Project Data Sheet

BASIC PROJECT DATA			
Full project title:	**LNG Masterplan for Rhine-Main-Danube**		
Short project title: (acronym)	LNG Masterplan	**Project logo:**	
Project website:	http://www.lngmasterplan.eu	**Project ID:**	PA1A023
Need and added value for Danube Region Strategy:	The EUSDR targets the modernisation of the Danube fleet in order to improve environmental and economic performance. A significant contribution to this goal can be made, if the Danube fleet switches from gasoil to other low-carbon fuel alternatives, such as LNG. In addition, the transport of LNG on the Danube could significantly increase transport volumes on the Danube and offer energy savings to related industries in the entire region. Compared to today's commonly used bunker oil for shipping, LNG reduces sulphur emissions down to nearly 0%. LNG fuelled ships emit nearly no particulate matters, about 90% less nitrogen oxides and 20-25% less CO2. The use of LNG as fuel shall, therefore, improve the environmental performance of inland navigation due to the cleanness of LNG compared to the currently used gasoil (EN 590 diesel). The LNG Masterplan delivered (besides market and regulatory assessment, feasibility studies and technical concepts or education and training materials) a comprehensive strategy and recommendations for deployment of LNG in inland waterway transport, which sets actions and measures needed for the wide-scale deployment of LNG in inland water transport. As part of their activities in the LNG Masterplan project, the partners and invited stakeholders identified several barriers (weaknesses and threats) in the deployment of LNG in inland water transport summarised and addressed in the strategy. The actions cover various aspects of LNG deployment such as (i) Governance and Legislation, (ii) Markets & Finances, (iii) Vessels & Equipment, (iv) LNG Infrastructure, (v) Jobs & Skills, and (vi) Awareness for LNG among general public and the decision makers. The strategy, as one of the main results of the project, was and still is widely disseminated at local, national and European levels. Necessary steps towards its implementation and related supporting financing instruments are being discussed with the decision and policy makers on the European and national levels. For the Danube region in addition the project contributed to the work of the Priority Area 1a of the European Strategy for the Danube Region (EUSDR).		
Objective(s) of project:	The Action's overall objective was to prepare and to launch the full-scale deployment of LNG as environmentally-friendly and efficient fuel and cargo in the inland navigation sector within the Rhine/Meuse-Main-Danube axis and to exploit synergies in deployments and operation of LNG infrastructure. To deliver on the overall objective of the Action, there were two specific objectives: • **to elaborate a comprehensive strategy with a detailed roadmap and appropriate guidelines and recommendations for the implementation of LNG as a fuel and cargo on the Rhine/Meuse-Main-Danube axis** • **to test, operate and monitor LNG deployment in a set of pilot components** The LNG Masterplan created a platform for cooperation between authorities and industry stakeholders with the purpose to facilitate the elaboration of a harmonised European regulatory framework for LNG as fuel and cargo in inland navigation and to promote the introduction of LNG as a fuel and cargo for inland		

	shipping. It delivered technical concepts for new and retrofitted vessels being propelled by LNG and transporting LNG as well as a significant number of pilot deployments of vessels and one terminal. It also developed a comprehensive strategy and recommendations for deployment of LNG in inland waterway transport, which sets actions and measures needed for the wide-scale deployment in line with EU transport/energy/environmental policy goals and actions. In detail, the LNG Masterplan achieved tangible outcomes: • to coordinate and facilitate development of harmonised and favourable regulatory framework and to trigger public – private investments • to investigate costs and benefits of the deployment of LNG as a fuel and as cargo for the European inland fleet • to identify obstacles and to elaborate recommendations for cost-effective and stepwise deployment in co-operation of public authorities and private industry • to provide assessments of potential LNG pioneer markets in the hinterland of river ports and to explore this markets as part of a hub & spoke distribution concept • to increase and transfer know-how from Northern Europe & maritime sector to the inland navigation sector in general and to Central / South Eastern Europe in particular • to position LNG as a green and alternative fuel for inland waterway transport • to trigger the follow-up development and modernisation in inland water transport (both infrastructure and fleet) by introducing the cleaner alternative fuel and a valuable commodity (all-in-one) • to facilitate and trigger (pilot) deployment of the waterborne LNG chains - through building-up of pilot LNG infrastructure in ports and pilot LNG-fuelled vessel(s) (newly built / and retrofitted) • to strengthen European innovation in ship-building and related technologies and thus to improve the competitive position of European shipyards and equipment providers LNG is an important opportunity for the IWT sector but it certainly is not a remedy for all structural and economic problems in IWT. All the work was based on a realistic and integrated European approach. A vision is that inland ports on the Rhine/Meuse-Main-Danube axis shall become key distribution centres for LNG. Inland terminals shall function as satellites to the hinterland enabling to reach other pioneer markets like public (transport) sector and heavy duty transport industry (buses, garbage collection trucks, city logistics) and the energy industry.
Conducted project activities:	The LNG Masterplan was defined as a study with integrated pilot deployment, with characteristics of being more a programme than a project. The beneficiaries executed their own project activities in the framework of defined co-operation activities and in parallel to the regulatory work of relevant authorities. The authorities received technical and organisational support from competent project partners and necessary input for their regulatory work. The common activities facilitated the transfer of know-how and led to the harmonisation of some technical solutions and to elaboration of guidelines and recommendations for the necessary regulatory framework. The LNG Masterplan functioned as a platform which enabled the participants to benefit from the synergies of the common work. The targeted co-operation of public and private stakeholders generated a high European added value for all participants and resulted in an improved framework for follow-up activities and triggered the follow-up investments & projects, among others the LNG terminal in Antwerp, LNG bunkering station in Duisburg, LNG-fuelled busses in Slovakia, etc. The LNG Masterplan delivered a high number of measurable outcomes which can be downloaded under: http://lngmasterplan.eu/download/deliverables (such as Feasibility studies, Economic and technical assessments, Technical

design studies, Technical concepts, Pilot deployments in vessels, terminals and vehicles, Workshops and round tables, Education and training materials, Guidelines and recommendations).

The work carried out in the project was structured, besides Project management & dissemination activities, into 5 activities, each with several sub-activities.

Activity 1: Framework & Market Analysis

LNG Masterplan consortium investigated and assessed the framework conditions, supply markets and market opportunities for the implementation of LNG as fuel and cargo on the Rhine/Meuse-Main-Danube axis. Attention was paid to a comprehensive impact analysis addressing safety, ecology and socio-economic matters of the LNG introduction. The delivered outcomes address (i) Status Quo Analysis & Trends, (ii) LNG Supply Analysis, (iii) LNG Demand Analysis, and (iv) Impact Analysis: Safety, ecology & socio-economic aspects.

Activity 2: Technologies & Operational Concepts

LNG Masterplan consortium, through research work as well as concrete vessel projects, contributed to elaboration of technical and operational solutions for small scale LNG operations in the inland navigation sector. It addressed and investigated innovative (i) Engine technologies and concepts, and (ii) LNG tank and equipment technologies. Activities furthermore addressed the necessary work for harmonisation of regulations in (iii) LNG bunkering in European sea and inland ports and thus contributed to the regulatory work with regard to the provision of recommendations and guidelines for harmonised bunkering of LNG. The safety and response studies elaborated as part of the (iv) Technical Evidence & Safety and Risk Assessment activities give insight into safety regulations and procedures and guidance on how to organise local safety regulations and procedure for LNG bunkering and (un-)loading. These studies give overview of incident scenarios and guidance for incident response.

Activity 3: Vessel & Terminal Solutions

As part of project activities the involved partners elaborated feasibility studies and technical concepts for LNG terminals; new-built LNG tanker and LNG-fuelled vessels; for vessels being retrofitted for LNG propulsion as well as for other vehicles & machinery which are elements of the applied LNG supply chain approach. The activities included all necessary works with classification societies, regulatory bodies and authorities to obtain permits for terminals and vessels, including required safety and risk studies (such as HAZID) and/or environmental impact assessments; all necessary before starting the pilot deployment. Furthermore, besides a concrete support for individual activities of beneficiaries, guidelines for preparing LNG terminal and vessel projects to get a solid financing scheme behind the project were delivered (financial & legal).

Activity 4: Regulatory Framework & Masterplan

The work of the LNG Masterplan, through (i) Provisions for harmonised European regulations, contributed to the regulatory process of relevant bodies such as EC, CCNR, UN/ECE and national authorities. The work addressed vessel specifications, transport of LNG as dangerous cargo, bunkering of LNG, police regulations, port regulations and education & training of involved personal. As part of the (ii) Education & training requirements activities, curricula and lesson materials, e-learning modules and pilot simulators were developed. To respond to the education and training needs of the planned pilot deployments, pilot training classes based on developed standards and materials were executed. Knowledge, experience, good practice examples and lessons learned gained through the project lifecycle were collected, assessed and further disseminated as part of the (iii) Assessment of concepts, trials & pilot deployments activities. These were the basis of a comprehensive Strategy for the implementation of

	LNG as fuel for inland vessels and as cargo on the Rhine-Main-Danube waterway axis - (iv) Masterplan for the LNG Implementation on Rhine/Meuse-Main-Danube (Strategy & Recommendations). The Strategy sets actions and measures needed for the wide-scale deployment of LNG in inland water transport and addresses (a) Governance and Legislation, (b) Markets & Finances, (c) Vessels & Equipment, (d) LNG infrastructure, (e) Jobs & Skills, and (f) Awareness. **Activity 5: Pilot Deployment** The objective was to test, operate and monitor LNG deployment in a set of pilots. The pilot deployments interacted with the Action's other activities by feeding into the regulatory framework, providing lessons learned, recommendations and best practice solutions, creating the baseload for LNG demand to set up the first small scale LNG supply chains, creating the awareness among decision makers and demonstrating benefits of the LNG to the wider public. The activities were performed by barge and terminal operators, as well as shipyards together with their commercial partners and suppliers. Due to the complex permitting procedures, still immature market and limited project timeframe, some pilot deployments were cancelled, among others (ii) LNG tankers (LNG as cargo). The technical concepts of two LNG Inland tankers using different tank technologies were prepared, with one receiving the temporary permit from CCNR & UN/ECE (derogations from existing legislation). The following pilot deployments were executed: (i) LNG Terminals • LNG terminal in Ruse with fuelling station for LNG-fuelled trucks and preparatory works for the bunkering station for LNG-fuelled vessels (Bulmarket DM Ltd.) (iii) LNG propelled vessels (LNG as fuel) • Container vessel of DCL Barge B.V. • LNG propelled chemical tanker of Chemgas Barging S.a.r.l. • LNG propelled chemical tanker of Damen Hardinxveld BV (iv) LNG vehicles & machinery • LNG fuelling station of Bulmarket Ltd. • LNG-fuelled trucks to distribute LNG to the end-customers **Activity 6: Project Management** The LNG Masterplan was a multi-beneficiary project, with characteristics of an entire programme. Therefore, a robust and proven management structure (proven by other big and successful projects) with experienced project management team was established. Activities comprised of all work related to project management (financial, technical and quality management), dissemination & exploitation of the project and its results to national and international stakeholders, the management of the industry reference group as well as the strategic liaison with related projects and initiatives in Europe and overseas (e.g. China, USA, Canada) and with variety of already on-going project and standardisation initiatives.
Transboundary impact:	Transboundary issues such as a lack of international co-operation, different infrastructure or operating standards or a lack of common working methods, operations or the training and safety standards were addressed by the LNG

	Masterplan and know-how transfer between two regions – Rhine & Danube was ensured. Further topics comprised: reduction of adverse (vessel) air emissions, creation of a new and high-volume market for Danube transportation, reduction of fuel costs for barging companies, reduction of transport costs for industries of Danube region, increase of competitiveness of several sectors of industry, increase of energy efficiency and safety for entire region along the Rhine-Main-Danube axis, especially in the Danube countries.
Project beneficiaries / target groups:	Barge operators; transport users from production and wholesale industry, major industries of the region using LNG as alternative source of energy, people living in agglomerations along the Rhine & Danube benefiting from reduction of air emissions as well as variety of authorities and public administrations. The list of beneficiaries comprised barge operators, port authorities, shipyards, technology providers, energy industry, research organisations, classification organisations and consultants.

STATUS AND TIME FRAME			
Current project phase: (please tick a box)	☐ Definition (e.g. project idea, abstract) ☐ Preparation (e.g. project proposal, feasibility study) ☐ Implementation ☒ Completion		
Start date:	01/2013	**End date:**	12/2015
Notes:	-		

PROJECT TEAM	
Project leader:	Pro Danube Management GmbH
Project partner(s):	The project brought together 33 companies and organisations with the relevant authorities from 12 countries, creating the critical mass of stakeholders needed for the development of the necessary regulatory framework and deployment of LNG in inland navigation sector. The Beneficiaries were: A3PS - Austrian Association for Advanced Propulsion Systems (AT); Erste Group Bank AG (AT), EVN AG (AT), FH OÖ Forschungs & Entwicklungs GmbH (AT), Pro Danube Management GmbH (AT), Gemeentelijk Havenbedrijf Antwerpen (BE), Bulmarket DM Ltd. (BG), Asociace NGV o.s. (CZ), DST Entwicklungszentrum für Schiffstechnik und Transportsysteme e.V. (DE), DNV GL SE (DE), Universität Duisburg Essen (DE), Port autonome de Strasbourg (FR), Chemgas Barging Sarl (LU), Argos Bunkering B.V. (NL), Chemgas Holding B.V. (NL), DCL Barge B.V. (NL), Havenbedrijf Rotterdam N.V. (NL), Stichting STC-Group (NL), Kooiman Marine B.V. (NL), LNG E-motion BV (NL), National Company The Maritime Danube Ports Administration Joint Stock Company Galati (RO), Ceronav (RO), Compania De Navigatie Fluviala Romana Navrom S.A. (RO), Transport Trade Services S.A. (RO), University of Craiova (RO), Danube LNG EEIG (SK), Výskumný ústav dopravný, a. s. (SK), Staatliche Rhein-Neckar-Hafengesellschaft Mannheim mbH (DE), LINZ AG für Energie, Telekommunikation, Verkehr und Kommunale Dienste (AT), Italian Republic - Ministero delle Infrastrutture e dei Trasporti (IT), Schönherr Rechtsanwälte GmbH (AT), Scheepswerf Damen Hardinxveld B.V. (NL), Bernhard Schulte (Cyprus) Ltd. (CY). The majority of project partners was from the private sector but also included some public bodies and authorities. The Port of Basel from Switzerland (not eligible for TEN-T funding, however involved as the partner number 34) participated directly in the project activities

	through its nationally supported LNG related project. The LNG Masterplan received approval and acknowledgement of all 12 Member states where the project was executed, with a special support from the Netherlands, Austria, Slovakia, Czech Republic, Romania and Bulgaria that explicitly expressed their interest in the project and confirmed their support and / or involvement in the regulatory activities. The project had a big industry support through the Industry Reference Group, which comprised more than 50 big industry players and advisory support of another more than 20 organisations (professional associations representing IWT stakeholders, such as European Barge Union, European Federation of Inland Ports, Inland Navigation Europe, or Romanian Inland Ports Union as well as other public bodies & authorities).	
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FINANCING		
Available: (please tick a box)	☒ Yes ☐ Partly ☐ No	
Total budget:	20.48 MEUR	
Source(s) and amount (potential sources for project ideas): (please tick a box and provide further info)	☐ National/regional funds:	-
	☒ EU funds:	10.24 MEUR of eligible costs (TEN-T MAP 2007-2013; Call 2012 Project proposal application) (50% funding rate for studies)
	☐ IFI loans:	-
	☒ Private funds:	10.24 MEUR of eligible costs
	☐ Other:	-

PROJECT ENVIRONMENT	
Project cross-reference:	• Project “CODE 24”: EU funded INTERREG IVB NMW • Project “Consolidation and strengthening of the corridor Upper Rhine as a central hub for the TEN-T network” (2011-EU-95029-S): TEN-T Study • Project “COSTA” (2011-EU-21007-S): TEN-T Study • Project “Innovative Danube Vessel”: commissioned by DG REGIO in the framework of the Danube Region Strategy • Project “PLATINA 2”

	• Project “NEWADA Duo – Network of waterway administrations”: SEE Programme • Project “LNG Rotterdam-Gothenburg“: TEN-T MAP Call 2012 • Project “High performance Green Port Giurgiu”: TEN-T MAP Call 2012 • **amendment:** Project “PAN-LNG-4-DANUBE”
Cross-reference ID(s):	–
Strategic reference:	• European Union Climate Action - Climate Energy Policy (2009) with 20-20-20 targets until year 2020 • Europe 2020 – New Economic Strategy (2010) with Flagship initiative “Resource Efficient Europe” • White Paper on Transport – 2030/2050 perspective (2010) • Proposal for the "Directive of the European Parliament and of the Council on the deployment of alternative fuels infrastructure" (2013) which is part of the "Clean Power for Transport Package" • NAIADES, et al.

Relevant legislation:	• Rhine Vessel Inspection Regulations
	• EU Directive 2006/87/EC laying down technical requirements for inland waterway vessel
	• ADN - Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways/UNECE/Committee on Inland Transport
	• Rhine Police Regulations
	• UNECE/CEVNI
	• Relevant standardisation activities:
	  ○ Standards of Training and Certification in Inland Navigation (STCIN)
	  ○ Regulations for bunkering
	  ○ Guidelines for sea and inland ports

Other:	–
EUSDR EMBEDDING	
Relation to other Priority Areas of the Danube Region Strategy:	☒ PA1b: To improve mobility and multimodality – Road, rail and air links ☒ PA02: To encourage more sustainable energy ☐ PA03: To promote culture and tourism, people and people contacts ☐ PA04: To restore and maintain the quality of waters ☐ PA05: To manage environmental risks ☒ PA06: To preserve biodiversity, landscapes and the quality of air and soils ☐ PA07: To develop the knowledge society through research, education and information technologies ☒ PA08: To support the competitiveness of enterprises, including cluster development

	☐ PA09: To invest in people and skills ☐ PA10: To step up institutional capacity and cooperation ☐ PA11: To work together to promote security and tackle organised and serious crime
EUSDR COMPLIANCE	
Compliance with targets of the Danube Region Strategy:	☒ Increase the cargo transport on the river by 20% by 2020 compared to 2010. ☐ Solve obstacles to navigability, taking into account the specific characteristics of each section of the Danube and its navigable tributaries and establish effective waterway infrastructure management by 2015. ☒ Develop efficient multimodal terminals at river ports along the Danube and its navigable tributaries to connect inland waterways with rail and road transport by 2020. ☐ Implement harmonised River Information Services (RIS) on the Danube and its navigable tributaries and ensure the international exchange of RIS data preferably by 2015. ☒ Solve the shortage of qualified personnel and harmonize education standards in inland navigation in the Danube region by 2020, taking duly into account the social dimension of the respective measures.
Compliance with actions of the Danube Region Strategy:	☐ To complete the implementation of TEN-T Priority Project 18 on time and in an environmentally sustainable way. ☐ To invest in waterway infrastructure of Danube and its tributaries and develop the interconnections. ☒ To modernise the Danube fleet in order to improve environmental and economic performance. ☒ To coordinate national transport policies in the field of navigation in the Danube basin. ☐ To support Danube Commission in finalising the process of reviewing the Belgrade Convention. ☐ To develop ports in the Danube river basin into multimodal logistics centres. ☐ To improve comprehensive waterway management of the Danube and its tributaries. ☒ To promote sustainable freight transport in the Danube Region. ☐ To implement harmonised River Information Services (RIS). ☒ To invest in education and jobs in the Danube navigation sector.
Affiliation to thematic working group of Priority Area 1a of the EUSDR:	☐ Waterway infrastructure and management ☒ Ports and sustainable freight transport ☒ Danube fleet ☐ River Information Services

	☒ Education and jobs
OTHER RELEVANT ISSUES	
Project requirements:	Participation of key stakeholders from the transport and energy industry. Engagement of relevant authorities in both regions addressing the regulatory framework. Investment into LNG terminal in Black Sea port Constanta (for the Danube region) & vehicles (planned). Positive evaluation within the TEN-T Multi-annual Call Programme 2012 (pending).
Follow-up project:	Full-scale implementation.
Any other issues:	Project of high interest and substantial economic value.