GLOBAL ROADMAP OF ACTION

Toward Sustainable Mobility

SUSTAINABLE mobility FOR ALL™

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GLOBAL ROADMAP OF ACTION

Toward Sustainable Mobility

SUSTAINABLE mobility FOR ALL

WORLD BANK GROUP

german cooperation
DEUTSCHE ZUSAMMENARBEIT

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LIST OF ACRONYMS

ACARE	Advisory Council for Aviation Research and Innovation In Europe
AFCAP	Africa Community Access Partnership
ANSV	Spain National Road Safety Agency
BEV	Battery Electric Vehicle
BMZ	German Federal Ministry for Economic Cooperation and Development
BRT	Bus Rapid Transport
CO_2	Carbon dioxide
CORSIA	Carbon Offset and Reduction Scheme for International Aviation
DFID	UK Department for International Development
EIRR	Economic Internal Rate of Return
EPD	Electronic Pre- Declaration
ETSC	European Transport Safety Council
EU	European Union
EV	Electric Vehicles
FIA	Fédération Internationale de l'Automobile
GANP	Global Aviation Safety Plan
GASP	Global Air Navigation Plan
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GMR	Global Mobility Report
GPS	Global Positioning System
GRA	Global Roadmap of Action
GTF	Global Tracking Framework for Transport
GTP	Growth and Transformation Plan
HOV	High Occupancy Vehicles
ICAO	International Civil Aviation Organization
ICCIMA	Iran Chamber of Commerce, Industries, Mines and Agriculture
IEA	International Energy Agency
ILO	International Labor Organization

IMO	International Maritime Organization
IRU	International Road Transport Union
IT	Information Technology
ITDP	Institute for Transport and Development Policy
ITF	International Transport Forum
ITS	Intelligent Transport System
LAQ	Local Air Quality
LCA	Life Cycle Analysis
LEZs	Low Emission Zones
LIC	Low-Income Countries
LMICs	Low- and Middle-Income Countries
LPI	Logistics Performance Index
MIC	Middle- Income Countries
MPI	Mobility Performance Index
MRV	Measurement, Reporting and Verification
NGOs	Non-Government Organizations
NOx	Nitrogen Oxide
PIN	Performance Index
PM	Particular Matter
PPMC	Paris Process on Mobility and Climate
PPP	Public Private Partnership
R&D	Research and Development
RAI	Rural Access Index
RAMS	Reliability, availability, maintainability and safety
ReCAP	Research for Community Access Partnership
RPAS	Remotely Piloted Aircraft Systems
RTR	Rapid Transit to Resident Ratio
RTS	Real Time Safe
SARPs	Standards And Recommended Practices
SDGs	Sustainable development goals
SETPs	Sistemas Estratégicos de Transporte Público
SIKA	Swedish Institute of Transport and Communication
Sox	Sulphur Oxide
STEM	Science Technology Engineering and Mathematics
SuM4All	Sustainable Mobility for All
TIR	Transport Internationaux Routiers

TNCs	Transport Networking Companies
TOD	Transit-Oriented Development
UITP	Union Internationale des Transports Publics (International Association of Public Transport)
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
URRAP	Universal Rural Road Access Programme
WBCSD	World Business Council for Sustainable Development
WHO	World Health Organization
WRI	World Resources Institute
WTO	World Trade Organization
ZEV	Zero Emission Vehicle

FOREWORD

Sustainable Mobility for All (SuM4All) is an umbrella platform that brings together 55 public and private organizations and companies with a shared ambition to transform the future of mobility. Its unique value lies in bringing key influential actors to work together. It serves as the principal platform for international cooperation on sustainable mobility, a center of excellence, and a repository of policy, knowledge and resource on sustainable mobility. Its mission is to play a leading role in the ongoing transformation of the global mobility system, and support countries in their transition towards sustainable mobility.

Established in 2017, SuM4All's first task at hand was to find common ground on what countries wanted to achieve. We all agreed that transport was a key contributor to economic development and core to people's quality of life. We also agreed that the transport that we have is not the transport that we want—congestion in cities, segregation among rural and urban communities, carbon emissions, air and noise pollution, and traffic accidents that are symptomatic of a systemic problem with mobility. We set our ambition high for the mobility of the future: we need an equitable, efficient, safe and green mobility.

The consensus on what sustainable mobility meant set us on our next task to establish the imperative for action. The Global Mobility Report (GMR) 2017 benchmarked countries' performances on mobility relative to four policy goals. The findings of that report were alarming: not a single country in the world—developed or developing—has achieved sustainable mobility.

With evidence at hand, SuM4All embarked on a major drive in 2018 to develop a comprehensive policy framework to assist decision makers in cities and countries as well as practitioners at development banks to identify gaps, necessary steps, and appropriate instruments to attain the Sustainable Development Goals (SDGs), and improve the sustainability of their transport sector.

We are pleased to share the outcomes of these efforts that embody the collective knowledge of all its members and more than 180 experts, and feedback from more than 50 public decision makers and 25 large private corporations. The report builds on six policy papers and one private sector consultation summary paper, whose content is made accessible and usable in a web-based tool for decision making.

Sustainable Mobility for All Steering Committee
(On behalf of our 55 Member organizations)
July 2019, Washington, D.C.

EXECUTIVE SUMMARY

How can countries and cities attain their Sustainable Development Goals (SDGs) and improve the sustainability of their transport sector? How can they prioritize action based on their performances on mobility and accelerate progress? These questions are at the heart of "Global Roadmap of Action toward Sustainable Mobility" (GRA)—an ambitious and comprehensive effort led by the SuM4All coalition to identify the most relevant and impactful policy measures to achieve sustainable mobility, based on country's performances.

The GRA, in focusing on the "how to", emerges as a natural complement to the Global Mobility Report 2017 (GMR 2017) that addressed the "what" factors and established the imperative for urgent action on mobility around the world. There have been many attempts in the past to develop programs of action, action plans and policy frameworks. The GRA is unique in several respects:

- It proposes a coherent and integrated menu of policy actions to attain the SDGs and achieve the four policy goals that define sustainable mobility (i.e., universal access, efficiency, safety and green mobility). Too often in the past, policy programs and action plans were devised with one policy goal in mind, or for only one mode of transport. This approach resulted in incremental progress on certain facets of transport, but never achieved the much-needed systemic transformation of mobility.
- It defines a path for countries to follow to attain the SDGs and achieve the four policy goals that define sustainable mobility. This path consists of a series of action plans to be implemented over time depending on progress on mobility. It takes the view that a one-size-fits-all model is ineffective; policy actions on mobility should be tailored according to where countries stand relative to the four policy goals, and more importantly the policy objectives of the countries themselves. The GRA offers a unique methodology to filter the comprehensive policy framework and draw action plans tailored to country's conditions.
- It embodies the collective knowledge of all 55 Member organizations and 180 experts, and it has received the feedback of more than 50 decision makers in cities and countries including transport ministers, city mayors, and public transport operators, and 25 large private corporations. As such, it compiles the most up-to-date intelligence on transport, covering accessibility, system efficiency, safety and climate change considerations. The GRA is complemented by six policy papers and one private sector consultation summary paper that provide in-depth policy analyses by policy goal. The GRA represents the best knowledge that we have at our disposal on policies that can move mobility into a sustainable direction.

The GRA makes three important contributions to the policy agenda on mobility:

1. It charts mobility performances of 183 developed and developing countries. Key findings include:
    a. Some countries are closer than others in achieving one or more policy goals, but not a single country (including any developed country) is on target.
    b. Developed countries outperform developing countries on all mobility policy goals, except transport-related greenhouse gas (GHG) emissions per capita. The gap is more striking on safety and air pollution, placing a higher burden on developing countries compared with the developed countries.

c. Within developed and developing countries wide disparities surface. For example, in developed countries, universal urban access, as measured by the rapid transit to resident ratio, varies between zero and 95, and averages 32 kilometers per million residents. In developing countries, the same indicator ranges between zero and 48, but averages only 4.

d. Disparities are also apparent between regions in the developing group of countries. Countries in Europe and Central Asia perform on average better on universal access both rural and urban, including gender, efficiency and safety. Sub-Saharan Africa, in turn, fared the lowest in terms of universal access, efficiency, and safety. The South Asia region faces the highest burden on air pollution.

e. A classification of all countries in the world into four groups reveals other interesting findings. The groups are defined by equal intervals of the distribution of each indicator (from "D" as the lowest performing group to "A" as the highest performing group). The number of countries in each group for universal rural access is equally balanced. This contrasts all other policy goals: most of the countries fall into the lowest performance groups for universal urban access, gender, and efficiency.

2. It provides a catalogue of policy measures that have been used and tested around the world to achieve any of the four policy goals. Taken as a whole, this policy framework consists of 182 policy measures. Six case studies (Ethiopia, Colombia, Sweden, Spain, China and Europe and Central Asia) show how some of these policy measures have been implemented to make progress on mobility.

3. It developed a methodology to extract from the broad catalogue of measures those that are most impactful and relevant given a country's context. Those policy measures form a prototype action plan consisting of nearly 30 top policy actions for a country to prioritize, given its current mobility performances. The GRA relies on a scoring approach to filter the catalogue of policy measures. Each policy measure is assigned two scores: an impact score to measure the impact on each of the four policy goals, and a country-relevance score to measure the relevance of this policy measure by country group. Prototype action plans are derived by selecting those measures that have the highest scores on both impact and country relevance.

A by-product of the GRA is a web-based tool that makes the policy framework easily available and usable for policy making and dedicated to decision makers and practitioners in the field. This tool enables its users to derive and customize a series of action plans tailored to their country's performances on mobility.

The GRA was developed through an iterative process to ensure its relevance and practicality. It involved all member organizations making their knowledge available to the platform. Policy decision makers at the country and city levels engaged on various drafts and to share their experiences, and more than 25 large corporations were questioned on constraints in the enabling environment to innovate and create the solutions of the future.[1] It also involved donors supporting this effort over an 18-month period (The German Federal Ministry for Economic Cooperation and Development, the World Bank and the Michelin Foundation). With this tool in hand, SuM4All has invested in fundamental policy work, and is now equipped to engage with decision makers in a new dialogue on mobility and support their transition towards sustainable mobility.

ENDNOTES

1 A consultation led by Michelin (on behalf of the SuM4All Steering committee), with support of the World Business Council for Sustainable Development (WBCSD), Movin'On and Ernst & Young took the pulse of more than 25 large corporations covering the whole value chain—raw materials, transport services, equipment, digital services, manufacturing, financial services, energy, and consulting. In addition to this, Movin'On (the annual world summit on sustainable mobility) organized a workshop in Montreal in June, during its 2019 edition, dedicated to the GRA, offering SuM4All a unique opportunity to get direct outreach to business.

Box E.1: Our Moonshot on Sustainable Mobility

Universal Access

- An additional **1+ billion** people would be connected to education, health and jobs if we close the transport access gap in rural areas.
- Globally, an additional **380 million** people would have access to sustainable transport if rapid transit systems were introduced in cities with a population of a million or more that currently lack it.
- An additional **20+ million** women would work in transport if the sector achieved gender parity in employment.

Efficiency

- Improvements in border administration, transport and communication infrastructure could increase global GDP by up to **US$2.6 trillion.**[a]

Safety

- Globally, **800,000** deaths would be avoided per year if all countries reduced their road traffic fatalities to OECD level.

Green Mobility

- Globally, an additional **1.6 billion** people would breathe cleaner air if transport pollution was halved.
- Transport-related GHG emissions would decrease from **23% to 15%** of all energy-related emissions—equivalent to a reduction of 1.8 gigatons of CO2—if top-emitting countries bring their emissions down to their respective income group median.

Note:
1. Moonshots on Universal Access, Safety and Green Mobility are based on data and analysis from chapter 3 of the Global Roadmap of Action Toward Sustainable Mobility.
2. Moonshot on Efficiency is adapted from the finding of the World Economic Forum Report: Enabling Trade and Valuing Growth Opportunities (2013)

Source:
a Enabling Trade: Valuing Growth Opportunities." (2013). Geneva, World Economic Forum. Retrieved from: http://www3.weforum.org/docs/WEF_SCT_EnablingTrade_Report_2013.pdf

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The global roadmap of action toward sustainable mobility (GRA) was developed as a cross-cutting piece that extracts policy goal-specific knowledge from six policy papers and one private sector consultation summary paper and looks at synergies and trade-offs among the four goals that define sustainable mobility. The GRA team was led by Nancy Vandycke (World Bank) and included Jose Viegas (consultant), Javier Morales Sarriera (World Bank), 12 working groups and teams in charge of developing the policy papers.

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1. CONTEXT

"The world is off track to achieving sustainable mobility," concluded the Global Mobility Report 2017 (GMR 2017), the first multi-agency assessment of the state of transport globally. The GMR 2017 lamented the steep cost to society of increased mobility of people and goods and underlined the urgency of action to reverse this trend.

The contribution of transport to economic development and human capital is undeniable. Transport shapes our lifestyles and underpins everything that we do—the way people travel to work or leisure, how businesses send employees to meet customers, and how firms ship products to distribution centers. Our lives and livelihoods depend on mobility.

However, the prevailing global mobility system clearly is unsustainable. Mobility is associated with intensive fossil-fuel use, large emissions of greenhouse gases, air and noise pollution, degradation of the environment, traffic accidents and deaths, and exclusion of rural communities and poor urban dwellers from economic opportunities. In a world increasingly rich and aspiring for more mobility, getting the mobility system to be sustainable has become a defining factor of society's future.

1.1. TRANSPORT'S ROLE RECOGNIZED

Transport has long been seen solely as aiding improvements in other sectors such as better educational outcomes, health benefits, or lower agricultural waste. Today, transport is seen as a sector in its own right that is crucial to delivering a better and more sustainable future. Transport is increasingly viewed as central to address global public challenges such as climate change and peace. Political stability and social inclusion cannot be achieved unless individual travel needs are met, including that of older persons, children, people with disabilities, women, and those in vulnerable groups. Environmental changes affecting climate cannot be reversed unless transport cuts its dependency on fossil fuels.

Efforts have accelerated to define and agree on what constitutes sustainable mobility. The international community came together in 2017 to frame sustainable mobility around the achievement of four global policy goals: equity of access, efficiency, safety, and green mobility. We have now quantitative targets for each of these policy goals—whenever possible, corresponding to international commitments—and a set of supporting indicators.

In parallel, United Nations (UN) member states have endorsed multiple international agreements, conventions, and declarations that set long-term directions for transport, and established new benchmarks against which progress toward sustainable mobility will be measured in the future (SuM4All, 2018). These measures have set the bar high on what is needed to transform the sector. Among others,

- UN Decade of Action on Road Safety (2010),
- Sustainable Development Goals (2015),
- New Urban Agenda (2016),
- Vienna Programme of Action for Landlocked Developing Countries (2014),
- Paris Climate Agreement (2015), and
- the United Nations Global Sustainable Transport Conference (2016).

But results have trailed behind the vision. Aspirations and declarations have more often taken precedence over bold actions; innovative solutions have been implemented on a limited ad hoc basis; and short-term tactics from policy makers have superseded the pursuit of an international vision for the common good.

1.2. WHAT IS MISSING AND WHAT IS NEEDED

How can developed and developing countries achieve sustainable mobility?

Three factors align and support sustainable mobility (Figure 1.1).

With rapid and growing urbanization, booming world trade, and yet unchanged basic technologies, the mobility system is stressed. The prevailing system largely promotes improvement in dominant modes of transport–road use, principally–over any other modes of transport, such as rail and active mobility. It also encourages the physical transport of people over virtual mobility (e.g., online shopping).

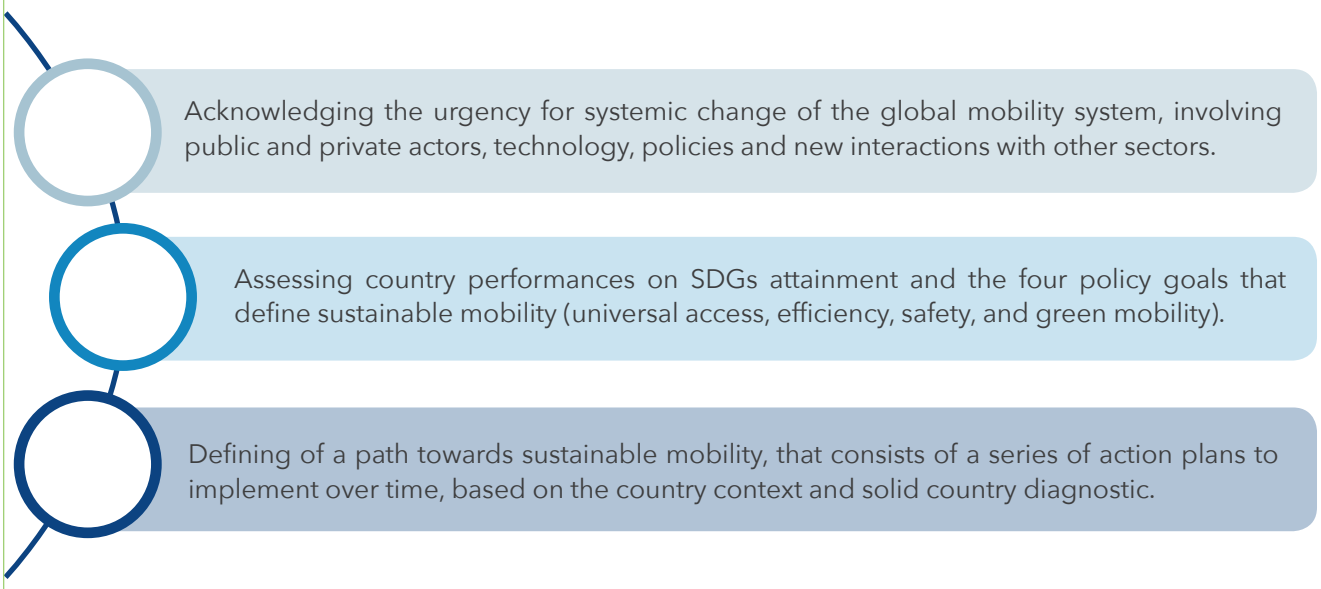
Whether one is looking at autonomous vehicles, electric vehicles, or the sharing economy, all these technological and behavioral breakthroughs under the spotlight tend to reinforce a road-centric culture that arose from the industrial revolution more than a hundred years ago.

At the country level, several governments have pushed for specific solutions. China, India, and countries in Africa have invested massively in programs to bridge the rural access gap across modes of transport. Countries like Mexico pledged to decarbonize the transport sector by 2030. China targeted electric vehicles to represent 40 percent of the total auto sales by the year 2025, while India expects a 30 percent share of Electric Vehicles (EV) on the road by 2030. A few front-running cities around the world have taken proactive steps to ensure healthier lifestyles and decrease greenhouse gas (GHG) emissions.

So far, the approach has been fragmented, and often driven by only one or two policy goals in mind. For example, in some countries policy makers have only promoted the construction of more roads to increase people's accessibility to markets and opportunities. Often though, more roads have translated into an increased number of vehicles, with associated fatalities, greenhouse gas emissions, and air and noise pollution. In other countries, policy makers are promoting technologies, electric vehicles for example, to cut on GHG emissions, instead of broadening the spectrum of transport solutions.

This fragmented approach has resulted in incremental progress in certain facets of transport, but never in the required transformation of the mobility system.

Figure 1.1: Requirements to achieve sustainable mobility



1.2.1. Public–Private Collaboration

As transport and related industries undergo fundamental changes—fiercer competition with new entrants, multiple exits of traditional actors, new business models, and rapid development of new technologies, changes cannot happen without the private sector. Private actors are leading players of the transformation of mobility—as they are the ones providing innovative technologies, products and services as well as business models required for the transition. From the design stage of public policies to the implementation of concrete actions, collaboration between the private sector and public authorities is needed to foster results that cannot be reached in isolation.

- What constraints do private companies face to innovate and create the mobility solutions of the future? What could the public sector do to help them? We carried out consultations with 25 large corporations, and concur with the collated comments of the private sector. Partnerships are increasingly important to the success of private companies. The ongoing mobility revolution has brought new opportunities, but has also created a more complex and volatile business environment. In the face of such rapid and fundamental change, there is a strong sense among companies that no sector or industry can succeed on their own, and that partnering with others has become the only way to survive and prosper. As the Chief Executive Officer of a high-end leading car brand noted.

> *"We have sold cars for a hundred years. That model is no longer profitable. We now need to sell mobility. We are not yet equipped to do so. Succeeding in that new space would require interactions with a range of actors we have never interacted with, such as local administrations and energy companies."*

- Consistent public policies will help the private sector plan for the long term. The pace of change is making it hard for companies to anticipate demand, adapt to the market, or plan long-term investment in research, development, and production. Against this backdrop, the public sector can play an important role in providing some degree of stability and predictability. But this requires countries to commit to a solid vision for sustainable mobility, and to bridge the gap between (shorter-term) political cycle and (long-term) industrial investment cycles. One way to achieve is to establish legally binding long-term mobility targets, along with a consistent legal and regulatory framework. Companies also highlighted governments' role in producing and publicizing mobility data, raising awareness on the social and economic cost of the current mobility model, and promoting behavior change–which, ultimately, would help boost consumer demand for new mobility solutions.
- There are more instruments that the public sector can leverage to accelerate innovation. Although largely unused, public procurement can be an effective and relatively straightforward lever to advance sustainable mobility; mobility products and services commissioned by governments are often worth millions of dollars, giving them significant influence and bargaining power over companies competing for their business. Therefore, by setting more stringent requirements—in performance, cost, environmental impact for instance—public clients can give the private sector new incentives to innovate. When it comes to new technologies, there is a strong sense that public decision makers should be setting clear targets and timelines while remaining technologically neutral, focusing on leveling the playing field instead of promoting one technology over another. This would mean, for example, putting in place carbon pricing mechanisms and incentives for clean vehicles, instead of choosing a specific technology (e.g., battery vehicle vs. hydrogen).

1.2.2. Work With The Energy Sector

Many countries have been actively promoting electric passenger vehicles, light duty trucks, and trains to reduce carbon emissions from transport. Electric vehicle sales have been rising steadily and could reach an estimated 4.5 million units by 2020, which constitutes nearly 5 percent of the global light-vehicle market.

The growing popularity of EVs will have a profound impact on the energy market and will significantly increase electricity demand—a welcome development for electric utility companies which have been struggling with declining electricity prices. In the United States, for instance, EVs could increase power demand by up to 38 percent by 2050.

The two perspectives of transport and energy have yet to be tied in. Unless they are connected, developments in these respective industries are unlikely to result in lower carbon emissions—worse, they may exacerbate the problem.[2]

Although EVs themselves do not release greenhouse gas into the atmosphere, the carbon footprint of the electricity that powers them cannot be ignored. EVs can only make a real difference if they run on clean electricity. Unfortunately, renewables currently account for a mere quarter of the world's total power generation. Progress in most markets has been far too slow. Nine of the G20 countries have seen their share of renewable electricity generation go down in recent years.

Progress toward green mobility requires efforts to minimize emissions from the production and operation of vehicles over the entire lifecycle. Some estimates suggest that emissions associated with the extraction of raw material like lithium and the manufacturing of batteries offset the CO_2 emission advantage of EVs by about 40 percent. However, continued improvement in battery technology will likely strengthen the environmental case for EVs in the long term.

Three years after the Paris Climate Agreement, the transition toward cleaner energy and transport remains an uphill battle. Transport accounts for 30 percent of the total final energy demand, but less than 5 percent of that energy comes from renewable sources. New evidence shows that the development of renewable energy is slowing down, while the contribution of transport to overall carbon emissions continues to grow.

The global community clearly needs a more ambitious vision along with policy mechanisms that provide concrete incentives for both EV adoption and renewable energy.

1.2.3. Technology

The ongoing wave of innovation opens a range of exciting new possibilities for the emerging mobility ecosystem. A cluster of innovative forces is coming together with the potential to mitigate some the unintended costs of a road-centric paradigm.

Vehicles are becoming productive data centers and ultimately, components of a larger mobility network that is already evident in e-hailing and real-time data-driven navigation systems. Because of the remarkable leaps in computing power, data generation through sensors and cameras, and virtually free data storage, the probability of unprecedented automotive innovations entering the market by 2030 is high. Blockchains are one striking example, with potentially multiple applications that could be game changers, including fare collection for self-driving taxis, payments for tolls and parking, improvements to reduce emissions and increase safety.

But with new technologies come also a new potential to move away from a road-centric paradigm.

Drones, for example, are delivering medical supplies to remote rural areas in developing countries where freight delivery is difficult and costly. The medical supplies are ordered via text messages by health workers and are airdropped by drones to clinics and villages.[3]

Another example is the emergence of 5G mobile network technology, which will allow further applications of technology in transport. In the railway sector, the localization precision levels of 5G—which go beyond Global Positioning System (GPS) capability—will greatly improve dynamic train operations, such as enabling virtual coupling of trains which is the independent, contactless coupling of trains during journeys to form longer virtual units.[4]

1.2.4. Policies

The future lies in reducing excess road use, expanding the mode share of greener and safer transport modes and creating new ones, and avoiding unnecessary

trips. To achieve that level ambition and transform the global mobility system globally, the imperative necessity is to undertake a comprehensive effort on policy work:

- What policy measures have been tested around the world and are worth replicating?
- What is the expected impact of each of these policy measures on sustainable mobility?
- How can these policy measures be prioritized into a manageable set of policy measures that are most impactful and relevant to a country?
- How can we define a time-bound roadmap of action to attain sustainable mobility over time?

This is the task at hand in this Report.

1.3. THE GLOBAL ROADMAP OF ACTION TOWARD SUSTAINABLE MOBILITY

The Global Roadmap of Action toward Sustainable Mobility (GRA) is first-ever comprehensive attempt by the international transport community to address the "how to" achieve sustainable mobility. It emerges as a natural complement of the Global Mobility Report 2017 that addressed the "what" factors and established the imperative for action on mobility around the world.

The GRA is an ambitious effort led by the SuM4All coalition to identify the most relevant and impactful policy measures to achieve sustainable mobility, based on a country's context.

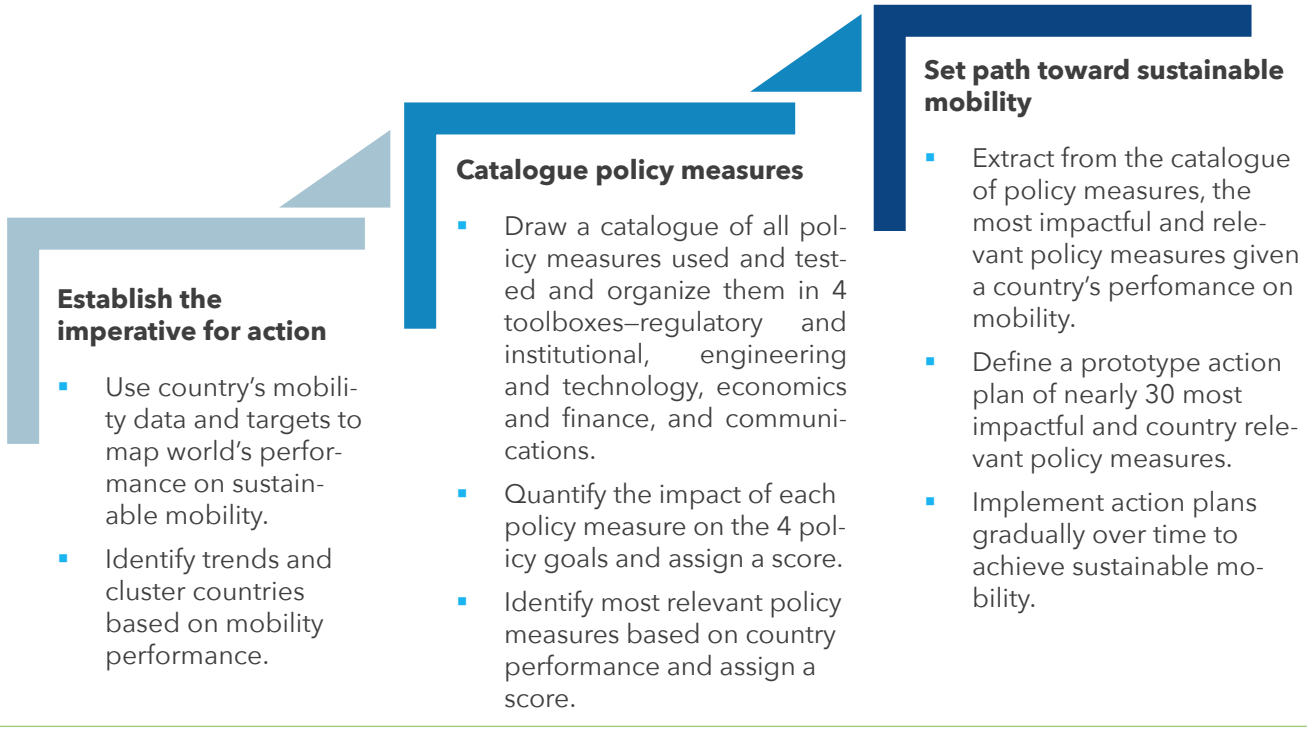
It will make three important contributions to the policy agenda on mobility (see Figure 1.2):

(i) Chart mobility performances of 183 developed and developing countries.

(ii) Provide a catalogue of suitable policy measures that have been used and tested around the world to achieve any of the four policy goals.

(iii) Lay out a methodology to extract from this catalogue of policies those measures that are most impactful and relevant to a country's context. Those policy measures will form a prototype action plan, consisting of nearly 30 top policy actions for a country to prioritize, given its mobility performances.

Figure 1.2: From diagnosis to implementation: Step-by-step approach to reach sustainable mobility



The GRA effort will support countries in their transition toward sustainable mobility in three ways:

(i) Diagnose their performances on sustainable mobility. With a battery of indicators, data and targets, it is possible to assess how far a given country is from meeting international commitments on transport and achieving sustainable mobility. This information will draw from the GRA, global tracking framework and transport data portal developed under SuM4All.

(ii) Recommend a way forward in terms of top policy measures to achieve sustainable mobility—in the form of a prototype action plan.

(iii) Establish a roadmap of action for the country to follow, consisting of a series of action plans to implement over time depending on progress on mobility.

A by-product of this work is a web-based version of the GRA, dedicated to decision makers and practitioners in this field that will make the policy framework and filters easily available and usable for policy making.

The GRA report is backed by six goal-specific policy papers whose content is summarized in Annex III. These papers provide in-depth discussion on how to achieve one of the four policy goals, with universal access segregated into urban, rural and gender subgoals.

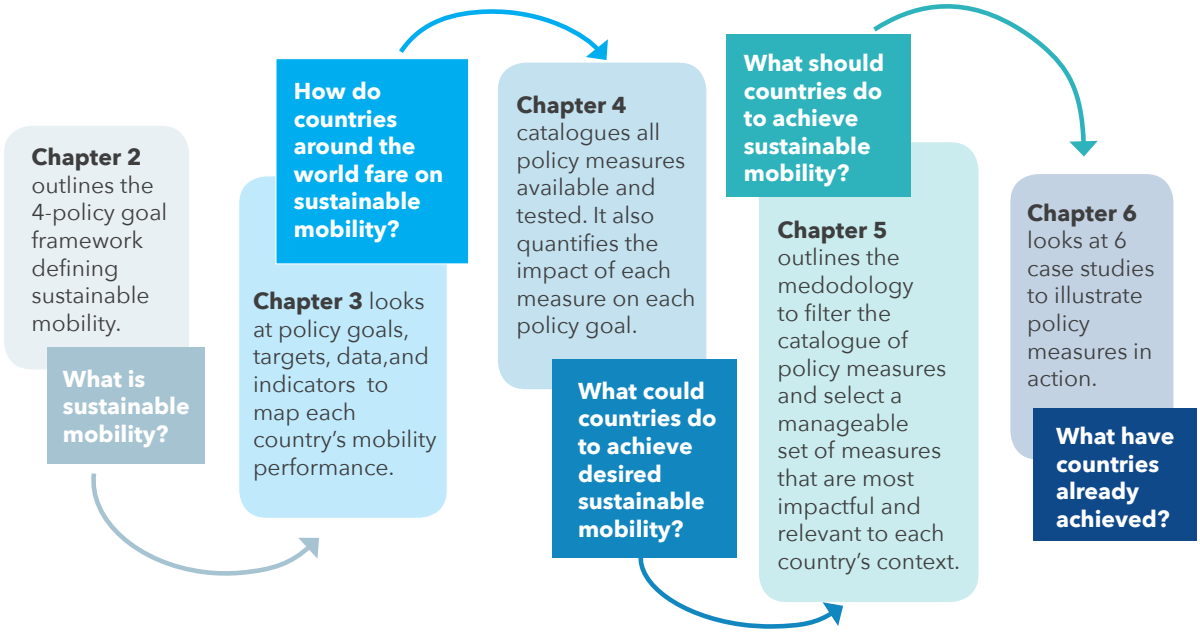
The GRA was developed in an iterative process to ensure its relevance and practicality. It embodies the collective knowledge of the 55 member organizations and 180 experts. The various drafts received feedback from a range of external stakeholders, including 50 policy decision makers at the country and city levels; and more than 25 corporations questioned on constraints in the enabling environment to innovate and create the solutions of the future.

With the GRA at hand, SuM4All has invested in fundamental policy work. Together with the Global Mobility Report and the transport data portal, SuM4All is equipped to engage decision makers in a new dialogue on mobility, and support their transition toward sustainable mobility.

1.4. OUTLINE

The GRA report answers critical questions in the chapters ahead (Figure 1.3).

Figure 1.3: Overview of the GRA report



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2 Vandycke, N. "To build a low-carbon future, we need active collaboration between transport and energy professionals." *Transport for Development*. World Bank, May 20 2019. Blog.

3 Marquez, P. 5 February 2019. Blog post. "Drones and blood safety can save lives." Investing in Health, The World Bank.

4 "Secure data transfer between trains with the 5G mobile radio system", Deutsches Zentrum für Luft- und Raumfahrt, 4 November 2018. The World Bank.

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2. DEFINING SUSTAINABLE MOBILITY

The international community has made several commitments over the last decade related to transport, setting the bar high on what is needed to transform the sector, and to ensure that the future is sustainable. For example, the 2030 Agenda for Sustainable Development identified a rich array of characteristics that defined a sustainable world. The UN Secretary General's high-level advisory group on sustainable transport identified the attributes that mobility must embody to ensure a sustainable future, including safety, affordability, accessibility, efficiency, resilience, and carbon impacts.

Under the umbrella of the Sustainable Mobility for All platform, 55 public and private sector organizations–including development banks, UN agencies, private companies and civil society–joined forces in 2017 in bringing together the international community to rally around a common vision. Many organizations, such as the International Finance Corporation, the Islamic Development Bank, Agence Française de Développement, and the European Commission, integrated this vision in their new transport strategy and investment programs. This frames sustainable mobility around the achievement of four global policy goals: universal access, efficiency, safety, and green mobility (figure 2.1).

The four-policy goal framework, supported by a major effort to identify relevant indicators and targets and collect country data, was then used to assess the state of the transport sector globally. The outcome of this analysis featured in the GMR 2017.

Since the publication of the GMR 2017, further work

Figure 2.1: Defining Sustainable Mobility

was conducted on the universal access goal, which led to the addition of gender aspects as a key dimension under that pillar. The GRA reflects this extension by including policy measures to ensure that sustainable mobility can benefit women equally. Addressing the theme of gender as an integral part of SuM4All will help reinforce equality, equity, and social inclusion aspects of sustainable mobility.

2.1. UNIVERSAL ACCESS

The universal access policy goal captures the ambition of transport "to connect all people and communities to economic and social opportunities, taking into account the needs of different groups, including the poor, those in vulnerable situations, women, children, the elderly, and persons with disabilities, across geographical locations."

This policy goal embodies several SDG targets and indicators:

- SDG target 9.1 "develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all",
- SDG indicator 9.1.1 "proportion of the rural population who live within 2 kilometers of an all-season road", and
- SDG target 11.2 "access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons".

The GMR 2017 estimated that more than a billion people, or one-third of the global rural population lacked access to all season roads and transport services in 2016. In Africa, this represented more than 70 percent of the continent's population living in rural areas. In Northern Russia, more than 1,000 communities are inaccessible by road. For all vulnerable groups, as well as for migrant communities and people living in remote and low-density areas, air transport services are a lifeline to enhance their social inclusion. Only 51% of the world's population has access to an international airport within 100 kilometers of where they live (74% have access to a domestic airport with at least one connection a day to an international airport).[5] In urban areas, access of all to jobs and social opportunities is at risk; the growth of the population in cities is far outstripping the growth in public transport, including mass transport. Moreover, lack of universal access to transport services has disproportionately impacted vulnerable groups, such as low-income populations and persons with disabilities (box 2.1).

Gender

As a subset of universal access considerations, mobility needs of women are interwoven with transport. Transport is not gender neutral; it is often biased to the needs of adult men in the way it is planned, implemented, or managed, and it does not always provide the same benefits for all. From the user's perspective, female mobility patterns are known to be different from men's; women tend to have shorter commuting distances, make more non work-related trips, and use public transport and taxi services more often than men. And young women are often accompanied by children.

Women make up half of the global population; and transport influences their quality of life as the primary user of public transport, but also constrains it, for example, safety in public transport, discrimination in labor force participation and leadership positions, and vehicle ownership.

Limited access to safe transport is estimated to be the greatest obstacle to women's participation in the labor market in developing countries (International Labour Organization, ILO 2017). Moreover, women face many barriers relating to employment in the transport sector. For example, women encounter numerous restrictions in getting jobs because of bias and discrimination in the recruitment and selection processes and stereotypes, as well as unfavorable work practices re-

stricting interruptions and re-entry for family reasons, and barriers to promotion. Finally, women are underrepresented at all levels of decision making—political, diplomatic, financial, economic, and commercial sectors—and, for all modes of transport, women are underrepresented in their leadership and workforce.

The objective is to transform the discussion from women as vulnerable groups to actors of change. This will require changes in how transport is decided upon, designed, constructed, managed, and operated; it must become part of the ongoing change in the overall mobility system.

2.2. EFFICIENCY

The efficiency policy goal captures the ambition "for transport systems to be predictable, reliable, timely and cost-effective."

This policy goal embodies the movement of transport vehicles of all types, their passengers, and cargo, through terminals and transport infrastructure worldwide, along various trajectories and routes, either under one mode of transport or a combination of modes, in a timely and least-costly manner to transport providers and users, and without undue constraints arising from unreliable and unpredictable operating, administrative, documentary, legal, regulatory, and institutional frameworks.[6]

Efficiency as a policy goal captures the whole spectrum of transport modes (including road, rail, aviation, maritime, walking, and bicycling), and how well these modes of transport are integrated to deliver an efficient mobility system (box 2.1). Serious legal, regulatory and institutional cross-border obstacles hinder landlocked countries to access the sea. As a result, the average volume of international trade of a landlocked developing country is only 60 percent of the trade volume of a comparable coastal country.

Mobility is expected to evolve dramatically, in terms of volume and substitution among modes; for example, between 2015 and 2050, annual passenger traffic and global freight volume will more than double, with expected modal changes. The largest growth in passenger transport volume is expected to occur in air transport, while private transport in urban areas is expected to slow down. The share of freight transported by sea will increase to 75 percent, while the shares of road and rail are expected to fall. The mobility system of the future will evolve with aviation and maritime transport systems playing increasingly important roles.

2.3. SAFETY

The safety policy goal captures the ambition "to avoid fatalities, injuries, and crashes from transport mishaps across modes of transport, thus averting the public health risks, and social and economic losses associated with unsafe mobility."

The scale of the safety problem is profoundly felt across all transport modes, including air, rail, road, and water. The safety policy goal is aimed at curbing the human pain, suffering, loss, grief, and economic costs of transport's crash-related injuries and deaths.

Safety efforts need to be focused on low- and middle-income countries (LMICs), where 90 percent of the 1.4 million transport crash deaths occur each year. Road traffic deaths, as a share of the population, increased by 32 percent in low-income countries between 2010 and 2013. Globally, 40 to 50 percent of traffic fatalities occur in urban areas. The proportion of fatalities in urban areas is high and rising in the LMICs. Air transport has seen a continuous reduction in the number of fatalities and crashes over recent years, and fatalities in some regions have dropped to zero in recent years. Similarly, safety performance on railways has also improved since the early 21st century.

To date, no overarching effort has materialized to set an overall target for the safety of mobility across transport modes, although various agencies have attempted to address the safety of discrete modes of transport (box 2.1).

Road safety is featured in two SDG targets: target 3.6, which aims to halve the number of global deaths and injuries from road accidents by 2020, and target 11.2, which aims to improve road safety by expanding public transport. And while road and aviation have global safety plans, rail does not. Key conventions are proposed as standards by the International Maritime Organization (IMO) but no global waterborne transport safety plan is in place. The nature of transport systems also varies: rail and air transport are largely closed or highly regulated systems; waterborne transport is a mix; and road transport is an open system with billions of often minimally regulated participants.

2.4. GREEN MOBILITY

The green mobility policy goal captures the ambition of transport to "reduce the environmental impact of mobility in terms of greenhouse gas (GHG) emissions, air pollution, and noise."

This policy objective is well aligned with and supported by the Paris Climate Agreement, the Sustainable Development Goals (e.g., SDGs 3, 7, 9, and 11–14), the international policy frameworks for international aviation (for example, the carbon offsetting and reduction scheme) and maritime transport, and other frameworks for action at the global and regional levels (box 2.1).

Transport was the largest energy-consuming sector in 40 percent of countries worldwide in 2012, and second in the remaining countries. In a projection by the International Transport Forum (ITF 2019), transport-related GHG emissions will grow up to 60 percent by 2050 compared to 2015 levels. According to the International Energy Agency (IEA, 2018), the sector already contributes to 24 percent of global energy-related GHG emissions, a share that increases to 36 percent in the Americas. Air pollution, both ambient (outdoor) and household (indoor), is the biggest environmental risk to health. Ambient air pollution alone kills three million people each year. Evidence from a few countries suggests that traffic noise ranks second in environmental impact on health after air pollution.

Sub-goal 1: Climate Change Mitigation

"Reduce GHG emissions from the whole transport sector as consistent with the worldwide objective of limiting global average temperature increase to well below 2 degrees Celsius above pre-industrial levels and aiming for 1.5 degrees by the end of the century."

- *Inland Transport:* 82 percent of total GHG emissions in 2015 were from domestic transport (ITF 2017), approximately 90 percent of which comes from the road sector. Further, by 2050, road transport emissions may rise by 63 percent.
- *International Aviation:* Aviation accounts for 6 percent of transport GHG emissions, and projections on air traffic (passengers) suggest a potential doubling to quadrupling of total emissions by 2050.
- *International Maritime Transport:* The IMO estimates that shipping's carbon dioxide emissions, that constitute 11 percent of transport emissions, may increase by 50 to 250 percent by 2050 unless additional action to address those emissions is taken.

Sub-goal 2: Air Pollution

"Substantially reduce premature deaths and illnesses from air pollution from local transport".

- *International Aviation:* The International Civil Aviation Organization (ICAO) developed policy recommendations aimed at limiting or reducing the impact of aircraft engine emissions on local air quality. Engine emissions are regulated[7] including standards for the certification of gaseous exhaust emissions from jet engines, such as nitrogen oxides (NOx) and particulate matter (PM). Aircraft engine emissions that affect local air quality are expected to grow at a rate slower than the growth in traffic.[8]
- *International Maritime:* IMO regulations address air pollutants[9] from international shipping, particularly sulphur oxides (SOx) and nitrogen oxides (NOx). Sulphur content in fuel oil is capped glob-

ally at 3.5 percent (m/m) which will be lowered in 2020 to 0.5 percent, while in IMO designated emission control areas the limit is 0.1 percent.

Sub-goal 3: Noise Pollution

"Substantially reduce global human mortality and burden of disease from local transport-related noise levels".

- *International Aviation:* ICAO has set out to control aircraft noise since the 1970s by setting noise limits for aircraft[10] in the form of standards and recommended practices (SARPs), and aircraft produced today are 75 percent quieter than they were in the 1960s. As a result, it is expected that an increase in aircraft operations may no longer result in an increase in noise-affected areas after 2030.

Box 2.1: Setting Aspirational Targets

Universal Access. Internationally agreed quantitative targets for universal access do not exist. The policy ambition seeks to leave no one behind. This embodies the notion that transport is a tool to achieve greater equity in society. No international targets are set to capture the gender and equity equality ambition. Integrating and engaging women and girls will support the achievement of SDG 5, which aims to achieve gender equality and empower all women and girls.

Efficiency. No universally agreed targets exist for efficiency. However, qualitative directions are given in some SDGs, for example, SDG 9, "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation."

Safety. The targets to 2030 for safety (with 2020 as a baseline) are as follows:

- *Inland Transport:* Road safety is featured directly in SDG target 3.6 (halving the number of global deaths and injuries from road traffic accidents by 2020) and SDG target 11.2 (improving road safety by expanding public transport). Given that the SDG target period ends in 2020 and, as the UN resolution (A/72/271) notes, "The SDG target is unlikely to be met, a new interim road fatality reduction target is required as follows: to halve the number of global deaths arising from road traffic crashes and to provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and the elderly."
- *Air Transport:* Safety is covered in the Global Aviation Safety Plan 2017–19, with a target of "zero deaths in commercial passenger aviation."
- *Rail and Maritime Transport:* Target of "reducing by 10 percent the human fatalities in rail and maritime modes."

Green Mobility (climate change mitigation). The deep decarbonization required to achieve the Paris Agreement objectives implies an indicative target for the national emissions in the transport sector as a whole of 2–4 Gt CO_2 (billions of tons of CO_2) emissions by 2050, down from approximately 8 Gt today, and net-zero emissions in the beginning of the second half of the century; this implies the peaking of emissions by the mid–2020s, or at the latest by 2030.

Achieving this ambition requires an integrated approach to low-carbon transport, and action from every subsector, with some transport modes having set targets. For inland transport, The Paris Climate Agreement sets out to reverse this trend, including inland transport, to decarbonize collectively in the second

Box 2.1 *(continue)*: Setting Aspirational Targets

half of the century. The 2010 General Assembly of ICAO set the collective global aspirational goals for international aviation of two percent of annual fuel-efficiency improvements, and carbon neutral growth from 2020. IMO's initial strategy for maritime transport, on the reduction of GHG emissions from ships, adopted in April 2018, identifies its levels of ambition as follows: by 2050, a total annual GHG reduction by at least 50 percent compared with 2008 levels, while pursuing efforts toward phasing them "as soon as possible in this century" on the path of CO_2 emission reduction consistent with the Paris Agreement temperature goals.

Green Mobility (air pollution). Indicative target: Each country and each large and medium-sized city has developed clean air plans by 2020 with the objective of reaching a 50 percent reduction of premature deaths from transport sources by 2030, compared with 2010 levels.

Green Mobility (noise pollution). Indicative target: Each country and city has developed traffic noise reduction plans by 2020 and raised awareness among the population of the health benefits from noise abatement, with the objective that the number of urban dwellers exposed to excessive noise levels be reduced by 50 percent by 2030 compared with 2015 levels.

ENDNOTES

5 ICAO iSTARs data portal. https://www.icao.int/safety/iStars/pages/air-transport-accessibility.aspx

6 Based on the concept of Efficient Air Transport as defined by Advisory Council for Aviation Research and innovation in Europe (ACARE)

7 ICAO Chicago Convention Annex 16 (Environmental Protection), Volume II – Aircraft Engine Emissions

8 ICAO. 2016. Working Paper. Assembly 39th Session, WP/55

9 IMO. 2010. MARPOL Annex VI. Prevention of Air Pollution from Ships

10 ICAO. Annex 16 on Environmental Protection, Volume I. Aircraft Noise

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3. WORLD'S MAPPING OF SUSTAINABLE MOBILITY

Which countries are performing well on sustainable mobility? Which ones are faring better on green mobility? Or efficiency? How far are other countries from achieving their targets? While this chapter shows that some countries are closer than others in achieving one or more policy goals, not a single country–developed or developing–is on target.

This conclusion is backed by data collected by SuM4All in the transport data portal and structured under the global tracking framework for transport (GTF).

The GTF associates principal indicators and a series of supporting indicators with each policy goal (table 3.1). With aspirational targets defined for each policy goal, it is possible to map country mobility performances and identify the gap between actual performances and targets. With data collected for 183 developed and developing countries, it is possible to cluster countries into groups–from lowest performing to the best performing–and identify patterns.

It is imperative to highlight that data availability is a serious constraint to this effect. For example, we use the rural access index (RAI) to measure universal access in remote or rural areas or both, and the rapid transit to resident ratio to proxy universal access in urban areas. The former records data last collected in the early 2000s and is limited to roads; the latter is at best a proxy for public transport accessibility, which is not available for most cities. We use female employment in transport to measure gender owing to lack of data on women and girls as transport users. Safety is measured by road traffic deaths but ignores other modes of transport. Efficiency is measured by the logistics performance index (LPI)–a proxy for freight only, but not for passenger transport. Since the publication of the GMR 2017, work on efficiency and urban access indicators has been undertaken.[11,12] Investment in the development of new indicators and data collection and harmonization is urgently required to strengthen and refine the analysis.

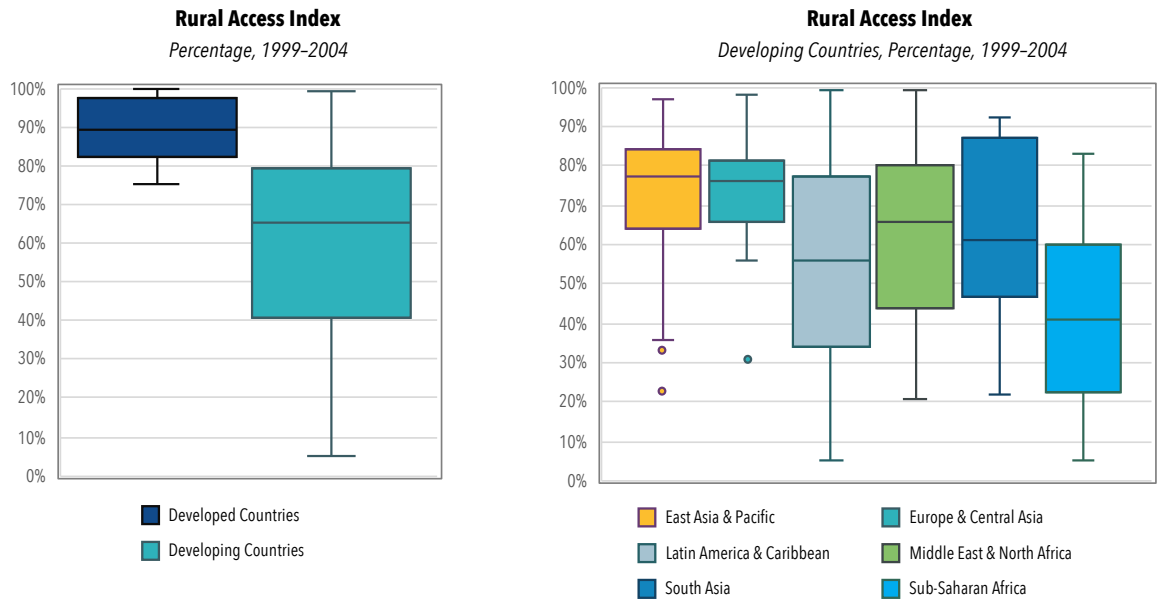
Table 3.1: Policy Goals and Aspirational Targets

Policy Goal (sub-goal)	Principal indicator	Aspirational Target	Data Source
Universal Access (rural)	Rural access index (percentage)	100%	World Bank
Universal Access (urban)	Rapid transit to resident ratio (km/million)	> 40	ITDP
Universal Access (gender)	Female workers in transport (percentage)	50%	ILO
Efficiency	Logistics Performance Index (Value 0-5)	5	World Bank
Safety	Mortality caused by road traffic injury (per 100,000 people)	0	WHO
Green Mobility (GHG emissions)	Transport-related GHG emissions per capita (tons of CO_2 per capita)	< 0.3	IEA
Green Mobility (Air Pollution)	PM 2.5. air pollution annual exposure (ug/cu.m)	< 10	Global Burden of Disease Study
Green Mobility (Noise Pollution)	Number of Urban Dwellers Exposed to Excessive Noise Levels	n/a	n/a

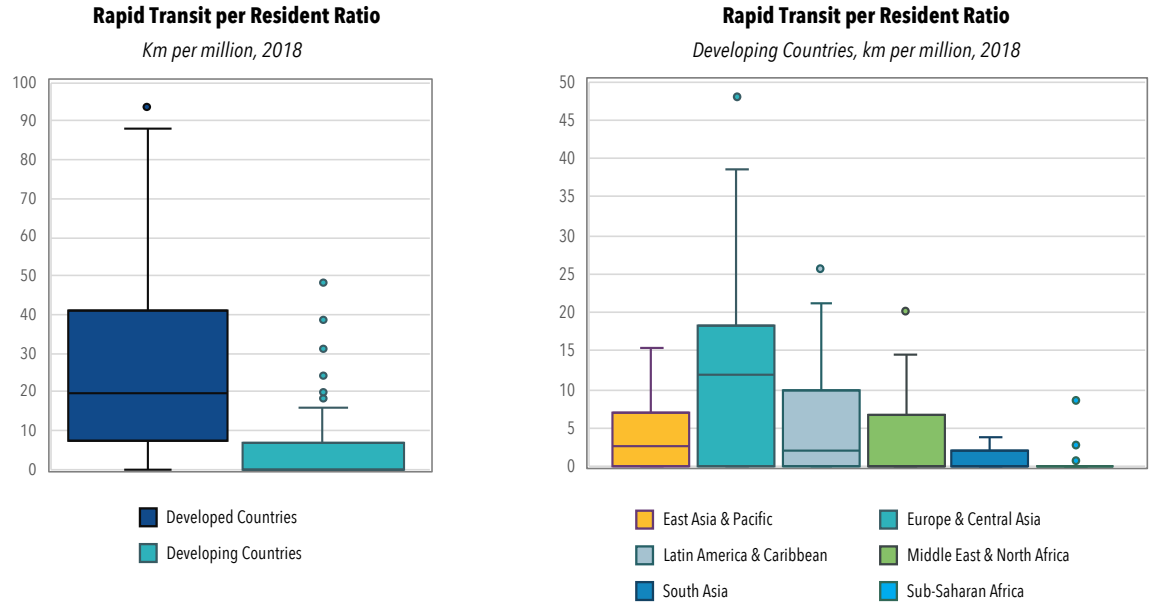
Note: On account of data scarcity to benchmark noise pollution, an aspirational target was not included.

Figure 3.1 shows mobility indicators for each policy goal for developed and developing countries and by region for developing countries only. The graphs show boxplots representing the distribution of indicators across countries, with the line in the box representing the median. Key findings follow.

Figure 3.1: Boxplot of Sustainable Mobility Indicators (by level of development and region)



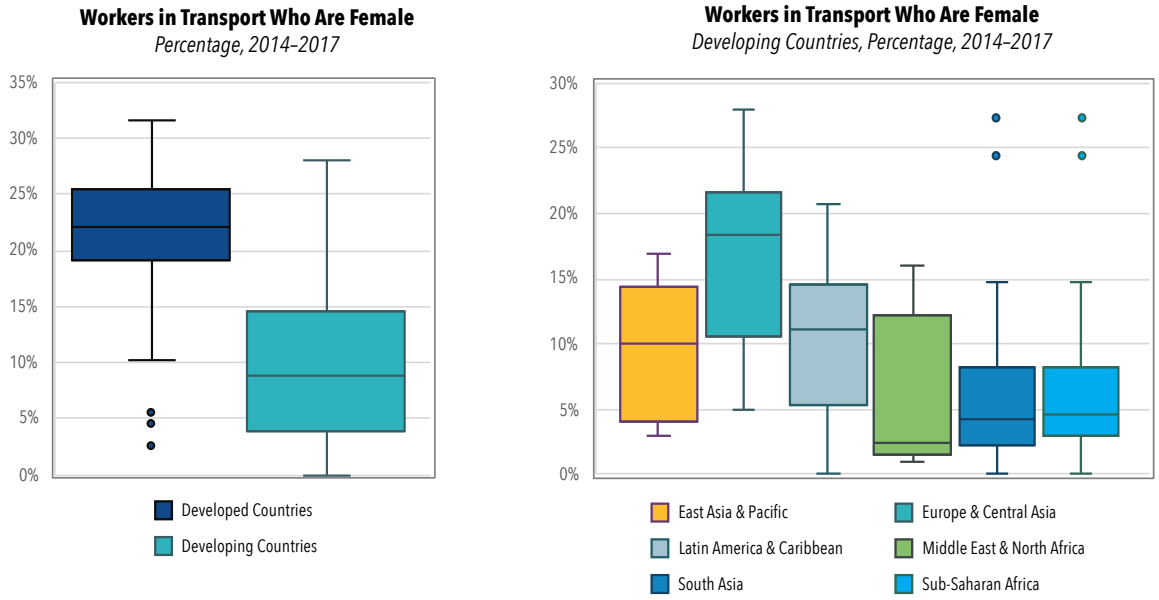
Source: World Bank raw data and analysis



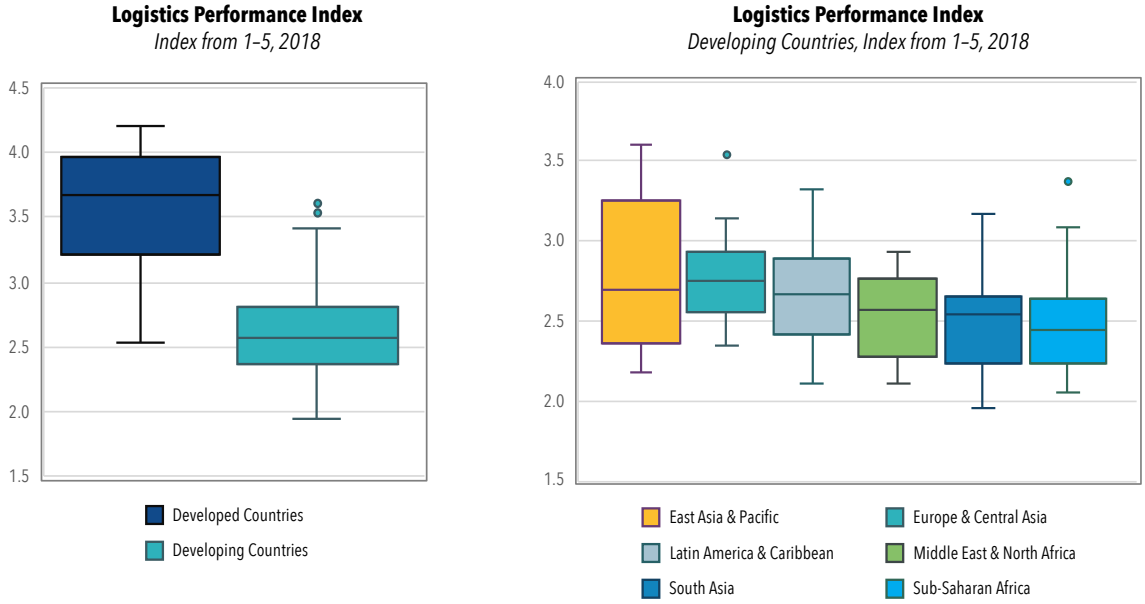
Source: ITDP raw data analyzed by the World Bank

Note: The width of the box on either side of the median shows the spread of the observations between the first and third quartiles (i.e., the 25% and 75% largest values). The whiskers show where the more spread-out observations lie. Individual dots show observations, which are outlying extreme values.

Figure 3.1 *(continued)*: Boxplot of Sustainable Mobility Indicators (by level of development and region)



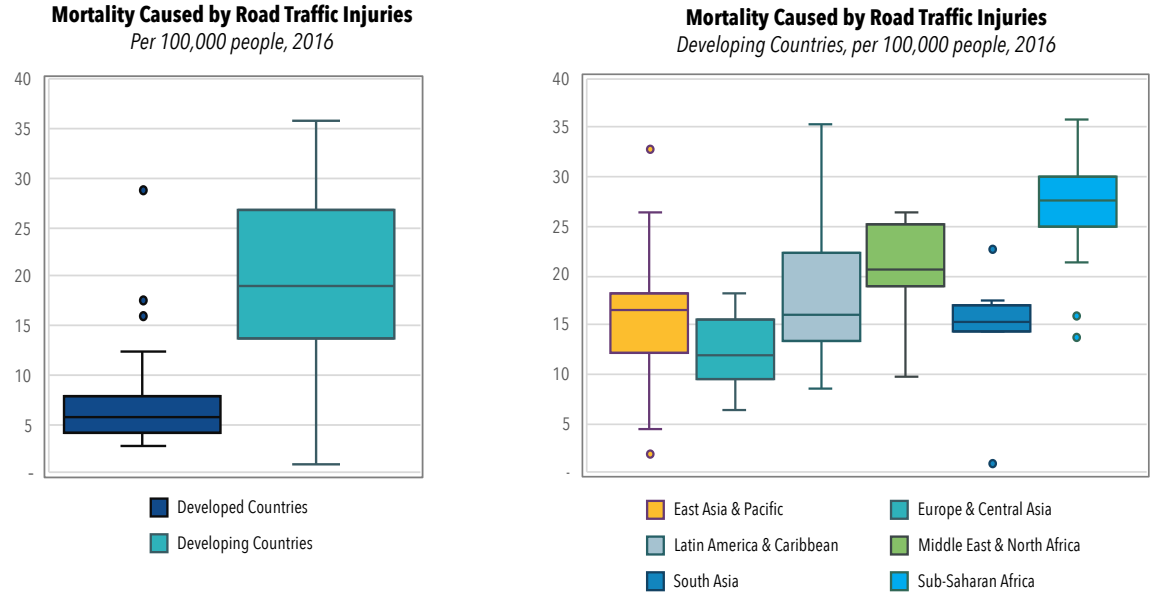
Source: ILO data analyzed by the World Bank



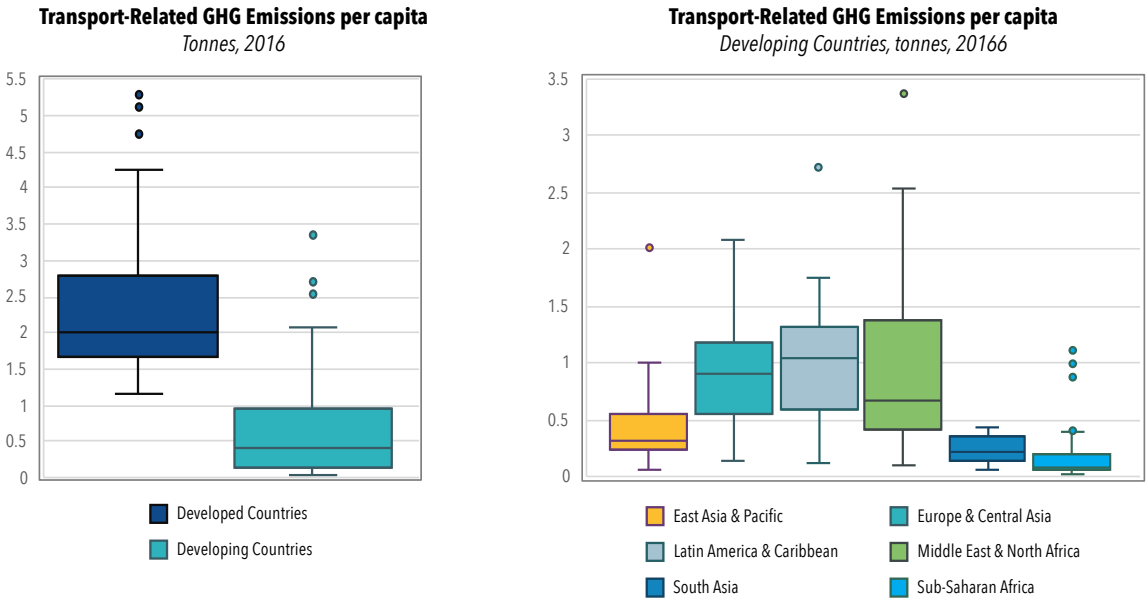
Source: World Bank raw data and analysis

Note: The width of the box on either side of the median shows the spread of the observations between the first and third quartiles (i.e., the 25% and 75% largest values). The whiskers show where the more spread-out observations lie. Individual dots show observations, which are outlying extreme values.

Figure 3.1 *(continued)*: Boxplot of Sustainable Mobility Indicators (by level of development and region)



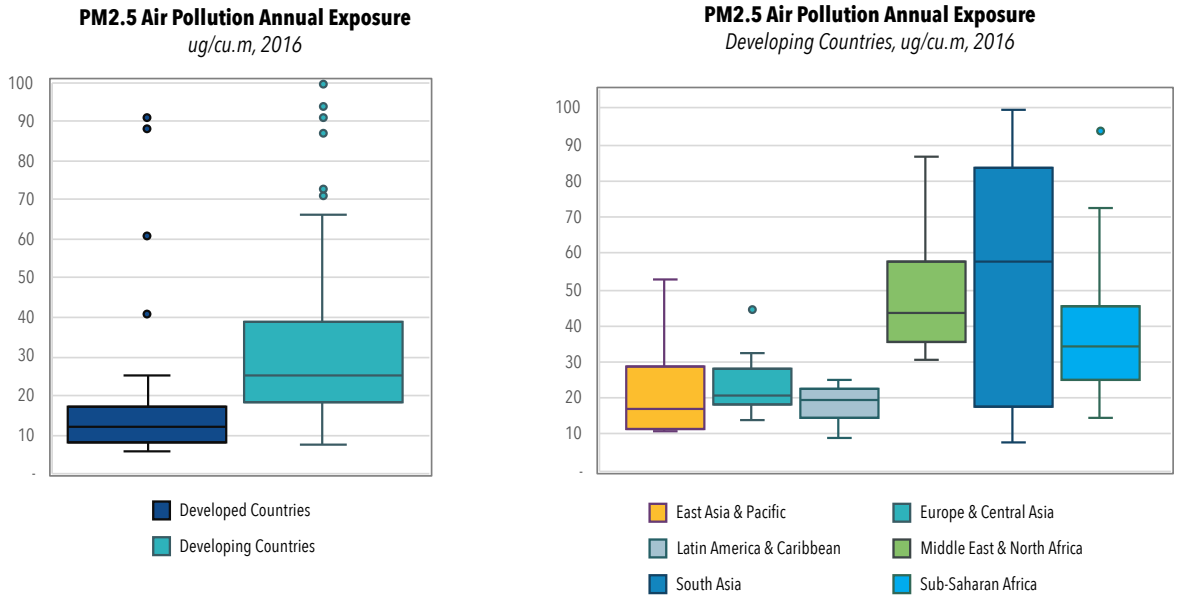
Source: WHO raw data analyzed by the World Bank



Source: IEA raw data analyzed by the World Bank

Note: The width of the box on either side of the median shows the spread of the observations between the first and third quartiles (i.e., the 25% and 75% largest values). The whiskers show where the more spread-out observations lie. Individual dots show observations, which are outlying extreme values.

Figure 3.1 *(continued)*: Boxplot of Sustainable Mobility Indicators (by level of development and region)



Source: Global Burden of Disease 2016 raw data analyzed by the World Bank

Note: The width of the box on either side of the median shows the spread of the observations between the first and third quartiles (i.e., the 25% and 75% largest values). The whiskers show where the more spread-out observations lie. Individual dots show observations, which are outlying extreme values.

3.1. DISPARITIES BETWEEN LEVELS OF DEVELOPMENT

- *Developed countries outperform developing countries on all sustainable mobility indicators,* except for transport-related GHG emissions per capita.
  - Developed countries have an average of 2.4 tons of annual CO_2 emissions per capita against 0.7 tons for developing countries.
  - The challenges associated with road safety and air pollution, in particular, place a much higher burden on developing countries compared to developed countries.
- *Disparities in sustainable mobility performance is apparent within developed and developed countries.* One example is RAI, which can be as low as 5 percent and as high as 99 percent within developing countries. In developed countries, the rapid transit to resident ratio can be as low as zero and as high as 94 kilometers per million residents.

3.2. DISPARITIES BETWEEN REGIONS

- *Disparities are also apparent between developing regions.* Developing countries in Europe and Central Asia on average perform better in universal rural and urban access, gender, efficiency, and safety. Sub-Saharan Africa fared the lowest in terms of universal rural and urban access, efficiency and safety.
- *Air pollution* is another striking example of differences between regions. For example, a higher burden is faced by South Asian developing countries compared to those in Latin America and the Caribbean. It is important to highlight that all countries in the two regions have an average level of particulate matter (PM 2.5) exposure that is higher than the guideline values recommended by the World Health Organization (WHO) of 10 ug/cu.m, except for Uruguay and Maldives.
- *At the country level, transport-related carbon emissions per capita is not correlated with expo-*

sure to air pollution. For example, South Asia and Sub-Saharan Africa, the regions with the highest exposure to air pollution, are also the developing regions with the least carbon emissions per capita.

- *Within each region, developing countries have low and high performers*. For example, East Asia and the Pacific are home to some of the top performers and some of the bottom performers in terms of transport efficiency globally, as measured by the logistics performance index (LPI); the top performer has 3.6 out of 5 while the bottom performer has 2.2.
- *The gender indicator shows that developing countries are yet to make significant progress*. Only in four developing countries worldwide more than 25 percent of the transport labor force is composed of women. This indicator is more alarming in developing countries of the Middle East and North Africa, South Asia, and Sub-Saharan Africa where countries have only about 5 percent of women on average in the transport labor force.

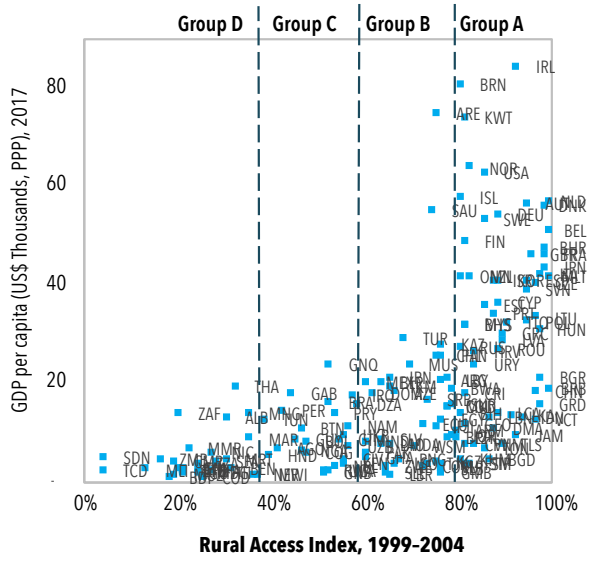
3.3. INCOME-BASED DISPARITIES

Figure 3.2 shows scatterplots of the sustainable mobility performance indicators and the Gross Domestic Product (GDP) per capita by country. The scatterplots confirm that higher income countries tend to perform better on all dimensions of sustainable mobility, except for transport-related carbon emissions per capita.

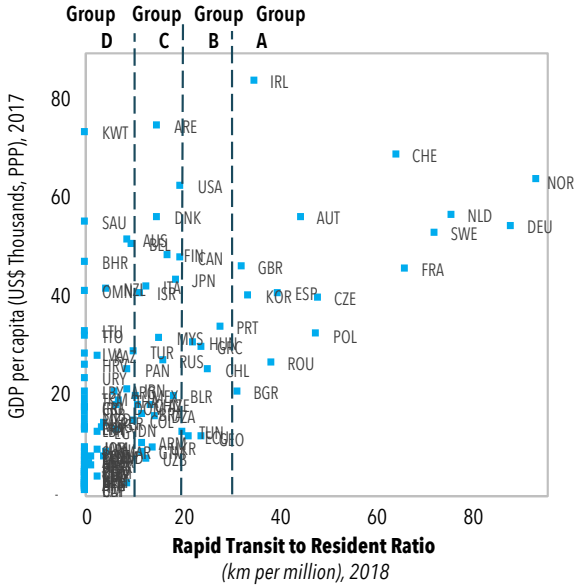
Key findings from this analysis include:

- Wide disparities in mobility performances exist among countries, and in some cases, the mobility performances are skewed. For example, for the rapid transit per resident ratio most countries are concentrated between zero and 10 kilometers per million residents, and for the share of workers in the transport sector that are female, most countries are between zero and 10 percent.
- The highest correlation between income per capita and mobility performance is with the indicator transport-related GHG emissions per capita (0.83). This must be factored in when considering the development pathways of low-income coun-

Figure 3.2: Scatterplot of Sustainable Mobility Indicators with the GDP per capita

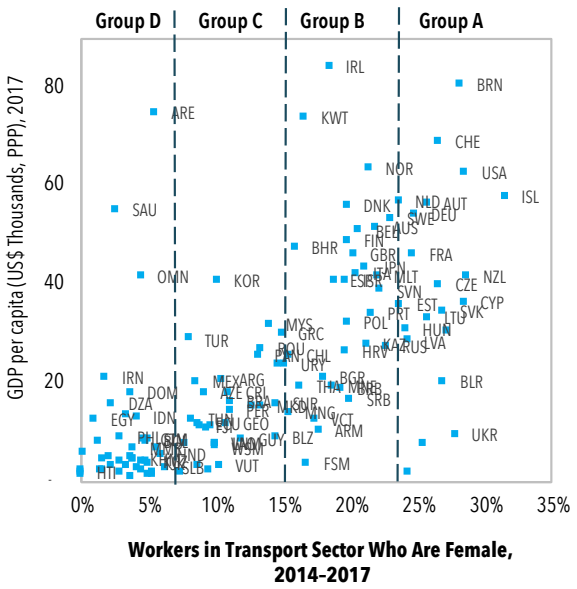


Source: World Bank raw data and analysis

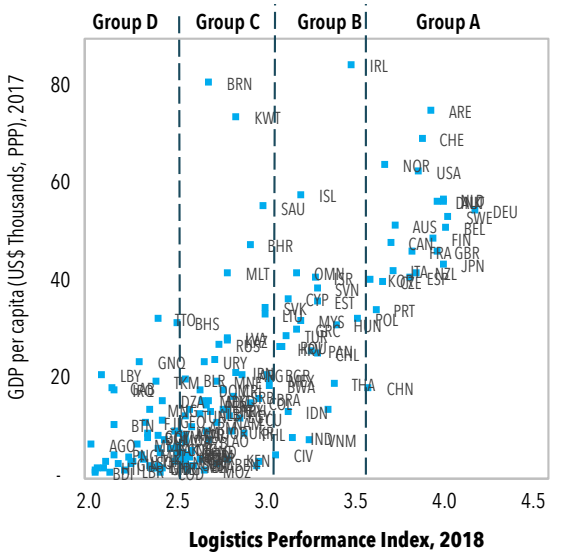


Source: ITDP raw data analyzed by the World Bank

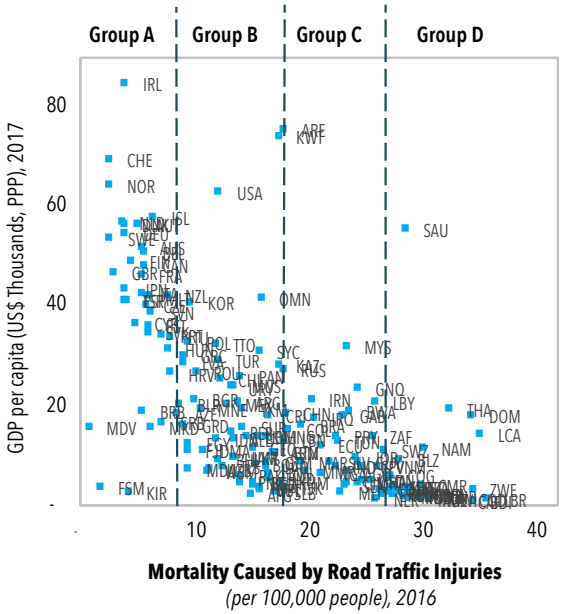
Figure 3.2 *(continued)*: Scatterplot of Sustainable Mobility Indicators with the GDP per capita



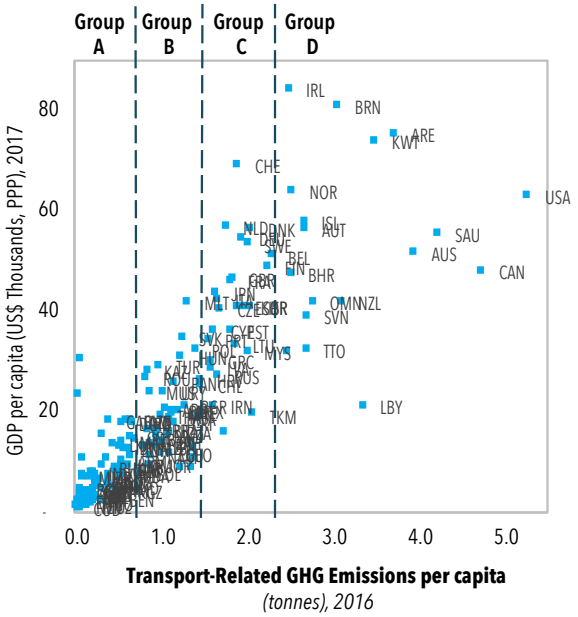
Source: ILO raw data analyzed by the World Bank



Source: World Bank raw data and analysis

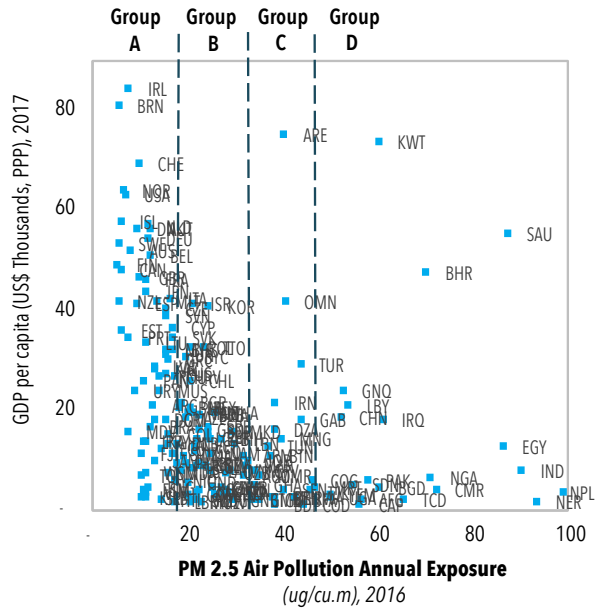


Source: WHO raw data analyzed by the World Bank



Source: IEA raw data analyzed by the World Bank

Figure 3.2 *(continued)*: Scatterplot of Sustainable Mobility Indicators with the GDP per capita



Source: Global Burden of Disease Study raw data analized by the World Bank

tries, in other words, sustainable mobility cannot be achieved at the expense of GHG emissions.

- The LPI is the second in correlation with the GDP per capita among mobility performance indicators (0.73). This goes to show that income is a crucial factor buttressing the right transport infrastructure and services to support trade and connect markets. However, it is important to highlight that some countries, despite their lower income levels, are capable of obtaining satisfactory transport efficiency outcomes and vice versa.
- Universal access and safety indicators are somewhat correlated with the GDP per capita; with correlations equal to 0.59 for the share of workers in transport who are female, -0.58 for mortality caused by road traffic crashes, 0.54 for the rural access index, and 0.50 for the rapid transit to resident ratio.
- Performance on air pollution is much more spread along the GDP per capita continuum, which signals that there are other factors that explain the pathways towards clean air rather than income.

3.4. CLUSTERING COUNTRIES

Owing to the wide disparities among countries across all indicators, we clustered countries into four groups based on their mobility performance. The groups are defined with equal intervals and the vertical lines for each indicator in the scatterplots of Figure 3.2. Country group A includes the best performing countries (i.e. closer to the aspirational targets), while group D clusters the bottom performers (i.e. countries that are furthest away from the aspirational target). Countries in each of the four groups may have different characteristics, but they may face similar mobility challenges. These similarities along specific mobility dimensions are the main reason why they are grouped together.

For example, the value of the LPI is used to proxy performance on the efficiency front. Looking at the LPI for 164 countries, its value ranges from 1.9 (worst performer) to 4.2 (best performer). We divide that range to create four equal groups to categorize countries. Group A includes all countries that have an LPI between 3.6 and 4.2. This group of countries, which consists of 13 percent of the world, has made the most progress in transport efficiency; group B includes all countries that have an LPI between 3.1 and 3.6; group C includes countries with values between 2.5 and 3.1; and group D includes countries with values between 1.9 and 2.5.

Owing to outliers in the distribution of the indicators for the GHG emissions, air pollution, and universal access (urban and rural), the four groups of countries for these three indicators were constructed using equal intervals between a minimum or a maximum threshold.[13] The thresholds used to cluster countries for each indicator are shown in table 3.2, and the proportion of countries under each country group is shown in table 3.3.

This classification of countries according to their performance on sustainable mobility reveals that:

- The four groups which characterize safety performance are equally balanced in the number of countries in the world: between 18 and 34 percent of the countries fall within each group.
- The findings on universal urban access, efficiency and gender are cause for serious reflection and action; 84 percent of countries in the world fall

in groups C and D for universal urban access, 71 percent for efficiency, and 59 percent of countries for gender.

- Countries which are the largest carbon emitters per capita, transport related, have levels of emission that are substantially higher than most countries for green mobility. The largest emitters belong to groups D and C, while most countries (75 percent) belong to group A and B. A similar situation arises for air pollution, where countries with the highest exposures to PM 2.5 fare much worse than the most countries (72 percent are in country groups A and B), and for universal rural access, where 66 per cent of countries are in groups A and B.

Table 3.2: Country Group Thresholds by Policy Goal (sub-goal)

		Country Group Thresholds			
Policy Goal (sub-goal)	**Principal indicator**	**D**	**C**	**B**	**A**
Universal Access (rural)	Rural access index (percentage)	0 - 40	40 - 60	60 - 80	80 - 100
Universal Access (urban)	Rapid transit to resident ratio (km/million)	0 - 10	10 - 20	20 - 30	30 - max
Universal Access (gender)	Workers in transport who are female (percentage)	0 - 8	8 - 16	16 - 23	23 - 31
Efficiency	Logistics Performance Index (Value 0-5)	1.9 - 2.5	2.5 - 3.1	3.1 - 3.6	3.6 - 4.2
Safety	Mortality cause by road traffic injury (per 100,000)	27 - 36	18 -27	9 - 18	0 - 9
Green Mobility (GHG emissions)	Transport-related GHG emissions per capita	2.3 - max	1.5 - 2.3	0.8 - 1.5	0 - 0.8
Green Mobility (Air Pollution)	PM 2.5. air pollution annual exposure	46 - max	32 - 46	18 - 32	0 - 18

Table 3.3: Percentage of Countries in Each Country Group by Policy Goal (sub-goal)

		Share of Countries			
Policy Goal (sub-goal)	**Principal indicator**	**D**	**C**	**B**	**A**
Universal Access (rural)	Rural access index (percentage)	19%	16%	27%	39%
Universal Access (urban)	Rapid transit to resident ratio (km/million)	68%	16%	6%	10%
Universal Access (gender)	Workers in transport who are female (percentage)	34%	25%	25%	16%
Efficiency	Logistics Performance Index (Value 0-5)	29%	42%	16%	13%
Safety	Mortality cause by road traffic injury (per 100,000)	18%	21%	34%	27%
Green Mobility (GHG emissions)	Transport-related GHG emissions per capita	12%	13%	23%	52%
Green Mobility (Air Pollution)	PM 2.5. air pollution annual exposure	14%	15%	32%	40%

ENDNOTES

11 Jose Viegas. Towards a (Passenger) Mobility Performance Index: a contribution. July 18, 2018. https://www.linkedin.com/pulse/towards-passenger-mobility-performance-index-jose-viegas/

12 Jose Viegas. Equitable Urban Access as a key dimension of Sustainable Mobility. July 16, 2018. https://www.linkedin.com/pulse/equitable-urban-access-key-dimension-sustainable-mobility-jose-viegas/ .

13 Owing to outliers in the distribution of the indicators for GHG emissions, air pollution, and universal access (urban and rural), the four groups of countries for these three indicators were constructed using equal intervals between a minimum or a maximum threshold. For GHG emissions, the range of the intervals is calculated between the minimum and 3 tons of annual transport-related GHG emissions per capita. Any country above the 3-ton threshold is at an unsustainable level and is mapped into group D. For air pollution, the range of the intervals is calculated between the minimum and 60 micrograms per c.u. meter. Any country above the 60 micrograms threshold is at an unsustainable level and is mapped into group D. For the rapid transit to resident ratio, the range of the group intervals is calculated between the minimum and 40 km of rapid transit per million residents. Any country above the 40 km threshold is considered at a sustainable level and mapped into group A. For the rural access index, the range of the group intervals is calculated between 20 percent and the maximum. Any country below the 20 percent threshold is considered at an unsustainable level and mapped into group D

4. THE CATALOGUE OF POLICY MEASURES

What can be done to achieve sustainable mobility? This chapter takes stock of suitable policy measures that have been used and tested around the world to support each of the four policy goals.

The catalogue lists 182 policy measures; it was the deliberated outcome of a process that spanned more than 18 months, 180 experts and 55 public and private organizations making their knowledge available to the SuM4All platform. This catalogue represents the most up-to-date intelligence on policies to achieve any of the four policy goals.

4.1. STRUCTURING BY TOOLBOXES

Policy measures address a variety of issues and at different levels of engagement. They may cover a broad reach, such as "creating complete multimodal transport networks"; they may address specific challenges in a sub-sector, such as "making public transport fares affordable for the poor" or they may offer a pioneer approach, such as "developing infrastructure for road transport electrification", among other characteristics.

We organized the catalogue of policy measures in four toolboxes:

- Regulatory and institutional toolbox—it comprises plans and strategies for the transport sector, cooperation and coordination across transport stakeholders, regulations (for cross-border transport, transport services, vehicles and vehicle use, use of data), procurement and contracts, as well as capacity building.
- Engineering and technology toolbox—it includes the design, provision and maintenance of transport infrastructure and transport services, the setting of technical standards, asset construction, and safeguards.
- Economics and finance toolbox—it covers actions such as financing, pricing, taxes and subsidies, innovation policy and cost-effectiveness.
- Communications toolbox—it covers stakeholder consultations and public campaigns to influence behavioral change, such as product labeling, and knowledge management.

Policy makers may draw from the distinct toolboxes (see annex I); as an example, a country can rely on:

- "Planning for a multi-tiered rural access approach" to improve universal access in rural areas (regulatory and institutional toolbox);
- "Building capacity for local path and road maintenance" (engineering and technology toolbox);
- "Establishing selection criteria for feeder roads projects" (economics and finance toolbox), and
- "Consulting with stakeholders during the full project cycle" (communications toolbox), among other policy measures.

The catalogue of policy measures is provided in annex I of this report.

4.2. GAUGING THE IMPACT

Many of the policy measures have an impact on more than one policy goal. For example, "setting design standards for sidewalks and bicycle paths" deeply influences universal urban access, gender, and safety, and has an important impact on green mobility.

The impact of policy measures on a given policy goal cannot be assessed in isolation of other policy goals. The focus is on how policy measures contribute to sustainable mobility broadly, rather than to one single policy goal. This observation becomes highly relevant when establishing action plans. An action plan should

only include a selected set of policy measures that can achieve more than one of the policy goals selected.

To that end, we rate the importance of each policy measure using a ranking system from zero to 2. For example, "applying market-based pricing to street parking" is considered very important for universal access (rating of 2) and for green mobility (rating of 2).[14] The values assigned to the impact rating are shown in table I.2 of annex I, and were sourced collectively and reviewed extensively by SuM4All experts from different organizations involved in the process to minimize subjectivity.

Of the 182 policy measures, 17 affect all policy goals while 21 impinge on only one policy goal. The most common outcome of policy measures is their impact on two or three policy goals. Impact scores are distributed across all policy goals, from 58 policy measures that influence gender to 106 measures that have an impact on efficiency (rating of 1 or 2). Each policy goal should contain on average 22 policy measures with a rating of 2.

4.3. CLASSIFYING POLICY MEASURES

In addition to the four toolboxes, a second level of classification of thematic areas was created to better categorize the catalogue of policy measures. For example, "project and program cycle" and "allocation of public funds" are both thematic areas under the economics and finance toolbox. A total of 22 thematic areas is shown in annex II.

4.3.1. Regulatory And Institutional Policy Measures

Transport Plans and Strategies

This thematic area defines a high-level set of considerations and the framework of logic used to ensure completeness, consistency, and rigor in developing policy, planning, and taking decisions. Plans and strategies are used to set goals, determine actions to achieve those goals, and organize resources to implement actions. Creating this framework is important because resources are limited and need to be efficiently and effectively deployed.

Ten policy measures cover regulatory and institutional policy and are of great interest to high-level decision makers in the government and private sector. These range from high-level recommendations that contribute to all policy goals, such as: "develop an integrated national transport plan to cover the four policy goals"; "set targets for the four policy goals, aligned with the national transport plan"; and "develop mobility plans at the subnational level".

The policy measures under this thematic area may consider and contribute to all policy goals or to specific policy goals.

Institutional design, cooperation, and coordination

Institutions play a critical role in the transport system, including the tasks of organizing, coordinating, mediating, and delivering. Institutions can include the political governance function of government, the administrative and civil service functions of government at all levels (international, national, sub-national and local), legal administration, non-governmental entities, commercial and industrial associations, and civil society organizations.

Some examples of relevant policy measures are: "coordinate across government agencies" to ensure shared responsibility for results across levels of government; "define roles and accountabilities across transport agencies"; and "establish a metropolitan transport governance and metropolitan institutional framework".

International Agreements and Standards

International agreements and standards provide the technical and legal framework to ensure consistency and compatibility across the many functions and activities of the transport system, between countries, and around the world. International agreements also aim to ensure coordination in the global efforts toward a specific policy goal, such as climate change mitigation.

The catalogue contains seven policy measures under this theme, such as: "acceding to and implementing international agreements and conventions", that facilitates trade between countries; "implementing

single-window and one-stop border posts" where international traders can submit documents; and "implementing mode specific international schemes and guidelines to improve energy efficiency and reduce carbon emissions", such as the Carbon Offset and Reduction Scheme for International Aviation (CORSIA) from the ICAO.

This thematic area contributes most strongly to the policy goals of efficiency and green mobility, and it is of interest to international entities, national governments, and global scale transport networks and service providers.

Regulations for Transport Services

This thematic area deals with regulations that directly affect the supply of transport services. It includes policy recommendations that put in place specific high-level laws, rules, and mechanisms to allow the transport system to function.

Regulation of transport services encompasses nine policy measures. They are broad ranging, some applicable to transport services in urban areas, including "allow and regulate programs, demand-responsive solutions, transport networking companies (TNCs)"; freight delivery regulations, such as "establishing maximum driving times for drivers"; "regulating truck size and weight limits", and "regulating freight delivery hours in urban areas". Two policy measures that set or improve the transport service standards to ensure safety and security for women are also part of this thematic area.

These policy measures are most relevant to the policy goals of efficiency, but some are particularly relevant to others such as universal urban access and gender, and are of interest to governments and transport service providers, including freight carriers, freight forwarders, public transport operators, and technology companies.

Regulations for Vehicles and Vehicle Use

Vehicles and vehicle use are the focus of the second thematic area involving regulations. Seventeen policy measures in this theme address topics such as vehicle standards and specifications, as well as other laws that regulate the licensing, safety practices, and overall use of all types of vehicles.

Examples include: "establish stringent fuel economy standards" for all types of vehicles including automobiles, airplanes, trains, and other vehicles: "require periodic vehicle inspections": "ensure legal certainty regarding driver permits"; and "implement regulations to prevent pollution from ships".

Most of the regulations in this thematic area have a high impact on the green mobility and safety policy goals. They are most relevant to vehicle manufacturers and vehicles users, such as motorists.

Regulations for Data Collection, Data Share and Use

Laws and guidelines for data protection, data reporting, data collection, and use of data to support decision making in the transport sector are four policy measures of this theme.

One example is to "establish data protection guidelines" in agencies and companies that store large volumes of consumer data. The regulation deals with handling personal consumer data, including travel data, with the appropriate safeguards. Another example is "require service providers to report standardized data", which would be applicable to TNCs, public transport operators, and vehicle sharing companies, and it would enable policy makers to use all available information to develop transport plans and to inform decision making.

Universal urban access, universal rural access, gender, and efficiency are significantly influenced by this thematic area, as are governments, especially those departments or agencies that provide regulatory oversight, creators and managers of transport assets, transport service providers, and civil society entities.

Procurement and Contracts

Best practices and guidelines for procurement in the transport sector are another key aspect to improve the institutional delivery of transport projects. Topics such as procurement rules, competitive selection, and the integration of sustainable mobility aspects into procurement are highlighted.

Examples of such policy measures include "preparing public procurement rules and procedures, and standard documents for infrastructure construction and maintenance" supported by an e-procurement platform. Aspects of integrating vehicle electrification, environmental considerations, and the circular economy into public procurement, whenever possible, form key considerations of the theme. It is particularly relevant to achieve universal access in rural and urban areas, and relevant to implementing agencies in governments and to contractors.

Capacity Building And Human Resource Development

Human resources are an essential part of the efficient delivery of transport infrastructure and services. Human resource development and capacity building must also strive to advance aspects of fairness, equity, equal opportunity, and innovation. Technical training for current and future transport workforce needs funding provided to build the skills and to develop the human resources needed to support the pathways toward sustainable mobility.

Eleven policy measures make up this theme; for example, "include more women in recruitment processes and foster women's leadership in the transport sector"; "build capacity across levels of government", including at the local and metropolitan levels, and "identify and empower sustainable mobility champions" or the policy makers who strive to achieve the policy goals of sustainable mobility.

This theme contributes strongly to the policy goals of universal access, in particular, addressing gender aspects. It is of great interest to national governments, local governments, transport service providers, and to civil society entities.

4.3.2. Engineering And Technology Measures

Technical Standards

The technical standards thematic area includes policy measures that supply technology and engineering frameworks to ensure function, compatibility, and safety across the many activities of the transport system.

Thirteen policy measures govern technical standards; a few are "creation of technical standards for transport infrastructure", encompassing a broad range applied to build railways to airports; "implementation of climate change adaptation standards" which will ensure that transport infrastructure is resilient to extreme weather events; "setting high quality design standards for sidewalks and bicycle paths" that covers street lighting and pedestrian crossings, and providing accessibility to persons with disabilities; and "ensuring that transport project design includes gender aspects", such as a review of bus or train levels of crowding, height of steps, location of grab rails and hanging straps, among other elements.

These policy measures contribute to all four policy goals but have the highest impact on safety. They are of interest to sub-national governments, creators and managers of transport assets, transport service providers, the construction industry, and transport equipment suppliers.

Asset Construction

Physical assets are an essential part of the transport system. Assets must be created, managed, and employed to support service provision in ways that promote allocative efficiency (build and use the right assets) and productive efficiency (build and use it the right way).

Asset construction exercises seventeen policy measures; a few being "building complete multimodal networks" to ensure optimal network availability; "developing infrastructure for road transport electrification" such as charging stations and electric road systems; "expanding public transport infrastructure adjusted to demand requirement" with a focus on equitable access; and "building rail and maritime transport infrastructure" which are energy- and space-efficient modes of transport.

Asset construction primarily supports efficiency and green mobility policy goals. It is of interest to national governments, especially ministries of transport or infrastructure, local governments, creators and managers of transport assets, and transport service providers.

Design and Deployment of Transport

Services

This thematic area focuses on the effective deployment of transport services and high standards of quality, with a focus on the use of new technologies and innovation.

Policy measures in design and deployment include: "ensure high quality and safety standards in public transport" along several aspects such as service frequency, reliability, and vehicle security and cleanliness; the wide "implementation of intelligent transport systems (ITS) solutions" such as in the provision of live information on traffic, routes, occupancy rates in train, mode options for both passengers and freight transport, among others; and "provide effective car and bicycle sharing systems," that provide an alternative to vehicle ownership.

The policy measures have a higher impact on universal access. Transport service operators, technology companies, and transport users such as shippers (for freight transport) and commuters (for passenger transport) constitute the main influencers.

Design and Deployment of Transport Programs

Transport program delivery rather than transport service delivery governs this theme. Its interventions aim to develop and support programs that (i) can provide incentives for behavior change, (ii) monitor and analyze transport systems, and (iii) generate and disseminate information among others.

Illustrative of such programs are the "deployment of road safety cameras" to monitor road conditions and to enforce traffic violations; "implementation of high-occupancy vehicle lanes" and "deployment of employee carpooling programs" that provide incentives for more sustainable commuting choices; "mapping of the full extension of the road network", and "identifying the risk and vulnerability of transport nodes and links to extreme weather events" that will further inform policy making in transport.

Broad ranging in their impact across policy goals is wide as are the main stakeholders that need to be involved, from the government to the private sector, and civil society.

Asset Management

Four policy measures that address asset management aim to maintain and restore transport infrastructure and ensure that transport systems meet their performance requirements over their life span, and across types of infrastructure for all modes of transport.

Asset management is supported by the "development of asset management plans and standards", that will preserve, maintain, and manage transport infrastructure; and "establishing reliable approaches to feeder road asset management," that focus on feeder road maintenance as one of the main bottlenecks for achieving universal rural access. Such policy measures promote an approach in which communities are involved in routine maintenance where feasible.

The main policy goals these measures address are efficiency and universal rural access. Local governments, maintenance contractors, and communities, play the largest role in the delivery of asset management policies.

Safeguards

Safeguards highlight the importance of ensuring that transport infrastructure and services do not cause significant adverse impacts to communities and the environment, notably in aspects of resettlement, gender-based violence, and impact on ecosystems.

One of the recommended policy measures is to "ensure that women—and their centers of interest—are not marginalized during resettlements" due to construction of transport infrastructure. As well, projects must "comply with gender-based violence prevention practices" that would require contractors to commit to an agreed code of conduct for gender-based violence prevention and response practices.

Safeguard policy measures address gender and universal rural access directly and are particularly relevant to transport agencies and their contractors.

4.3.3. Economics And Finance Measures

Project or Program Cycle

The project or program cycle encourages a systematic and consistent approach to developing, evaluating,

executing, and learning from projects or programs. This in turn allows for better review of proposals, of activities during implementation, and in the understanding of outcomes.

Examples of the theme's six policy measures comprise: "evaluate long-run transport infrastructure needs", including the backlog of deferred maintenance; "use a robust framework for project prioritization" given competing project priorities and limited public infrastructure funding; and "establish performance monitoring and evaluation schemes" to inform the regular adjustment of projects and their delivery.

Project or program cycle policy measures contribute to all policy goals, particularly that of universal rural access, universal urban access, and efficiency. They are of interest to national governments, especially ministries of transport, local governments, and creators and managers of transport assets.

Allocation of Public Funds

Generally speaking, the demand for financial resources to contribute to the transport system exceeds the availability of funds. Therefore, clear, fair, and understandable methods are necessary to allocate scarce funding to selected projects.

Three policy measures constitute this thematic area, including "requiring projects to meet cost-effectiveness thresholds" based on cost-benefit analysis and on the estimation of an economic internal rate of return (EIRR); and "allocating funding for transport safety interventions" using a rational evaluation framework and ensuring that minimum safety standards are included in the design of all projects.

The theme contributes to the policy goals of efficiency and safety, and is of interest to governments at all levels (national, sub-national, local or municipal), especially in those areas with budget responsibility for elements of the transport system.

Fiscal and Financial Measures

The theme aims to expand the capacity to mobilize capital for transport projects. It refers to the ability to raise funds and finance for investments and services, and it also refers to fiscal impacts on national and local governments.

Seven policy measures in this theme range from: "mobilizing public and private capital for transport finance" through public–private partnerships; "enabling municipal revenue through tax and bonds" so transport projects can be funded locally in medium-sized and large cities; and to "setting user fees to support transport infrastructure funding" such as toll roads.

This theme relates strongly to the universal access and efficiency policy goals, and these policy measures will be of interest to governments at all levels (national, sub-national, local or municipal) and to users of transport services, both passenger and freight.

Pricing for Efficiency and Inclusion

The pricing of transport services directly and powerfully influences demand of these services. Pricing transport aims at optimal levels to: (i) influence travel behavior, and (ii) make transport affordable to the poor. Pricing affect the choices made by users (travelers or shippers), including mode of transport, vehicle ownership, time of travel, among other variables. Prices should provide appropriate incentives that will reinforce sustainable outcomes.

Eight policy measures group together in this theme. Some examples are: "using congestion charging or pay-as-you-drive schemes" to price the congestion imposed by vehicle use; "implementing fuel taxes and phasing out fuel subsidies" to offset the cost of GHG emissions and air pollution; "providing financial incentives to reduce environmental impact" such as subsidies and tax credits for cleaner modes of transport or cleaner fuels; and "making public transport fares affordable for the poor" ensuring that populations of low–income have access to opportunities.

Pricing supports urban access, efficiency, and green mobility. Governments, transport asset managers, transport service providers, travelers, shippers, civil society, and local populations are interested in pricing questions.

Innovation Policy

Economic incentives may be used to encourage innovation in the transport sector. For example, providing funding for training and education programs; subsidies or tax breaks to encourage research and devel-

opment, or to supply innovative projects, products or services.

Six policy measures form innovation policy; for example, "supporting research and development to reduce environmental impacts" through joint industry and government research on issues such as alternative sustainable fuels and intelligent transport systems; and "supporting educational programs for innovation in transport".

This thematic area primarily supports the policy goals of efficiency and green mobility, and it is of most interest to governments, transport asset creators and managers, transport service providers, and suppliers to the transport system.

4.3.4. Communications Measures

Consultation and Public Engagement

A fundamental change toward sustainable mobility will require acceptance from the broad public and civil society. Acceptance, in turn, is made more likely through public participation and discussion about the transport system, and will occupy the full range of transport activity from strategy, investment, management, service delivery, land development, human resource development, financing, pricing, and relationships with non-transport sectors. At a project- specific level, consultations are important to understand the needs of affected communities and to reduce any adverse impacts.

Five policy measures comprise this theme, including "consultation with stakeholders during project formulation and establishing a framework for continuous consultation during project implementation"; "use of participatory planning methods" to provide space for communities to propose transport interventions; and "promotion of a discussion on new mobility solutions" with civil society to generate new ideas, innovations and tools.

Public participation and discussion policy measures relate to universal rural access, universal urban access, and gender, and are relevant to communities, civil society, governments, particularly those agencies with responsibilities in planning and implementation, and to transport asset creators and managers.

Promotion Campaigns and Public Awareness

Fundamental change from the economic and social trajectory also requires individuals and groups to adopt different behavior and consumption patterns. Better information can assist people in making sustainable choices.

All the eight policy measures of this thematic area provide incentives for sustainable mobility choices; for example, a policy for "labeling products according to their environmental performance", includes fuel economy labels for cars, eco-rating schemes that allow shippers to choose green freight alternatives; a policy for "raising road safety awareness", emphasizes shared responsibility for the delivery of road safety; and "implement anti-harassment campaigns in public transport".

This theme supports green mobility, gender, and safety, and the theme is of interest to local government, transport service providers, civil society, and local populations.

Knowledge Management and Dissemination of Best Practices

Widely sharing knowledge of successful models and best practices fosters a culture of learning from experience. Lessons learned should be disseminated and discussed.

"Sharing knowledge on successes and best practices" is one policy measure that must be considered across agencies at the local, national, and international levels, and must be based on well-designed knowledge transfer frameworks.

This theme cuts across all policy goals. It is of interest to national and local government, transport service providers, civil society, and local population.

ENDNOTES

14 We calculated the weighted number of policy goals impacted, using a weight of 2 for the cases with 2 stars, and a weight of 1 for the cases with one star.

5. ROADMAP TOWARD SUSTAINABLE MOBILITY

What policy measures should a country adopt to achieve sustainable mobility? The GRA assumes that this path is defined by a series of action plans that can be implemented over time to reach sustainable mobility.

This chapter outlines the approach used to create these prototype action plans. The approach combines four important principles:

- Each action plan should contain a manageable number of policy measures—approximately thirty— drawn from the entire catalogue of measures.
- Within this catalogue of policy measures, priority should be given to those measures that have an impact on more than one policy goal (impact criteria).
- Additionally, policy measures selected should be most relevant to a country's context; more specifically, where countries stand on sustainable mobility and how far they are from the target (country relevance criteria). Policy measures selected are likely to differ from one country to the other.
- Countries can be clustered into groups that have similar mobility performances for presentational simplicity—from the lowest performing group to the best performing group. Within each group, it is reasonable to recommend similar policy measures.

The GRA derives prototype action plans by country groups.

5.1. CREATING AN ACTION PLAN

As a first step, we reviewed each policy measure and assigned an impact score and a country-relevance score (both included in table I.2 of annex I). The scores were sourced collectively and reviewed extensively by SuM4All experts from different organizations involved in the process to minimize subjectivity:

- Impact score accounts for the impact of a policy measure on policy goals. The impact of a policy measure on each policy goal can be zero (no impact), 1 (some impact), or 2 (high impact). The full impact score for a policy measure is the sum of scores of that measure on each policy goal. For example, the policy measure "Define low emission zones (LEZs) in cities" has an impact score of 4, which is the total of a score of 1 for the universal access policy goal, a score of 1 for safety, and a score of 2 for the green mobility policy goal.
- Country-relevance score serves as proxy to the policy measure's relevance for each country group. The score ranges from zero (not relevant) to two (very relevant). For example, the policy measure "Expand the all-season road network" is assigned a score of 2 for the groups of countries that perform poorly on universal access rural (country group D), and a score of zero for country group A.[15]

We select those policy measures that have the highest scores of both impact and country relevance and create an action plan with a step-by-step approach:

1. Identify the country groups to which a country belongs. For example, France belongs to country group A for universal rural and urban access, gender, efficiency and safety; and country group C for green mobility.
2. Identify most impactful policy measures for the country groups to which a country belongs. For example, as France is in country group A for universal rural access, we identify the policy measures that are very relevant for country group A (with a country relevance score of 2), and that

have their highest impact on universal rural access (with an impact score of 2).

3. Assign policy measures to action plans. The most impactful policy measures identified above are assigned to the action plan of a country.[16]

This approach is then replicated for all policy goals. The resulting list of policy measures constitutes the prototype action plan.

For exposition purposes, table 5.1 shows a sample prototype action plan of a country, Rwanda. Rwanda is placed in group A for Green Mobility (GHG emissions), group C for efficiency and universal rural access, and group D for universal urban access, gender, and safety.

5.2. WEB-BASED ACTION PLANS

A web-based tool is available to automatize the derivation of prototype action plans based on countries' mobility performances. This tool is an open and interactive online application, hosted on the SuM4All website. It allows task project managers in development banks, decision makers in countries and cities, and other users to explore the catalogue of policy measures, filter policy measures, generate and customize action plans.

Table 5.1: Example Prototype Action Plan: Rwanda

Toolbox	Policy Measure	Impact on Policy Goal (• for important; •• for very important)						Country-Relevance Group (2 for very relevant; 1 for relevant)			
		Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Somewhat close to targets	C: Somewhat far from targets	D: Furthest from targets
Regulatory and Institutional	Prepare Public Procurement Rules and Procedures	••	••		•	•		1	1	2	2
	Procure Contractors on a Competitive Basis	••	••		•	•		1	1	2	2
	Build Capacity for Local Path and Roads Maintenance	••		•		•		1	1	2	2
	Train Security and Transport Staff in Gender Aspects	•	•	••				1	1	2	2
	Accede to and Implement International Conventions				••	•	•	1	2	2	2
	Embed the Safe System Approach into Transport Planning	•	•			••		2	2	1	1
	Limit the Import of Second-Hand Vehicles		•			•	••	2	1	1	1
	Set Fuel Quality Requirements and Blending Mandates		•		•		••	2	2	1	1
	Define Laws for Key Safety Rules			••		••		1	1	2	2

Toolbox	Policy Measure	Impact on Policy Goal (• for important; •• for very important)						Country-Relevance Group (2 for very relevant; 1 for relevant)			
		Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Somewhat close to targets	C: Somewhat far from targets	D: Furthest from targets
Engineering and Technology	Establish Approaches to Feeder Road Asset Management	••			•	•		0	1	2	2
	Expand the All-Season Road Network	••		•	•			0	1	2	2
	Expand Public Transport Infrastructure	•	••	•	•	•	•	1	1	2	2
	Repurpose Road Space to Allow Access for All Modes		•	•	•	••	•	2	2	1	1
	Build Rail and Maritime Transport Infrastructure	•	•		•	•	••	2	2	1	1
	Ensure Adequate Post-Crash Intervention	•	•			••		1	2	2	2
	Ensure Access to Transport Services in Underserved Areas	••	••	•				1	2	2	1
	Improve the Quality and Safety of Public Transport	•	••	•		•	•	0	1	2	2
Engineering and Technology	Establish Technical Standards for Transport Infrastructure	••	•		•		•	1	1	2	2
	Set Design Standards for Sidewalks and Bicycle Paths		••	••		••	•	1	2	2	2
	Modernize Air Traffic Management				••	••		2	2	2	2
	Ensure Safe Roads Design with Lower Design Speeds	•	•			••		2	2	2	1
	Set and Implement Climate Change Adaptation Standards	•	•		•		••	2	2	1	1
	Set Low-Noise Engineering and Traffic Management Practices	•	•			•	••	2	2	1	1
Economics and Finance	Require Projects to Meet Cost-Effectiveness Thresholds	•	•		••			1	2	2	2
	Make Public Transport Fares Affordable for the Poor	•	••	•	•	•	•	1	2	2	2

Toolbox	Policy Measure	Impact on Policy Goal (• for important; •• for very important)						Country-Relevance Group (2 for very relevant; 1 for relevant)			
		Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Somewhat close to targets	C: Somewhat far from targets	D: Furthest from targets
Communications	Consult with Stakeholders during the Full Project Cycle	••	••	••				1	1	2	2
	Implement Anti-Harassment Campaigns in Public Transport	•	••	••				1	1	2	2

ENDNOTES

15 The country relevance rating accounts for two important aspects: (i) policy measures are not rated "very important" in countries that already implement the measure successfully, i.e. no additional effort may be required, and (ii) policy measures are not rated "very important" when conditions to make the policy measure effective are not in place, or when the country must focus its resources on more urgent policy measures.

16 The criteria to assign a policy measure to an action plan is to have an impact score of at least 4.

6. POLICY MEASURES IN ACTION

This chapter presents six case studies highlighting the experience in implementing policy measures to advance on one or more policy goals.

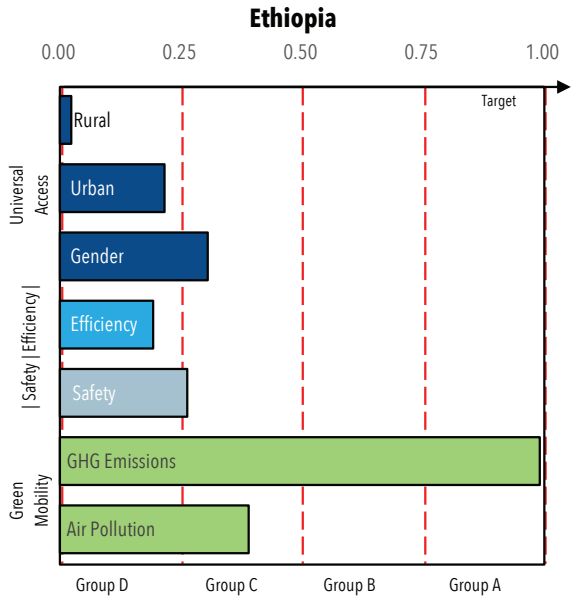
The analysis starts with an assessment of a country's mobility performance and shows the gap between actual performances and aspirational targets. It then discusses how one or more of these gaps were filled in by applying a set of policy measures, and touches on the political difficulties encountered in implementing these policy measures.

6.1. UNIVERSAL RURAL ACCESS – ETHIOPIA

Ethiopia belongs to country classification group D for efficiency and for universal access in rural and in urban areas, to country group C in terms of safety, gender equality, and air pollution, and it is among countries in groups A with respect to GHG emissions, shown in figure 6.1. Ethiopia's rural accessibility index (RAI) is lower than the median RAI in Sub-Saharan Africa and as such, Ethiopia has channeled efforts toward improvement in this area since 2010. Connectivity has been improved over the years because of expansion of rural roads, exemplified by an increase in rural access between 2010 and 2016.[17] In addition, there has been a significant increase in the market accessibility index (a measure of access to markets) for 25 percent of kebeles (smallest administrative unit in Ethiopia), and approximately an average 20 percent decrease in travel time to the nearest town since 2010.

In 2008–09, only about 37 percent of kebeles had all-season access, 20 percent had seasonal (dry season) access, and 43 percent did not have motorable access, and were impassable or unreachable by motorized transport in any season. More than 91 percent of rural households traveled a minimum distance of 15 kilometers to reach a health center. Two thirds of the rural population were located more than 5 kilometers from an all-season road, with 48 million people located more than 2 kilometers from an all-season road. The average distance to an all-season road was 11.3 kilometers, equivalent to more than 3.5 hours walk. During the rainy season, communities are often isolated, without access to transport services. Remoteness, isolation and lack of services increase vulnerability and constrain people's ability to contribute to the country's economy and development. These factors also exclude rural communities from exposure to new ideas and influences.

Figure 6.1: Ethiopia's Performance on Sustainable Mobility



Indicators and Sources: Rural Access Index (World Bank), Rapid Transit to Resident Ratio (ITDP), Percentage of Female Workers in Transport (ILO), Logistics Performance Index (World Bank), Mortality Caused by Road Traffic Injury (WHO), Transport-Related GHG Emissions per Capita (IEA), and PM 2.5 Air Pollution Annual Exposure (Global Burden of Disease Study).

Policy Measures Adopted

Expand the All-Season Road Network

Ethiopia has been implementing the Universal Rural Roads Access Programme (URRAP) since 2010. URRAP's mission is "to connect all kebeles by all-weather roads and provide year-round access, and that all road infrastructure will be appropriate to meet the needs of the rural communities and will be affordable to build and maintain." The overall aim is to provide all kebeles with all-season road connections. URRAP plans to build a total of 71,523 kilometers of rural roads which would increase rural access to about 80 percent.

Apply Innovative Solutions Financing for Asset Creation

Investment financing for URRAP was majorly provided by the government, the national road fund and community contributions, with the remainder funded by development partners. With the mobilized finance, under the Growth and Transformation Plan (GTP) I (2011-2015), URRAP was to construct a total of 71,523 kilometers of rural roads to provide 15,937 kebeles with all-season access at an estimated cost of $1.5 billion. Under the GTP II (2016-2020), the government plans to construct 90,000 km at an estimated cost of Br 45.0 billion ($1.6 billion).

Set Targets across Policy Goals

URRAP's objectives align with the strategic objectives for Ethiopia's economic development. Targets were determined to improve and expand the country's road network, and these targets were influenced by the needs assessment of required road infrastructure of the SDGs.

Meeting these targets is expected to (i) improve access of the rural population to markets, social, and other services by reducing transport time and cost; (ii) improve access for isolated areas and communities, enabling further implementation of other poverty reduction programs—such as sector programs in agriculture, health and education—all of which require reliable transport services and all-year access; (iii) improve administrative and economic integration of the country and facilitation of decentralization by linking rural communities, wereda (district) and kebele centers with the national economy and community; (iv) support the decentralization process and strengthening of public administration and planning, decision making, implementation and progress monitoring; and (v) support the private sector and small–medium enterprises that contribute to sustainability in the local construction industry and self-reliance.[18]

Establish Approaches to Feeder Road Asset Management

The approach to URRAP's implementation has been based on conducting works through small-scale contractors using labor-intensive methods. This approach is intended to reduce costs compared with using capital-intensive contractors, and to generate employment and incomes in areas with few non-farm economic opportunities.

Similarly, road maintenance activities, cutting vegetation, repairs to structures, filling potholes, maintaining road signs and road marking, cleaning ditches, culverts and small bridges are achieved using labor intensive and labor-based operations.

URRAP introduced sustainable approaches to maintenance management, including programmed routine and periodic maintenance systems, appropriate maintenance techniques and strengthened the maintenance procurement and contract management.[19]

Conduct Impact Evaluation Studies

Studies of completed roads confirm that these roads have reduced transport costs and trip duration, expanded the availability of transport services, and improved the prices that farmers can obtain for their produce. For example. Household surveys have shown that improved access has transformed many areas in rural Ethiopia, reducing travel time, making it faster, easier and safer for animal carts and motor vehicles to pass, and providing access to ambulance services. Evidence shows that farmers have begun to use animal carts instead of carrying headloads of their produce to markets. Furthermore, traders have started coming to farms to buy produce. This has not only saved farmers the time and effort of transporting goods to the market, but has created some competition among traders, which has increased the farmers' income.

Challenges

Implementation of URRAP faced challenges. First, manuals that were prepared to support program execution have not always been followed. For example, UK Department for International Development (DFID) funded Africa Community Access Partnership (AFCAP), which assisted URRAP by preparing low volume road manuals to support program implementation (AFCAP 2013), and were widely disseminated to authorities, contractors and consultants. The goal to maximize the available funding was to focus on narrower carriageways and low-volume gravel-surfaced roads, which would lead to lower unit-road construction costs, however, this standard was not followed in the majority of the roads.

Furthermore, implementation was slower than originally planned. Nearly 36,000 kilometers out of a planned 45,381 kilometers of rural road projects had been completed by 2014 (Sampson and Asrat 2014). Among the main reasons for delay were: the large number of small-scale contractors to be administered (945 contractors, 275 consultants); the low financial and managerial capacity of small-scale enterprises; the need to provide the small-scale enterprises with initial training, basic equipment and tools; and delays in government issuing payments to contractors (Ethiopia Road Department 2016).

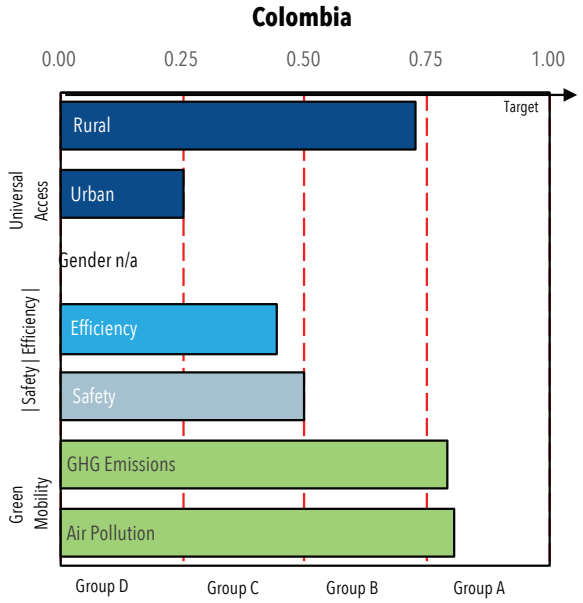
6.2. URBAN UNIVERSAL ACCESS - COLOMBIA

Colombia is in group C in terms of universal urban access along with most other developing countries. Colombia has achieved significant progress since 2000: (i) it ranks sixth in its total kilometers of bus rapid transit (BRT), and (ii) Colombia's largest cities average 10.1 kilometers of mass rapid transit per million inhabitants, a number that has grown steadily since the implementation of the first metro line in 1995 in Medellín. Globally, Colombia ranks 44th in terms of its rapid transit per resident ratio (figure 6.2). In the Latin America region, Colombia comes sixth in rapid transit ratio only behind Chile, Ecuador, Guatemala, Brazil and Mexico.

In Colombia, public transport systems in the largest cities, before the 2000s, were fully provided by private companies, which operated mostly informally, without regulated payment methods, scheduled service, or assigned stops. In Bogota, although fares were set by the city government and routes assigned to private companies, bus operations remained unregulated. Bus drivers were paid by the number of passengers carried, creating a perverse incentive for competing with other drivers along the same route, boarding and dropping off passengers anywhere along the route, and driving carelessly. This resulted in unsafe practices and poor level of service (Vergel-Tovar et al. 2018).

The informal system—with buses operating in mixed traffic lanes and erratic driving—often meant longer distances and higher travel times for passengers. This situation was particularly challenging for people of lower incomes, who depend the most on public transport because they often live in the periphery of metropolitan areas. Furthermore, as private companies operated based on revenue, peripheral and poor areas often lacked public transport options, while some profitable areas had an oversupply of routes.[20]

Figure 6.2: Colombia's Performance on Sustainable Mobility



Indicators and Sources: Rural Access Index (World Bank), Rapid Transit to Resident Ratio (ITDP), Percentage of Female Workers in Transport (ILO), Logistics Performance Index (World Bank), Mortality Caused by Road Traffic Injury (WHO), Transport-Related GHG Emissions per Capita (IEA), and PM 2.5 Air Pollution Annual Exposure (Global Burden of Disease Study).

Policy Actions Adopted

Develop an Integrated National Transport Plan and Develop Mobility Plans at the Sub-national Level

The national government in Colombia developed a national urban transport policy in 2002. This policy was based on the principle that the national government would finance between 40 and 70 percent of infrastructure investments for urban public transport. The policy also defined the main problems and externalities associated with the provision of public transport in Colombian cities, among these: deficient institutional capacity, inadequate regulation, oversupply, inequitable and unsustainable infrastructure, congestion and issues with road safety.[21] The policy also defined the national strategy for improving public transport in cities, based on strengthening institutions in cities in terms of planning, managing, regulating and controlling transport. The strategy defined responsibilities at both the national and local levels.

The Ministry of Transport published a decree with transport solutions recommending that cities, with less than 600,000 and more than 250,000 inhabitants, should implement strategic public transport systems, and established the Sistemas Estratégicos de Transporte Público (SETPs).[22] The first policy goal was, "Improve coverage, accessibility and connectivity between different sectors of the city […] ensuring the entirety of the strategic system is accessible for the population". As of 2017, eight cities had started the process of design and implementation of SETPs.[23] Cities that have implemented SETPs have improved public spaces and implemented cycle infrastructure as part of the general infrastructure investment.

Expand Public Transport Infrastructure

A set of national-level policy documents have determined that cities with more than 600,000 inhabitants should implement integrated mass transit systems. After the implementation of TransMilenio, one of the first large-scale BRT systems in the world, new regulations allowed and promoted the implementation of other integrated mass transit systems. Following the national guidance, six smaller BRT systems were developed in other cities in Colombia.

Challenges

While the implementation of integrated mass transit systems and, specifically, the expansion of BRT have seen some measures of success, medium-sized cities have had more difficulties when developing SETPs. Issues such as the competition from motorcycles serving as public transport, and difficulties when reorganizing existing informal transport systems have led to operational problems, and to lower demand than expected.[24]

6.3. GENDER – SWEDEN

Sweden is one of the countries that is the closest to achieving all four policy goals of universal access in urban areas, efficiency, safety, and green mobility. Sweden is placed in country group A in terms of efficiency, safety, and universal urban access. Sweden is among the top performers of universal access in urban areas in terms of its rapid transit to resident ratio, with a relatively large network of urban rail of 73.4 kilometers of rapid transit per million residents. Worldwide, this ratio is only lower than Norway (95.3 km) and Germany (80.1 km). Sweden ranks group B for gender equality, as measured by the percentage of female workers in the transport sector, and group C for GHG emissions, as measured by transport–related GHG emissions per capita (figure 6.3).

In Sweden, 23 percent of the transport workforce are female. This percentage is similar to the average in high-income countries (21%) and the same as the regional average in high-income countries in Europe (23%). However, it falls behind other countries in Europe such as Iceland (32%), Lithuania (26%), Germany (25%), and France (25%). Sweden has made significant progress with the implementation of actions that promote gender equality in the transport sector. A result of this progress is that Sweden is in the fifth place out of 144 countries in the Global Gender Gap Report 2017 (WEF, 2017), which addresses four key areas: health, education, economy and politics.

Gender equality is seen as a cornerstone of Swedish society, and gender mainstreaming has been included in the Swedish government's strategy for gender equality policies 1993–94. National policies and budget allocations are expected to contribute to gender equality and be gender sensitive across all areas. The

government has set a gender equality policy goal and is committed to implement gender mainstreaming and gender-responsive budgeting. Equal employment and pay, representation and health are three specific focus areas.

Policy Actions Adopted

Address Gender Aspects in Transport Plans

Gender has been included in sustainable transport system policy design since 1993. Reports in 1996 and 2001, and in-depth analysis of the individual and institutional levels within the transport sector helped socio-economic modeling, public bidding, political representation and decision making across all parts of the transport sector. Policy design included those outside the political realm, such as business interests, and identified how best to implement gender equality within the transport and information technology (IT) sectors.

Important recommendations followed on gender equality in transport policy, leading to gender equality being added as the sixth goal of Swedish transport policy and modified in 2009. Unique to Sweden is that "the transport system should respond equally to women's and men's transport needs".

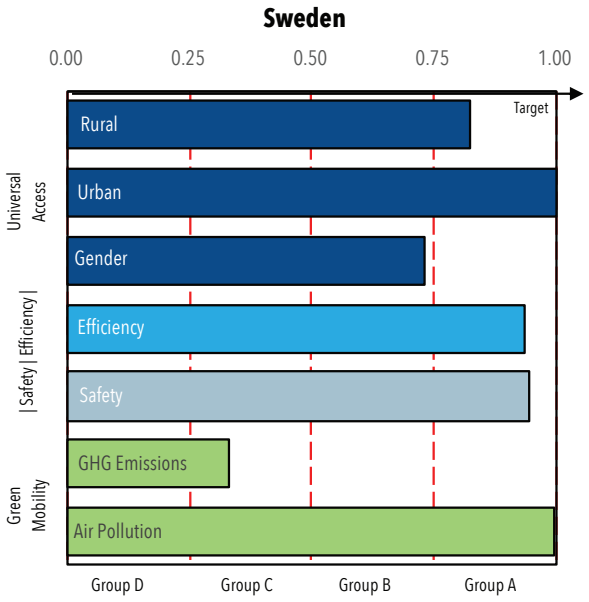
Develop Data Repositories and Data Collection Guidelines

Official statistics are regulated according to the Official Statistics Ordinance, which states that those official statistics related to individuals are to be disaggregated by sex, unless there are special reasons for not doing so. All transport agencies include reports on travel surveys for women and travel patterns in their respective sector reports, but this information is not always public in its disaggregated form. Guidance is also given to local municipalities on how to address gender and transport, and there is national allocation of research funding to gender studies that cover all sectors.

Ensure Transport Project Design Include Gender Aspects

The Swedish national transport policy requires agencies to bear in mind that equality in the transport system does not mean that men and women's transport requirements should be met at any price, but rather that their respective needs are to be met equally and that both women and men should have the same levels of influence in the design of the transport system.

Figure 6.3: Sweden's Performance on Sustainable Mobility



Indicators and Sources: Rural Access Index (World Bank), Rapid Transit to Resident Ratio (ITDP), Percentage of Female Workers in Transport (ILO), Logistics Performance Index (World Bank), Mortality Caused by Road Traffic Injury (WHO), Transport-Related GHG Emissions per Capita (IEA), and PM 2.5 Air Pollution Annual Exposure (Global Burden of Disease Study).

Challenges

The complexities of incorporating gender into transport policy, employment practices, projects and implementation are a challenge. Sweden's policy envisioned a gender-equal transport system as one in which women and men are equally represented in decision making and planning, with women and men's travel needs being equally satisfied, and women and men's values are given comparable weight. These criteria may appear straightforward but key aspects such as how to evaluate gender equality has not been specified or agreed.

Many challenges continue to remain to change deep-

ly engrained behavior and the gendered distribution of power. How this influences decision in the sector, or the criteria used to judge whether women and men's travel needs are adequately satisfied, are not established with a common understanding or set of indicators. For example, most of the governmental committees cited in the previous sections had an equal number of women and men, but this fact did not change how superficially gender was dealt with in most of the reports. Therefore, it is essential to separate gender distributions of power from the inequalities that exist between women and men that are a result of their unequal status and position in society. Within transport policy, structural and organizational distributions of power must also be analyzed and dealt with separately from differences in individual needs and requirements related to transport that may be collected as statistics.

Insufficient documentation inhibits any attempt to determine whether the transport resources are approaching the objective of a gender equal transport system. The Swedish Institute of Transport and Communication (SIKA) indicates that the present Swedish transport system deviates markedly from what may be regarded as an optimal state of social efficiency, despite comprehensive information available for investments and responsibility for transport costs. Passenger satisfaction with public transport quality ranks slightly lower than European averages, although this information is not sex disaggregated.

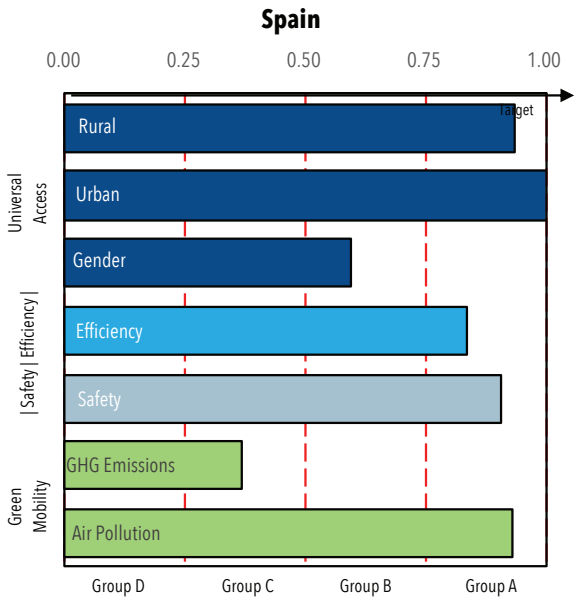
Data, analyses and research are still lacking on women and men's travel patterns to drive policy development. Overall despite gender budgeting at national level, SIKA also noted that very few resources are allocated to work with the equality objective by the transport agencies. Much remains to be done before women and men have the same influence over the design of the transport system. Progress to achieve equality in the transport system is moving in the right direction, but it is moving very slowly.

6.4. SAFETY – SPAIN

Across all indicators used to assess a country's progress toward a sustainable mobility policy goal, Spain performs relatively well compared with most countries worldwide. Spain belongs to group A in terms of universal access in urban and rural areas, safety, efficiency, and green mobility (air pollution). Spain is positioned in group B in terms of its proximity to the gender equality (GHG emission) policy goal and in group C in terms of transport-related GHG emissions per capita (figure 6.4).

Spain's performance on transport safety is remarkable; it is one of the countries with the lowest mortality caused by road injury (4.1 per 100,000 people in 2016), even when compared to other high-income countries in Europe (average of 5.5). Spain has seen a steady decrease in road mortality from 15.6 deaths per 100,000 people in 2000 to 3.6 in 2015 and 4.1 in 2016. The lowest death rate ever in the country was in 2013 with 1680 deaths, which placed Spain among the top five world performers when rates per population are computed, a much-improved ranking than the 74th place Spain occupied in 2000.

Figure 6.4: Spain's Performance on Sustainable Mobility



Indicators and Sources: Rural Access Index (World Bank), Rapid Transit to Resident Ratio (ITDP), Percentage of Female Workers in Transport (ILO), Logistics Performance Index (World Bank), Mortality Caused by Road Traffic Injury (WHO), Transport-Related GHG Emissions per Capita (IEA), and PM 2.5 Air Pollution Annual Exposure (Global Burden of Disease Study).

Policy Actions Adopted

Develop an Integrated National Transport Plan and Embed the Safe System Approach into Transport Planning

Spain's national lead agency for road safety, the National Road Safety Agency (ANSV), has existed since 1957. Its responsibilities and accountabilities include coordinating with ministries, local authorities, and congress; planning the national road safety policy; promoting and implementing infrastructure systems and audits and inspections; supporting the police and the use of technological elements; providing information through the National Road Safety Observatory; promoting awareness campaigns and education, and supporting the governing bodies in road safety regulation.

Set Targets across Policy Goals

The national road safety plan of 2011-20 comprises specific targets and indicators, and its main objective is aligned with the European objective of reducing the number of people killed by 50 percent by 2020. In 2012, Spain adopted "vision zero", an international road traffic safety approach that aims to achieve a highway system with no fatalities or serious injuries involving road traffic. Six of the thirteen 2020 road safety targets had been achieved by 2015. This progress resulted in numerous awards, including the European Transport Safety Council (ETSC) performance index (PIN) award in 2014.

Expand Public Transport Infrastructure and Build Rail Transport Infrastructure

Spain has developed one of the largest high-speed train networks since 2000, a popular mode amongst citizens and tourists. In addition, substantial improvements have been made on the rail network in general, in both quality and regularity of trains, even for short distances. Public transport in urban areas has also greatly improved.

Establish Technical Standards for Transport Infrastructure

Supported in part by EU funding, Spain has become one of European Union (EU) countries with an excess road capacity and a high-quality network as measured by all international standards. At least 3000 kilometers were transformed from conventional two-lane roads into segregated two lanes each-way roads.

Accede to and Implement International Conventions

Spain was able to adopt international frameworks for national level legislation to the setting up of traffic management centers very quickly with technical expertise from the EU. Under the umbrella of mandates from the EU, relatively difficult political decisions were eased into place. EU membership helped adapt and adopt higher levels of traffic management, and also gave politicians tactical measures to avoid potential conflict.

Deploy Road Safety Cameras

Speed cameras were deployed along the 20,000 kilometers of major intercity roads. In total, some 800 cameras were implemented in these roads that carry most of the travel in the road network. A fully automated ticketing center was created with capacity to issue 8 million speed tickets annually.

Define and Enforce Laws for Key Safety Rules

Substantial increases in penalties for selected behaviors (for example, speed, drugs, and alcohol) were introduced. EU cross-border measures also helped as they allowed national authorities to issue and follow-up tickets.

Enforcement practices were augmented to ensure not only random-driver testing but also that offenders and crash-involved drivers were tested both for alcohol and drugs through alcohol tests and saliva-based tests for illegal drugs. Multiple-offence enforcement was developed. For example, speeding cars detected

by cameras are also checked automatically for technical inspection certification and insurance status since 2014.

Challenges

For countries active in road safety for many years such as Spain, the ambition as they move closer toward vision zero presents challenges for strengthening safety management. For example, one challenge that Spain faced was budget cuts for road safety in 2012, in the aftermath of a global financial crisis that proved to be Spain's most severe economic crises experienced.

6.5. GREEN MOBILITY – CHINA

China sits in group A in terms of universal access in rural areas and green mobility (GHG emissions). China provides all-season road access to about 97 percent of the rural population, ranks 25th in the world in logistics performance index (and second considering among middle-income countries). Despite being the world's largest GHG emitter in absolute terms, China has a relatively low road transport-related GHG emission per capita. China sits in group B for safety and efficiency, and in group C for universal urban access. China is among countries in group D for air pollution (figure 6.5).

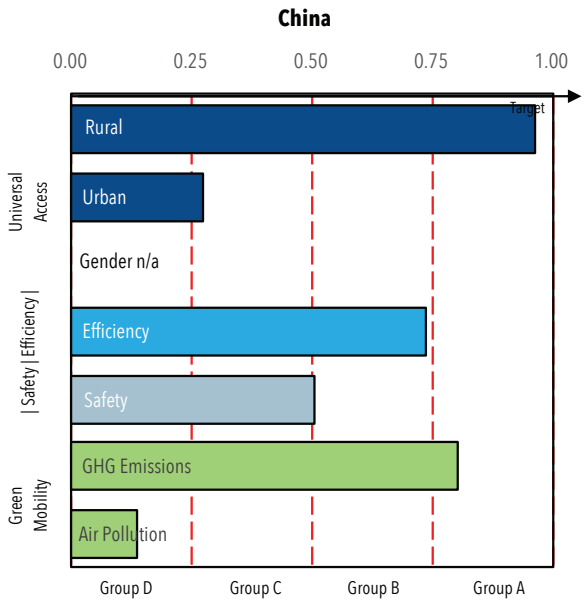
While China's road transport-related GHG emissions are relatively low in per capita terms, they are increasing rapidly. Air pollution exposure is particularly severe in cities but some improvement can be noted, as the average concentration of PM10 in 338 prefectural-level cities decreased by 22.7 percent, compared with the 2013 levels. The 2017 China environmental noise pollution prevention report states that, in 2016, noise complaints represented 43.9 percent of total environmental complaints registered by the relevant departments, making it a prevalent issue for citizens.

Policy Actions Adopted

Establish More Stringent Fuel Economy Standards

China has pressed for the introduction of stringent fuel efficiency, fuel quality and emission standards that comply with European regulations. Such regulations, known as China VI Standards, will come into effect in 2020, and will cover both light-duty and heavy-duty vehicles. Car restrictions have also been introduced in multiple cities as vehicle quotas or number plate auctioning; such measures are however only targeted at conventional vehicles, and do not affect next generation ones.

Figure 6.5: China's Performance on Sustainable Mobility



Indicators and Sources: Rural Access Index (World Bank), Rapid Transit to Resident Ratio (ITDP), Percentage of Female Workers in Transport (ILO), Logistics Performance Index (World Bank), Mortality Caused by Road Traffic Injury (WHO), Transport-Related GHG Emissions per Capita (IEA), and PM 2.5 Air Pollution Annual Exposure (Global Burden of Disease Study).

Provide Financial Incentives to Reduce Environmental Impact and Use Public Procurement to Support Vehicle Electrification

China actively promotes the use of electric vehicles (new energy vehicles) through subsidies and by encouraging a gradual phasing out of conventional vehicles. Examples of such policies would be a ban on conventional motorcycles in multiple cities that has resulted in a spectacular rise of e-bike use, as well as the deployment of hybrid and electric buses at a massive scale.

Build Rail Transport Infrastructure

The Chinese government supports expansion of high quality mass transit network within and between cities, including the development of an extensive network of high-speed rail. Thirty-four cities in China had opened urban rail transit networks by the end of 2017. In subway and train stations, emphasis is also put on land-value capture by introducing additional amenities to the infrastructure, such as convenience stores or restaurants.

Expand the Network of Bicycle Lanes and Set Design Standards for Sidewalks and Bicycle Paths

Active mobility has been on the rise thanks to the construction of high-quality walking and cycling infrastructure and the availability of bike sharing facilities.

Invest in Port Electrification

China has put important emphasis on green logistics, particularly when it comes to clean shipping; Shanghai port, for example, has benefited from government subsidies covering 70–80 percent of the costs linked to the construction of shore-based electric power supply equipment covering 26 port berths.

Challenges

While China has stepped up its role and pace in the implementation of policies towards green mobility, the increase of overall carbon emissions in the country is a challenge and must be addressed by scaling up current initiatives and adopting additional actions.

For example, other potential policy measures for China's road transport include the launch of low emissions zones, under examination for Beijing, Hefei, Taiyuan and Shanghai. Increased fuel efficiency and emission standard stringency could also be envisioned, together with the introduction of noise standards, along the same lines of the Shanghai regulations prohibiting horns within the outer ring.[25] Further electrification should also be promoted, particularly for trucks and two-wheelers, with an emphasis put on safety and better infrastructure. Transport demand management is another prevalent issue and could be developed through speed limits, better intersection design and stricter parking policy.

Shipping could benefit from further port-based incentives with the development of clean-energy ships, while biofuels are an option to be explored in aviation. China is the fourth country worldwide with independent R&D resources for bio-aviation fuels.

Finally, adaptation planning is greatly needed and must be considered for the further development of climate-resilient transport infrastructure.

6.6. EFFICIENCY – EUROPE AND CENTRAL ASIA

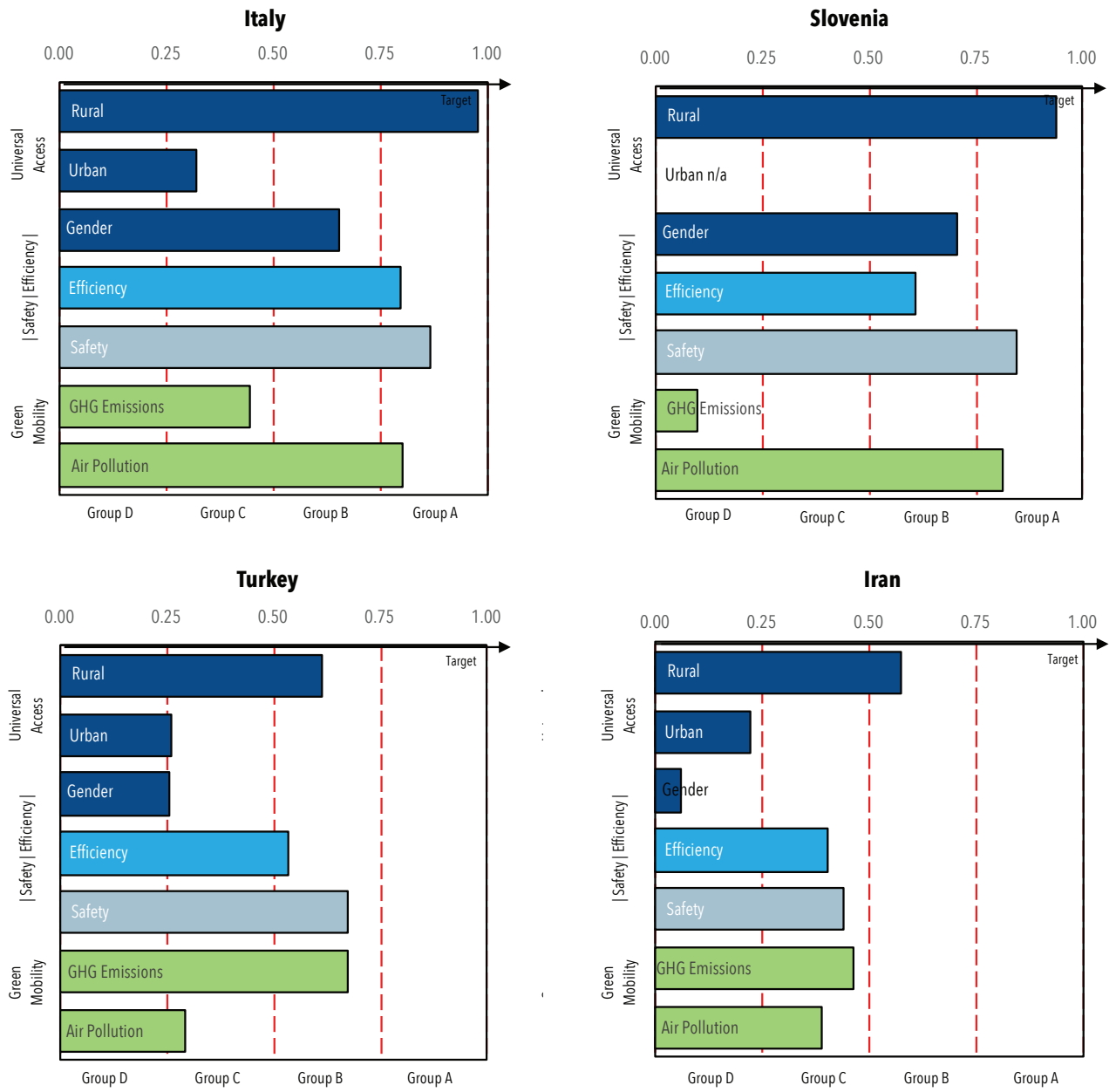
The case study covers an intermodal container transport involving road, sea and rail legs using the Transports Internationaux Routiers (TIR) system, and involves routes of Ljubljana in Slovenia, Trieste in Italy, Mersin in Turkey, and Razi, Sahlan and Bandar Abbas in Iran.

The four countries—Iran, Italy, Slovenia and Turkey—that are part of the intermodal container transport are in different positions in relation to their progress toward sustainable mobility. While in terms of GHG emissions per capita Turkey is in group B, Iran and Italy are in group C, and Slovenia is in group D, the opposite order of countries is observed for air pollution, with Slovenia and Italy in group A, and Iran and Turkey in group C. In terms of gender, Italy and Slovenia belong to group B, Turkey to group C, and Iran to group D. Italy, Slovenia, and Turkey are closer to achieving the target (all in group A) in the safety goal, while Iran, in group C, is yet to make progress toward the policy goal (figure 6.6).

The LPI on transport efficiency indicates a difference between the four countries. Italy belongs to group A, Turkey and Slovenia to group B, and Iran to group C. Comparing the index from 2007 with the data from 2018, progress has been observed for all four countries: Iran (which increased from an index of 2.6 to 2.9), Turkey (from 3.1 to 3.15), Italy (from 3.6 to 3.7), and Slovenia (3.1 to 3.3) (World Bank 2018).

The use of the TIR system offers the world's widest geographical coverage (50 countries) of international customs transit system, administered by UNECE.

Figure 6.6: Performance on Sustainable Mobility (Italy, Slovenia, Turkey, Iran)



Indicators and Sources: Rural Access Index (World Bank), Rapid Transit to Resident Ratio (ITDP), Percentage of Female Workers in Transport (ILO), Logistics Performance Index (World Bank), Mortality Caused by Road Traffic Injury (WHO), Transport-Related GHG Emissions per Capita (IEA), and PM 2.5 Air Pollution Annual Exposure (Global Burden of Disease Study).

The first successful intermodal TIR operation involving road, sea, and rail legs took place in November 2017 between Slovenia and Iran. It was organized in cooperation with representatives of International Road Transport Union (IRU), member associations Iran Chamber of Commerce, Industries, Mines and Agriculture (ICCIMA) and Intertransport, the TIR carnet holder shipping companies, and the Customs Authorities of Iran and IRU.

The intermodal transport operation of the container included a road leg from Slovenia to Italy, followed by a sea crossing from the port of Trieste in Italy to the port of Mersin in Turkey. At Mersin, the container was loaded onto a train through to the Iranian Customs office at Razi and continued by rail to the Sahlan Customs office and rail terminal in Iran. There, the container was placed onto an Iranian truck and it continued to the destination port of Bandar Abbas. The combination of rail and road transport in Iran saved five days in comparison to the use of rail alone.

Policy Actions Adopted

Accede to and Implement International Conventions

The TIR was used on the road leg between Slovenia and Italy, further reactivated at the customs of entry to Iran (Razi) and used until the destination at the port of Bandar Abbas. The TIR carnet used for this transport operation belonged to a Slovenian TIR carnet holder who completed the road transport leg from Slovenia to Italy, and was responsible for the organization of the transport, and liable for the intermodal transit where the TIR guarantee was in use. The road transport leg in Iran was performed by an Iranian partner of the Slovenian TIR carnet holder, also an authorized TIR operator and a member of ICCIMA.

Iranian Customs opened an office in Razi to make the intermodal corridor operational for use of the TIR, and began to accept the TIR as both a transit document and a guarantee for the transport of goods during the rail leg. All four countries in this trade corridor had ratified the TIR convention (Italy in 1982, Iran in 1984, Turkey in 1984 and Slovenia in 1992).

Remove Barriers to Intermodal Interoperability

The TIR system provided countries with an international customs transit system facilitating the carriage of goods from one or more customs offices of destinations, and through as many countries as necessary. Through the TIR transport, goods remain in sealed vehicles or containers, without requiring extensive and time-consuming border checks at intermediate borders while, at the same time, providing customs authorities with the required security and guarantees. Such an approach provides clear and consistent operating practices for trade facilitation.

Adopt the Use of E-Documents for International Trade

The eTIR system is an additional platform provided to ensure the secure exchange of data between national customs systems related to the international transit of goods, vehicles or containers according to the provisions of the TIR Convention and to allow customs manage data on guarantees, issued by guarantee chains to holders authorized to use the TIR system. The use of the TIR IT tools significantly facilitated the transport operation and enhanced its security. The TIR carnet holder sent electronic pre-declaration (EPD) to the countries along the route where the TIR was in use, and the EPD was required free of charge with the possibility of following the status allocated to the EPD in real time. In addition, the TIR carnet holder was able to provide Iranian Customs with the information about the vehicle collecting the container on the second road leg. Using the TIR-EPD, the customs authorities performed an advance risk assessment of the cargo transported under the TIR, rather than being obliged to wait until the vehicle arrived. Using real time safe (RTS) TIR, customs authorities were able to control the validity of the TIR guarantee, and transmitted the TIR termination data once the TIR journey was completed.

Challenges

Some challenges associated with the implementation of the TIR system include potential customs fraud and smuggling, which can be attributed to changing political and economic situations at the national level, or to

hikes in customs duties and taxes that lead towards an increase in such activities. In addition, new countries adopting the TIR system need first to acquire the required expertise and trained personnel before operating efficiently under the TIR transit system.[26]

Replacement of paper documents by electronic data processing is an ongoing process in the adoption of eTIR. Since the TIR has more than 70 contracting parties, each with different administrative structures, the eTIR system must function in a very decentralized and flexible manner based on only a few internationally accepted standard features. (Porcel et al. 2018)

ENDNOTES

17 As indicated by the World Bank Review of Ethiopian Rural Roads Program. 2018.

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ANNEX I. CATALOGUE OF MEASURES

Table I.1: Policy Measures with Description (by toolbox and thematic area)

Policy Measure	Policy Measure Description
Toolbox: Regulatory and Institutional	
Thematic Area: Plans and Strategies	
Develop an Integrated National Transport Plan	Develop and implement an integrated national transport plan to cover the four policy goals, all modes of transport, and passenger and freight traffic.
Set Targets across Policy Goals	Set clear targets to be achieved in the long term and in the interim for the four policy goals, aligned with an integrated sustainable mobility plan.
Develop Mobility Plans at the Sub-National Level	Develop a sustainable urban mobility plan and implement strategies at the sub-national level that are consistent with the integrated national sustainable transport plan.
Plan for a Multi-Tiered Rural Access Approach	Use a multi-tiered and multimodal approach to universal rural access in the integrated national transport plan, supporting both early attainment of universal rural access and further upgrading to higher-access tiers based on affordability and feasibility.
Plan for Integrated Multimodal Transport Networks	Plan for the optimal location of transport corridors, linear facilities, and hubs from a multimodal network perspective, based on the analysis of freight origins and destinations, including a rail network development plan.
Adopt TOD Principles in Land Use Planning	Adopt integrated land use planning that supports transit-oriented development (TOD), mixed land use and compact city planning, reforming development policies and zoning codes, limiting urban expansion, and incorporating rail network development in urban planning.
Mainstream Gender Aspects in Transport Plans	Mainstream gender into national transport plans to establish and improve the decision-making process on gender-sensitive transport.
Address Green and Low Carbon Shipping in Transport Plans	Ensure that the national transport plan addresses low-carbon and green shipping and describes the financial instruments to support it, including incentives and technology support programs.
Embed the Safe System Approach into Transport Planning	Embed the safe system approach to road safety in all aspects of national and sub-national transport planning
Provide Policy Certainty to Businesses and Investors	Ensure a stable regulatory and policy framework, setting a timeline sustainable mobility targets, to increase the confidence for businesses and financial investors to make long-term decisions.

Policy Measure	Policy Measure Description
Thematic Area: Institutional Design, Cooperation, and Coordination	
Coordinate Planning across Government Agencies	Coordinate across agencies to ensure integrated planning and shared responsibility for results across levels of government, jurisdictions, and agencies, including but not limited to the coordination of road safety responsibilities and the coordination of response to extreme weather events.
Define Roles and Accountabilities across Agencies	Define government roles, responsibilities and accountabilities in the transport sector across the four policy goals, modes of transport, national and sub-national government levels, and passenger and freight transport.
Establish a Metropolitan Transport Governance	Establish a governance structure and an institutional framework for transport at the metropolitan level.
Establish Joint Gender Programs Across Agencies	Establish joint programs with ministries and agencies responsible for gender to include transport in their work program.
Thematic Area: International agreements and regulations	
Remove Non-Tariff Barriers for International Trade	Remove non-tariff barriers for cross-border traffic, including barriers for rail and waterborne transport.
Implement Single-Window and One-Stop Border Posts	Implement one-stop border posts and a single-window system, i.e., border facilities combining two stops for national border control processing into one, and a single location where international traders can submit documents.
Adopt the Use of E-Documents for International Trade	Adopt the use of electronic documents for international trade.
Accede to and Implement International Conventions	Accede to and implement relevant international agreements and conventions that address one or more policy goals, for example, the TIR Convention, the World Trade Organization (WTO) Trade Facilitation Agreement, or core road safety-related UN legal instruments.
Adopt Trucking Cabotage Rules	Adopt cabotage rules to optimize trucks' load factors, i.e., allow truck transport between two places in the same country by a transport operator from another country.
Implement ICAO's Carbon Emission Scheme	Adopt sector specific emission mitigation approaches such as the Carbon Offset and Reduction Scheme for International Aviation (CORSIA).
Implement IMO's Energy Efficiency Framework	Strengthen and implement the International Maritime Organization's energy-efficiency technical and operational framework, including ship design standards, and pollution standards and regulations
Thematic Area: Regulations for Transport Services	
Adopt a Coherent Competition Policy	Adopt a coherent competition policy for passenger and freight transport based on the principles that competitive markets are central to efficiency, and acknowledge that market failures in the transport sector require regulation.
Regulate Truck Size and Weight Limits	Adopt regulations of truck size and weight limits by transport corridor.
Regulate Freight Delivery Hours in Urban Areas	Introduce regulations about the hours and areas in which freight delivery in urban areas is allowed to reduce congestion and noise pollution, mindful of the important role of freight delivery for economic activity.

Policy Measure	Policy Measure Description
Establish Maximum Driving Times for Drivers	Establish maximum driving times and minimum rest periods for professional drivers and vehicle operators, for example, road haulage and passenger transport vehicles, or accede to international/regional regulation in this area.
Remove Barriers to Intermodal Interoperability	Remove regulatory barriers to improve inter-operator and intermodal interoperability.
Review Legal Framework for Women's Security in Transport	Review the national framework for security and safety in public spaces used to access transport, and for in-vehicle protection from harassment.
Exclude Drivers with a Record of Gender-Based Violence	Set or improve standards on license requirements for taxis and buses to exclude those that have a history or criminal record of violence against women and minorities.
Allow and Regulate Vehicle Sharing and TNCs	Reform regulations to allow and support vehicle sharing programs (cars, bicycles, scooters), transportation networking companies (TNCs), and demand-responsive transport solutions, with a focus on last mile connectivity to high capacity modes, and support vehicle-sharing community networks such as car-sharing fleets within companies and administrations.
Review transport regulations periodically	Promote the periodic review of the regulations to allow the fast-moving mobility solutions to evolve towards a sustainable and inclusive transport system
Thematic Area: Regulations for Vehicles and Vehicle Use	
Ensure Legal Certainty Regarding Driver Permits	Adopt standards and compliance regimes for the provision and withholding of driver licenses and permits, including compliance regimes designed to prevent and reduce fatal and serious injury risk.
Define and Enforce Speed Limits	Define and enforce speed limits according to modal mix, road function, and protective qualities of roads.
Define Low Emission Zones in Cities	Define low emission zones (LEZ) in cities, i.e., areas where the most polluting vehicles are regulated through access restrictions, which could be based on vehicle emission standards or vehicle age, and enlarge them progressively.
Limit the Number of Parking Spaces in New Developments	Replace parking minimum requirements with caps (maximum limits) and other policies that support parking management.
Establish Electric Vehicle Manufacturing Mandates	Establish mandates for manufacturing electric vehicles and gradually increase their supply.
Limit the Number of New License Plates for Cars	Implement restrictions on vehicle ownership by limiting the number of new license plates issued.
Limit the Import of Second-Hand Vehicles	Limit the import of second-hand fossil fuel motor vehicles beyond a maximum age, including 2- and 3-wheelers.
Establish More Stringent Fuel Economy Standards	Establish stricter fuel economy standards and CO2 emission standards for new motor vehicles, as well as stricter fuel specifications, for example, the use of low-sulphur petroleum products.
Set Fuel Quality Requirements and Blending Mandates	Determine fuel quality requirements, for example, the use of low-sulphur petroleum products, and blending mandates to support alternative fuels.
Require Periodic Vehicle Inspection	Require periodic vehicle inspections to ensure vehicles conform to regulations governing emissions and safety.

Policy Measure	Policy Measure Description
Establish Stricter Noise Pollution Standards for Vehicles	Establish stricter noise pollution standards for road transport vehicles.
Define Laws for Key Safety Rules	Define standards and compliance regimes for key safety rules, for example, the use of seat belts and crash helmets for drivers and passengers, child restraints, driving without alcohol or other drugs or fatigue, driving without distraction, restrict the use of mobile phones while driving, considering the needs of women and vulnerable groups.
Require New and Used Vehicles to Meet Safety Standards	Require new and used vehicles to meet high quality safety standards, such as the recommended priority UN regulations, global technical regulations, or equivalent recognized national performance requirements.
Require Crash Protective Designs in Vehicles	Require new and used vehicles to meet high quality safety standards, such as the recommended priority UN regulations, global technical regulations, or equivalent recognized national performance requirements.
Adopt Emission Standards for Aircraft	Adopt the ICAO engine emissions standards and implement the ICAO airport air quality manual to minimize the impact of aviation emissions on local air quality (LAQ).
Adopt Noise Management Approaches to Aircraft	Adopt the ICAO balanced approach to aircraft noise management to minimize the number of people affected by significant aircraft noise.
Implement Regulations to Prevent Pollution from Ships	Strengthen the design standards and regulations for the prevention of pollution from ships.
Adopt Emission Standards for Rail Transport	Adopt emission standards for diesel-powered locomotives and railcars, for example, the non-road mobile machinery by European Commission regulations.
Support Vehicle Connectivity and Smart Charging Regulations	Implement regulations supporting internationally harmonized vehicle-to-everything (V2X) technologies and smart charging solutions, both in terms of hardware and software, to facilitate the growth of e-mobility
Thematic Area: Regulations for Data Collection, Share and Use	
Establish Data Protection Regulations	Establish personal and travel data protection regulations, with processes that handle personal data with the appropriate safeguards and ensure that data are not made available to the public without explicit informed consent.
Require Service Providers to Report Standardized Data	Establish standardized data reporting requirements for all transport service providers, including transportation network companies (TNC), public transport operators, and bike- or car-share companies.
Develop Data Repositories and Data Collection Guidelines	Develop centralized data repositories and establish data collection guidelines at the national and metropolitan levels, and facilitate data access to different stakeholders (academics, private sector, etc.) while stablishing a legislative framework defining the context and purpose of its use.
Require Use of Data to Support Decision Making	Require using operational data to support decision making and regulatory oversight.
Thematic Area: Procurement and Contracts	
Prepare Public Procurement Rules and Procedures	Prepare procurement rules and procedures, standard contract documents for infrastructure construction and maintenance, supported by an e-procurement platform, and harmonize those at a regional or international level to foster economies of scale.

Policy Measure	Policy Measure Description
Procure Contractors on a Competitive Basis	Procure contractors on a competitive basis, using packaging of batches of projects to attract multiple capable contractors.
Use Public Procurement to Support the Circular Economy	Use circular economy principles in public procurement, by which public authorities purchase transport goods, services and works that contribute to closed energy and material loops, minimizing environmental impact and waste creation.
Use Public Procurement to Support Vehicle Electrification	Encourage transport electrification through the public procurement of electric vehicles, for example electric buses for public transport.
Establish Green Procurement Practices	Establish green procurement practices so that environmental criteria play a role in determining which firm gets a service contract.
Integrate Gender in Public Procurement and PPPs	Integrate gender in bidding documents for standard public procurement and public-private partnerships (PPPs) by requesting bidders to demonstrate gender experience, by setting gender-specific targets for women's employment and entrepreneurship, for example, quotas for contracts to be awarded to women-owned and managed businesses.
Establish a Pool of Technical and Financial Experts	Establish a pool of independent experts capable to undertake technical and financial audits of projects.
Thematic Area: Capacity Building and Human Resource Development	
Identify and Empower Sustainable Mobility Champions	Identify and Empower Country Champions to Help Move Forward the Sustainable Mobility Agenda, for example, ministers and mayors.
Build Capacity Across Levels of Government	Build national and local capacity across levels of government, jurisdictions, organization, and modes, including providing training and information resources.
Provide Training for Workforce in Leadership Positions	Provide training for the current and future transport workforce in leadership positions, enabling well-trained staff to drive change toward sustainable mobility.
Facilitate Capacity Building at the International Level	Facilitate sector specific capacity building at the international level.
Build Capacity for Local Path and Road Maintenance	Provide capacity building to assist stakeholders to perform their roles in the maintenance of local paths and roads.
Train more Women on Skills Needed in Transport	Create incentives for training more women with the skills needed in transport, for example, operating heavy duty vehicles.
Build Capacity on Gender-Inclusive Accessibility Planning	Build capacity on accessibility planning that includes gender impacts, for example, consider access to centers of interest for women and gendered information on access to jobs and education.
Ensure Legal Protection for Women in the Workplace	Ensure non-discrimination and enforcement of legal protection of women in workplaces, and the removal of barriers of entry to employment for women in the transport sector.
Include Women in Recruitment and Foster Women's Leadership	Encourage public authorities and service providers to include women in their recruitment processes (gender-neutral job profiling), such as in the maintenance works for rural roads. Foster talent and leadership to create a baseline of decision makers in transport, promoting candidates to positions of power.

Policy Measure	Policy Measure Description
Train Security and Transport Staff in Gender Aspects	Train security and transport stakeholders in gendered aspects of transport, especially security.
Create Mentoring Programs and Professional Networks	Create programs to promote role models, mentoring and networks of transport professionals, including programs targeted to women.
Toolbox: Engineering and Technology	
Thematic Area: Technical Standards	
Establish Technical Standards for Transport Infrastructure	Establish high technical standards for transport infrastructure design, for example, performing climate vulnerability screening, protecting roads against water penetration, and using local materials and resources when feasible.
Harmonize Construction Standards along Corridors	Adopt construction standards so that assets are created using accepted, up-to-date, harmonized standards and regulations, across borders, within regions and along transport corridors.
Recruit Qualified Firms for Project Design and Feasibility	Recruit qualified consulting firms for preparing feasibility reports and engineering designs, and supervising civil works.
Ensure Safe Roads Design with Lower Design Speeds	Plan and design safe roads and roadsides for lower speeds, including features that calm traffic, and considering the increasing use of bicycles and pedestrian flows in urban areas.
Ensure Integration of Public Transport and Bicycles	Ensure physical integration between public transport and bicycles, for example, providing bicycle parking and allowing bicycles in public transport (with limitations because of vehicle size or passenger density).
Improve Intermodal Connections in Transport Hubs	Improve local access to transport hubs including bus and train stations, ports and airports.
Set Design Standards for Sidewalks and Bicycle Paths	Set high quality design standards for sidewalks and bicycle paths, for example, safe and convenient pedestrian crossing and adequate street lighting, ensuring accessibility to persons with disabilities and considering gender sensitive aspects (for example, dropped kerbs at crossings, size of refuge islands, and timing of traffic signals).
Ensure Transport Project Design Includes Gender Aspects	Include considerations for women and for people with disabilities in transport infrastructure project design and planning.
Set and Implement Climate Change Adaptation Standards	Set climate change adaptation and resilience standards and practices, and integrate them into project design across transport infrastructure, including roads, airports, and seaports.
Set Low-Noise Engineering and Traffic Management Practices	Set traffic management practices to reduce noise pollution, for example, speed limitations, speed humps, traffic lights coordination and roundabouts, and low-noise road engineering and maintenance practices, for example low-noise pavement and noise barriers.
Modernize Air Traffic Management	Modernize air traffic management to improve aviation safety and efficiency as defined in the ICAO global air navigation plan (GANP) endorsed by the ICAO Assembly.
Establish a State Aviation Safety Oversight System	Establish and implement a States safety oversight system in line with the ICAO Global Aviation Safety Plan (GASP) Objectives and to progressively adapt them into more sophisticated means of managing safety

Policy Measure	Policy Measure Description
Coordinate New Transport and Telecom Infrastructure	Coordinate among the different civil works necessary for new mobility infrastructure, for instance, road and telecommunication infrastructure, in order to maximize synergies and limit costs
Thematic Area: Asset Construction	
Build Complete Multimodal Networks	Build complete multimodal networks ensuring optimal network operational availability.
Build Rail and Maritime Transport Infrastructure	Build infrastructure for energy- and space-efficient modes such as rail and waterborne transport, including high-speed rail for corridors with sufficient demand.
Expand Public Transport Infrastructure	Expand the public transport network adjusted to demand requirements, with an emphasis on equitable access and considering the most appropriate modes in each context, including bus, rail, demand-responsive service, cable-propelled transport and ferry transport.
Prevent the Construction of Urban Expressways	Prevent the development of new urban expressways to avoid the segregation of neighborhoods and to avoid additional car travel.
Build Logistics Consolidation Centers	Build logistics consolidation centers and exchange platforms with a focus on multi-modal transport to avoid fragmented supply, production, and distribution chains, fostering private sector participation in investment and operations of logistics hubs.
Build Roadside Produce Storage for Farmers	Create simple roadside produce storage facilities to allow farmers to consolidate produce before collection and to reduce losses due to perishability.
Invest in Quality Aviation Infrastructure	Invest in the modernization and expansion of quality aviation infrastructure as defined in the ICAO GANP endorsed by the ICAO Assembly.
Develop Infrastructure for Road Transport Electrification	Develop infrastructure for road transport electrification, such as charging stations, electric road systems, including electricity and hydrogen power for trucks, cars, buses, etc.
Invest in Port Electrification	Invest in infrastructure for port electrification, such as electric charging facilities in ports and hybrid and electric ships.
Invest in Railway Electrification	Invest in railway electrification, battery-hybrid trains, biogas or hydrogen-powered trains, to reduce the dependence on diesel fuel, increase energy efficiency, and reduce noise and vibrations.
Expand the All-Season Road Network	Expand the density of the all-season road network in rural areas.
Improve First and Last Mile Access Infrastructure	Evaluate and improve first and last mile access to major transport services in urban and rural areas.
Expand the Network of Bicycle Lanes	Build quality and safe infrastructure for cycling, with a focus on protected bicycle lanes.
Repurpose Road Space to Allow Access for All Modes	Repurpose existing road space with complete street designs accommodating diverse users and uses, with access for all modes, particularly pedestrians and cyclists and their access to public transport stations.
Invest in Sustainable Fuel Storage for Ships	Invest in facilities for the production and storage of sustainable alternative fuel for ships.

Policy Measure	Policy Measure Description
Ensure an Optimal Level of Vehicle Availability and Use	Ensure an optimal level of vehicle availability and use, for example, adapt bus or train capacity to activity and load factor, invest in buses and rolling stock to reduce public transport crowding.
Modernize Railway Infrastructure	Modernize rail infrastructure by investing in lightweight rail vehicle components, electronic brakes, aerodynamic shape of rolling stock, and energy consumption metering system, with the aim of improving energy efficiency.
Thematic Area: Design and Deployment of Transport Services	
Improve the Quality and Safety of Public Transport	Improve the quality and safety standards of public and private as well as formal and informal public transport operations, such as service frequency, reliability, cleanliness, and safe driving practices, and implement bus lanes and other bus priority measures.
Provide Effective Car and Bicycle Sharing Systems	Provide effective shared car and bicycle-sharing systems as an alternative to vehicle ownership.
Ensure Access to Transport Services in Underserved Areas	Ensure complete transport services by extending services to underserved areas and populations.
Prioritize Pedestrians and Cyclists in Traffic Management	Adopt traffic management strategies that prioritize pedestrians and cyclists.
Support Truck Platooning Strategies	Support truck-platooning strategies based on trucks equipped with state-of-the-art driving support systems closely following each other.
Provide Eco-Driving Training for Truck Drivers	Provide eco-driving training for truck drivers, including driving practices that can reduce fuel consumption without increasing travel time.
Develop Online Platforms for Rural Transport Services	Introduce online platforms to create marketplaces linking rural transport service users with service providers for freight and passenger services.
Implement ITS Solutions for Providing Transport Information	Implement online platforms and other ITS solutions for providing information on traffic, routes, and transport mode options for both passengers and freight transport
Conduct Accessibility Evaluation and Mapping	Develop tools for measuring the accessibility of different locations and evaluation how various transport and land use changes will affect accessibility for various groups and activities, with a special attention to access for disadvantaged groups.
Implement Mobility as a Service Packages	Implement government-coordinated mobility as a service (MaaS) packages combining different services and platforms for transport users to review travel options, changing the focus from providing a specific service on one mode of transport to mobility solutions that are consumed as a service.
Introduce Pedestrian and Bicycle Means of Delivery	Introduce pedestrian and bicycle-friendly means of delivery.
Adopt Best Practices for Train Driving and Timetabling	Adopt train driving and timetabling practices, such as eco-driving, automatic train operations, driver advisory systems, synchronization of acceleration and braking, and adapting train capacity to activity, to optimize energy consumption.

Policy Measure	Policy Measure Description
Implement Railway Electrical Smart Grids	Implement railway electrical smart grids, with cooperation between railway grid and electricity grid managers, for example, by coupling storage facilities with renewable energy, using or storing recovered energy from braking trains, and reducing energy losses in catenary.
Invest in Rail Sector Digitalization	Invest in the digitalization of the rail sector, which includes implementing advanced forms of signaling systems, improvement of train localization, adoption of autonomous trains, optimization of braking curves, inclusion of solutions for cybersecurity, and use of 5G to support the future applications of the railway system.
Integrate New Mobility Solutions to Existing Transport	Support the complementarity of new shared solutions such as car-sharing, electric vehicles rentals and autonomous vehicles with existing public transport networks, for instance by supporting new solutions to direct traffic to public transport stations or as a replacement after operating hours.
Thematic Area: Design and Deployment of Programs	
Adopt Building Back Better Principle for Reconstruction	Adopt a building back better principle, i.e. rebuilding work after disasters and conflicts to be conducted with a decentralized participatory approach for a more cost-effective and sustainable recovery of transport systems.
Map the Full Extension of the Road Network	Map the full extension of the road network and maintain the data updated, including road quality attributes.
Identify Risks and Vulnerabilities to Extreme Weather Events	Conduct risk appraisal and impact quantification of failures and disruptions due to extreme weather events, identifying the most vulnerable transport links.
Monitor Weather Events and Develop Warning Systems	Conduct real-time monitoring of extreme weather events, developing plans to take immediate actions to mitigate damage with early warnings.
Deploy Road Safety Cameras	Deploy road safety cameras to monitor the condition on the road and enforce traffic violations.
Promote Driver Assistance Technologies	Promote the adoption of driver assistance technologies to prevent road crashes.
Ensure Adequate Post-Crash Intervention	Ensure adequate post-crash intervention through efficient emergency notification, fast transport of qualified medical personnel, correct diagnosis at the scene, stabilization of the patient, prompt transport to point of treatment, quality emergency room and trauma care, and extensive rehabilitation services.
Support Data Sharing Programs and Platforms	Establish a framework and promote data sharing programs and platforms across different sectors to exchange data relevant for transport policy, such as data collaboratives models including the public and private sector.
Provide Incentives to Increase Car Occupancy	Provide incentives to increase private vehicle occupancy, for example, high occupancy vehicle (HOV) lanes.
Provide Sustainable Alternatives for Commuting Trips	Encourage initiatives that provide sustainable mobility options for employees, such as employer-sponsored transport programs, carpooling schemes, and public transport commuter benefits.
Implement Telecommuting Policies	Implement policies that allow flexible work schedules and telecommuting, i.e., working from home schemes, to avoid non-essential trips.

Policy Measure	Policy Measure Description
Support Freight Parcel Standardization and Containerization	Support corporate initiatives to standardize freight parcels and promote containerization, facilitating intermodal integration.
Develop Vehicle Rental Platforms for Different Types of Use	Provide effective shared car and bicycle-sharing systems as an alternative to vehicle ownership. Promote the use of vehicles adapted to daily needs (i.e. small Battery Electric Vehicle (BEV) for daily trips) and offer alternatives renting solutions for exceptional journeys (i.e range-extender or large BEV holidays).
Thematic Area: Asset Management	
Develop Asset Management Standards and Plans	Develop asset management standards and plans to preserve, maintain, and manage transport infrastructure and their systems over their life cycle.
Establish Approaches to Feeder Road Asset Management	Establish reliable approaches to asset management of feeder roads, with communities performing routine maintenance in rural paths and roads, where feasible, and contractors performing periodic maintenance, based on reliability, availability, maintainability, and safety (RAMS) approach
Set Up Audits for Construction Design and Safety	Set up independent audits of asset management industries and of construction design and safety to ensure the quality of assets.
Audit the Usability and Safety of Public Transport for Women	Conduct systematic participatory audits to ensure that public transport infrastructure remain usable, safe and secure for women.
Thematic Area: Safeguards	
Ensure Women are not Marginalized during Resettlements	Ensure that women and their centers of interest are not marginalized in resettled because of transport projects.
Ensure Project-Induced Resettlement is Conducted Fairly	Ensure that project-induced displacements are economically justified and handled with fair and dignified treatment of those affected, ensuring that safeguards are in place.
Comply with Gender-Based Violence Prevention Practices	Require contractors to commit to an agreed code of conduct that should be applied to employees and sub-contractors, ensuring compliance with gender-based-violence prevention and response practices.
Mitigate the impact of transport on ecosystems and biodiversity	Manage potentially adverse environmental impacts of transport projects on ecosystems and biodiversity.
Toolbox: Economics and Finance	
Thematic Area: Project or Program Cycle	
Evaluate Long Run Transport Infrastructure Needs	Evaluate long-run infrastructure finance needs including the existing backlog of deferred maintenance (i.e., infrastructure gap).
Use a Robust Framework for Project Prioritization	Use a robust investment evaluation framework to prioritize the allocation of public infrastructure funding to infrastructure projects and associated services.
Establish Selection Criteria for Feeder Roads Projects	Establish a set of selection criteria for feeder road projects and disseminate these widely among rural communities with a view to attracting their participation in the process.
Establish Performance Monitoring and Evaluation Schemes	Establish performance and result monitoring and evaluation schemes to inform the regular adjustment for projects, policies and programs, for example, the evaluation of road safety interventions and their institutional delivery.

Policy Measure	Policy Measure Description
Conduct Impact Evaluation Studies	Conduct impact evaluation studies to improve the evidence base available to policymakers, considering the impact of transport infrastructure projects on economic growth and employment, and considering differentiated impacts on women.
Implement transport projects on time and on budget	Ensure that transport projects are delivered on time and on budget according to project planning with realistic risk and cost assessments.
Thematic Area: Allocation of Public Funds	
Require Projects to Meet Cost-Effectiveness Thresholds	Require transport projects to meet an economic viability threshold based on a cost-benefit analysis and estimate the economic internal rate of return (EIRR), reflecting least-cost planning principles
Allocate Funding for Transport Safety Interventions	Allocate funding and other resources for safety interventions on a sustainable basis, using a rational evaluation and programming framework.
Implement an International Taxonomy for Green Investments	Develop an internationally recognized taxonomy for sustainable and green investments and attach fiscal and regulatory incentives (e.g. reduced solvability ratios) to these investments
Thematic Area: Fiscal and Financial Measures	
Enable Municipal Revenue through Tax and Bonds	Enable city-level revenue generation, such as taxation and bonds, for transport projects to be funded locally, especially in medium and large cities.
Apply Innovative Solutions Financing for Asset Creation	Apply sustainable and innovative financing schemes for asset creation, including new financing mechanisms, new fund management techniques, and new institutional arrangements.
Set User Fees to Support Transport Infrastructure Funding	Adopt transport user fees to help fund transport infrastructure and allow for return on investment, for example, toll roads.
Mobilize Public and Private Capital for Transport Finance	Mobilize public and private capital for transport finance, using Public Private Partnership (PPPs) to improve sector efficiency when appropriate, and help bridge the transport infrastructure gap.
Use Land Value Capture Schemes	Use land value capture schemes to increase funding for urban transport systems, capturing the increase in property value around new transport infrastructure development.
Prioritize Financial Products for Sustainable Investment	Reinforce blended finance models both for local multi-stakeholders' projects and large projects requiring the collaboration of several IFIs and private actors. Ensure their promotion towards both public and private actors including financial institutions.
Support Sustainable Mobility Impact Funds	Define regulatory frameworks to facilitate the creation of impact funds targeting sustainable mobility including small scale projects led by start-ups or NGOs. Support existing funds.
Thematic Area: Pricing for Efficiency and Inclusion	
Implement Fuel Taxes and Phase Out Fuel Subsidies	Implement and increase fuel taxes while phasing out fossil fuel subsidies to offset the social cost of greenhouse gas emissions and air pollution.
Use Congestion Charging or Pay-as-You-Drive Schemes	Use congestion charging or pay-as-you-drive schemes to charge for the congestion costs imposed by personal motorized vehicle use, with rates that increase under urban-peak conditions to reduce traffic congestions.

Policy Measure	Policy Measure Description
Implement or Increase Vehicle Registration Fees	Implement or increase vehicle registration fees to support road maintenance funding, reducing the incentives for purchasing a vehicle.
Apply Market-Based Parking Pricing	Apply market-based pricing schemes to on-street and off-street parking, such as variable pricing based on demand.
Promote Green Port Fees	Promote green port fees, charging lower fees to ships that are less polluting.
Provide Financial Incentives to Reduce Environmental Impact	Provide financial incentives, for example subsidies, tax credits, or low tax rates to reduce the environmental impact of transport, including financial incentives for cleaner vehicles, cleaner fuels, old vehicle abatements, and the circular economy.
Make Public Transport Fares Affordable for the Poor	Make public transport fares affordable for the poor using means testes approaches to ensure cost-recovering mechanisms.
Ensure Integrated Fare Payment across All Modes	Develop integrated fare payment systems across all modes of public transport, parking and road charges.
Thematic Area: Innovation Policy and Enhancement	
Provide Education Programs for Innovation	Provide neutral trainings and educational programs to develop up-to-date skills, increase awareness of the latest innovations and support innovation in transport, relying on close cooperation with companies to develop curriculums.
Support Innovation through Regulatory Incentives	Develop a framework at national and sub-national level enabling public-private cooperation to design policies such as targets, regulations supporting technical and business innovation and its diffusion
Provide Financial Incentives to R&D and Innovative Products	Provide subsidies or tax credits to encourage research and development and the supply of innovative products or services.
Support R&D to Reduce Environmental Impacts	Support systematic research and development for technologies that reduce the environmental damage from transport through joint industry and government research, for example, research to optimize the life cycle of batteries for vehicle electrification, alternative fuels (sustainable biofuels, biogas, synthetic fuels, hydrogen) and intelligent transport systems (ITS).
Support R&D to optimize the life cycle of vehicle batteries	Support the research to optimize the life cycle of batteries by improving their lifespan and developing optimal cost-efficient sustainable recycling solutions
Develop a Demand-driven Research Framework	Develop a demand-driven research framework by allowing experimentations at a local level and strong connections with research centers and universities to optimize the R&D process and enable identifying missing technologies
Toolbox: Communication	
Thematic Area: Consultation and Public Engagement	
Consult with Stakeholders during the Full Project Cycle	Consult extensively with stakeholders during project formulation and establish a framework for continuous consultation during project implementation.
Use Participatory Planning Methods	Use participatory planning methods, including creation of a website, to help communities propose interventions.
Ensure Women's Participation in Consultation Processes	Ensure that voices of women are upheld during pre- and post-project consultation.

Policy Measure	Policy Measure Description
Promote Public Discussion on New Mobility Solutions	Promote public discussion with civil society about new mobility solutions to generate new ideas, innovations and tools.
Ensure Neutrality on Technology related communication	Ensure neutrality and transparency on technology related communication, taking into account the whole life-cycle of technologies when making technology decisions, using for instance LCA (Life Cycle Analysis) methodologies.
Thematic Area: Promotion Campaigns and Public Awareness	
Implement Awareness and Behavior Change Strategies	Implement awareness and behavior change (ABC) strategies to help shift attitudes towards sustainable modes, for example, public transport, walking and cycling, complementing other engineering, legal or economic measures.
Label Products According to Environmental Performance	Label products and services according to their environmental performance, this includes adopting fuel economy labels clearly displayed on all cars and light trucks for sale, green freight labelling schemes for logistics service providers and eco-rating schemes that allow shippers to choose green freight practices, and labeling products based on their embedded energy use.
Run Campaigns to Attract Women to Transport Professions	Develop public awareness campaigns to attract women to transport sector professions by promoting that they can be as good (and sometimes better) at traditional male jobs.
Implement Anti-Harassment Campaigns in Public Transport	Implement anti-harassment awareness campaigns in public transport spaces.
Raise Road Safety Awareness	Ensure sustained communication of road safety as a core business for government and society, emphasize the shared responsibility for the delivery of road safety interventions, and raise awareness about the dangers of speeding.
Make Information Publicly Available on Projects and Policies	Make information accessible to increase the public support to transport policies and projects.
Foster a Security Culture in Public Transport	Foster a security culture to improve efficiency and attractiveness of public transport, based on the psychological elements that make passengers feel secure while using buses, trains, and other modes of public transport.
Increase Awareness about the Real Cost of Mobility	Insert the topics of sustainable mobility into formal and informal education in order to increase population's awareness of the challenges of mobility (including externalities) and raise the willingness to pay and use efficient, safe and green transport services.
Thematic Area: Knowledge Management and Dissemination of Best Practices	
Share Knowledge on Successes and Best Practices	Share successes and best practices with other agencies at the local, national and international level, based on a well-designed knowledge transfer framework.
Inform Users about New Sustainable Solutions	Promote physical and online information centers aiming to reinforce the demand for sustainable mobility products, and facilitate the understanding of new technologies.

Table I.2: Impact and Country Relevance Scores by Policy Measure

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Develop an Integrated National Transport Plan	•	•	•	•	•	•	2	2	2	2
Set Targets across Policy Goals	•	•	•	•	•	•	1	1	1	1
Develop Mobility Plans at the Sub-National Level	••	••	•	•	•	•	1	2	1	1
Plan for a Multi-Tiered Rural Access Approach	••		•		•		0	1	1	2
Plan for Integrated Multimodal Transport Networks				••		•	1	2	1	1
Adopt TOD Principles in Land Use Planning		••		•	•	•	1	2	1	1
Mainstream Gender Aspects in Transport Plans			••		•		1	1	1	2
Address Green and Low Carbon Shipping in Transport Plans						••	1	1	1	2
Embed the Safe System Approach into Transport Planning	•	•			••		2	2	1	1
Provide Policy Certainty to Businesses and Investors	•	•		•		•	1	2	2	1
Coordinate Planning across Government Agencies	•	•	•	•	•	•	1	2	1	1
Define Roles and Accountabilities across Agencies	•	•	•	•	•	•	1	1	1	1
Establish a Metropolitan Transport Governance		••		•	•	•	1	2	2	1
Establish Joint Gender Programs Across Agencies	•	•	••		•		1	1	1	1
Remove Non-Tariff Barriers for International Trade	•			••		•	1	2	2	1
Implement Single-Window and One-Stop Border Posts				••			1	2	2	1
Adopt the Use of E-Documents for International Trade				••			2	2	1	1
Accede to and Implement International Conventions				••	•	•	1	2	2	2
Adopt Trucking Cabotage Rules				••		••	1	2	2	1

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Implement ICAO's Carbon Emission Scheme				•		••	2	2	2	2
Implement IMO's Energy Efficiency Framework				•		••	1	1	1	1
Adopt a Coherent Competition Policy	•	•		••		•	2	2	1	1
Regulate Truck Size and Weight Limits				•	••	•	0	1	1	1
Regulate Freight Delivery Hours in Urban Areas		•		•		•	2	1	1	0
Establish Maximum Driving Times for Drivers			•		••		0	1	2	2
Remove Barriers to Intermodal Interoperability				••		•	2	2	1	1
Review Legal Framework for Women's Security in Transport	•	•	••				1	1	1	1
Exclude Drivers with a Record of Gender-Based Violence			•				0	0	1	1
Allow and Regulate Vehicle Sharing and TNCs		••		•	•	•	2	2	1	1
Review transport regulations periodically	•	•	•	•	•	•	1	1	1	1
Ensure Legal Certainty Regarding Driver Permits	•	•		•	••		0	1	1	2
Define and Enforce Speed Limits	•	•			••	•	1	1	2	2
Define Low Emission Zones in Cities		•			•	••	0	1	1	2
Limit the Number of Parking Spaces in New Developments		•		•		•	1	1	0	0
Establish Electric Vehicle Manufacturing Mandates		•		•		••	0	0	2	2
Limit the Number of New License Plates for Cars		•		•		•	0	1	1	0
Limit the Import of Second-Hand Vehicles		•			•	••	2	1	1	1
Establish More Stringent Fuel Economy Standards	•	•		•		••	0	1	2	2
Set Fuel Quality Requirements and Blending Mandates		•		•		••	2	2	1	1
Require Periodic Vehicle Inspection					••	••	1	1	1	1
Establish Stricter Noise Pollution Standards for Vehicles						••	0	0	1	1

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Define Laws for Key Safety Rules			••		••		1	1	2	2
Require New and Used Vehicles to Meet Safety Standards			•		••		2	1	1	0
Require Crash Protective Designs in Vehicles			•		••		1	2	2	1
Adopt Emission Standards for Aircraft				•		••	2	2	2	2
Adopt Noise Management Approaches to Aircraft				•		••	2	2	2	2
Implement Regulations to Prevent Pollution from Ships				•		••	1	1	1	1
Adopt Emission Standards for Rail Transport				•		••	1	1	1	0
Support Vehicle Connectivity and Smart Charging Regulations				•	•	••	2	1	0	0
Establish Data Protection Regulations	•	•	•				1	1	1	1
Require Service Providers to Report Standardized Data	•	••	•	••	•		2	2	1	0
Develop Data Repositories and Data Collection Guidelines	•	•	•	•	•	•	1	2	2	2
Require Use of Data to Support Decision Making	•	•	•	•	•	•	1	1	1	1
Prepare Public Procurement Rules and Procedures	••	••		•	•		1	1	2	2
Procure Contractors on a Competitive Basis	••	••		•	•		1	1	2	2
Use Public Procurement to Support the Circular Economy					•	••	1	1	1	1
Use Public Procurement to Support Vehicle Electrification						••	1	1	2	2
Establish Green Procurement Practices						••	0	0	1	2
Integrate Gender in Public Procurement and PPPs	•	•	••				2	2	1	1
Establish a Pool of Technical and Financial Experts	•	•			•		1	1	2	2

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Identify and Empower Sustainable Mobility Champions	•	•	•	•	•	•	1	1	1	1
Build Capacity Across Levels of Government	•	•	•	•	•	•	0	1	1	2
Provide Training for Workforce in Leadership Positions	•	•	•	•	•	•	1	1	1	1
Facilitate Capacity Building at the International Level	•	•	•	•	•	•	2	2	2	2
Build Capacity for Local Path and Road Maintenance	••		•		•		1	1	2	2
Train more Women on Skills Needed in Transport	•	•	••				1	2	2	1
Build Capacity on Gender-Inclusive Accessibility Planning	•	•	•				1	1	1	1
Ensure Legal Protection for Women in the Workplace			••				2	2	1	1
Include Women in Recruitment and Foster Women's Leadership			••				2	2	1	1
Train Security and Transport Staff in Gender Aspects	•	•	••				1	1	2	2
Create Mentoring Programs and Professional Networks	•	•	•	•	•	•	1	1	1	1
Establish Technical Standards for Transport Infrastructure	••	•		•		•	1	1	2	2
Harmonize Construction Standards along Corridors	•			••	•		1	2	2	1
Recruit Qualified Firms for Project Design and Feasibility	•	•		•	•		0	1	1	1
Ensure Safe Roads Design with Lower Design Speeds	•	•			••		2	2	2	1
Ensure Integration of Public Transport and Bicycles		•		•		•	1	1	1	0

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Improve Intermodal Connections in Transport Hubs	•	••		••	•		1	1	1	0
Set Design Standards for Sidewalks and Bicycle Paths		••	••		••	•	1	2	2	2
Ensure Transport Project Design Includes Gender Aspects	•	•	••		•		1	1	1	1
Set and Implement Climate Change Adaptation Standards	•	•		•		••	2	2	1	1
Set Low-Noise Engineering and Traffic Management Practices	•	•			•	••	2	2	1	1
Modernize Air Traffic Management				••	••		2	2	2	2
Establish a State Aviation Safety Oversight System					••		2	2	2	2
Coordinate New Transport and Telecom Infrastructure				••	•	•	1	1	1	0
Build Complete Multimodal Networks				••	•	•	1	2	1	1
Build Rail and Maritime Transport Infrastructure	•	•		•	•	••	2	2	1	1
Expand Public Transport Infrastructure	•	••	•	•	•	•	1	1	2	2
Prevent the Construction of Urban Expressways		•				•	1	2	2	1
Build Logistics Consolidation Centers				••		•	2	2	1	1
Build Roadside Produce Storage for Farmers	••			•			0	0	1	2
Invest in Quality Aviation Infrastructure				•	•		2	2	2	2
Develop Infrastructure for Road Transport Electrification		•		•		••	0	1	1	2
Invest in Port Electrification				•		••	0	0	1	2
Invest in Railway Electrification				•		•	0	0	2	2
Expand the All-Season Road Network	••		•	•			0	1	2	2
Improve First and Last Mile Access Infrastructure	•	•	•		•		1	1	1	1
Expand the Network of Bicycle Lanes		•			••	•	1	1	1	0

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	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Repurpose Road Space to Allow Access for All Modes		•	•	•	••	•	2	2	1	1
Invest in Sustainable Fuel Storage for Ships				•		••	0	0	1	2
Ensure an Optimal Level of Vehicle Availability and Use		•		••			1	1	1	1
Modernize Railway Infrastructure						•	1	1	1	1
Improve the Quality and Safety of Public Transport	•	••	•		•	•	0	1	2	2
Provide Effective Car and Bicycle Sharing Systems		••		•		•	2	2	1	0
Ensure Access to Transport Services in Underserved Areas	••	••	•		•		1	2	2	1
Prioritize Pedestrians and Cyclists in Traffic Management		•			••		1	1	2	2
Support Truck Platooning Strategies				•		••	0	1	1	2
Provide Eco-Driving Training for Truck Drivers				•		••	1	1	1	1
Develop Online Platforms for Rural Transport Services	••			•			2	2	1	1
Implement ITS Solutions for Providing Transport Information	•	••		•	•	•	1	2	2	1
Conduct Accessibility Evaluation and Mapping	•	••	•	•			1	1	1	1
Implement Mobility as a Service Packages		••		•			2	1	1	0
Introduce Pedestrian and Bicycle Means of Delivery		•				•	1	1	1	0
Adopt Best Practices for Train Driving and Timetabling						•	1	1	1	1
Implement Railway Electrical Smart Grids						•	1	1	1	1
Invest in Rail Sector Digitalization				••			2	1	1	0
Integrate New Mobility Solutions to Existing Transport	•	••		•		•	1	2	2	1

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Adopt Building Back Better Principle for Reconstruction				•		•	1	1	1	1
Map the Full Extension of the Road Network	••			•			0	1	1	2
Identify Risks and Vulnerabilities to Extreme Weather Events	•			••		•	1	2	2	1
Monitor Weather Events and Develop Warning Systems	•			•	•	•	1	1	1	0
Deploy Road Safety Cameras		•			••		1	2	2	1
Promote Driver Assistance Technologies					••		2	1	1	0
Ensure Adequate Post-Crash Intervention	•	•			••		1	2	2	2
Support Data Sharing Programs and Platforms	•	•	•	•	•	•	1	1	1	0
Provide Incentives to Increase Car Occupancy		•		•		••	0	1	1	2
Provide Sustainable Alternatives for Commuting Trips		•	•	•		•	1	1	0	0
Implement Telecommuting Policies		•		•	•	•	2	1	1	0
Support Freight Parcel Standardization and Containerization				•		•	2	2	1	1
Develop Vehicle Rental Platforms for Different Types of Use		•		••		••	1	1	1	0
Develop Asset Management Standards and Plans	•	•		••	•		1	2	2	1
Establish Approaches to Feeder Road Asset Management	••			•	•		0	1	2	2
Set Up Audits for Construction Design and Safety	•	•		••			1	1	1	1
Audit the Usability and Safety of Public Transport for Women			••		•		0	1	1	1
Ensure Women are not Marginalized during Resettlements			••				1	1	1	1
Ensure Project-Induced Resettlement is Conducted Fairly	•	•	•				1	1	2	2

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Comply with Gender-Based Violence Prevention Practices	•		••				0	1	1	2
Mitigate the impact of transport on ecosystems and biodiversity			••				1	1	1	1
Evaluate Long Run Transport Infrastructure Needs				••	•		1	2	2	1
Use a Robust Framework for Project Prioritization	•	•		••	•		1	2	2	1
Establish Selection Criteria for Feeder Roads Projects	••		•	•			0	0	1	2
Establish Performance Monitoring and Evaluation Schemes	•	•	•	•	•	•	1	1	1	1
Conduct Impact Evaluation Studies	•	•	•	•	•	•	1	1	1	1
Implement transport projects on time and on budget				•			1	1	1	2
Require Projects to Meet Cost-Effectiveness Thresholds	•	•		••			1	2	2	2
Allocate Funding for Transport Safety Interventions					••		2	2	2	2
Implement an International Taxonomy for Green Investments						••	2	2	1	1
Enable Municipal Revenue through Tax and Bonds		••		•			1	2	1	0
Apply Innovative Solutions Financing for Asset Creation	•	•		••			1	1	1	0
Set User Fees to Support Transport Infrastructure Funding	•	•		••	•		2	2	1	1
Mobilize Public and Private Capital for Transport Finance	•	•		••	•		2	2	2	1
Use Land Value Capture Schemes		••		•			2	1	0	0
Prioritize Financial Products for Sustainable Investment				•		•	1	1	1	1
Support Sustainable Mobility Impact Funds				•		•	1	1	1	1

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Implement Fuel Taxes and Phase Out Fuel Subsidies		•		•		••	1	2	2	1
Use Congestion Charging or Pay-as-You-Drive Schemes		••		•		•	2	1	0	0
Implement or Increase Vehicle Registration Fees		•		•	•	•	1	1	1	2
Apply Market-Based Parking Pricing		•		•		••	1	2	1	1
Promote Green Port Fees				•		••	1	1	2	2
Provide Financial Incentives to Reduce Environmental Impact		•		•		••	1	2	2	1
Make Public Transport Fares Affordable for the Poor	•	••	•	•	•	•	1	2	2	2
Ensure Integrated Fare Payment across All Modes	•	•	•		•		1	2	1	1
Provide Education Programs for Innovation			•	•			1	1	1	1
Support Innovation through Regulatory Incentives				••		•	1	2	1	1
Provide Financial Incentives to R&D and Innovative Products				•	•	•	2	1	1	1
Support R&D to Reduce Environmental Impacts	•	•		•		••	1	1	2	2
Support R&D to optimize the life cycle of vehicle batteries				••		••	2	1	0	0
Develop a Demand-driven Research Framework				•		•	2	1	0	0
Consult with Stakeholders during the Full Project Cycle	••	••	••				1	1	2	2
Use Participatory Planning Methods	•	•	•	•	•	•	1	2	2	1
Ensure Women's Participation in Consultation Processes	•		••		•		1	2	2	2
Promote Public Discussion on New Mobility Solutions	•	•	•	•	•	•	1	1	0	0
Ensure Neutrality on Technology related communication	•	•				•	1	1	0	0

Policy Measure	Impact on Policy Goal (•• for very important; • for important)						Country-Relevance Group (2 for very relevant; 1 for relevant; 0 for low relevance)			
	Universal Rural Access	Universal Urban Access	Gender	Efficiency	Safety	Green Mobility	A: Closest to targets	B: Not close to targets	C: Somewhat far from targets	D: Farthest from targets
Implement Awareness and Behavior Change Strategies	•	•	•		•	•	2	1	1	1
Label Products According to Environmental Performance				•		••	0	1	2	2
Run Campaigns to Attract Women to Transport Professions			••				1	2	1	1
Implement Anti-Harassment Campaigns in Public Transport	•	••	••				1	1	2	2
Raise Road Safety Awareness	•	•			••		2	2	2	1
Make Information Publicly Available on Projects and Policies	•	•		•	•		1	2	1	1
Foster a Security Culture in Public Transport		•	•		•		1	1	1	1
Increase Awareness about the Real Cost of Mobility				•		••	2	2	1	1
Share Knowledge on Successes and Best Practices	•	•	•	•	•	•	1	1	1	1
Inform Users about New Sustainable Solutions	•	•				•	1	1	1	1

Note: Changes from gray to white rows represent a break in thematic area. Values in yellow represent a very important impact (rating of 2) of a policy measure on a policy goal. Values in green represent a highly relevant impact (rating of 2) of that policy measure on a policy goal for a country group.

ANNEX II. THEMATIC AREAS

Table II.1: List of Thematic Areas

Toolbox	Thematic Area
Regulatory and Institutional	Plans and Strategies
	Institutional Design, Cooperation, and Coordination
	International Agreements and Regulations
	Regulations for Transport Services
	Regulations for Vehicles and Vehicle Use
	Regulations for Data Collection, Data Sharing and Data Use
	Procurement and Contracts
	Capacity Building and Human Resource Development
Engineering and Technology	Technical Standards
	Asset Construction
	Design and deployment of Transport Services
	Design and deployment of Programs and Initiatives
	Asset Management
	Safeguards
Economics and Finance	Project or Program Cycle
	Allocation of Public Funds
	Fiscal and Financial Measures
	Pricing for Efficiency and Inclusion
	Innovation Policy and Enhancement
Communications	Consultation and Public Engagement
	Promotion Campaigns and Public Awareness
	Knowledge Management and Dissemination of Best Practices

Note: Changes from gray to white rows represent a break in thematic area, and correspond to the 22 categories of policy measures presented in table I.2 of annex I.

ANNEX III. POLICY GOALS AT A GLANCE

The Global Roadmap of Action (GRA) builds upon six policy papers. Each policy paper developed a catalogue of policy measures to enable countries to achieve one specific policy goal that defines sustainable mobility. In this annex, we present a summary of each policy paper.

UNIVERSAL RURAL ACCESS

Summary of the Policy Goal

One billion people in the world do not have access to transport, and the majority live in rural Africa. SDG target 9.1 aims at achieving universal rural access by 2030 with indicators that relate to transport infrastructure (9.1.1) and transport services (9.1.2). Access should be affordable to vulnerable populations and equitable, of good quality, reliable, sustainable and resilient.

The pressing needs of rural populations in low and middle-income countries, and issues in high-income countries associated with declining rural transport services form the basis of this section's summary.

Improvements in four types of rural access depend on needs, availability of funding and institutional capacity.

- Basic access entails providing spot improvements to overcome bottlenecks on un-engineered roads and tracks and to make them passable in all seasons.
- Motorcycle trails provide a faster type of all-season access using earthen tracks where passable, together with engineering improvements such as small bridges and narrow, paved running strips.
- Low volume rural roads involve widening the roadway for use by motor vehicles, and providing limited engineering improvements to make the surface more uniform, providing drainage, and raising safe driving speeds. In most cases such roads are unsealed.
- Higher volume rural roads involve constructing a fully engineered rural road with a sealed surface or more durable pavement.

Improvements in rural access make it more attractive for transport operators to provide bus and freight services and attract further improvements in service availability and quality.

Waterborne transport facilities such as providing small piers and safe landing places is especially relevant in remote coastal, lakeside and island communities, and in remote inland areas served by rivers. Air transport may have considerable significance in remote regions where distance, geography or population is an obstacle to access to health services, democratic systems, education or business opportunities. In some cases, building a small air strip and supporting public service flights might be a more cost-effective alternative to building vast road networks.

Unit investment costs in flat to rolling terrain for basic access and motorcycle trails are fairly low (e.g., less than $10,000 per km), and maintenance requirements are modest. Low volume rural roads cost more (e.g. $10,000–$60,000 per km), are more technically demanding to build, and require regular maintenance (e.g., grading or shape and drain). Higher volume rural roads are the most expensive (e.g., $60,000–$150,000 per km) and technically demanding to build and maintain. These costs are comparative indicators with wide variations even with regions.

All countries can progress toward universal and inclusive access. Those with lower financial and technical capacity may initially give priority to basic access or

motorcycle trails. Those with higher capacity may prioritize low volume rural roads and higher volume rural roads. When a lower cost access type is provided initially, it can later be upgraded when justified by traffic growth.

State of Play

The UN has adopted two indicators for the SDG target 9.1; the proportion of the rural population who live within 2 kilometers of an all-season road (the SDG indicator 9.1.1 also known as Rural Access Index), and the volumes of passenger and freight by mode of transport (SDG indicator 9.1.2).

Limited amounts of data are available for these indicators. The World Bank developed the rural access index (RAI), and prepared estimates for 62 developing countries from country surveys and modeling estimates, mainly for year 2003. Since then, the estimates have not been systematically updated.

Index values show differences among countries ranging from 5 to 99 percent. Countries with a lower index faced constraints because of geography, climate or demography (e.g. low population density), and limitations in financial, technical and institutional capacity. Countries with a higher index had fewer constraints (e.g., high-income countries).

A DFID initiative, in cooperation with the World Bank, Asian Development Bank and African Development Bank, works to provide regular data collection on the RAI.

Priority Areas of Action

Countries that have successfully improved rural access generally introduced a guiding policy framework and a well-defined investment program, and then implemented these consistently for an extended period (e.g., 10–20 years). The overall policy goal should be to achieve universal and inclusive access by 2030.

Governments of low-income countries (LIC) and medium-income countries (MIC), with support from development partners, will have to meet all or most of the investment costs, with assurances from their local governments and communities to commit firmly to contributing to future maintenance.

Technical Accountabilities

It is the responsibility of governments to:

- Establish common technical standards for the access types covered by the program (e.g., geometric design, drainage, climate resilience screening, traffic safety policy measures).
- Arrange for technical guidance on the approach to routine maintenance, and the introduction and use of objective systems for planning annual periodic maintenance works (e.g., simplified road asset management systems).
- Use appropriate technologies (e.g., locally available construction materials) that can improve the performance and lower the cost of effective rural access investments. Countries should, where possible, establish their own materials testing and research capacity or cooperate with neighboring countries that have such capacity and seek technical support from regional initiatives such as the Research for Community Access Partnership (ReCAP) program financed by the DFID.
- Assess the impacts of planning, design and construction of rural infrastructure on current and future climate.
- Introduce simple rural logistics improvements (e.g., roadside produce storage facilities) to allow farmers to consolidate produce before collection and reduce losses due to perishability.

Procurement Accountabilities

The government should:

- Prepare procurement rules, procedures, standard bidding documents and contract documents for the program. Rural access projects should meet an economic viability threshold.
- Develop, where feasible, an e-procurement platform to simplify and speed-up procurement, and support transparency.
- Recruit qualified consulting firms to prepare feasibility studies, engineering designs, and supervise works. Contractors procured on a competitive basis should carry out construction and periodic maintenance works.

- Establish a pool of independent experts to undertake technical and financial audits for quality assurance, value-for-money and anti-corruption. Distribute a set of project selection criteria among rural communities. Participatory planning should be used to help communities propose projects for an efficient future rural network.

Finance Accountabilities

- Take steps improve the quality, safety and competitiveness of private transport services using licensing, fare setting and other regulatory measures.
- Encourage the private sector to introduce online platforms and other innovations to improve the convenience, quality, efficiency and price of freight and passenger services, and to extend credit for financing of buses and other vehicles.

Communications Accountabilities

- Ensure good coordination between central, local government and communities, and with the programs of other relevant sectors that can benefit from improved access.
- Establish a framework of continuous stakeholder consultation to support the policy and program, including a website to disseminate information about the program and report progress.

Scale of the Challenge

The policy goal of achieving universal rural access by 2030 is ambitious and challenging but achievable. In many developing countries, it will entail providing access for more than half the rural population which may take 10 to 20 years to implement. Illustrative calculations for the MICs estimate that it may cost more than $100 per head of population served to achieve universal access using higher volume rural roads, but only $5 to $10 per head served using basic access and motorcycle trails. At this lower level of costs, it may be possible for even the poorest countries to approach universal access by 2030.

To finance the large investments needed, countries should establish a dedicated source of financing (e.g., fuel tax). Most countries will also need financing support from development partners.

Substantial capacity building is needed to provide the skills needed to implement the program and maintain the assets (e.g., technical leadership within central government, program planning and implementation by local government, and skills training for contractors and communities).

UNIVERSAL URBAN ACCESS

Summary of the Policy Goal

Central to universal access in urban areas, is that giving more access to opportunities goes beyond the idea of providing access to transport alone. It involves increasing population's access to opportunities, with a special emphasis on improving access for the most vulnerable populations and enhancing equity of access.

Challenges to universal urban access start with the mainstream approach in urban planning, which continues to give greater emphasis to low-density, sprawled urban areas and individual motorized traffic, while disregarding public transport, cycling and walking. Additionally, policy measures to manage demand are commonly discarded because of political challenges in implementation, despite their known positive effects in overall transport improvements.

- New approaches promote, for instance, exclusive right-of-way for public transport, redesigned street space for walking and cycling, sharing individual transport modes and lower maximum speeds. These can be complemented by multimodality, sharing and digital services, such as mobility-as-a-service (Maas), intelligent transport systems (ITS) and digital parking management. Give greater importance to accessibility rather than mobility (especially rather than focus on traffic).
- Focus on movement of people and goods rather than vehicles.
- Follow a hierarchy of modes where non-motorized, active travel is given greater priority than individual motorized traffic, and where integration of transport (i.e., ease of movement between

modes) is enhanced, most visibly in the allocation of street space.

- Focus on saving lives while making transport safer and cleaner rather than better performance of the transport system as a whole.
- Assess travel times instead of average speeds when measuring performance.

State of Play

Several indicators aimed at measuring access rely heavily on the availability and accuracy of data, often lacking in cities in the developing world. Various indicators provide information on the levels of urban access in different countries. The rapid transit to resident ratio (RTR) indicator (map IV.1) is a measure developed by the Institute for Transportation and Development Policy (ITDP) and provides a very good proxy for quality public transport provision.

Countries in Europe have the best performance, while countries that have traditionally favored sprawling and low-density cities, such as the USA and Australia, have low performances. Most developing countries have low levels of the RTR as well, although it is worth noting countries such as Ecuador or Chile, which have higher levels of rapid transit provision than some countries in the global North.

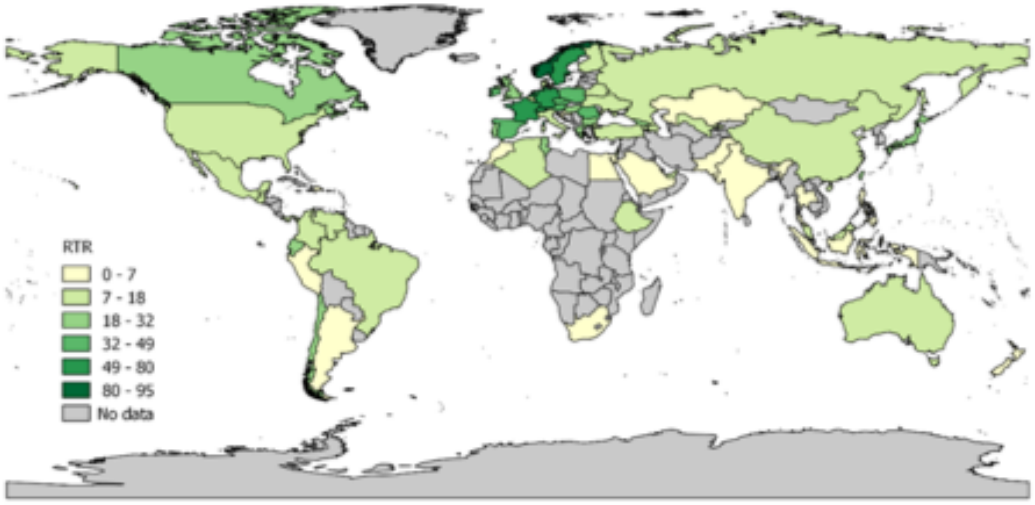
Scale of the Challenge

Sizeable challenges exist with solutions to implement.

Financing conditions are adequate as, in many cases, the magnitude of investment is not far from governmental budgets. The challenge lies in the allocation of funds into other interests, policies and investments, as well as hidden subsidies (Ardila-Gomez and Ortegon-Sanchez, 2016). Interestingly, the investments needed to achieve great improvements will be much smaller than the medium and long-term benefits that they will generate (ITDP and UC Davis, 2017).

Various global organizations use available knowledge to provide policy advice, technical support and financial help to governments that are willing to follow their lead. The challenge lies in applying that knowledge, redirect those investments, and learn from those best practices. Appropriate data and constant monitoring of such data and producing information and knowledge are elements that are very weak in many cities of the world when it comes to measuring access and many indicators of transport, and to the actual demonstration of the positive impacts in transport policies when concrete measures are applied.

Map III.1: Global status of Rapid Transit to Resident Ratio (RTR)



Source: Institute for Transportation and Development Policy (ITDP).

GENDER

Summary of the Policy Goal

Transport is not gender[27] neutral. The four policy-goal frameworks of the GMR 2017 have been enhanced by integrating more explicitly gender[28] as a subset of universal access. Women in both low- and high-income countries face many mobility challenges. Compelling reasons support the case for investing in gender and transport at numerous economic, social and environmental levels,[29] and reflected in a growing number of gender-related international policy frameworks and major conventions associated to transport. Women's empowerment is at the heart of the 2030 development agenda.

State of Play

Women[30] make up half of the global population.[31] Female mobility patterns differ men's: women tend to have shorter commuting distances, make more non-work-related trips, use public transport and taxi services more often than men, and frequently travel accompanied by children.

The transport sector still lacks diversity especially in decision making where women are underrepresented in all levels—political, diplomatic, financial, economic, and commercial sectors—and for all modes of transport. Moreover, women face many barriers relating to employment in the transport sector.

Limited access to opportunities and concerns about sexual harassment are estimated to be the greatest obstacles to women's participation in the labor market (ILO and ITF, 2014). For example, in developing countries these two aspects are estimated to reduce female labor force participation by 16.5 percent. Additionally, 19 countries (out of 189) legally restrict women from working in the same way as men, and globally only 75 countries mandate equal pay for equal work in all sectors. Moreover, only 32 countries have legislation on sexual harassment in public spaces, including transport.

The GTF was difficult to apply to gender because of a lack of disaggregated data. Indeed, the only data on female employment in the transport sector[32] that was continuous in nature included logistics and communications, making it difficult to set base lines. However, based on this limited data, countries were ranked, and Sweden was identified for a case study as being one of the more progressive countries.

No internationally agreed target captures the ambition for change. Without doubt, integrating and engaging women and girls will support the achievement of many of the SDGs; the SDG 5 prioritizes women's empowerment and the elimination of discrimination and violence against women and girls—in public and private spheres including trafficking, sexual, and other types of exploitation—to increase equity and equality.

Gender is a crosscutting theme, and the participation of women at all levels of transport decision making, planning, management and operations must be increased. Four main entry points were identified where action is required, and where indicators and goals are suggested.

- Women as decision makers at all levels in the transport sector.
- Women as transport users; further strengthening laws and regulations that help protect them and attract them to work in the sector.
- Women as transport workers; setting a target of 50 per cent females working in the sector.
- The gendered impact of transport infrastructure; promoting better gender equity and equality in procurement, transport design and planning and including women in all levels of decision making.

Four main sets of interventions and policy measures that can be taken to improve women's mobility are documented in the catalogue of policy measures.

Data collection

- Improve knowledge on gendered needs with systematic disaggregated data collection to build a strong evidence base and better understanding of the significant gender differences (including motorization levels and trip purpose). The approach helps identify gaps to improve women's freedom of movement and manage latent demand better.
- Improve guidelines on the planning, design, implementation, measurement, monitoring and

evaluation of transport systematically to include gender.

Diversity

- Build the case for positive action to make transport more inclusive.
- Increase the diversity of those working in transport and making decisions about it to respond better to women user needs.

Address legal and social barriers

- Address key barriers such as legal provisions and social norms that may restrict women's mobility. Some examples are: lax enforcement of equality and equity laws, social protection and offences of harassment and violence against women in public transport and public space. Create a zero tolerance of this behavior and make provisions for gender-sensitive training for security agencies, transport operators and resource gender units considered prerequisites.

Policy dialogue, capacity building and raising awareness

- Build capacity and skills on gender and transport at all levels—national, regional, local and community. Little capacity for action is present, even when higher decision-making levels request actions and can provide resources.
- Create integrated policies with complementary sectors such as education (girls in secondary education, technical vocations and encouraging more women into STEM areas).
- Campaign to raise awareness in public and private sectors, and with civil society on gender and transport with a focus on universal access that women have as much right to mobility as men.

Use policy dialogue and regional conferences to share learning and experience on gender and transport.

Actions relating to providing women, girls and transgender with accessible, affordable, safe and efficient mobility can be divided into five categories—legal, infrastructure design, operational dimensions, training (governments and operators), and engagement with civil society. Women are not a homogenous category; they vary significantly in socio-economic status, ethnicity health, education, civil status, age, geographical location and cultural aspects.

Scale of the Challenge

Transport is a system, a complex mix of regulation, infrastructure, technologies, market forces and business models, knowledge and data, public and private players, user practices and cultural values (Geels 2012; Schwanen 2014) relying on numerous interdependencies and interconnections.

The many important interdependencies between sustainable mobility, equity[33] and gender bring substantial benefits not only to transport but to all elements of the gendered development agenda.

EFFICIENCY

Summary of the Policy Goal

The growing demand for mobility points to the need for better utilization of resources while reducing our global footprint.

Overall efficiency is the sum of two activities. First, resources are expended in making the transport system available for use; to be efficient is to use the minimum resource to achieve the maximum output. Second, resources are also expended by users in consuming transport services. Inefficiency arises when users of services do not get the quality of service they expect —for example, with slow, unreliable, or unpredictable transport—and leads to waste of time, materials, and users' opportunities.

Two types of efficiency contribute to its analysis: productive efficiency in the optimal way of producing goods and services; and allocative efficiency in the optimal way of matching demand and supply and thus the distribution or allocation of resources in society.

State of Play

Efficiency can be assessed across various elements of the transport systems, but comparable data limits evaluating efficiency across countries. These limitations lead to focusing on only on one principle indicator,

the LPI, and a set of country attributes that are strongly correlated with it. In future work, a second summary indicator dealing with passenger transport—a mobility performance index (MPI)—needs to be developed to complete evaluation of transport efficiency.

The LPI is a comprehensive measure of the efficiency of international supply chains; the organization of the movement of goods through a network of activities and services operating at global, regional, and local scale. Efficient logistics connects people and firms to markets and opportunities and helps achieve higher levels of productivity and welfare.

A set of policy measures was identified to help countries advance the realization of the efficiency policy goal and improve their performance.

Priority Areas of Action

The priority areas of action for the efficiency policy goal are clustered in two ways. The issue of allocative efficiency, "doing the right things", is largely covered by a set of policy measures in the economics toolbox. The issue of productive efficiency, "doing things the right way", is largely covered by policy measures in the legal and technical and engineering toolboxes (box III.1).

The efficiency-related policy measures were developed to address the three principle activities of the transport system: asset creation, asset management (including maintenance), and the transport services supported by the assets. In economic terms, topics embrace theory and methods and their applications for strategy, planning, and decision making, funding investment, finance, pricing, completion, and safeguards. In regulatory terms, the topics include the framework for planning and strategy setting, coordination, regulation, adoption of best practices, frameworks for monitoring and evaluating results, and frameworks to support innovation and learning. In technical and engineering terms topics include setting standards (including international best practice), using the standards to build, maintain, and provide services and technical evaluation of the results. In communications and marketing terms topics include explaining transport to civil society, having public input into transport decisions, encouraging sustainable behavior, and having good information available to users. A logical progression exists of guidance and support for decisions and behavior by applying the tools, (economic, legal, technical) to each part of the transport system (asset creation, management, services). Communications tools are used throughout the process.

Scale of the Challenge

The growing global demand for mobility and trends in development, economic integration, and urbanization all point to the need for better utilization of resources to meet these demands while reducing our footprint.

Existing transport technologies and practices are tightly integrated into most economic and social activity. Our personal behavior, social habits, and business practices are conditioned by the transport sector. This means transport can influence and promote change in areas across the whole economy and society.

Tension exists between the long-run benefit of demonstrated and integrated productive innovation and the shorter-run cost of disruptive innovation. While the productive aspects of the innovation are proven, broader systems adapt to integrate the innovation. No single model is available to move from disruptive to productive innovation. The greatest challenges for efficient sustainable transport are public opinion and political will.

The multimodal, connected, and interactive nature of transport's sub-sectors indicates that transport has always faced complex patterns of interactions, transactions, difficult geography and distance, joint production, joint consumption, and government and private sector interactions. The existing mechanisms, institutions, arrangements and patterns provide a starting point to improve upon. We are not starting from zero.

SAFETY

Summary of the Policy Goal

Safe mobility is a fundamental principle of sustainable transport, and it is widely acknowledged that deaths and serious injuries resulting from transport crashes and incidents are largely preventable. While a safe mobility paradigm is needed across all modes, fundamental differences exist between road transport and

Box III.1: Policy Measures to Achieve Transport Efficiency

Economics and Finance Toolbox

- Use robust investment evaluation framework to decide public investment
- Adopt strategic policy on finance, pricing, infrastructure needs, and subsidy
- Use pricing to manage demand, raise revenue, and finance transport
- Encourage behavioral change to support sustainable transport
- Adopt a transport competition policy and mode-specific policies
- Develop support for access for low-income or vulnerable users
- Put in place regulatory framework to support technical and business innovation and its diffusion

Regulatory and Institutional Toolbox

- Prepare strategic goals and plan for the transport system and the role of transport services, nationally and sub-nationally
- Implement comprehensive and integrated transport planning and land-use planning processes. Ensure optimal planned locations of linear facilities and hubs
- Build national capacity across broad and multi-sector issues, budgeting, and regulation. Ensure adequate financial resources
- Accede to and implement relevant international agreements and conventions
- Require usage, financial information, and operational data to support decision making and regulatory oversight
- Support development of human resources in transport, and support for continuous improvement

Technology and Engineering Toolbox

- Create construction standards, support construction industry, promote sustainability in transport and adaptation to climate change
- Set up network management and service provision arrangements. Ensure optimal planned availability of infrastructure and optimal level of service
- Build specified complete multimodal networks. Ensure optimal network operational availability
- Provide active oversight of the construction and asset management industries

Communications Toolbox

- Build public support for the transport system and policies through accessible information, open discussion and understanding of policies and projects
- Improve user information (e.g., mode, route, routing conditions), for both passenger and freight transport.

other modes. Modes differ in their safety performance and with respect to the proactive, regulatory, and operational frameworks more evident in the non-road transport modes. The risks also vary widely between and within different transport modes.

Road transport is often described as an open system involving a larger number of responsible sectors as opposed to the opportunities for the more closely managed systems in air, rail, and maritime modes. Estimates indicate that road crashes contribute 97 percent of all global deaths resulting from transport crashes and incidents, with most road deaths occurring in low- and middle-income countries (LMICs). The sustainable development goals (SDGs) which directly relate to transport are concerned with road safety, thus highlighting safety as the priority transport concern.

While the GMR 2017 announced a general objective to improve the safety of mobility by avoiding fatalities, injuries, and crashes across all modes of transport, no global overarching long-term goals exist for transport safety. The GMR 2017 did, however, propose a target to halve the number of global deaths and injuries from road traffic accidents by 2020 (SDG target 3.6), and to reduce by 5 percent the fatalities in rail, maritime and air transport. A long-term goal is important since it signals that the levels set for interim targets are not acceptable but are milestones on a path to the only acceptable, albeit long-term, outcome of zero death and serious injury.

State of Play

The last 15 years has seen unprecedented agreement on road safety between international and national agencies and organizations about understanding the key road safety problems and the means of addressing them. However, a gap needs to be closed between what is known to be correct and effective, and what is actually practiced and accepted.

Air transport has seen a continuous reduction in the number of fatal crashes and incidents, and some regions have begun to experience zero fatalities. One of the biggest challenges in air transport is how to achieve or maintain an ultimately safe system knowing that traffic is continually increasing, and new actors such as remotely piloted aircraft systems (RPAS) are entering the aviation system.

The safety performance on railways has also improved in the last 20 years. The main challenges faced by rail transport are two-fold: i) collecting and analyzing worldwide information on rail transport, including the number of incidents, victims, and location of crashes; ii) improving safety measures for cars and at pedestrian crossings, anticipating urban expansion.

Roadmap of Action

A detailed, integrated global safety path inclusive of all modes is challenging to outline, not only because of differences mentioned previously, but also on account of the lack of available key data to inform specific intervention and implementation needs to prevent and mitigate death and serious injuries for transport users.

Transport safety must be produced from a planned, systematic, results-focused response that considers the results to be achieved, the selection of interventions needed to achieve results, and the broad scope of institutional delivery and cooperation that provide the foundation for activity. Experience shows that approaches which fail to consider each of these elements and their linkages are likely to be unsuccessful. Key areas of action include: regulatory and institutional agreements; building leadership; building essential capacity to allow goals and targets for projects and programs to be addressed; accelerating knowledge transfer; scaling up investment for transport safety; and continuing international cooperation to improve safety in all modes of transport.

Scale of the Challenge

Countries need to work on and meet safety goals and targets. Further work and cooperation are required to establish firmly knowledge and pragmatic guidance, increase investments, reinforce work that is already delivering results, and address challenges and opportunities provided by further automation and other developments. Without strengthened institutions, better data, accelerated knowledge creation and transfer, plus scaled-up investment and increased international cooperation and development aid, ill-prepared LMICs are likely to be overwhelmed by the sheer scale and

rapid spread of the crises of death and serious injury on the road.

GREEN MOBILITY

Summary of the Policy Goal

The green mobility policy goal captures the essence of this ambition by aiming to "reduce the environmental impact of mobility in terms of greenhouse gas (GHG) emissions, air pollution, and noise."

State of Play

GHG emissions from the transport sector need to be reduced from 8 billion tons CO_2 to contribute effectively to keeping temperature increase within acceptable limits. The goal is a reduction to 2 to 4 billion tons in 2050, with net-zero emissions in the decades thereafter. This implies emissions of less than 0.5 tons on average per capita. Many countries are below this level, yet their emissions are rising rapidly because of increased motorization. Meanwhile, countries with high per capita emissions of 1 to 5 tons, require rapid decarbonization as a necessity.

The transport sector, in particular because of diesel vehicles and ships, is also a key contributor to ambient air pollution. Air pollution annually causes 4.2 million deaths globally. Only a few countries and large cities meet the WHO's mean guideline value of 10 microgram PM2.5/m3. Against this backdrop, it is proposed that by 2020, each country and each large or medium-sized city develop clean air plans with the objective of reaching 50 percent reduction of premature deaths from surface transport sources by 2030, compared to 2010 levels.

Though a lack of globally comparable data envelops noise pollution, transport-related sources have been identified as serious health threats, particularly in cities. The priority is to "substantially reducing global human mortality and burden of disease from local transport-related noise levels". It is thus proposed that, by 2030, the number of urban dwellers exposed to excessive noise levels be reduced by 50 percent compared to 2015 levels.

Priority Areas of Action

Priority areas are highlighted based on an avoid–shift–improve framework to address these environmental impacts from transport. The avoid-and-shift measures, in particular, are often employed for other sustainability reasons than the environment. Reducing the GHG and air pollution could be considered co-benefits of sustainable transport actions. However, it is the "improve" policy measures that are driven by air quality, energy and climate concerns that provide relatively few co-benefits for the other policy goals.

The nationally determined contributions under the Paris Agreement (Gota et al. 2019) provide a framework for national and local actions for low-carbon transport, however these do not go far enough to decarbonize the sector. Priority policy measures, listed in box III.2, are organized by passenger and freight, with both sub sectors crucial in addressing environmental issues.

Improved data, and measurement, reporting and verification (MRV) are critical, and will support the transport policy making process. Institutional development is important as well; transport, stakeholders of environment, energy and industry need to work together and coordinate to design integrated Green Mobility strategies.

A long-term transition to green mobility additionally requires significant changes in the energy system. Key issues include decarbonization of electricity supply, investments in grids, battery life-cycle management and sustainable bio-or synthetic fuels.

International and Maritime

Building upon the existing frameworks developed by the ICAO and the IMO, further policy measures such as advanced R&D on cleaner aircraft and alternative fuels launched at country level, particularly in connection with other transport modes, can be developed.

Adaptation

Box III.2: Policy Measures to Achieve Green Mobility

Priority Measures for Green Freight and Logistics

- Factor in energy and environmental concerns for better informed freight transport decisions through market-base mechanisms, pricing, green freight labeling and better data and monitoring systems
- Encourage efficient supply chains and circular economy, e.g., by optimizing logistics (freight exchange, consolidation centers), improving information for consumers, setting national targets and incentives for recycling
- Favor modal shift towards more rail and waterways through better infrastructure, and by addressing tariff and non-tariff barriers
- Increase ship and truck energy efficiency, reduce pollution, and noise through fuel economy or CO_2 standards, diesel quality standards, emission standards, energy efficiency measures, and port-based measures.
- Develop and promote clean, low-carbon fuels and vehicles through low-emission zones (LEZ), low-sulphur diesel, incentives for sustainable biofuels, and electric road systems
- Foster R&D strategies for promising technologies such as electric trucks, delivery vehicles and ships, synthetic and bio fuels, hydrogen fuel cells, and advanced ITS solutions.

Priority Measures for Green Passenger Mobility

- Promote active mobility modes (walking and cycling) through adapted infrastructure, planning, traffic calming, national and local action plans
- Push and pull approach to induce modal shift in cities by providing integrated public transport systems and first/last mile connectivity, together with transport demand management measures
- Promote electric two-wheelers by phasing out conventional motorcycles, setting up low-emission zones, incentives and vehicle regulations
- Apply standards and incentives for clean and low-carbon buses
- Policy packages for cleaner and more efficient cars, including standards for low-sulphur diesel, progressive vehicle emission standards, fuel economy or CO_2 standards coupled with incentives and labeling
- Phase out fossil fuel subsidies and reflect external costs in prices for fuel and mobility
- Design policies supporting the transition to electric vehicles, including LEZ, zero emission vehicle (VEZ) mandates, phasing out of fossil-fueled cars, incentives public procurement standards and supporting of a charging infrastructure network
- Take advantage of digital tools and new mobility models (shared, connected, autonomous) to increase attractiveness of sustainable modes and EVs, while keeping total vehicle km and urban sprawl in check
- Address noise issues by implementing of standards for road surface, vehicles and tires, speed limits, as well as end-of-pipe solutions such as insulation and noise barriers

Climate change strategies for transport should also include adaptation, as climate change poses major threats to transport infrastructure because of the increased risk of disasters. The case in favor of a more resilient transport system seems clear, especially since transport can also help alleviate the impact of economic and safety-related consequences of extreme weather events. It rests with major adaptation strategies on international regional and local levels to make a resilient transport system possible. Nonetheless, such developments remain rare and only a limited number of countries have so far developed full-fledged national adaptation plans. Consequently, adaptation efforts should be strengthened and broadened, in combination with mitigation measures.

Scale of the Challenge

Increasing investment attractiveness in low-carbon technologies and crafting supporting economic instruments will be paramount to succeed in accelerating the transformation of the sector. Studies show that the cost of action is less than the cost of inaction because of substantial savings to infrastructure, fuel and vehicle expenditures.

Therefore, resistive trends to change, arising from vested interests in solutions proposed, must be fought.

ENDNOTES

27 Sex refers to attributes one is born with; gender refers to what happens after birth. Gender is the term used to illustrate the different roles played by women and men and the characteristics of their expected behaviors due to cultural, historic, and socio-economic contexts that define their responsibilities, opportunities and constraints and can go beyond their biological differences.

28 In this report, the use of the gender encompasses the LGBT (lesbian, gay, bi-sexual and transgender) communities.

29 World bank Gender Equality Brief May 2018 Conclusions p.18 https://openknowledge.worldbank.org/bitstream/handle/10986/29865/126579-Public-on-5-30-18-WorldBank-GenderInequality-Brief-v13.pdf?sequence=1&isAllowed=y.

30 Although it is important to include transgender (and LBGT) aspects our intention should be to highlight the specific needs of this community that may need consideration rather than neglecting it entirely. To avoid always referring to women, girls and transgender, we have used the abbreviation of the WGT to represent women, girls and transgender and in the majority of cases transgender is also included when the term women or gender is used in this report.

31 UN population reference: http://www.un.org/en/development/desa/population/publications/database/index.shtml

32 Country-level data on employment in "transport; storage and communication" from International Labor Organization (ILO) is used. This is complemented with an analysis of legal barriers to women's employment in the transport sector. This aspect serves as proxy using World Bank data which tracks whether there are any legal barriers that prevent women from doing the same jobs as men.

33 Equity is giving everyone what they need to be successful. Equality is treating everyone the same. Equality aims to promote fairness, but it can only work if everyone starts from the same place and needs the same help, thus those who start disadvantaged are likely to remain disadvantaged unless programs and initiatives bring them up to be able to take up the same levels of opportunity, as the majority.

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