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How industry is preparing for alternative fuels

Tawirat (Danny) Bates, Ipieca

Advancing environmental and social performance across the energy transition

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Agenda

- **Ipieca introduction**
- **Background of Ipieca's work:**
  - Low emissions pathways for transport
  - Biofuels
  - Hydrogen
  - Low Sulphur Fuel Oils
- **Ipieca and the IMO**
  - Highlights
  - The Global Initiative programme
- **Responding to alternative fuels spills**
  - Workshops and Exercises
  - Very-low Sulphur Fuel Oil
  - Biodiesel
- **Looking ahead**
  - Alternative Fuels and Products Response Task Force
  - Future Workstreams

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Ipieca introduction

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Energy is key to sustainable development

- **Affordable, reliable energy access is essential**
- **Transitioning to a low-carbon future requires global collaboration and support**
- **Ipieca members recognise their crucial role in supporting the energy transition and contributing to sustainable development**

Ipieca

Founded in 1974 at the request of the UN Environment Programme

Our vision

To advance the oil and gas industry's environmental and social performance and contribution to the energy transition in the context of sustainable development

Our strategic intent

An accelerated industry contribution to a sustainable world through action underpinned by collaboration and shared understanding across the UN, business, finance, and civil society

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Our mission

Advancing a shared industry response to the energy transition in the context of sustainable development

Develop, share and promote good practices and solutions

Enhance and communicate knowledge and understanding

Engage members and others in the industry

Work in partnership with key stakeholders

Ipieca is unique

Sustainability focused

Non-lobby

Collaborative

Full value chain

Ipieca Principles

For corporate and associate members

CLIMATE	1. Support the Paris Agreement and its aims
	2. Advance emissions reduction and innovation and enable adoption of low-carbon products and solutions across oil, gas and/or alternative energy
NATURE	3. Support the aims of the UN Convention for Biological Diversity
	4. Responsibly manage operational impacts on the natural environment and ecosystem services
PEOPLE	5. Support the UN Guiding Principles on Business and Human Rights
	6. Promote the health, wellbeing and social inclusion of workforces and local communities relating to operations, and contribute to the social and economic development of host communities and countries
SUSTAINABILITY	7. Support the UN 2030 Agenda for Sustainable Development as embodied by the Sustainable Development Goals
	8. Integrate sustainability across activities, increase transparency and engage with key stakeholders

Ipieca members

79 companies and associations, representing **64% of oil and gas production**

Companies

Associations

Our membership operates in **180** COUNTRIES

Our membership employs **1.1** MILLION PEOPLE

Our association network represents **2300** OIL & GAS COMPANIES

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Background of Ipieca's work

Low Emission Pathways for Transport

Biofuels

Hydrogen

Low Sulphur Fuel Oils

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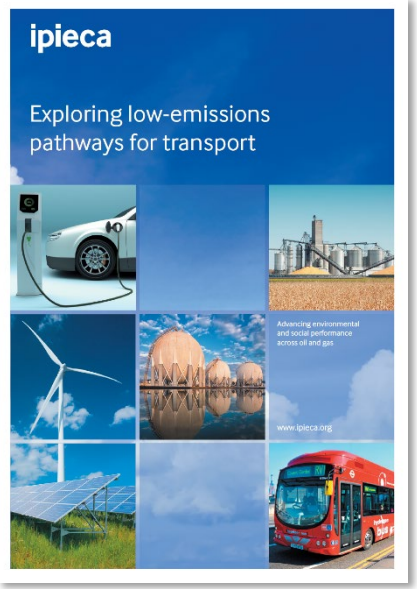
Insights from Ipieca's work on alternative fuels

Low-emissions pathways for transport

Key messages:

- Transport is the backbone of modern society, providing unprecedented levels of personal mobility and facilitating global trade and commerce.
- As a major emitter of carbon dioxide (CO_2), the transport sector will require a transformation over the course of the century to meet the goals of the Paris Agreement.
- Heavy-duty vehicles, aviation and commercial shipping present more challenges to electrification because these transport modes need significantly greater energy density and power than light-duty vehicles.
- The transformation of the transport sector will require sound public policies that support technology-neutral innovative solutions, are informed by a life-cycle greenhouse gas (GHG) analysis approach and provide regulatory certainty.



Insights from Ipieca's work on alternative fuels

Biofuels

Key messages:

- Biofuels can contribute to energy security and lower transport emissions, but they are only beneficial if produced and used sustainably across their full life cycle
- Large-scale biofuel production carries significant risks, including competition with food, pressure on land and water, and potential long-term increases in CO_2 emissions if high-carbon land is cleared
- Robust sustainability safeguards and certification are essential, including full greenhouse gas accounting, consideration of indirect land-use change, and assessment of social and environmental impacts
- The oil and gas industry plays a key enabling role, through investment, quality assurance, certification systems, and development of next-generation biofuels.

Oil and gas: meeting challenges today... for tomorrow

Meeting the world's growing energy demands will require many sources. Biofuels could play a part in meeting this demand because of their potential as an economically viable, low emissions transportation fuel.

BIOFUELS:
MAXIMIZING SUSTAINABILITY

The oil and gas industry is committed to developing and supplying sustainable biofuels for the transport sector. Biofuels can help improve energy security, promote rural development and reduce greenhouse gas (GHG) emissions.

Large-scale development of biofuels raises a number of sustainability concerns relating to competition with food and pressure on land and water resources. In some cases, when biofuels production causes clearing of high carbon content land, substantial CO_2 emissions can be produced that may impact the GHG emission benefits of a biofuels system for decades. Strict environmental and social safeguards are needed for the sustainable production of biofuels. To realize the full potential of biofuels a careful evaluation of their impacts and benefits along their entire life cycle is required. The effective contribution of biofuels to reducing greenhouse gas emissions depends on a thorough assessment of their carbon footprint across their production and consumption chains, including indirect land use change.

"Biofuel production involves both opportunities and risks for food security and environment. To effectively manage the impact on food security, the establishment of specific public policies regarding the production and consumption of biofuels is needed"

United Nations Food and Agriculture Organization

Turning biofuels into a dependable, sustainable and competitive source of energy requires assuring consumers about their availability, quality, reasonable cost and performance.

BIOFUELS CERTIFICATION

The oil and gas industry recognizes that if biofuels are to play a material part in the market, they must be produced sustainably and the end-user must also be be assured that the biofuels incorporated in fuel blends have been produced sustainably.

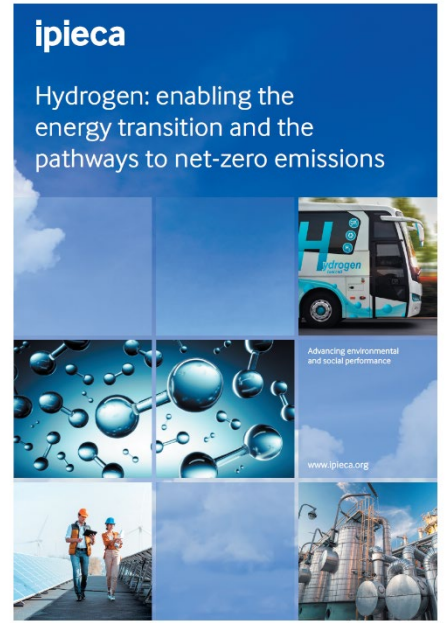
The oil and gas industry supports the development of internationally recognized

Insights from Ipieca's work on alternative fuels

Hydrogen

Key messages:

- Hydrogen can play a critical role in decarbonising transport, particularly in segments where electrification is challenging, such as long-haul trucking, shipping and potentially aviation, while producing zero emissions at the point of use
- The climate benefits of hydrogen transport depends on how hydrogen is produced, with low-carbon pathways (blue hydrogen with CCS and green hydrogen from renewables) being essential to deliver genuine emissions reductions across the full life cycle
- Scaling hydrogen for transport requires coordinated investment in infrastructure, policy and safety frameworks, including refuelling networks, standards, certification, and collaboration across vehicle manufacturers, fuel suppliers, governments and the oil and gas sector



Insights from Ipieca's work on low-sulphur fuel oils

Joint Industry Guidance on the supply and use of 0.50%-sulphur marine fuel

Background

- In 2020, a new requirement came into effect, setting a new global limit for sulfur in fuel oil used on board ships: 0.50% m/m (mass by mass) - the IMO 2020 sulphur regulation is part of MARPOL Annex VI
- Significant reductions of environmental impact of the shipping industry – with far reaching implications on the marine fuel supply chain need to be considered.

Joint industry guidance

- In 2019, Ipieca, in collaboration with a number of shipping, refining, fuel supply and standards organisations, published a *Joint Industry Guidance on the supply and use of 0.50%-sulphur marine fuel*.
- This presented safety and operational issues relating to the supply and use of 0.50%-sulphur fuels, an overview of fuel quality principles, and the controls to ensure that safety issues are well managed.

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Ipieca and the IMO

Highlights

GI SEA

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Ipieca and the IMO

Ipieca has been an observer of the IMO since 1995, providing technical input and feedback to discussions.

Marine Spill Group overview

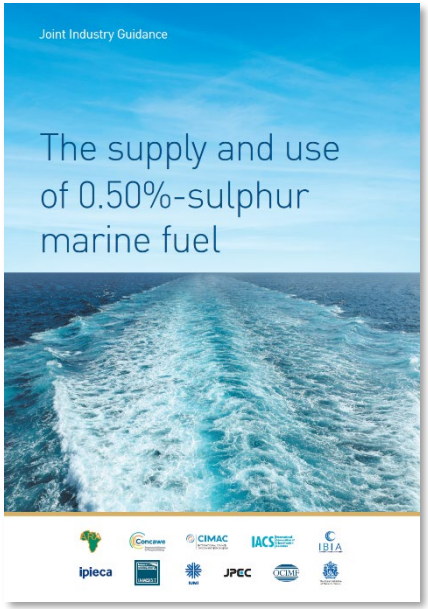
- Ipieca partners with the IMO on the topics of oil, alternative fuel, and nurdle spill response
- Ipieca regularly attends MEPC meetings and provides technical input to relevant documents
- IMO-Ipieca Global Initiative Programme

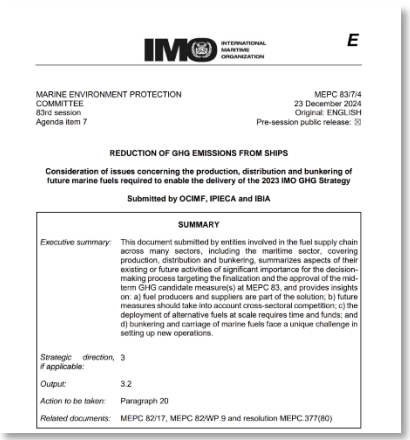
Greenhouse Gas (GHG) overview

- Ipieca attends the ISWG-GHG and MEPC meetings, providing technical input and education on several topics such as:
  - Life cycle-based GHG emissions
  - Fuels certification
  - Carbon capture and storage
  - Joint industry guidance

Ipieca and the IMO

Some highlights





IMO INTERNATIONAL MARITIME ORGANIZATION

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MARINE ENVIRONMENT PROTECTION COMMITTEE
83rd session
Agenda item 7

MEPC 83/7/4
23 December 2024
Original: ENGLISH
Pre-session public release:

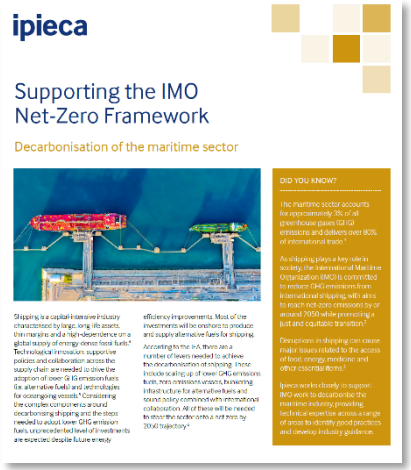
REDUCTION OF GHG EMISSIONS FROM SHIPS

Consideration of issues concerning the production, distribution and bunkering of future marine fuels required to enable the delivery of the 2023 IMO GHG Strategy

Submitted by OCIMF, IPIECA and IBIA

SUMMARY

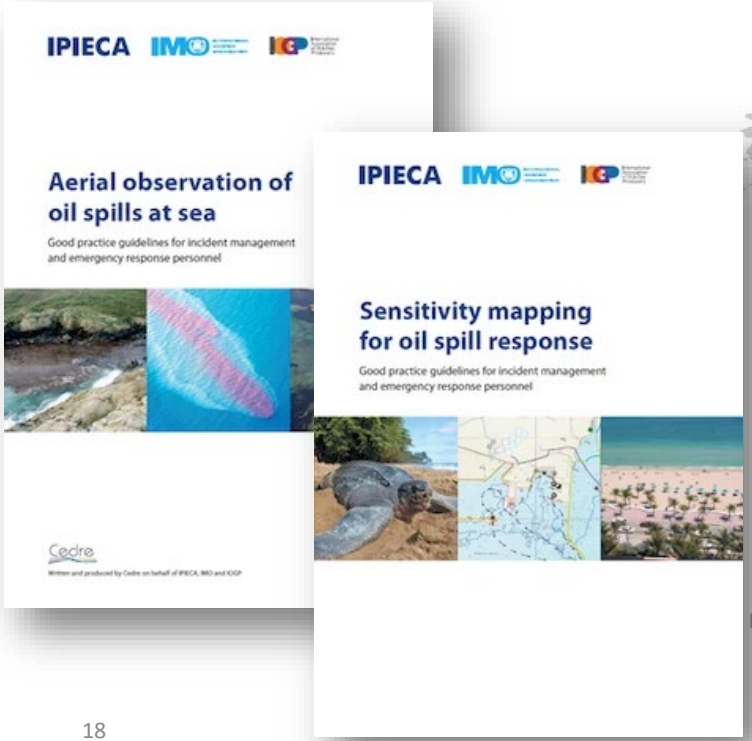
Executive summary:	This document submitted by entities involved in the fuel supply chain across many sectors, including the maritime sector, covering production, distribution and bunkering, summarizes aspects of their existing or future activities of significant importance for the decision-making process targeting the finalization and the approval of the mid-term GHG candidate measure(s) at MEPC 83, and provides insights on: a) fuel producers and suppliers are part of the solution; b) future measures should take into account cross-sectoral competition; c) the deployment of alternative fuels at scale requires time and funds; and d) bunkering and carriage of marine fuels face a unique challenge in setting up new operations.
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 20
Related documents:	MEPC 82/17, MEPC 82/WP.9 and resolution MEPC.377(80)

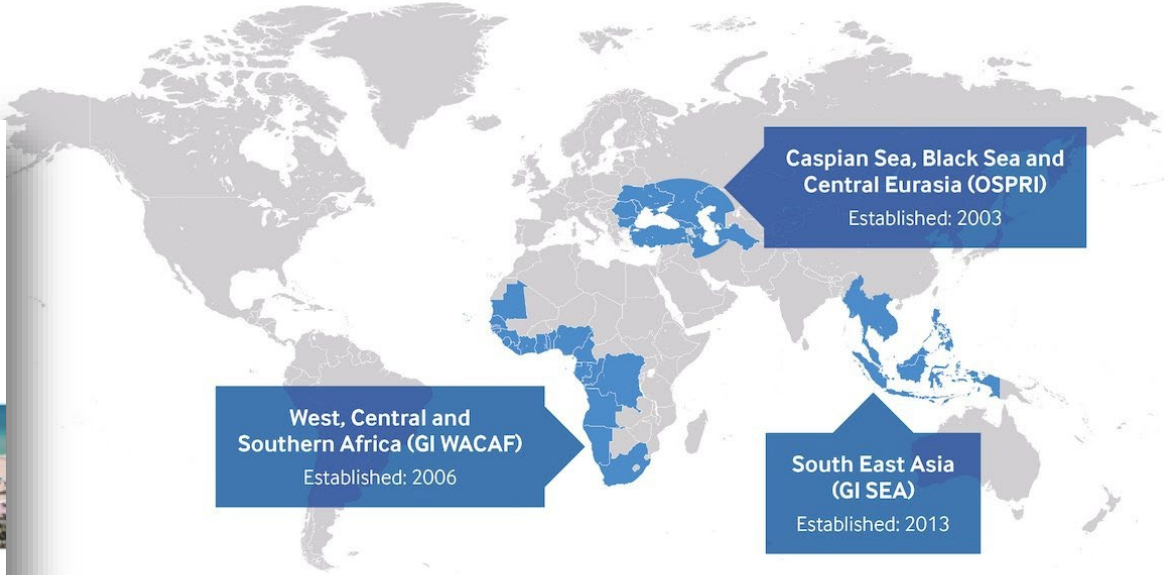


2023 IMO Strategy on Reduction of GHG Emissions from Ships

Ipieca and the IMO

Some highlights





Regional map of GI programmes and related initiatives

Global Initiate for Southeast Asia (GI SEA)

A regional project under the Global Initiative (GI) umbrella

MISSION

Improve the regional capability *in Southeast Asia, by assisting in the development of national capacities in spill preparedness and response, through* ***government and industry cooperation***

WHAT WE DO

- ***Promote ratification*** *of OPRC 1990, OPRC-HNS Protocol, and other key international conventions*
- ***Assist development*** *of spill contingency plans at local, national and regional levels*
- ***Strengthen*** *existing bilateral, sub-regional and regional agreements*
- ***Encourage*** *good practice in marine spill preparedness and response*

HOW WE DO IT

Organise and facilitate workshops for member states, by coordinating with IMO and technical experts

Attend key events to provide support and promote good practices

Enable dialogue between key government authorities and industry members to boost regional capacity

Chevron

TotalEnergies

GI SEA and alternative fuels

The region is slowly shifting its focus to HNS and alternative fuels response

- More alternative fuel vessel traffic and spill risks
- More HNS handling at terminals

GI SEA's efforts in HNS and alternative fuels

- HNS Workshop in Philippines
- South Korea's Oil and HNS Spill Forum
- ITOPF training on HNS response
- 2026 IMO supported workshops on HNS
- Global Center for Maritime Decarbonization (GCMD) connection
- IMO HNS Forum

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Responding to alternative fuels spills

Workshops and Exercises

Very Low Sulphur Fuel Oil (VLSFO)

Biodiesel

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Ipieca Work on responding to alternative fuel spills

Workshops and tabletop exercises

Responding to very low sulphur fuel oil (VLSFO)

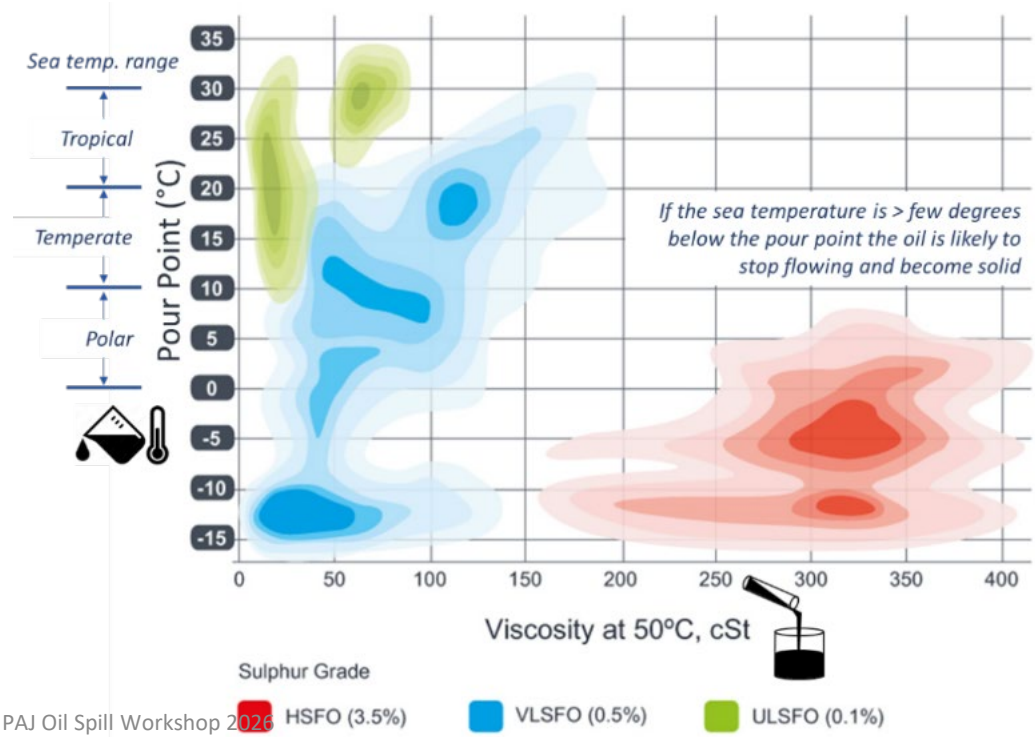
Physicochemical properties

- **Formulations vary significantly**
- **Knowledge of properties essential**
- **Physicochemical properties variable:**
  - Density
  - Viscosity
  - Pour point
  - Stability
- **Behaviour depends on oil properties and sea temperature**
- **Will change over time due to weathering**

Responding to very low sulphur fuel oil (VLSFO)

Physicochemical properties

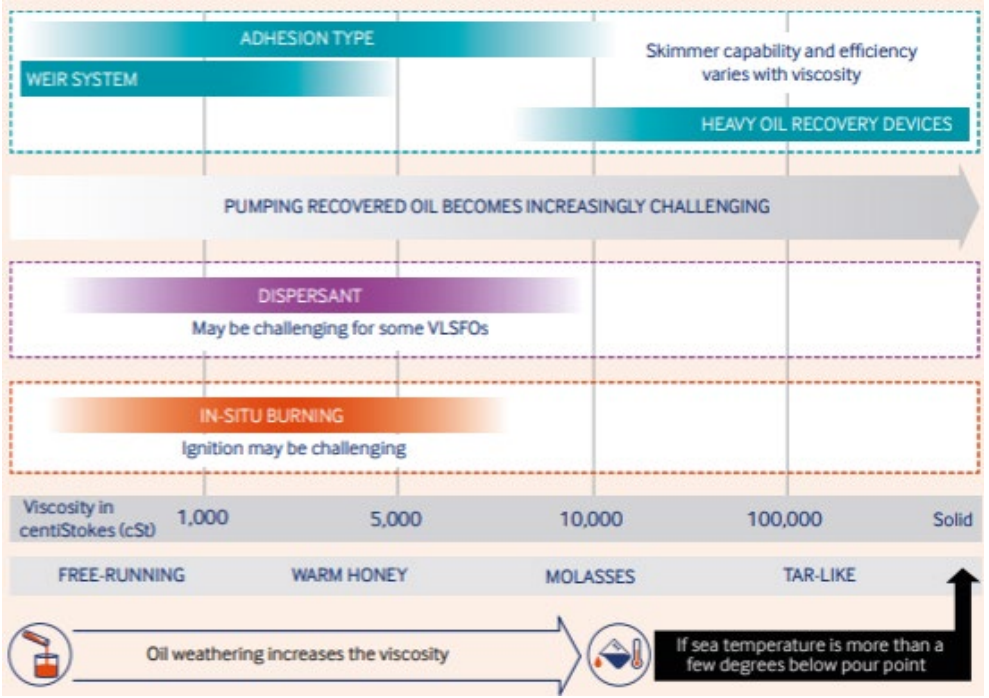
- **Variable pour point and viscosity, both increase with weathering**
- **Can forma emulsions**
- **Avoid mixing of different VLSFOs**
- **Reference safety data sheet and bunker delivery note**
- **Initial and ongoing field sampling and assessment**



Responding to very low sulphur fuel oil (VLSFO)

Response and clean-up

- **Response tactics difficult to generalise and may vary as VLSFO weathers**
- **Anticipate persistence of some oil**
- **Be ready for everything**
- **Be adaptable**



Responding to very low sulphur fuel oil (VLSFO)

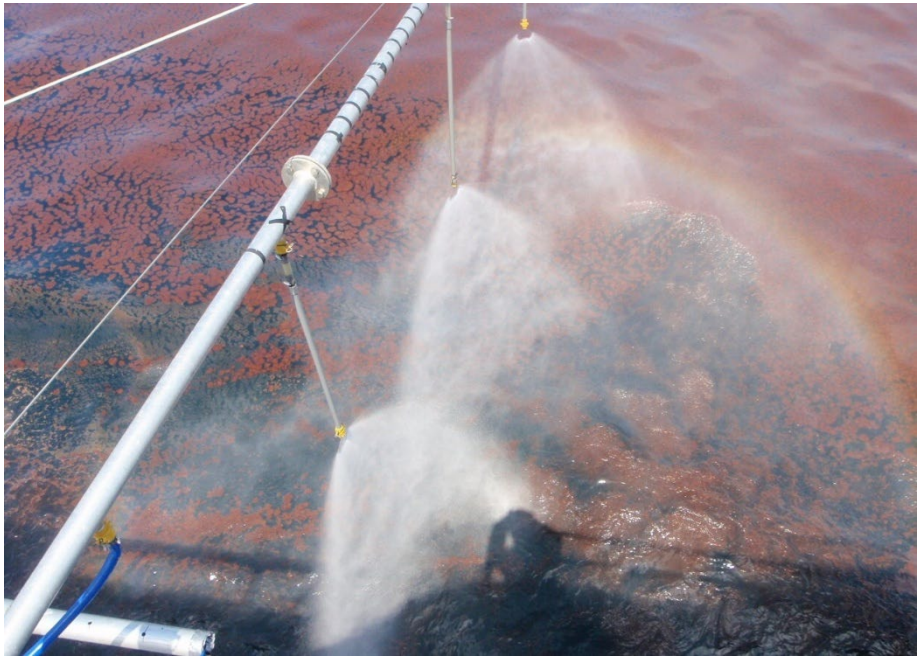
Containment and recovery

- **Range of skimmers in stockpile**
- **Skimmer efficiency varies depending on temperature and weathering state**
- **High viscosity material:**
  - May need to grab/net solid material
  - Positive displacement or screw pumps
  - Heat to reduce viscosity

Responding to very low sulphur fuel oil (VLSFO)

Dispersants

- **No examples we are aware of**
- **Effective dispersion in lab studies of VLSFO within a range of viscosities**
- **High pour point/weathering reduces dispersibility**
- **Always attain government approval before applying dispersants**



Responding to very low sulphur fuel oils (VLSFO)

In-situ burning

- **No in-situ burning experience**
- **Likely to burn reasonably well**
- **Low volatile content – challenging ignition**
- **Emulsification will reduce ignitability**

Responding to very low sulphur fuel oil (VLSFO)

Shoreline clean-up

- **Behaviour and choice of clean-up depends on:**
  - Oil initial composition
  - Weathering
  - Shoreline type
- **Oil may penetrate porous beach types**
- **Many existing techniques may be viable**
- **Assess on case-by-case basis**

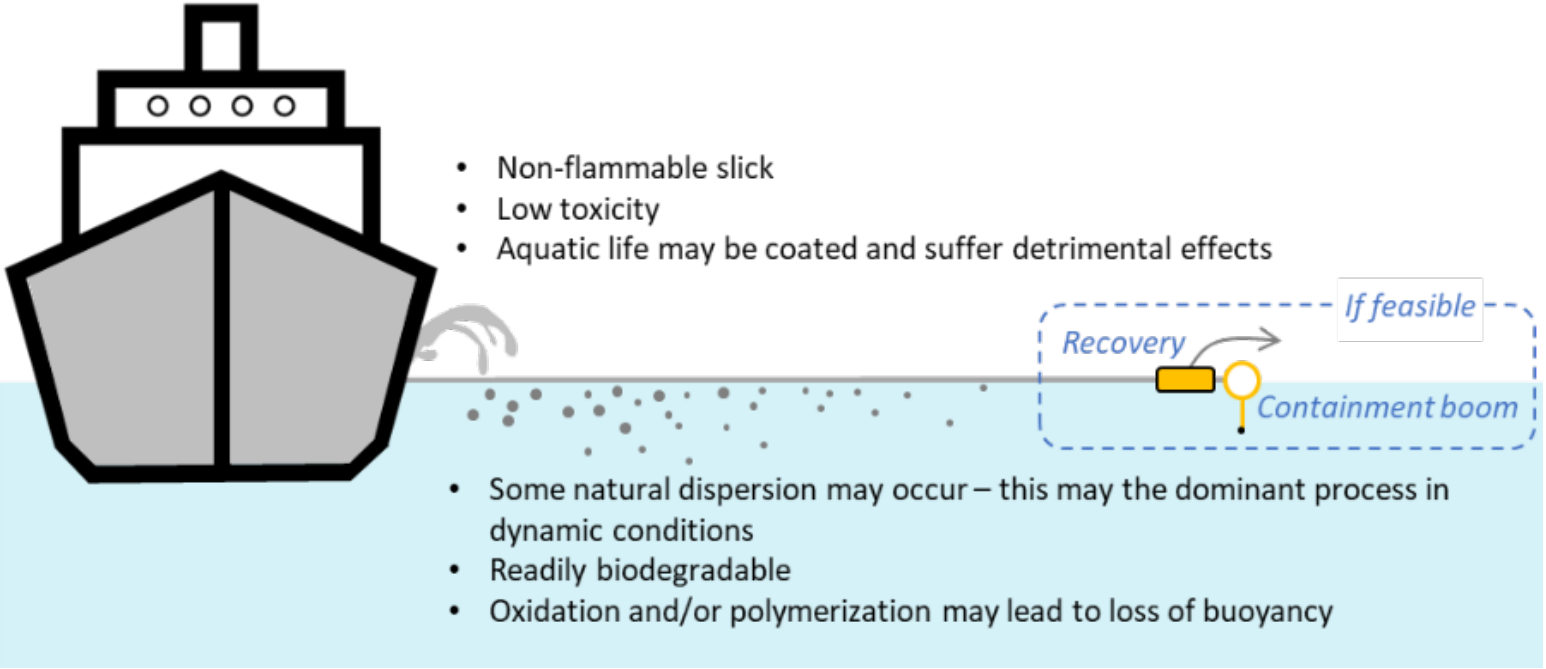
Responding to biodiesel spills

Understanding properties and behaviour

Fuel type	Density	Viscosity	Appearance	Behaviour	
Biodiesel/ FAME	Group I/II	Very low	Clear	Spills to water will tend to spread out to form a slick or oily film on the water surface. Depending on wave action, and in the absence of containment measures, the slick may disperse or degrade, typically within a few days, though potentially longer for high volume incidents. Whilst biofuel emulsions can form, it is unlikely they will be stable.	
Renewable diesel	Group I/II	Very low	Clear		
Straight vegetable oil (SVO)	Group III	Low to medium	Varied		SVOs undergo little or no evaporation and may be prone to oxidise, polymerize a nd start to sink, or, if the sea temperature is more than a few degrees below the pour point, SVOs may form semi-solid lumps

Responding to biodiesel spills

Behaviour when spilled



- Non-flammable slick
- Low toxicity
- Aquatic life may be coated and suffer detrimental effects

- Some natural dispersion may occur – this may the dominant process in dynamic conditions
- Readily biodegradable
- Oxidation and/or polymerization may lead to loss of buoyancy

Responding to biodiesel spills

Detection, monitoring and sampling

- **Spreads to thin layer**
- **Visual detection challenging**
- **Radar detection possible**
- **Hyperspectral Laser Induced Fluorescence Light Detection and Ranging (HLIF LiDAR) proving useful**
- **Microwave radiometry may identify thick slick**
- **Water sampling**
- **Sediment sampling if it sinks**

Responding to biodiesel spills

Response and clean-up

- **Similar techniques as for conventional diesel spills**
- **Containment and recovery: light-oil skimmer**
- **Chemical dispersant: typically not appropriate**
- **In-situ burning: not feasible due to ignition challenges**
- **Low temp – SVO may form lumps – remove with trawl net**

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Looking Ahead

Alternative Fuels and Products Response Task Force

Future Workstreams

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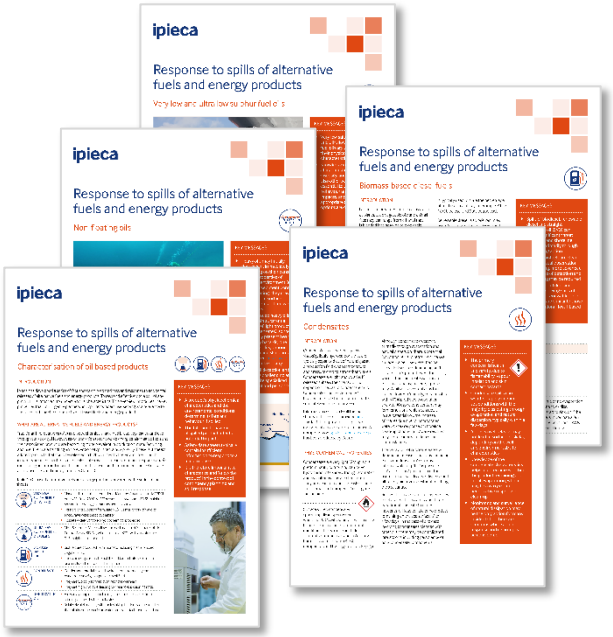
Alternative Fuels and Products Response Task Force

Completed:

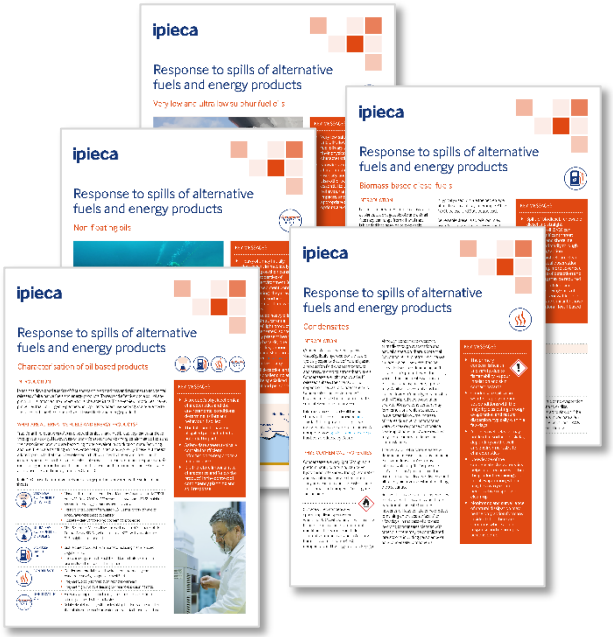
- ✓ **Five spill response fact sheets on lesser understood/new fuel oils, covering:**
  - Oil characterisation
  - Low- and ultra-low sulphur fuel oils
  - Biomass-based diesel oils
  - Condensates
  - Non-floating oils
- ✓ **3 x Alternative fuel spill exercises and workshops**



Future workstreams

Coming up:

- More spill response fact sheets on alternative fuels and products:
  - Ammonia
  - Methanol
  - Hydrogen
  - LNG
  - LCO_2
- Online spill response tool, including:
  - Behaviour when spilled
  - Safety hazards
  - Response options



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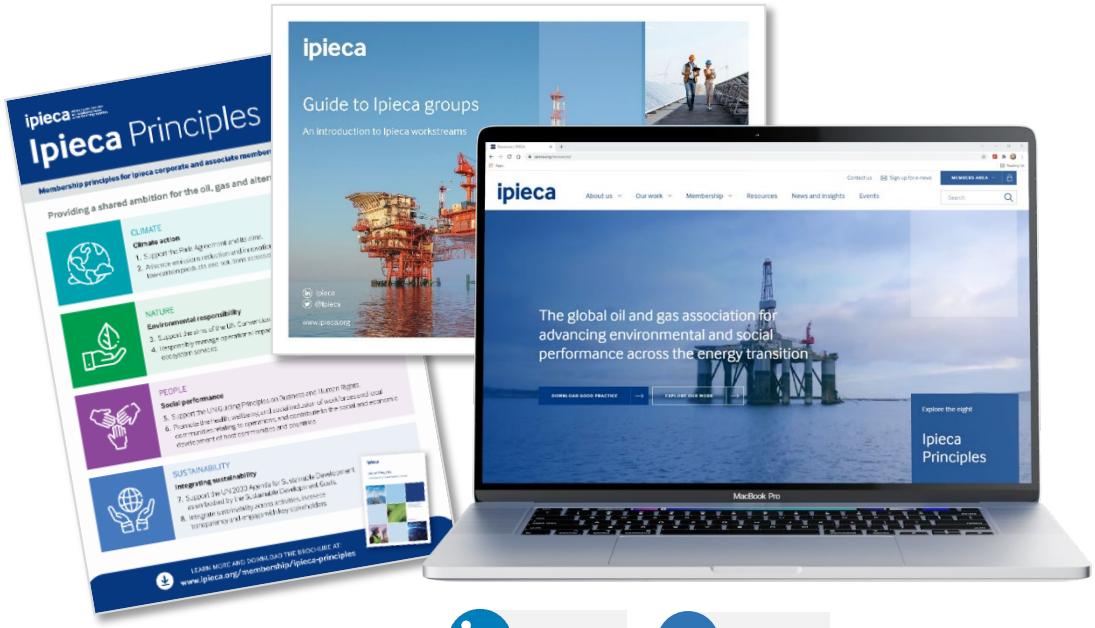

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