



Key points of the CCNR roadmap for reducing inland navigation emissions



I. Ministerial mandate and objectives of the roadmap

In accordance with the mandate given by the Ministerial Declaration of 17 October 2018 in Mannheim, the Central Commission for the Navigation of the Rhine (CCNR) developed a roadmap aiming at largely eliminating greenhouse gas emissions and air pollutants of the inland navigation sector by 2050, a long-term vision which is also shared by the European Union (EU).

Built on the CCNR study on the energy transition towards a zero-emissions inland navigation sector,¹ this roadmap shall be understood as the primary CCNR instrument for mitigating climate change, fostering the energy transition and contributing to the European IWT policy. As this energy transition represents a crucial challenge to Rhine and European inland navigation, the aim of the roadmap is to contribute to a reduction in emissions from Rhine and inland waterways navigation by:

- » setting transition pathways for the fleet (new and existing vessels),
- » suggesting, planning, and implementing measures directly adopted or not by the CCNR,
- » monitoring the intermediate and final objectives laid down by the Mannheim Declaration.

The CCNR hopes that this roadmap will contribute to developing a common vision of the energy transition and the associated challenges within the inland navigation sector, as well as to generating support and acceptance for related political measures.

¹ <https://www.ccr-zkr.org/12080000-en.html>

II. Scope and assumptions of the roadmap

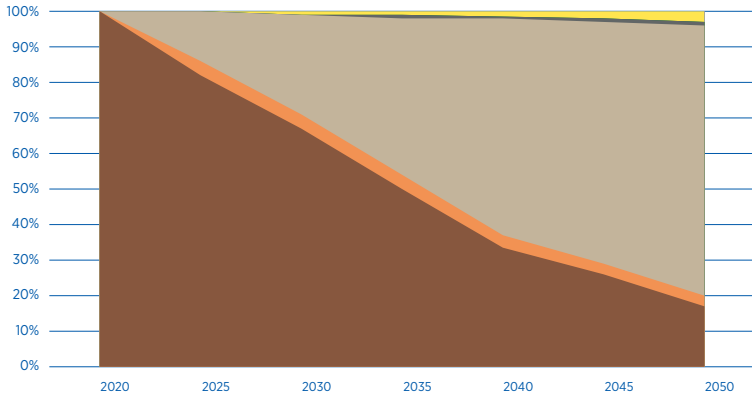
To ensure a common understanding between all the actors involved in the energy transition of inland navigation, the CCNR decided to:

- » lay focus on inland navigation meaning the transport of goods and the carriage of passengers by inland waterway vessels. Recreational crafts, service vessels and floating equipment were not included at this stage.
- » define emissions as atmospheric pollutants and greenhouse gases (GHG) arising from the operation of an inland navigation vessel's propulsion and auxiliary systems.
- » adopt a "tank-to-wake" approach (TTW), as an interim solution, until a "well-to-wake" approach (WTW) is available for the relevant energy carriers. Application of this approach however implies making assumptions concerning the upstream chains (emissions produced and fuel availability) which are idealised.

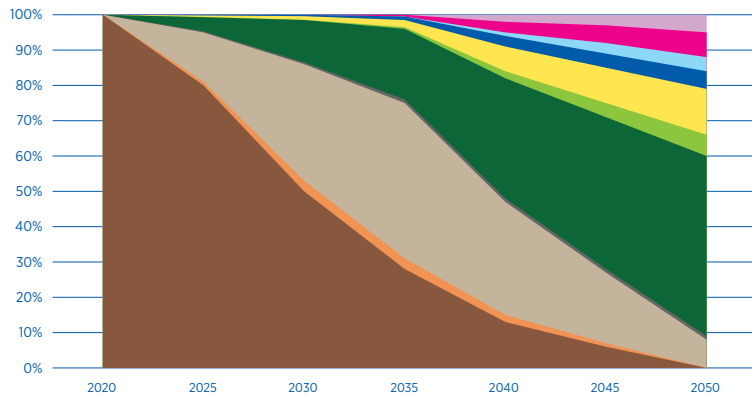
III. Two transition pathways for inland navigation leading up to 2050

The roadmap aims to outline two transition pathways for the fleet (new and existing vessels). A more conservative transition pathway, based on technologies that are already mature, cost efficient in the short-term but with uncertainties on the availability on certain fuels, and a more innovative one, relying on technologies still in their infancy stage but providing more promising emission reduction potential on the long run. The two transition pathways are both sufficiently ambitious to achieve the objectives of the Mannheim Declaration. A key conclusion points to the absence of a "one size fits all" technology solution adapted to all types of vessels and navigation profiles. A technologically neutral approach appears therefore relevant to achieve the energy transition.

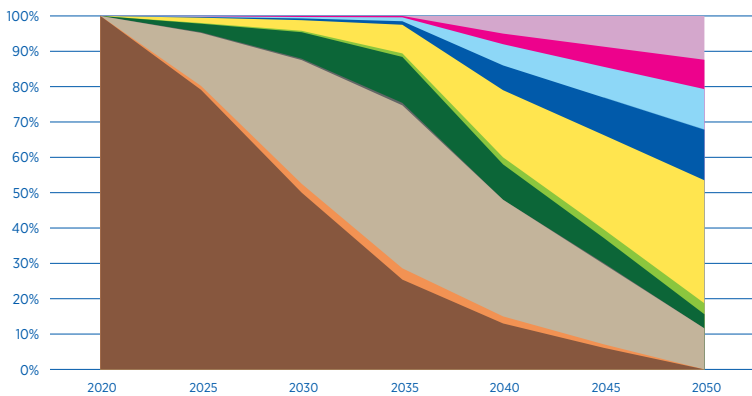
**BUSINESS-AS-USUAL SCENARIO:
DEVELOPMENT OF TECHNOLOGIES BY 2050**



**CONSERVATIVE TRANSITION PATHWAY:
DEVELOPMENT OF TECHNOLOGIES BY 2050**



**INNOVATIVE TRANSITION PATHWAY:
DEVELOPMENT OF TECHNOLOGIES BY 2050**



**TECHNOLOGIES CONSIDERED
IN THE PATHWAYS**

CCNR 2 or below, Diesel	Fossil diesel in an internal combustion engine which complies with the emission limits CCNR 2 or older engine.
CCNR 2 + SCR, Diesel	Fossil diesel in an internal combustion engine which complies with the emission limits CCNR 2 and equipped with an additional Selective Catalytic Reduction system.
Stage V, Diesel	Fossil diesel in an internal combustion engine which complies with the emission limits EU Stage V.
LNG	Liquefied Natural Gas in an internal combustion engine which complies with the emission limits EU Stage V.
Stage V, HVO	HVO in an internal combustion engine which complies with the emission limits EU Stage V. HVO stands for hydrotreated vegetable oil itself (without blending with fossil fuels) and all comparable drop-in biofuels (including e-fuels) as well as synthetic diesel made with captured CO ₂ and sustainable electric power.
LBM	Liquefied Bio Methane (or bio-LNG) in an internal combustion engine which complies with the emission limits EU Stage V.
Battery	Battery electric propulsion systems, with fixed or exchangeable battery systems.
H₂, FC	Hydrogen stored in liquid or gaseous form and used in fuel cells.
H₂, ICE	Hydrogen stored in liquid or gaseous form and used in internal combustion engines.
MeOH, FC	Methanol used in fuel cells.
MeOH, ICE	Methanol used in internal combustion engines.

IV. The energy transition financial challenge

Initial estimates show that the financial challenge involved in achieving the aim of zero emissions by 2050 is considerable. Depending on the transition pathway, the financial gap to be bridged to achieve the Mannheim Declaration emission reduction objectives varies significantly but is several billions in any scenario. The energy transition-related costs will exceed the financial resources of the navigation profession, which will only be able to bear a part of the costs required to achieve this transition. Significant grants are needed to close this gap, and to make the transition pathways economically viable for the inland navigation industry, energy suppliers, and shore-side infrastructure operators. Strong public support is therefore necessary. In order to support the energy transition of the inland waterway transport sector, the CCNR considers it opportune to pursue the idea of a European financial support instrument for the energy transition of the inland waterway transport sector, based on mixed sources (public and private), including a sector contribution. In order to ensure a level playing field, such a European funding and financing instrument should be open to EU countries as well as Rhine and Danube riparian states which are not members of the EU (Switzerland, Serbia, Moldavia and Ukraine in particular). Easy access to such an instrument is paramount, as is administrative simplicity.

V. Implementation plan and next steps

The CCNR has developed an implementation plan taking into account economic, technical, infrastructure, social and regulatory aspects. This plan aims at suggesting, planning and implementing measures to be adopted directly or not by the CCNR, as well as monitoring the intermediate and final objectives laid down by the Mannheim Declaration.

Regulatory measures	Voluntary measures
Appropriate regulatory framework for the use of alternative fuels and batteries (vessel construction, crew, vessel operation transport of dangerous goods, definition, fuel characteristics, blending and supply)	Label for environmental and climate protection
Scrutiny and where appropriate amendment of safety and statutory requirements for bunkering of alternative fuels in inland waterway transport	Carbon offsetting measures (carbon compensation)
Possible out phasing of the most harmful technologies which appear inconsistent with the CCNR's and EU's long-term emission reduction ambition	Pilot vessel trials (all vessel types)
Infrastructure requirements for alternative fuel and electricity for propulsion	Innovative vessels (Database)
Examination of the possibility of a sector contribution in the framework of a European funding and financing instrument	Innovation award
	Situation reports: Regularly analyse emissions reduction status and the effectiveness of measures
	Financial measures
	Examination of European funding and financing instrument to support the inland navigation energy transition
	EU Taxonomy – establishment of an EU classification system for sustainable activities
	Stimulate research and innovation projects

The CCNR will undertake, to report, by 2025, on the progress in the implementation as well as the need to update and, if necessary, revise the roadmap by 2030, the roadmap and the corresponding action plan.

It is desirable to deepen the cooperation with other energy transition actors, especially the EU, with a view to implement the proposed action plan jointly as well as to ensuring that measures are tailored to the inland navigation sector.

