

November 27, 2019

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 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
- Simply put into place a fuel quality monitoring legislation and system.

The full report updates the previous report (see Insights, [Nov. 29, 2018](#)), and examines key developments in off-road diesel quality and vehicle emissions. This 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 table below). In this year's ranking, Germany overtook Russia and India as the 3rd largest off-road diesel market, Canada moved up to take the 7th place, while Brazil reentered into the Top 10 by taking the 10th place and Saudi Arabia dropped out of the Top 10.

Top 10 Off-Road Diesel Markets

Rank No.	Country	2017 Demand (thousand b/d)						
		Rail	Agriculture	Construction, Heavy Industry and Other Industry	Domestic Navigation and International Bunkers	Service Sector	Residential	Total
1	China	64	310	347	401	224	79	1,425
2	U.S.	229	192	259	123	176	187	1,166
3	Germany	7	0	15	26	130	213	391
4	Russia	29	52	64	180	37	18	380
5	India	57	203	85	7	0	0	352
6	Japan	3	50	96	24	120	0	293
7	Canada	41	71	79	18	33	29	271
8	France	3	56	20	4	39	96	218
9	Indonesia	0	40	78	52	11	0	181
10	Brazil	19	103	21	10	0.2	0	153

Note: Power generation demand numbers not available for 2017.

Source: Stratas Advisors, September 2019

Changes Since Last Report

Since the last report, Stratas Advisors found new specifications or information for off-road diesel grades in Africa and Asia Pacific. In Africa, new specifications were set for fuel oil domestic (FOD or DDO) in Benin, which set a maximum sulfur limit of 2,000 ppm. In Asia Pacific, Stratas Advisors found specifications for special purpose diesel in South Korea also with a maximum sulfur limit of 2,000 ppm, as well as for marine diesel in Taiwan with a maximum sulfur limit of 10,000 ppm.

On the other hand, China has been removed from the list of countries with separate off-road diesel specs in place, as it phased out off-road diesel specifications in 2019, where off-road diesel fuel is now required to meet on-road diesel specifications. In addition, Stratas Advisors found that industrial diesel grades in Chile and the Philippines were phased out and decreased to zero respectively as of 2018, even though their specifications continue to be valid.

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