

Developments in the usage of LNG as fuel in inland waterway vessels

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Content

- **Expertise and Innovation Centre inland Barging**
 - EICB and LNG projects
 - EICB Innovation Lab
- **Breakthrough LNG deployment in Inland Waterway Transport**
 - LNG developments
 - Background and scope of the project
 - Partners
 - Activities

EICB: Background

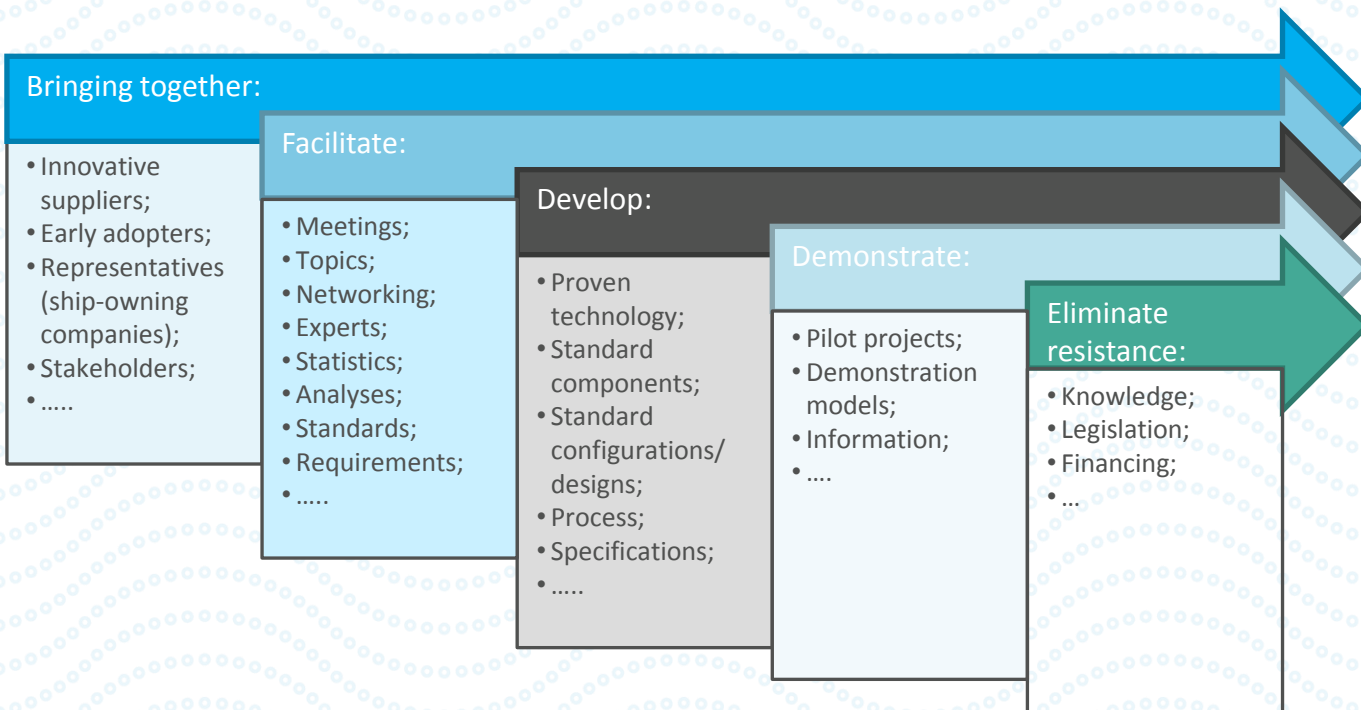


- **Stichting Projecten Binnenvaart (Shipping Projects Bureau, 1996)**
- **Binnenvaart Convenant (IWT covenant, 2006):**
 - Between (then) Ministry of Transport and Public Works (now Ministry of Infrastructure and the Environment) and Dutch IWT sector organisations
 - Stimulation of concrete innovation in IWT and the greening of IWT
 - Foundation of an expertise and innovation centre (→ Expertise and Innovation Centre inland Barging)
- **Subsidy for Innovation in IWT (SIB)**
 - Duration 2008-2011
 - Amongst the funded projects 'Dual fuel (LNG) engine for inland navigation' (MTS Argonon)

EICB and LNG

- **EICB Innovation Lab:**
 - Working group LNG
- **Knowledge- and Expertise Centre LNG**
 - Total Cost of Ownership model LNG
- **Research sailing pattern of potential LNG-vessels**
- **PROMINENT:**
 - LNG as alternative fuel
- **European Inland Barging Innovation Platform:**
 - Concerning 'rapid uptake of alternative fuels'
- **Dutch National LNG Platform**
 - Board member

EICB Innovation Lab



Greening of 4100 engines

300
LNG

2500
SCR/DPF

900
Low power

400
Alternative

600
Hybrid

300
Right-
sizing



Project Partners

ADS van STIGT

Antea Group

Axces Emission Technology

Blueco Group

CleanFlex

Cummins

Discom

Dolderman B.V.

Emigreen

E-mission Europe

Exomission

Expertise- en InnovatieCentrum

Binnenvaart

Havenbedrijf Rotterdam

HDM Sustainable Solutions

Hug Engineering

Inspectie Leefomgeving en

Transport

Koedood Dieselservice

MS Anda

MTU Benelux

Multronic

NPRC

Pon Power

Scheepvaartonderneming Verkade

Solfic

Teus Vlot Diesel Marine

TriFleet Leasing BV

Vereniging Importeurs van

Verbrandingsmotoren

Vidol Marine

Volvo Penta

Wärtsilä Netherlands

Aspirant members

Hybrid Ship Propulsion

Veth Propulsion

DCL

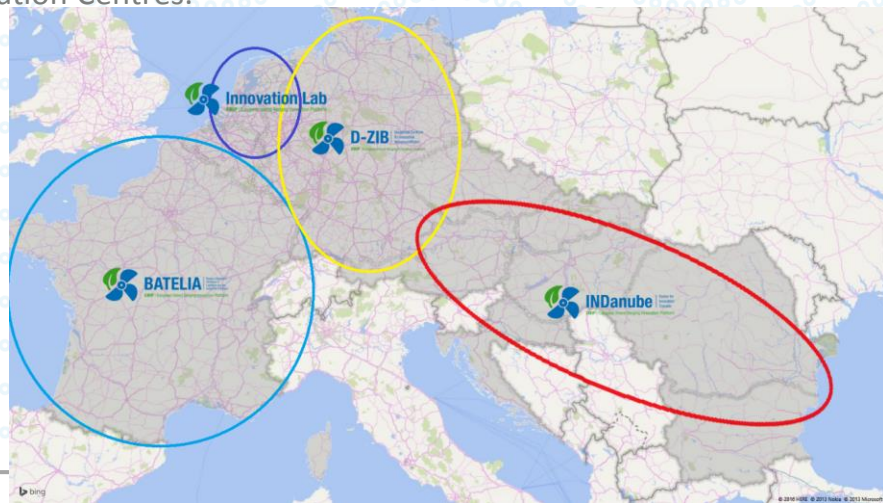
European Inland Barging Innovation Platform (EIBIP)



EIBIP

EIBIP | European Inland Barging Innovation Platform

- **Promote the uptake of innovation by the IWT sector, by:**
 - Identifying and addressing barriers to the market transfer of innovation, covering technological, organisational and financing aspects;
 - Conducting promotion and awareness campaigns, and business cases.
 - Facilitated by a European Platform of existing and new Innovation Centres.
- **3 Innovation Centres:**
 - INDanube (Danube region, managed by Pro Danube)
 - D-ZIB (Germany, managed by MARIKO)
 - BATELIA (France, managed by VNF)
- **www.eibip.eu**



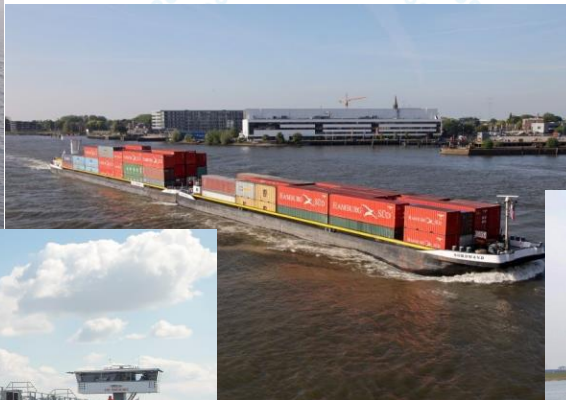
Research of sailing pattern potential LNG vessels

Research performed for Dutch Ministry of Infrastructure and the Environment

Tracked ± 300 Dutch inland vessels with an annual fuel consumption of $\geq 500 \text{ m}^3$



Current LNG vessels



Development in bunkering



Legislative developments

- **CESNI: European standard laying down technical requirements for inland navigation vessels (ES-TRIN)**
- **New (Stage V) emission limits and type-approval for internal combustion engines for non-road mobile machinery**

EU NRMM Stage V

Power range	CO	HC	NOx	PM mass	PN	A	Mandatory date of application of this Regulation for	
kW	g/kWh	g/kWh	g/kWh	g/kWh	#/kWh		EU type- approval of engines	Placing on the market of engines
19≤P<75	5	(HC+NOx≤4,70)		0.3	-	6	1 January 2018	1 January 2019
75≤P<130	5	(HC+NOx≤5,40)		0.14	-	6		
130≤P<300	3.5	1	2.1	0.1	-	6		
P≥300	3.5	0.19	1.8	0.015	1x10 ¹²	6	1 January 2019	1 January 2020

For gas engines:
 $HC = 0.19 + (1.5 \cdot A \cdot \text{Gas Energy Ratio})$
 Max.: $HC = A + 0.19 = 6.19 \text{ g/kWh}$

Breakthrough LNG deployment in Inland Waterway Transport

Contributing to the implementation of the TEN-T Network:

Core network

Horizontal priority: New technologies & innovations

Location of the action:

The Netherlands, Germany and Belgium

Duration of the action:

01/01/2016 - 31/12/2018

Mission:

Reducing investment barriers for ship-owning companies targeting a large-scale implementation of LNG in IWT

Forcing breakthrough in the LNG market

Partners involved

Stichting Projecten Binnenvaart / Expertise- en InnovatieCentrum Binnenvaart (SPB/EICB) (Coordinator)

ENGIE LNG Solutions BV

Scheepswerf Gebr. Kooiman BV

Pon Power BV

Trifleet Leasing B.V.

Koedood Dieselservice BV

Dolderman BV

Pitpoint BV

Cryonorm Systems B.V.

Wärtsilä Netherlands B.V.

Activities

- **Activities:**

- Study concerning **standardisation** and **type approval** of the most common used components and configurations, resulting in an absolute reduction of the investment costs;
- Application of **innovative financial constructions** in the business client relationship to avoid the need of capital investments by ship owners and safeguard the benefits for the operator by securing a fixed price gap between diesel and LNG;
- Elaboration of **robust business cases**
- Identification of the **best locations** for LNG bunker stations

- **Pilots:**

- 6 LNG-vessels
- 4 LNG-bunker stations

Activities

Activity no.	Activity title
1	Study regarding standardisation and type approval
2	Pilot deployment: equipping 6 representative vessels with LNG fuelling technology
3	Study on innovative financial constructions in the business-client-relation for LNG vessel retrofitting
4	Business case calculations
5	Study into best locations for LNG bunkering stations
6	Pilot deployment study of four LNG bunkering stations
7	Project management, evaluation of results and dissemination

1. Study regarding standardisation and type approval

- Execution of ex-ante cost/benefit analyses for the best available LNG technologies for vessels
- Development of standardised components for best available LNG technologies
- Defining a total configuration of a vessel-bunker station solution
- Adoption of the standard configuration by the competent authorities
- Specification of pilot test settings

2. Pilot deployment: equipping 6 representative vessels with LNG fuelling technology

- Equip 6 vessels with an LNG installation
- Pilot test
- Evaluate the results of the pilot test and write report

3. Study on innovative financial constructions in the business-client-relation for LNG vessel retrofitting

- Study on financial lease of exchangeable fuel tank containers
- Pilot study on proposed solution for the Capex/Opex paradox

4. Business case calculations

- Analysis of the potential and sailing profiles of LNG using vessels in Europe
- Development of total cost-of-ownership model and financing constructions
- Stakeholder consultation and market research

6. Pilot deployment study of four LNG bunkering stations

- Within Activity 5. Study into best locations for LNG bunkering stations
- Analysis of the potential and sailing profiles of LNG using vessels in Europe
- Development of total cost-of-ownership model and financing constructions
- Stakeholder consultation and market research

Contact details



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