

Japan

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Japan is an island nation with a population of 127 million. It is the 10th most populous country in the world with its capital, Tokyo, home to 37 million people making it the largest city in the world. Since 2011, Japan's population has begun to decline and average age increase, with over-65's comprising 27% of the population.

The ageing population has been one factor in Japan's falling tax revenues, with public debt now double the size of the economy, resulting in Japan becoming the world's most indebted industrial nation.

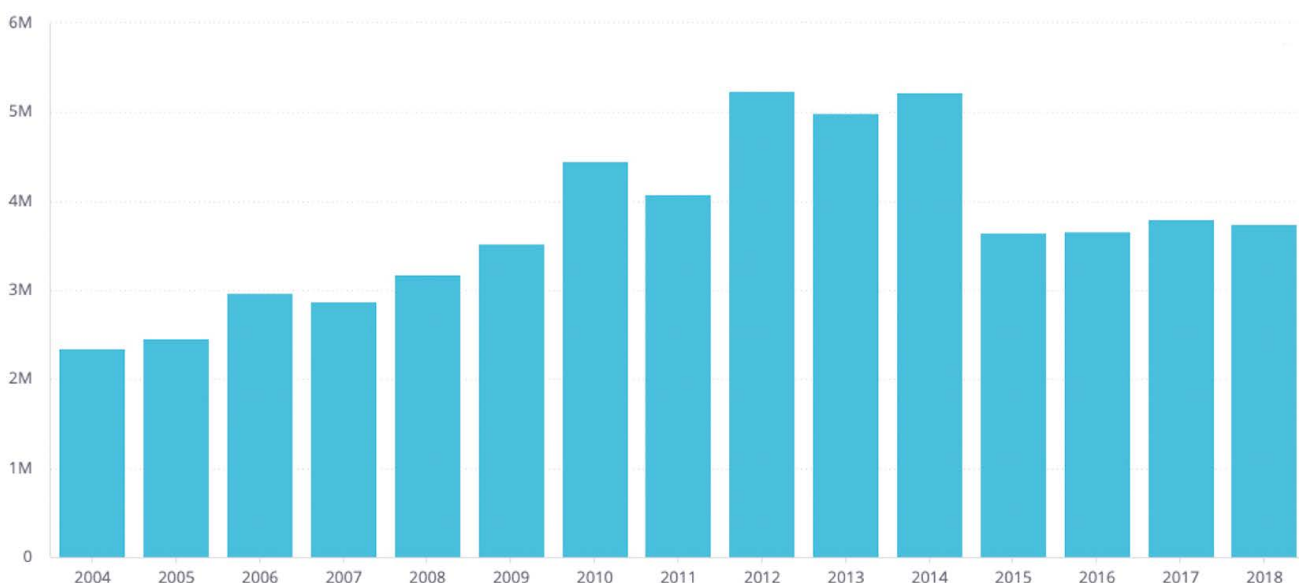
The vehicle parc, manufacturing and sales

Japan's vehicle parc has grown significantly since 1945 when the parc was just 113,000 cars, trucks and vans. By 2018 that number had swollen to 81 million with the majority of cars aged between four and eight years old. Motorcycle ownership last year stood at 10.7m, down from its 1986 peak of 18.7m. Sales of cars, trucks and buses (including imports) have remained relatively flat over the past three years at around 5.2m units. By August 2019, sales had reach 3.6m, showing 1.8% year-on-year growth.

Despite being the world's most populous city, Toyko has the least number of private passenger cars in use per 100 households in Japan by some margin (44.5 against 175 in the Fukui Prefecture). In terms of tax, the cost of car ownership in Japan is significant, particularly post-purchase, with total taxes some 31 times higher than the US and more than twice greater than the UK and Germany.

Japan is home to four of the world's largest automakers. Including manufacturing plants overseas, Toyota is the world's top producer at almost 10.5m units annually. Nissan is ranked sixth in the world at 5.7m followed by Honda at 5.2m. Suzuki sits in 11th place globally at 3.3m units.

The top five best-selling car brands at the end of 2018 were Toyota (1.5m units), Honda (747k), Suzuki (714k), Daihatsu (646k) and Nissan (616k). Amongst individual models, Toyota's Prius and Aqua models are currently battling against Nissan's Note and Serena for the top four positions. However, foreign manufacturers, led by Mercedes and BMW have started to gain a significant presence, hitting a record 9.1% of sales in the 2017 fiscal year.



Passenger car ownership in Japan by year of registration (Dec 2018). Total parc = 81m. Source: OATS

That said, according to Japan's motor industry trade body – JAMA – automotive is one of the Japanese economy's core industrial sectors, particularly for export. North America is the prime destination (1.9m units in 2017), ahead of Europe (865k units). Overall some 4.8m units were exported in 2018.

In 2018, motorcycle production was 652,000 units, down from a high of 7.4 million manufactured in 1981. The four Japanese motorcycle OEMs that make up around 90% of the domestic market share are, in order of rank, Honda, Yamaha, Suzuki and Kawasaki. While Japan was once the highest producer of motorcycles, that title is now held by India.

Base oil production

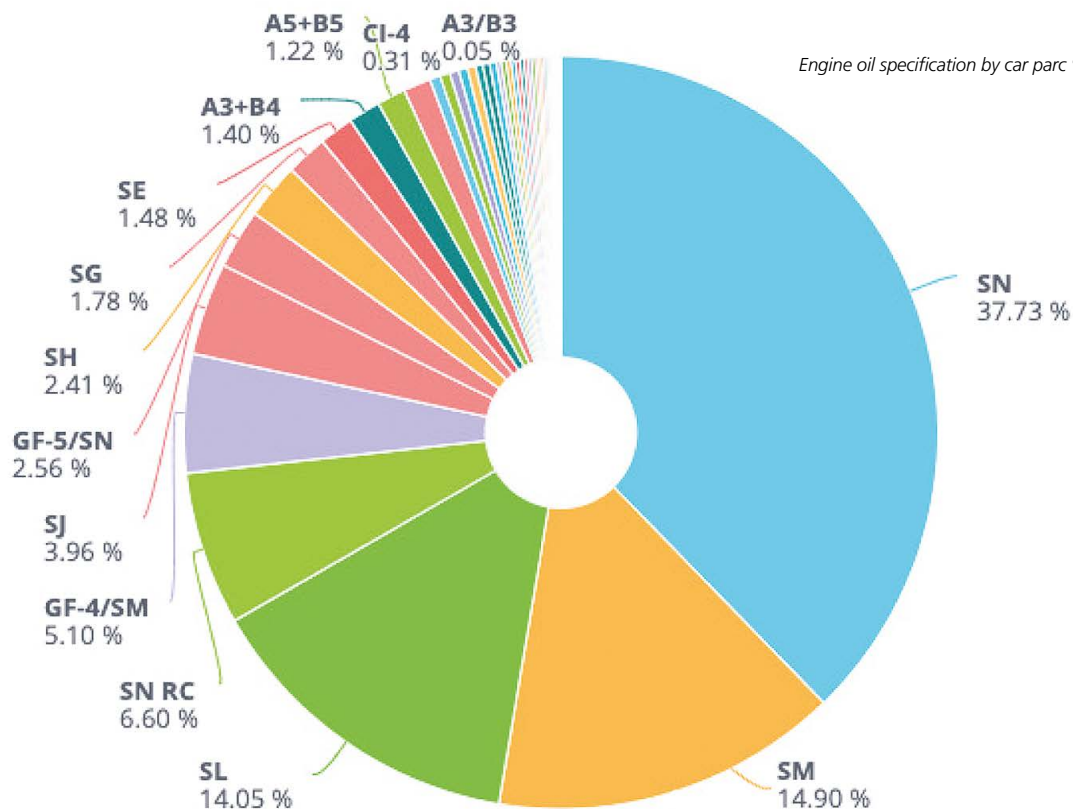
Japan is not self-sufficient in crude. As a result, it is forced to import all of its requirements for its 15 oil companies and 22 refineries to produce approximately 3.52m b/d, with the majority of crude coming from Saudi Arabia followed by the UAE. Because of an oil dependence of greater than 99%, concerns over oil security have led to Japan essentially trying to remain neutral - especially after being declared an 'unfriendly state' by OPEC after the 1973 oil crisis - whilst also investing in Middle Eastern projects. Recently, Japan has taken a more active role in the region – including Iran and Russia - becoming more involved in both

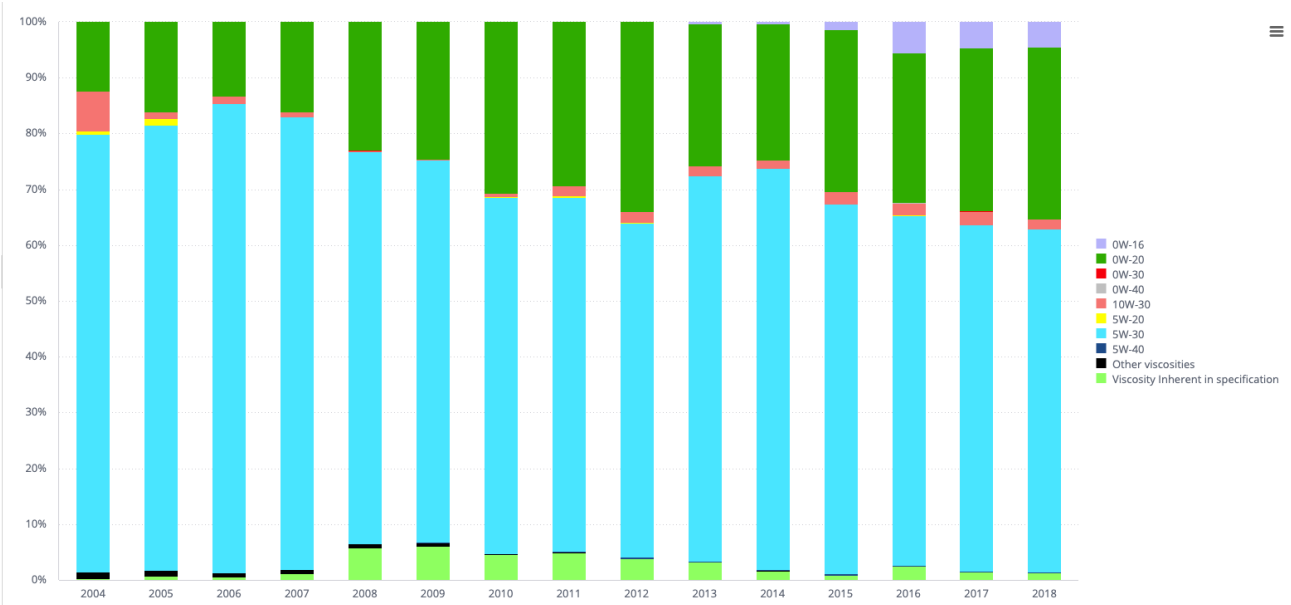
industrial and infrastructure investment projects beyond just oil and gas. However, US sanctions against Russia have curtailed some investment plans.

Japan is also a large importer of gas, with a significant volume coming from Australia, where it has interests, as well as Mozambique.

There has been consolidation in Japanese oil refineries. JXTG Nippon Oil & Energy is now the largest, formed in 2017 through a merger of JXTG Holdings and TonenGeneral Sekiyu K.K. Next in scale is Idemitsu Kosan Co. and Cosmo. Earlier this year, Idemitsu also merged with fourth-ranked Showa Shell Sekiyu K.K. to form Idemitsu Showa Shell, which has combined sales of more than \$45bn.

Base oils and specifications are of a high standard with many formulations using Grp II, Grp III, and Grp IV base oils. Both diesel and gasoline fuel quality and specifications are equal to those found in Europe and elsewhere, including the use of biofuels which is limited to B5. Non-conforming fuel, found to be off-spec with regard to mandatory requirements, will attract harsh non-compliance penalties. These include fines, a possible jail term and closure of the businesses involved such as refiners, retail stations and importers.





Parc % by year of manufacture by significant viscosities. Source: OATS

Lubricants production and market

In terms of world consumption, Japan ranks fourth after India, the US and China. Idemitsu ranks seventh as a global lubricants producer despite a 4.4% drop in sales in 2018. This was in line with overall domestic sales which contracted by some 11 %, while exports increased by about 30%. As local demand has fallen, Japan has become a net exporter of refined products.

As with their European and American counterparts, OEM's also specify and prefer their own branded lubricants. However, in terms of specifications, Japanese automakers are far more likely to allow lubricating oil specifications like JASO, ACEA, and API as alternatives, given that many of their large markets and manufacturing plants are situated in developing countries in Africa, South America, and Asia itself. This demonstrates a robustness and longevity of design in general and particularly in harsh operating conditions.

As innovators, Japanese automakers are constantly improving engine designs, from the early Mazda rotary engine to Honda's off-set crankshaft design to Mazda's spark ignited high compression engine; Toyota and Infiniti's variable compression engine designs and Aisin's automatic and Nissan's CVT transmissions. As a result, Japan leads the way in low viscosity engine, gear and transmission formulations, with their latest JASO Standard, GLV-1 SAE 0W-8, and 0W-12, 4-stroke engine oils.

Generally speaking, the Japanese consumer displays a much higher degree of brand loyalty than their

Chinese or Indian counterparts. As early as 2003, viscosities of 5W-30 and lower were predominant and this has remained largely unchanged, with semi and fully-synthetic products forming virtually the entire engine oil market. As with many current oil specifications, there is a cost to obtaining GLV-1 approval, from a filing fee to a per-cost increment of product sold.

In summary

It will be interesting to see how this industrial nation and its auto industry will evolve and adapt as a result of the national and global transformation in vehicle design, ownership and use. This, combined with climate change legislation and more stringent emission standards targeted at reducing air pollution, requires both the automotive and lubricants industries to transform at an increasingly rapid pace. In itself, this should hold little fear for Japanese manufacturers who have regularly led the way in design evolution. Although Japan's population is currently ageing, the nation's youth - like their global counterparts - are no longer identifying motor vehicle ownership as a prime objective. Add a drive for more efficient utilization of resources, a low carbon economy and the future of alternative powered vehicles, and Japan could become a bellwether for the future direction of both mobility and lubricants development and marketing.

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