

### 3.1 *Publishable summary*

#### 3.1.1 A summary description of project context and objectives

NEWS (Development of a Next generation European Inland Waterway Ship and logistics system) project is supported by the European Commission under the 7<sup>th</sup> Framework Programme for Research and Technological Development. The project started in March 2013 and will end in August 2015 and it is conducted by ten partners across Europe (four universities and research institutes, five SMEs and one enterprise from five different EU Member States).

NEWS main objective is to increase transport flows on inland waterways (focusing mainly on the container transport on the Danube) by:

- a) developing a Next generation European Inland Waterway Ship and logistics system to make inland waterway transport more economically, ecologically and time efficient
- b) convincing customers with the help of a preliminary approval, logistics concept, port preparation, a finance and business plan and the demonstration of usability and performance to invest into NEWS.

Central European inland waterways are presently utilized way below their theoretical carrying capacity: for example at the moment cargo transported on the Danube is only 10-20% of that transported on the Rhine. Some major reasons for this are:

- a) shipping agents may assume that forwarders (or owner-operators) on inland waterways are more inflexible than road or railways
- b) due to altering water-levels, schedules may not be followed reliably
- c) time-critical transport is problematic due to waiting times at locks or inland ports
- d) inland waterways are often not being maintained properly according to actual TEN-T requirements
- e) combined transport, requires additional moves in traffic nodes
- f) “critical reputation” of inland waterway shipping industry.

The economic situation of companies operating inland waterway transport is, amongst others, characterized by an over aged fleet, eroding profit margins, a high dependency on fuel costs, and/or infrastructural bottlenecks causing delays in running-times. Container transport on European inland waterways will and shall grow within the next years: one aim of the EU Strategy for the Danube Region (EUSDR) is to increase cargo transport on the river by 20% by 2020 compared to the year 2010. This growth will only be manageable if the entire transport and logistics chain, including port infrastructure and logistical processes, is optimized simultaneously. The main technical innovations with regards to NEWS are:

- a) re-design of a container specified hull allowing to store 4 containers side-by-side and 3 stacked increasing transport efficiency whilst maintaining standard technical and infrastructural dimensions
- b) adaptable draught and ballast tank (crossing below even low bridges and reacting to altering water-levels) increasing days of navigability
- c) LNG-electric energy and propulsion system allowing increase in resource efficiency up to 30% and decrease of harmful exhaust emissions.

To realize the full potential of NEWS, the surrounding logistics systems will be taken into account:

- a) Logistical network structures within the identified most promising catchment area are analysed and re-organized (designing logistics chains). Inland ports for container handling

will be integrated into the NEWS concept since they are linking the different transport stages within transport chains

### 3.1.2 A description of the work performed since the beginning of the project and the main results achieved so far

Having worked mainly on WPs 1, 2, 3, 4, 5, 8 and 9/10 within the first reporting period (M 1 – M 15), the following results have been achieved or are in progress:

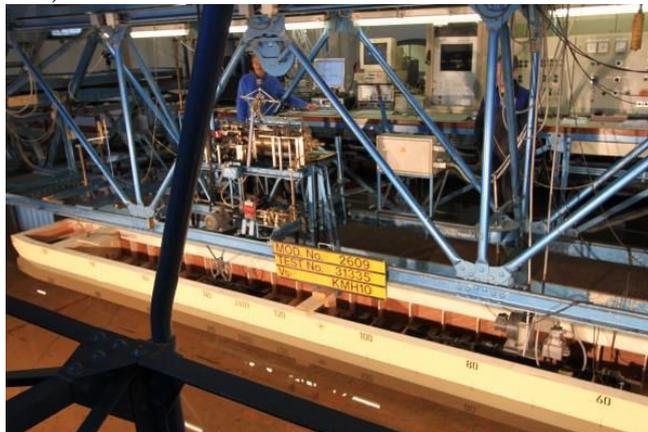
#### WP 1: Technical development of novel container ship

After having developed hull lines, elaborated the structural Design of the Container Vessel, undertaken a Weight Calculation, calculated Displacement Values, composed main ship data and provided a Lines Plan, General Arrangement Drawings, Web Frames, Building frames and bulk heads for NEWS, Germanischer Lloyd has approved the Construction Principles. Of course, a net load curve, the shear force curve and the bending moment curve for critical loading conditions in agreement with “Germanischer Lloyd” have been calculated as well.

The results gained so far are technically satisfactory as they show the absolute possibility to carry three layers of containers and four containers side by side on the Danube and moreover on about 80% of European Inland Waterways.

For validation purposes, model tank tests were carried out at Vienna Model Basin Ltd. in November 2013. The tests were carried out with a model in the scale of 1:12,5. Three model versions were tested:

- Model 1: Extended version of a "Stein" class vessel. The design of the aft body remained identical to the "Stein"-class ships. The basic model was Mod. No. 2609.
- Model 2: The forebody and the parallel mid body (Model No. 2609A) was identical model 1, the aft body was modified. NEWS is designed without a conventional engine room, but a certain number of power sets are positioned on the main deck, and L- or Z-drives are used as propulsors.
- Model 3: Like model 2, but equipped with a newly designed forebody, which normally is not used on shallow water ships, but is similar to conventional bow shapes of sea-going ships (Model No. 2609B).



With models 1 and 2, resistance-and self-propulsion tests were carried out. With model 3, a self-propulsion test was performed. All tests were carried out on a draught corresponding to 2,70 m in full scale on a full scale water depth of 4,0 m. The NEWS design of the aft body **led to an average**

**improvement of 10% compared to the extended "Stein"-class ship.** The newly designed fore body expectedly led to no improvements, except at the low speed of 10 km/h, where an improvement close to 17% was noticed. At speeds exceeding 12 km/h, a remarkable increase of power was noticed. The results of the tests are the basis for further considerations concerning the use of various propulsors.#

Based on the results of the model tank tests, power speed calculations, based on LNG as fuel, were carried out. 22.5% of fuel costs can be saved annually with NEWS (LNG-driven) in comparison to the best-performing alternative inland vessel operating on the Danube.

## **WP 2: Technical development of LNG-electric energy- and propulsion system**

Contributing to the “Technical development of novel diesel-, gas-, LNG-electric energy and propulsion system”, the improvement of the sustainability of the propulsion- and ship service system has been worked out. First, a State-of-the-art comparison for propulsion systems including the energy production, propulsion and energy distribution system on board of the comparison ships to NEWS has been undertaken. Technical sketches of the main arrangement of the components of all variants:

- Diesel-Mechanic
- Diesel-Electric
- Gas-Electric
- one Propeller
- two Propellers
- with propeller-nozzle
- fixed shaft line
- Z-drive Azimuth thrusters

have been provided.

In that context, electric control operation and distribution system for an LNG-electric propulsion system attuned to the requirements of NEWS was elaborated, including power speed predictions. As a special feature, the complexity of electrical consumers on board of inland vessels have been analyzed and visualized in a detailed drawing. This ended up in a first proposal for an electric load-balance table.

Focusing on real-market conditions, representative loading cases (spot-and liner market) have been defined. By the help of running profiles, an innovative bridge calculating tool and Navigation Conditions of water depth and average stream of the Danube virtual route calculations could be carried out. They serve to prove NEWS’ flexibility with respect to ballast water and lowering the ship draft. Considering the route Ybbs → Costantza, a comparative fuel oil calculation of different vessel types and propulsion concepts has been carried out to demonstrate NEWS’ features beyond-the-state-of-the-art. These calculations proved that the annual fuel costs of NEWS were by far the lowest.

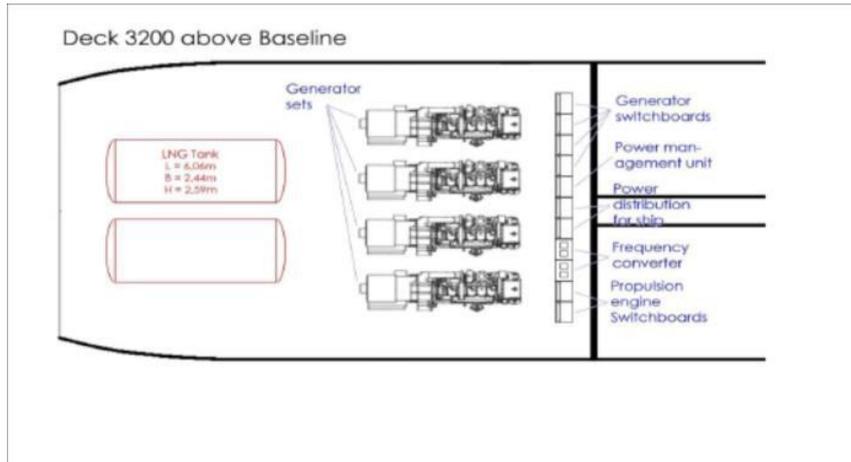
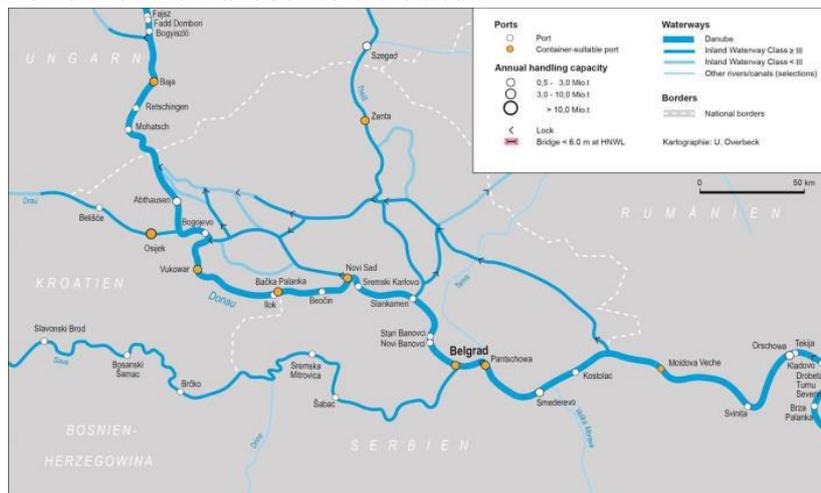


Figure 1: NEWS with LNG-electric propulsion (Lindenau)

### WP 3: Macro-regional analysis: Spatial framework

A basic geographic infrastructural analysis of the Danube, providing the framework for inland waterway transport (IWT) and potential application of NEWS, was undertaken. Especially locks, bridges, ports and fairway depth of the Danube were analysed. As a main result, maps of the infrastructural framework of the Danube were created.



A tool making it possible to calculate clearances of all bridges along the Danube as well as along the bordering waterway system (e.g. Rhine) for a vessel with different loading conditions has been developed. It will be enlarged in course of WP 7.

Bridges across the Danube				Crossing		NEWS
No.	km.	Country	Name	Upstream	Downstream	
1	0.414.25	DE	Maximiliansbrücke (Kehlheim)			Statistical numbers (upstream)
2	0.412.72	DE	Europa-Brücke (Kehlheim)			Used TEU-Container places (ETU)
3	0.410.10	DE	Straßenbrücke Saal			Number of loaded containers (ETU)
4	0.401.90	DE	Eisenbahnbrücke Reimsen			Number of TEU-Container places (ETU) or empty TEU-Containers
5	0.401.74	DE	Wehrbrücke Bad Abbach			Weight of all loaded TEU-Containers (10.03 t/TEU)
6	0.400.28	DE	Wirtschaftswehbrücke Bad A.			Weight of all loaded TEU-Containers (13.4 t/TEU)
7	0.397.59	DE	Autobahnbrücke Siming Str.			Weight of all loaded containers
8	0.386.71	DE	Eisenbahnbrücke Siming Str.			Number of empty containers
9	0.385.87	DE	Eisenbahnbrücke Marienort B.			Number of TEU-Container places (ETU) or empty TEU-Containers
10	0.381.10	DE	Autobahnbrücke Pfaffenst.			Weight of all empty TEU-Containers (2.33 t/TEU)
11	0.381.06	DE	Wehrbrücke Pfaffenst. Bsp.			Weight of all empty FEU-Containers (4 t/FEU)
12	0.380.17	DE	Oberpflaßbrücke (Regenb.)			Weight of all empty containers
13	0.379.56	DE	Pratzmühlwehbrücke (Regenb.)			Daught (cm)
14	0.379.39	DE	Nebelungenbrücke (Niederr.)			Clearance (cm)
15	0.376.82	DE	Eisenbahnbrücke Schwabehn.			Used TEU-Container places through TEU and FEU
16	0.376.33	DE	Straßenbrücke Regensburg			Statistical numbers (downstream)
17	0.369.64	DE	Straßenbrücke Constanst.			Used TEU-Container places (ETU)
18	0.368.26	DE	Autobahnbrücke Wippen Str.			Number of loaded containers (ETU)
19	0.363.31	DE	Straßenbrücke Pfaffen Str.			Number of TEU-Container places (ETU) or empty TEU-Containers
20	0.321.82	DE	Straßenbrücke Lin. Selmstau			Weight of all loaded TEU-Containers (11.03 t/TEU)
21	0.320.00	DE	Agnes-Bernauer-Brücke Str.			Weight of all loaded FEU-Containers (2 t/FEU)
22	0.316.98	DE	Straßenbrücke Reibarsdorf			Number of empty containers
23	0.311.27	DE	Eisenbahnbrücke Bogen Bah.			Number of TEU-Container places (ETU) or empty TEU-Containers
24	0.306.40	DE	Straßenbrücke Bogen Str.			Weight of all empty TEU-Containers (2.33 t/TEU)
25	0.290.12	DE	Autobahnbrücke Metzer Str.			Weight of all empty containers
26	0.285.90	DE	Eisenbahnbrücke Deggendorf			Weight of all containers
28	0.283.49	DE	Autobahnbrücke Fischendorf			Daught (cm)
29	0.283.49	DE	Autobahnbrücke Duggendorf			Clearance (cm)
30	0.282.52	DE	Autobahnbrücke Duggendorf			Used TEU-Container places through TEU and FEU
31	0.286.23	DE	Donau-Wald-Brücke (Wimser)			Statistical numbers (downstream)
32	0.249.16	DE	Straßenbrücke Wisthofen IM			Used TEU-Container places (ETU)
33	0.234.26	DE	Autobahnbrücke Schindler			Number of loaded containers (ETU)
34	0.230.63	DE	Kabelsteg Fachleit. Kabel B.			Number of TEU-Container places (ETU) or empty TEU-Containers
35	0.230.42	DE	RMD-Schleusenbrücke Kappel			Weight of all empty FEU-Containers (4 t/FEU)
36	0.230.28	DE	Eisenbahnbrücke Straubach			Weight of all empty containers
37	0.230.10	DE	Franz Josef-Strauß-Brücke			Daught (cm)
38	0.226.98	DE	Schandlbrücke (Passau) Str.			Clearance (cm)
39	0.225.76	DE	Autobahnbrücke (Passau) Str.			Used TEU-Container places through TEU and FEU
40	0.223.20	DE	Eisenbahnbrücke Kraselheim			Ship characteristics
41	0.203.28	DE	Kranbrücke Jochenstein Kra			Change draught 1 cm per parked (t)
42	0.194.10	AT	Straßenbrücke Niederranna			Draught without parked (cm)
						Max. High (cm) at Height in the Centreline (2 Layer)
						Ballast Tank (change draught in cm)

Moreover, the most **promising catchment and operation area for NEWS** out of a macro-regional perspective was localized. Therefore, a macro-regional analysis of the existing transport flows and the existing economic structure in the hinterland of the Danube was conducted.

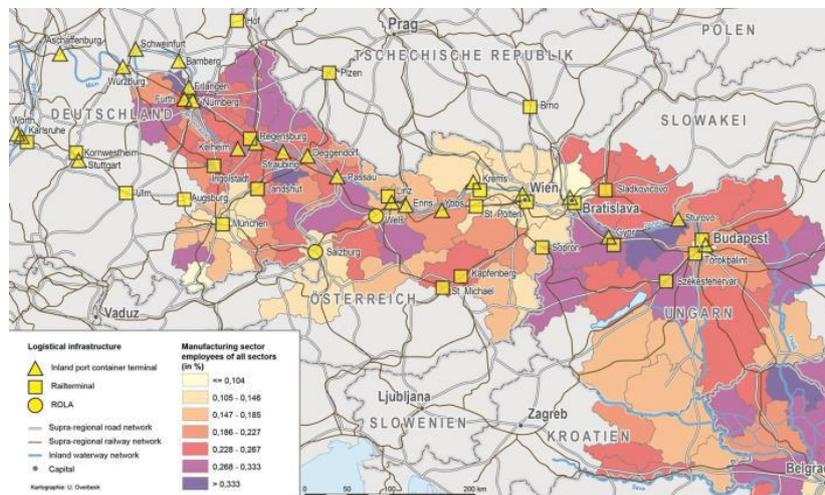
#### WP 4: Micro-regional analysis: Logistical network structures and intermodal integration of NEWS

The Upper Danube between Germany and Hungary with its main population centres Vienna (AT), Bratislava (SK) and Budapest (HU) and their significant spatial concentration of the manufacturing sector in the corridor Bavaria-Linz-Vienna-Bratislava-Budapest has been identified as the most promising catchment and operation area for NEWS.

Within the micro-regional analysis, the logistical network in the most promising catchment area for NEWS has been analyzed. The analysis serves as basis for all further steps regarding the re-organization of existing transport chains. It is vital to be aware of all characteristics of the logistical nodes and links to be able to...

- asses existing transport chains
- design potential new transport chains with NEWS
- identify bottlenecks and give hints how to optimize them

Therefore, all trimodal and multimodal logistical nodes and links within a 100 km corridor of the Danubian hinterland have been identified and characterized. To characterize trimodal and multimodal logistical nodes and transport links, a multi-criteria evaluation matrix with eight different categories has been developed.



To visualize the logistical network in the most promising catchment area, a thematic map was drawn. The different logistical nodes have been classified in “Rolling Road (RoLa)”, “Rail Terminal” and “Inland port container terminal”.

#### WP 8: Dissemination

The NEWS consortium has produced the following dissemination material and has performed tasks accordingly:

- Public Website
- Dissemination Material

- Printed Publications
- Electronic Newsletters
- Conference Attendance

The dissemination activities are on-going activities during the entire project duration

## **WP 9/10: Technical and Administrative Project Management**

Address of project website: [www.news-fp7.eu](http://www.news-fp7.eu)

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The following SMEs and research institutions are NEWS partners:

- Ziviltechnikerkanzlei Anzböck/ Austria
- Regional Development Agency of the West Region Romania  
Lindenau Maritime Engineering and Projecting/ Germany
- University of Duisburg-Essen/ Germany
- TU Dortmund University/ Germany
- University of Novi Sad/ Serbia
- Intermodal Concepts & Management AG/ Switzerland
- PROJEKTkompetenz.eu GmbH

NEWS is happy to count on the following associated partners:

- Port of Vienna
- Port of Novi Sad
- Port of Enns
- Port of Moldova Noua
- SENATOR INTERNATIONAL
- DHL Global Forwarding GmbH
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