

# Refinery Catalysts: Market Strategies, Analysis, and Opportunities

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## Abstracts

The study addresses hydroprocessing catalysts and FCC catalysts. Hydroprocessing catalysts are used to create cleaner fuels--especially ULSD. Demand for cleaner fuels is driving the market. Refining catalysts are experiencing strong growth. New fuel standards are coupled with refineries increasing use of heavier and dirtier feedstocks and major additions to refining capacity.

The refinery catalyst market is thus boosted by the fact that the efficient use of catalysts can help the manufacturers' better address the increasing energy demand. Fluid catalytic cracking (FCC) is the conversion process used in petroleum refineries. It is widely used to convert the high-boiling, high-molecular weight hydrocarbon fractions of petroleum crude oils to more valuable gasoline, olefinic gases and other products. Cracking of petroleum hydrocarbons is done by catalytic cracking because it produces more gasoline with a higher-octane rating. Byproduct gases are more olefinic. These are more valuable than those produced by thermal cracking.

The feedstock to an FCC is that portion of the crude oil that has an initial boiling point of 340 °C or higher at atmospheric pressure. The average molecular weight ranges from about 200 to 600 or higher. This portion of crude oil is often referred to as heavy gas oil. The FCC process vaporizes and breaks the long-chain molecules of the high-boiling hydrocarbon liquids into much shorter molecules by contacting the feedstock, at high temperature and moderate pressure, with a fluidized powdered catalyst.

Hydroprocessing faces significant challenges as crude feeds get heavier; there will be more sulphur and nitrogen to extract; more aromatics to saturate; more metals to remove; and more coke to deal with. Refiners have ageing facilities, which may not be designed and optimized to meet new challenges. As more capital investment is needed, costs for refining fossil fuels will rise, stimulating markets for renewable energy, making them more competitive with fossil fuels.

The cost of hydrocracking catalysts varies because of composition differences. The

catalysts can be alumina with base metals or contain added crystalline zeolites. High quality ultra-stable type Y molecular sieve zeolites are used in this service. Nickel-moly or nickel-tungsten are the active metals frequently used.

FCC additives are used with catalysts to meet specific unit objectives. Higher gasoline octane, lower gasoline sulfur, lower sulfur oxides (SO<sub>x</sub>) and nitrogen oxides emissions, lower carbon monoxide levels, improve fluidization, make more propylene and/or liquefied petroleum gas (LPG) and improve bottoms cracking are FCC objectives.

“Fluid Catalytic Cracking (FCC) petroleum refining products overcome limiting factors affecting refinery capacity and operating flexibility to deliver value and performance. Catalysts are a crucial component in the processing of highly valued petrochemicals, gasoline, diesel and other fuels.”

The market for refinery catalysts in the oil refining sector at \$4,967 million in 2016 is expected to be worth \$6,490 million by 2023, growing at 3.8% on average between 2017 and 2023. There are 500 FCC units being operated globally, each of which requires a constant supply of FCC catalysts. There are 3,000 HPC units being operated globally, or a capacity of approximately 44 million barrels per day, each of which typically requires replacement HPC catalysts once every one to four years.

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