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**Economic Commission for Europe****Inland Transport Committee****Working Party on Inland Water Transport****Working Party on the Standardization of Technical  
and Safety Requirements in Inland Navigation****Fifty-eighth session**

Geneva, 17–19 February 2021

Item 5 (b) of the provisional agenda

**Standardization of technical and safety requirements in inland navigation:  
Recommendations on Harmonized Europe-Wide Technical Requirements  
for Inland Navigation Vessels (resolution No. 61, revision 2)****Outcome of the project “Green and Efficient Danube Fleet”****Note by the secretariat****Mandate**

1. This document is submitted in line with the Proposed Programme Budget for 2021, part V, Regional cooperation for development, section 20, Economic Development in Europe. Programme 17, Economic Development in Europe (A/75/6 (Sect.20), para. 20.51).
2. At its fifty-fifth session, the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation (SC.3/WP.3) took note of the project GRENDEL (Green and efficient Danube fleet) by Pro Danube International as a part of the workshop “Encouraging the realization of a modern fleet, enhancing navigation safety and fostering innovations” (ECE/TRANS/SC.3/WP.3/110, paras. 26 and 27).
3. An overview of the project and its outcome presented at the final event organized by the GRENDEL consortium on 29 October 2020, including the proposed strategies and recommendations, transmitted by Pro Danube International, is given in the annex to this document.

## Annex

# Green and Efficient Danube Fleet: Strategy and Recommendations for modernization of the Danube inland waterway fleet

## A. General overview

1. The GRENDEL project supports the Danube vessel fleet operators and their public counterparts in modernization of the sector. The project addresses various aspects of the fleet modernization and better integration of inland water transport on the Danube into logistics chains:

- (a) Use of low carbon and alternative fuels on inland waterways;
- (b) Reduction of air pollutant emissions (CO<sub>2</sub>, NO<sub>x</sub>, particulate matter);
- (c) Overall energy consumption, and
- (d) New services provided by transport and logistics management processes, including River Information Services (RIS), digital data provision and dedicated tools to improve the efficiency of the fleet operation.

2. The overall goal of the project is the improvement of the environmental and economic performance of the Danube fleet through three specific objectives:

- Know-how transfer for the Danube fleet operators with the help of intensive transnational collaboration between private and public stakeholders and targeted know-how transfer activities in order to overcome the existing knowledge gap, lack of activities and absence of instruments to deploy innovative solutions
- Elaboration of innovative technical vessel concepts and improved transport and logistics management processes of fleet operators and sharing these as good practices for wide-scale implementation to strengthen the competitive position of inland navigation and to exploit its market potential
- Supporting development of favourable regulatory framework and well-designed public support measures by introducing a model state aid scheme to design national public support measures which will clearly address the needs of the sector.

3. With its activities, GRENDEL aims at achieving a higher acceptance and use of inland waterway transport as an environmentally friendly transport mode contributing to economic growth and a more sustainable transport system in the Danube region. GRENDEL is a vital step forward in providing a fruitful ground for the establishment of dedicated financial instruments that trigger investments in the fleet.

4. GRENDEL is a part of the Interreg Danube Transnational Programme of the European Union. The project started on 1 June 2018 and ended on 30 November 2020. Through a solid partnership under the lead of Pro Danube International, with members ranging from international organizations, national authorities and decision makers to stakeholders operating on the Danube and its navigable tributaries from Austria, Bulgaria, Croatia, Germany, Hungary, Romania and Serbia and the Danube Commission, GRENDEL resulted in:

- Elaboration of technological factsheets
- Design of innovative and greening inland vessel concepts
- Organization of know-how transfer events and public consultations
- Provision of an inland water transport innovative technologies database gathering technical information
- Development of a model state aid scheme for the Danube region

- Establishment of a Danube inland waterway fleet modernization strategy and recommendations.

Detailed information on the results of the project and the list of all GRENDEL project partners are available on the GRENDEL website [www.interreg-danube.eu/grendel](http://www.interreg-danube.eu/grendel).

## II. Main outcome of the project

### A. Know-how transfer

5. GRENDEL has developed a series of technological factsheets that propose concrete solutions to adapt the fleet to the strict environmental requirements set by the legislator. It covered:

- Gas and gas-electric propulsion
- Diesel-electric propulsion
- After-treatment
- Fuel cell propulsion
- Battery electric propulsion
- Drop-in fuels
- EURO VI truck and other non-road mobile machinery (NRE) engines
- Energy efficient navigation.

6. Moreover, the active involvement of various private vessel operators and businesses operating on the Danube gave the possibility to shape innovative technological solutions for the fleet modernization according to their needs and requirements:

- Conceptual design for retrofitting of four pusher types
- Conceptual design of a new LNG<sup>1</sup> propelled pusher
- Concept for electricity produced from renewable sources
- Advanced concept of diesel-electric or hybrid propulsion
- Concept for changing the main engines
- Elaboration of conceptual design for improving the hydrodynamics of the vessel hull design
- Concept for sewage plant upgrade
- Concept for improvement of noise and vibration characteristics.

### B. Public consultations

7. The project included several editions of public consultations with public and private stakeholders, state authorities and the relevant services of the European Commission on the drafting process of the Model State Aid Scheme, the impact of the COVID-19 pandemic on the operation of the Danube fleet, possible recovery actions and plans.

### C. Model State Aid Scheme

8. The Model State Aid Scheme covers five most important aspects of fleet modernization:

- (a) Environmental performance: reducing emissions of gaseous and particulate pollutants from internal combustion engines and auxiliary motors installed on vessels and by implementing other measures with direct environmental benefits;

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<sup>1</sup> Liquefied natural gas.

(b) Integration into logistics chains: increasing the involvement of inland waterway transport in multimodal transport chains by making the vessels more competitive, operationally flexible and secure in the context of multimodal transport chain;

(c) Increasing safety of inland water transport: focus on safety equipment, safety at work, adaptations of the wheelhouse, steering system and manoeuvrability of a vessel to support a skipper in navigational and operational aspects and decisions;

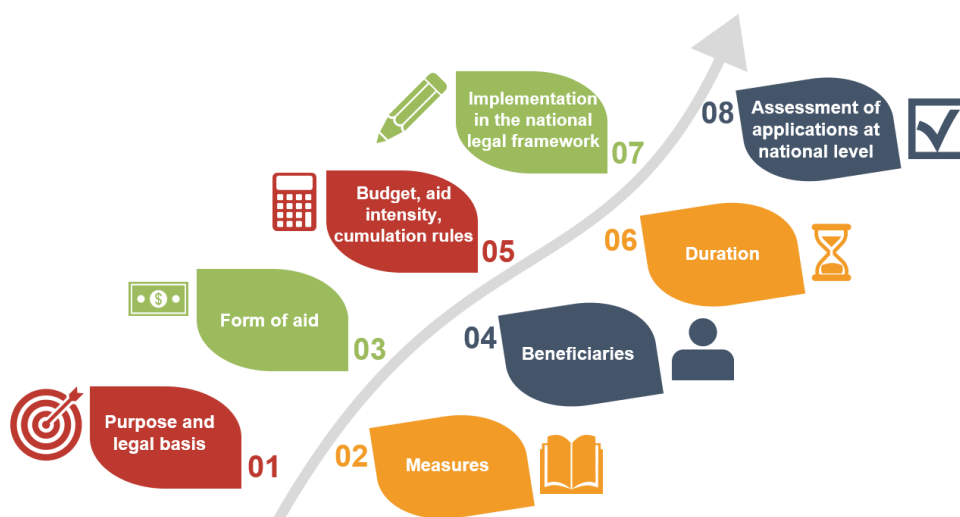
(d) Renewal of actors in the sector: encouraging the acquisition of the first boat for new river transport companies and new entrants, and

(e) Innovative solutions: development and experimentation with innovative solutions and new technologies as a response to specific needs of inland water transport, and feasibility studies.

9. The structure of the Model State Aid Scheme addresses various topics from possible legal bases to operational parameters, as shown in figure I below.

Figure 1

#### Structure of the GRENDEL Model State Aid Scheme



10. The Model State Aid Scheme is intended to serve as a guideline for the Danube riparian countries for developing national state aid schemes for fleet modernization according to their individual needs.

#### D. Danube fleet modernization strategy and recommendations

11. Adapting the Danube fleet to the specific needs and requirements of a future-oriented, multimodal and efficient transport system is an endeavour that has to go beyond borders. The Danube Fleet Modernization Strategy proposed by GRENDEL will identify and analyse specific challenges faced by inland water transport and develop customized actions, solutions and recommendations to overcome them in a well-defined and coordinated manner with a focus on the greening process of inland vessels and the efficient integration of inland water transport in the multimodal transport and logistics chains.

12. The core objective of the strategy is to provide a comprehensive analysis on the most important challenges for inland water transport in terms of legislation and its efficient integration into multimodal transport and logistics chains. Initiated by Pro Danube International with the purpose to propose concrete actions and measures to facilitate the modernization of the outdated Danube fleet, an ambitious plan to implement a widely harmonized State Aid Scheme for Danube Fleet Modernization has already started to produce tangible results in a number of the Danube riparian countries.

13. In relation to the environmental quality through low emissions, the strategy proposes solutions to adapt the fleet to the new requirements set out by the European legislation. Hence, the GRENDEL project developed a series of technological factsheets that propose

concrete innovative solutions to significantly reduce the environmental footprint of inland water transport, to make it more reliable and energy efficient. These factsheets provide information on the advantages and disadvantages of each analysed technology and highlight their suitability depending on the type of vessel. Moreover, the project developed an Inland water Transport Innovative Technologies Database covering a wide range of innovative technological solutions as a vital step to counteract the relatively low innovation intake in the sector.

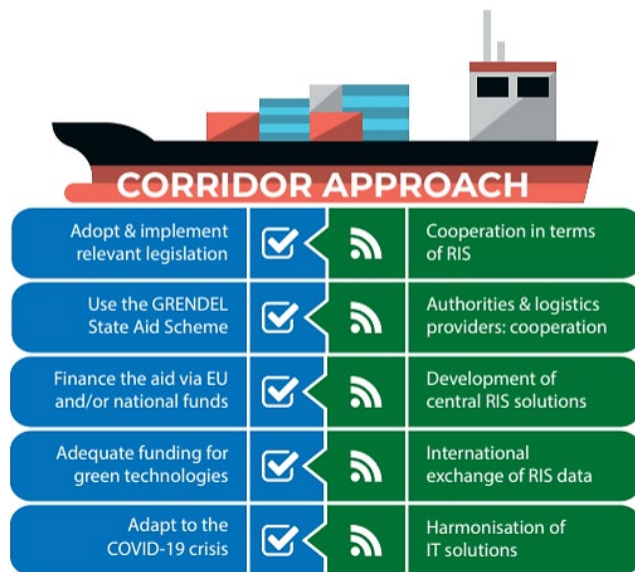
14. The second challenge, the efficient integration of inland water transport into multimodal transport and logistics chains, highlights the potential of digitalization as an important step in making the sector more attractive to a multitude of industries operating in Europe and beyond. Digitalization is considered as an important driver in simplifying administrative procedures, increasing efficiency and considerably reducing costs. It has the potential to make a more systematic use of the existing resources and infrastructure. Moreover, digitalization sets the ground for the development or expansion of new businesses, it makes inland water transport more attractive and improves the transport flow on inland waterways.

15. Another important topic addressed in the framework of the strategy refers to the impact of the COVID-19 pandemic on the sector. In order to reduce uncertainty and secure a smooth transport flow, the strategy proposes concrete actions and measures to reduce the harmful impact of the crisis on businesses operating on the Danube.

16. Based on the results of the GRENDDEL project, this strategy concludes with a set of recommendations reflecting the need for standardization and harmonization on corridor level for all Danube riparian countries in the following areas (see figure II below):

- Challenge 1 – Environmental quality through low emissions:
  - Adoption and implementation of the relevant legislation
  - Using the GRENDDEL Model State Aid Scheme
  - Financing the aid via the European Union and/or national funds
  - Adequate funding for green technologies
  - Adaptation to the COVID-19 crisis
- Challenge 2 – Integration of inland water transport into the multimodal logistics chains:
  - Continuous cooperation in the field of RIS
  - Continuous cooperation between relevant national authorities and logistics providers
  - Promotion of national best practices promoted on the transnational level
  - Development of central, standardized and harmonised RIS solutions to ensure the corridor approach
  - Engagement in the international exchange of RIS data with special focus on position and electronic reporting data
  - Connection to the European Hull Database
  - Harmonization of the available information technology solutions at the transnational level.

Figure 2  
**GRENDEL Recommendations**



17. Last, but not least, it is of utmost importance to facilitate the cooperation process between sector representatives, national and European political decision makers as well as water management authorities at the national level.

### III. Final event

18. The main findings of the project were presented at the final event, held online on 29 October 2020. The event was attended by more than eighty experts from the European Commission, United Nations Economic Commission for Europe, river commissions, branch organizations and engine manufacturers and other key stakeholders. It was unanimously agreed that GRENDEL was a vital step forward in providing a fruitful ground for the establishment of dedicated financial instruments to support the fleet modernization. The support provided by the European Commission will encourage the Danube riparian countries to use the GRENDEL Model State Aid Scheme as a basis to develop investment incentives that could be financed via various types of financial resources, both at the national and European level, and a number of Danube riparian countries have already begun discussions related to its implementation.