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Workshop "Circular economy in inland water transport"

Use of Circular Economy Principles in Inland Water Transport

Note by the secretariat*

I. Mandate

1. This document is submitted in line with the programme of work of the Transport subprogramme for 2020 (ECE/TRANS/2020/21, chapter IV, table, section A, para. 11) adopted by the Inland Transport Committee at its eighty-second session (ECE/TRANS/294, para. 136).

2. At its fifty-sixth session, the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation (SC.3/WP.3) decided that the theme topic for its next session would be the circular economy in inland water transport (ECE/TRANS/SC.3/WP.3/112, para. 98).

3. This document contains an overview of the circular economy as a concept, the existing business models and tools of relevance for inland water transport, the ongoing work carried out by the Economic Commission for Europe (ECE) and other international organizations. Sections II and V are prepared from the conclusions of "Towards the Circular Economy – Innovation Policies for Sustainable Production and Consumption" held at the tenth session of the Team of Specialists on Innovation and Competitiveness Policies of the Committee on Innovation, Competitiveness and Public-Private Partnerships (TOS–ICP), Geneva, 18 and 19 October 2017 (ECE/CECI/2018/3).

II. The Circular Economy Model

4. The existing industrial economy is largely based on a linear model of resource consumption that follows a "take-make-dispose" pattern. From this, the industrial economy incurs significant losses of value and negative effects all along the material supply chain. It

* The present document was submitted after the deadline in order to reflect the most recent information.

is evident that a strong demand exists for a new industrial model – one that is less dependent on primary energy and materials inputs, and able to regenerate natural capital. The quest for substantial improvement in resource performance across the economy has led businesses to explore ways to reuse products or components, and restore more material, energy and labour inputs. The concept itself of a circular economy has been recognized as an effective solution and gained momentum since the late 1970s.

5. As an economic model, the circular economy eliminates waste and promotes the continual use of resources, in contrast to the traditional linear model of production and consumption, in which goods are manufactured from raw materials, sold, used and then discarded or incinerated as waste. The Ellen MacArthur Foundation has defined this as "an industrial system that is restorative or regenerative by intention and design. It replaces the "end-of-life" concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models."[1]

6. The circular economy may be broadly construed as a system where the value of products, materials and resources is maintained in the economic cycle for as long as possible. The model offers a profitable opportunity to move away from resource-intensive processes, maximize the use of existing assets and create new revenue streams, and thereby render production and consumption processes more sustainable and competitive. The ultimate goal is to decouple global economic development from the consumption of finite resources.

7. The circular economy is based on three principles:

(a) Preserve and enhance natural capital by controlling finite stocks and balancing renewable flows. Technologies and processes allow, where possible, the use of renewables or better performing resources, for example replacing fossil fuels with renewable energy;

(b) Optimize resource yields by circulating products, components and materials at the highest utility at all times in the technical and biological cycles. This is translated into product design to remanufacture, refurbish and recycle, thus favouring maintenance to extend product lifetimes;

(c) Foster system effectiveness by revealing and designing out negative externalities such as water, air, soil and noise pollution.[2]

8. The circular economy promises a range of benefits. The World Economic Forum estimates that the economic benefit of transitioning to this new business model would be worth more than $1 trillion in material savings.[3] Among the benefits are: (a) a reduction in the environmental pressures, i.e. greenhouse gas (GHG) emissions, particulate pollution, toxicity and biodiversity loss, (b) economic expansion and creation of new jobs across industrial sectors, through local reverse logistics, and within small and medium-sized enterprises, through increased innovation and entrepreneurship and a new service-based economy, and (c) reduced risk of raw material supply shocks.[4]

9. The United Nations Environment International Resource Panel has recently noted that improving resource efficiency is indispensable for meeting climate change targets in a cost-effective way. Achievement of twelve of the seventeen Sustainable Development Goals will depend on the sustainable use of natural resources. In a circular economy scenario, carbon dioxide emissions are estimated to drop by as much as 48 per cent by 2030 (2012 base scenario) and 83 per cent by 2050.[5]

[1] Ellen MacArthur Foundation, Towards the Circular Economy. Economic and Business Rationale for an Accelerated Transition, 2013/1.

[2] ECE/CECI/2018/3, para. 12.

[3] World Economic Forum, in collaboration with the Ellen MacArthur Foundation and McKinsey and Company. Towards the Circular Economy: Accelerating the scale-up across global supply chains. World Economic Forum, Geneva, Switzerland, 2014.

[4] OECD (2019), Business Models for the Circular Economy: Opportunities and Challenges for Policy, OECD Publishing, Paris.

[5] ECE/CECI/2018/3, para. 20.

10. The circular economy offers substantial net material savings and reduced exposure to price volatility. Estimated forecasts of net material cost savings at the European Union level are up to €630 billion annually. By 2050, the circular economy could reduce mobility costs for the average European Union household by 60 to 80 per cent, food costs by 25 to 40 per cent and housing costs by 25 to 35 per cent.[6]

11. The transition to the circular economy could increase primary resource productivity in the European Union by up to 3 per cent annually by 2030, and raise GDP by up to 7 per cent over the current development scenario. Annual benefits are estimated at up to €0.9 trillion.[7]

12. Innovation plays a key role in ensuring the successful transition. There are numerous examples of new technologies, processes, services and business models that are reshaping product life cycles from design through production and usage on to disposal and recycling. New forms of sustainable consumption, such as sharing platforms, appear in transport, housing and other areas. The importance of innovation, not only scientific research and new technologies, but also experimentation with technologies, policies, governance arrangements and business ideas, were emphasized at the discussion "The Growth We Want is Sustainable: Harnessing Innovation for a Circular Economy for All", that was organized by UNEP and ECE on 9 July 2019 in a side event for the 2019 High-Level Political Forum.

13. However, the transition towards the circular economy is still at an early stage in both the world and most of the UNECE region. The Circularity Gap Report presented at the World Economic Forum Annual Meeting 2019 held on 22 to 25 January 2019 in Davos-Klosters (Switzerland) estimated that, at that time, the world was only 8.6 per cent circular.[8]

III. Supply Chains and Reverse Logistics in the Circular Economy

14. There are two fundamental differences between supply chains in a circular economy and conventional supply chains, which are based on forms of collaboration within the supply chain:

- The product design and the socioeconomic context of consumption: products are so designed as to have a longer life cycle and be reprocessed in some manner once it is complete.
- Collection of used or consumed biological and technical goods for reprocessing, where the conventional linear structure of supply chains becomes a feedback loop.[9]

15. The reverse logistics of technical goods involves four collaborative layers:

- Maintenance: ensure the ongoing serviceability of a product, including its upgrade at or near its place of use.
- Reuse: transfer a product from one user (or user group) to another by collection, maintenance, storage at the distributor and delivery.
- Remanufacture: return a product to at least its original performance with a warranty that is equivalent or better than that of new, newly manufactured product; [10] the product is reintroduced into the supply chain.

[6] Ellen MacArthur Foundation, Report "Growth within: A circular economy vision for a competitive Europe", June 2015; ECE/CECI/2018/3, para. 17.

[7] Idem; ECE/CECI/2018/3, para. 19.

[8] www.circularity-gap.world.

[9] Rodrigue, J.P. (2018), "Efficiency and Sustainability in Multimodal Supply Chains", International Transport Forum Discussion Papers, OECD Publishing, Paris.

[10] The definition by the British Standards Institution (standard BS 8887-2 "Design for manufacture, assembly, disassembly and end-of-life processing (MADE) Part 2: Terms and definitions").

- Recycle: collection of various materials for subsequent reuse in the manufacturing of new products or remanufacturing.[11]

IV. Business Models

16. Business models could facilitate the transition to a more resource efficient and circular economy. The Organization for Economic Cooperation and Development considers the following categorization of circular activities:

- Circular supply models, which involve the replacement of traditional production inputs with bio-based, renewable, or recovered materials (known as "cradle to cradle" product design)
- Resource recovery models, which involve the production of secondary raw materials from waste streams
- Product life extension models, which involve extending the life of products and may comprise of the classic long life model, direct reuse, maintenance and repair, and refurbishment and remanufacturing
- Sharing models which involve more intensive use of under-utilized consumer assets through lending or pooling, e.g. housing, vehicles, clothing and tools
- Product service system models which combine a physical product with a service component; they can be divided into product-oriented, user-oriented and result-oriented models. [12]

17. Corporate Social Responsibility (CSR) is a self-regulating business model that helps a company to be socially accountable to itself, its stakeholders and to the public. The European Commission defines CSR as a concept whereby "companies integrate social and environment concerns in their business operations and in their interaction with stakeholders on a voluntary basis."[13] CSR is increasingly important for the competitiveness of enterprises in terms of the circular economy, as it can bring benefits in risk management, reduction of costs, access to capital, customer relationship management, human resources and innovation capacity.

18. Examples of successful circular economy business models exist, including in the transport sector. In automotive industry, the Renault Group factory at Choisy-le-Roi (France) has expertise in reconditioning mechanical components. Production covers five major parts: engines, mechanical gearboxes, turbo-compressors, injection pumps and cylinder head kits. Remanufactured parts are used exclusively for the repair of in-use vehicles. These are less expensive, have the same guarantee and comply with the same quality control tests as new parts. It is also the only available way of making a part which has otherwise been discontinued.[14]

19. The Rolls-Royce Total Care programme for engine maintenance, intended for aerospace customers, assumes the management of the engine throughout its life cycle. The Total Care business model helps reduce waste and optimize resource efficiency, while maximizing the flying potential of engines. [15]

[11] Rodrigue, J.P. (2018), "Efficiency and Sustainability in Multimodal Supply Chains", International Transport Forum Discussion Papers, OECD Publishing, Paris.

[12] OECD (2019), Business Models for the Circular Economy: Opportunities and Challenges for Policy, OECD Publishing, Paris.

[13] Commission of the European Communities, Green Paper "Promoting a European framework for Corporate Social Responsibility". COM(2001)366.

[14] www.ellenmacarthurfoundation.org/news/the-circular-economy-applied-to-the-automotive-industry-2; https://group.renault.com/en/our-company/locations/choisy-le-roi-plant-2/.

[15] https://summit.movinonconnect.com/en/mobility/4-examples-of-circular-economy-in-transportation/#/, www.rolls-royce.com/media/our-stories/discover/2017/totalcare.aspx.

20. The circular hub strategy of the port of Rotterdam focuses on promising technologies that cope with the large volumes of the Rotterdam region and on encouraging innovation by attracting new circular initiatives and scaling start-ups. Furthermore, the port aims at a leading role in international energy transition and has issued a road map to achieve the national climate goals for 2030 and 2050 in three stages. Circularity is indispensable to achieve these goals.[16]

21. The strategy of London Gatwick Airport aims to recycle 85 per cent of all waste generated within the airport by 2020. In 2010, London Gatwick Airport set up sustainability goals up to 2020 in the areas of community, economy, carbon, air quality, noise, transport, energy, waste, water and biodiversity. In 2017, the airport achieved, for example, a 10.5 per cent reduction in carbon emissions and a 5 per cent reduction in energy consumption per passenger, and reached the zero threshold for untreated waste sent to landfill.[17]

V. Transitioning to the Circular Economy across the pan-European Region and the World

22. In recent years, the circular economy has gained in prominence as a solution to some of the world's most pressing, cross-cutting sustainable development challenges, particularly, to achieve the 2030 Agenda. It relates, first of all, to Sustainable Development Goals 6, 8, 11, 12, 13, 14 and 15.[18]

23. ECE activities support the circular economy in various aspects of sustainable development and aim at fostering cross-sectoral linkages to further accelerate the transition. To this end, ECE has pooled its multisectoral expertise through an integrated "nexus" approach towards the 2030 Agenda. Examples include the "Environment for Europe" process – a high-level platform for addressing environmental priorities, the Pan-European Strategic Framework for Greening the Economy under the Batumi Initiative on Green Economy, a management framework that helps make use of valuable resources from mining and landfill under the United Nations Framework Classification for Resources (UNFC), innovation policies for sustainable production and consumption, policy recommendations on recycling, the development of a blockchain-supported application to enable a circular approach in the garment and footwear sector value chains, an innovative food loss management system, the circular economy in cities and sustainable forest management.

24. Several international stakeholder platforms aim to advance the circular economy and foster cooperation among the key players. In the pan-European region are (a) the Platform for Accelerating the Circular Economy (PACE)[19], and (b) the European Circular Economy Stakeholder Platform,[20] a joint initiative of the European Commission and the European Economic and Social Committee.

25. Policy efforts have been significant at the European Union level. In December 2015, the European Commission published "Closing the loop – An EU action plan for the circular economy"[21], a strategy to support the transition to the circular economy in the European Union. The action plan targeted five sectors: plastics, food waste, critical raw materials, construction and demolition, and biomass-biobased products. As a concrete and ambitious programme of action up to 2019, around 50 measures covered the entire cycle from

[16] www.circle-economy.com/news/rotterdam-towards-a-circular-port.

[17] https://summit.movinonconnect.com/en/mobility/4-examples-of-circular-economy-in-transportation/#/.

[18] Draft Concept and Programme for the joint meeting of the Economic and Financial (Second Committee) of the 73 United Nations General Assembly and the United Nations Economic and Social Council.

[19] https://pacecircular.org.

[20] https://circulareconomy.europa.eu/platform/en.

[21] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the loop - An EU action plan for the Circular Economy (COM/2015/0614).

production and consumption to waste management and the market for secondary raw materials, as well as an annual report on implementation.[22]

26. The European Waste Framework Directive (2008/98/EC) also offers an instructive example of policy principles to create markets that reduce waste from production, including: a waste management hierarchy, the polluter pays principle, and extended producer responsibility.[23]

27. Various European countries have successfully created a culture of recycling among consumers – the "recycling society". Examples are the German Resource Efficiency programme, the Green Deal initiative in the Netherlands and the Task Force on Resource Efficiency in Denmark to identify and address regulatory barriers.[24]

28. At its tenth session, TOS–ICP stressed that "policy intervention should fix market and regulatory failure and stimulate activity actively, through targets, procurement policy, platforms, and technical and financial support to businesses". As mentioned by the team of specialists, potential policies to facilitate the transition to the circular economy include:

- Regulatory instruments, including better implementation and enforcement of related existing legislation; revisions to relevant legislation, new measures and regulations
- Voluntary agreements, fiscal incentives including taxes, charges and levies, information and advisory services and awareness-raising campaigns
- Public investment in research and development, skills and training and infrastructure, industrial symbiosis and clusters, green public procurement
- Encourage innovation and accelerating public and private investment in resource efficient technologies, systems and skills
- Implementation, use and adoption of smart regulations, standards and codes of conduct
- Abolish environmentally harmful subsidies and tax breaks, and
- Create better market conditions for products and services that have lower impacts over their life cycles and that are durable, repairable and recyclable.[25]

VI. Circular Economy Principles in Waterborne Transport

29. In the maritime sector, a number of international instruments towards the circular economy are already in force. They cover reducing harmful emissions and the environmental impact from shipping, ship recycling and other relevant aspects. IMO has introduced mandatory measures for reducing GHG in international shipping in the framework of the International Convention for the Prevention of Pollution from Ships (MARPOL), which include the Energy Efficiency Design Index and the Ship Energy Efficiency Management Plan. The initial IMO strategy on reduction of GHG emissions from ships, adopted in 2018, aimed at reducing GHG emissions by at least 50 per cent by 2050. Reducing the emission of sulphur dioxide is realized through Emission Control Areas designated under Annex VI of MARPOL, by limiting the maximum sulphur content in the fuel oil.

30. The instruments for reducing the environmental impact from international shipping include:

- MARPOL
- The International Convention on the Control of Harmful Anti-fouling Systems on Ships, which entered into force on 17 September 2008

[22] ECE/CECI/2018/3, para. 35.
[23] ECE/CECI/2018/3, para. 36.
[24] See ECE/CECI/2018/3, paras. 37, 43–45.
[25] ECE/CECI/2018/3, paras. 45–46.

- The International Convention for the Control and Management of Ships' Ballast Water and Sediments, which entered into force on 8 September 2017
- The Action Plan to address the health and environmental problems caused by plastic litter from ships, adopted by the Marine Environment Protection Committee on 26 October 2018.

31. Safe principles of ship recycling are set out in the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, adopted on 15 May 2009 but not yet in force.

32. In 2017, the Inland Navigation Commission (InCom) of the World Association for Waterborne Transport Infrastructure (PIANC) established a new Working Group WG 203 "Sustainable Inland Waterways – A Guide for Waterways Managers on Social and Environmental Impacts". [26] It addressed the concept of circular economy, along with sustainable development and social and environmental responsibility, in a wider concept of CSR. The objectives of WG 203 are to: (a) provide a general overview of possible contributions from waterborne infrastructure managers in the global move to a sustainably developed society, (b) allow a better understanding and awareness of the role of waterways in sustainable development, and (c) to propose solutions for resolving potential conflicts in operations and management of the multifunctional nature of inland waterways.

33. In support of the European Union action plan for the circular economy, the coalition of inland waterway transport and ports: European Barge Union, European Skippers' Organization, European Federation of Inland Ports and Inland Navigation Europe, adopted a joint declaration in 2017 with a vision of inland waterway transport and ports towards 2030. The declaration states that a "common vision of green, smart and congestion-free transport and logistics servicing a circular and bio-based economy will only materialise tomorrow if we build a solid policy strategy and equip our people with effective implementation tools today and tomorrow".[27] Their focus lies on the need for coordination, investment, legislation and innovation.

VII. Purposes of the Workshop and Topics for Discussion

34. Transport by inland waterways is integral to transport and logistics chains and, therefore, must be considered in any circular economy as: (a) an element of the circular economy, and (b) a component of a reverse cycle infrastructure and logistics. It can be noted that some of the policy recommendations set out in the White Paper on the Progress, Accomplishments and Future of Sustainable Inland Water Transport, are directly linked to the principles of circularity and can facilitate the transition.

35. The circular economy may bring advantages to inland water transport and contribute to increasing its role in transport and logistics chains. At the same time, it may have implications for the sector: general for the whole inland transport sector, and specific features for this transport mode, i.e., considerable costs for the construction and modernization of the waterways and the inland fleet, operating conditions, fleet ageing, lack of necessary infrastructure and others.

36. In the transition process, inland water transport may benefit from the experience and best practices of the existing business models in the maritime shipping, automotive industry and other fields.

37. The topics proposed for discussion are:

- Role of inland water transport in the circular economy supply chains and reverse logistics
- Advantages of the circular economy and prospects for the inland water transport sector

[26] www.pianc.org/uploads/files/InCom/ToR/ToR-InCom-WG-203-Sustainable-Inland-Waterways-%E2%80%93-A-Guide-for-Waterways-Managers-on-Social-and-Environmental-Impacts.pdf.

[27] www.inlandnavigation.eu/news/events/inland-waterways-ports-present-vision-for-2030-bis/.

- Implications for the sector and possible solutions
- Innovations for the sector towards the circular economy, such as greening of the fleet, fleet modernization, incentives for green product design and more efficient product use
- Business models: best practice and relevance for inland water transport
- Role of ports as circular hubs
- Policies and market mechanisms that can encourage transition to the circular economy, for example, “polluter pays” principle
- Application of CSR in the sector and its role in the circular economy.

38. The Working Party is invited to share its views, best practices and successful business models, and to consider follow-up steps for inland navigation towards a circular economy.