

GREEN DANUBE

**Integrated transnational policies and practical solutions
for an environmentally-friendly Inland Water Transport system
in the Danube region**



**INNOVATIVE GREENING TECHNOLOGIES
in the Inland Waterways Transport Sector**

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23 Feb 2017, Constanta

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



**Danube Transnational Programme
GREEN DANUBE**

Innovative Greening Technologies

Technical and operational measures for reducing greenhouse gas emissions from inland navigation



We need to improve the environmental performance of IWT ships of all types

By use of alternative innovative technologies





Greening Technologies

EU Project **PROMINENT** - Promoting Innovation in the Inland Waterways Transport (IWT) Sector – launched May 2015

Foresees a forward-looking approach bringing together the economy, the environment and safety for inland navigation with a clear focus on reduction of greenhouse gas emissions and increased environmental friendliness of navigation as well as an increase of competitiveness of inland navigation in logistics networks. Focuses on:.

USA: **Green Ship Technology** conference; Harmonising global industry regulations and promoting sustainability in shipping

- Managing Air Emissions; - Vessel General Permit Spotlight; - Options for Reducing Emissions with Alternative Fuels; - Innovations in Sustainable Ship Design; -Methods for Improving Energy Efficiency; - Approaches to Ballast Water Management

DK: **Green Ship of the Future**

A large-scale Danish research and development project (15 partners) aims to reduce CO₂ emissions from future ships by 30%, and sulphur and nitrogen emissions by 90%





Technology advancement



Machinery – production and consumption of energy



Propulsion



General design



Operation and maintenance



Logistics



Renewable energies



To both retro-fitting and new buildings



Green Danube WP 4 - Greening Technologies



Objective: To contribute to emissions reduction in the Danube ecosystem by analyzing and promoting existing green technologies for IWT, and providing tailor-made innovative solutions for Danube region.

- **Start** : March 2017; **End** : June 2019
- **WP Leader:** BDCA
- **Partners:**; ACTEDJ, CER, CRUP, DCC, DST, PDM, REC, RSOE
 - *ASPs: BMA, DC, MT, OVF, PLOVPUT*
- **Deliverables**
 - D.4.1.1: Technical report on inventory with information on all vessel types
 - D.4.2.1: Technical Report on “Existing technologies and best practices”
 - D.4.3.1: Report on existing facilities for supply of alternative fuels
- **Main output : Strategy for greening the Danube IWT (June 2019)**



existing! Trailing suction hopper dredger, built according to a 'green' design, equipped with 'dual fuel' engines and LNG tanks,



built by Royal IHC (IHC) on behalf of DEME Group, powered by Wärtsilä dual-fuel (DF) engines



existing!

existing !

New Technology of High Efficiency WCT Propeller

**3 Blades Propeller
(High Efficiency)**

+

**WCT
(Low Vibration)**

- Improving Propulsion Efficiency with the Low Vibration & Noise Level

3-Blades WCT

Applied Case: **STX 400K VLOC**

4 Blades - 100% Dia.
3 Blades - 104% Dia.

3% Power Saving

	4 Blades Conv.	4 Blades WCT	3 Blades WCT
Fluctuating Pressure	1.85kPa	1.65 kPa	2.56 kPa

STX Offshore & Shipbuilding



existing!

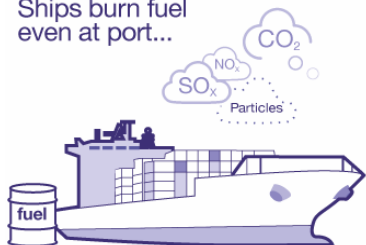


Eliminate port emissions Why can't all ports have clean air?

Ships consume fuel when they stay at the port. This creates pollution, noise and vibration in the port area. The solution to this problem is shore-to-ship power. It allows direct connection of ships to a harbor's electric grid.

Business as usual

Ships burn fuel even at port...



...resulting in



noise



emissions



vibration

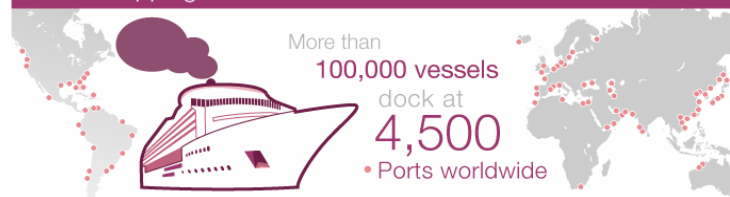
900 Million metric tons of CO₂ emitted annually at ports world-wide

220x

Equal to 220 coal-fired plants



Global shipping



Shore-to-ship power

Any ship can be connected to the power grid

clean air



Benefits



1 cruise ship connected to the grid in the port could annually save

\$750,000 in operational cost



\$3,200,000 in respiratory and heart treatments in the US alone

CO₂ emissions equivalent to 2,500 cars



existing!



Classical AC-Distribution

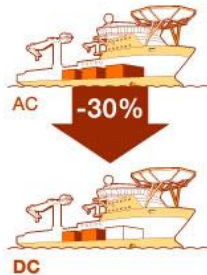
Onboard DC-Grid



Annual emission reduction*

The Onboard DC Grid provides a highly efficient power distribution system that allows a wide range of sea-faring vessels to cut their fuel consumption as well as incorporate DC energy sources such as solar panels and fuel cells.

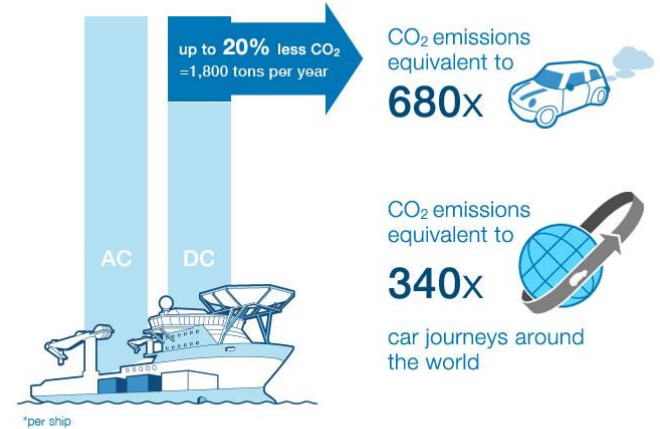
Weight reduced by up to 30%



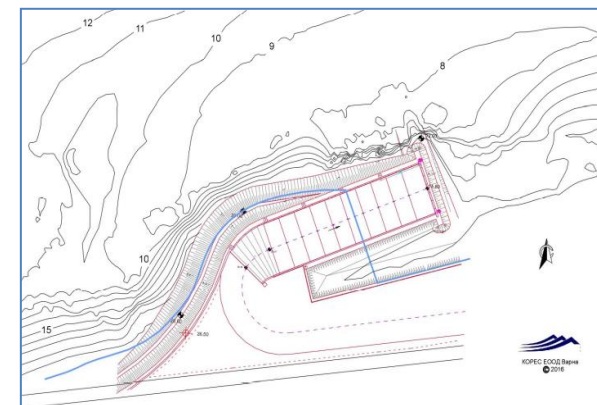
Integration of Renewables



Fuel savings up to 27%



Zero-Emission Autonomous (USV) solar driven hydrographic survey and WQ monitoring boat



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Existing! CORES / BDCA, Varna, Bulgaria

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