



## IMAREST Benelux branch Programme 2021

Practical information for technical lectures (unless otherwise specified):

Digital meeting room open 18:45. Start of lecture 19:00.

Venue: due to the uncertain COVID situation, hybrid lectures are foreseen.

Details about real-life and online attendance will be communicated via:

<https://www.linkedin.com/company/imarest-benelux-branch>

and

<https://www.imarest.org/local-communities/europe/benelux>

### Tuesday 16<sup>th</sup> of February 2021

*Technical lecture*

Speakers: Jogchum Bruinsma (Nedstack) and Herm Jan de Vries (OSD-IMT)

**Topic:** The application of hydrogen fuel cell technology in a zero emission harbour tug

The use of hydrogen as a maritime fuel is a promising way to reduce greenhouse gas and hazardous emissions from shipping, but challenging. It requires a major shift in shore infrastructure, on-board fuel storage and overall ship design. Polymer electrolyte membrane (PEM) fuel cells can play a central role in on board power supply. They can be used to achieve clean, zero-emission on-board power generation at a very low noise level. In this technical lecture the speakers will zoom in on PEM fuel cell technology in general and show how to integrate PEM fuel cells as main power generators in ships. Furthermore, they will present a case study on the concept of a full electric harbour tug.

### Thursday 8<sup>th</sup> of April 2021

*Technical lecture*

Speakers: Rob Stevens (Yara), Martin de Koning (Anthony Veder), Niels de Vries (C-Job) and Peter de Vos (TU Delft)

**Topic:** ammonia as maritime fuel

Ammonia (NH<sub>3</sub>) is attracting a lot of attention as a maritime fuel. Ammonia is a well-known substance that has been traded and transported over the seas in bulk quantities for many decades. Production at industrial scale is possible ever since Fritz Haber and Carl Bosch developed the Haber-Bosch process in the first decade of the 20<sup>th</sup> century.

Why is this extremely hazardous substance (as ammonia is classified in the USA) now seriously being considered as a maritime fuel? What efforts are being undertaken and what is yet to come? What does ammonia as a fuel onboard a ship mean for design, fueling procedures and the crew? Many questions arise when considering ammonia as a maritime fuel! In their short presentations the speakers will shed some light on these questions and discuss with the audience the way forward for ammonia as a maritime fuel.

**Tuesday 8<sup>th</sup> of June 2021**

*Technical lecture*

Speaker: Jos van der Burgt (DNV) and Ronald Dingemanse (RH-Marine)

**Topic:** Battery developments for maritime applications

Battery developments seem to go very fast and therefore it is sometimes considered hard to keep up and understand the pros and cons of specific battery types and technologies. Unfortunately, clear performance indicators to compare batteries of different types and suppliers in the light of the intended (maritime) application are not well defined or not well adhered to. In this technical lecture the technical backgrounds of specific types of batteries are discussed by Jos van der Burgt of DNV.

Subsequently the implementation of batteries in hybrid vessels is discussed by Ronald Dingemanse of RH-Marine, showing how a vessel's operations affects the selection of battery systems.

**Thursday 16<sup>th</sup> of September 2021**

*Technical lecture*

Speakers: Jan-Rients Sinnema and Peter van den Bergh (van Halteren Special Products)

**Topic:** Chilled Water Units and new coolants

Cooling is "mission critical" nowadays on board of naval vessels, such as frigates and submarines. Same as for cruise ships it provides cooling for the men and women on board, but naval vessels also have extensive direct cooling of the mission vital weapon electronics. The Heating Ventilation and Air Conditioning (HVAC) system will be explained in general and especially the Chilled Water Unit, the heart of a HVAC system, that provides a flow of chilled water all over the ship. Where previous submarines relied on "direct expansion" systems where the coolant was directly distributed the Walrus class submarines were the first in the RNLN to have a chiller. Recently during midlife conversion these units were replaced by state-of-the-art-units. The refrigerant, the cooling gas in the Chilled Water Unit, nowadays has sophisticated control in order to become more environmentally friendly. Recent developments will be described including the presenter's views into the future.

**Friday 12<sup>th</sup> of November 2021**

*Annual General Meeting & Mini-symposium*

**Topic:** To be announced

Details and location to be announced.