Nordic Energy Research

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BEFORE COVID-19

Prospects for energy and maritime transport in the Nordic region

Achieving the goals of the initial IMO strategy on reduction of GHG emissions from ships

EXPERT WORKSHOP, WMU 26-27 February 2020

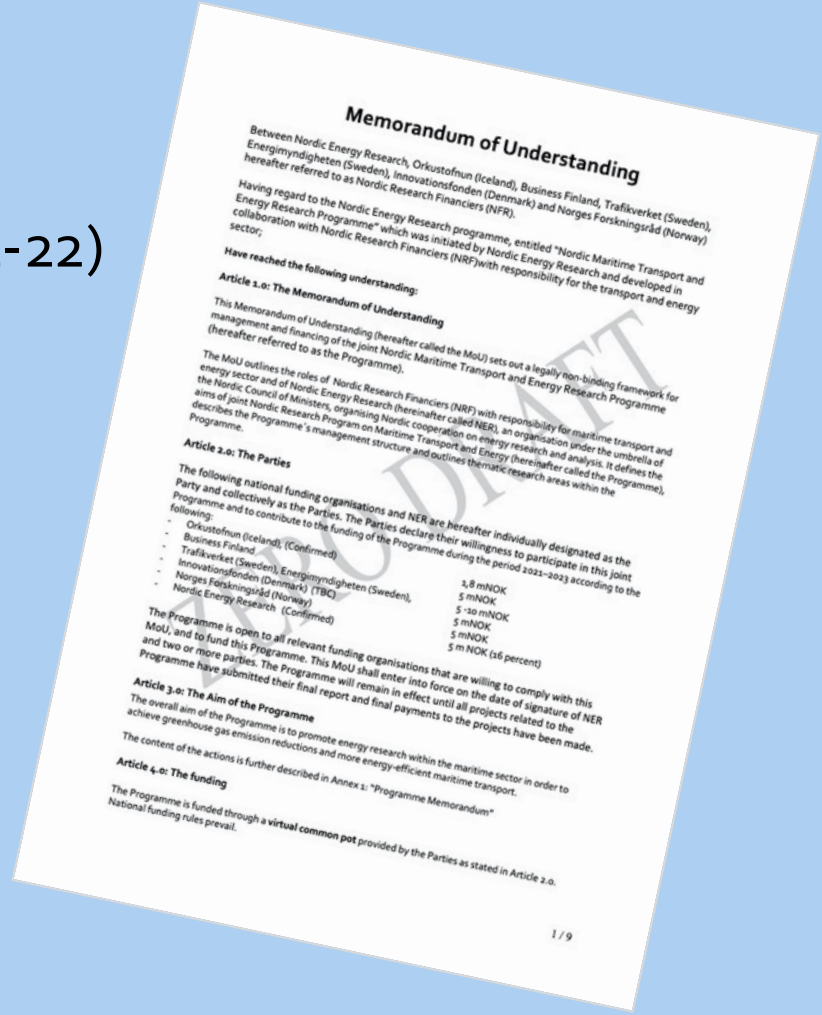
International Transport Forum

WMU WORLD MARITIME UNIVERSITY

Nordic Energy Research

Nordic Energy and Maritime Transport Research programme –key features

- Steering Board – established MOU
- Virtual Common Pot, ca. 30 mNOK/2 years (2021-22)
- Zero-emission maritime fuels
- Deep industry involvement
- Interdisciplinary approach
- NER will provide co-fund



Memorandum of Understanding

Between Nordic Energy Research, Orkustofnun (Iceland), Business Finland, Trafikverket (Sweden), Energimyndigheten (Sweden), Innovationsfonden (Denmark) and Norges Forskningsråd (Norway) hereafter referred to as Nordic Research Financiers (NFR).

Having regard to the Nordic Energy Research programme, entitled "Nordic Maritime Transport and Energy Research Programme" which was initiated by Nordic Energy Research and developed in collaboration with Nordic Research Financiers (NRF)with responsibility for the transport and energy sector;

Have reached the following understanding:

Article 1.0: The Memorandum of Understanding

This Memorandum of Understanding (hereafter called the MoU) sets out a legally non-binding framework for management and financing of the joint Nordic Maritime Transport and Energy Research Programme (hereafter referred to as the Programme).

The MoU outlines the roles of Nordic Research Financiers (NRF) with responsibility for maritime transport and energy sector and of Nordic Energy Research (hereinafter called NER), an organisation under the umbrella of the Nordic Council of Ministers, organising Nordic cooperation on energy research and analysis. It defines the aims of joint Nordic Research Program on Maritime Transport and Energy (hereinafter called the Programme), describes the Programme's management structure and outlines thematic research areas within the Programme.

Article 2.0: The Parties

The following national funding organisations and NER are hereafter individually designated as the Party and collectively as the Parties. The Parties declare their willingness to participate in this joint Programme and to contribute to the funding of the Programme during the period 2021–2023 according to the following:

- Orkustofnun (Iceland), (Confirmed) 1,8 mNOK
- Business Finland 5 mNOK
- Trafikverket (Sweden), Energimyndigheten (Sweden), 5 -10 mNOK
- Innovationsfonden (Denmark) (TBC) 5 mNOK
- Norges Forskningsråd (Norway) 5 mNOK
- Nordic Energy Research (Confirmed) 5 m NOK (36 percent)

The Programme is open to all relevant funding organisations that are willing to comply with this MoU, and to fund this Programme. This MoU shall enter into force on the date of signature of NER and two or more parties. The Programme will remain in effect until all projects related to the Programme have submitted their final report and final payments to the projects have been made.

Article 3.0: The Aim of the Programme

The overall aim of the Programme is to promote energy research within the maritime sector in order to achieve greenhouse gas emission reductions and more energy-efficient maritime transport.

The content of the actions is further described in Annex 1: "Programme Memorandum"

Article 4.0: The funding

The Programme is funded through a **virtual common pot** provided by the Parties as stated in Article 2.0. National funding rules prevail.

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Alternative fuels and energy carriers

Biofuels

Electric

LNG/LBG

Hydrogen

Methanol

Ammonia

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Focus of projects: Hydrogen and Ammonia

- "The CAHEMA project hypothesises that marine engines could use a combination of **ammonia and hydrogen** as fuels, based on **new engine concepts**, to operate successfully and without the emission of large amounts of pollutants and GHG".
- "The AEGIR project proposes a unique **fuel cell** and membrane-based system for efficient conversion of **ammonia** into electric energy."
- "The HOPE project is a ship concept where a typical RORO/ROPAX-vessel with operating distances of around 100 nautical miles with **hydrogen as fuel and fuel cells** for energy conversion".

RPO - Partners

	CAHEMA	AEGIR	HOPE
Lund University	LEAD		
World Maritime University	X		
Alto University	X		
NTNU	X		
DTU		LEAD	
SINTEF		X	X
VTT		X	X
IVL			LEAD
University of Iceland			X

Industry partners

	CAHEMA	AEGIR	HOPE
Wärsilä	X		
FORSEA	X		
MAN	X		
Stolt Tankers BV	X		
Powercell			X
Ballard		X	
Stena Rederi AB			X
CoorsTEK		X	
VARD		X	

Nordic Added Value

	CAHEMA	AEGIR	HOPE
	X	X	X
	X	X	
	X		X
	X	X	
			X