



SUB-COMMITTEE ON BULK LIQUIDS
AND GASES
14th session
Agenda item 6

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DEVELOPMENT OF PROVISIONS FOR GAS-FUELLED SHIPS

Progress in fuel cell and Hydrogen technology in the German maritime industry

Submitted by the Community of European Shipyards' Associations (CESA)

SUMMARY

Executive summary: This submission provides information on the progress in the marine application of fuel cell technology and Hydrogen in the German maritime industry. It briefly introduces the recently-launched R&D project “*e4ships – Clean Energy for Ships*”, which aims at the rapid utilization of fuel cells in international merchant shipping through commercially used full scale demonstrators. The project contains a dedicated module to introduce the research results into the IMO rule development of provisions for gas-fuelled ships in order to facilitate the timely finalization of the IGF Code, which is necessary to utilize the full CO₂ reduction potential of this new technology.

Strategic direction: 5.2

High-level action: 5.2.1

Planned output: 5.2.1.3

Action to be taken: Paragraph 8

Related document: BLG 14/6/1

Introduction

1 The need to reduce air emissions of the shipping sector in order to deliver maritime contributions for the protection of our environment and to prevent climate change has raised the interest in maritime fuel cell applications in several ship types. The fuel cell technology can be utilized with various gas and liquid fuel types resulting in emissions with significantly lower CO₂ and zero particle, SO_x and NO_x concentrations. European shipyards anticipate a rapidly increasing demand for fuel cell applications on board cruise ships, ro-ro and passenger ferries, as well as yachts, research vessels and tugs.

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2 With this submission CESA would like to draw the attention of this Sub-Committee to the dynamic development that is currently taking place in the German maritime industry, where this important field of eco-innovation is progressed with a National Innovation Program (NIP) for hydrogen and fuel cell technology. The first marine R&D project within the NIP was launched in July 2009 under the acronym and title “e4ships – Clean Energy for Ships”.

Goals and scope of the e4ships project

3 The purpose of the project, which will run until 2016, is to demonstrate that fuel cells can function in power supply systems of ships under everyday conditions in order to facilitate the introduction of cleaner energy generation in merchant shipping. The co-operating project partners are well-known German shipyards and shipowners, leading fuel cell manufacturers, and classification societies. Both high-temperature molten carbonate fuel cells (MCFC), and low-temperature fuel cells using Proton Exchange Membrane (PEM) technology are employed in this project. The total budget for the project, which is sponsored by the German Federal Ministry of Transport, comes to more than €50 million. The e4ships project is coordinated by NOW, the German national organization for hydrogen and fuel cell technology. For more information please visit the website: <http://www.e4ships.de/>.

4 The e4ships project is not limited to research and pre-competitive development but is aiming at the implementation of R&D results in large scale demonstrators. In the timeframe of this project several commercially used vessels will come into service. Three specific applications will be developed in the following project modules:

- .1 The Pa-X-ell module is developing a decentralized heat and power generation with fuel cell on board large cruise ships and ro-ro ferries using several fuel types such as natural gas, LPG, ethanol and methanol. Besides increasing the energy efficiency and reducing air emissions the modular design of the system is aiming at higher redundancy in with the safe return to port concept.
- .2 The SchIBZ module is developing a fuel cell system for mega yachts and research vessels with onboard diesel reformer using low-sulphur diesel or second generation bio-fuels (BtL).
- .3 The HyFerry module will equip passenger ferries for coastal service with hybrid main propulsion systems using hydrogen-powered PEM fuel cells. In conjunction with hydrogen production powered by offshore wind turbines a CO₂ emission free transport system will be developed.

5 The project also comprises an overarching module dedicated to the integration of the results achieved in the specific demonstration modules. A key challenge is the parallel development of uniform safety regulations, technical standards as well as education and training requirements. Since some of the new ships are intended for world-wide service those activities are performed with an international perspective.

Interaction with IMO

6 The broad application of efficient fuel cells and cleaner ships' fuel in merchant shipping requires the timely development of mandatory international safety regulations. The matching timeframes for the work program item Development of Provisions for Gas-Fuelled Ships and the e4ships project offer a unique opportunity to achieve this goal. The project therefore contains

a dedicated work package to interact with IMO and to provide research results for the development of the draft IGF Code. This task is performed by the German Shipbuilders' Association (VSM) in co-operation with CESA.

7 In order to utilize the full potential of fuel cell technology developed in this large integrated project as one initiative of many the scope of the future IGF Code should be as broad as possible. Besides containing a dedicated chapter for fuel cell systems the Code should also cover all relevant fuel types including low flashpoint liquids.

Action requested of the Sub-Committee

8 The Sub-Committee is invited to take note of the information provided.
