Sustainable, safe and economically feasible energy concepts and technologies for European Inland Shipping

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Part B

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### Authors of the document

<table>
<thead>
<tr>
<th>Responsible organisation</th>
<th>Principle author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Via Donau</td>
<td>Juha Schweighofer</td>
</tr>
<tr>
<td>STC-Nestra B.V.</td>
<td>Martin Quispel</td>
</tr>
<tr>
<td>Stichting STC-Group</td>
<td>Jaap Gebraad</td>
</tr>
<tr>
<td>Pro Danube Management GmbH</td>
<td>Robert Rafael</td>
</tr>
<tr>
<td>TNO</td>
<td>Ruud Verbeek</td>
</tr>
<tr>
<td>SPB</td>
<td>Bas Kelderman</td>
</tr>
<tr>
<td>STC B.V.</td>
<td>Rob van Reem</td>
</tr>
<tr>
<td>Stichting STC-Group</td>
<td>Timon Jongkind en Jaap Gebraad</td>
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1. Explanation of the work carried out by the beneficiaries and Overview of the progress

PROMINENT aims to support the massive implementation of innovative greening solutions in inland waterway transport in order to improve economic competitiveness and environmental performance. In addition to the development of “hardware” solutions, PROMINENT will focus in particular on improving the “orgware”. In other words, PROMINENT will also focus on improving the framework conditions, which are primarily responsible for the current stagnating innovation levels in the IWT sector. The PROMINENT project will:

- Develop cost-effective solutions and standardised applications (reducing required investment costs):
  - 70%+ coverage: developing solutions that are applicable to at least 70% of the European inland fleet and their operating areas;
  - 30% costs reduction: reducing implementation costs of innovative greening solutions by 30%
- Involving all relevant actors concerned in the innovation and research process:
  - 100% inclusive - all stakeholders who are required for the full coverage of the innovation cycle from initial concept to real-life deployment are to be taken on board
- Actively addressing and removing current implementation barriers by 2020:
  - Visible and physical results by 2017 - Producing results on the ground during the project lifetime;
  - 2020 as ultimate time horizon - setting-up a roll-out strategy which is geared towards producing the required full impacts by no later than 2020.

These objectives have led to the following work package breakdown structure

Figure 1: Work Package Breakdown structure
The PROMINENT Work Packages 1 to 7 represent targeted and interconnected activities which reflect the key actions for this work programme topic. It is complemented by an efficient and focussed project management. This report reflects the key developments during the first 18 months of the project towards the project goals as described in the Grant Agreement.

1.1 Objectives

The specific contributions towards the objectives per work package have been described below. They are complemented by a more detailed analysis when describing the activities executed and results achieved per work package.

- Work Package 1 State-of-Play: during the first 18 months of the project, the activities in this work package have been concluded and the following objectives have been achieved:
  o an identification of the best available greening technologies that are applicable to the majority of the European Inland fleet;
  o an analysis of the facilitating factors to overcome barriers to the deployment of the technologies identified.

This work package has thereby laid a solid basis for the execution of the activities in the 6 other work packages.

- Work Package 2 Advanced Concepts for Mass Introduction: during the first 18 months of the project, standardised solutions for diesel-after treatment as well as energy-efficient navigation have been prepared for pilot testing, including the ex-ante cost-benefit analysis for both technologies. The two other concepts will be prepared during the next 18 months of the project (LNG and right-sizing/hybrid concepts);

- Work Package 3 Certification, Monitoring and Enforcement: the state-of-play concerning certification, monitoring and enforcement has been identified during the first 18 months of the project. In addition, an assessment of certification, monitoring and enforcement options and procedures has been conducted, thereby supporting the preparation of the pilot testing, which is executed in work package 5. The results have been discussed with the CESNI/PT in November 2016;

- Work Package 4 Digital Education Tools: the preparations regarding the activities with respect to simulators and the e-SRB/e-Logbook have been conducted during the first 18 months of the project. In addition, the first e-learning modules have almost been finalised as well as the modules for the lesson material to facilitate the integration of IWT in the logistics chain;

- Work Package 5 Real-life pilot Deployments: a number of pilots have been launched during the first 18 months: energy-efficient navigation, monitoring as well as logistics education;

- Work Package 6 Roll-out: in order to facilitate the roll-out of the technologies and concepts developed in the framework of PROMINENT, templates have been developed for the evaluation of the pilots executed. The majority of the activities foreseen in work package 6 will be executed during the second reporting period;

- Work Package 7 Project Management: besides project management activities, stakeholder involvement is key for the success of PROMINENT. The stakeholder involvement activities are described in more detail on the following pages.
1.2 Explanation of the work carried out per WP

This paragraph provides an overview of the work carried out and results achieved per work package in the reporting period.

1.2.1 Work Package 1 State-of-Play

Work Package 1 was successfully concluded in November 2015, fully complying with the objectives set. It provided the knowledge base and gave direction for the further work in the PROMINENT project.

The objectives were:

- identify typical fleet families and operational profiles on European inland waterways and canals;
- identify and assess available greening technologies and concepts;
- select the best available greening technologies and concepts concerning their effects, impact and availability;
- prepare knowledge on barriers and facilitating factors to uptake of these best available technologies as basis for developing counter-measures by public and private stakeholders.

Sub-Work Package 1.1 Identify operational profiles and “fleet families”

In a first step, groups of comparable vessels (“fleet families”) and their operational profiles (characteristics of the trips) on the main European inland waterways and canals were identified and their cost structures were analysed.

The identification of the European fleet and the construction of a macro model of this fleet were done by combining several databases and cross-checking the data. The macro model provides insights into the fleet composition with respect to the number and share of vessels in the various fleet families, resulting in a model with 12,263 vessels.

To provide information on the performance of these vessels as well, the share of the different vessel classes in the tonne-kilometre (tkm) performance and in the fuel consumption was assessed.

In detail, vessels sailing on the Rhine, the Danube and other waterways in Germany, The Netherlands, Belgium and France were considered.

For each of the sailing areas mentioned above, a selection of representative journeys was made, mainly based on freight flows (in tonnes and tkm). Added to the list of representative journeys were also journeys which - based on expert knowledge - increase the representativeness of the European fleet. This resulted in a list of 25 Rhine journeys, 10 Danube journeys, 18 on other waterways and 7 journeys with passenger vessels. For these journeys a list was created containing the main dimensions and operational characteristics of the vessels.

The results of the work carried out are described in the deliverable D1.1 List of operational profiles and fleet families which was delivered according to plan.
Sub-Work Package 1.2 Identify best available greening technologies and concepts

In the second step, the best greening technologies and concepts to raise energy efficiency and lower emissions were assessed regarding their effects, range of impact and their availability for the most relevant European fleet families identified. This was done oriented on comparable criteria that were also elaborated in WP1. This assessment allowed conclusions on the best available technologies for greening the majority of the European inland waterway transport (IWT) fleet in the short term and their selection for further elaboration within the project. Regarding the assessment criterion comprising the range of applicability, i.e. impact, a match was made between the main ship types in operation on the European waterways and their navigational profiles (number of trips, average distance, fuel consumption, stream velocities, etc.), which were identified in Sub-Work Package (SWP) 1.1. The key-technologies to be further considered (Table 1) were comprehensively described using technology data sheets of common format.

<table>
<thead>
<tr>
<th>Type of measure</th>
<th>Area</th>
<th>Measure</th>
<th>NOx</th>
<th>PM</th>
<th>CO2</th>
<th>GHG (CO2 &amp; CH4)</th>
<th>Applicability on the fleet</th>
<th>Economic feasibility (Ship owner)</th>
<th>Technical maturity</th>
<th>Non-techn. maturity (barriers)</th>
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<tbody>
<tr>
<td>Ship-related technical measures</td>
<td>Fuels, standardised solutions</td>
<td>Use LNG [Liquefied Natural Gas] - single fuel/ spark ignition</td>
<td>70-80</td>
<td>up to 95</td>
<td>20-25</td>
<td>0-10</td>
<td>10 - 50%</td>
<td>++</td>
<td>6</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apply dual fuel (LNG and diesel)</td>
<td>50-65</td>
<td>50-90</td>
<td>20-25</td>
<td>0-10</td>
<td>10 - 50%</td>
<td>++</td>
<td>6</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apply GTL fuel</td>
<td>10</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>&gt;50%</td>
<td>-</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Propulsion system, standardised solutions</td>
<td>Apply SCR</td>
<td>70-90</td>
<td>0-20</td>
<td>&gt;0</td>
<td>&gt;0</td>
<td>10 - 50%</td>
<td>--</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wall flow DPF</td>
<td>0</td>
<td>90</td>
<td>&gt;0</td>
<td>&gt;0</td>
<td>10 - 50%</td>
<td>---</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combine SCR and DPF</td>
<td>80-90</td>
<td>90</td>
<td>&gt;0</td>
<td>&gt;0</td>
<td>10 - 50%</td>
<td>---</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exchange of main diesel engine (CCRI by CCR II engine)</td>
<td>15-35</td>
<td>40-60%</td>
<td>0</td>
<td>0</td>
<td>&gt;50%</td>
<td>Q-</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exchange of main diesel engine (by Stage V engine)</td>
<td>65</td>
<td>80-90</td>
<td>0</td>
<td>0</td>
<td>&gt;50%</td>
<td>-</td>
<td>5</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Right sizing</td>
<td>0-10</td>
<td>0-10</td>
<td>0-10</td>
<td>0-10</td>
<td>100%</td>
<td>++</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diesel-hybrid prop. w/o buffer batt.</td>
<td>0-10</td>
<td>0-10</td>
<td>0-10</td>
<td>0-10</td>
<td>10-50%</td>
<td>+</td>
<td>9</td>
<td>0</td>
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<tr>
<td></td>
<td></td>
<td>Diesel-hybrid prop. w/ buffer batt.</td>
<td>0-10</td>
<td>0-10</td>
<td>0-10</td>
<td>0-10</td>
<td>10 - 50%</td>
<td>+</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Waterway Information</td>
<td>Real time info on fairw. data</td>
<td>14 (3-25)</td>
<td>&gt;50%</td>
<td>+</td>
<td>5/7</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ship-operational measures</td>
<td>Sailing behaviour</td>
<td>Speed adaption</td>
<td>&gt;50%</td>
<td>+</td>
<td>5</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optimised track choice</td>
<td>&gt;50%</td>
<td>+</td>
<td>5</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The average emission reduction values refer to vessels equipped with a drive train including a CCNR II diesel engine.

Maturity:
The Technology Readiness Level (TRL) reaches from 1: basic R&D until 9: full commercial application.
The non-technical maturity is assessed qualitatively from --- (very strong barriers) to +++ (no barriers)

Table 1: Overview of short listed greening technologies and concepts including their characteristics.

The results of the work carried out are described in the deliverable D1.2 List of best available greening technologies and concepts which was delivered according to plan.
Sub-Work Package 1.3 Barriers and facilitating factors to innovation uptake

The technologies identified in SWP 1.2 are expected to have strong advantageous effects on the IWT sector. Nevertheless, they are not automatically taken up by market players as it was shown in the past. Therefore, the activities of WP1 were completed by an investigation with the aim to identify the reasons for this fact as well as measures to overcome them.

In SWP 1.3, barriers and facilitating factors to innovation uptake were assessed for each of the technologies that were selected in SWP 1.2. The assessment was based on desk research of recent IWT literature and the expert knowledge of the PROMINENT consortium. Furthermore, the barriers identified were validated during the first PROMINENT Advisory Board Meeting in January 2016.

A total of six categories of generic barriers to innovation uptake were identified in the innovation literature, namely technical, legal, financial, knowledge, market, and cultural barriers. These barriers were defined in detail and a brief explanation was provided on why these barriers are relevant to be considered with respect to IWT technology uptake.

Consequently, the barrier categories were specified for each of the selected technologies. Differences between fleet families and operational profiles were discussed where relevant. In addition, the level (severity) of the barrier was assessed and quantified using the expert knowledge within the PROMINENT consortium. This quantitative assessment facilitated the comparison of technologies and indicates the feasibility of each technology per fleet family.

Generally, it was concluded that LNG, Dual fuel, Stage V engines, and hybrid-propulsion with buffer battery are technologies confronted by the highest barriers. The technologies that currently experience the lowest barriers are GTL fuel, right sizing, CCNR II engines, and SCR technologies. Substantial differences between fleet families can however occur and should be acknowledged.

The results of the work carried out are described in the deliverable D1.3 Analysis of barriers and facilitating factors for innovation uptake which was delivered according to plan.

Work carried out by beneficiary

STC: Major contributions to and review of D1.1, in particular with respect to the creation of the macro model for the European fleet, research and elaboration of operational profiles for the Rhine fleet and the ones on the other waterways; contributions to and review of D1.2, elaboration of a methodology for selection and assessment of best greening technologies; contributions to and review of D1.3.

VIA: Work package lead, review of D1.1, D1.2 and D.1.3, contributions to D1.1, research on fleet characteristics and operational profiles of the Danube fleet; major contributions to and lead of the creation of D1.2, contributions to D1.3.

SPB: Major contributions to and lead of the creation of D1.1; provision of input to D1.2 relating to previous projects and field experiences collected, involvement of the Innovation Lab; contributions to D1.3.

PRO: Contributions to D1.1, research on fleet characteristics and operational profiles of the Danube fleet; contributions to D1.2 and D1.3.

ECO: Major contributions to and lead of the creation of D1.3; contributions to D1.2

DST: Major contributions to D1.1, in particular with respect to the comprehensive determination of the operational profiles; contributions to D1.2.
TNO: Contributions to and review of D1.2, elaboration of latest knowledge on the effects of the greening technologies considered, as well as provision of information on most recent developments, complementing the established lists of greening technologies.

NAV: Contributions to D1.2 with respect to fleet characteristics and operational profiles of the Danube fleet.
1.2.2 Work package 2 Advanced Concepts for Mass Introduction

Work Package 2 focuses on the reduction of air pollutant emissions, energy – and fuel – consumption by inland waterway vessels. To achieve this, this work package concentrates on the further development of four emission-reducing concepts and technologies. The aim of this is a mass introduction in line with the mission of PROMINENT, to make this available for 70% of the fleet and reducing the application costs with 30%. For this, the results of the studies in WP1 (on the best available technologies and on the European fleet and the operational profiles and fleet families) are used as input for the activities conducted in WP2.

The work in this Work Package results for each of these concepts in further developed configurations by means of standardisation and modularisation of their components. If demonstrated in pilots (Work Package 5), this is defined in pilot test specifications. As input for the work in Work Package 6 (roll-out), ex-ante cost/benefit analyses are made for each of the concepts.

The work started in M1 of the project and within this Work Package four deliverables have been submitted and approved, resulting in the finalisation of two of the four Sub-Work Packages.

**SWP 2.1: LNG as alternative fuel**

This Sub-Work Package - led by Wärtsilä - focuses on the further development of LNG as alternative fuel for the propulsion of inland waterway vessels. The initially proposed work in this Sub-work Package was focused on the development of LNG configurations, resulting in pilot test specifications, and the elaboration of an ex-ante cost/benefit analysis. The deliverables were foreseen to be submitted in Month 12. However, due to changed circumstances (e.g. the agreement on the new NRMM emissions standards), adjustments were proposed to INEA concerning the scope of work in this Sub-work Package. These adjustments concentrate on meeting the new NRMM Stage V standards. To meet these standards, especially the reduction of emission of particles and methane slip should be further researched. This implies developments for new vessels as well as for retrofitting the vessels currently sailing on LNG (both are included in the pilot activities proposed). The research in WP2 would be highly beneficial for the IWT sector, and 100% in line with the call for proposals as launched at the end of 2013. In the process of amending the grant agreement, the adjustment of the tasks and the deliverables will be elaborated.

**SWP 2.2: Emission after-treatment of diesel engines**

The research in Sub-Work Package 2.2 on the use of emission after-treatment was coordinated by Multronic and focussed on the standardisation of the components of an after-treatment system. This resulted in a report with the pilot test specification for the pilot in Sub-Work Package 5.3, D2.1 Pilot test specifications for standard after-treatment configurations, which was submitted in Month 6. Besides, Multronic, SPB and TNO - with the support of STC-Nestra - made an ex-ante cost/benefit analysis of the use of after-treatment configurations on several vessel classes and representative journeys, including the effectiveness of the costs on the reduction of NOx and PM. This resulted in D2.2 Ex-ante cost/benefit analysis of business cases for standard after-treatment configurations, delivered in Month 6 as well. With both deliverables submitted and approved, the work in this Sub-Work Package has been completed.

**SWP 2.3: Energy-efficient navigation**

Under the coordination of Via Donau, together with Pro Danube, DST, TNO, BAW, NAVROM and SPB, in this Sub-Work Package the concept of energy-efficient navigation for the reduction of energy consumption was studied and further developed. Deliverable D2.3 Pilot test specification for energy-efficient navigation, dealt with the state-of-the-art and principles of this concept and a
description of a system including its requirements and the system set-up. This deliverable was submitted in Month 6.

Also for energy-efficient navigation, an ex-ante cost/benefit analysis was delivered - under the lead of STC-Nestra and Via Donau - with the business cases for several vessel classes and representative journeys, considering three scenarios. This deliverable (D2.4 Ex-ante cost/benefit analysis of business cases for energy-efficient navigation) was submitted in Month 6. With both deliverables submitted and approved, also the work in this SWP has been completed.

**SWP 2.4: Right-sizing and hybrid concepts**

SWP 2.4 is coordinated by TNO, in cooperation with ADS Van Stigt, SPB and Via Donau. The work in this SWP focuses on creating standards for right engine size and hybrid configurations. This work is done by the further development of the mathematical models on engine performance, in which amongst others outcomes of the 'monitoring' pilot (SWP 5.1) are used. This results in a validated mathematical ship energy model, foreseen to be delivered in Month 24. For both concepts, standardised models will be created with for each a cost/benefit assessment, which are both foreseen to be delivered in Month 30.

The results developed in work package 2 will be, after pilot testing and adaptations where needed, exploitable, since the technologies and concepts are ready for market uptake. For the first 18 months of the PROMINENT project, this means that the standardised after-treatment configurations as well as the tools for energy-efficient navigation, will be exploitable. In the next 18 months of the project, end-user involvement will be key for the market uptake. In addition, the activities in work package 6 will facilitate the market uptake by end-users (ship owning companies as well as waterway administrations).
1.2.3 Work package 3 Certification, Monitoring and Enforcement

Sub-Work Package 3.1 Improved certification, monitoring & enforcement

According to the work plan, SWP 3.1 has three deliverables.
- D3.1: State-of-the-art report;
- D3.2: Assessment of certification procedures;
- D3.3: Assessment of options for monitoring and enforcement.

Upon the request of the PROMINENT partners, INEA approved the request to combine the deliverables D3.2 and D3.3. The reason was the fact that certification, monitoring and enforcement are intertwined. The basis of Monitoring and Enforcement must be laid in the Certification. Also the basis of the ultimate goal; predictable and good Real Sailing Emissions must be laid in Certification. By combining the subjects in one deliverable, this relation can be made clear.

D3.1, the state-of-the-art report consisted of an overview of current emission legislation relevant to IWT, including country specific regulations. In addition a description of emission control technologies to meet stringent emission limits and a section with potential improvements of certification were included. This was also based on experiences in other sectors of the transport industry such as road transport. Most project partners involved in WP3 delivered technical input for this deliverable (TUV Nord, IMST, SGS and TNO). STC reviewed the document. D3.1 State-of-the-art report was submitted to and approved by INEA (1st quarter 2016).

The first activity of the work for D3.2 and D3.3 Assessment of certification procedures and options for monitoring and enforcement consisted of an evaluation of laboratory and on-board test procedures (TUV Nord, Multronic, SGS, TNO). As on-board measurement procedure, a number of options are available and these are already done for different purposes. Basically they can be split in ‘single day measurements’ usually using laboratory type equipment and ‘continuous measurements’ using sensor based equipment. It appeared that both types of measurements can play a good role in on-board validation of emission performance and also for monitoring and enforcement.

After the initial work, two meetings were organised; one in Bucharest and one in Delft. All project partners involved in WP3 participated in these meetings (TUV Nord, Multronic, SGS, IMST and TNO). After the first workshop several items were researched and reported in a PowerPoint as input for the second meeting. In the second meeting these were reviewed in depth and consequently the proposed advise was drafted for the following (test) procedures:
1. Retrofit Emission Control devices;
2. Real Sailing Emissions (RSE);
3. Monitoring and Enforcement;
4. Environmental Performance Monitoring (EPM).

The composition of meeting 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.

During the second meeting the precise content of the report was decided and the writing contributions were distributed across the partners. The results were reported in the combined deliverable D3.2/D3.3, which was submitted to INEA in September 2016.

The work was discussed several times with the CCNR-Secretariat, in relation to the activities in the CESNI-PT Working Group. For the 28 November, a meeting is planned with the CESNI-PT working group to present, discuss and validate the content of this deliverable. The CESNI-PT working group
consists of representatives of Member States, the industry as well as the European Commission. The CESNI-PT working group deals with the following topics which are relevant for the activities in WP3:

- Official procedures as well as technical requirements of devices;
- Voluntary standards are included in the working programme of CESNI-PT;

PROMINENT will deliver information recommendations to the CESNI-PT working group in relation to the NRMM requirements. NGO’s will be included in the next round of discussions.

**SWP 3.2 Prepare and evaluate real life testing**

This sub-work package consist of two deliverables:
- D3.4. Design and project plan for the real-life testing
- D3.5. Ex-ante cost/benefit analysis of systems for certification, monitoring and enforcement

**D3.4. Design and project plan for the real-life testing**

The project plan for real-life testing was prepared by Multronic and TNO. These partners are also responsible for the measurements on vessels in Sub-work Package P5.1. The work built on D3.2/D3.3 and on the experience of these companies. Already in 2015, the parameter list for on-board measurements and the structure of the database were prepared and circulated with the project partners of Work Package 5. Apart from Sub Work Package P5.1, also measurements on board of ships are executed for SWP5.3 (demonstration of exhaust after treatment systems) and SPW5.4 (efficient navigation).

Deliverable **D3.4 Design and Project Plan for the demonstration of real-life testing** furthermore consists of a description of the following items:
- Measurements of sailing patterns and engine load patterns for different types of ships on different routes;
- On-board emissions measurements with different engine and emission control technologies;
- Evaluation of different on-board measurement systems;
- The data-analysis of the real life testing.

The report was submitted to INEA in August 2016.

**D3.5. Ex-ante cost/benefit analysis of systems for certification, monitoring and enforcement**

This work started just in September 2016 and is directly based on the tasks executed and options described in the D3.2/D3.3 report. STC-NESTRA B.V. and TNO have set-out the structure of the cost benefit analysis and are currently requesting input from the Work Package partners on costs of a number of measurement activities with respect to certification and type approval of retrofit emissions control devices (REC) and Real Sailing Emissions (RSE), with respect to in-service monitoring and Environmental Performance Monitoring (EPM). It is planned to finalise this deliverable by December 2016.

The results of WP3, options for certification, monitoring and enforcement are exploitable, when endorsed by the Member States of the EU via participation in the CESNI-PT working group. Further synergies with the CESNI-PT working group will be exploited in the course of WP5.
1.2.4 Work package 4 Digital Education Tools

In Work Package 4 the focus is on digital education tools. Work Package 4 will develop prototypes of electronic tools and digital tools and will come forward with a comprehensive tool for the further integration of IWT knowledge in logistics education. These tools will be tested in SWP5.5. In this paragraph the objectives will be described with reference to the Sub Work Packages (SWP’s). Furthermore the activities carried out within each SWP will be described in more detail.

The objectives of this Work package are:
- To retain existing and to gain additional qualified staff and to raise labour mobility. The development of E-learning modules covering various relevant topics, as carried out in SWP4.1, will contribute to this objective;
- To facilitate the process of harmonization and modernization of professional qualifications by means of simulators and digital tools. This objective will be reached by the assessment of the effectiveness of inland shipping simulator in SWP4.1;
- To facilitate the process of the harmonization and modernization of professional qualifications by developing and assessing a prototype of a European electronic service record book (e-SRB) connected to a European electronic logbook. This will be reached by the activities carried out in SWP4.2
- To further facilitate the integration of inland waterway transport into general logistics education. This objective will be reached by the development of the Community of Practice in SWP4.3

The activities carried out in WP4 will lead to the following deliverables:
- D4.1 Assessment of the effectiveness of the use of simulations with respect to education, assessment and examination;
- D4.2 Development and assessment of a prototype of a European e-SRB linked to a European e-logbook;
- D4.3 Digital tools to support the further integration of IWT knowledge to general logistics education and training
- D4.4 Prototype of digital and training tools

SWP4.1 Simulations and digital tools

Simulations

Within task 4.1.1 a draft proposal is written to compare the use of vessel handling inland navigation simulators (VHINS) for the purpose of education, assessment and examination to real-life experiences. STC and DST will use their knowledge and experiences together with IWT stakeholders, i.e. experienced skippers to prepare, execute and evaluate VHINS simulator functionalities through exercises and assessments. These exercises will be executed using different scenarios and in total shall cover the most relevant functionalities. Currently for each exercise the parameters such as the sailing area, vessel type, weather conditions, etc. are defined. Based on these descriptions the exercises will be built in the simulators in order to create reliable and objective test situations. Furthermore the evaluation process with supporting documents such as questionnaires will be
developed. During the first half of 2017 the test with experienced skippers will be executed. The outcome of the test and the evaluation will give the necessary information for a broader implementation of VHINS simulators in inland navigation.

E-learning modules

Within Sub Work package 4.1.2 the first two out of three E-learning modules are under development. IWT experts from SPB, DST, IMST and STC provided their technical and organisational knowledge to draft the first versions. The “vessel stability” module will be a tool to create awareness and sensitivity for vessel stability in general and especially container and tanker vessels. The module “Energy efficient navigation” gives insight in the basics and advanced information on internal and external factors, such as; interactions between water depth, current and sailing speed, affecting on resulting fuel consumption. This module also contains the latest insights gained during the pilots carried out in Work Package 5. The third module is about handling of (alternative) fuel and cargo, especially dangerous goods. This module will consist of three different parts, adjusted for three target groups, namely crew on non-ADN vessels, non ADN-certified crew on ADN vessels and crew involved with loading and unloading LNG as cargo. All modules will be available for all interested students and personnel in the IWT sector. By means of a pilot these tools will be tested in Work Package 5. During the various meetings of CESNI-QP and the CCNR, the developments in this Work Package are discussed.

Figure 2: Impression of e-learning module
Figure 3: Impression of e-learning module
SWP4.2 European electronic service record book and logbook
Within tasks 4.2.1 and 4.2.2 a prototype of an Electronic Service Record Book and Electronic Logbook will be developed. In close cooperation with the Joint research Centre the functional requirements were determined. Besides the experiences with current pilots with Smart Card and a Web-based model, several options for central data collection and reporting to authorities are investigated. STC is coordinating this task and is currently carrying out a tender procedure to find appropriate system development partners. Based on the outcomes of the tender procedure a choice will be made for the best option to be developed. During a real life pilot (Work Package 5) the prototype will be tested and evaluated with stakeholders.

SWP4.3 Integration of inland navigation in general logistics education
Within task 4.3.1 a web-based community of practice (CoP) with learning modules is developed. FHOO, IMST, VIA and STC have provided their expertise in development of learning material as well as digital education tools to create a sustainable learning tool. By means of an open access learning management system (LMS) the content is available for all interested educational institutes, IWT companies and related stakeholders. By means of Train the Trainer workshops the prototype of the CoP, the learning modules and related case studies are shared and discussed with lecturers of different institutes. The CoP provides adaptable and up-to-date learning material. The first part consists of four basic modules covering the basic knowledge and understanding about the Inland Shipping modality characteristics, requirements, examples and position in the Transport Chain. The modules are:

1. Use & comparison of transport modes
2. Economic geography and infrastructure of waterways
3. Multimodal transport
4. Innovative transport concepts and green logistics

During the education pilots (WP5) students will apply their knowledge and skills during the pilots and case studies in close cooperation with IWT companies.
1.2.5 Work package 5 Real Life Pilot Deployment

In Work Package 5 of the PROMINENT project, pilots are designed and rolled out together with end-users to test, validate and demonstrate the key approaches and technologies for greening of the fleet elaborated in Work Packages 2, 3 and 4, accompanied by a thorough assessment of operational and environmental performance, including cost-efficiency. In order to reach already a strong impact by the year 2020 the research and innovation efforts do focus on pilots that aim and contribute to standardised concepts and are suitable for a wide range of the existing European fleet - pilots targeting existing vessels, retrofitting and monitoring of existing vessels. The technical evaluation reports will allow to further develop the promising concepts identified in Work Packages 2 - 4 and prepare the Roll-Out in Work Package 6. Work Package 5 officially started in October 2015 and the sub-work package activities started up accordingly. External stakeholders (such as vessel owners and operators) are involved in the project, however, the discussions leading to agreements on installations, measurements etc. take significantly longer than expected. The preparation of the respective deliverables has been started. For changes, please see chapter 5.1. One of the main outputs of PROMINENT, the 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.

The objectives of WP5 are:

- To evaluate the real life performance of advanced emission control systems;
- To evaluate procedures for improved certification (including retrofit) and on-board monitoring systems to secure compliance with strict exhaust gas emission limits (Stage 4/5);
- To deploy, test and validate new standardised LNG tank and fuelling system especially retro-fitting of existing vessels;
- To deploy, test and validate standardised after-treatment systems on two vessels and their design parameters;
- To collect statistical information on ship operational profiles and corresponding driveline power profiles;
- To develop an advising system and related tools to support boat masters in energy efficient sailing and ship-owners in assessing navigation performance;
- To perform real-life test operations on Rhine and Danube and provision of technical conclusions;
- To implement an advanced train-the-trainer concept to integrate IWT knowledge in general logistics education.

Sub-work Package 5.1: Monitoring exhaust gas emissions and operational profiles on existing, innovative vessels

With the lead of TNO and MUL, the installation of monitoring equipment for exhaust gas emissions is proceeding on different types of inland navigation 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 NAVROM units (part of Sub-work Package 5.4) being in operation in the Danube Region as well.
The following vessels have been installed with on-board measurement equipment:

1. Aqua Myra
2. Nadorias
3. Fides
4. Arese
5. Jura
6. Amulet
7. Semper Fi
8. Delta
9. Intermezzo
10. Atlantis
11. Donau
12. Veerhaven XI
13. Desmar
14. Baden-Württemberg (equipped in SWP 5.4)
15. Symphonie (equipped outside PROMINENT)
16. Monika Deymann (equipped in SWP 5.4)
17. Mercur 205 and 206 (equipped in SWP 5.4)
18. Mercur 207 (equipped in SWP 5.4)
19. Mercur 301, 303, 304, 305 and 306 (equipped in SWP 5.4)
20. Anina and Rovinari 8 (equipped in SWP 5.4)

The analysis of the first incoming data sets has started and is subject of the deliverable D5.1

Completed on-board monitoring on existing innovative ships.

Sub-work Package 5.2 Pilot LNG

With the involvement of STC, WAR and PRO, new tasks have been included into Work Package 5 by means of focusing 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. The roll-out of this SWP and the delivery of the respective deliverables 5.2, 5.11, 5.12 will be shifted accordingly.

Sub-work Package 5.3: Pilot standardises retrofit diesel after-treatment systems

In Q1 of 2016, the PROMINENT consortium has drafted a status report on WP5 to INEA, which has included the slight modification compared to the description of the activities that one vessel with two engines will be used in the SWP 5.3 pilot.

In this respect, a pusher has been selected by MUL that will be equipped with after-treatment systems during Q1 in 2017. MUL has received all drawings of the vessels, with which the design and planning works have already been started to prepare the installations. The installations need to be fine-tuned specifically to the selected vessel. This vessel will also be monitored for exhaust gas emissions. The installation of the systems is scheduled for Q1 of 2017 due to the high occupancy of the vessel, thus the consortium has requested a change of deadline for submission of the respective deliverables 5.3, 5.4 and 5.9. By e-mail, the draft deliverable D5.3 Installation of two standard pilot after-treatment systems, will be submitted to INEA.

Since the new NRMM regulation has been published, it is obvious that with after-treatment systems only including SCR, it is not possible to achieve air pollutant emissions foreseen for new-build vessels, MUL is looking for alternative solutions that can support the process.

Sub-work Package 5.4: Pilot energy efficient navigation

More than ten vessels in the Rhine (2 by BAW & DST) and Danube Region (10 by NAV) have been equipped with measurement equipment. These instruments deliver flow data about the fairway (depth, flow velocity) and the vessel (position, speed, engine performance etc.) towards the consolidated PROMINENT database. 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 of the on-board tool is under finalisation. This includes the real time modelling and making use of fairway data received from waterway management organisations from Germany (BAW) and Austria (VIA) that are already being collected in the database. AFDJ, the Galati Lower Danube River
Administration is being continuously contacted by PRO to receive fairway data for the selected test section on the Danube in Romania, however, due to the current technical status it is not fully feasible. It is agreed that when the updated models and other relevant information is available (e.g. based on AFDJ’s involvement in the FAIRway CEF Action), these data will be integrated into the PROMINENT database.

In SWP 5.4 two tools are to be pilot deployed:

- An on-board trip advisory tool and;
- Land based tool for evaluation of ship efficiency and navigation performance.

Both tools will be web-based applications that are available from all kind of devices. The first prototype of the on-board tool is under finalisation. TNO – with the involvement of an external IT development company – has developed the GUI and included the first vessel with its model data and the fairway data provided by BAW for the Rhine in Germany and the testing by the PROMINENT partners has started. Feedback will be provided to TNO who will elaborate the next versions of the tool. The on-board tool will make use of the positioning device / service available on the vessel. The land based tool will be built on the same principles as the on-shore one, whereas it will provide additional features for the stakeholders that will be defined at a later stage after the fine-tuning of the on-board tool and using the experiences gained.

The crew of the 12 equipped vessels are already making use of the installed equipment by means of receiving the measurement data on dedicated output interfaces in the wheelhouse, whereas for NAV a fleet manager application is also developed, providing real-time position information of the convoy together with engine performance and fairway measurement data:

During the next reporting period, potential end-users will be actively approached to support the market uptake of the tools developed in this SWP.

Sub-work Package 5.5: Pilot Logistics Education

In the field of the pilot of the logistics education, the Sub-work Package 5.5 partners are in active co-operation with the Joint Research Centre of the EU to receive the results of eIWT concerning the e-SRB and the e-Logbook. In order to be able to assign the development and pilot of these products, a tender procedure has been started. Based on the product requirements set up by the JRC a
Request for Quotation was sent to different external parties. The requirements of the JRC documents are more extended than the description of action of PROMINENT. This has led to a budget shift request, which is an element of the grant agreement request recently submitted to INEA.

Three different scenarios for the simulator cases are being checked by experienced skippers, also against the CESNI requirements. The execution of the simulator pilots and the evaluation will be done at STC, DST and others. The simulator pilots aim to deliver solutions both for training and examination purposes.

The E-learning modules Vessel Stability and Energy Efficient Navigation are currently under development. Both courses are developed by a team of Inland Shipping experts, E-learning developers and educational specialists.

The capstone courses have been developed in the online Community of Practice (CoP). To access the CoP the existing platform ILIAS is used. By means of Train the Trainer Workshops teachers will be informed about the possibilities with this CoP.

The first two courses have been held:
- “Train the Trainer” on 6th October 2016 in Ennshafen by FHOO
- “Train the Trainer” on 14th October 2016 in Rotterdam by STC
- First pilot lecture on 19-20th October 2016 by FHOO

Furthermore, the tasks being rolled out in WP4 will also be taken over to WP5 during the year by STC, FHOO, DST. SPB, PRO and IMST are providing their organisational and technical expertise.
The overview of the status of WP5 is summarised below:

<table>
<thead>
<tr>
<th>SWP</th>
<th>Status as of M18 / October 2016</th>
<th>Partners’ involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>The installation of monitoring equipment has been done and data collection and analysis has started also with the incoming data from SWP5.4 vessels as estimations.</td>
<td>TNO coordinates the SWP and does on-board monitoring. MUL also installs on-board monitoring tools. SGS does accurate measurements. TUV NORD, IMST and SGS take part in the selection and description of the certification and monitoring procedures, specification of monitoring equipment and database set-up.</td>
</tr>
<tr>
<td>5.2</td>
<td>The content of the SWP is under revision in line with the requested grant agreement amendment.</td>
<td>WAR, STC and PRO have worked together with INEA on the re-definition of the content and the tasks.</td>
</tr>
<tr>
<td>5.3</td>
<td>MUL has selected the vessel (Donau pusher) to be pilot equipped with diesel after-treatment solutions. The design phase of the installation has started.</td>
<td>MUL is leading the SWP and SPB, SGS and TNO provide their organisation and technical expertise.</td>
</tr>
</tbody>
</table>
| 5.4 | • 12 vessels have been installed with monitoring equipment  
• The consolidated PROMINENT database has been set up (also collecting data in SWP 5.1)  
• The pilot deployment of the trip advisory tool has started | PRO is leading the SWP. TNO has developed the consolidated database, where NAV, DST and BAW feed in information from the vessels involved in the pilot. SPB contributes to benchmarking of fuel consumption and data collection as well as development of the user interface. VIA and BAW are providing fairway data into the consolidated database. |
| 5.5 | • Active cooperation with the Joint Research Centre of the EU to receive the results of eIWT concerning the e-SRB and the e-Logbook. In order to be able to assign the development and pilot of these products, a tender procedure has been started.  
• The E-learning modules Vessel Stability and Energy Efficient Navigation are under development  
• The capstone courses have been developed in the online Community of Practice (CoP) | STC is leading the SWP. DST leads the pilot on simulations and FHOO on the logistics education: SPB, PRO and IMST provide their organisational and technical expertise. |
Figures illustrating the work being rolled out in WP5

**Consolidated database**

- Engine data: - RPM - Load - Fuel consumption
- Survey data provided by waterway administrations
- Modelling / data processing
- Vessel operators
- Skippers
- Waterway administrations

Geographical data - coming from the involved vessels:
- Water depth
- Water flow
- GPS data

Engine data:
- RPM
- Load
- Fuel consumption

Survey data provided by waterway administrations

**Figure 5: Overview of the relations with the consolidated database**

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**Figure 6: Detailed outline of the PROMINENT pilots SWP 5.1 & 5.4**

- 5.4. Rhine river model data from BAW
- 5.4. Danube river model data from Pro Danube and Viadonau
- 5.4. Fixed data: locations of waterway sections
- 5.1. Fixed data: ship specifications
- Central Data/Information Storage, processing & Retrieval
- TNO OBU (8x)
- Multronic OBU (12x)
- NAVROM OBU (10x)
- BAW OBU (8x)

**WP 5.4. ship propulsion, trip and Danube river data**

**WP 5.4. ship propulsion, trip and Rhine river data**
Figure 7: Installation of pilot equipment of SWP 5.4 on a NAVROM unit on the Danube

Figure 8: Selection of vessels involved in the PROMINENT pilots SWP 5.1 & 5.4
Figure 9: Physical ship model developed by DST

Figure 10: Pilot GUI of the trip advisory tool
1.2.6 Work package 6 Roll-Out

Work Package 6 does focus on the identification, analyses and preparation of contents on the lessons learned, the barriers to resolve and the follow-up actions for both the IWT industry and the public organisations. The WP6 consist of four parts:

- Pilot implementation review (6.1);
- Financial analyses and solutions for most promising innovations (6.2);
- Preparation of mass implementation (key user buy-in) (6.3);
- Policy recommendations and draft implementation roadmap (6.4).

It shall be remarked that the activities in Work Package 6 will be fed into large extent by the findings and results achieved in the previous Work Packages, notably Work Package 5 where the pilots are being implemented and technically evaluated.

Until now, in particular there has been done significant work in Sub-work Package 6.1. However, in general there has been done work to make agreements on sharing information with other research projects in The Netherlands concerning on-board-monitoring to share information under the so called “Green Deal”.

Sub-work Package 6.1 | Pilot implementation review
The completed action is to develop a common analysis framework and template for sound evaluation of pilots. This framework and the templates were discussed with the involved partners. Based on this framework the final review report will be prepared. This will provide important input for further analyses and recommendations on policy actions taking into account the cost-benefit analyses and feasibility aspects (multi criteria analyses). An integrated approach ensures solid conclusions and recommendations regarding the implementation strategy.

The Deliverable 6.1 “Evaluation guidance report with methodology and templates” was prepared and drafted by STC and Via Donau and submitted in November 2015 and approved by INEA.

The grids for the evaluation have been further discussed by Via Donau with the involved partners in the pilots in WP5 to ensure the applicability and feasibility to collect the required data.

Sub-work Package 6.2 | Financial analyses and solutions for most promising innovations
Technical support and coordination was provided by STC on the development of common frameworks for the ex-ante cost-benefit analyses in Work Package 2 and Work Package 3. This was done to ensure a common approach and comparable results as regards financial analyses of greening solutions.

Furthermore, as regards the financing, the developments were followed closely to set-up a greening fund in The Netherlands and in Europe. A Dutch initiative involving a wide range of stakeholders (e.g. banks, regional governments, associations, fuel suppliers) is ongoing which can possibly be extended to a European investment fund for inland navigation, possibly taking into account EIB/EFSI financing. SPB/EICB is currently leading a study in The Netherlands and will provide a report by end of 2016.

Active research work will start as soon as the pilots are completed in Work Package 5 and ex-post cost-benefit analyses are becoming available.

Sub-work Package 6.3 | Preparation of mass implementation (key user buy-in)
Presentations about PROMINENT and the Roll-Out have been made by STC at NAIADES Implementation meetings and Advisory Board meeting of PROMINENT. Moreover STC made a presentation and participated in a panel discussion on 7th of June 2016 in Dusseldorf at the workshop “LNG Roadmap”, LNG as a driving force for cross-border cooperation within Europe”.

Further work will be carried out as soon as the results are available from the pilots in WP5.
Sub-work Package 6.4 | Policy recommendations and draft implementation roadmap
This Sub-work Package didn’t start yet, this will be done after Work Package 5 is completed.

The results of WP6 will support the market uptake of the exploitable results of PROMINENT.
1.2.7 Work package 7 Project Management

Work Package 7 consists of the following 3 sub-work packages:

- Administrative and financial management;
- Project Dissemination;
- Stakeholder involvement

Sub-work Package 7.1 | Administrative and financial management

Sub-work Package 7.1 consists of administrative and technical management, executed by the project coordinator and the Project Management Secretariat. The Administrative management consists of the following tasks:

- Cost controlling and financial monitoring;
- Preparation and release of sub contracts;
- Preparation and release of periodic reports;
- Provision of user manuals to project partners on Horizon 2020 financial rules;
- Consolidation of financial statements;
- Progress reporting to INEA.

Although the administrative management is a continuous task from the start until the end of the project duration, some tasks have already been closed. The partners have submitted an interim-financial statement over the first 12 months of the project, which serves as an exercise for partners without any experience in European funded projects. The reports however do not provide yet a solid overview of where budget shifts (on top of the budget shifts already notified) are needed. This overview will follow after receipt of the periodic financial reports, which are currently being evaluated. The user manual on Horizon 2020 financial rules has been developed and distributed at the start of the project. In addition, there is a frequent exchange of information with the project officer from INEA.

The technical management consists of the following tasks:

- Co-ordination and prioritisation of tasks and workload between project partners;
- Quality review of technical work;
- Endorsement and release of deliverables;
- Technical progress monitoring and reporting to INEA project officer.

14 deliverables have been submitted to INEA during the first 18 months of the project, of which 11 have been approved. A number of deliverables are delayed, mainly the ones relating to LNG, however these delays are always communicated on forehand to INEA. 35 deliverables have to be submitted until the end of the project, including the periodic report and the final report. Dissemination and exploitation plan has been submitted to and approved by INEA.
Sub-work Package 7.2 | Project Dissemination

This sub-work package coordinates the dissemination and communication efforts for the entire project. Where the activities in sub-work package 7.3 focus on stakeholder involvement, the activities in this sub-work package aim at the general public and public society as a whole. The main tasks carried out in this sub-work package are:

- Create and supervise a “corporate identity” for the PROMINENT project;
- Issue a dissemination strategy in cooperation with representatives of the European Commission;
- Disseminate the activities and results of the PROMINET project by means of brochures, newsletters, press releases, active participation in symposia, exhibitions and the like;
- Maintain a database of all the documents received or generated by PROMINENT and provide access for the European Commission, Advisory Board, Project partners and other authorised parties;
- Development and maintenance of a dedicated website.

At the start of the PROMINENT Project, a “corporate identity” has been developed, which is used for all dissemination activities, deliverables, memos, letters, etc. Several newsletters and leaflets have been developed, which are referred to in the section on dissemination activities. The log-in area of the Sharepoint environment has been shared with the European Commission and Project Partners, and will be shared with other stakeholders upon request.

The dissemination activities executed in the framework of PROMINENT will be discussed in detail in the section on communication and dissemination activities. At the same time, the website of PROMINENT which has been developed at the start of the project is currently being revised.
Sub-work Package 7.3 | Stakeholder Involvement

This sub-work package coordinates the direct addressing and involving of stakeholders. The activities consist of following main tasks:

- Overall coordination by means of the stakeholder involvement plan;
- Function as coordination bureau and contact point for the stakeholder event series;
- Coordinate stakeholder involvement with other ongoing European projects, regional/national initiatives, workshops and seminars will be sought, if necessary;
- Maintaining and coordinating a PROMINENT stakeholder event calendar;
- Coordinate and draft PROMINENT newsletters presenting important technical results;
- Promote the use of the I-STEER application for the IWT industry

The stakeholder involvement plan has been submitted to and approved by INEA. The dissemination activities executed concerning stakeholder involvement are referred to in the section reporting on dissemination activities. Stakeholder involvement is of utmost importance for the success of the PROMINENT Project. Throughout the Work Packages various groups of stakeholders are continuously involved. The Advisory Board meeting, responsible for strategic guidance, has met in January 2016 and will meet again on the 14th of December 2016.

Since cooperation is of utmost importance for the success of the PROMINENT Project, the cooperation paper as initially compiled has been updated:

Coordination actions between DG Move, the Joint Research Centre (JRC) and PROMINENT

DG Move has been working on the modernisation and harmonisation of professional qualifications in inland navigation since 2012. One of the elements of the process of harmonisation and modernisation of professional qualifications in IWT is the development of electronic tools, which will support the process of modernisation and especially harmonisation. The development of a European electronic Service Record Book (e-SRB) connected to a European electronic Logbook (e-Logbook) is one of the activities in this field. For this purpose, DG Move concluded an administrative agreement with the JRC, which will be working on the eIWT project for a period of 15 months. The eIWT project focusses on the development of an initial system architecture for the e-SRB and the e-Logbook. For this reason, cooperation on the developments in the area of the modernisation and harmonisation of professional qualifications in inland navigation should be agreed upon between DG Move, JRC and PROMINENT:

- PROMINENT will develop a prototype of eIWT based on the initial system architecture as developed in the framework of eIWT. The development and testing of this prototype will be executed in PROMINENT;
- PROMINENT will deliver input to the JRC with respect to the implications on professional qualifications concerning the introduction of new propulsion technologies, like LNG;
- PROMINENT will facilitate the active involvement of key stakeholders by means of organising dedicated workshops in close cooperation with DG Move and JRC.

From this perspective, the Description of Action already includes close cooperation with DG Move and the JRC, in particular with respect to the project eIWT. DG Move and JRC will deliver input to PROMINENT with respect to the developments on electronic tools for inland navigation, where PROMINENT will support the activities of eIWT. In addition, frequent meetings with DG Move and INEA could be scheduled to ensure the work executed by PROMINENT contributes to the efforts of DG Move in the area of professional qualifications in inland navigation as well as in policy related activities.
As outlined in the DoA, two WP’s of PROMINENT focus on the e-SRB and e-Logbook, WP4 and WP5. In WP4, the development of the prototype is foreseen, where WP5 will test and evaluate the prototype developed in WP4. Overlap with activities foreseen in eIWT are identified and tasks should be rewritten to ensure efficient cooperation. Basically, three steps could be identified for the development of an e-SRB connected to an e-Logbook:
- Specification of requirements: the specification of requirements of an e-SRB connected to an e-Logbook has been taken up by the JRC in the project eIWT, however has been supported by PROMINENT by means of organising workshops to further exchange views with respective stakeholders;
- Development of a prototype will be taken up by PROMINENT, based on the specifications of requirements as identified in eIWT. The development of the prototype would take place over a period of 6 months, and would therefore end in month number 18, However, the development of the prototype is currently pending on the approval of a request for a contract amendment, since the specifications as delivered by the eIWT project go beyond the original scope of work. A separate paper has been submitted regarding this issue;
- From month number 18 to month 30 the developed prototype will be tested on vessels in the Rhine and Danube area and will be adjusted where necessary. The results of this step will feed into the development of the roadmap (WP6).

DG Move, INEA, JRC and PROMINENT could schedule progress meetings with respect to the tasks on the electronic tools, as well as with respect to activities in the field of certification, monitoring and enforcement and policy support when and if needed. In the first 18 months of the PROMINENT project, the PROMINENT WP4 organised frequent meetings and stakeholder workshops with the JRC. The cooperation concerning the other topics is outlined in this section of the Periodic Report.

The following work packages of PROMINENT require specific additional actions which have not been described in the DoA:
- WP3 on certification, monitoring and equipment, where PROMINENT will liaise with the CCNR on activities foreseen in CESNI. In addition to bilateral meetings between WP3 and the CCNR-secretariat, at the end of November PROMINENT attended a CESNI/PT meeting to exchange views on the developments in WP3
- WP4: digital education tools; close cooperation with DG Move and JRC. Concerning the other topics, e-learning modules and simulators (of which the activities recently started) there is a close cooperation with the CCNR-secretariat, both in the role as secretariat for the Member States as well as secretariat for CESNI/QP;
- WP5: pilot digital education tools: close cooperation with DG Move and JRC. The respective pilots have not been started yet, as aforementioned.
- WP6: Roll-out, with a specific focus on the activities with respect to policy recommendations in the area of:
  o Certification, monitoring and enforcement for strict emission limits in IWT;
  o Implementations of engine room improvements in vessels for emission reduction;
  o Skilled workforce and quality jobs;
  o Support measurers for roll-out of energy-efficient navigation.
Frequently there are bilateral meetings between WP6 and DG Move.
The involvement of end-users (varying from ship owning companies, engine manufacturers, waterway administrations, member states administrations, river commissions and education and training institutes) is key for the success of PROMINENT. For this reason, PROMIMENT will liaise with DG Move whether meetings organised by DG Move, e.g. the NAIADES Implementation meetings, could be used to disseminate the progress of the project and obtain feedback from key stakeholders. During the Naiaides Implementation Meeting in June 2015, PROMINENT presented the start of the activities. Unfortunately, the NAIDES Implementation meeting at the end of 2015 was cancelled.

Additional information concerning the cooperation with EIBIP

The European Inland Barging Innovation Platform (EIBIP) was established as a platform of innovation centres (composed of existing and new innovation facilitation centres), in response to the call for tenders for a study of support measures for the implementation of the TEN-T core network related to i.e. inland waterway transport. Three new innovation centres were founded in Germany (D-ZIB), in France (BATELIA) and the Danube region (IDAnube). These innovation centres promote the uptake of innovation by the inland waterway transport sector, in particular where innovation is hampered by a demonstrated market failure. The activities to arrange this ‘uptake of innovation’ consist of the identification and addressing of barriers, the facilitation of market transfer of innovation, covering technological, organisational and financing aspects. EIBIP conducts promotion and awareness activities, as well as the implementation of concrete business cases to facilitate the uptake.

In the interest of the uptake of innovation in inland waterway transport, a maximised impact can be achieved by the cooperation between EIBIP and PROMINENT. There is a synergy between the roll-out of the research and demonstration activities performed within PROMINENT and the activities of EIBIP to address barriers and facilitate market transfer of innovation. There are direct links between several WPs of PROMINENT and the EIBIP activities:

- WP2: Advanced concepts for mass introduction: overlap between the concepts researched within PROMINENT, leading to more standardised concepts and overcoming some barriers, and the concepts which will be promoted within EIBIP;
- WP4: Digital education tools: Overlap between e.g. the concept of e-learning energy-efficient navigation and promoted tools within EIBIP aiming at a reduction of energy consumption;
- WP5: Real-life pilot deployment: Demonstrations within PROMINENT can serve as best practices for EIBIP’s activities in promoting innovation uptake;
- WP6: Roll-out: EIBIP can be used for the roll-out of the outcomes of PROMINENT. The cost-benefit analyses of PROMINENT can be used for the implementation of concrete business cases within EIBIP;
- WP7: Project management: Collaborative activities of EIBIP and PROMINENT concerning dissemination and the involvement of stakeholders, e.g. during TEN-T days and in the organisation of advisory board meetings.

Two partners of PROMINENT: 1) Pro Danube and 2) SPB/EICB, are also involved in EIBIP, which guarantees a close cooperation between EIBIP and PROMINENT. There is a constant exchange of information between PROMINENT and EIBIP by means of these two beneficiaries of PROMINENT. In addition, PROMINENT and EIBIP had a joint stand during the TEN-T infodays in Rotterdam in June 2016. Normally, the PROMINENT Advisory Board of December 2016 would be organised back-to-back with an EIBIP meeting, however, this meeting was postponed. During the next 18 months of the project, the cooperation will maintain, since market uptake is one of the key activities of the final half of the PROMINENT Project.
1.3 Impact

The expected impacts can be achieved pursuing the ambitious PROMINENT objectives and work approach: developing solutions that are applicable to at least 70% of the European inland fleet and their operating areas and at the same time reducing implementation costs of innovative greening solutions by 30% through standardisation and modularisation. The complementary activities of the PROMINENT Project ensures that the expected impact is met. This is however depending on external factors as well: the financial situation in the inland waterway transport sector, prices of fossil fuels and alternative energy, the legislative landscape (NRMM Stage V) and other factors will influence the fact whether the activities will lead to the expected impact. For this reason, during the second reporting period, a strong emphasis will be placed on the activities in WP5 and WP6, in order to ensure the developments of the PROMINENT project will be taken up by the market. At the same time, this sometimes requests a change of scope, e.g. in the area of the LNG activities, where the renewed scope is focussing on compliance with the NRMM Stage V regulation. PROMINENT does not focus on one technological solution, but considers a broader range of solution, such as after-treatment systems and concepts for energy-efficient navigation. This will result in a more robust roll-out plan and strategy at the end of the project lifetime. Concerning the activities in the area of professional qualifications in inland navigation, the constant dialogue with the European Commission, the Joint Research Centre, the CCNR-Secretariat and CESNI/QP ensure that the activities exploited in the framework of PROMINENT fit into the legislative developments.

By focussing on the market uptake by the roll-out plan and the constant involvement of all key stakeholders, PROMINENT ensures the products developed meet the market requirements. In case the barriers identified will be solved, the way is paved for the uptake of all products developed in the framework of PROMINENT.
2. Update of the plan for exploitation and dissemination of result (if applicable)

The cooperation with stakeholders with a special focus on end-users and authorities to support the market uptake is of key interest for the PROMINENT Project. The plan for exploitation and dissemination of results is still applicable and executed, however is not that detailed. For this reason, we have updated the extended dissemination and exploitation plan as submitted in Month 6 and attached as annex to this Periodic Report. The updated plan for exploitation and dissemination of results is shown below.

<table>
<thead>
<tr>
<th>WP</th>
<th>Main dissemination activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP7</td>
<td>project management</td>
</tr>
<tr>
<td></td>
<td>SWP 7.2 «Project dissemination» coordinates the communication targeting public society</td>
</tr>
<tr>
<td></td>
<td>SWP 7.3 «Stakeholder involvement» coordinates the communication with external stakeholders and end users as well as the European Commission and the PROMINENT Advisory Board (details on both see description of WP7)</td>
</tr>
<tr>
<td>WP1</td>
<td>state of play</td>
</tr>
<tr>
<td></td>
<td>For the validation of outcomes, interviews and workshops with end-users and equipment manufacturers have been conducted, presentations and communication material provided as well as a dedicated parts on the project website.</td>
</tr>
<tr>
<td>WP2</td>
<td>advanced concepts for mass introduction</td>
</tr>
<tr>
<td></td>
<td>Expert meetings; presentations and communication materials, dedicated part on the website, participation in various conferences and seminars. Participants to conferences to deliver a key note speech / presentation during the conference and communication of the results. Developed tools/models will be made available via the website. End-users, industry and Advisory Board are the main target audience. Only conferences in Europe are allowed, maximum number of 2 during the project lifetime.</td>
</tr>
<tr>
<td>WP3</td>
<td>certification &amp; monitoring</td>
</tr>
<tr>
<td></td>
<td>Brochures or technical summaries available through the websites of PROMINENT and participating partners, expert meetings, participation in various conferences and seminars. Participants to conferences will deliver a key note speech / presentation during the conference and communicate the results. Competent authorities, and users and the Advisory Board are main target audience. Only one international conference allowed and one in Europe, during the project lifetime.</td>
</tr>
<tr>
<td>WP4</td>
<td>digital education tools</td>
</tr>
<tr>
<td></td>
<td>Close cooperation and expert meetings/workshops with involved actors and stakeholders like educational institutes, EDINNA, ELA, INE, boatmasters, competent authorities, river commissions and professional associations. Close cooperation with Advisory Board and competent authorities with respect to digital tools. Detailed dissemination plan for logistics material included in WP4 description, train-the-trainer sessions included</td>
</tr>
<tr>
<td>WP5</td>
<td>real-life pilot deployment</td>
</tr>
</tbody>
</table>
|    | Interviews/workshops/expert meetings are foreseen to discuss the concepts, progress and the outcomes with relevant stakeholders. Scientific
<table>
<thead>
<tr>
<th>WP</th>
<th>Main dissemination activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>publications, presentations and leaflets as well as a dedicated part on the project website.</td>
</tr>
<tr>
<td>WP6</td>
<td>roll-out</td>
</tr>
</tbody>
</table>

Table 2: Updated Exploitation and Dissemination Plan
3. Deviations from Annex 1 (if applicable)

3.1 Tasks

The main deviation from Annex 1 concerns the activities in the area of LNG. In September 2016 the PROMINENT consortium submitted a contract amendment request to INEA, which is currently being discussed. Besides, smaller amendment requests are included in this package, concerning a small delay of a number of deliverables (either related to LNG or because of other reasons), which are summarized below:

- Deliverable 2.5: Pilot test specification for standard LNG Configuration (depending on Contract Amendment), originally foreseen in Month 12;
- Deliverable 2.6: Ex-ante cost/benefit analysis of business cases for standard LNG configurations (depending on Contract Amendment), originally foreseen in Month 12;
- Deliverable 3.5: Ex-ante cost/benefit analysis of systems for certification, monitoring and enforcement, will be submitted in Month 20. This deliverable is delayed because of the request of DG Move to liaise the activities in PROMINENT concerning certification, monitoring and enforcement with the working programme of CESNI/PT;
- Deliverable 5.2: Installation of standardized LNG tank system and LNG configuration (depending on Contract Amendment), originally foreseen in Month 18;
- Deliverable 5.3: Installation of two standard pilot after-treatment systems, will be submitted in Month 24 as explained in the description of progress of WP5;
- Deliverable 5.4: Installation of on-board monitoring systems with after-treatment, will be submitted in Month 24, as this is interlinked to the installation of the pilot after-treatment systems;
- Deliverable 5.6: Land-based tool for evaluation of ship-efficiency and navigation performance, will be submitted in Month 20;
- Deliverable 7.3: Period report, is foreseen in the Participant Portal for Month 20, however due to the conditions in the Grant Agreement this should be delivered in Month 22. In the meantime, we agreed to submit the final version of the Periodic Report before Christmas 2016.

The possible Contract Amendment will influence the time planning of WP6 as well, however, we will ensure WP6 will submit all deliverables before the end of the project duration.
3.2 Use of resources

The following use of resources per WP applies for the first 18 months of the project:

- WP1: 31,48 men months used compared to 29 budgeted, however the budget available for WP1 has not been spent yet. The additional men months spent are compensated by the monthly rate for personnel costs;

- WP2: 23,64 men months used compared to 46 budgeted, which is in line with the project duration and the pending tasks concerning LNG;

- WP3: 34,91 men months used compared to 38 budgeted, which is in line with the activities executed in the first 18 months of the project. There is still some work to be done, which is compensated by the monthly rate for personnel costs;

- WP4: 48,20 men months used compared to 60,5 budgeted, which is in line with the activities executed in the first 18 months of the project. There is still some work to be done, which is compensated by the monthly rate for personnel costs;

- WP5: 100,93 men months used compared to 160 budgeted, which is in line with the activities executed in the first 18 months of the project. There is still some work to be done, which is compensated by the monthly rate for personnel costs;

- WP6: 4,16 men months used compared to 55,5 budgeted, which is in line with the activities executed in the first 18 months of the project.

- WP7: 24,34 men months used compared to 52,5 budgeted, which is in line with the activities executed in the first 18 months of the project.

The following budget transfers have already been discussed (besides the one mentioned in the contract amendment request):

<table>
<thead>
<tr>
<th>Amount from</th>
<th>WP</th>
<th>Beneficiary</th>
<th>Cost category</th>
<th>To</th>
<th>WP</th>
<th>Beneficiary</th>
<th>Cost category</th>
<th>Explanation</th>
<th>Type of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40,000</td>
<td>WP4</td>
<td>PHOOC</td>
<td>Subcontracting</td>
<td>to</td>
<td>WP4</td>
<td>PHOOC</td>
<td>Personnel costs</td>
<td>Subcontracting not executed, but tasks executed by own staff</td>
</tr>
<tr>
<td>2</td>
<td>3,000</td>
<td>WP2</td>
<td>VIA</td>
<td>Subcontracting</td>
<td>to</td>
<td>WP5</td>
<td>VIA</td>
<td>Subcontracting</td>
<td>Enhancement of code for water-level calculations</td>
</tr>
<tr>
<td>3</td>
<td>17,000</td>
<td>WP2</td>
<td>VIA</td>
<td>Subcontracting</td>
<td>to</td>
<td>WP5</td>
<td>VIA</td>
<td>Personnel costs</td>
<td>Execution of tasks in WP5</td>
</tr>
<tr>
<td>4</td>
<td>16,198</td>
<td>WP4</td>
<td>TNO</td>
<td>Personnel Costs</td>
<td>to</td>
<td>WP5</td>
<td>TNO</td>
<td>Personnel costs</td>
<td>The change of scope of the e-logbook and e-SRB in combination with additional efforts needed for the navigation tool</td>
</tr>
</tbody>
</table>
3.2.1 Unforeseen subcontracting (if applicable)

There is unforeseen subcontracting of VIA in WP5

**Work (tasks) performed by subcontractor:**
Modification of the module “onliwater” of the hydrology software used at viadonau. It contains an update of the “discharge-water-level (gauge)-matrix”, as well as an enhancement of the module with information on flow velocities of the river Danube.

**Explanation of circumstances which caused the need for a subcontract**
The original source code of the hydrology software of viadonau lacked possibilities of providing the full set of waterway data as requested by the PROMINENT project. In order to comply fully with the requirements set, the software had to be enhanced with the aim to provide the on-board fairway track and integrated engine speed advise tool with real time data on water levels and flow velocities.

**Confirmation of proper choice of subcontractor**
As it was necessary to interfere with the source code of the hydrology software of viadonau, and only the provider of the code had access to it and was able to do so, only one subcontractor could be chosen (Simutech). The subcontract was awarded ensuring good value for money and avoiding any conflict of interest.