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Focus Feature 3

Adaptation Policy Measures in the Transport Sector

Transport systems, assets and modes worldwide are vulnerable to shocks and stresses – including climate change. Depending on their nature and the degree of exposure, some systems will be affected by gradual (or slow-onset) changes, such as in temperature or sea level, while others may be impacted by more frequent or severe hydro-meteorological events, including heatwaves, rainfall (flooding or drought), extreme wind speeds or wave heights.[1]

The types of impacts vary. Heatwaves can damage infrastructure such as rail tracks, overhead wires, and pavement surfaces, disrupting transport. Droughts can reduce water levels for inland navigation, and long dry spells can affect the integrity of infrastructure. High winds, extreme waves and storm surges can impact coastal infrastructure, including ports; high winds can affect airports; and extreme rainfall can flood river-based transport corridors. Trucks, trains, ships, buses, planes, cars and other transport modes may need to be modified to ensure safe and reliable operation in extreme conditions.

Adapting to slow-onset changes

In some cases, the response to gradual changes in temperature and hence in sea level, precipitation patterns, etc. may require physical interventions such as relocating, reinforcing, raising, strengthening or otherwise modifying transport infrastructure or systems. However, not all adaptation requires such costly interventions. Operational changes may suffice, including revised working practices, rescheduled activities or operations, or restrictions in high-risk areas. Monitoring can help inform decisions on when action is needed, but climate change exacerbates existing uncertainties and introduces new ones. These uncertainties, including about the rate and magnitude of change in key climate parameters and processes, must be accommodated in order to avoid "maladaptation" (an action, or inaction, that leads to an increased risk of an adverse climate-related outcome).

Climate change demands innovative solutions, which first require a recognition and understanding of the challenge. To help identify these challenges when options are being considered for adaptation of a system, asset or operation with an operational life of more than 10 years, a range of climate change scenarios will need to be assessed.[2] In some cases, the extent of difference between the various plausible climate futures may indicate a preference for an adaptive solution that can be modified as conditions change. In other cases, back-up provisions or engineered redundancy may need to incorporated. The cost of inaction can be significant.

Preparing for extremes

As with slow-onset changes, some of the challenges facing transport infrastructure and systems can be addressed through modifications to existing networks or assets, or by the design of new ones. However,

structures and operations that are prone to failure should be designed to fail "gracefully" (in a managed way) rather than catastrophically when conditions exceed design standards. This may involve undertaking risk assessments and preparing contingency plans; developing early-warning systems; prioritising asset inspection and maintenance; and investing in back-up provisions. Sharing information and engaging with relevant stakeholders plays a critical role in delivering sustainable and resilient transport networks.

Institutional support

Effective adaptation of transport systems, infrastructure and modes requires more than just technical/physical and operational/management action. Institutional measures are also vital.[3] Climate change adaptation plans need to be prepared and strategies developed. Land-use planning and development control policies can reduce risks by encouraging transport infrastructure to locate (or relocate) out of high-risk areas, and by introducing "build back better" and similar policies. Technical guidelines and codes of practice may also need to be revised.

Financing organisations and the insurance industry are key players in encouraging and delivering effective adaptation. Climate risk and adaptation costs should be embedded in finance decisions for all new development. Climate risk disclosure is an important tool but is often inadequate. Improved information on physical risks will be needed, as the cost and availability of insurance will increasingly reflect the adequacy of investment in resilience.

The early months of the COVID-19 pandemic exposed many vulnerabilities in transport systems: a lack of contingency planning and preparedness; inflexible operations with insufficient adaptive capacity; and a limited ability to respond quickly. But over time, new ways of working have evolved and important lessons about adaptation planning have been learned. The potential for extreme events to disrupt transport has many parallels with the pandemic. Improved preparedness and resilience will be essential if consequences are to be minimised and recovery rates optimised.

Annex: Methodological Note

Data usage

Time period for data:
The report strives to utilise the most recent publicly available data and information just prior to the time of publication (as of 31 May 2021). The figures in the report were developed between September and December 2020 using the most recent data available.

Secondary data:
SLOCAT relies on secondary data and information collected and provided by SLOCAT partners and other entities and does not make use of any internal modelling tools.

Data on sustainable mobility: A call to action

The report benefits directly from data collected by a wide range of stakeholders working in different areas of transport.

Data are important for providing a comprehensive picture of the status of sustainable, low carbon transport and are essential for both policy and investment decision making. In these times of change, it is critical to upgrade data and policy collection and interpretation capacities to better understand progress and the hurdles that must be addressed.

The data limitations mentioned below are not new. Obtaining regular, reliable and public data across regions and transport modes remains an outstanding issue. When an increasing number of stakeholders are collecting data and policy information, more and better open-access data and capacity building efforts for data interpretation are supported by many multi-stakeholder partnerships in the sustainable, low carbon movement.

If you share our passion for open-access data and knowledge towards greater impact on policy and investment decision making worldwide and/or would like to contribute data or knowledge to our collective efforts on this report, **please reach out to the research team in the SLOCAT Secretariat at tcc-gsr@slocatpartnership.org**.

Specific data used in this report

Data on emissions

The data in this edition of the report point to the direct carbon emissions from transport activity; they do not cover the indirect emissions and land-use impacts associated with certain modes of transport. The report primarily utilises CO_2 emission data compiled in the Emissions Database for Global Atmospheric Research (EDGAR) from the Joint Research Centre of the European Commission, as this represents the most recent, comprehensive dataset on transport CO_2 emissions. However, this global dataset does not convey in full detail the unique situations of individual countries.

EDGAR provides estimates for fossil CO_2 emissions from all anthropogenic activities with the exception of land use, land-use change, forestry and the large-scale burning of biomass. The main activities covered are CO_2 emissions emitted by the power sector (i.e., power and heat genertion plants), by other industrial combustion (i.e., combustion for industrial manufacturing and fuel production) and by buildings and other activities such as industrial process emissions, agricultural soils and waste. Transport activities covered within EDGAR include road transport, non-road transport, domestic aviation, and inland waterways on a country level, as well as international aviation and shipping.[1]

For the world, regions and countries, the CO_2 emission data (provided by EDGAR) span through 2019. In a few places in the report, CO_2 data for 2020 are shown to illustrate the impact of the COVID-19 pandemic; however, these data are based on a different methodology than the EDGAR dataset and should not be compared directly with the data from previous years.

The latest CO_2 emission data for individual transport modes are for 2018 and have been compiled only at the global level. For passenger and freight transport, the data on global CO_2 emissions are for 2017, as this is the latest year with robust data. Data on passenger activity (passenger-kilometres) and freight activity (tonne-kilometres) – provided mainly in the country fact sheets – are based on the latest available year, as indicated in the report analysis.

Information on greenhouse gas emissions – provided in CO_2 equivalent (CO_{2eq}) – include not only CO_2 but also methane, nitrous oxide, and industrial gases such as hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride.[2] These data are less up-to-date. As of 31 May 2021, data on greenhouse gas emissions were not readily available for the period 2019-2020. In some cases, additional data sources were used to provide detailed information about other climate pollutants besides CO_2.

All data on CO_2 and other greenhouse gas emissions, as well as CO_{2eq}, are provided in metric tonnes.

Data on car ownership

Information on car ownership rates is based on a global dataset from the International Organization of Motor Vehicle Manufacturers (OICA), with the latest release (as of 31 May 2021) dating from 2015.[3] Although newer information is available for some individual countries, using these data would hinder accurate global comparisons. Data on passenger and commercial vehicle sales were available only up to 2019.

Policy landscape data

The policy-related information presented in this report is not intended to be comprehensive. The data for the policy landscape indicators provided in Section 3 were gathered through desk research unless otherwise indicated. Barriers to accessing such information include language and limited availability of information through online media (e.g., websites, press releases and news articles).

Data in country fact sheets

Information in the fact sheets is based on desk research and on contributions from the national focal points. The data were collected to the best of the authors' knowledge and based on data availability, and thus may not be complete or show the most recent status. When no information was available for a given indicator, the term "Not available" is used.

Data gaps

Major data gaps exist in areas where there is no globally accepted data collection methodology. For example, the mapping of cycling and walking infrastructure is not currently done in all regions. Also, the modal share can be surveyed through different methods, leading to inconsistencies in available data. In addition, data on paratransit (informal transport), a predominant form of transport in many parts of the world, are largely lacking. This results in an incomplete picture of the impact of transport on climate change and sustainable development.

Methodological approach

Countries and regions

The report follows the M49 Standard of the United Nations Statistics Division.[4] In total, 196 countries have official United Nations membership and are also party to the United Nations Framework Convention on Climate Change. The available data have been put in a common structure for the United Nations member countries, regions and income groups to enable a consistent assessment. Income groups are based on the World Bank's classification of 2019.[5]

Economic calculations

The per capita and gross domestic product (GDP) calculations are based on the United Nations World Population Prospects 2019 and on World Bank GDP data using constant 2010 USD.[6]

Spatial and temporal scales

The geographic scale (global, national, city-level, etc.) as well as time scale (annual, monthly, daily) used in this report depends largely on the available dataset, as noted in the relevant figures and text. The detailed data forming the basis of the calculations and analysis are provided in the SLOCAT Transport Knowledge Base.[7]

Criteria for selection

The report covers policies, targets, emission reductions (achieved or envisioned) and market measures. To merit inclusion in the analysis, the policies, projects and trends must have been announced or completed between 2018 and 2020. Significant developments from January through May 2021 were included when deemed relevant, with the understanding that the next edition of the *Transport and Climate Change Global Status Report* will cover a period starting in 2021.

Pre- and post-COVID-19 pandemic trends

The year 2020 was pivotal for the world, and the COVID-19 pandemic has had substantial impacts on many of the transport trends monitored in this report. This edition attempts to differentiate between long-term trends and impacts due to the pandemic. To the extent possible, the analysis notes "pre-pandemic" (up to the end of 2019 or latest by February 2020) and "during pandemic" trends (starting in March 2020 until the end of 2020), as in some cases the pandemic led to reversals in long-term trends, at least for a specific period of time. In each section, a box describes the impacts that the pandemic has had on specific regions and sub-sectors.

Assembling the report

Global Strategy Team

This edition of the report was guided by a global strategy team consisting of 20 experts in the field who provided inputs over the span of six meetings between September 2019 and October 2020. Additionally, small group consultations were organised in February 2021, following the peer review process.

Authors and contributors

The report was collaboratively drafted by 22 authors and contributors from 16 organisations, led by the SLOCAT Secretariat. This includes additions and high-level inputs from the copy editor and from the special advisor who also co-authored the Executive Summary. Authors researched and compiled relevant facts and figures for the five sections of the report, including the Focus Features, with supporting review and inputs from several other organisations.

Peer review: A peer review process was carried out from 18 December 2020 to 20 January 2021 with 1,700 comments received from 74 reviewers. Each comment was individually reviewed by the SLOCAT Secretariat and considered in finalising the report.

National focal points: The report benefited from the contributions of voluntary national focal points, or experts from various regions and countries who have been essential to overcome language and information barriers. A public call for participation to provide information on policies and data resulted in several hundred initial registrations. Out of these registrations, 78 national focal points provided inputs through a first survey from 24 January to 3 February 2020; and through a second survey (focused on the country fact sheets) from 6 to 30 August 2020. All national focal points that contributed to the surveys are listed in the Acknowledgements.

Endnotes

Focus Feature 3 | Adaptation Policy Measures in the Transport Sector

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Annex: Methodological Note

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Tracking Trends in a Time of Change: The Need for Radical Action Towards Sustainable Transport Decarbonisation

SLOCAT Transport and Climate Change Global Status Report 2nd Edition

This report should be cited as:

SLOCAT (2021), *Tracking Trends in a Time of Change: The Need for Radical Action Towards Sustainable Transport Decarbonisation*, Transport and Climate Change Global Status Report – 2nd edition, www.tcc-gsr.com.

Data access and licensing:

The development of this report was led by Maruxa Cardama, Angel Cortez, Nicolas Cruz, Angela Enriquez, Emily Hosek, Karl Peet, Nikola Medimorec, Arturo Steinvorth and Alice Yiu from the secretariat of the SLOCAT Partnership.

For a full list of acknowledgements, please visit the the online page here.

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