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Diesel Sulfur Reduction Remains Critical as Prerequisite for Cleaner Vehicle Sales

Stratas Advisors

Sulfur reduction remains the most dominant parameter for on-road diesel fuel quality improvements, which is one of the pre-conditions for sales of cleaner diesel vehicles, especially for passenger cars used in top diesel fuel markets such as the EU, India, Turkey, South Korea, Australia, etc. While several of the top markets have already achieved 10-15 ppm sulfur limits, developing countries are in the process of reducing diesel sulfur content to similar levels, although implementation delays are continued to be expected. In the full report, two case studies are presented on Bolivia and Kenya discussing the need for imports to meet new diesel sulfur specifications in Bolivia, and the impact of diesel price increases on fuel adulteration resulting in the presence of high sulfur diesel in Kenya.

Besides sulfur, other properties such as cetane, density, lubricity, polyaromatics (PAH), total aromatics, cold flow and water content are also important in determining diesel quality. Several countries around the world are planning to increase cetane number similarly to the EU limit of 51 min, which enables quicker ignition and helps reduce emissions such as NOx. Besides increasing cetane limits, countries of Malaysia and Saudi Arabia plan to set PAH limits for the first time in the next few years. In addition, this year's report covers cold flow issues with a case study on the Netherlands observing filter plugging issues during the colder seasons as a possible result of FAME use. Another case study on issues associated with water contamination was also added to the full report by discussing recent problems observed with the presence of water in storage of diesel fuel at service stations in Australia.

In analyzing the trends in local, regional and global on-road diesel quality, Stratas Advisors compared the world's top 10 on-road diesel markets, which is the same as last year's ranking (see figure below).

Top On-Road Diesel Markets

Note: Volumes include biodiesel (as FAME, HVO, etc.) and GTL diesel where applicable..

Source: Stratas Advisors, 2022

Current maximum on-road diesel sulfur limits worldwide vary from 10 ppm in the most developed regions to 12,000 ppm in developing countries (see figure below). For the past years, Stratas Advisors has been reporting on the advantages of low sulfur fuels in new vehicles (to enable application of PM traps, NOx reduction) vs. older/ used vehicles with no catalysts (to reduce SOx emissions). Currently, a number of countries including Australia, Canada, Chile, China, EU-27, India, Japan, New Zealand, Russia, South Korea, U.S. etc. are receiving the biggest benefit from requiring 10-15 ppm sulfur diesel fuel.

Current Maximum Sulfur Limits in On-Road Diesel

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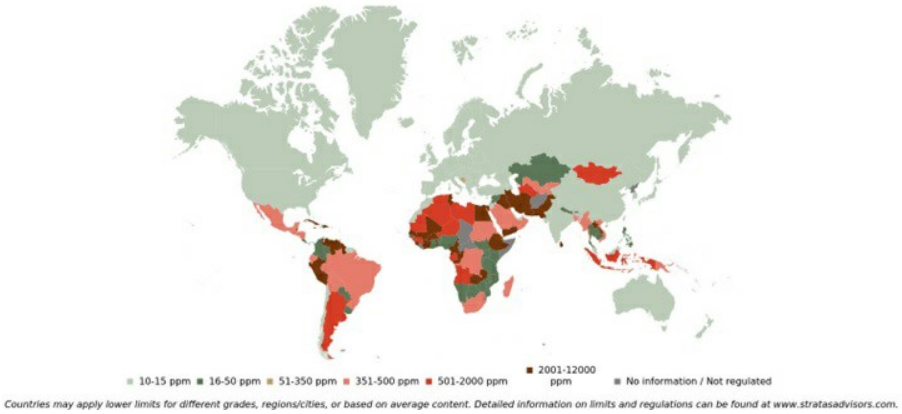
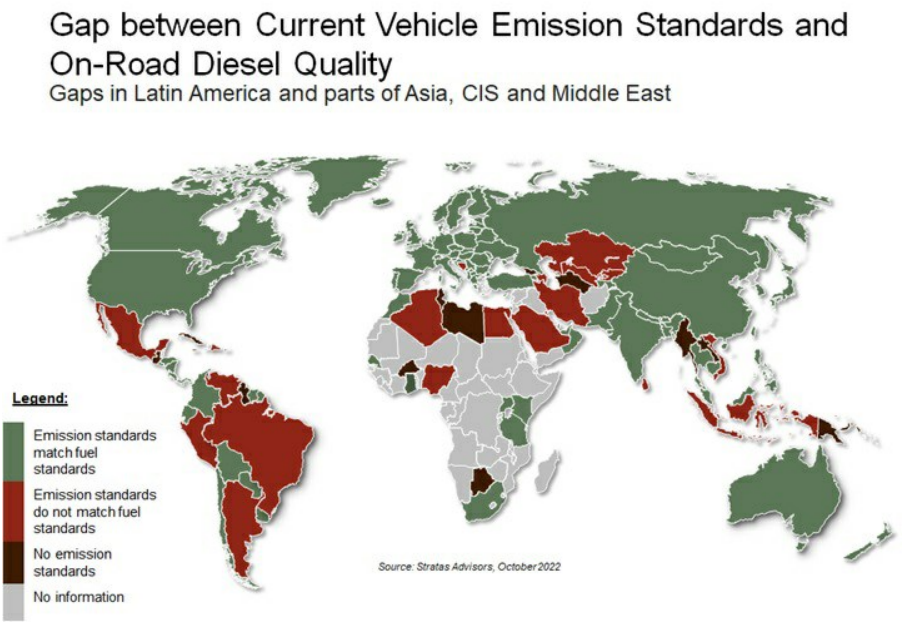


Source: Stratas Advisors, October 2022

These changes are often accompanied by improvements in fuel quality, but this is not always the case for some countries, resulting in gaps between their vehicle emission requirements and diesel fuel quality (see figure below). For example, Costa Rica plans to require Euro 6 emission standards for new diesel vehicles by 2023, but has yet to plan for requiring 10 ppm sulfur diesel while the current limit stands at 50 ppm max. This shows a gap between its vehicle emission standards and diesel fuel quality, since diesel with maximum sulfur of 10 ppm or below should be made available already from 2023 (or earlier) to achieve maximum benefits from introducing Euro 6 emission standards.

In addition, automakers and governments often indicate that new vehicles meeting the emission requirements will not (and cannot) be supplied until fuel of compatible quality is made available on the market. For example, Cambodia plans to require Euro 4/IV-equivalent vehicle emission standards now that 50 ppm sulfur diesel is imported and widely available in the country.

Gap between Current Vehicle Emission Standards and On-Road Diesel Quality



Source: Stratas Advisors, October 2022

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The full report examines key developments in on-road diesel quality and vehicle emissions, including Stratas Advisors' outlook for changes in diesel fuel quality and emission regulations. Updating the previous report (see Insights, Oct. 28, 2021), the report primarily focuses on issues surrounding sulfur, cold flow, water contamination, emissions and fuel efficiency standards for vehicles running on diesel, i.e., passenger cars (PC), light-duty vehicles (LDV) and heavy-duty vehicles (HDV).

Subscribers can access the full report from our Global Fuel Specifications service.

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