

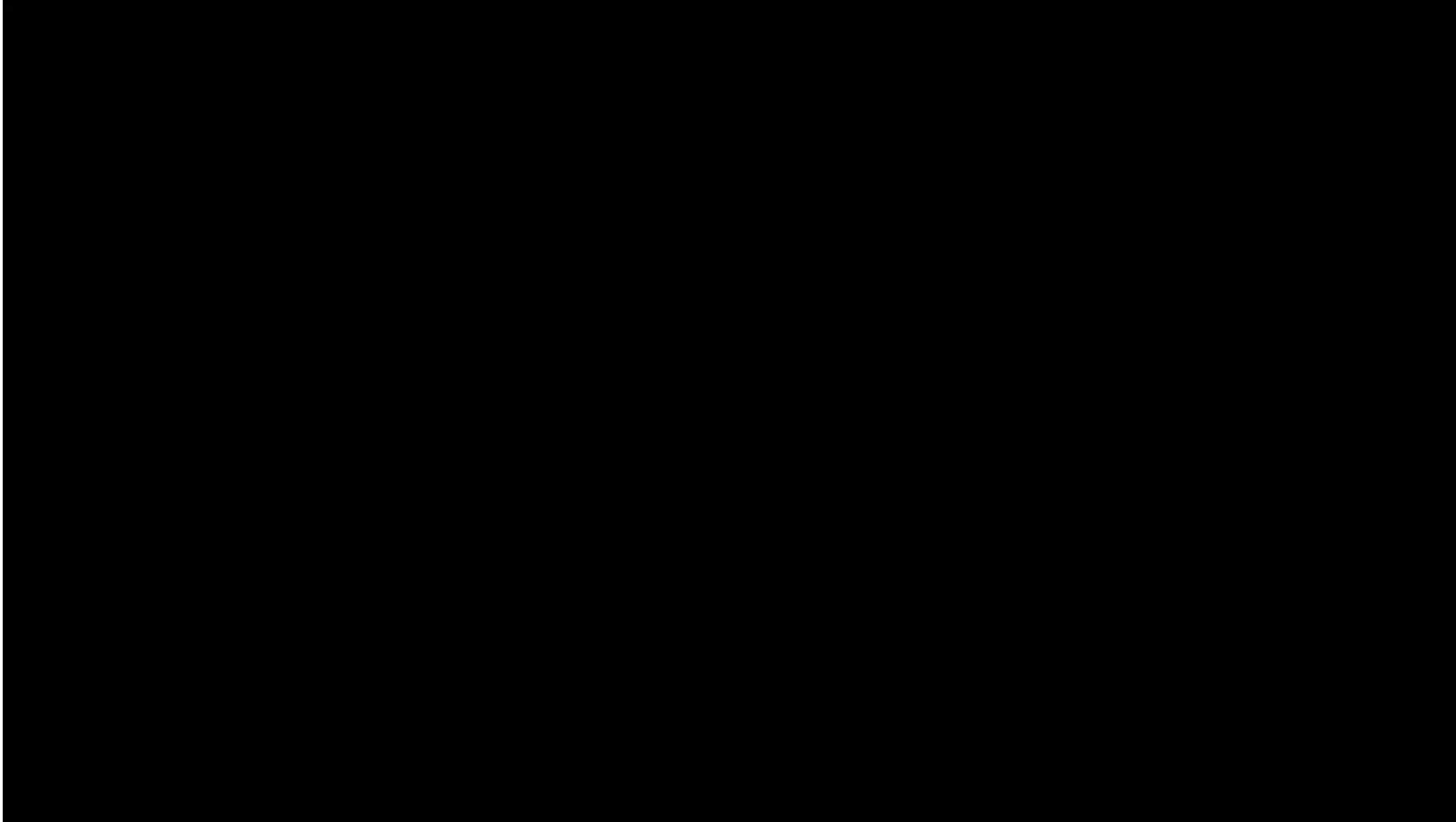
Towards stricter regulations in the Norwegian Fjords

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Innovation and new technology







Towards stricter regulations in the Norwegian Fjords

- Opportunities or challenges?
- Proposed for the World Heritage fjords:
 - Tier I from 1. januar 2020.
 - Tier II from 1. januar 2022.
 - Tier III from 1. januar 2025.

Give headstart to reach the goals put out by IMO

«Headache» for shipowner and itinerary planning, possibilities for equipment suppliers



The Future – Opportunities or Challenges

Ship owners, technology suppliers and the industry in general, meeting the requirements of the fjords, will make them more prepared for what's coming.

It will be challenging for us as an administration, but also for ship owners and Classification societies to choose and approve several different technologies.

However, the possibilities and opportunities is enormous for those that manage to keep up

506
Shares



IMO Agrees to CO2 Emissions Target



Delegates at MEPC 72 (IMO)

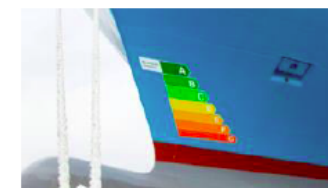
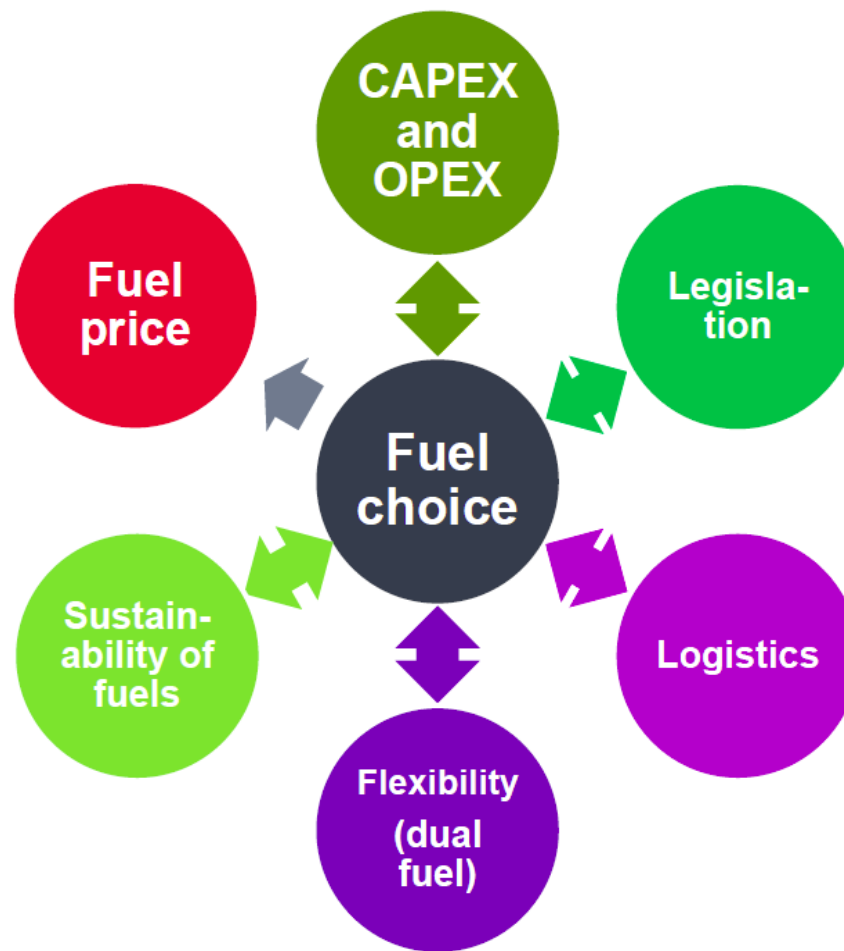
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After several years of negotiations, the IMO has reached an agreement on an "initial strategy" for the reduction of CO2 emissions from shipping.

On Friday, the IMO Marine Environment Protection Committee (MEPC) announced that member state delegates have agreed on a target to cut the shipping sector's overall CO2 output by 50 percent by 2050. to begin emissions reductions as soon as possible. and to pursue efforts to phase out carbon



Fuel Choice for the Future





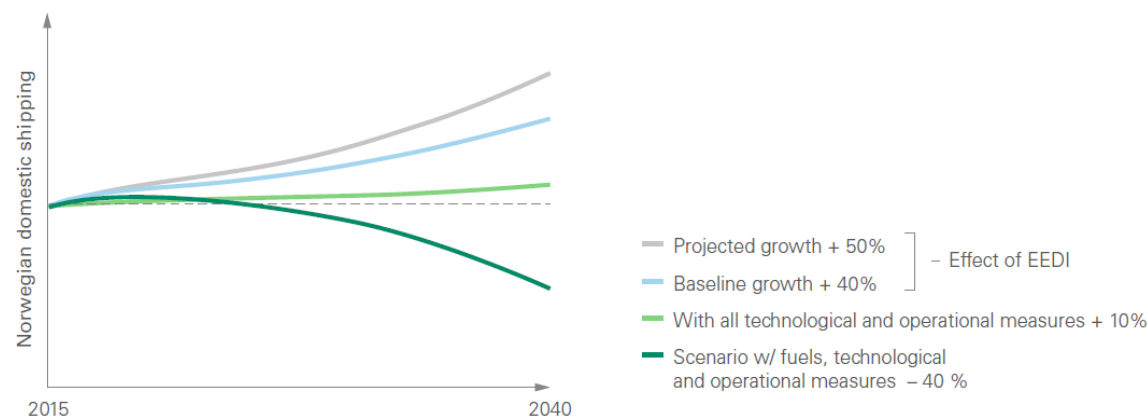
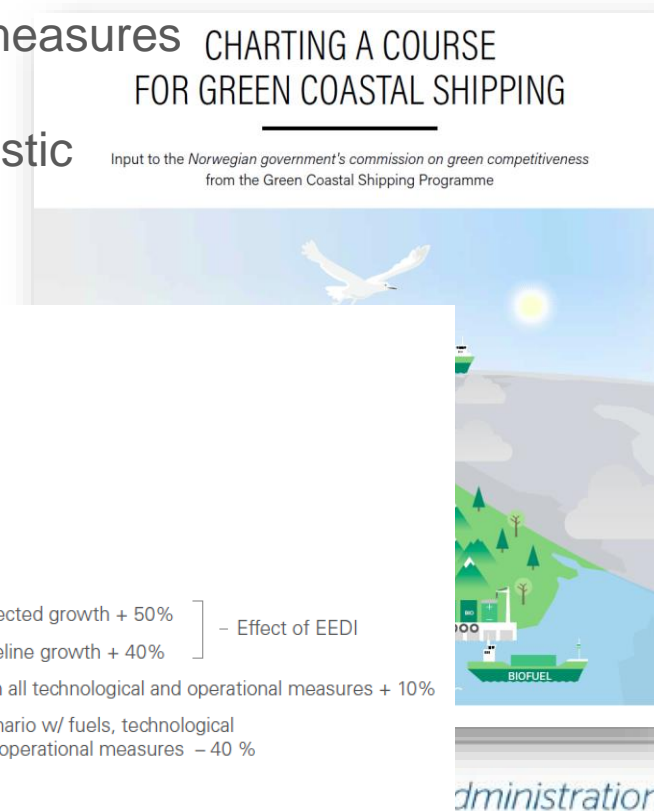
Fuels for the future 2020 - 2050

- The fuel mix of the future will be more complex than today. Fuel could differ to each vessel and its trade area.
- The Norwegian Maritime Authority cannot predict the future fuel, but we aim to be a partner that finds good and safe solutions together with the industry.
- **The new IMO strategy on GHG may change the situation as significant CO₂ reductions may be mandatory.**
 - HFO engines w/scrubbers and EGR
 - Marine diesel engines w/SCR and EGR
 - **Low sulphur diesel oil**
 - **Ammonia gas dual fuel engines**
 - **LNG/gas engines single/dual fuel**
 - **Methanol dual fuel engines**
 - **LNG/gas generators and electrical propulsion**
 - **Electrical propulsion – battery only**
 - **Biodiesel/gas or LNG battery hybrids**
 - **LNG/gas electrical propulsion with H2 fuel cells and battery**
 - **Hydrogen fuel cells and battery hybrids**



Potential for reduction of climate gasses

- The Norwegian private-public partnership, Green Coastal Shipping Programme, published “Charting a course for green coastal shipping” as input to the Norwegian government's commission on green competitiveness
- The report covers the technical measures, operational measures and fuel measures to reduce CO2 emissions
- It also covers the potential to reduce greenhouse gas emissions from domestic shipping
- To achieve a reduction in emission, we need to look towards other fuels





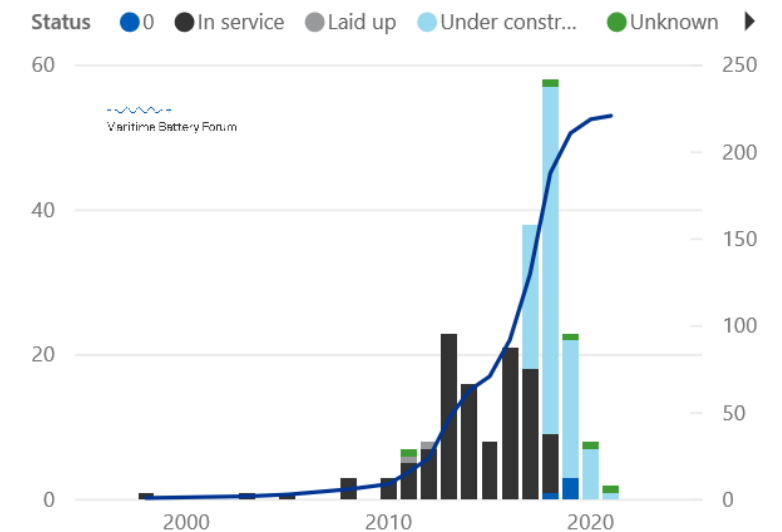
Is the international regulatory framework ready?

- The emission targets would be challenging to reach without looking towards new fuels, and most of them having low flash point.
- From the 1.1.2017 the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code) regulates the use of fuels with flash point below 60°C.
- The code currently only have detailed requirements for using natural gas
- Alternative design for other fuels

Batteries

- Both the increase in number of vessels and the potential for even more, shows that the industry are willing to change to more environmental solutions.
- The potential market for maritime batteries and hybrid solutions is very large.
- Battery is a good case as economy and environment goes hand in hand.

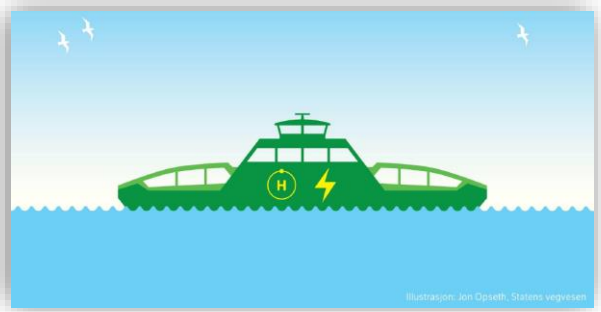
Number of ships





New Technology and Solutions

- We are able to:
 - Give preliminary assessment of a project, even before any new building contract is signed.
 - Customer focused and solution oriented experienced engineers
 - Be involved in the process as and when and where required by the customer
 - Broad contact network in the industry and in relevant classification societies
 - Provide guidance as much of the new technology are not regulated in detailed regulations
 - Solutions will be based on risk based approvals, ensuring that one maintains an equal level of safety
 - Be an administration that is up to date on new technologies
 - In addition, for Autonomous ships and New fuels and Alternative energy, the NMA has established dedicated teams.





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