

## PROMINENT November 2017

The **PROMINENT** project delivers a range of products which are ready for market-uptake. First of all, a number of technologies and concepts which will assist ship-owning companies in becoming more environmentally friendly than today. Second of all, the **PROMINENT** project delivers a number of policy support results, in the following fields: certification, monitoring and enforcement; engine room improvements for emission reduction; skilled workforce and quality jobs and support measures for roll-out of energy-efficient navigation. Legislative developments are often the foundation for the implementation of greening technologies and concepts by the end users. Therefore, **PROMINENT** not only supports the market uptake by means of standardisation and an effort to decrease implementation costs, but by policy support as well. In addition, the greening of the sector depends on the human factor as well.



For this reason, dedicated activities are undertaken in the area of the human factor. From the 16th till the 19th of April 2018, **PROMINENT** will be attending the Transport Research Arena (TRA) in Vienna ([www.traconference.eu](http://www.traconference.eu)). Besides the activities during the exhibition, **PROMINENT** will host as well the final meeting and will organise an event where students from all over Europe will work on cases to further integrate IWT into the logistics chain. You are all welcomed to join the activities of **PROMINENT** during the TRA and an invitation concerning the definitive date of the final meeting will follow as soon as possible. Looking forward to meeting you in Vienna to discuss the results achieved by **PROMINENT**.

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## WP 2 Cost and energy-efficient emission reduction

One of the first activities within **PROMINENT** was the identification of the best available technologies for emission reduction. This resulted in a shortlist of these technologies, based on the possible emission reduction, the technical and financial feasibility and applicability on inland vessels. On this shortlist are also the rightsizing of the engine configurations and diesel electric or hybrid configurations. Both configurations depend strongly on the operational profiles of an inland vessel.

### Energy model

Rightsizing of the engine is a solution for so-called 'over-dimensioning'. Operational profiles often show that the total installed propulsion power is hardly used. The key of right-sizing is to design/use an optimal engine configuration for the operational profile of the vessel. Hybrid propulsion is one of the possibilities to use engines more efficiently, aiming at a higher average engine load and a higher fuel efficiency. However, for these configurations, it is important to carefully optimise, as energy losses occur due to conversion from mechanical to electric power and visa-versa. Within **PROMINENT** an energy model is developed, making it possible to simulate a wide range of (hybrid) drivelines

and compare the performance of them. To do this, a generic driveline model is presented with existing configurations. In order to apply the model to real case vessels, on-board measurements are used to fit the energy model to match the delivered engine power exactly. For this, on-board flow and depth measurements are used. In conclusion, the fitted energy model makes it possible to study and compare hybrid vessel propulsion configurations.

### Rightsizing tool

Based on this ship energy model, a right-sizing tool is currently developed, in which a supplier or a shipowner can compare driveline configurations to come to optimal settings. In this tool a particular

vessel type and an operational profile can be chosen. Then it's possible to adjust the speed parameters for up-, downstream and canals. The outcome is an overview of engine configurations (e.g. the conventional diesel configuration, some hybrid configurations and diesel minimum power) with their fuel consumption, the NO<sub>x</sub> and CO<sub>2</sub> emissions. For each of the components within an engine configuration the costs are determined in

discussion with the suppliers, making it possible to calculate the costs and benefits of them. The report on the ship energy model can be downloaded from the **PROMINENT** website.

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## WP 3 Certification and monitoring

*The concept and PROMINENT results of On-Board Monitoring were presented on two international workshops, both coincidentally in Frankfurt. The first one was during the 2nd annual Forum for Non Road Mobile Machinery on 7 & 8 September, organized by the TBM group. The second one was during the Horiba TECHDay taking place on 18 October.*

Participants of the NRMM forum were equipment- and engine manufacturers, measurement equipment suppliers, the European Commission (JRC) and some universities. The focus of this meeting was around the Stage V emission legislation, especially on the so called In-Service Monitoring (ISM). ISM is formally required to be carried out by the engine OEMs, on a sample basis, for the land based NRMM (56 to 560 kW). For inland vessels and rail locomotive, the formal requirements will follow later.

Ruud Verbeek of TNO presented the **PROMINENT** methodology of (long term) continuous monitoring as a good option to collect these ISM results. In **PROMINENT** this is referred to as Real Sailing Emissions (RSE). In this concept NO<sub>x</sub>, fuel flow and other key parameters such as GPS position are monitored during several weeks or more. Consequently the raw measurement data is sent by GPRS to a central database and converted to practical units such as the g/kWh emissions and power and several standard graphs are created to judge the overall performance.

The focus of the Horiba RDE TECHDay was legislation and measuring equipment for Heavy-Duty (trucks) and NRMM. Also low costs On-Board Monitoring equipment such as used in **PROMINENT** came back in several presentations. For road vehicles, the On-Board Monitoring equipment is primarily seen as ideal development tool in order to make sure (for the vehicle OEM) that his vehicles will perform adequately under all (legally required) circumstances. This is an important item since 'diesel gate' (NO<sub>x</sub> emission problems with diesel cars).

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## WP 4 Digital Education Tools

### E-learning

The E-learning modules Vessel Stability, Energy Efficient Navigation and Dangerous goods are finalized and reviewed within the project team. The modules are uploaded on a test environment of a Learning Management System and will be tested with students of STC Group in Rotterdam and Schiffer-Berufskolleg RHEIN in Duisburg. The students experiences will be used to evaluate and further improve the modules before sharing the content for public use.

### European electronic service record book and logbook

The prototype of the e-SRB and E-Logbook will be completed and ready to be tested by half of November. In the period November 2017 till February 2018 different pilots will be conducted on vessels from different barge operators such as Interstream Barging, Thyssenkrup Veerhaven and Navrom.

### Pilot CoP Logistics Education

On the 10th of October a Train-the-Trainer workshop was conducted in Duisburg. During this event lecturers were trained how to use the Community of Practice. Besides the CoP system and the material developed was disseminated to participants from the IWT industry and educational institutes. During the TRA 2018 in Vienna, in April 2018, a final event will be organized, in which the project partners and involved students will promote the CoP.

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## WP 5

# Real life pilots:

## Monitoring and simulation results for *PROMINENT* vessels

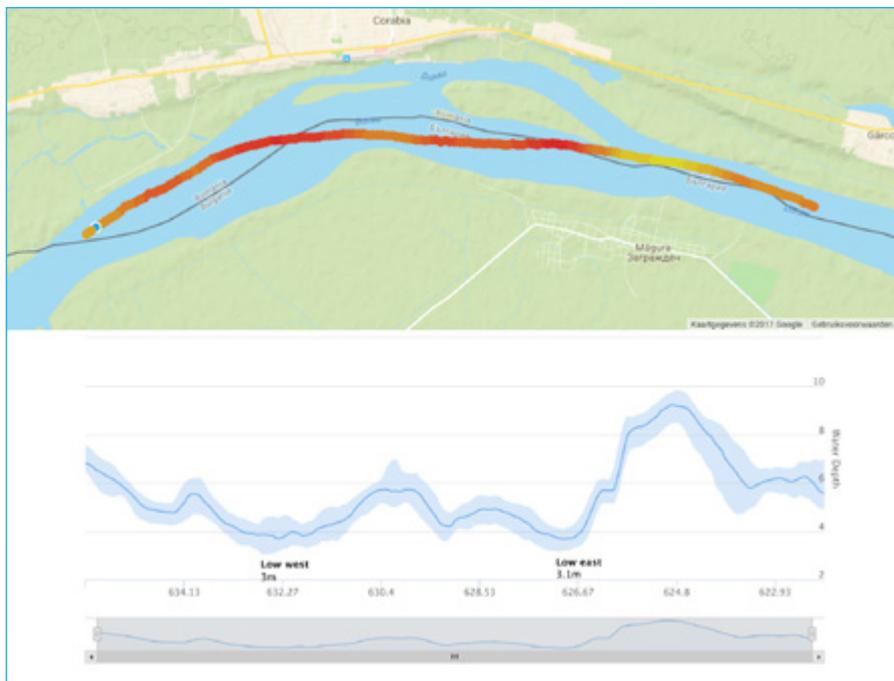
Since January 2016 the Danube monitoring within *PROMINENT* is taking place on a group of ten pushers. On top of engine performance, special care is taken of observing river conditions such as water depths and currents. Already, the *PROMINENT* database has grown to contain over 100,000 hours of data. In this pilot, this data is utilized to estimate the river depths remotely at a Romanian city called Corabia. This part of the Danube is a well-known bottleneck.

### Data quality

The validity of the data was filtered using common-sense conditions in order to obtain the most precise dataset. This resulted in a total of 55 valid observations of the bottleneck. The observations were done in all different seasons, making the results useful year around. The analysis showed a strong correlation between the observed water depths in the fairway and the water levels provided by a water level gauge situated at Corabia. This correlation has made it possible to estimate water levels in the fairway, without monitoring the fairway condition continuously.

### Website

In order to publish the results, a website was set up. This website provides a day-to-day estimation of the water depths near Corabia. The target groups are waterway authorities and logistical planners. The website shows the most shallow parts of the river and provides detailed information on their locations.



Since the depth profile is defined in a 100m resolution, numerical depth values can be obtained at high spatial resolution. This is done by tapping/clicking on the map or graph, which activates a popup screen with the expected water depth and range to indicate the uncertainty.

This pilot shows that it is possible to estimate water depths using the a combination of local on board monitoring data and real-time water levels of an on shore gauge. Confidence in the quality of the data is high enough to use the result to support decision making for further monitoring, in case that maintenance may be required, or to support

for logistical planners to estimate the amount of cargo that may be shipped.

The usefulness of the data and the quality of the depth estimate indicate that this method may be suitable to use in other bottlenecks of the Danube as well. There is however the condition that monitoring data of the bottleneck is available from the measurements, and that the fairway is not too wide so that the quality of the estimation can be guaranteed.

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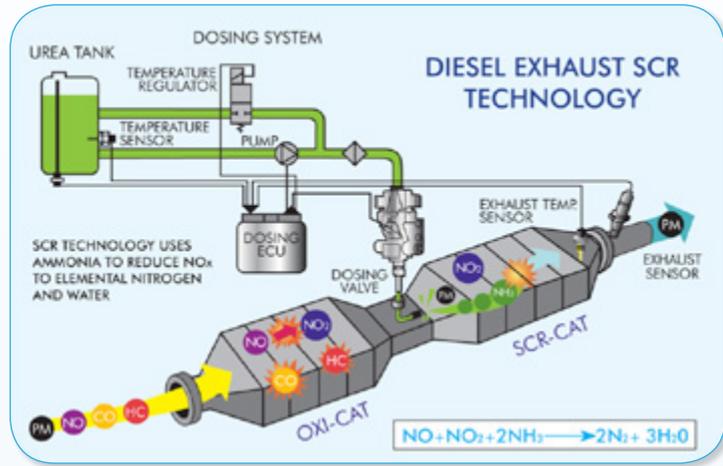
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## WP 6 Roll-out

In the WP 6 Roll-Out the intermediate report was prepared for the review of the pilots. There is good progress and already quite interesting result, such as the indication that the SCR system developed in PROMINENT might even reach NO<sub>x</sub> levels which are in the range of EURO VI trucks. Moreover, the monitoring pilots show interesting diagrams on the real power usage and emission levels for different types of vessels and sailing profiles. This is vital input for greening options such as optimising engine size/configuration, energy efficient navigation, applicability of hybrid concepts as well as the effectiveness of SCR systems.



Another ongoing work is the assessment of financing options and needs to enable roll-out of the greening technologies. An overview is being made of available schemes on national subsidy and financing schemes and interviews are being carried out with different types of stakeholders across Europe (banks, ship owners, technology providers, governments, etc.). Recently a first assessment of investment needs was made and provided to INE, EBU and ESO to take into account for their discussions with European Commission as regards the request for financial instruments and funding.

### Investment Support Tool

Furthermore, a tool is being prepared to support ship-owners in the investment decisions. This is called "I-STEER" which is an acronym for "Investment Support Tool for Emission and Energy Reduction". This tool shall build on validated findings of the PROMINENT research and pilots. The ship owner will get an overview of the various greening options and will be able to make for his situation an assessment on the feasibility/applicability. Moreover, it is meant to become an open and neutral platform for system suppliers and market place for green solutions and technologies, including a business model for continuity also after the PROMINENT project is finished.

Moreover, during the first quarter of 2018 all results of the PROMINENT project from other Work Packages will be reviewed, notably the results of pilots. Subsequently the conclusions will be drawn and recommendations will be made for the follow-up actions (roadmaps) for different topics:

- Certification, monitoring and enforcement emission limits
- Engine room improvements
- Skilled workforce and quality job
- Energy efficient navigation

In order to have a solid base for conclusions and recommendations and embedding of follow-up activities, there is coordination and interaction as well with other projects and initiatives such as GLEC, the Green Deal COBALD in The Netherlands, and projects CoVadem / NOVIMAR, CLINSH, CEF LNG Breakthrough, EIBIP. The Dutch LNG Platform and with CESNI.

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