

Emission Control Catalysts

31 May 2016

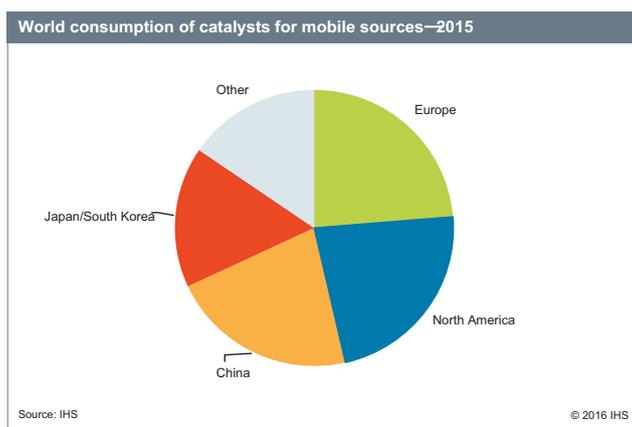
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Abstract

The importance of emission control catalysts has been increasing as environmental concerns and measures to fight pollution have become more important globally. Emission control catalysts are divided into two types according to the source of the emission—emission control catalysts for mobile sources (such as automobile catalysts) and for stationary sources. The largest part of the market is the mobile emission catalyst segment; the stationary emission catalyst market is smaller.

The global catalyst market is expected to grow at around 4% annually (excluding platinum group metals) over the next five years.

The following pie chart shows world consumption of catalysts for mobile sources on a value basis:



Two factors are driving the growth of the mobile emission catalyst markets: further tightening of regulations in the United States, the European Union, and Japan, and the introduction or further tightening of emission standards in China, India, other Asian countries, Russia, and Latin America in the forecast period. Emissions from mobile and stationary sources have increased in recent years.

Europe and North America represent the largest markets for emission catalysts for mobile sources, each with a share of about 24%, followed by China with a share of 22%. China has increased its market share at the expense of Europe and the United States as a result of the faster growth of its automotive industry and also because of increasingly tighter emission specifications. The trend of larger growth in China and other Asian countries is expected to continue through the forecast period.

The main processes used in stationary emission control catalysts are selective catalytic reduction (SCR), catalytic oxidation, catalyzed traps/filters for particulate matter and catalytic incineration of VOC emissions. The main end-use

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industries are fossil fuel-fired power plants, stationary diesel engines and turbines that are fired with hydrocarbons (mainly diesel, natural gas, and coal), boilers, chemical and industrial processes, and marine and locomotive applications. The emission control catalyst market for stationary sources is expected to grow at a rate of around 3.5% annually to 2020.

The SCR catalyst market can be split into two segments—the reload and retrofit segment to replace the spent catalyst layers in existing installations and the original equipment market to furnish newly built processing plants. The SCR catalyst market in North America, Europe and Japan is mainly a reload and retrofit market, while the main new market for coal-fired power plants/SCR catalysts is in China.

Catalysts for environmental protection are becoming more widespread for applications such as off-gas cleaning, including

- NO_x from electrical power plants, refineries and chemical plants, and furnaces, boilers, and incinerators.
- VOC emission treatment from chemical plants, surface coating facilities, and so on.
- Regenerative thermal oxidizers and converters for exhaust streams in chemical plants.
- Dioxin reduction from waste incinerators.
- Catalytic converters in two-stroke stationary engines. Biofuels such as palm oil can be used in combined heat and power plants in a low-speed two-stroke engine. This combination represents a special challenge to NO_x reduction technology to fulfill air emissions legislation. The chemistry of biofuels differs from fossil fuels in that the exhaust gas includes phosphorus, which needs to be taken into consideration in order to avoid catalyst deactivation. Two-stroke diesel engines, on the other hand, result in very low exhaust temperatures, demanding a particular design for reliable operation of NO_x reduction.

Recently, apparent manipulations in automotive software resulted in emission values under test conditions that did not reflect real emissions under normal use conditions. It appears that some automotive producers tried to avoid the use of selective catalytic reduction (SCR) catalysts in smaller diesel vehicles. These catalysts require additional space under the hood, which is already tight, as well as an additional tank for the reducing agent, which in turn is inconvenient for the consumer as it needs to be refilled. As it turns out, the use of only oxidation catalysts does not seem to allow for the simultaneous achievement of target values for diesel consumption, motor power, and emission values under normal driving conditions; accordingly, SCR catalysts will become the norm in these types of diesel vehicles in the coming years.

Trends that are expected to affect the global emission control catalyst business from 2015 to 2020 include the following:

- Increasing automobile production, especially in developing countries.
- More-stringent legislation on automobile emissions in both developed and developing countries.
- More-stringent emission standards for off-road diesel engines (e.g., industrial drilling rigs, compressors, construction wheel loaders, bulldozers, nonroad trucks, highway excavators, forklift trucks, road maintenance equipment, snowplows, ground support equipment in airports, aerial lifts and mobile cranes, agricultural and forestry tractors) as well as for ships and vessels, and railway locomotives and railcars.
- More-stringent legislation on emissions from stationary sources.

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