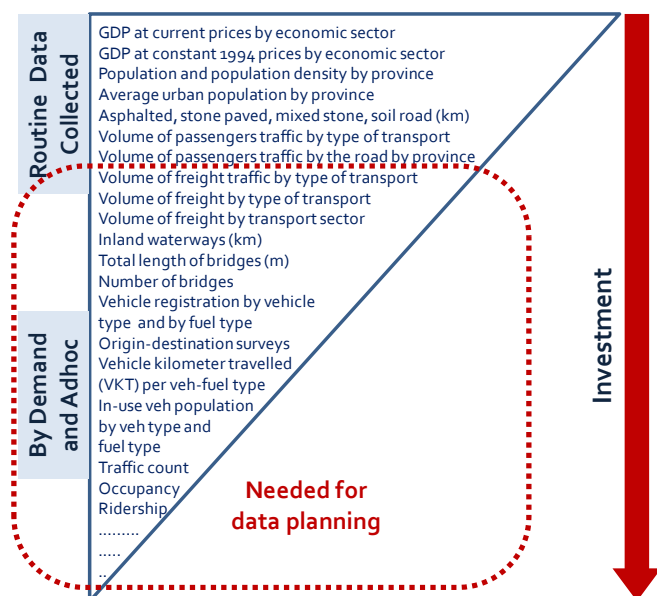


Figure 3. Investment on Transport Data Collection and Maintenance

Source: CAI-Asia. 2010. Availability, quality and use of transport and energy data in Asia: A regional case study. Presented by Patdu, K. at the Better Air Quality Conference 2010 held in Singapore, 9-11 November 2010. Available: <http://baq2010.org/node/1497>

2.4 Comparability of Transport Data within and between Countries

Lack of harmonized classification and methodologies

Another observation on transport data in Asia is that definitions, methodology for collection may vary within and between countries. In the Philippines, for instance, different government agencies use varying vehicle classifications. The vehicle classification used by the Land Transportation Office is not the same with the one used by the Department of Trade and Industry or the Bureau of Customs. The same is also observed when attempting to consolidate data across countries within the region. While there are initiatives for a harmonized classification system (*e.g.*, ASEAN level), it is still a lengthy process.

The government's response time to classify emerging vehicle types usually takes a long time, as in the case of electric vehicles. This may result to vehicle types which are unaccounted for in national vehicle fleet counts but are already being used.

3. BANGKOK 2020 DECLARATION EST INDICATORS

3.1 Understanding Indicators and Input Parameters

An *indicator* is a variable based on measurements or derived from input parameters, representing, as accurately as possible and necessary, a phenomenon of interest.⁷ While an *input data* is a property that is measured or observed that is used in the calculation/derivation of an indicator.

Indicators perform many functions. They can support better decisions-making and more effective actions by simplifying, clarifying and making aggregated information available to policy makers.⁸ They are essential tools for communicating issues to policymakers and to the public, and for promoting institutional dialogue.⁹ Joumard, R. and Gudmundsson, H., (Eds) (2010) characterized the general policy-type functions (supporting decision-making or policy development) of indicators as:

- Focus function – What is important?
- Descriptive function – What is the situation? Where are we going?
- Assessment function – How are we doing relative to previous year/standard/target/reference point?
- Diagnostic function – What is wrong? How much is due to different factors?
- Prioritizing – What should we do?
- Accountability function – Who is responsible?
- Learning/ Improving function – How can we improve? How can we do better?
- Communicating – How can it be shown?

While indicators are useful, it is necessary to be aware of the inherent limitations of an indicator for proper use and interpretation. Several of limitations in indicators are influenced by the input parameters used its derivation. Practical issues that must be taken into consideration include the scope and quality of input parameters used to derive an indicator, the data sources and collection procedure, presentation and interpretation of indicators.¹⁰ Each indicator should be read and interpreted in reference of a country's individual circumstances.¹¹

⁷ Joumard, R. and Gudmundsson, H., (Eds) 2010. "*Indicators of environmental sustainability in transport: a interdisciplinary approach to methods.*" INRETS report, Recherches R282, Bron, France.

⁸ United Nations Development of Economic and Social Affairs (UN-DESA), 2010. "*Indicators of Sustainable Development: Guidelines and Methodologies.*" 3rd Ed. United Nations, New York.

⁹ International Atomic Energy Agency (IAEA), UN Department of Economic and Social Affairs, International Energy Agency, Eurostat and European Environment Agency, 2005. "*Energy Indicators for Sustainable Development: Guidelines and Methodologies.*" IAEA, Austria.

¹⁰ WHO, 2006. "Reproductive Health Indicators: Guidelines for their generation, interpretation and analysis for global monitoring." WHO, Geneva, Switzerland.

¹¹ International Atomic Energy Agency (IAEA), UN Department of Economic and Social Affairs, International Energy Agency, Eurostat and European Environment Agency, 2005. "*Energy Indicators for Sustainable Development: Guidelines and Methodologies.*" IAEA, Austria.

3.2 Preliminary list of Bangkok 2020 Declaration EST Indicators

The Bangkok 2020 Declaration includes an extensive list of performance indicators for each strategic goal as guidelines for governments to voluntarily benchmark progress towards establishing sustainable transport systems. This preliminary set includes 102 indicators for the 20 EST Goals. An extensive list of indicators was prepared to provide guidelines for objective measurement of the efficiency and effectiveness of the transport system to achieve the desired EST goals. Further, because EST covers several areas, a set of indicators would provide more comprehensive insights rather than indicators in isolation.

However, this still needs to be refined and improved to adapt to the needs of its users. This may involve reduction in the number of indicators, or alternatively, involve identification of subsets of indicators for specific users. Currently, the framework for the selection of indicators has not been defined. There are a number of guideline documents which may be considered in developing a framework for selection of indicators. An initial list of selection criteria for the indicators is provided in Table .

Table 3: Initial list of selection criteria for indicators

Criterion	Explanation/Description
Demand-driven	In identifying and selecting indicators, it is necessary to identify the primary users of the indicators and what they need to know/ need indicators to address.
Scientifically robust	<p>An indicator must be a valid, specific, sensitive and reliable reflection of that which it purports to measure.</p> <ul style="list-style-type: none"> • A valid indicator must actually measure the issue or factor it is supposed to measure. • A specific indicator reflects only changes in the issue or factor under consideration. • The sensitivity of an indicator depends on its ability to reveal important changes in the factor of interest. • A reliable indicator must give the same value if its measurement were repeated in the same way on the same population and at almost the same time. <p>Source: WHO, 1997.</p>
Measurable	A measurable indicator should be straight-forward and relatively inexpensive to measure. Source: Dale and Beyeler, 2001.
Data availability	<p>Input parameters required to calculate an indicator should be available or relatively easy to acquire by feasible data collection methods that have been validated in field trials. Source: WHO, 1997.</p> <p>The data have to be accurate, comparable over time, complete with historical information and covering sufficient geographic area. Source: Boyle, 1998.</p> <p>Indicators will be easily estimated if input data are already regularly measured or collected by other organizations/institutions.</p>
Representative	An indicator must adequately encompass all the issues or sectors it is expected to cover. Source: WHO, 1997.

Criterion	Explanation/Description
Understandable	An indicator must be simple to define and its value must be easy to interpret. Source: WHO, 2006.
Transparency	A transparent indicator is one which is feasible to understand and possible to reproduce for intended users. The input data and statistics, assumptions, methods, models and theories must be accessible. Transparency allows the user to check the calculation and therefore to trust in the figures. Transparency is associated with but not identical to simplicity. A simple indicator may be more attractive because it is easier to show how it is produced. However, complex indicators may also be transparent if the methodology is well justified, well defined and well explained. Source: Joumard, R. and Gudmundsson, H., (Eds) 2010.
Ethical	An indicator must be seen to comply with basic human rights and must require only data that are consistent with the morals, beliefs or values of the local population. Source: WHO, 1997.

Source: Based on author's research for GHG and Air Pollutant Indicators for Transport and Energy Sectors (2010).

The report "Implementing the Bangkok 2020 Declaration" (2011) also highlighted the need for data and indicators to measure the progress of implementation of the Declaration. It also provided some recommendations for criteria to be considered for future EST data and indicators as follows.

- a) Comprehensive – Indicators should reflect various economic, social, and environmental impacts, and various transport activities (such as both personal and freight transport).
- b) Accurate – Data collection practices should reflect high standards to insure that information is accurate and consistent.
- c) Comparable – Data collection should preferably be standardized so the results are suitable for comparison between various jurisdictions, times, and groups. Indicators should be clearly defined.
- d) Accessible and transparent – Indicators (and the data they are based on) and analysis details should be available to all stakeholders.
- e) Cost effective – The suite of indicators should be cost effective to collect.

From the initial list of 102 indicators, the study team conducted an initial short-listing process of the indicators primarily based on its measurability, leading to a reduced list of 75 indicators. Then, these indicators were assessed based on their data availability for the 22 Member Countries. Three factors were considered for this analysis: availability, accessibility and quality. Table provides the proposed indicators with assessment of data availability.

Table 4: Preliminary Bangkok 2020 Declaration indicators and their data availability

Legend:

Availability: ++ high; + medium; – low; -- situation unclear

Accessibility: ++ available-free; + available-request; – paid; -- not available

Quality: ++ high; + medium; – low; -- situation unclear

MC = member countries

Strategy	#	Indicator	Assessment of Data Availability			
			Availability	Accessibility	Quality	Issues/ Comments
“AVOID” STRATEGIES						
	1	Meta Indicator: Vehicle kilometers traveled per person at the metropolitan and national levels	–	++/+	+	Data is only available for certain years, not in time-series.
GOAL 1: Integrated Land-Use Transport Planning	2	Number of cities in the country having formally developed integrated land use-transport plan	+	++	++	No existing database. Still needs to be collected from MC.
GOAL 2: Mixed-Use Development	3	Average passenger trip length in capital and/or key cities	–	+/-	+	Data is only available for certain years, not in time-series. Most MCs do not conduct regular national household surveys.
	4	Average freight trip distance regionally and nationally	–	+/-	+	Data is only available for certain years, not in time-series.
	5	Number of units developed in purpose-built mixed-use projects	--	--	--	This is usually not monitored in the MCs.
	6	Number of public transport projects achieving transit-oriented development (TOD) around station	--	--	--	This is usually not monitored in the MCs.
	7	Population and employment per square kilometer along major public transport corridors	--	--	--	This is usually not monitored in the MCs.
	8	Number of public transport corridors achieving an increase in development and population density	--	--	--	This is usually not monitored in the MCs.

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Strategy	#	Indicator	Assessment of Data Availability			
			Availability	Accessibility	Quality	Issues/ Comments
	9	Amount of increase in property value along corridors of quality public transport projects	--	--	--	This is usually not monitored in the MCs.
GOAL 3: Information and Communications Technologies (ICT)	10	Number of policies developed encouraging ICT as a substitute for travel	+	++	++	No existing database. Still needs to be collected from MC.
	11	Number of policies and/or programs that promote telecommuting	+	++	++	No existing database. Still needs to be collected from MC.
	12	Average broadband speed of internet services	++	++	++	OECD's Broadband Portal provides this information but only for a couple of MCs. There are speedtest websites which can also provide this information.
	13	Penetration rate of mobile telephone in the country	++	++	++	No official database but market research groups provide this information.
“SHIFT” STRATEGIES						
	14	Mode share of all major transport modes at the metropolitan and national levels, including: <ul style="list-style-type: none"> passenger transport (walking, bicycles, car driver, car passenger, motorcycle driver, motorcycle passenger, motorized three-wheelers, non-motorized three-wheelers, buses, minibuses, and urban rail), inter-city transport (private motorized vehicles, bus, rail, and boat), and freight transport (truck, rail, barge, minivan, and non-motorized) 	-	++/+	-	Classification may vary per country. No existing database.
GOAL 4: Non-Motorized Transport	15	Number of cities with NMT specifically highlighted in the city's integrated transport master plans	+	++	++	No existing database. Still needs to be collected from MC.
	16	Do road and traffic design guidelines have adequate component for NMT?	+	++	++	No existing database. Still needs to be collected from MC.

Strategy	#	Indicator	Assessment of Data Availability			
			Availability	Accessibility	Quality	Issues/ Comments
	17	Promote the monitoring and measurement of the quality of pedestrian facilities and the number of cities surveyed or audited for a “walkability” score	+	++	+	Initial information collected by Authors.
	18	Number of cities with dedicated cycleways	–	++/+	–	Not monitored for most of MCs.
	19	Number of kilometers of cycleways	–	++/+	–	Not monitored for most of MCs.
	20	Number of cities with shared bicycle programmes and number of shared bikes per programme	++	++	++	Initial information collected by Authors.
	21	Number of cities participating in a Car-Free Day programme	++	++	++	Initial information collected by Authors.
GOAL 5: Public Transport	22	Number of cities with trunk bus corridors operating on dedicated busway lanes in the median of the roadway (Bus Rapid Transit)	++	++	++	Initial information collected by Authors.
	23	Number of kilometres of dedicated, median busways (Bus Rapid Transit)	+	++	+	Initial information collected by Authors.
	24	Number of cities with bus systems using pre-board fare verification and stations designed for at-level fast boarding	+	++	+	No existing database.
	25	Number of cities utilizing electronic fare cards on their public transport system	+	++	+	No existing database.
	26	Number of kilometres of MRT	+	++/+	+	No existing database. Initial information collected by Authors.
GOAL 6: Transportation Demand Management	27	Number of cities or areas utilizing congestion charging	+	++	++	No existing database. Still needs to be collected from MC.
	28	Number of cities or areas utilizing road tolls	+	++	++	No existing database. Still needs to be collected from MC.
	29	Parking costs reflect true land cost or market value	--	--	--	Requires analysis.
	30	Number of cities with active parking management programmes	+	++	++	No existing database. Still needs to be collected from MC.
	31	Fuel price of subsidy	+	++/+	+	

Strategy	#	Indicator	Assessment of Data Availability			
			Availability	Accessibility	Quality	Issues/ Comments
GOAL 7: Inter-City Passenger and Goods Transport	32	Mode share of high-quality inter-city bus services	–	--	--	Limited availability.
	33	Mode share of inter-city conventional rail services	–	--	--	Limited availability.
	34	Mode share of high-speed inter-city rail services	–	--	--	Limited availability.
	35	Number of kilometres of high-speed inter-city rail	+	++/+	+	No existing database. Initial information collected by Authors.
“SHIFT” STRATEGIES						
	36	Fuel efficiency levels of passenger and freight fleets	–	+	–	
GOAL 8: Cleaner Fuels and Technologies	37	Market share (or number) of alternative fuels for road transport, including renewably-generated electricity, natural gas, and sustainably managed and cultivated biofuels that do not compete with food crops	–	+/-	–	This is possible at national level.
	38	Market share (or number) of electric vehicles, hybrid vehicles, and fuel cell vehicles	–	+/-	–	May be under-reported / not monitored for some MCs.
	39	Sulfur levels in diesel	++	++	+	This information is collected by Authors.
	40	% biofuels allowed/mandated	++	++	++	Initial information collected by Authors.
GOAL 9: Standards	41	Note current fuel quality standards and the time line for attainment of EURO IV (or equivalent) fuel quality standard	+	++/+	+	Information for LDV maintained by Authors. Limited availability for HDV and 2-3W.
	42	Note current vehicle emission standards for each vehicle class	+	++/+	+	Information for LDV maintained by Authors. Limited availability for HDV and 2-3W.
	43	Note current fuel economy standards for each vehicle class	+	++	++	Few MCs have fuel economy standards. Initial information collected by authors.
GOAL 10: Inspection and	44	Note the nature of commercial vehicle testing requirements, including frequency	–	-/-	--	Poor data availability for MCs especially for number vehicles retired.

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Strategy	#	Indicator	Assessment of Data Availability			
			Availability	Accessibility	Quality	Issues/ Comments
Maintenance		of tests, emission levels required, safety features examined, and number of vehicles (passenger vehicles) retired				
	45	Number of cities that conduct roadway spot checks on vehicle emissions	+	+	+	No existing database. Still needs to be collected from MC.
	46	Number of persons taking driver licensing testing and provision of the pass/fail rate	+	++	+	
GOAL 11: Intelligent Transportation System	47	Number of public transport vehicles per city with Automatic Vehicle Location tracking technology	--	+	-	No existing database, but data is relatively easy to collect per city.
	48	Number of public transport stations and vehicles using real-time information display	--	+	-	No existing database, but information should be relatively easy to collect.
	49	Number of cities with a control centre to manage traffic incidents and manage public transport fleets	--	+	-	No existing database. Still needs to be collected from MC.
GOAL 12: Freight Transport	50	Number of kilometers of freight rail lines	+	++/+	+	No existing database. Still needs to be collected from MC.
	51	Number of inland dry ports	+	++/+	+	No existing database. Still needs to be collected from MC.
	52	Freight transport emissions per km or energy consumption in relation to output measures as tonne-km	-	+/-	+	Poor data availability. Inconsistencies with methodology of derivation.
	53	Freight transport intensity (ratio of total freight moved to GDP)	+	+/-	+	Poor data availability. For most MCs, data is not available in time-series.
	54	Traffic fatality related to freight transport	+	++	+	There may be under-reporting in some MCs.
“CROSS-CUTTING” STRATEGIES						
GOAL 13: Safety	55	Number of traffic accidents	++	++	+	Information would be usually sourced from police data. Numbers may be under-reported. Difficulty in comparing countries because of differences in definitions.
	56	Number of transport-related injuries and	++	++	+	Information would be usually sourced

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Strategy	#	Indicator	Assessment of Data Availability			
			Availability	Accessibility	Quality	Issues/ Comments
		deaths number of transport-related injuries and deaths				from police data. Numbers may be under-reported. Difficulty in comparing countries because of differences in definitions.
	57	Adoption of fatality reduction targets	+	++/+	+	Level of implementation is unclear.
	58	Mandated speed limits in urban areas	++	++	++	WHO has an existing database for this. Level of implementation is unclear.
GOAL 14: Health	59	Incidence levels of disease and illnesses related to transport emissions including asthma, other pulmonary diseases, heart disease, stroke, and flu	++	++/+	+	Needs to be collected from Health Ministries/departments. Initial data collected by Authors.
	60	Number of cities with policies in place to prohibit smoking in public places, including public transport systems	++	++	+	Initial data collected by Authors. Level of implementation is unclear.
GOAL 15: Air Pollution and Noise	61	Air quality levels for particulate matter (PM10 and PM2.5), nitrogen oxides (NOx), sulphur oxides (SOx), carbon monoxide (CO), and ground-level ozone for each major city	++	++/+	-	There are many issues on data quality of monitoring data.
	62	Noise level standards	+	++/+	+	Monitoring of compliance is unclear.
	63	Number of cities monitoring noise levels	--	+	--	
GOAL 16: Climate Change and Energy Security	64	Note existence of transport Nationally Appropriate Mitigation Actions (NAMAs)	++	+	++	Easy to check with MCs.
	65	Note the number of transport GEF projects approved for the country	++	+	++	Easy to check with MCs.
	66	Fuel consumption of transport sector	+	++/+	+	There may be under-reporting on this.
GOAL 17: Social Equity	67	Bus fare per kilometer	++	++/+	+	
	68	Number of public transport vehicles and stations permitting full universal access for users in wheelchairs and parents with prams	--	--	--	Usually not monitored/ not available.
	69	Number of public transport stations and				Usually not monitored/ not available.

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Strategy	#	Indicator	Assessment of Data Availability			
			Availability	Accessibility	Quality	Issues/ Comments
		kilometres of footpaths with tactile paving tiles for the sight impaired				
	70	Number of kilometres of footpaths that have been upgraded to be fully accessible to persons in wheelchairs	--	--	--	Usually not monitored/ not available.
GOAL 18: Finance and Economics	71	Number of applications for greenhouse gas emission reduction credits (for transport projects)	++	+	++	Easy to check with MCs.
	72	Number of Public-Private Partnerships (PPPs) implemented	++	++/+	++	Would be easy to collect. Can be made specific to cover investments in public transport
GOAL 19: Information and Awareness	73	-				
GOAL 20: Institutions and Governance	74	Specific unit/name of ministry with EST Mandate	++	++/+	++	
	75	Are there sufficient human and financial resources devoted to EST At national level? At regional level? At local level?	--	+	--	May be difficult to quantify.

Source: Authors.

Note: In practice, these indicators could be tailor-made by countries based on their own criteria or be a set of benchmarks to evaluate the performance and progress made in the transport sector.

The current list of EST indicators includes some indicators which currently cannot be quantified as data limitations still impose challenges. It is important to note that some of the indicators currently identified include some policies and which are not necessarily indicators themselves. There is also a need to distinguish between national and city level indicators because several indicators refer to city-wide data, like public transport ridership and mixed-land use development, whereas, imposition of emissions standards is a policy in itself and at the national level.

As part of the development, adoption, and maintenance of the EST indicators, there is a need to conduct a more in-depth review with inputs from the participating governments in the EST forum on current data availability. There is also a need to establish links with other reporting systems at the national (like the national census data and/or the national household travel data survey, if available) and at the international level (like the reporting on fuel consumption as basis of national greenhouse gas assessments).

4. RECOMMENDATIONS AND NEXT STEPS FOR DEVELOPING AND MAINTAINING INDICATORS FOR THE 20 EST GOALS

The UNCRD EST process and the Bangkok 2020 Declaration have clearly contributed to mainstreaming an integrated EST approach in Asia. The development and maintenance of indicators to track the progress of the implementation of the Bangkok 2020 Goals will be able to help individual countries in measuring their progress and also in learning from other countries. In order to effectively develop and maintain indicators for the 20 EST Goals, it is also important for Asian countries and regional organizations to support the strengthening of transport data collection and management.

Based on the findings of this study and the results of the and CAI-Asia Study on Transport Data in Asia (2010) on behalf of the ADB and the ongoing World Bank-CAI-Asia Transport and Energy Data Indicators Project, including discussions with experts and some government officials, the following key recommendations were identified.

- **Establishment of a regional reporting mechanism** – can encourage countries to better maintain their transport databases, similar to reporting by OECD countries to IEA countries, and/or the requirement of countries in reporting to UNFCCC on their greenhouse gas emissions. The UNCRD in coordination with other UN bodies, like ESCAP, can take on the lead role of maintaining the indicators set forth under the Bangkok 2020 Declaration with appropriate support from participating countries.
- **Harmonized definitions, classification and methodologies** – can contribute to a more structured collection of transport related information, particularly for transport activity data, vehicle classification, and establishment of a national database. This includes a harmonized definition of relevant statistics.
- **Establishment of a national focal point on transport** – can facilitate the collation of relevant transport data from various government agencies and other organizations. Transport ministries are usually expected to take on this role but it is important that sufficient linkages with existing national processes like National Census Data collected by Statistical Departments or offices will be necessary. Including relevant transport questions in the national census can provide national transport activity data on a regular basis. The establishment of national transport household surveys as a supplement to national censuses should also be considered.
- **Thorough assessment of the indicators, including development of criteria and guidelines for their derivation and use** – can differ across countries, but adequate guidelines and some level of consistency can help facilitate the tracking of implementation and achievement of countries in operationalizing the Bangkok 2020 EST Goals.
- **Institutional cooperation to operationalize the Bangkok 2020 EST Goals and Indicators** – can strengthen and formalize the process that has already been started under the UNCRD EST Forum.

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As part of this study, the UNCRD in cooperation with the Clean Air Initiative for Asian Cities will continue to further assess the status of countries against the goals of the Bangkok 2020 Declaration and as well as the data and indicators related to the Bangkok 2020 EST goals, in addition or in relation to the ones already identified (see Annex 1 and 2) during and after the Sixth Regional EST Forum in Asia, 4-6 December 2011, New Delhi, India..