

GRENDEL „Green and Efficient Danube Fleet“

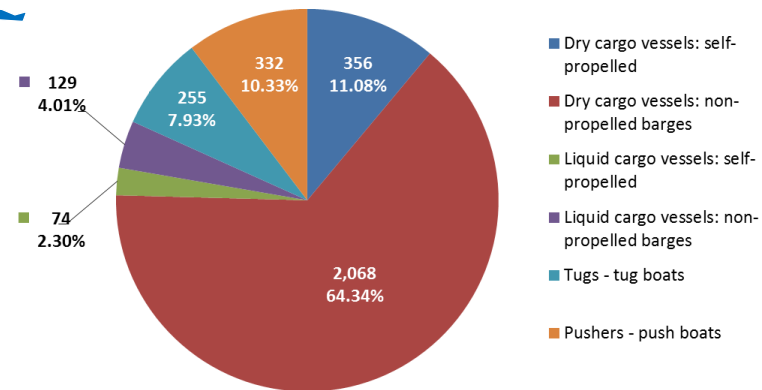
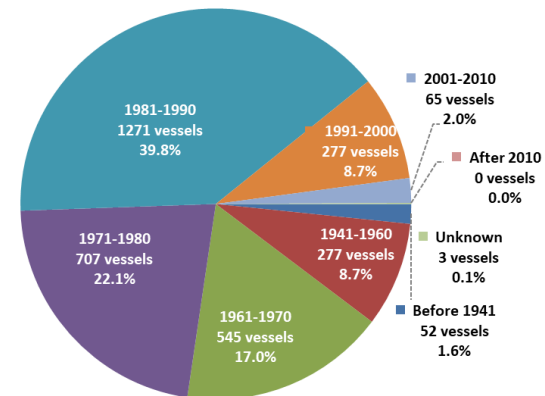
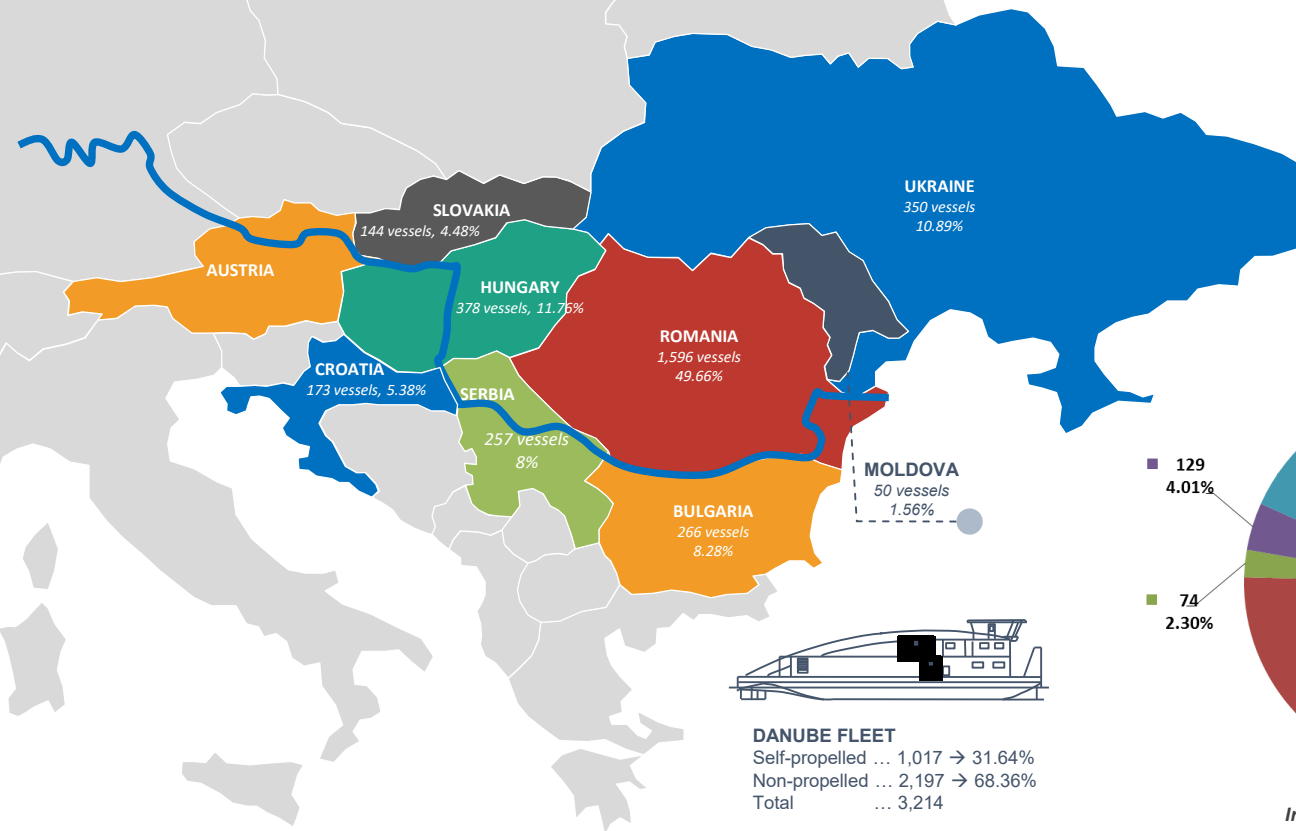
*Towards modernisation and greening of Danube inland waterborne sector
and strengthening its competitiveness*

1st Sustainable Shipping Technologies Forum

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Pro Danube Management GbmH



DANUBE CARGO VESSELS



Inland vessels per country, per age and per type. Figures are for 2016.
 [Source: Danube Commission. Charts: Pro Danube]

CHALLENGES

DANUBE CARGO VESSELS



WATERWAY MAINTENANCE

Insufficient waterway maintenance led to little operating profits, thus to almost no fleet investment and rather to repair activities



ADDRESSING ENERGY TRANSITION

- ❑ to be competitive (environmentally) to road & rail
- ❑ to be compliant with Stage V of NRMM
- ❑ to be politically supported and socially accepted



ADAPTATIONS TO NEW MARKETS

- ❑ RORO, container, biomass, biofuels, LNG & other gases, chemicals, fertilizers, high & heavy
- ❑ quality requirements beyond current equipment & service levels

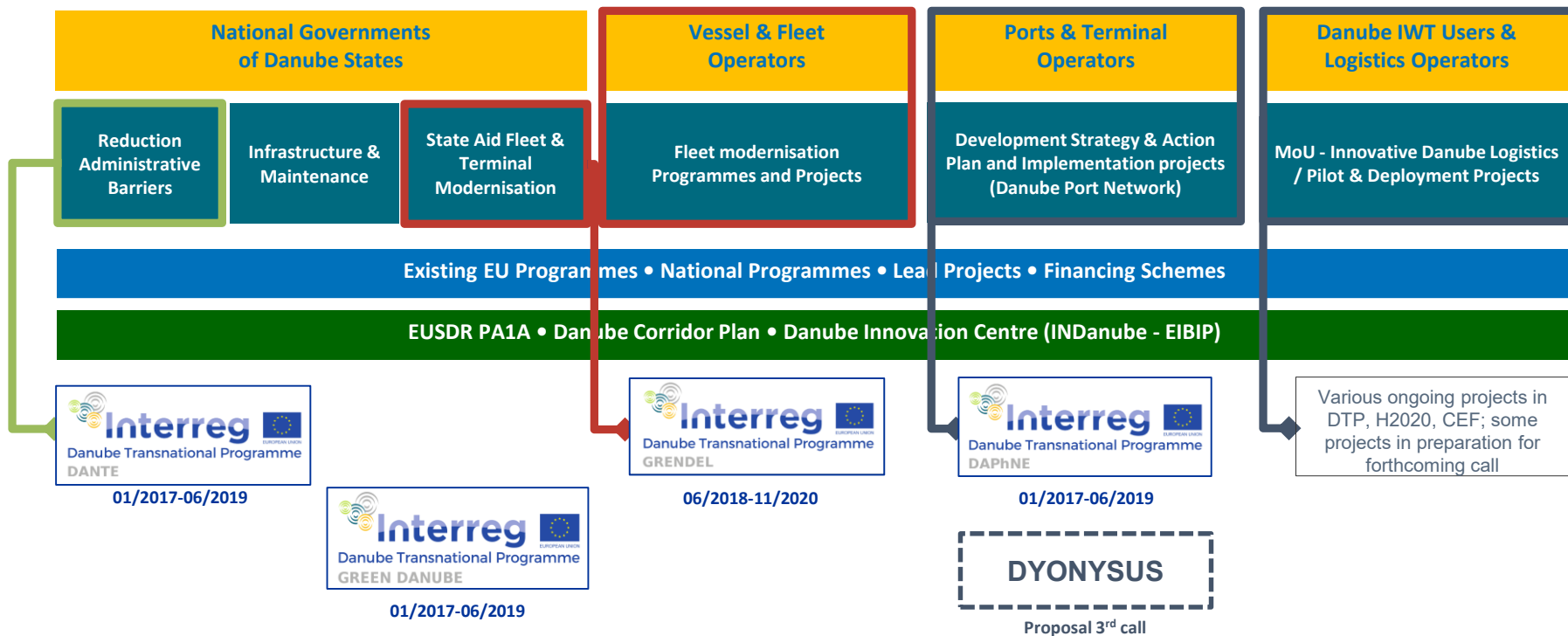


GREENING & MODERNISATION OF INLAND VESSELS

- ❑ Enables the **transition towards zero-emission** and **climate neutral** economy
- ❑ Contributes to **improvement of air quality** in urban areas along waterway and to **reduction of global warming**
- ❑ Strengthens sector **competitiveness**, the industry can be boosted, and both jobs in Europe and export opportunity for greening technologies worldwide can be created.

POLICY INITIATIVE

GREEN DEAL FOR DANUBE RIVER TRANSPORT



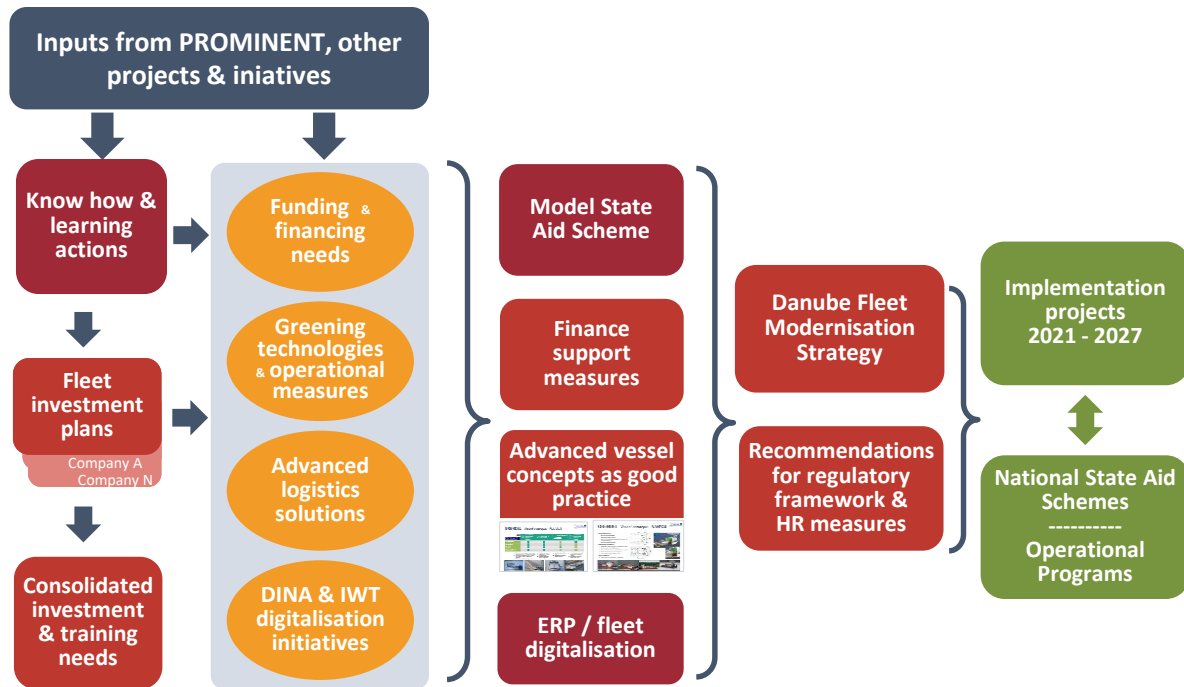
GRENDel Work approach

Green and Efficient Danube Fleet

“

“GRENDel addresses various fleet modernisation aspects: [i] use of low carbon & alternative fuels, [ii] reduction of air pollutant emissions (CO₂, NO_x, PM) and [iii] overall energy consumption. Besides this, [iv] transport & logistics management processes are addressed to ensure better integration of the Danube IWT into logistics chains...”

*Jun 2018 – Nov 2020
Funding: Interreg / DTP*



GRENDel *Know-how transfer to sector*

Technological factsheets & know-how transfer events



CONTENT

- 🕒 Regulations & solutions in development
- 🕒 Technical concept
- 🕒 Economics: investment & operational costs
- 🕒 Environmental sustainability
- 🕒 Benefits
- 🕒 Consideration for deployment
- 🕒 Deployment examples



GREDEL *State Aid scheme model*

Priorities

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.

 **DETAILS**

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.

 **DETAILS**

Increasing safety of IWT



Focusing at safety equipment, safety at work, adaptations to wheelhouse, steering system and manoeuvrability of a vessel, all to support a skipper in navigational and operational aspects / decisions → increase safety.

 **DETAILS**

Renewal of actors in the sector



Encourage the acquisition of the first boat for new river transport companies and new entrants.

 **DETAILS**

Innovative solutions









Development and experimentation with innovative solutions:

- experimentation w. existing or new technology, unproven for IWT
- R&D: design of new technologies to respond to specific needs of IWT
- feasibility studies

 **DETAILS**

GRENDL Vessel concepts - FLUVIUS

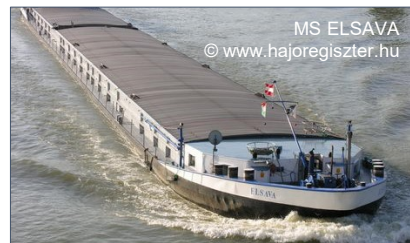
  <small>Schiffahrts und Spedition GmbH</small>	 ELECTRICITY - RENEWABLE ENERGY SOURCE	 RENEWAL OF ENGINES	 HYDRODYNAMICS	 CONCEPTUAL DESIGN (LOW EMISSION ENGINE)
MS JOHANNA	✓	✓	✗	✓
MS ELSAVA	✓	✓	✗	✗
MS ULM	✓	✓	✓	✗
MS MELANIE - H	✓	✓	✗	✗

- ✓ Electrical system assessed and performance measurements done → solar panels feasible
- ✓ Technical solutions with low enviro impact (LED, heating, cooling, water supply - examined)
- ❑ Elaboration of detailed concept - starts soon

- ✓ Emission measurements
- ✓ Suggestions for environmental measures
- ❑ Elaboration of detailed concept - starts soon

- ❑ Vessel in shipyard – Sep 2019
- ❑ Measurements & detailed concept - Jan 2020

- ✓ Measuring operational profile is on-going with equipment installed
- ❑ Elaboration of conceptual design - starts soon



GRENDL Vessel concepts - NAVROM

Structural modification

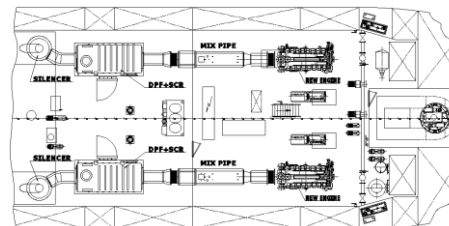
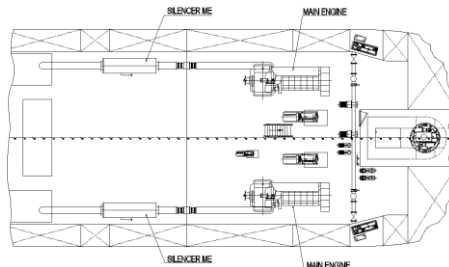
- New main engine foundation
- New exhaust system supports
- Top of funnel modifications, extension of funnel to aft (air draft unchanged)
- New stainless steel urea tank

Piping system modifications

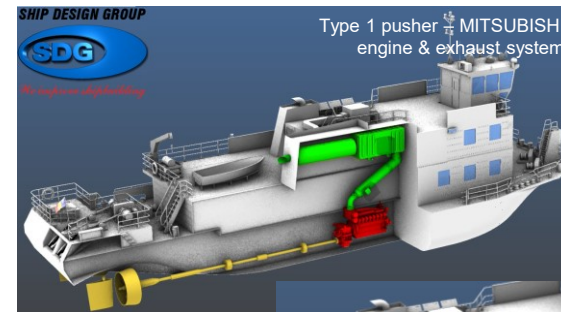
- New exhaust system for ME's and modified for DG's
- New box coolers for the ME's system
- Minor modifications for the fuel oil and lube oil systems
- Modified ventilation system arrangement
- New urea and compressed air systems

Other modifications

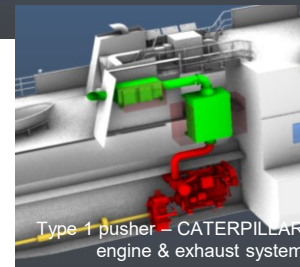
- Control panels and alarm panels, cable trays



Type 3 pusher



Type 1 pusher - MITSUBISHI engine & exhaust system



Type 1 pusher - CATERPILLAR engine & exhaust system



© Peter Kosztolicz. MarineTraffic.com

Type 1 pusher: 2 x 1194 kW/1800 rpm



© Frank22. MarineTraffic.com

Type 2 pusher: 2 x 895 kW/1800rpm



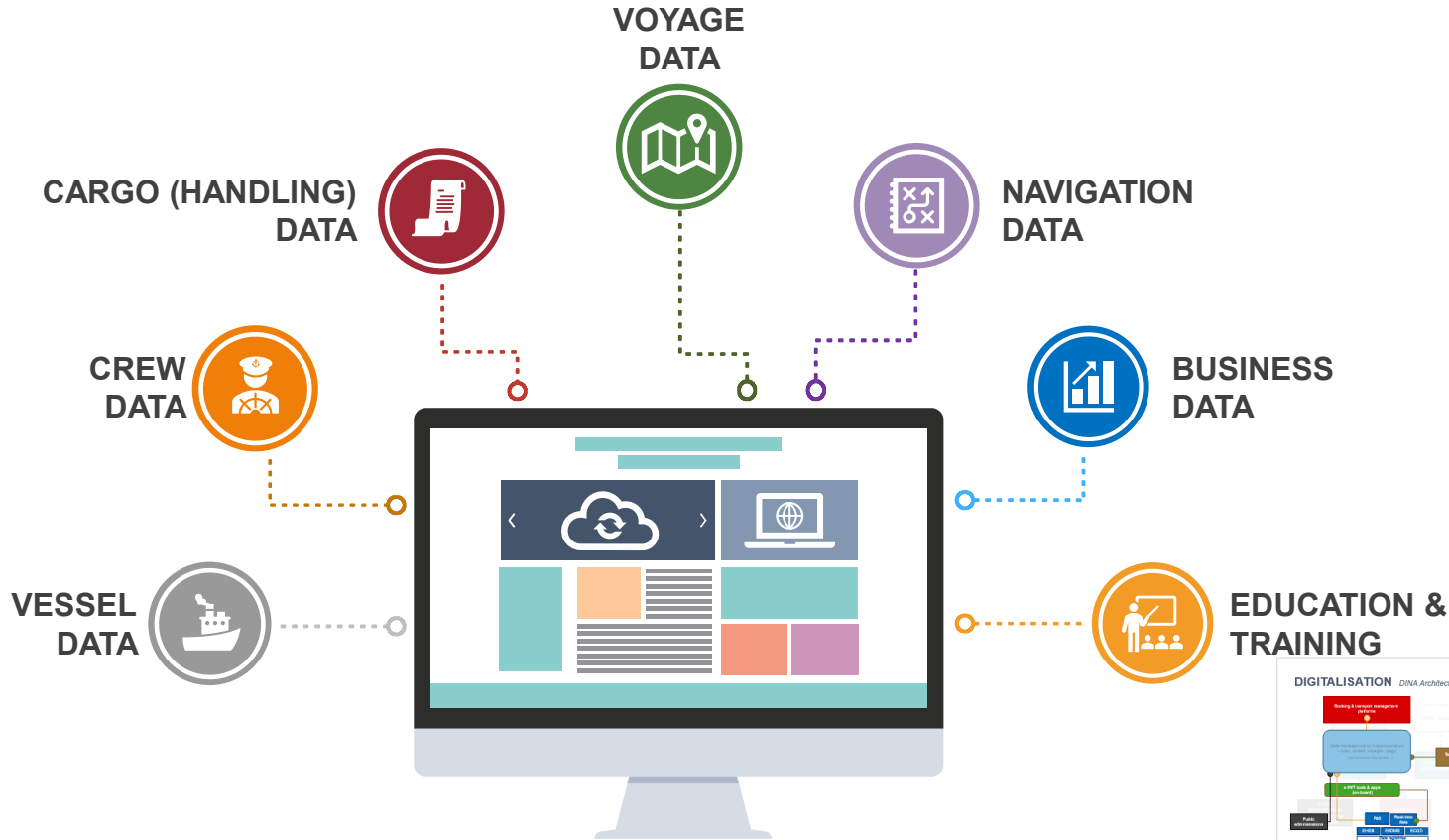
Type 3 pusher: 2 x 1185 kW/1000rpm



Type 4 pusher: 2 x 925 kW/750rpm

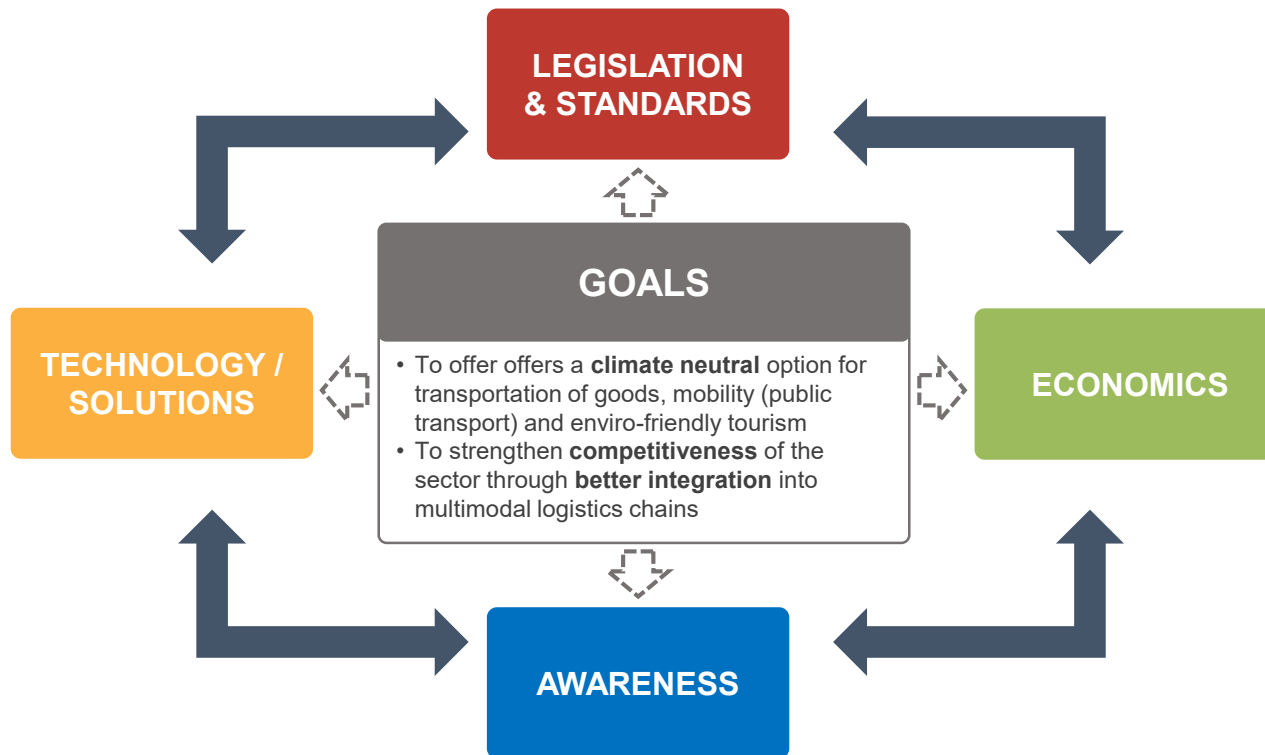
GRENDEL *Enterprise Resource Planning & Fleet Management*

Data Management for Vessel Operators



GRENDel *Danube fleet modernisation strategy*

VISION, GOALS & APPROACH



Strategy will address the long term objectives but will focus mainly on the short-term actions

ACTIONS

Develop ...	Prepare ...
Elaborate ...	Establish ...
Improve ...	Lead ...
Provide ...	Streamline ...
Understand ...	Collaborate ...
Adapt ...	Engage ...
Embed ...	Optimise ...
Secure ...	Maintain ...
Build and exploit ...	Stimulate ...

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Photo: © NAVROM

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www.interreg-danube.eu/grendel

