

Distr.: General
25 September 2024

English only

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-seventh session

Geneva, 1 and 2 October 2024

Item 2 of the provisional agenda

Initiatives in climate change impact assessment and adaptation for inland transport

Draft chapter II - Policies and legislation for acting on adaptation of climate change in transport*

Submitted by UNCTAD

I. Introduction

1. This chapter focuses on the important role of policies and legislation in reducing vulnerability and, ultimately, climate risk for critical transport infrastructure assets¹, including seaports, which facilitate over 80 per cent of global trade in goods and are key nodes in the network of global supply chains. Climate-driven Infrastructure damage, operational disruption and delay affecting seaports and other critical transport infrastructure can have cascading effects throughout supply-chains (Izaguirre et al 2020; Izaguirre et al. 2021; Verschuur et al. 2023a; Verschuur et al. 2023b) with repercussions for the trade and sustainable development prospects of the most vulnerable (Asariotis, 2021; UNCTAD, 2022). Following section II offering some background and context, sections III and IV provide an analytical overview of relevant policy and legal instruments at the international and regional level, including in particular some important recent developments at the EU level. Section V highlights some of the important implications and considerations arising from climate change impacts on transport infrastructure and operations for commercial contracts used for the international carriage and sale of goods. *[Additional information about national policies and legislation in the ECE region is set out in section VI].*

* Draft contribution by UNCTAD, Technical Report (Part 1), UNECE EG on Assessment of Climate Change Impacts and Adaptation for Inland Transport.

1 With the risk of climate impacts being a function of hazard, exposure and vulnerability (IPCC, 2014), exposure to growing hazards will result in increasing risks, unless effective action is taken to reduce vulnerability (i.e. enhance the capacity to respond).

II. The critical role of policy and legal frameworks - context and background

2. Supportive policy and legal frameworks have a particularly critical role to play in advancing and facilitating climate change adaptation and resilience-building on the ground, thus reducing vulnerability (UNCTAD 2020a; Asariotis et al, 2024). *Policies, strategies and plans* define and formulate ambition, objectives and commitments, while legal instruments establish legally binding obligations and are powerful – and vital – tools for the implementation of agreed policy objectives. *Legal instruments* include national laws, as well as international (and in few cases regional) conventions and agreements that require a certain number of ratifications for their entry into force and are legally binding on all States that have ratified or acceded. In addition, at the EU level, there are legal instruments which are binding as a matter of supra-national law for each of the 27 EU Member States and are enforceable in the national courts, subject to the overall oversight and jurisdiction of the European Court of Justice and enforcement actions, including by the European Commission (EU 2020, Arts. 288, 258-260). The supra-national nature of EU law, effective in a large number of States (27) and the importance of the EU as a major global trading partner and donor make relevant legal instruments both particularly efficient and coherent tools for the achievement of agreed policy commitments at the EU level and of considerable interest – both from a global perspective and from the perspective of transport in the broader UNECE region.

3. Both policies and legislation can provide economic incentives to support adaptation, resilience-building and Disaster Risk Reduction (DRR) efforts, promote cooperation and transfer of relevant ‘hard’ and ‘soft’ technologies, and contribute to the collection, availability and accessibility of accurate (and indispensable) climate data at different spatio-temporal scales. They are also key in ensuring accountability, public participation and non-discrimination in related decision-making processes. *Legal instruments* and requirements in particular can help create a level playing field and promote as well as facilitate and galvanize action to reduce exposure and vulnerability to climate hazards; they can assist in both the prevention, mitigation and recovery from extreme events (i.e., support DRR) as well as help mitigate the impacts of slow-onset events (Asariotis et al. 2024). To be fit for purpose and avoid maladaptation, both policies and laws need to take into account the latest available scientific information and facilitate risk-informed decision making under uncertainty.

III. Key international policy and legal instruments that are of particular relevance

4. Reflecting a growing recognition of the need for effective climate change adaptation measures, the policy and legal framework at international, regional and national levels has been strengthened over recent years, with climate change adaptation increasingly being integrated into policy and planning instruments, as well as into some legal instruments (see also UNCTAD 2020a; UNFCCC 2023; Velegrakis et. al. 2021). While a review of relevant national level policy and legal instruments across jurisdictions is not possible here, examples include the **UK Climate Change Act 2008** (UK 2008) which, among others, provides the basis for reporting by infrastructure operators and public bodies on the current and future predicted effects of climate change on their organisation, as well as on their proposals for adapting to climate change and related progress (Article 62);² and the recent German Federal Climate Adaptation Law (**Bundes-Klimaanpassungsgesetz**, (KAnG 2023) which, among others, envisages the development of a cross-sectoral federal climate change adaptation strategy, periodic climate-risk analysis/assessment and integration of related considerations by public bodies (and private entities entrusted with public functions) into their planning and decision-making processes across disciplines and policy domains (*for further information about national policy and legal instruments in the ECE region, see Section VI, below*).

² Recent related adaptation reports, see <https://www.gov.uk/government/collections/climate-change-adaptation-reporting-third-round-reports#harbour-authorities>.

5. At the international level, key strategies, policies and plans include the **2030 Agenda for Sustainable Development** (United Nations 2015a) consisting of 17 goals and 169 targets which are “*integrated and indivisible, global in nature and universally applicable*”, including several that are of particular relevance in the present context (e.g. 1.5, 9, 13; see UNCTAD 2020b); and the **Sendai Framework for Disaster Risk Reduction 2015 – 2030 (SFDRR)** (United Nations 2015b), the global policy framework stipulating seven global targets and priority areas and adopting a multi-hazard and systems approach for understanding disaster risk in all its dimensions, strengthening disaster risk governance and management, investing in disaster risk reduction for resilience, and enhancing disaster preparedness for effective response and to “*build back better*”.

6. Relevant international legal instruments³ include the **1992 United Nations Framework Convention on Climate Change (UNFCCC)** (United Nations 1992), which is in force for 198 Contracting Parties and provides the overarching legal framework for climate change action at the international level;⁴ and the **2015 Paris Agreement** (United Nations 2015c), in which its 195 Contracting Parties establish “*the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change*”, and commit to related action and cooperation, as well as regular reporting and assessment processes (Article 7). The Paris Agreement also envisages wide-ranging cooperation among Contracting Parties, with the aim of averting, minimizing and addressing loss and damage, including under the dedicated Warsaw International Mechanism (Art. 8; see also UNFCCC 2020). Also worth noting in this context is the **1998 Aarhus Convention** on access to information, public participation in decision-making and access to justice in environmental matters (UNECE 1998), in which its 47 State Parties undertake to guarantee relevant rights in accordance with detailed provisions set out in the Convention.

7. At regional levels, relevant policy instruments include the **Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas** (UN Environment/MAP 2017) endorsed by the Contracting Parties of the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean; and the **OECS Climate Change Adaptation Strategy and Action Plan (CCASAP) 2021-2026** (OECS 2021), endorsed by the OECS Council of Ministers in 2021 (D’Auvergne 2022), both of which reflect important policy commitments and strategies to building resilience to and reducing disasters from climatic hazards (including e.g., coastal flooding due to extreme events).

8. Relevant policies and legislation at the EU level are of particular interest and deserve special consideration, as they are of direct relevance for the 27 EU Member States that collectively account for around half of the 56 UNECE member countries. There have been a number of important developments over the past few years, which are further detailed in the following Section.

IV. Important recent developments at the EU level

9. At the EU level, of particular relevance in terms of policies, plans and mechanisms, are the comprehensive **2021 EU Climate Change Adaptation Strategy** (EU 2021a), which cuts across sectors and policy domains and aims to ensure a climate-resilient EU by 2050, “*fully adapted to the unavoidable impacts of climate change*”; the **EU Action Plan on SFDRR 2015–2030** (EU 2016), which envisages a range of specific actions and measures across policy areas to implement the targets and objectives of the SFDRR; as well as the

3 Authoritative information on the status of ratification of international legal instruments referred to in the text is available at <https://treaties.un.org>.

4 The Parties commit among others to: establish, implement and update national/regional programmes containing measures to facilitate adequate adaptation to climate change; cooperate in preparing for climate change adaptation; employ impact assessments; and promote and cooperate in scientific research, systematic observation and data archives related to the climate system (Art. 4(1) (b),(c),(f) and (g)).

Union Civil Protection Mechanism, the main operational EU mechanism for disaster risk reduction, response and recovery, which has recently been strengthened (EU 2021b).⁵

10. Moreover, there are various EU legal instruments which explicitly, or implicitly, address issues of relevance to adaptation, resilience-building and DRR for ports and other critical transport infrastructure and are applicable as a matter of supra-national law in all 27 EU Member States. This includes several *Directives* – which are binding across the EU as to the results to be achieved but need to be transposed into national legislation within a certain number of years, as well as some *Regulations*, which are directly applicable and effective in each EU Member States as from the date of their entry into force (see EU, 2020, Art. 288).

11. The **Floods Directive** (EU 2007a) imposes a general duty on EU Member States to assess and map the coastal flood risk, affected areas, assets and humans at risk and take adequate/coordinated measures to manage and reduce the flood risk. EU Member States are required to carry out preliminary flood risk assessments, prepare comprehensive flood hazard and risk maps (FHRMs) and establish flood risk management plans (FRMPs), as well as review and update these in recurring implementation cycles taking into account, among others, “*the likely impact of climate change on the occurrence of floods*”.⁶

12. The amended **EIA Directive** (EU 2014b) envisages that for all (public and private) projects falling within its scope, including ports and other transport infrastructure, Environmental Impact Assessments (EIAs) are carried out, taking into account, among others, the risks and vulnerabilities associated with climate change (see Art. 1(a); Annex II 8.b; Annex II 10.e; Annex III 1(f)). Relevant EIAs need to “*identify, describe and assess*” direct and indirect significant effects of the project, including those deriving from the vulnerability of the project to the risk of major accidents, and/or natural disasters, (such as flooding, sea level rise, or earthquakes), on populations, human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape, and their interactions (Art. 3; see also preamble, para. 13 and 15).

13. Seaport and shipping operations can influence (and be influenced by) the offshore marine environment and, thus, EU Directives with an offshore geographical scope (1 nm from the coast) may also be worth noting. The **Maritime Spatial Planning Directive** (EU 2014a) requires Member States, among others, to contribute through their maritime spatial planning to the sustainable development of maritime transport, “*including resilience to climate change impacts*” (Art 5.2).

14. Other Directives are relevant in terms of access to and the coherence of the information and data that is essential for effective climate-risk assessment and management: **Directive 2003/4/EC** (EU 2003), which implements the 1998 Aarhus Convention (UNECE 1998) within the EU as a matter of supra-national law, and seeks to guarantee rights of access to environmental information held by (and for) public authorities, as well as to public participation in decision-making and access to justice; and the **INSPIRE Directive** (EU 2007b), last amended in 2019, which aims to establish compatible and usable spatial data infrastructures in a EU-wide and transboundary context.

15. In addition, a number of very recent legislative developments at the EU level are of special relevance to climate change adaptation for transport infrastructure and therefore deserve highlighting. Of major importance is the adoption, in June 2021, of a new Regulation on a **European Climate Law** (EU 2021c) which envisages strong action on climate change adaptation and resilience-building (Art. 5), as well as related stocktaking, assessment and

⁵ See also COM Recommendation (8.2.2023, 2023/C 56/01) on ‘European Union Disaster Resilience Goals’, which has a flood relevant specific goal: Annex, Union disaster resilience goal No. 4: Respond - Enhancing the Union Civil Protection Mechanism’s response capacity, specific objective 4.2 ‘In the area of flood response’. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023H0215%2801%29&qid=1676531610023>.

⁶ Articles 4 (2); 14 (4); 16. Preliminary flood risk assessments were to be reviewed and updated by 22 December 2018; FRMPs, by 22 December 2021, taking into account the likely impact of climate change on the occurrence of floods. Further review and update is required every six years.

review, every five years, starting in 2023 (see Arts. 6 and 7).⁷ Among others, the Regulation requires EU institutions and Member States to “ensure continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change in accordance with Article 7 of the Paris Agreement” (Art. 5(1)), thereby making relevant action a legal requirement, for the first time, in an important effort to facilitate coherence across policy and legal frameworks. The Regulation, which entered into force on 29 July 2021 for all 27 EU Member States is expected to have clear and important benefits for efforts at climate-resilience building and adaptation in EU coastal zones, including in respects of ports and other transport infrastructure. It introduces a number of legally binding obligations and, unlike a Directive, is directly applicable and effective at national levels, without the need for the time-consuming development of potentially divergent national implementing legislation (EU, 2020, Art. 288).

16. Art. 5(5) of the European Climate Law also mandates the European Commission to adopt “guidelines setting out common principles and practices for the identification, classification and prudential management of material physical climate risks when planning, developing, executing and monitoring projects and programmes for projects”. Relevant “Technical guidance on the climate proofing of infrastructure in the period 2021-2027” has since been published (EU 2021d). Compliance with its detailed parameters, including climate-risk assessment and adaptation is, among others, required as part of environmental impact assessments under the EIA Directive (EU 2014b), for strategic environmental assessments under the SEA Directive (EU 2001) and for EU (internal and external) infrastructure project funding, making risk and vulnerability assessments and development of adaptation options an integral part of project planning, development and financing. Of considerable practical significance is that in contrast to other technical guidelines and standards, this technical guidance has normative effect: its application is not entirely voluntary but will be required, for environmental impact assessments and the ‘climate proofing’ of new infrastructure envisaged under EU law, as well as for all EU funded infrastructure projects (including EU-external).

17. In a major recent development, “climate proofing” of new transport infrastructure is also envisaged under **Regulation (EU) 2024/1679** (EU 2024) revising the EU TEN-T guidelines (EU 2013) for the development of the trans-European transport network (TEN-T), of which ports and other transport infrastructure assets are vital components. More specifically, paras. 1 and 2 of Art. 46 of the Regulation, which deals with “Resilience of infrastructure”, provide as follows:

“1. When projects of common interest are planned and implemented, Member States shall make all appropriate efforts to improve the security and resilience of the infrastructure to climate change, natural hazards, hybrid threats, human-made disasters, accidents, and operational interruptions, as well as intentional disruptions affecting the functioning of the Union transport system. In particular, consideration shall be given to: (a) interdependencies, linkages and cascading effects with other networks such as telecommunication and electricity network; (b) safety, security and performance in the presence of multiple hazards; (c) structural infrastructure quality during its whole lifecycle, with particular attention to the environmental conditions and the future projected climate conditions; (d) civil protection needs to react to disruptions, including those for the transport of dangerous goods; and (e) cyber-security and resilience of infrastructure, with particular attention to cross-border infrastructure.

2. Projects of common interest for which an environmental impact assessment must be carried out in compliance with Directive 2011/92/EU shall be subject to climate proofing. The climate proofing shall be undertaken taking into account the latest available best practice and guidance to ensure that transport infrastructures are

⁷ Where collective progress on adaptation is found to be insufficient or Union measures inconsistent with ensuring progress, the Commission shall ‘take the necessary measures in accordance with the Treaties’ (Art. 6). Where the Commission finds that a Member State’s measures are inconsistent with ensuring progress on adaptation, it may issue recommendations to that Member State, and if so, make these publicly available (Art. 7)

resilient to the adverse impacts of climate change, through a climate vulnerability and risk assessment, including through relevant adaptation measures, and through integration of the costs of greenhouse gas emissions in the cost-benefit analysis. Without prejudice to other Union legal acts, such requirement does not apply to projects for which the procurement process of the environmental impact assessment has been initiated by 18 July 2024.”

18. Thus, while no express reference is made to the European Commission’s “*Technical guidance on the climate proofing of infrastructure in the period 2021-2027*” issued in 2021, climate-proofing of new TEN-T infrastructure, “*taking into account the latest available best practice and guidance*” is now a legal requirement, “*to ensure that transport infrastructures are resilient to the adverse impacts of climate change, through a climate vulnerability and risk assessment, including through relevant adaptation measures*”. In addition, by 19 July 2026, the Regulation mandates the Commission, in collaboration with Member States, to carry out “*an assessment of the resilience and vulnerability of the core network to the consequences of climate change on the basis of which it may elaborate and make publicly available best practices on possible adaptation measures to ensure the resilience of the network*” (Art. 46(3)).

19. The Regulation, which entered into force on 18 July 2024 and is directly effective and applicable in all EU Member States as from this date, may be expected to significantly strengthen implementation of climate and disaster-risk resilience considerations, in line with the objectives and requirements of the EU Adaptation Strategy, European Climate Law and international agreements, notably the 2015 SFDRR and Paris Agreement.

20. Other relevant recent EU legislation includes a **Directive on Resilience of Critical Entities** (EU 2022b; repealing the European Critical Infrastructure Directive 2008), which entered into force on 16 January 2023, and aims to ensure the resilience of public and private “*critical entities*” across sectors, including transport, against a broad range of risks that could lead to disruptions. By specified dates in 2026, Member States will need to identify the critical entities that provide essential services, develop a national strategy to enhance the resilience of critical entities and carry out a risk assessment (thereafter at least every four years).⁸ Critical entities will need to identify risks that may significantly disrupt the provision of essential services, take appropriate measures necessary to ensure their resilience, “*including measures necessary to prevent incidents from occurring, duly considering disaster risk reduction and climate adaptation measures*” and notify disruptive incidents to the competent authorities (Art. 13(1)). The Directive needs to be transposed into the legislation of each EU Member State by 17 October 2024.

21. The introduction of further legal requirements at EU level and at national levels, along similar lines may be likely, in the light of Art. 5(4) of the European Climate Law, which requires Member States to “*adopt and implement national adaptation strategies and plans taking into account the [EU Adaptation Strategy], and based on robust climate change and vulnerability analyses, progress assessments and indicators, and guided by the best available and most recent scientific evidence*”.

22. The net-upshot of the abovementioned developments is that the policy and legal framework supporting – and requiring climate-risk assessment and adaptation – for ports and other critical transport infrastructure in the 27 EU Member States and for EU funded infrastructure projects in third countries has been strengthened significantly. Its success will depend on effective implementation, compliance and enforcement, as well as on the availability of finance, capacity-building and training for stakeholders, whose active collaboration will be vital. For purposes of climate-risk assessments and the development of adaptation options in line with legal requirements, there is also likely to be a growing need and demand for further scientific and technological research, high quality information and

⁸ Articles 4-6. See also a Commission Delegated Regulation (EU, 2023) which entered into force in November 2023, establishing a non-exhaustive list of essential services in the 11 sectors covered by the Directive, including ports in the ‘transport sector/water subsector’ (Art 2. (2)(c)(ii)). This is to be used by competent authorities to carry out risk assessments by 17 January 2026 and to then identify the critical entities, by 17 July 2026.

data, as well as for standards (e.g. ISO 2019; ISO 2021) and industry-specific technical guidance (e.g. PIANC 2020; PIANC 2022; PIANC 2024).

23. The development of effective policy and legal instruments for the climate resilience of critical transport infrastructure is an area that merits further analysis and research. However, the EU's approach of aiming for coherence among policy and legal instruments as well as technical guidance to ensure the climate-proofing of ports and other critical infrastructure assets may serve as a useful example and could provide an important impetus for other countries considering how best to move forward.

V. Implications of climate change impacts on transport infrastructure and operations for commercial transport contracts and law

24. In line with recent trends and projections, extreme weather events are likely to increase under climate change in frequency and/or severity (IPCC 2023; IPCC 2019; IPCC 2018; WMO 2023; Mora et al 2017); other hazards too, such as sea-level rise, changes in wave energy and direction, long-waves and swell, as well as fog, and changes to estuarine water level in cases of flash floods and droughts can pose particular increased risks for ports, inland waterways and coastal transport infrastructure - and for the safety of operations (Izaguirre et al. 2020; Izaguirre et al. 2021; Asariotis, et al. 2024; Monioudi et al. 2018; Vousdoukas et al. 2018). Hazards and impacts affect different modes of transport in different ways (UNECE 2014; UNECE 2020; Koks et al., 2019; Liu et al. 2023). In many cases, associated damage, operational disruptions and delay will have implications for transport and trade throughout the closely interconnected global network of supply chains, and for the performance of related contractual obligations and associated liabilities, as well as for insurance (e.g. coverage and premiums, risk disclosure obligations).

25. In the case of maritime transport, increasing climate and weather-related risks and impacts may lead to greater incidence of cargo loss/damage, heightened risks for the carriage of deck cargo, and pose particular challenges for the safety of berthing, loading and discharge operations; as well as increase the risks of delays and disruptions, maritime accidents, environmental pollution, groundings and bunker oil spills – in all cases with potential implications for contractual obligations, liability and compensation and related disputes (see further Asariotis 2023; UNCTAD 2024).

26. Climate change impacts may also give rise to major commercial risks which need to be borne by commercial parties. Relevant risks are not new in nature, but matter more, if they are likely to materialize to a greater extent or more frequently. With climate and weather-related risks growing, the established commercial risk-allocation as between the parties under a range of contracts that work in tandem - including carriage of goods by sea under charterparties or bills of lading and international sale of goods on shipment terms - may no longer be appropriate and/or need to be adjusted. To minimize losses and help inform the development of contractual approaches to risk allocation, it will be important to ensure a better understanding among all contracting parties—as well as insurers and banks facilitating transactions by way of letter of credit—of both the specific risks associated with weather- and climate-related impacts on transport infrastructure/operations and the related contractual implications. This requires further research, training and capacity-building, in particular for small traders/entities – especially in developing countries.

27. To mitigate their exposure to potentially extensive commercial losses arising from climate and weather-related damage, delay and disruption, and avoid lengthy and costly disputes and litigation, commercial parties are urgently advised to review and adjust their contracts. As appropriate, they should consider the inclusion of carefully worded specialist clauses that accommodate future risks and provide for a suitably balanced commercial risk allocation in the light of changing circumstances. Industry organizations can play an important role in this context, by developing suitable standard form clauses for incorporation into commercial contracts; this process should involve all affected stakeholders, so that their respective legitimate interests are appropriately reflected (UNCTAD 2024).

28. In this context, some of the insights gained from understanding the commercial law implications of disruptions caused by the pandemic and the response measures it triggered can offer valuable lessons. Relevant considerations, reflected in analytical reports and training materials developed by UNCTAD⁹ can be useful when developing appropriate contractual risk allocation clauses (UNCTAD 2023).

29. More fundamentally, in the light of long infrastructure planning horizons and lifespans, worsening climate projections, as well as the cost of inaction, timely and effective adaptation action for key transport infrastructure assets must be an urgent priority for governments, as well as for public and private entities with a stake in international transport and trade. In this context, targeted adaptation finance, capacity-building, as well as effective policy action can play an important role in promoting and ensuring the climate-resilience of transport infrastructure and systems and reduce as well as mitigate related risks for operations and associated losses (UNCTAD 2020b; UNCTAD 2022).

⁹ See <https://unttc.org/stream/key-international-commercial-law-implications>.

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