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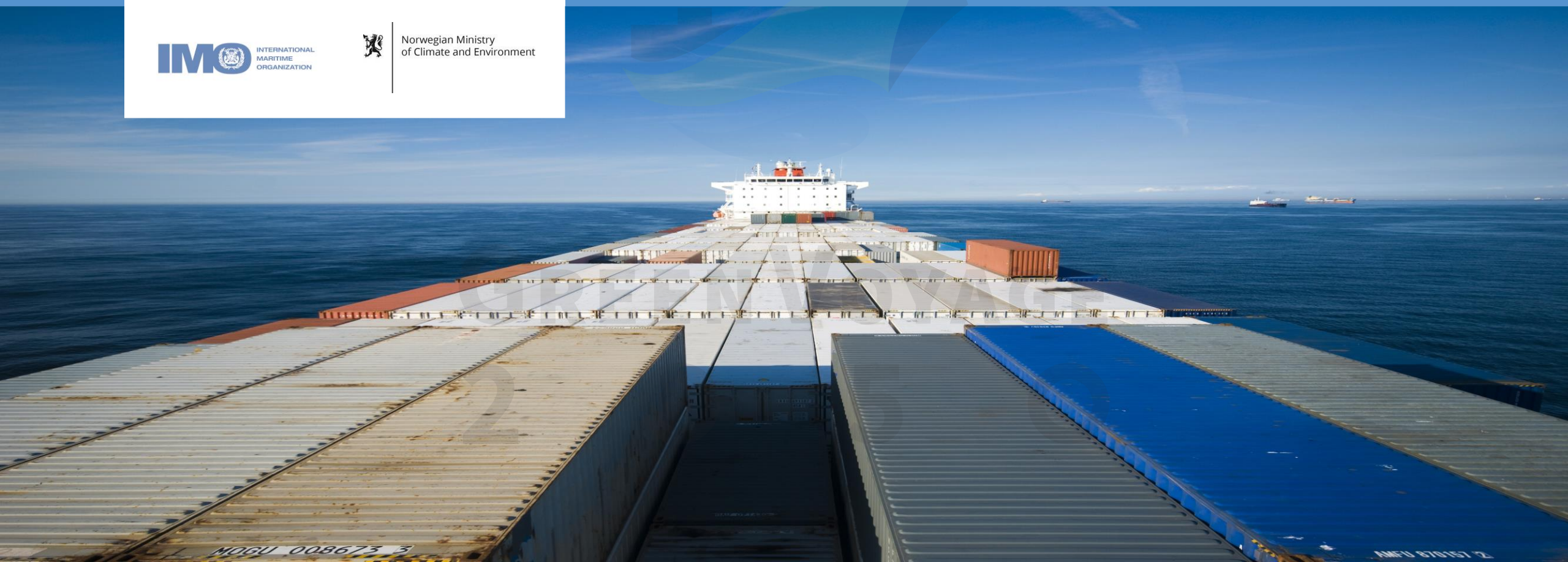


Norwegian Ministry
of Climate and Environment

ALTERNATIVE FUELS AND ENERGY CARRIERS FOR SHIPPING

Session 2 – Alternative fuels in detail: Part 1

March 2021



AGENDA

1. Alternative fuels in detail: introduction
2. Liquefied natural gas (LNG)
3. Liquefied petroleum gas (LPG)
4. Methanol
5. Drop-in biofuels

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ALTERNATIVE FUELS IN DETAIL: INTRODUCTION

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Introduction

- Today's session will focus on the alternative fuels that are more commercially available (although not necessarily widely available today)
- Tomorrow's session will focus on those alternative fuels and energy sources that are in demonstration and development
- For each fuel we will consider the following aspects (among other specific areas):
 - Feedstocks and energy sources
 - Production technologies
 - Onshore requirements
 - Onboard requirements
 - Regulations, standards and guidance
 - Environmental impact
 - Cost overview
 - Barriers and risks

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First, a look at the today's dominant fuels...

- Before we look at the various alternative fuel options, an overview of heavy fuel oil (HFO) and marine gas oil (MGO), the main fuels in use today for shipping, is shown below.
- HFO will be used as a comparison as we look at each of the alternative fuels, given that this is the main fuel used in international shipping.

HFO

- Residual fuel
- Energy density: 42 MJ/kg
- Flashpoint: 60°C
- Generally used by larger vessels in international shipping
- **Dominant option due to its low cost, widespread availability and high energy density**

HFO

MGO

- Distillate fuel
- Energy density: 45 MJ/kg
- Flashpoint: 60°C
- Generally used by smaller vessels for inland or coastal shipping (including where HFO is unsuitable)
- **Less dominant than HFO (and more expensive), but still widely available with a high energy density**

MGO

