

**Towards green, efficient and competitive river Danube transport**

## **WP3 Fleet Investment Planning**

Kick-off Meeting

**Benjamin FRIEDHOFF (DST)**

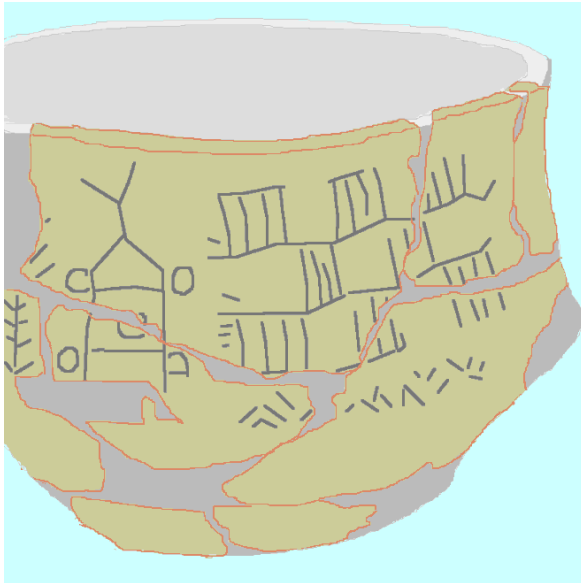
---

*Project co-funded by European Union Funds (ERDF, IPA)*





# Modes of Transport



Source: Funnelbeaker Cult. Wikimedia.org



Source: dpa



Source: [www.geo.de/Reisen](http://www.geo.de/Reisen)

- IWT is slow but extremely energy efficient.
- External costs are low and reserve capacity exists.
- Shifting cargo is desired to reach climate goals.



# Carriers in IWT



Mercur 206	ENI 46000350
Length	34.66 m
Breadth	10.09 m
Built	1990
Main Engine	2 x 954 kW



# Carriers in IWT



Meggy	ENI 02307190
Length	80 m
Breadth	9 m
DWT	1178 t
Built	1948
Main Engine	660 kW



# Carriers in IWT



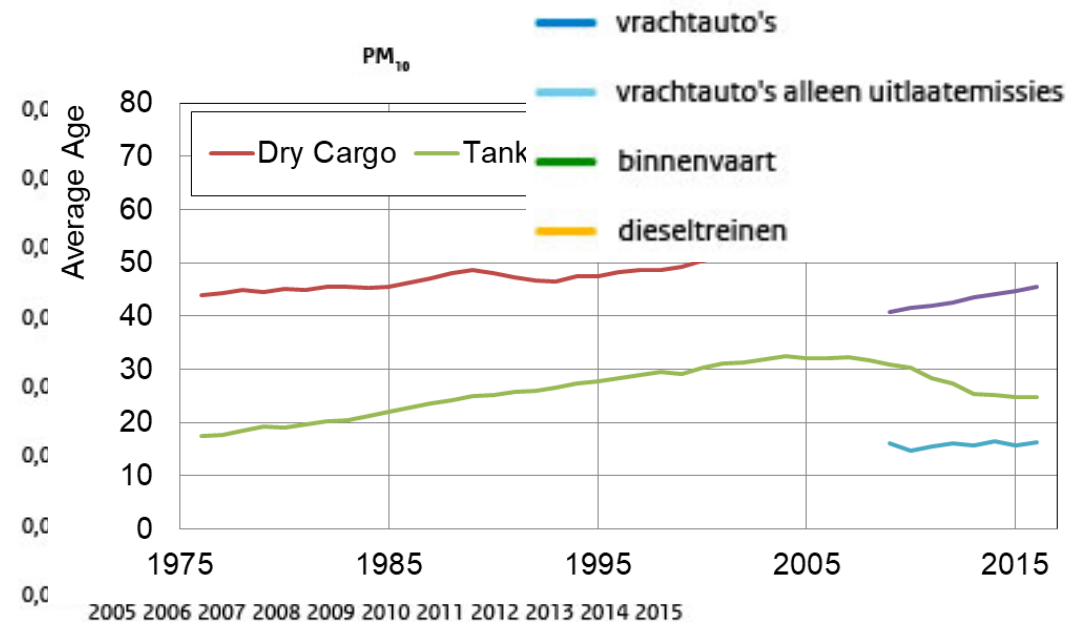
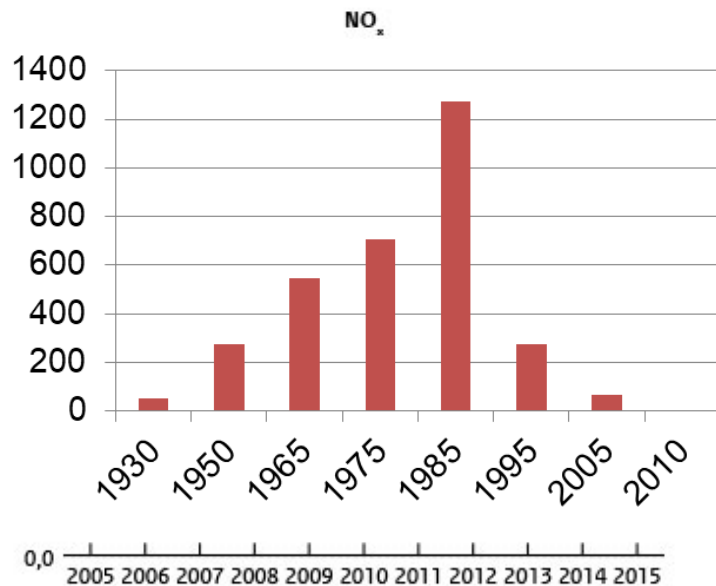
Franada	ENI 04009670
Länge	65 m
Breite	8 m
DWT	699 t
Baujahr	1912
Leistung	275 kW





# Carriers in IWT

- Inland ships have extremely long lifecycles.
- Energy efficiency helps the ice bear and the operator.
- NO<sub>x</sub> and PM harm locally (including the crew).
- Road transport is catching up in emission of air pollutants.



Source: K. Tachi, EICB



# Emission Standards



## CCNR I emission limit values

Power range	CO	HC	NO <sub>x</sub>	PM
(kW)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)
37≤P<75	6.5	1.3	9.2	0.85
75≤P<130	5.0	1.3	9.2	0.70
P≥300	5.0	1.3	n ≥ 2800 min <sup>-1</sup> = 9,2 500 ≤ n < 2800 min <sup>-1</sup> = 45 * n - 0.2	0.54

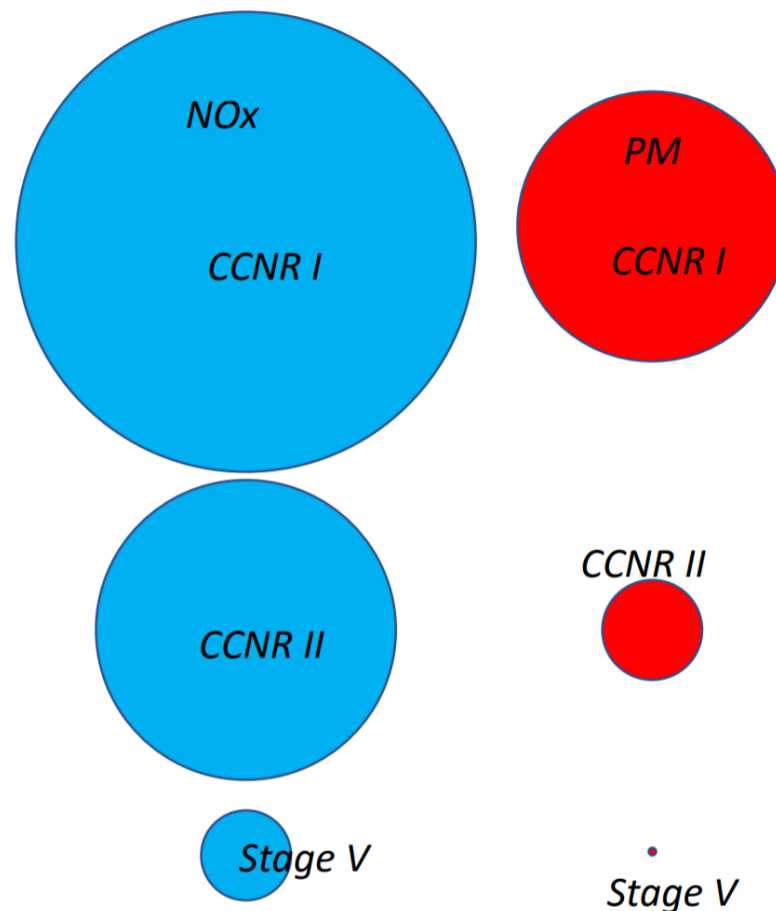
## CCNR II emission limit values

Power range	CO	HC	NO <sub>x</sub>	PM
(kW)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)
19≤P<37	5.5	1.5	8.0	0.8
37≤P<75	5.0	1.3	7.0	0.4
75≤P<130	5.0	1.0	6.0	0.2
130≤P<560	3.5	1.0	6.0	0.2
P≥560	3.5	1.0	n ≥ 3150 min <sup>-1</sup> = 6,0 343 ≤ n < 3150 min <sup>-1</sup> = 45 n - 0.2 - 3 n < 343 min <sup>-1</sup> = 11,0	0.2

## EU NRMM Stage V emission standards for engine types IWP and IWA

Power range	Engine ignition type	CO	HC	NO <sub>x</sub>	PM mass	PN	A
(kW)	(-)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(1/kWh)	(-)
19≤P<75	all	5	(HC + NO <sub>x</sub> ≤ 4.70)		0.3	-	6
75≤P<130	all	5	(HC + NO <sub>x</sub> ≤ 5.40)		0.14	-	6
130≤P<300	all	3.5	1	2.1	0.1	-	6
P≥300	all	3.5	0.19	1.8	0.015	1x10 <sup>12</sup>	6

Source: K. Tachi, EICB

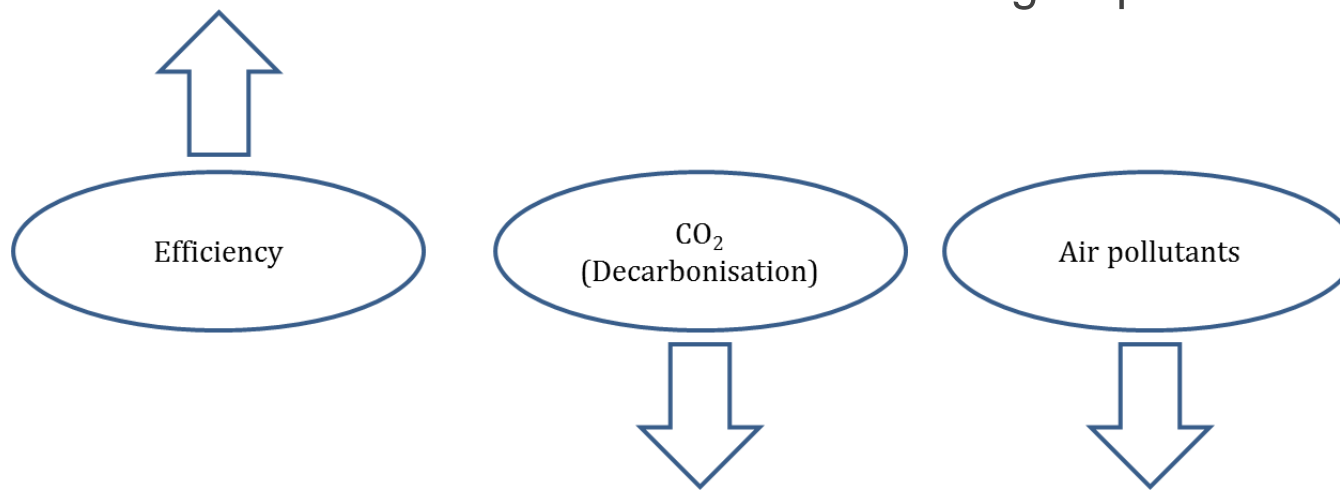




# GRENDEL WP3



- IWT sector has to invest for greening and new markets.
- This requires coordinated efforts → GRENDEL → WP3
- WP3 is divided into 3 activities:
  - 3.1 Know-how transfer & learning interactions,
  - 3.2 Elaboration of individual fleet investment plans and
  - 3.3 Consolidation of investment needs & training requirements.

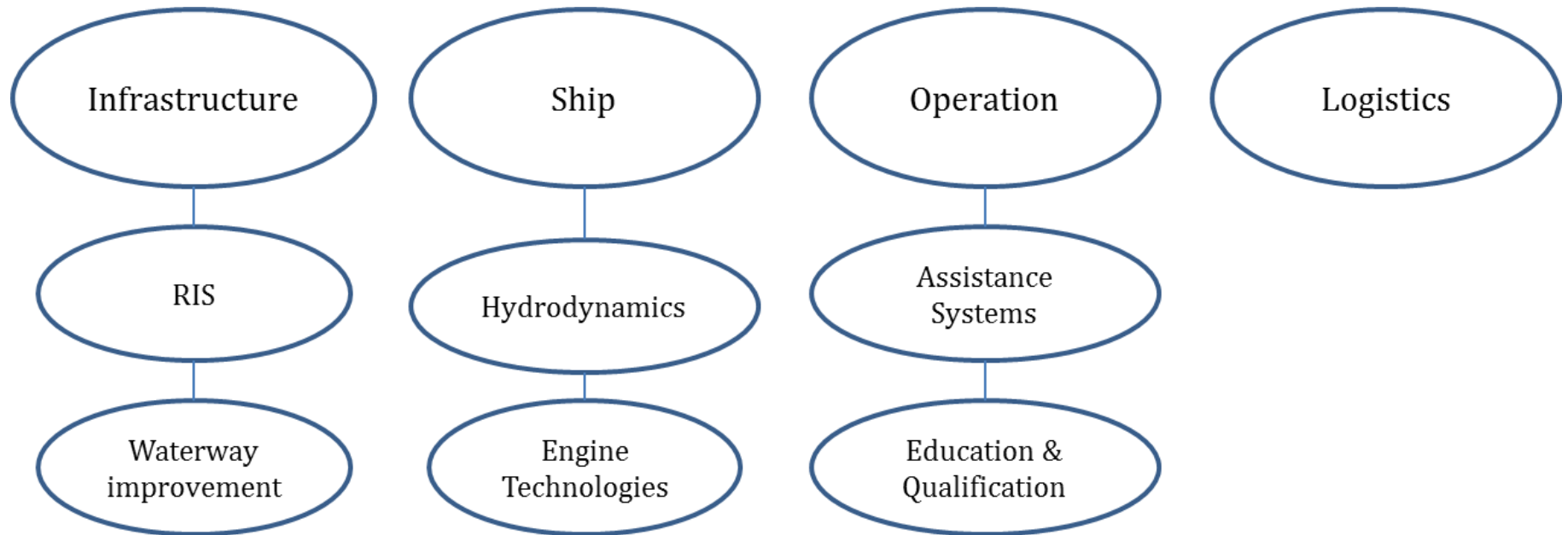




# Know-how transfer

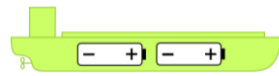


## Greening Measures





# Know-how transfer



INNOVATIVE DANUBE VESSEL

- Dedicated selection of measures for the Danube region.
- Assessment of existing decision support tools.
- Promotion and know-how transfer for stakeholders.



# Example of Modernisation



MV Nosce Orbis (ex. ENOK)  
Built: 1955 / Upgraded: 2010  
Length: 85,00 m  
Breadth: 9,5 m  
Draught max: 2,85 m  
Tonnage: 1505 t

Old Engines:  
2 x 396 kW (Volvo)  
Gearbox – 6.16:1  
Propeller Rate 292 rpm

Upgrade:  
Gensets 4x 250 kW  
Electric Motors:  
4x 230 kW @ 330 rpm

Thruster, 175 kW





# Know-how transfer



- Investment decisions require understanding of technologies.
- Regional know-how transfer (Austria, Romania and Serbia) for fleet operators & other stakeholders will focus on:
  - (i) alternative fuels - both deployable at short time (drop in fuels/bio-fuels) and those needing more extensive preparation (LNG, hybrid, hydrogen, fuel cells)
  - (ii) air pollutant emission reduction covering i.e. after treatment systems for existing diesel engines, new engine concepts and alternative optimisation solutions, on-board emission and fuel consumption monitoring;
  - (iii) reduction of energy consumption, incl. energy efficient navigation, energy efficient ship design, hybrid and electric propulsion.
  - (iv) new regulations (NRMM, ES-TRIN).



# Deliverables

---



- D 3.1.1 Report on applicable most promising greening technologies & efficient fleet management solutions (Target: 1, Period: 4)
- D 3.1.2 Report on usage & experience with decision support tools by Danube IWT stakeholders (Target: 1, Period: 4)
- D 3.1.3 Technological innovation factsheets: Overview & assessment of most relevant/promising technological innovations made available in form of digital factsheets (Target: 8, Period: 4)



# Questions





**Benjamin Friedhoff**

Head of Hydrodynamics

Development Centre for Ship Technology and Transport Systems  
Oststr. 77, 47057 Duisburg, Germany

T + 49-203-99369-29

E [friedhoff@dst-org.de](mailto:friedhoff@dst-org.de) W [www.dst-org.de](http://www.dst-org.de)

Photo: © NAVROM

**GRENDEL “Green and efficient Danube fleet”**

Towards modernisation & greening of Danube inland waterborne sector and strengthening its competitiveness

[www.interreg-danube.eu/grendel](http://www.interreg-danube.eu/grendel)



**Towards green, efficient and competitive river Danube transport**

# **Fleet investment plans**

GRENDEL Kick off meeting

Manfred Seitz (Pro Danube International)

---

*Project co-funded by European Union Funds (ERDF, IPA)*





# Motivation & Goals



- Elaborate detailed company individual fleet investment plans for time period 2020-2027 addressing fleet modernization requirements in order to improve environmental and economic performance of funded fleet operators
- Consolidate fleet investment plans on national level
- Support the identification of investment items which shall be included into State Aid Scheme Model (eligible items for funding/preferred technologies/innovation priorities)
- Provide indication on investment volumes per country (as aggregated figure) and their distribution over the lifespan of the State Aid Scheme
- Provide indication on budgetary requirements for the State Aid Schemes on national and EU level (funding needs) in money terms as well as with regard to their yearly distribution
- Provide indication on financing needs of IWT sector (Financing instruments & measures)



# Approach

- Collecting information on planned investment over period 2020-2027 (covering next financial period of the European Union)
- Directly from Funded Partners & ASP (voluntarily) of GRENDEL consortium
- In addition via National coordinators from other major fleet operators (same information or at least consolidated information indications) – company specific meetings and/or stakeholder coordination meetings
- Using questionnaire and capex template
- Aggregation of individual fleet investment plans plus information gathered from major other market stakeholders into “National Fleet Investment Plans”

2

## 1. Existing Fleet

Please fill in the table below. If you have an overview of your fleet in another format, you can just attach it to the questionnaire.

Number	Size	Year built	Engine			Modernisation activities (Year and Type if possible)									
			Type	Emission standard	Year built	Main Engine	Aux Engine	Row Thruster	Bulker	Duct	Cargo Section	Bay Section	Alt body	Other	

3

## 2. Origin of your fleet and typical decommissioning of vessels

If you buy new vessels or decommission them, what are the most common actions you take? Please rate from 1 (very rare procedure) to 10 (most common procedure).

Action	1	2	3	4	5	6	7	8	9	10
Buy new-built vessels										
Buy used vessels										
Decommissioned vessels are sold										
Decommissioned vessels are scrapped										

## 3. How long do you usually keep vessels within your fleet?

---



---



---



---

## 4. What are your reasons to decommission a vessel?

When you decommission a vessel, what describes your reasons to do so best? Please rate from 1 (very rare) to 10 (most common).

Reason	1	2	3	4	5	6	7	8	9	10
Vessel too old (refurbishment not economic)										
Vessel too small (operation not economic)										
Emission standard too low										
Image										



# Fleet Investment Plan Template



Detailed investment planning in different categories for 10 years period

## Maintenance for existing devices and equipment (Refurbishment)

- Repair
- Overhaul
- Exchange

## Equipment in focus:

- Gear boxes,
- Propellers, nozzles, bow thrusters
- Main and aux. engines
- Electric works
- Rudder system
- Anchors and anchor chains,
- Navigation equipment

## Installation of new equipment and devices (Renewal)

- New equipment, that has not been on the vessel before

## Equipment in focus:

- New gear boxes,
- Improved propellers
- Nozzles, bow thrusters
- New main and aux. engines
- Electric works, automation
- Improved rudder system
- Exhaust-after treatment
- New alternative fuel
- RIS related equipment

## Work concerning the whole ship

- Major conversion

## Work in focus:

- Docking
- Hull repair/refurb
- Improved aft section
- Improved bow
- Broadening / Prolonging
- Reconstruction of electric wiring

## Cargo Compartment

## Work in focus:

- Modifying Hatchways
- Adapting to RoRo
- Provision of Power
- Air conditioning



**Manfred SEITZ**

General Secretary

Pro Danube International

Handelskai 265, 1020 Vienna/Austria

**M** + +43 676 406 78 78 **T** + 43 1 890 66 47-20

**E** seitz@prodanube.eu **W** www.prodanube.eu

Photo: © NAVROM

**GRENDEL “Green and efficient Danube fleet”**

Towards modernisation & greening of Danube inland waterborne sector and strengthening its competitiveness

[www.interreg-danube.eu/grendel](http://www.interreg-danube.eu/grendel)



**Towards green, efficient and competitive river Danube transport**

## **Activity 3.2: Elaboration of Individual Fleet Investment Plans**

Kick-off Meeting

Silviu METERNA (Pro Danube Romania) / Manfred SEITZ (Pro Danube International)

---

*Project co-funded by European Union Funds (ERDF, IPA)*





# Activity 3.2: Fleet Investment Plan Template



- **Fleet investment plan questionnaire**
  - Objective: Assessment of current CAPEX plans of shipping companies
  - Structure:
    - General information on fleet, company profile and individual ships
    - Questions on the current strategy of fleet maintenance and renewal
- **Fleet investment plan template**
  - Objective: Provide a common template for the individual fleet investment plans to be developed by the shipping companies



# Activity 3.2: Fleet Investment Questionnaire



- **Main topics of the questionnaire**
  - Overview current fleet
    - Number of ships, age, machinery, annual fuel consumption, equipment, modernisation activities
  - Origin of fleet and decommissioning of vessels
    - New vessels (new-built vs. 2<sup>nd</sup> hand)
    - Decommissioned vessels (sold vs. scrapped)
  - Reasons for decommissioning a vessel
    - Age / general condition / other
  - Maintenance strategy
    - Fixed intervals / On-demand for the whole vessel or certain parts
  - Opening up to new markets
  - Use of alternative fuels



# Activity 3.2: Fleet Investment Questionnaire

## Fleet investment plan questionnaire

### GRENDL Green and efficient Danube Fleet

Long service life of inland vessels, high investment costs, low re-investment capacity of the Danube fleet operators together with knowledge deficits about the lack of public actions & incentives impose severe barriers for the fleet to forthcoming European IWT and environmental policy objectives. GRENDL shall support the Danube fleet operators and their public relevant authorities in the required modernisation process by establishing a cooperation platform of key IWT stakeholders. With the help of dedicated technology deployment preparatory works, as well as guidelines into a widely accepted overall strategy for Danube fleet modernisation to overcome major innovation obstacles. Dedicated activities shall raise the awareness of the sector concerning regulations, advanced technologies which reduce air pollutants & vessels as well as improved transport & logistics management and digitalisation. Further to this, GRENDL will support public authorities support measures (State Aid Model) based on defined investment IWT fleet operators in terms of greening technologies, financial attention is paid to human resources & training requirements of the solutions elaborated will be shared with the Danube IWT sector through the established stakeholder platform, thus ensuring the project results. Improving the environmental and economic performance of the IWT sector as an environmentally friendly transport mode contributes to a more sustainable transport system.

The purpose of this questionnaire is the assessment of the Danube

Nation: \_\_\_\_\_

Number of own ships: \_\_\_\_\_

Number of further ships operating for your company: \_\_\_\_\_

Project co-funded by European Union Funds (ERDF, IPA)

### 1. Existing Fleet

Please fill in the table below. If you have an overview of your fleet in another

Number	Size	Year built	Type	Engine		Main Engine	Aux. Engine	Mod.
				Emission standard	Year built			

Project co-funded by European Union Funds (ERDF, IPA)

### 2. Origin of your fleet and typical decommissioning of vessels

If you buy new vessels or decommission them, what are the most common actions you take? Please rate from 1 (very rare procedure) to 10 (most common procedure).

Action	1	2	3	4	5	6	7	8	9	10
Buy new-built vessels										
Buy used vessels										
Decommissioned vessels are sold										
Decommissioned vessels are scrapped										

### 3. How long do you usually keep vessels within your fleet?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### 4. What are your reasons to decommission a vessel?

When you decommission a vessel, what describes your reasons to do so best? Please rate from 1 (very rare) to 10 (most common).

Reason	1	2	3	4	5	6	7	8	9	10
Vessel too old (refurbishment not economic)										
Vessel too small (operation not economic)										
Emission standard too low										
Image										

Project co-funded by European Union Funds (ERDF, IPA)

### 5. What would describe your maintenance strategy best? Multiple answers are possible.

- ☐ Fixed maintenance intervals for the whole vessel (general overhaul).
- ☐ Fixed maintenance intervals for certain parts.
- ☐ Maintenance only in case of a failure.
- ☐ Parts are replaced when a damage is irreparable.
- ☐ Parts are replaced according to manufacturer recommendation or after a predefined lifetime.
- ☐ Other: \_\_\_\_\_
- ☐ ...

### 6. What are your investment priorities?

Please rate from 1 (lowest priority) to 10 (highest priority).

Reason	1	2	3	4	5	6	7	8	9	10
Modernisation requirements (refurbishment and renewal)										
Increase environmental performance										
Increase economic performance										

Project co-funded by European Union Funds (ERDF, IPA)



# Activity 3.2: Fleet Investment Plan Template



Detailed investment planning in different categories for 10 years period

## Maintenance for existing devices and equipment (Refurbishment)

- Repair
- Overhaul
- Exchange

## Equipment in focus:

- Gear boxes,
- Propellers, nozzles, bow thrusters,
- Main and aux. engines
- Electric works
- Rudder system,
- Anchors and anchor chains,
- Navigation equipment

## Installation of new equipment and devices (Renewal)

- New equipment, that has not been on the vessel before

## Equipment in focus:

- New gear boxes,
- Improved propellers,
- Nozzles, bow thrusters,
- New main and aux. engines
- Electric works, automation
- Improved rudder system
- Exhaust-after treatment
- New alternative fuel
- RIS related equipment

## Work concerning the whole ship

- Major conversion

## Work in focus:

- Docking
- Hull repair / refurbishing
- Improved aft section
- Improved bow section
- Broadening / Prolonging
- Reconstruction of electric wiring

## Cargo Compartment

## Work in focus:

- Mod. Hatchways
- Mod. to RoRo
- Prov. Power & Air conditioning



# Activity 3.2: Fleet Investment Plan Template



VESSEL CAPEX PLAN	Project No.	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028-2030	Total	Remarks
Vessel #1		Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost		
<b>Repair</b>													
Gear boxes													
Propellers, rudders supply, installation													
Bowthruster													
Machinery, electric works													
Rudder system general repair													
Main engine general repair													
Anchors and anchor chains													
Radar													
Auxiliary engine													
Other:													
Other:													
Other:													
<b>Overhaul</b>													
Gear boxes													
Propellers, rudders supply, installation													
Bowthruster													
Machinery, electric works													
Rudder system													
Anchors and anchor chains													
Radar													
Auxiliary engine													
Other:													
Other:													
Other:													
<b>Exchange with similar</b>													
Removing old engines													
Gear boxes													
Propellers, rudders supply, installation													
Bowthruster													
Machinery, electric works													
Rudder system													
Anchors and anchor chains													
Radar													
Auxiliary engine													
Other:													
Other:													
Other:													
<b>Installation of new devices</b>													
New engines													
Propellers, rudders supply, installation													
Bowthruster													
New auxiliary engine(s)													
New main engine													
Rudder system													
Antiskid after-treatment													
RIS related equipment													
New alternative fuel equipment													
Other:													
Other:													
Other:													
<b>Work concerning the whole ship</b>													
Docking													
Hull repair													
Improved aft section													
Improved bow section													
Broadening/lengthening vessel													
Reconstruction of electric wiring													
Other:													
Other:													
Other:													
<b>Deck Compartment</b>													
Modifying hatchways (raising, extending, sealing, etc.)													
Modifications for carrying cars and other Roll-on/Roll-off items													
Providing power and air-conditioning													
Other:													
Other:													
Other:													



# Activity 3.2: Fleet Investment Plan Template



BARGE CAPEX PLAN	Project No.	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028-2030	Total	Remarks
		Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost		
<b>BARGE #1</b>													
<b>Repair</b>													
Bowthruster													
Machinery, electric works													
Anchor and anchor chains													
Auxiliary engine													
Other:													
Other:													
Other:													
<b>Overhaul</b>													
Bowthruster													
Machinery, electric works													
Anchor and anchor chains													
Auxiliary engine													
Other:													
Other:													
Other:													
<b>Exchange with similar</b>													
Bowthruster													
Machinery, electric works													
Anchor and anchor chains													
Auxiliary engine													
Other:													
Other:													
Other:													
<b>Installation of new devices</b>													
New auxiliary engine(s)													
Other:													
Other:													
Other:													
<b>Work concerning the whole ship</b>													
Docking													
Hull repair													
Improved aft section													
Improved bow section													
Broadening/prolonging vessel													
Reconstruction of electric wiring													
Other:													
Other:													
Other:													
<b>Cargo Compartment</b>													
Modifying hatchways (raising, extending, sealing, etc)													
Modifications for carrying cars and other RoRo items													
Providing power and air-conditioning													
Other:													
Other:													
Other:													