IMO 2020: WHAT’S NEXT?
Shell can offer a wide range of marine fuels, lubricants and services to be your partner in providing low sulphur marine transport.

**IMO 2020: WHAT IS CHANGING?**

In 2016, the IMO announced that the effective date for the reduction of marine fuel sulphur will be 2020. Under the new global cap, ships will have to use marine fuels with a sulphur content of no more than 0.5%S against the current limit of 3.5%S in an effort to reduce greenhouse gas emissions. The Emission Control Areas (ECAs) will remain at the 2015 standard of 0.1%S content.

**WHAT DOES IMO 2020 MEAN FOR SHIP OWNERS?**

Ship owners will soon need to decide if they want to continue using high sulphur fuel oil, in conjunction with scrubbers or exhaust gas cleaning systems; or switch to low sulphur fuel options, including distillates; or virtually sulphur-free LNG fuel.

“Over 200 LNG powered vessels in operation and on order.”

– LNG World Shipping, March 2017
**WHY IT MATTERS?**

- The transition to 0.5%S will cause more changes to global marine industry than the switch to the 0.1%S fuel in the ECAs. The impact of this transition represents approximately 75% of global marine fuel demand when compared to the demand of ECA.

  - In total 3 million barrels per day (mbd) of High Sulphur Fuel Oil (HSFO) Bunkers will need to switch to 0.5%S fuel through blending with gasoil, plus improved logistics segregation.
  - Higher production costs and increased use of gasoil in the 0.5%S blend may effectively drive up the fuel cost. At the same time, a lack of demand for HSFO will drive down its price.
  - There will be a need for a larger variability in fuel quality. Shell can help by sharing expertise and operational experience from the 0.1%S ECA launch to manage this variability.
  - There could be key price drivers depending on the spread between GO-FO and LNG-oil.
  - LNG fuel can help ship owners and operators meet emissions regulations, as it contains virtually no sulphur, and offers reduced NOx and PM emissions. Shell LNG can also help reduce GHG emissions in shipping.
  - Shell LNG can be a cost competitive marine fuel choice versus conventional fuels. LNG can be priced off of oil markers to reduce risk and ensure a level playing field.

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**Shell can offer expertise and operational best practices from its ULSFO 0.1%S launch.**
**WHAT IS SHELL DOING?**

- Shell is developing a variety of fuel product offerings to the shipping industry that include marine gasoil (MGO) and low sulphur fuel oil (LSFO) supply in key bunker ports; high sulphur fuel oil (HSFO) supply for ships with on-board scrubbers; and liquefied natural gas (LNG).
- Shell is preparing for the implementation of a 0.5%S blend using similar analysis for the 0.1%S launch.
- Shell offers a global marine bunker network, and is developing key supply locations to serve customers who have chosen Shell LNG fuel as their bunkering fuel.
- Shell has lubricants designed specifically to protect engines burning low sulphur fuels from wear and deposits.

Shell will continue to offer solutions across the spectrum including: residues, distillates and LNG at selected ports.

**SHIP OWNERS WILL HAVE A NUMBER OF CHOICES OF HOW TO COMPLY WITH THE NEW SULPHUR SPECIFICATIONS**

<table>
<thead>
<tr>
<th>0.1/0.5%S Fuel Oil</th>
<th>MGO/DMA</th>
<th>Scrubber New/Retrofit</th>
<th>LNG New Build/Retrofit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimise operational difficulty and cost</td>
<td>Convenient and widely available</td>
<td>Cheaper fuel and quick payback</td>
<td>Proven technology and reduction SOx, NOx and PM</td>
</tr>
<tr>
<td>Variability of quality of blends per supplier</td>
<td>Operational experience in industry</td>
<td>Limited operating experience</td>
<td>Lower GHG emissions</td>
</tr>
<tr>
<td>Only a few suppliers can offer reliable supply</td>
<td>Higher cost</td>
<td>Ship stability and space</td>
<td>Growing availability</td>
</tr>
<tr>
<td></td>
<td>Thermal shock and lubricity issues</td>
<td>Safe sludge handling and disposal necessary</td>
<td>Cost advantage to MGO/DMA</td>
</tr>
</tbody>
</table>

Shell will supply differentiated LSFO

MGO/DMA will remain key products for Shell

Shell can supply HSFO 3.5%

Shell holds industry leadership in LNG

**LUBRICANTS FOR CROSSHEAD DIESEL ENGINES (2 STROKE)**

- Alexia S3, 40*
- Alexia S3
- Alexia S3
- Alexia 50 (70*), S6 (100*), 140*

**LUBRICANTS FOR TRUNK PISTON ENGINES (4 STROKE)**

- Argina S2, S3
- Gadinia S3
- Mysella S3 N, S5 N
- Argina S3, S4, S5
LNG as a marine fuel is expanding globally with bunker locations growing and LNG fuelled ship segments broadening.
WHAT’S NEXT?
IMO 2020 REGULATIONS
Below is a timeline of critical meetings where 2020 implementation items may be discussed.

2020 critical implementation plan meetings

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Year</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEPC 70</td>
<td>2020</td>
<td>Oct 2016</td>
</tr>
<tr>
<td>MEPC 71</td>
<td>2017</td>
<td>Jan 2017</td>
</tr>
<tr>
<td>MEPC 72</td>
<td>2018</td>
<td>Jan/Feb 2018</td>
</tr>
<tr>
<td>PPR6</td>
<td>2019</td>
<td>Spring 2019</td>
</tr>
<tr>
<td>MEPC 74</td>
<td>2020</td>
<td>Jan 2020</td>
</tr>
</tbody>
</table>

Compliance
There are still many uncertainties on how ship owners and operators are expected to comply with the 2020 regulatory framework. Shell can help support in determining the right fuel selection for you and your organization.

MOVING FORWARD
The shipping industry must prepare for a future with lower transport emissions.

An efficient and successful transition towards cleaner marine transport greatly depends on strong collaboration between governments, energy companies, engine manufacturers, charterers, fleet owners and many others.

You can count on Shell as your partner to supply marine fuels. As a worldwide and reliable supplier of various marine fuels and services, we can offer a complete portfolio and customised solutions.

For questions or more information please refer to our website

www.shell.com/marine

Shell LNG can help meet current and future shipping regulations.