Availability of low-sulphur fuels for shipping

Jasper Faber, Beijing, 25 July 2019
CE Delft

- Independent research and consultancy since 1978, focusing on environmental policies
- Transport, energy and resources
- More than 20 years of experience in the shipping sector
- 60 employees, based in Delft, the Netherlands
- Clients: IMO, European Commission, German, UK and Dutch government, shipping companies, ports, trade associations and environmental NGOs.
Presentation outline

• Introduction
• Impact of CHN ECA on demand for fuel oil
• Specification of the main question of this presentation
• 2016 “Assessment of Fuel Oil Availability”
• Interim conclusion
• Developments since 2016
• Overall conclusions
Introduction

• This workshop is about a Chinese ECA where ships are required to use fuel with a sulphur content of 0.10% m/m or less.

• The possible implementation of a Chinese ECA would increase demand for marine fuels with a sulphur content of 0.10% m/m or less.

• This presentation addresses the question whether the refining sector can supply those fuels.

• We will first estimate the additional demand for 0.10% fuel after the possible introduction of a Chinese ECA, assess the amount of sulphur that needs to be removed, and then assess whether the refining sector has the capacity to provide these fuels.
Impact of CHN ECA on demand for fuel oil

- Fuel oil demand

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2020</th>
<th>&gt;2020, CHN ECA</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.50%</td>
<td>260</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>0.50%</td>
<td>-</td>
<td>233</td>
<td>218</td>
</tr>
<tr>
<td>0.10%</td>
<td>32</td>
<td>39</td>
<td>59</td>
</tr>
<tr>
<td>LNG</td>
<td>8</td>
<td>12</td>
<td>12</td>
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- Source: CE Delft et al., 2016, CE Delft ad-hoc estimates.
- Assumption: Chinese ECA increases global demand for 0.10% fuels by 50%.
- 2020: remove ~4.7 million tonnes of sulphur.
- CHN ECA: remove ~0.1 million tonnes of sulphur.
- Will there be sufficient sulphur-removal capacity?
Main question of this presentation

- Given the implementation of the global sulphur cap, will there be sufficient sulphur-removal capacity for the introduction of a CHN ECA?

Caveats:

- The assessment is based on the existing literature. We did not do any modelling.
- The additional demand of the CHN ECA was not modelled but estimated to be 50% of the fuel consumption in the existing ECAs.
- The main source is CE Delft et al., 2016: Assessment of Fuel Oil Availability, London: IMO
- Additional sources are studies and press reports about the 2020 fuel switch.
Context of “Assessment of Fuel Oil Availability”

  - The sulphur content of any fuel oil used on board ships outside ECAs shall not exceed the following limits (14.1):
    - 3.50% m/m from 2012;
    - 0.50% m/m from 2020,
- Regulation 4 specifies that these limits can also be achieved by alternative compliance methods that are ‘at least as effective in terms of emissions reductions’,
- Regulation 14.8 specifies that the 0.50% limit shall be subject to a review to be completed in 2018, taking into account:
  - the global market supply and demand for compliant fuel;
  - trends in fuel oil markets; and
  - any other relevant issue.
Aim and scope of “Assessment of Fuel Oil Availability”

Overall objective:

• to conduct an assessment of the availability of fuel oil with a sulphur content of 0.50% m/m or less by 2020.

Specific objectives:

• develop quantitative estimates of the demand for fuel oil meeting the global 0.50% m/m sulphur limit, both globally and for different world regions;

• assess the ability of the refinery industry to supply the projected demand; and

• compare the demand and supply scenarios to assess their implications with respect to the availability of compliant fuels.
Methods, models and data sources

2012 maritime fuel demand (3rd IMO GHG study) → 2012 production maritime fuels → 2012 production other fuels

Δ Activity
Δ Exhaust gas cleaning systems
Δ Regulations
Δ Alternative fuels

2012 refinery configuration

Δ Refining capacity
Δ Crude oil slate

2020 maritime fuel demand → 2020 maritime fuel supply

Assessment
Main Conclusion of “Assessment of Fuel Oil Availability”

• Sufficient amounts of fuel oil of the required quality can be produced to meet demand in all plausible demand projections.
  - Although crude distillation capacity increase lags the demand increase between 2012 and 2020, hydrocracking, middle distillate and residual hydrotreatment capacity increases are higher than demand increases.
  - This creates capacity to produce low sulphur marine fuels, provided that:
    ◦ the sulphur content of the crude does not increase too much; and
    ◦ the road diesel and road gasoline sulphur limits are not tightened more than in current legislation.
• These fuels can be hydrotreated residual fuels, unconverted oil from hydrocrackers, and lighter oils.
Main Conclusion of “Assessment of Fuel Oil Availability”

• We find global shortages improbable. The maximum amount that can be provided by the refinery sector exceeds projected demand by 27%.

• Situations of regional oversupply and shortages, which cancel each other out on a global level, are likely to occur:
  - In several scenarios, oversupplies occur in Latin America, Europe, and the Middle East, while Africa, Asia and North America produce less than is sold there.

• Regional supply and demand can be balanced by:
  - transport of products.
  - changes in bunkering patterns.
Main Conclusion of “Assessment of Fuel Oil Availability”

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- Regional supply and demand can be balanced by:
  - transport of products.
  - changes in bunkering patterns.
Interim conclusions

- Based on the 2016 Assessment of Fuel Oil Availability, the global refinery sector should be able to meet the additional demand for 0.10% sulphur fuels arising from the introduction of a CHN ECA.
  - the additional desulphurisation capacity required for the CHN ECA amounts to ~0.1 million tonnes of sulphur;
  - the refinery sector can produce 27% more compliant fuels than projected, i.e. remove ~1.3 million tonnes of sulphur.

- Additional desulphurisation capacity exists in Latin America, Europe, and the Middle East, while Asia has a shortage of desulphurisation capacity.
Developments since 2016

- Fuel Oil Supply (from the press):
  - ExxonMobil has announced it will start supplying compliant fuels in Q3 2019 in 7 ports, including Singapore, Laem Chabang and Hong Kong;
  - BP has announced it will start supplying compliant fuels in several ports, including China, Hong Kong, and Singapore;
  - Singapore will have many bunker fuels suppliers that offer 0.50% fuels;
  - Chimbusco and Sinopec offer 0.50% fuels in Chinese ports.
- It appears that the lack of desulphurisation capacity in Asia does not result in unavailability of low-sulphur fuels in Asia.
Developments since 2016

- Fuel oil demand:
  - the number of ships equipped with scrubbers nears 4,000 (Clarksons 2019);
  - the share of the fleet equipped with scrubbers is projected to increase from 11% (by GT) to 15% (by GT) in 2020 (Clarksons 2019);
  - several experts expect the number of scrubbers to increase even further after 2020.
- If the number of ships equipped with scrubbers increases, the demand for 0.50% sulphur fuel will decrease, freeing up capacity to produce 0.10% sulphur fuel

Source: EIA 2019
Conclusions

• Compared to the 2020 global sulphur cap agreed by the IMO, a Chinese ECA will probably have a small impact on marine fuel demand (this will need to be confirmed by fuel consumption modelling).

• Based on the 2016 “Assessment of Fuel Oil Availability” and subsequent studies and press reports, there seems to be sufficient desulphurisation capacity in the refinery sector to produce more 0.10% fuels because:
  - the existing capacity in the refining sector;
  - a higher-than-expected uptake of scrubbers, which is projected to continue after 2020 (this will need to be confirmed by refinery modelling).

• Local shortages of compliant fuels do not appear to exist (this will become clear in 2020).
Thank you for your attention!

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