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Economic Commission for Europe

Inland Transport Committee

Working Party on Transport Trends and Economics

Group of Experts on Assessment of Climate Change Impacts and Adaptation for Inland Transport

Twenty fifth session
Geneva, 30 and 31 October 2023
Item 2 of the provisional agenda
Initiatives in climate change impact assessment and adaptation for inland transport

Annotated outline for the final report

Note by the Chairs and the secretariat

I. Introduction

1. At its twenty-fourth session, the Group of Experts on Assessment of Climate Change Impacts and Adaptation for Inland Transport (GE.3) reviewed the initial annotated outline for the final report prepared the Chair and Vice-Chairs with the support of the secretariat and provided comments and suggestions for changes. GE.3 requested that chapters on (i) policies and legislation, (ii) methodologies for assessing climate hazard, and (iii) effective adaptation are incorporated in the outline along with other specific changes made.

2. This document contains the updated annotated outline. GE.3 is invited to review it and may agree on allocating the responsibilities for specific chapters among experts.

II. Outline for the final report

3. The agreed title is: “Towards climate change resilient transport systems”. The report should consist of the following chapters and sections:

A. Summary for policy makers

B. Background:

This section is to describe the 2020-25 mandate given to GE.3 and summarize the Group’s activities, including conferences and events held during the mandate.

C. Introduction:

This section is to set the scene for this report. It will incorporate the motivation for acting upon climate change adaptation in transport. It will raise awareness about the costs and benefits of adaptation in comparison with the costs of inaction, hence it will raise the issue of the business case for adaption. It will then introduce this report and

the subsequent, two parts, with part one including chapters to clarify how the information contained in this report is to help transport community to help act on making transport system resilient to climate change, and part two containing specific case studies from countries.

Part 1:

I. Climate Variability and Change – observed changes and projected trends:

This chapter in section one is to briefly update on the current state of knowledge with regard to observed changes and trends of climate change. It should refer action/inaction in terms of climate change mitigation and discuss the GHG concentration trajectories, including RCP, SSP and GWL, which need to be considered in understanding future conditions in which transport system would operate. This chapter should refer to the science included in the latest IPPC reports and state of climate reports.

In section two, this chapter will present analysis carried out for climate impacts on transport networks and nodes projected for temperature, precipitation, and wind gust. Particular attention will be given to various thresholds of weather phenomena.

II. Policies and legislation supporting action on adaptation to climate change in transport:

This chapter will focus on the important role of policies and legislation in reducing vulnerability and the risk of climate change impacts for critical transport infrastructure assets, drawing among others on UNCTAD's related work and collaboration with a broad range of stakeholders. It will:

(a) provide context and background, including why and how policies and legislation can facilitate and support effective risk-assessment and adaptation action on the ground;

(b) highlight key international policy and legal instruments that are of particular relevance; and

(c) detail important recent developments at the EU level, which are of direct relevance for the 27 European Union Member States that collectively account for around half of the 56 ECE member countries, and may serve as a useful example of good practice for consideration by other countries in the region.

If considered appropriate, the chapter could also include brief information (e.g. text boxes) prepared/compiled by members of the EG on any specific targeted policies and legislation at national levels.

III. Methodologies for assessing climate change hazards on transport systems:

In section one, it will describe the various circumstances that an assessment will be needed, framed by international best practice as set out in various subsectors – PIANC, PIARC, IRF, UIC for example and ISO 14090.

Section two will focus on impact assessment methods. It will compare and contrast various ways to assess risks, from hazard x vulnerability x exposure to likelihood and consequence and threshold analyses; it will make reference to IPCC also with how capacity can alter risk profile.

Section three will describe infrastructure asset classes as typical in ports, waterways, roads and railways with [possibly presented as a table or series of graphics] a list of assets, systems and typical vulnerabilities caused by xx hazards. A box on critical infrastructure could be a good way of illustrating how to decide on priorities.

Section four will focus on methodologies. It will set out, perhaps in tabular or graphical form (and with signposting), the tools as are known and an indication of where they are suitable:

- *Stress tests*
- *Rapid Adaptation Pathway Analysis*

- *Vulnerability Assessment*
- *Risk Assessment*
- *Criticality Assessment*
- *Threshold Analysis*
- *Etc.*

Finally, section five will provide information on systemic thoughts. It will bring in other areas of best practice – an assessment of hazards, for example, can lead to adaptation action. But many activities are necessary for action to happen – leadership and governance are important, as is resourcing – human and financial. Pointers towards practice in these and other areas will be given. Some words on Policies/ Strategies/ Plans as set out in ISO55000 on Asset Management can be useful.

IV. Effective adaptation of transport systems to climate change hazards

This chapter in section one will discuss categories/types of measures for adapting transport to climate change. These measures will follow the recommendations of IPCC AR5 Table 14- 1:[1]

Structural/physical:

- *Engineered: retrofitting or design (strengthening/raising/etc.); asset or operation relocation; flood and erosion protection; drainage capacity; shelters/storage facilities; maintenance activities; materials or equipment selection; energy; water supply and treatment…*
- *Technological: early warning systems; hazard mapping; real time monitoring and forecasting systems; SMART management systems; water management technologies; insulation and cooling technologies…*
- *Nature-based: green and blue infrastructure; nature-based solutions (e.g. for flood protection); water management; land-use*

Social:

- *Operational: risk assessment; working practices; operational protocols; asset inspection; safe routes/diversions; scheduling; guidelines*
- *Behavioural: record keeping; information sharing protocols; technology transfer; emergency response procedures and drills*
- *-Education: awareness raising; engagement; training; toolbox talks; ownership of solutions*
- *Institutional:*
    - *Economic: contingency or disaster response funds; demonstrated resilience incentives; investment pre-conditions for new infrastructure; financial penalties; insurance requirements; grants and loans*
    - Legal: health and safety requirements; standards and codes of practice; non-compliance enforcement and penalties; legal protection for vulnerable habitats with risk reduction role

[1] in Noble, I.R., S. Huq, Y.A. Anokhin, J. Carmin, D. Goudou, F.P. Lansigan, B. Osman-Elasha, and A. Villamizar, 2014: Adaptation needs and options. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 833-868

- Policy: local/regional/international strategic adaptation planning; zoning according to risk; set back or relocation policies; build-back-better (or out-of-harm's-way); diversification

This section will also address the interdependencies and synergies between disaster risk reduction/early warning and climate adaptation.

In section two, it will provide guiding principles for dealing with uncertainty and avoiding maladaptation as well as consequences of inaction. It will stress the importance of the adaption planning horizon (the longer the design or operational life, the greater need for flexible and adaptive solutions that can be modified as conditions change). It will also explain the importance of redundancy/adaptive capacity; design for managed (rather than catastrophic) failure, inclusion of sacrificial components.

In section three, it will focus on adaptation pathways. It will introduce the context, describe the role of low-hanging fruit, quick wins, win-wins, no or low regret solutions and other temporary/short-term/interim measures to 'buy time', It will also discuss the need to consider transformational as well as incremental solutions. In there, the guidance on adaptation pathways in transport will be referred to.

Section four will explain the role of monitoring to timely inform the decision-making. It will focus on:

(a) local trends and rates of changes,

(b) residual life and condition of asset, and

(c) additional costs incurred e.g. increased maintenance, extreme events (to understand costs of inaction).

Finally, section five will describe the importance of choosing suitable evaluation methods (CBA vs. MCA; influence of discount rates). It will stress the importance of understanding the consequences of inaction in making the economic case for investment in adaptation and resilience. It will provide a figure with evaluation methods and provide signposting to methodologies developed in countries/partner organisations.

V. Lessons learned and recommendations:

This chapter will present the lessons learned and recommendations by GE.3.

Part 2 – Case studies

I. Application of methodologies for assessing climate change hazards on transport systems

This chapter will contain a few case studies from countries/partner organizations showcasing the application of some of the methodologies.

II. Application of adaptation measures

This chapter will present case studies from countries/partner organizations on the application of concrete adaptation measures at specific assets.