A Global Overview and Outlook of Off-Road Diesel Quality, Vehicle Emissions and Fuel Efficiency

Stratas Advisors

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Diesel remains an important fuel for the off-road sector including construction, agricultural, mining, heating, power generation, maritime, locomotives, heavy industries etc., especially in the developing regions. Similarly with on-road fuels, harmonization of off-road diesel specifications and vehicle emission standards has yet to be achieved. This is because countries are at different stages of economic and socio-political development especially in Asia Pacific which is currently the highest user of off-road diesel. There are a number of countries that already use a single diesel grade for both their on-road and off-road sectors, while others aim to eventually harmonize specifications of off-road diesel with on-road diesel to avoid possible adulteration and distribution issues.

However, before harmonization can be achieved, countries are currently using various methods to avoid supply of illegal and off-spec products:

- Use of dyes, markers and tax incentives to differentiate multiple diesel grades by color;
- Encourage supply of better off-road diesel quality; or
- Put into place a fuel quality monitoring legislation and system.

The full report updates the previous report (see Insights, Nov. 27, 2019), and examines key developments in off-road diesel quality and vehicle emissions. The report primarily focuses on issues regarding sulfur and FAME because of the legislative and regulatory developments occurring globally for these two parameters. Of the two, sulfur reduction is the more dominant issue being considered by governments and stakeholders globally. Notably, other properties such as lubricity and cold flow are important in determining off-road diesel quality and influencing the composition of emissions, but there is no legislative or regulatory activity for these at this time.

In analyzing the trends in off-road diesel quality and vehicle emissions, Stratas Advisors compared the world’s top 10 off-road diesel markets (see figure below). In this year’s ranking, India overtook Germany as the 3rd largest off-road diesel market resulting in Germany moving to the 5th place, while Saudi Arabia took France’s previously 8th place resulting in France moving to the 10th place. This in turn resulted in Brazil dropping out of the top 10. It is also worthwhile to note that generally, the industrial sector comprises majority of off-road diesel demand, followed by agriculture and domestic navigation and bunkers.

Top 10 Off-Road Diesel Markets
In the full report, Stratas Advisors found new specifications or information for off-road diesel grades in Asia Pacific, Latin America and Middle East. Furthermore, despite the IMO’s switch to 0.5% sulfur requirements in marine fuels from January 2020 (see Insights, Dec. 17, 2019), Stratas Advisors found that several marine diesel specs have yet to be updated including those of Angola, Argentina, Colombia, Taiwan, Uruguay and Venezuela. At the time of publishing this report, their sulfur limits continue to range from 1% to 1.5%.

Looking at the sulfur outlook for off-road diesel, Tajikistan and Kyrgyzstan plan to phase out 2,000 ppm sulfur off-road diesel fuel by end-2020 and August 2021 respectively (see table below). However, Stratas Advisors expects it is unlikely for Tajikistan to phase it out by the end of 2020 depending on the import situation.

**Outlook in Sulfur Changes for Separate Off-Road Diesel Specifications (in ppm)**

<table>
<thead>
<tr>
<th>Country</th>
<th>2020</th>
<th>2021</th>
<th>Likelihood of Implementation</th>
<th>Reason for Delay, if Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyrgyzstan</td>
<td>Phase out of 2,000 ppm grade for off-road</td>
<td>Likely</td>
<td>Depending on imports</td>
<td></td>
</tr>
<tr>
<td>Tajikistan</td>
<td>Phase out of 2,000 ppm grade for off-road</td>
<td>Unlikely</td>
<td>Depending on imports</td>
<td></td>
</tr>
</tbody>
</table>


Source: Stratas Advisors, November 2020

In addition, stricter emission requirements for non-road mobile machinery (NRMM) in the EU and India have been delayed from 2020 to 2021 due to COVID-19. Tighter emission requirements are also planned to be implemented in China and India before 2025.

In the full report, three case studies are presented on India, U.K. and U.S. focusing on the impact of off-road diesel fuel and NRMM use on air quality and climate, as well as COVID-19 and lack of certified engines delaying implementation of tighter emission requirements for NRMM and marine diesel engines.

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