Green Vessels
Red Numbers

Changing landscapes – IVR Congress 2023
by Daisy Rycquart

Secretary Innovation & Greening committee & Director CITBO

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01. Introduction

Policy framework

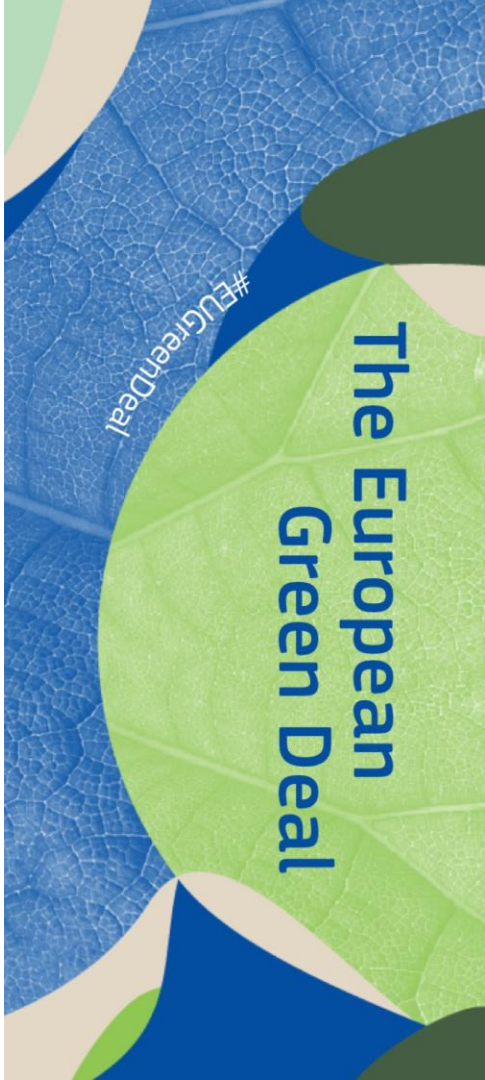
IWT POLICY FRAMEWORK

October 2018 - Decleration of Mannheim

35% reduction GHG and air pollution compared with 2015 by 2035,
>90% reduction greenhouse gases and other pollutants by 2050

December 2019 – EU GREEN DEAL

50-55% reduction GHG by 2030 compared to 1990 levels
90% reduction in transport emissions by 2050



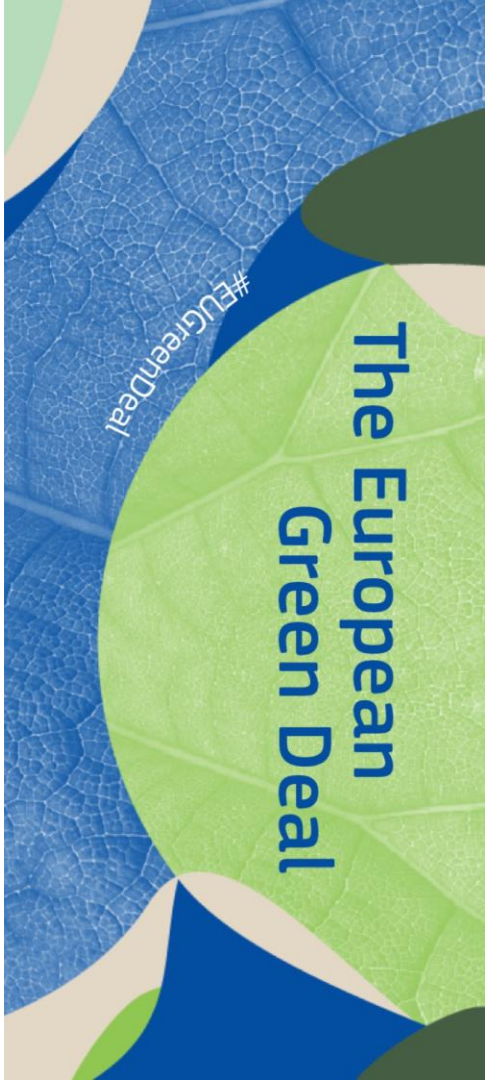
EU Strategy on Sustainable & Smart Mobility
published on December 9th, 2020

8) Transport by inland waterways and short sea shipping will increase by 25% by 2030 and by 50% by 2050 (compared to 2015)

9) By 2030, rail and waterborne-based intermodal transport will be able to compete on equal footing with road-only transport in the EU

10) All external costs of transport within the EU will be covered by the transport users at the latest by 2050.

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789



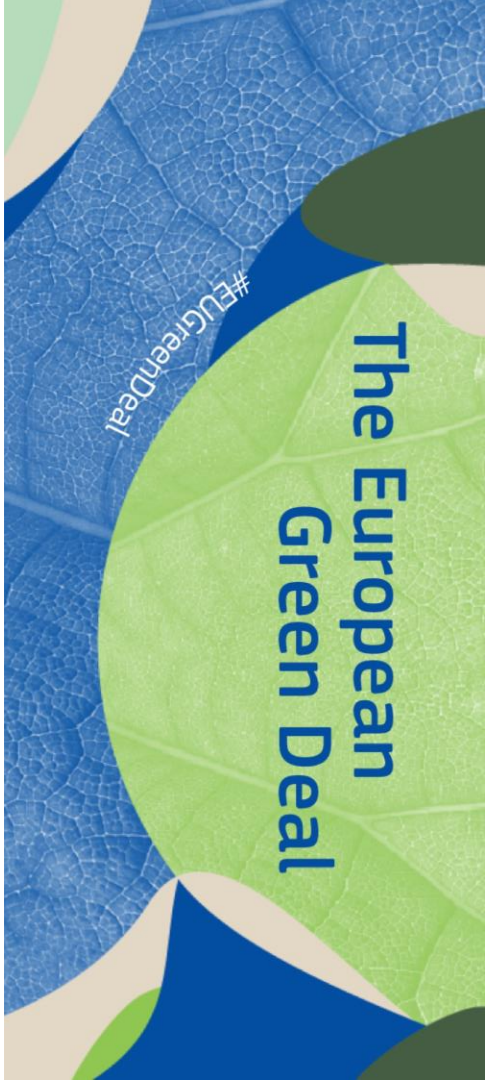
Fit for 55 package - delivering the EU's 2030 Climate Target on the way to climate neutrality

published on July 14th, 2021

The “Fit for 55” package aims to deliver the EU’s increased emission reductions target, touching the:

- **Emission Trading Scheme** Directive (ETS) – extension to maritime
- **Energy Taxation Directive** – no exemptions for fuels in maritime and inland shipping; exemption possibility for shore side electricity; zero minimum rates for sustainable fuels for 10 year.
- **Regulation on alternative fuels infrastructure** (AFIR) – on-shore power supply for TEN-T maritime and inland ports and provisioning of appropriate LNG refuelling points in TEN-T core maritime ports.
- **Renewable Energy Directive** (REDIII) – counts energy used in international shipping towards the target

https://ec.europa.eu/info/strategy/priorities-20192024/european-green-deal/delivering-european-green-deal_en#documents



Navigation And Inland Waterway Action and Development in Europe (NAIADES) III Action Plan

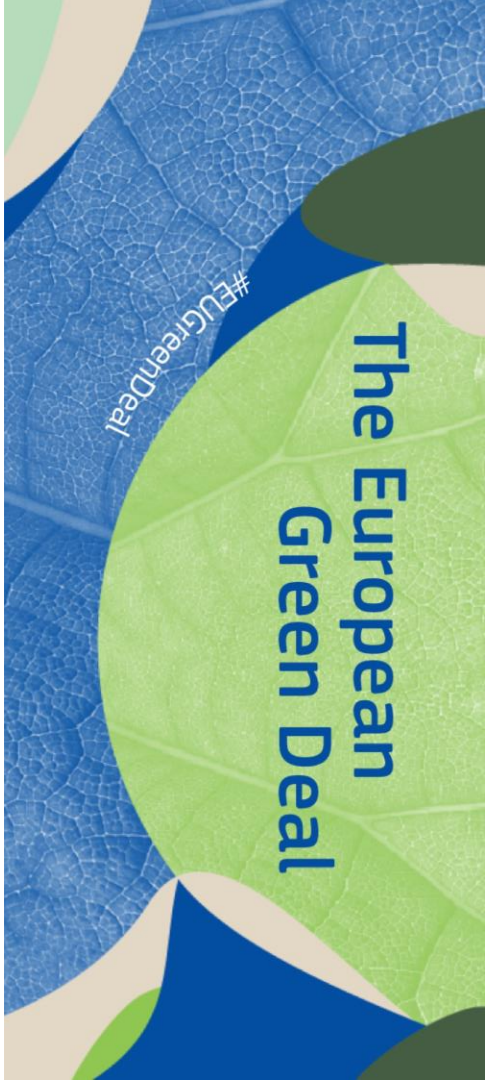
2021-2027

What does the initiative aim to achieve and how?

(A) moving more transport by inland waterways

(B) a gradual shift towards zero emission inland vessels

https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12789-Binnenvaart-actieplan-NAIADES-III-2021-2027_nl



02. Challenges

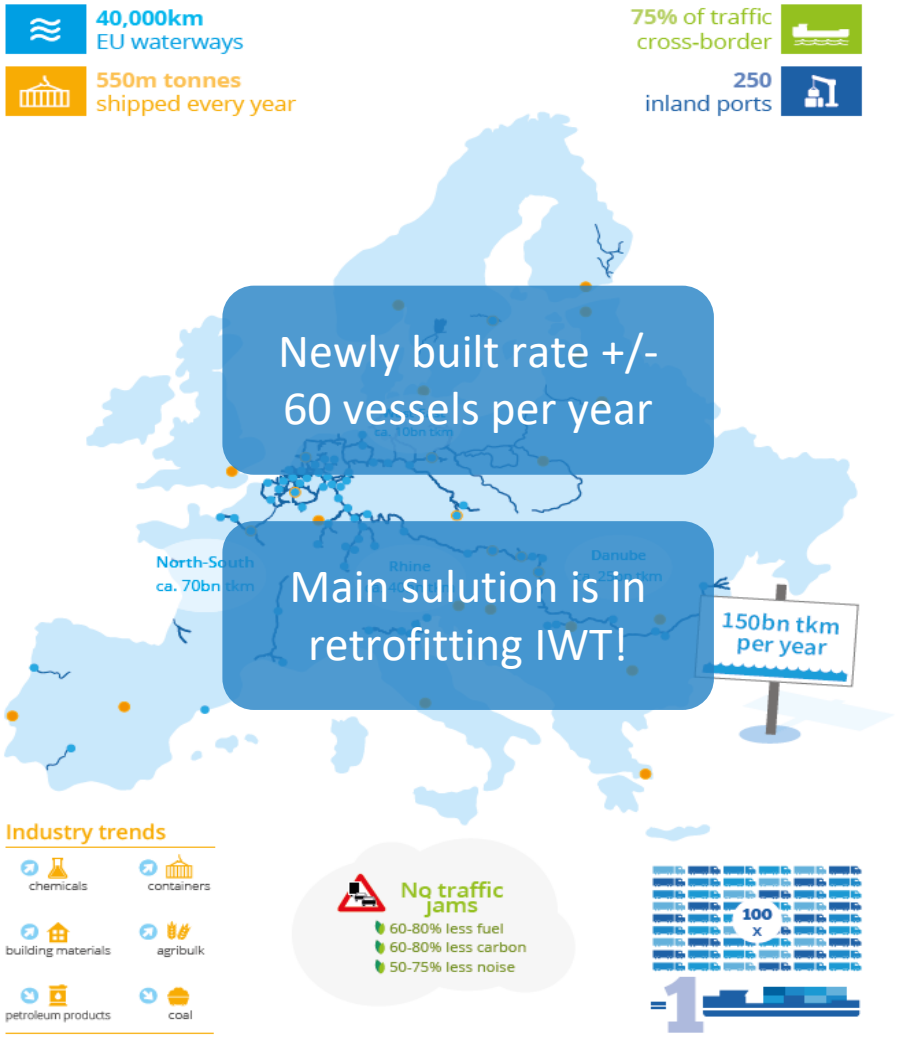
Step by step background information on greening challenges

Fleet size

1. European transport vessels reach just over **16.000 vessels** with more than 62% vessels active and based in the Rhine region

2. River cruise vessels in Europe reach **405 vessels**

< 0,4% today = “Green”



Main bottle necks towards zero emission IWT

1. **Financial bottleneck**
There is no business case for greening

2. **Technical bottleneck**
Which technique is a no-regret investment?

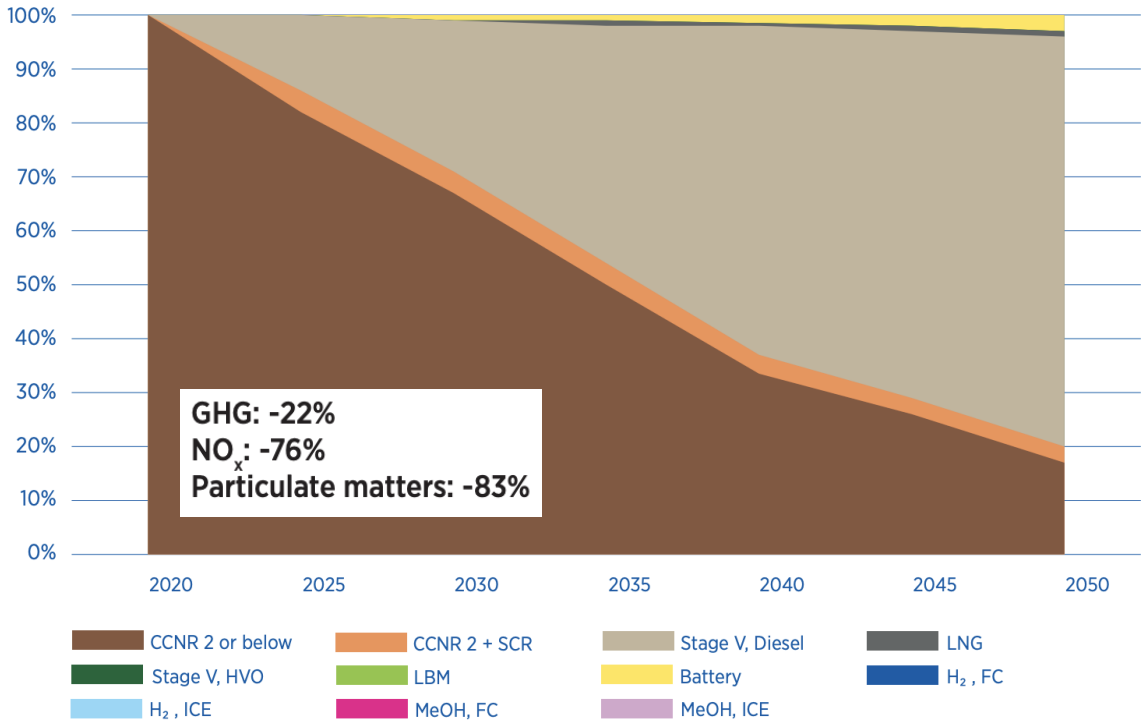
3. **Lack of regulatory incentives**
At this moment the only European regulatory incentive is the Non-Road Mobily Machinery (NRMM) EU Regulation 2016/1628 where it is obligatory to install a STAGE V engine when installing a new engine on board (retrofit or newly built)

CCNR
COMMISSION CENTRALE
POUR LA NAVIGATION DU RHIN

Largely eliminating both GHG and air pollutant emissions from inland navigation by 2050 is clearly no longer an option but a necessity if inland navigation wants to preserve and strengthen its position as a competitive, sustainable and environmentally friendly mode of transport.

https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

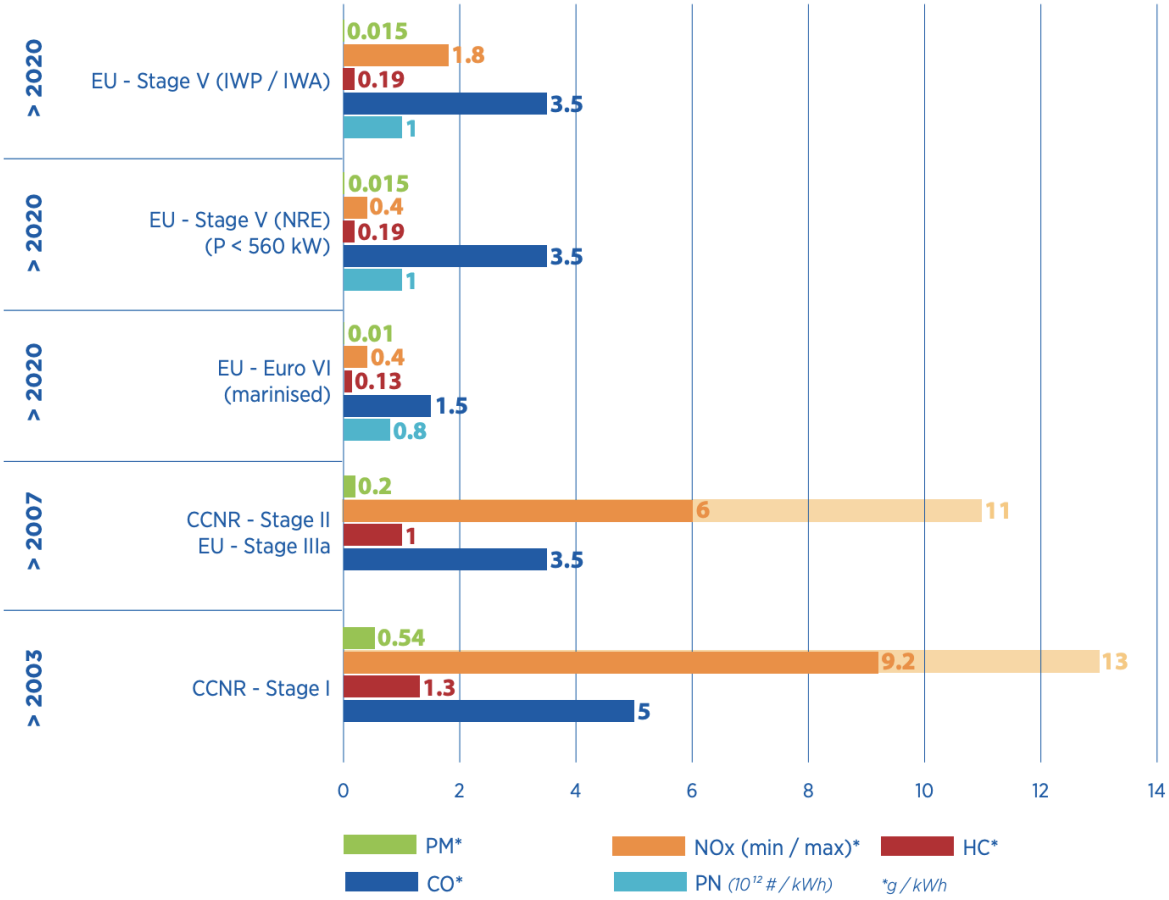
Business as usual scenario



https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

Figure 1

EMISSION LIMITS FOR IWT ENGINES (Power > 300 kW)

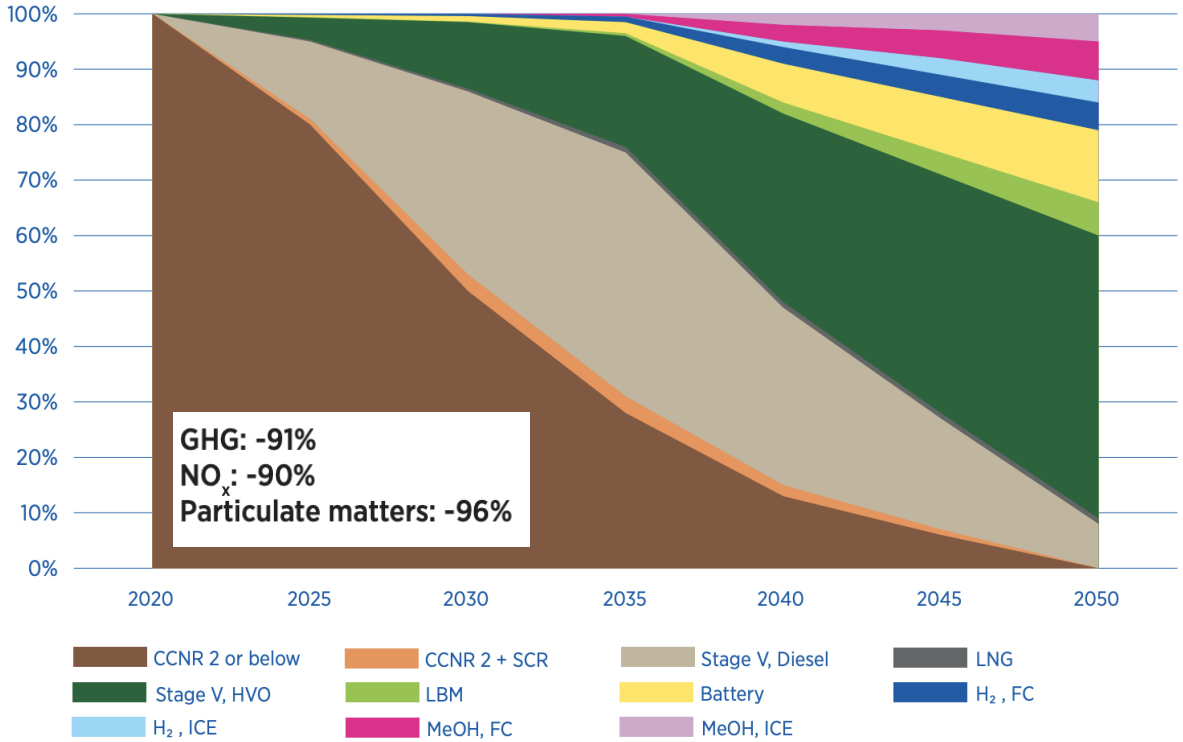


Including SCR+DPF installation

NOx reduction >80 %
PM reduction >94 %

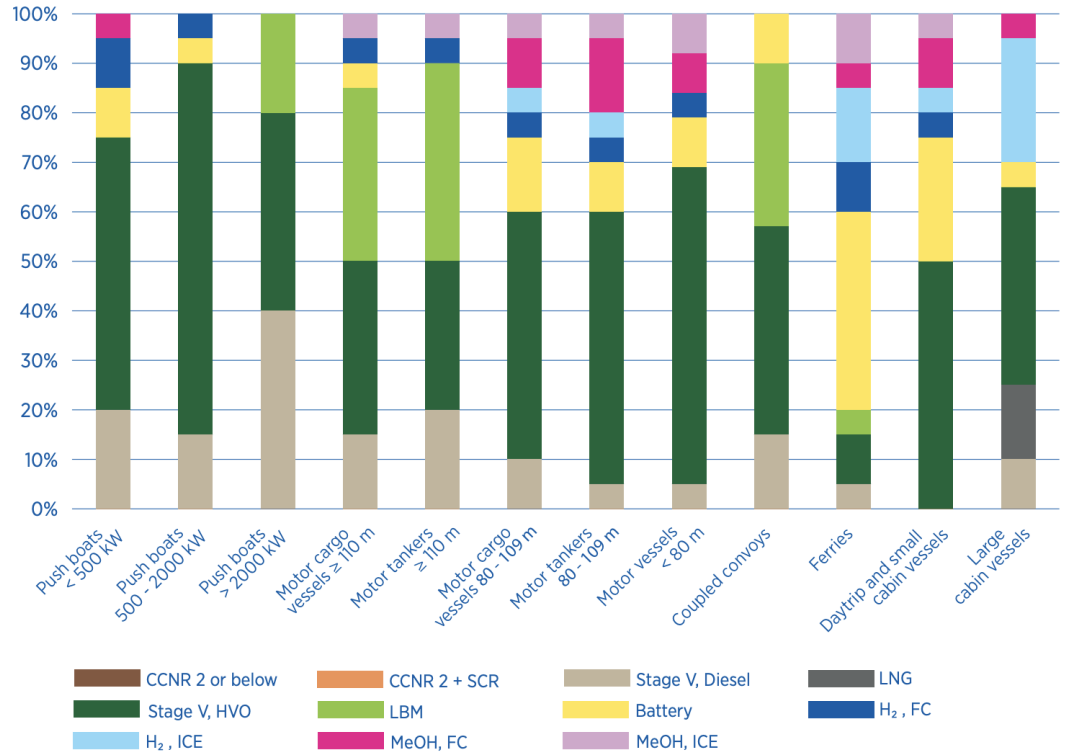
Source: CCNR https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

Conservative scenario – Transition pathway



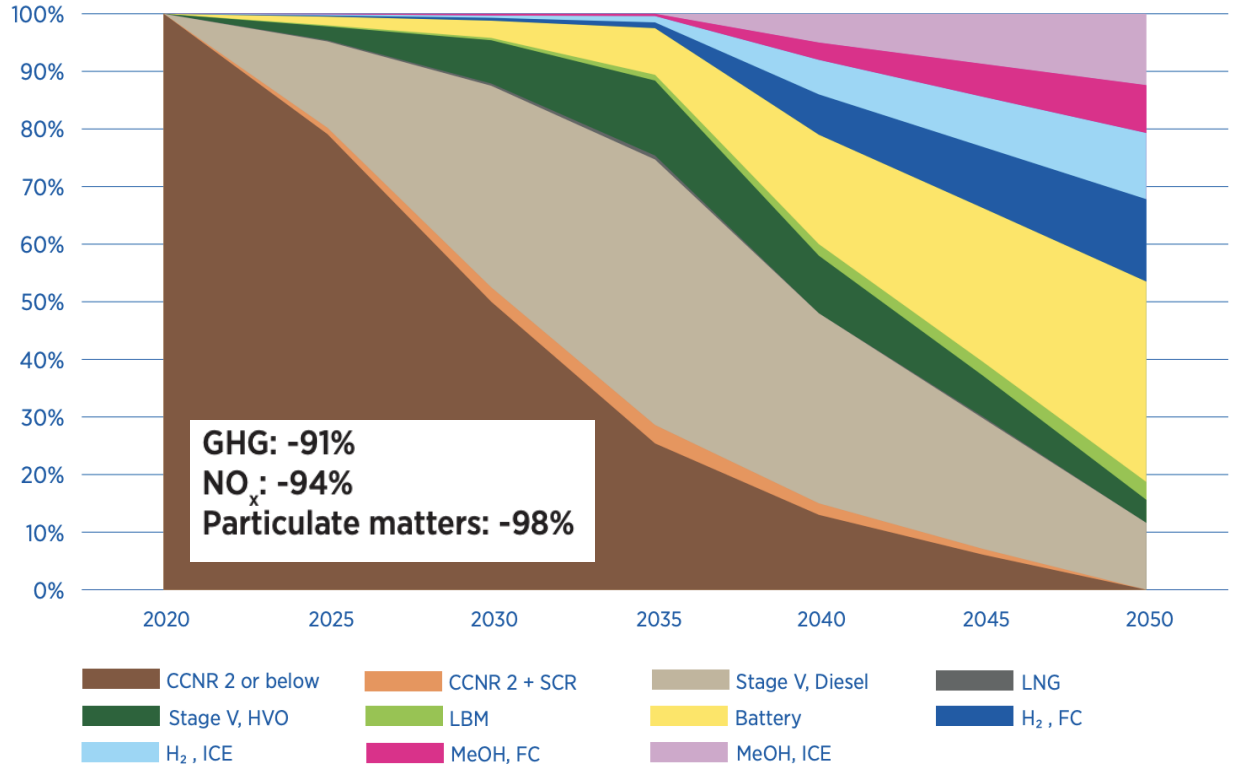
https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

Conservative scenario – Technology share per fleet family in 2050



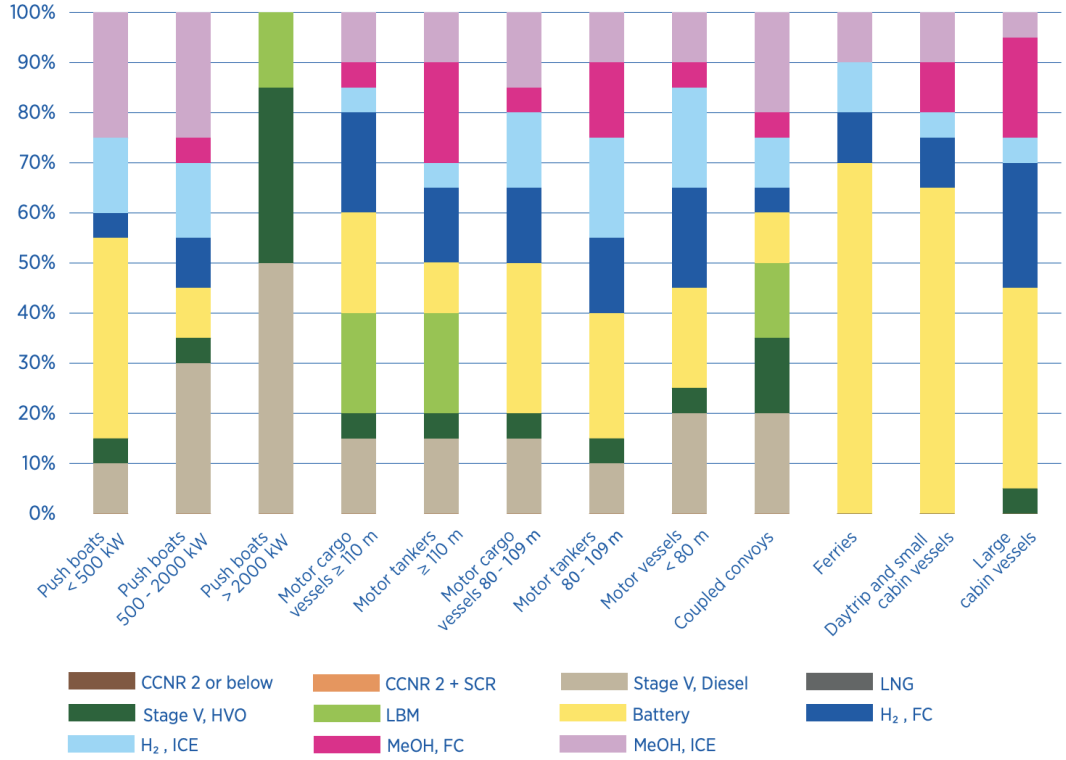
https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

Innovative scenario – Transition pathway



https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

Innovative scenario – Technology share per fleet family in 2050



https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

Price tag

+/- €7 billion

In the **conservative pathway** as compared to the BAU scenario the TCO gap (total of 30 years, 2020-2050) is approximately:

- €2.43 bln in the minimum price scenario
- €2.67 bln in the average price scenario
- €6.38 bln in the maximum price scenario

In the **innovative pathway** as compared to the BAU scenario the TCO gap (total of 30 years, 2020-2050) is approximately:

- €5.26 bln in the minimum price scenario
- €7.80 bln in the average price scenario
- €10.19 bln in the maximum price scenario

Table 3: Capability of vessels to invest in a Stage V (compliant) engine

Tonnes	Own capital	Bank financing	Amount needed	Gap	% Grant needed
250 - 400	€ 23,070	€ 40,971	€ 94,653	€ 30,611	32.3%
400 – 650	€ 47,369	€ 40,116	€ 146,068	€ 58,583	40.1%
650 -1000	€ 43,593	€ 63,559	€ 192,431	€ 85,279	44.3%
1000 – 1600	€ 100,492	€ 98,516	€ 284,572	€ 85,563	30.1%
1600 -2500	€ 138,976	€ 124,203	€ 432,567	€ 169,388	39.2%
> 2500	€ 85,055	€ 360,577	€ 722,409	€ 276,776	38.3%

Source: Panteia (2020), based upon Stichting Abri database and Research Question C inputs

STAGE V
30%—45%
investment gap

Table 2: Capability of vessels to invest in technologies that work towards zero emission.

Tonnes	Own capital	Bank financing	Amount needed	Gap	% Grant needed
250 – 400	€ 23,070	€ 119,884	**€ 373,713**	€ 230,759	61.7%
400 – 650	€ 47,369	€ 97,244	**€ 390,045**	€ 245,432	62.9%
650 -1000	€ 43,593	€ 122,237	**€ 404,772**	€ 238,942	59.0%
1000 – 1600	€ 100,492	€ 150,885	**€ 434,040**	€ 182,663	42.1%
1600 – 2500	€ 138,976	€ 147,539	**€ 481,051**	€ 194,536	40.4%
> 2500	€ 85,055	€ 264,484	**€ 573,118**	€ 223,579	39.0%

Source: Panteia (2020), based upon Stichting Abri database and Research Question C inputs

ZERO EMISSION:
40%-63%
investment gap

https://www.ccr-zkr.org/files/documents/EtudesTransEner/Final_overall_study_report.pdf

The EU reserve fund (scrapping and old-for-new scheme)

+/- €26,8 million

After financing the EU IWT platform for a fixed timeline of 10 years, the remaining means are around €26,8 million.

Looking at the avarage TCO gap towards zero emission of €7 billion, the means of the **reserve fund would only be good for 0,4%** of the costs to cover.

It is an illusion the EU reserve fund based on financial contribution by the European shipowners in the past would be a sole solution.

03. Current solutions

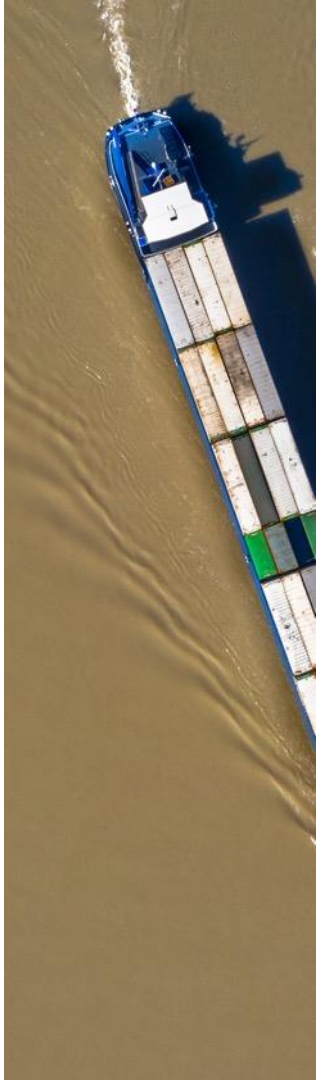
What’s on the table today

Main bottle necks towards zero emission IWT

1. **Financial bottleneck**
   There is no business case for greening

2. **Technical bottleneck**
   Which technique is a no-regret investment?

3. **Lack of regulatory incentives**
   At this moment the only European regulatory incentive is the Non-Road Mobily Machinery (NRMM) Directive where it is obligatory to install a STAGE V engine when installing a new engine on board (retrofit or newly built)



An Inland Waterway Transport Greening Fund?

Table S2: Options for a contribution basis

Options for contribution basis	Contribution equal to 4 cent per litre on average (€ 53 mln per year)	Contribution equal to 8 cent per litre on average (€ 106 mln per year)
Option 6 Contribution based on a flat rate for the bunkered amount of fuel/energy	4 eurocent/litre bunkered fuel flat rate (not differentiated)	8 eurocent/ litre bunkered fuel flat rate (not differentiated)
Option 7 Contribution based on real-time measured emissions on board of vessels	0.79 euro/kg NOx 3.12 euro/kg PM 1.62 euro/ton CO_2e	1.59 euro/kg NOx 6.25 euro/kg PM 3.24 euro/ton CO_2e
Option 8 Contribution based on emissions calculated		
Option 9 Contribution based on the emission Label/Energy Index combined with the bunkered amount of fuel/energy per vessel	4 eurocent/ litre bunkered fuel on average (differentiated)	8 eurocent/ litre bunkered fuel on average (differentiated)

https://www.ccr-zkr.org/files/documents/EtudesTransEner/Final_overall_study_report.pdf

Inspiration on calculations made in the past

Overview

TCO GAP	Sector Contribution	Reserve Fund	Public Grants
€7 billion	€1,3 - €2,6 billion (based on 4-8cents surcharge)	€26,8 million	€5,7 – €4,4 billion
100%	18% - 37%	0,4%	82% - 63%

Emission Trading Scheme (ETS)

The European Union's Emission Trading System (ETS) was launched in 2005, being the first carbon trading system on a global scale. It covers approximately 45% of the total GHG emissions in the EU.

The ETS is based on a cap-and-trade approach. In this regard, the cap puts a certain limit on the GHG emissions, that may become stricter over time.

The cost impact in of a contribution to the EU-ETS could be equivalent for IWT to an **increase in fuel price of around €213/1000l of diesel fuel**, based on current EU-ETS prices per ton of CO_2 emission.*

This corresponds to 21 cents per litre and is therefore much higher than the option of an earmarked and differentiated sector contribution ranging between 4 to 8 cents on gasoil (example).

*Source: Platina 3 – Deliverable 2.5 *Calculation based on a CO_2 price of €80 per tonne of CO_2*

04. Pioneers

IWT examples of greening and innovation

This is where greening meets innovation today:

Innovation type	Name	Activity
Multitechniques	AB INITIO	Training vessel (NL)
Battery electric	Alphenaar	Cargo vessel (NL)
Methanol	Tugboat vessel	Port of Antwerp Bruges (BE)
Hydrogen fuel cell (green)	Antonie	Cargo vessel (NL)
Battery fuel cell	Elektra	Push boat cargo (DE)
Modular & semi-autonomous	Riverdrone	Cargo vessel (BE)
…	…	**…**

Thanks!