

PROMINENT mid-term review

The **PROMINENT** project is approaching its mid-term review, which is conducted by INEA as an evaluation of the first 18 months of the project. The **PROMINENT** Consortium has conducted thorough exercises and already delivered concrete results beneficial for the Inland Waterway Transport Sector and all its key stakeholders. It is obvious that stakeholder involvement is key for the success of this project. The research and pilot deployment are conducted in close cooperation with all key stakeholders, in order to ensure that the outcomes will be taken up by the industry after the lifetime of **PROMINENT**.

In the area of pilot deployment, the first vessels have been equipped with material and tests are being conducted. The results are reflected upon in this newsletter. Other pilot deployment activities are undertaken in the area of logistics education. On the 13th and 14th of December this year, the **PROMINENT** project will conduct its mid-term review with INEA, DG Move and the Joint Research Centre of the European Commission, followed by the Advisory Board which provides strategic guidance to the project. These meetings are conducted in Brussels. The meeting of the Advisory Board is open to key stakeholders and in case you are not included in the list of invitees, please do not hesitate to contact us.

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WP 2

Advanced concepts for mass introduction

For a research and innovation project like **PROMINENT**, it is important to closely follow new developments concerning market demands and regulatory issues. At the end of the project, the concepts further developed in **PROMINENT** shall comply with the relevant regulations and be in line with the needs of the market. Important regulations for the emission-reducing concepts are emission standards.

NRMM Stage V

In July, the European Parliament and the Council for the European Union adopted a new proposal for the revision of the EU emission standards for 'non-road mobile machinery', stage V. In 2019/2020 these standards will come into force and new engines for inland vessels shall comply with them. These new standards require 70 to 84% NO_x reduction and 92.5% PM reduction compared to the present CCNR-II standards. Next to these challenging ambitions for emission reduction, these new emission standards introduce a standard for the maximum number of particulates as well.

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

* For gas engines: $0.19 + (1.5 \cdot A \cdot GER)$, in which A=6 and GER is the average Gas Energy Ratio, with a maximum of HC=6.19 / kWh.

Future-proof concepts

Research is performed on the further development of four 'advanced concepts for mass introduction', concepts aiming at emission reduction of inland vessels and making it available and affordable for a major share of the fleet: SCR catalysts and DPF (diesel particulate filter), LNG, energy-efficient navigation and right-sizing and hybrid configurations. One of the ambitions of **PROMINENT** is to align these concepts with the new emission standards. For this reason, the research on SCR/DPF was already anticipated on the emission levels for NO_x and PM within EU NRMM Stage V. The cost-benefit analysis of SCR and DPF is based on a reduction to these

emission levels. The same amounts for the pilot with SCR and DPF, which can effectively result in NRMM Stage V levels. For LNG engines a specific limit for HC (hydrocarbons) will be introduced, which is 0.19 g/kWh for a diesel engine and - depending on the gas energy ratio - maximum 6.19 g/kWh for a LNG engine. This makes it important for the application of LNG engines to also develop technologies for dealing with methane slip. With some of the future requirements for smaller engines being less strict than for larger engines, there could also be an increasing interest in the application of a set of smaller and larger engines instead of one large

engine. To meet this demand, the concepts of rightsizing and hybrid configurations are studied within **PROMINENT**.

All of these technologies can be combined with the concept of energy-efficient navigation, supporting skippers to reduce fuel consumption and further reduce emissions. The first cost-benefit analysis showed positive business cases of energy-efficient navigation.

WP-LEADER

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WP 3 Certification and monitoring

Great progress was made with practical advice on procedures for certification and monitoring. These are focussed on securing low emissions of inland vessels and making optimal use of the investments in emissions control technologies.

After an evaluation of laboratory and on board test methods in the first quarter of 2016, two workshops were organised in May and June to discuss and draft the advice on the following (test) procedures for:

- 1 Retrofit Emission Control devices
- 2 Real Sailing Emissions (RSE)
- 3 Monitoring and Enforcement
- 4 Environmental Performance Monitoring (EPM).

The composition of workshop participants was very well suited to do this job, because it consisted of experts in the area of type approval and certification as well as on emission control and manufacturing technologies. Central in the advice was cost effectiveness, building on existing procedures of other sectors and conformity between OEM and retrofit systems where possible. The results



were reported in combined deliverable D3.2/D3.3. The next step, based on this report, will be the consultation of stakeholders, including the official bodies (EU, CCNR), engine/retrofit equipment manufacturers and skippers.

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WP 4

Digital education tools

The project partners in this work package focus on the development of digital and electrical education tools.

Simulations and digital tools

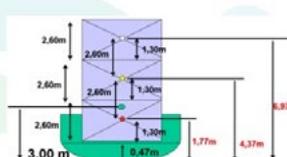
The E-learning modules Vessel Stability and Energy Efficient Navigation are currently under development. Both courses are developed by a team of inland navigation experts, E-learning developers and educational specialists. During the coming weeks the first courses will be finalized within the project team. When the final draft is completed the courses will be tested by means of a pilot. The pilots will be conducted as part of WP5 and thoroughly be evaluated in order to improve the e-learning courses.

03 Applying stability practically

On the previous slide we have determined the height of the centre of gravity to 3.00 meters above the keel.

What does this say about the stability?

For now absolutely nothing. The number alone doesn't mean anything. In order to interpret this number we need to grab the stability book. We will do this on the next slide.



European electronic service record book and logbook

In order to be able to assign the development and pilot of the electronic service records and logbook, a tender procedure has been started. Based on the product requirements set up by the JRC a Request for Quotation was sent to different suppliers.

Integration of inland navigation in general logistics education

The capstone courses have been developed in the online Community of Practice (CoP). To access the CoP the existing platform ILIAS is used. In October, teachers will be informed about the possibilities with the CoP by means of Train the Trainer workshops. The workshops will show how the CoP is built up and how teachers of logistics at bachelor level these learning materials could implement in their own curricula. These workshops will be used as a starting point for the pilots during which bachelor students in different institutes will use the new materials and collaborate in the new CoP.

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WP 5

Key results and outlook

In this work package, the project partners will design and implement pilots to test, validate and demonstrate the key approaches and technologies for greening the fleet. In order to reach a strong impact by the year 2020, the research and innovation efforts focus on pilots that aim at and contribute to standardised concepts and are suitable for a wide range of the existing European fleet.

A consolidated database is set up that serves the purposes to collect data from the exhaust gas emission measurements and the vessel & fairway data for energy efficient navigation. With the lead of TNO and Multronic, the installation of monitoring equipment for exhaust gas emissions is proceeding on different types of inland vessels. The physical data collection has started in the Rhine Region and the experts have opened up the possibility to estimate air emissions

based on the engine performance data being received from the Danube Region as well.

Over ten vessels in the Rhine and Danube Region have been equipped with measurement equipment in order to deliver flow data about the fairway and the



vessel. These data, in combination with dedicated model tests for some of the vessels, are the basis to set up the relevant models that will serve the on-

board trip advisory tool, giving recommendations for the skipper during a certain voyage. The first prototype is under finalisation. This includes the real time modelling and making use of fairway data received from waterway management organisations from Germany and Austria that are already being collected in the database. A pusher has been selected that will be equipped with after-treatment systems. This vessel will also be monitored for exhaust gas emissions.

New tasks have been included into WP5 by means of focussing on the compliance with the recently updated non-road mobile machinery regulation of the EU. The tasks will be fine-tuned during the grant agreement amendment procedure.

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The Green Deal

On the 12th of September the Dutch Minister for Infrastructure and the Environment signed the Green Deal 'COBALD' to work together on the testing of on board equipment for continuous measurements of air pollutants emitted by inland vessels. The Green Deal action plan brings together partners from projects such as CLINCH, COVADEM and PROMINENT.

By means of the on board measurements, the shipping companies will get a view on the real sailing emissions, which may strongly differ from emissions measured for the certification of the engine in laboratory environments based on test cycles. The ship operator shall get in this way a tool to change the sailing behaviour in order to reduce energy consumption and harmful emissions. Moreover, he or she gets a tool for

marketing purposes and can make better decisions on the investments in modern engines and to apply greening technologies.

Furthermore, one of the objectives is also to investigate the opportunity to use on board measurements for certification and monitoring as regards emission standards. In particular for the compliance check of existing vessels and their

engines which are retrofitted with greening technologies there is an opportunity for such on board measurements. Ideally ship owners could see if their vessels would reach CCNR Stage 2 emission levels or even the new NRMM Stage V levels after application of technologies such as after treatment systems or LNG as alternative fuel. The results of the COBALD Green Deal will be shared with the **PROMINENT** partners and will strengthen the conclusions of work packages 3 and 6.

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