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Climate change and transport: Impacts of climate change on international transport networks and adaptation requirements

Impacts of climate change on international transport networks and adaptation requirements

Note by the secretariat

Summary

The note provides the Inland Transport Committee with a brief review of issues of climate change impacts and adaptation on international transport networks. It also highlights the importance of adaptation action in reducing the vulnerabilities and increasing the resilience of transport systems to climatic impacts. Moreover, it provides information regarding the main objectives and the program of work that the expert group has achieved throughout the whole period of its work.

I. The mandate

1. At its seventy-second session in February 2010, the United Nations Economic Commission for Europe (UNECE) Inland Transport Committee invited its subsidiary bodies to incorporate global warming and transport in their agendas (ECE/TRANS/208, para. 94). In September 2010, UNECE and the United Nations Conference on Trade and Development (UNCTAD), drawing on their respective mandates and experience, jointly organized a workshop on “Climate Change Impacts on International Transport Networks”, held under the auspices of the Working Party on Transport Trends and Economics (WP.5). The workshop raised awareness about the important challenges that climate change impacts and adaptation requirements present for international transport networks. It also demonstrated the urgent need to prepare appropriate policy actions, as well as the need to exchange information about best practices and concluded that there is considerable merit in establishing a new expert group to study the matter.

2. At its seventy-third session, March 2011, the Inland Transport Committee, noting the results of the joint UNECE-UNCTAD workshop, agreed to establish a Group of Experts on climate change impacts and adaptation for international transport networks and to adopt its terms of reference. At its forty-first meeting, the UNECE Executive Committee (EXCOM) approved the establishment of such an expert group. The Group of Experts, functioning under the supervision of WP.5, is expected to complete its work and submit a final report within two years (May 2013).

II. Introduction and background

3. The work of the UNECE on climate change was mainly focused on the mitigation of environmentally harmful effects of inland transport. In particular, activities of the UNECE have targeted the reduction of emissions of gaseous pollutants and greenhouse gases in the road transport sector through more stringent emission requirements for new vehicles elaborated by the World Forum for Harmonization of Vehicle Regulations (WP.29). The World Forum’s Round Table on Climate Change and Transport in June 2010 identified potential scenarios from which WP.29 would develop its future work.

4. In 2009 the UNECE Transport Division initiated a new project called ForFITS (For Future Inland Transport Systems) to study the impact of inland transport on climate change and called the UN Development Account (UNDA) for funds to build up this project together with all UN Regional Commissions. The funds for this 3 years project have been released in January 2011 and the work activities are in progress. The implementation of this project will be concluded in December 2013.

5. The main objective of the project is to enhance international cooperation and planning towards sustainable transport policies through the development and use of a standard monitoring and assessment tool for CO₂ emissions in inland transport including a transport policy converter. This first activity within this project is to develop an information and analysis tool based on a uniform methodology for the evaluation of the emissions of carbon dioxide (CO₂) in the inland transport sector (road, rail and waterways except national and international aviation and maritime transport), taking into account climate-relevant indicators, new transportation trends and the implementation of regional, national or local policy measures. CO₂ emissions caused by international aviation and maritime transport are excluded from this project.

6. UNECE took coordinated steps to address climate change adaptation in the field of transport. The term adaptation refers to the ability of a system to adjust to climate change

(including climate variability and extremes) to moderate potential damage, to take advantage of opportunities, or to cope with the consequences. Adaptation responses have not been given, generally, as much priority as mitigation. It is however imperative that policy makers and stakeholders focus on this aspect of addressing the climate change challenge. A clear understanding of climate change potential impacts, risks and vulnerabilities are a pre-requisite for well designed, resilient systems and structures. Poor health of populations, lack of infrastructure, weakly diversified economies, missing institutions and soft governance structures expose poorer countries and communities not just to potentially catastrophic large-scale disasters but also to a more permanent state of economic stress from higher average temperatures, reduced water sources, more frequent flooding and intensified windstorms.

7. Developing effective adaptation strategies for climate change impacts on transport requires both policy action and collaborative research. Well targeted vulnerability studies, empirical studies and assessment of projected risks and related costs are a first step toward bridging the current knowledge gaps and identifying priority areas.

8. Adaptation action aims at reducing vulnerabilities and increases the resilience of transport systems to climatic impacts. Resilience refers to the ability of a system to withstand negative impacts without losing its basic functions. In the transport context, it is not only about physical strength and durability of a structure, but more importantly, it defines the ability of a system to recover from an incident quickly and at minimal cost. This means, in other words, that materials have to be cost-effective and easy to find, replace or repair. It follows that climate change impacts on infrastructure ought to be a key consideration in transport planning, design and construction, as well as in broader economic and development policies.

III. The Work of the Expert Group

9. The Group of Experts is expected to complete its work within 2013 and to submit a full report of its accomplishments. This will include policy-oriented recommendations that aim to improve the long-term sustainability of transport with an emphasis on international connections and set best examples of national policies, address the issues of transport networks vulnerability amongst member Governments; including developing and landlocked countries, as well as small island States.

10. More specifically the work of the expert group focused on the following:

(a) Identify potential climatic impacts on transport infrastructure, including ports and their hinterland connections, as well as on transport services and networks across the broader supply-chain, including their type, range and distribution across different regions and transport modes;

(b) Prepare, in a coordinated manner, recommendations or proposals to member Governments, with a view to improving the adaptability of transport networks to climate change in areas such as: infrastructure, risk-assessment methodology, evaluation of adaptive measures, risk management, training tools, and cross-border information sharing by national transport authorities;

(c) Identify existing best practices in national policies and risk management as well as formulation of relevant strategies to enhance the resilience of transport networks, through changes in infrastructure design and operation planning and management, taking into account specific risks and vulnerabilities.

(d) Take stock of the available data and analysis of climate change impacts on transport networks in the ECE region and beyond;

(e) Collect information on all relevant planning, management, organizational and other initiatives for adaptation of transport networks to climate change;

11. Following the approval of the establishment of the Expert Group by EXCOM in May 2011, the group during 2012 met three times, in April, October and December, respectively. The group attracted the attention of 22 governments, governmental and non governmental organizations, such as the European Commission, World Meteorological Organization, the Eurasian Economic Community, the International Union of Railways, the International Road Transport Union, the International Road Federation and academia. Through the allocation of some modest funding, the secretariat has been able to ensure the services of a consultant in support of the work of the group.

12. Under the chairmanship of Mr Jerzy KLENIEWSKI (POL) and Mr. André LEUXE (FR) as vice-chair the group addressed the following topics:

(a) developed the structure of final report,

(b) developed with the help of the external consultant the scientific questionnaire for the collection of information needed,

(c) collected the replies to the questionnaire from 28 countries, 2 universities, 3 international organizations, 3 rail organizations and 1 port and analyzed them with the help of the external consultant;

(d) delivered by the external consultant the first final draft of the report.

(e) organized an international prestigious conference on “Adaptation of Transport Networks to Climate Change” in Alexandroupolis, Greece on 25-26 June 2012. The Conference was kindly hosted by the Evros Chamber of Commerce and Industry and the Hellenic Chambers Transport Association, with the support of the Hellenic Ministry of Infrastructure, Transport and Networks and the Hellenic Ministry of Environment, Energy and Climate Change. The conference raised awareness on the subject and contributed to the work of the group.

13. Recognizing that climate change impacts and adaptation on transport networks is a global issue, as well as the unique character of the work of this group and the importance of the issues at stake, the group requested the secretariat to invite other UN regional commissions and UN agencies including UNCTAD, and WMO as well as the EC to contribute to its work.

14. The last forecasted meeting of the group will take place in March 2013 where the experts will provide final comments – amendments – observations and will endorse the final report of the group.

IV. The international conference on “Adaptation of Transport Networks to Climate Change”

15. The international conference on “Climate Change Adaptation for International Transport Networks”, kindly hosted by the Evros Chamber of Commerce and Industry and the Hellenic Chambers Transport Association, with the support of the Hellenic Ministry of Infrastructure, Transport and Networks and the Hellenic Ministry of Environment, Energy and Climate Change, was held in Alexandroupolis on 25-26 June 2012.

16. The Conference was opened on behalf of the Greek Ministry of Development, Infrastructure, Transport and Networks by Mr. Nikolaos Malakatas, Director of Design and Studies of Road Works at the General Secretariat for Public Works and Mrs Eva Molnar,

Director of Transport Division, UNECE. Mr. Christodoulos Topsidis, President of the Evros Chamber of Commerce and Industry, the leader of the Council of the Department of Eastern Macedonia and Thrace Mr Aris Giannakidis, as well as the Mayor of Alexandroupolis Mr Vaggelis Lambakis welcomed the participants. Finally, Prof. Dimitrios Tsamboulas delivered a welcome address on behalf of the Greek Minister of Development, Infrastructure, Transport and Networks, Mr. Kostis Chatzidakis.

17. The Conference was fully supported by the Inland Transport Committee of UNECE where it was represented by its chairman Mr. Jerzy Kleniewski.

18. The Conference was attended by 70 participants from the public and private sectors from Greece and other European and non-European countries, including delegations from the Ministries of Transport and Public Works of France, Kazakhstan, the Netherlands, Poland, Saudi Arabia, Spain and Ukraine. Among the Conference participants were also representatives from the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the Community of European Railway and Infrastructure Companies (CER) AISBL, the Alexandroupolis Port Authority S.A., the Attica Tollway Operations Authority, the Attikes Diadromes SA, the Hellenic Institute of Transportation Engineers, Hellenic Institute of Transport of the Centre for Research and Technology Hellas (CERTH-HIT), the French Railway Company (SNCF), the East Japan Railway Company, the Forum of European National Highway Research Laboratories (FEHRL), the ICF INTERNATIONAL, the Mauritius Port Authority, the National Technical University of Athens, the Stanford University, the Hong Kong Polytechnic University, the University of the Aegean, the Via Donau – Österreichische Wasserstraßen Gesellschaft mbH, the Hellenic Chambers of Commerce and Industry, together with representatives of the local authorities and the business community. The representatives from mass media at national and local levels followed the sessions and participated in the Press Conference.

19. Climate change may be one of the greatest threats the planet is facing. There is now conclusive scientific evidence to substantiate claims that climate change presents serious global risks for water resources, food security, biodiversity, human settlement and development, health, living conditions, and international peace and security. It has been also recognized that climate change presents a significant and indeed imminent challenge for both freight and passenger transport. Climate change, therefore, demands an urgent global and coordinated response on multiple levels.

20. Rising sea levels, increased frequency/intensity of extreme storm waves and surges, droughts, increased temperatures and heat waves, cooler winters, extreme precipitation events and river floods, as well as the melting of permafrost pose serious threats to both coastal and inland transport infrastructure and services. Road pavements surfaces and other infrastructure, rail and airport infrastructure and operations, vehicles design and driving conditions, the inland waterway infrastructure and operations, the seaport and inland port infrastructure and operations are all likely to be impacted by climate change to a varying degree.

21. The distinguished speakers and participants in the Conference from UNECE and UNESCAP, Member States, intergovernmental and non-governmental organizations, as well as the transport industry, research and academia discussed issues related to risks, exposure and vulnerabilities of the international transport networks and related adaptation measures. They all agreed that given the magnitude of the challenge, it is imperative that climate change impacts and related adaptation requirements be considered as a matter of

priority, along with other transport-related initiatives aimed at mitigating global warming and in respect of which UNECE work is well advanced.

22. The exact definition of the term “adaptation” in particular was amongst the issues debated by the participants, who agreed that adaptation refers to “the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damage, to take advantage of opportunities, or to cope with the consequences”. As a result, adaptation action aims at reducing vulnerabilities and increase resilience of transport systems.

23. Several experts from various countries shared their experience concerning sector-specific adaptation measures that have reduced transport network vulnerability. The participants were of the opinion that such examples of effective infrastructure adaptation to climate change could assist in the development of guidelines and/or best practices.

The participants:

- Agreed that there is an urgent need to prepare appropriate policy actions and exchange information about best practices.
- Observed that amongst the existing National Adaptation Programmes of Action (NAPAs), a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to adapt to climate change, developed under the United Nations Framework Convention on Climate Change, none had explicit references to transport infrastructure.
- Commented that the Green Public Procurement (GPP), a process through which public entities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle, is certainly a step towards the right direction. They also noted that several countries have already decided to adopt the GPP for at least of 50% of their supplied products.
- Observed that Concession Contracts of transport infrastructure, and particularly those relating to road transport, generally lack necessary climate change adaptation clauses.
- Noted that transport infrastructure planners/designers and transport manufacturers should take into account from the planning stage, climate change regional projections and their potential impacts. Furthermore, climate change should be incorporated into engineering management practices and integrated into national and international policies and regulations.
- Suggested that criticality screening of transport infrastructure is crucial to identify and successfully implement optimum adaptation measures.
- Observed that as small changes expected to mean water levels until 2050, climate change impacts on inland waterways are not expected to be significant; however, the greater temporal (and spatial) variability in water levels expected can create problems, that require integrated waterway planning and management.
- Agreed that the development of effective adaptation strategies requires both collaborative research and the formulation of effective policies. Within this context, they welcomed the research methodology adopted by the ECONNET project, which combines

climate and hydrological models with transport-economic models in order to identify effective adaptation measures for the inland waterways.

- Noted the work on climate change adaptation undertaken by the European Union: (i) the 2009 Adaptation White Paper, which aims at making the EU more resilient to climate change and (ii) the Adaptation Strategy, that will be in effect by 2013 and will function as the Roadmap for the former. They also suggested that more strategic and long-term approaches to spatial planning will be required.

- Were informed on the specifics of the planned “Sea to Sea” Project, that aims to establish a rail connection between the Mediterranean and the Black Seas (Alexandroupolis to Burgas).

- Observed that Small Island Developing States (SIDS) face great climate change–induced challenges (such as tropical cyclones, storm surges and other extreme events) that can result to seaport and airport inundation and other damages affecting very significantly operations/services. At the same time, SIDS development depends on economic activities (e.g. tourism) that themselves are going to be greatly affected by climate change; this can, in turn, have negative impacts on international transportation. These states are in need of financial and technical assistance from developed countries and international organizations, in order to build the necessary local capacity.

- Underlined that although several large port infrastructure projects are currently at their design/construction stage, their investment schemes/design standards do not generally incorporate climate change considerations. Port resilience would require capacity building, risk detection and management (e.g. emergency and/or evacuation drills) and risk transfer (increase of insurance cover, disaster relief etc).

- Observed that although climate change poses significant problems, might also provide opportunities (potential rise of new seaports, new destinations for tourism).

- Agreed that there is a need for more coordination between the different transport sectors and their respective initiatives to develop intermobility.

- Noted that several countries cannot, at this time, afford to implement adaptation plans, due to the very large investments required. It was, however, stressed that low-cost techniques, based upon an improved understanding of risks and their potential costs, could be adopted to adapt existing infrastructure.

- Observed the urgent need for stakeholders to fund adaptation plans, as well as the necessity for identifying innovative solutions.

- Suggested that transport networks should be preferentially positioned in areas less likely to be affected by climate change; in addition, strategic land use and integration of other sectors (e.g. agriculture and tourism) should be taken into account during the planning phase, using a holistic approach.

- Were informed on a study on costs and adaptation of Greek transport networks to climate change, funded by the Bank of Greece, in which more than 200 scientists – 4 dedicated to transport - of various disciplines took part.

- Two activities of related research efforts at EU level were shortly presented. The completed FP7 WEATHER project (Weather Extremes: Assessment of Impacts on Transport Systems and Hazards for European Regions) and the continuation thereof, the FP7 MOWE-IT project (Management of weather events for transport systems), which aim to assess and quantify impacts of climate change on transport networks.

24. Considering transport networks adaptation to climate change as a problem which can only be tackled through collective efforts and cooperation at all levels, the participants agreed on the following recommendations:

1. The lessons learned during the conference should be disseminated to the other Government Entities of the countries participating in the Conference that are involved in transport network adaptation to climate change.
2. Adaptation practices in the transport sector should also be disseminated through the UNFCCC Nairobi work programme (NWP) by submitting an Action Pledge. The NWP provides a platform to organizations for knowledge sharing and networking.
3. Governments should be aware of the climate change and its impacts on transport networks; awareness should be raised on transport infrastructure adaptation to climate change and more effort should be put towards this direction.
4. There should be both collaborative research and policy actions to develop effective adaptation strategies for climate change impacts on international transport. Well targeted vulnerability studies, empirical studies and assessment of projected risks and related costs should be a first step towards bridging the current knowledge gaps and identifying priority areas.
5. There should be science-based policy formulation that takes into consideration the specifics of each region.
6. Investments specifically targeted for the adaptation of transport networks to climate change should become available, as adaptation of infrastructure is linked with higher than normal construction costs and, in addition, some States are not in position to financially undertake such plans.
7. In view of the above, further research and promotion of specific measures for affordable adaptation of transport infrastructure and transportation mobile to climate change should be conducted.
8. The results of the Conference should be promoted in order to assist in the development of guidelines to be followed by countries in all the United Nations Regional Commissions' geographical areas.
25. The participants expressed their gratitude to Evros Chamber of Commerce and Industry and the Hellenic Chambers Transport Association, for warmly hosting the conference in Alexandroupolis in such excellent conditions, the Hellenic Ministry of Infrastructure, Transport and Networks and the Hellenic Ministry of Environment, Energy and Climate Change for supporting the event, to speakers for having shared their experience and provided for possible solutions to improve the adaptation of transport networks to climate change, and UNECE for having organized the Conference.
26. The proceedings of the Conference, including presentation and all conference material will be published on the UNECE website at http://www.unece.org/trans/main/wp5/wp5_conf_2012_june.html