

FUNDAMENTALS

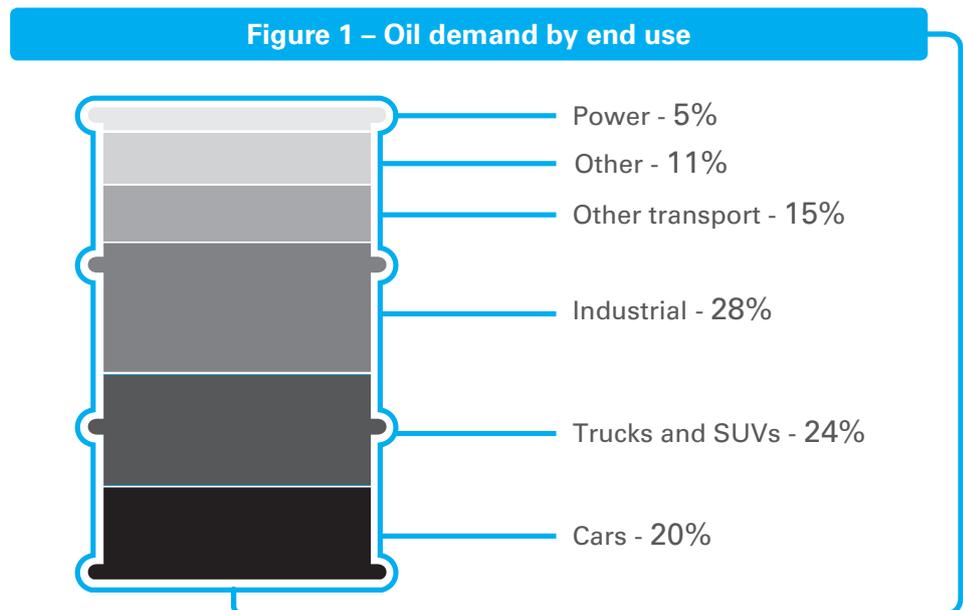
What happened to peak oil?

Peak oil demand is a contentious topic. It is crucial for climate change, yet there are possible negative downsides such as volatile oil equity prices and corporate bond defaults. It could even undermine the growth of entire countries.

It is remarkable how quickly and dramatically market narratives can change. Well-established, widely-held beliefs end up being dismissed by the same market participants who had been their biggest advocates. Peak oil – the view that the world would soon pass the peak in oil production, thereafter entering terminal decline – was one such belief. Today, it is very difficult to find mainstream market participants who still hold this view.

Peak oil is still with us though – only now it is the belief that oil demand is about to peak. While the consequences of peak supply could have been disastrous for economic activity, some aspects of peak demand could be positive as consumers and companies improve efficiency and switch to cleaner energy sources.

A steady increase in oil demand has been very important in supporting strong capital expenditure from oil companies, even during economic downturns. Each year, companies have been confident that demand is going to be a bit higher, and ‘legacy’ supply (all else equal) is going to be a bit lower. But if oil demand peaks, companies will be less inclined to maintain levels of investment.



Source: LGIM analysis, BP

Moreover, should excess supply lead to price falls, the oil sector’s equity and bond prices could come under pressure. In 2015 and 2016, falling oil prices led to corporate bond defaults spiking higher and some oil-producing countries slipping into recession.

FOCUS ON TRANSPORTATION

Oil demand is a complex topic, encompassing factors such as economic growth, technology development and government policy. Each could influence whether oil demand is set to peak in the coming years, and we will return to them in future research. However, for the purposes of this analysis we

are going to focus on the dominant use of oil today, transportation. Somewhere between 25% and 30% of all oil demand is attributed to cars and SUVs as captured in Figure 1. Our analysis suggests that at some point in the future we believe it is highly likely that passenger vehicle oil demand is going to peak. That said, we think there are good reasons to suggest this will not happen in the coming five to ten years.

FUEL EFFICIENCY OUTWEIGHING ELECTRIC CAR ADOPTION

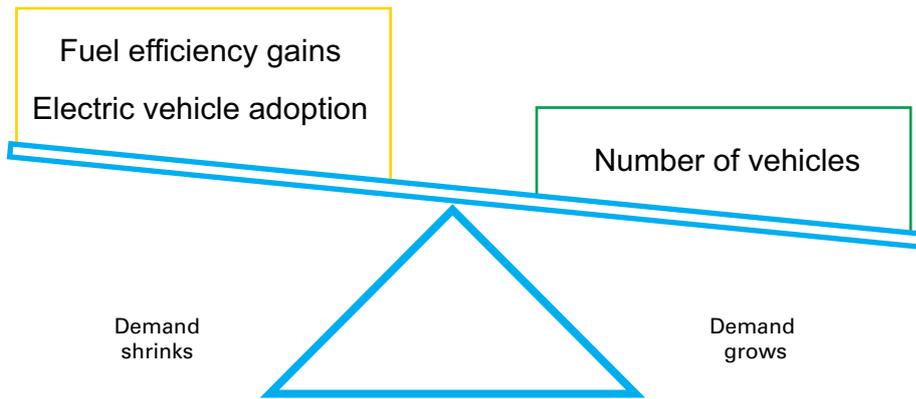
Focusing on passenger vehicles, and assuming that miles driven per car is constant, analysing the amount of oil used for passenger vehicles can be largely reduced to three factors: fuel efficiency gains, electric vehicle adoption and total vehicle growth (Figure 2).

The prevailing argument from the new generation of advocates for peak oil is that the rapid adoption of electric vehicles, along with a drive to improve fuel efficiency, will result in a reduction in oil demand.

As with any new technology, estimating the impact of electric vehicle adoption is challenging. This is especially the case given that government intervention can be a factor in accelerating the adoption of electric cars. We are therefore cautious when predicting the implications for oil demand. However, in relative terms, the impact of fuel efficiency improvement is generally thought to outweigh electric car adoption. One forecaster estimates that fuel efficiency gains will have twenty times more impact on oil demand than that of electric vehicle adoption. Other forecasts may be less extreme, but they broadly agree that fuel efficiency is far more important.

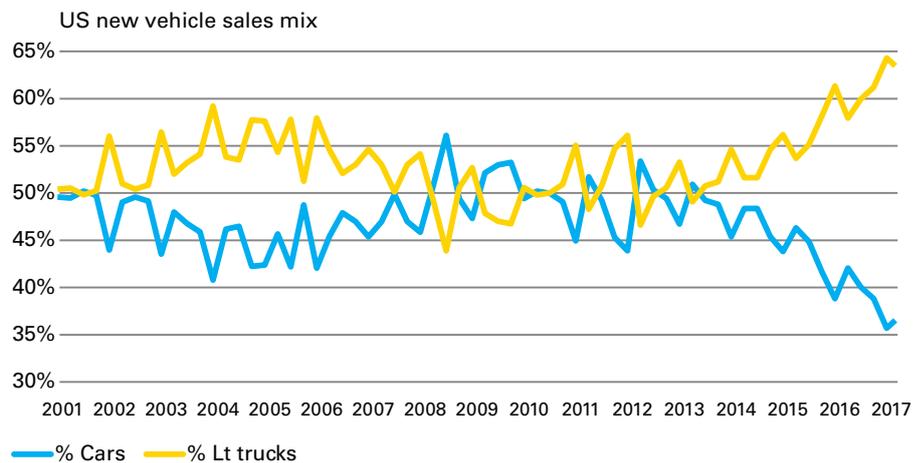
The same forecasters predict that fuel efficiency will make a meaningful dent in oil demand growth. For example, BP estimates that of the 23 million barrels per day of demand growth that they believe would otherwise occur between now and 2035, 17 million barrels per day will be offset by gains in fuel efficiency.

Figure 2 – A balancing act of demand dynamics



Source: LGIM

Figure 3 – Continued US appetite for pickup trucks



Source: LGIM Analysis, Bloomberg

This would be a positive outcome for the environment, with carbon emissions from passenger vehicles being a substantial contributor towards climate change. However, it is likely that shifting from coal to gas (or renewable) power generation is going to be a much more important force in this battle, far more than simply just replacing old diesel vehicles.

In any case, we doubt that such optimistic fuel efficiency predictions will be realised, for two main reasons.

Reason 1: Consumers still desire inefficient vehicles

Whilst it is impossible to prove, consumer data suggests that buying a fuel efficient car is driven by affordability concerns, rather than a decision based on the technology. The US consumer is demonstrating a seemingly insatiable appetite for pickup trucks as shown in Figure 3, which is creating a meaningful drag on average fuel efficiency.

Furthermore, Figure 4 demonstrates how the average vehicle sold in the US stopped being more efficient at almost exactly the same time as the oil price started to decline, suggesting that US consumers have an underlying preference for large and fuel inefficient vehicles, but will only buy them when they are affordable.

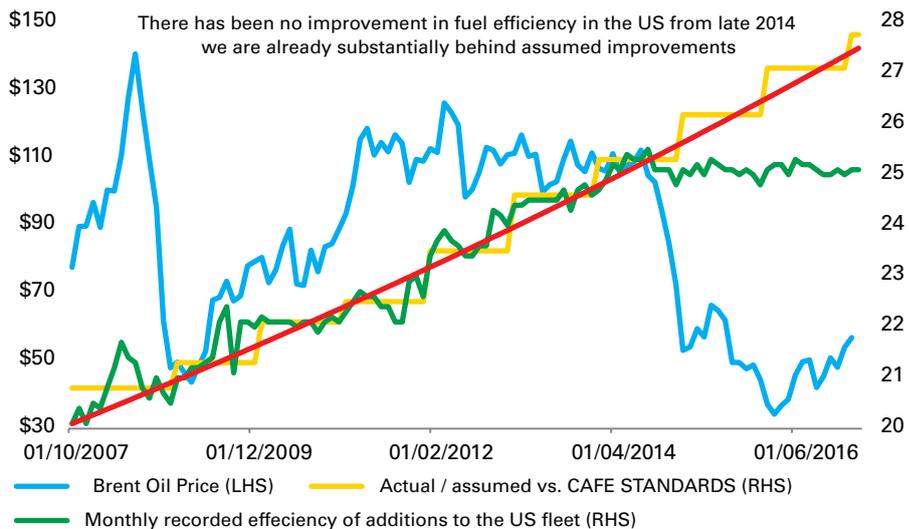
Figure 4 also demonstrates that the US is falling materially behind their fuel efficiency targets (CAFE¹). Our view is that the efficiency gains mandated by global regulators as shown in Figure 4 are unlikely to be met. In tandem with the failure to meet fuel efficiency targets we also note that US automakers have been lobbying aggressively for a relaxation of both emissions and efficiency standards. We forecast that US average fuel efficiency will resume its trend growth from 2018 onwards.

We note a preference for inefficient vehicles in other parts of the world too. The data quality is less strong elsewhere, but in China we estimate that at least one in three new cars is a “light truck” (i.e. an SUV), and that this is likely to rise with disposable incomes (Figure 5). We expect, therefore, that Chinese fuel efficiency improvements are only in line with historical trends of about 3% a year, rather than the much more aggressive target of 6%.

Reason 2: Fuel efficiency credibility in jeopardy

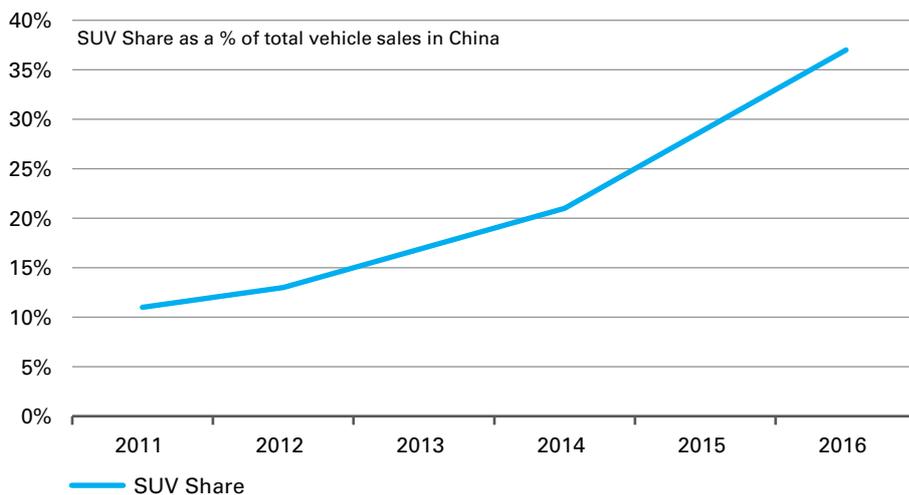
What about Europe? Europe has by far the most fuel efficient car fleet in the world, with more fuel efficient diesel-powered cars, and much smaller and lighter vehicles. Again, we believe this is largely driven by affordability.

Figure 4 – US consumers have a preference for inefficient vehicles



Source: LGIM Analysis, Bernstein, University of Michigan, Bloomberg

Figure 5 – SUV share of total passenger vehicle sales



Source: LGIM Analysis, Bernstein

Small diesel cars are very efficient, with new generations reporting fuel efficiency figures of 90 miles per gallon or more. However, we now know that emissions from these cars are not nearly as clean as we had been led to believe. To help counter these emissions, a number of European cities have announced plans to ban diesel cars and vans from their centres by 2025. Rather than diesel continuing to grow market share – as required to meet official efficiency targets – we therefore think it is more likely

to decline. We assume that diesel declines to 25% of new vehicle sales by 2025, from the c.50% of sales it represents today.

OECD* PASSENGER VEHICLE OIL DEMAND COULD BE SIGNIFICANTLY ABOVE CONSENSUS

Holding all other things constant, we estimate that by 2025 oil demand from passenger vehicles may be anywhere from 1.2 million to 1.7 million barrels per day higher than consensus expectations. Given that expectations for annual demand

1. The Corporate Average Fuel Economy (CAFE) standards are regulations in the United States, first enacted by the United States Congress in 1975, after the 1973-74 Arab oil embargo, to improve the average fuel economy of cars and light trucks (trucks, vans and sport utility vehicles) produced for sale in the United States.

*OECD - The Organisation for Economic Co-operation and Development

growth are around 1 million barrels per day, this represents a significant increase that is roughly equivalent to an additional year's worth of demand growth. It is also about the same size as the co-ordinated OPEC supply cut in the fourth quarter of 2016 that saw oil prices rise around 15%.

This is of course just one component in understanding the likely shape of the supply / demand balance in oil markets over the next decade, and there may well be other factors we identify in our research that offset this.

Of course, a more rapid take-up of electric vehicles could materially alter this analysis. Government policy is likely to be a substantial driver here. For example, Norway has one of the highest rates of electric vehicle adoption in the world – with one in every two new cars sold either a fully electric or hybrid vehicle – but also has one of the highest rates of government subsidy in the world (around \$10,000). Denmark also had high electric vehicle adoption rates, and an even more generous subsidy. However, this was withdrawn in early 2016, resulting in plummeting electric vehicle adoption. To make a real difference, electric vehicle sales would have to rise rapidly. We estimate it would take around 150 million electric cars – about 15 times the current global fleet – to offset our estimate of extra oil demand.

The environmental consequences could be significant. All the evidence we have seen suggests that government intervention can make a significant difference to consumer behaviour. Not only are

carbon emissions from passenger vehicles an important contributor to overall emissions, but there is increasing awareness of the impact that they have on urban air quality. (Our conclusions from this analysis assume that no effective policy action is put in place to mitigate these trends.) Given the progress that has been made on efficiency, and the crucial role that rising energy efficiency will play in hitting our global targets on CO2 emissions, a key conclusion of our work has to be to urge policy makers to take further action in this area. This is especially true in the US where the direction of travel appears to be the opposite.

CONGESTION – THE LIMITING FACTOR?

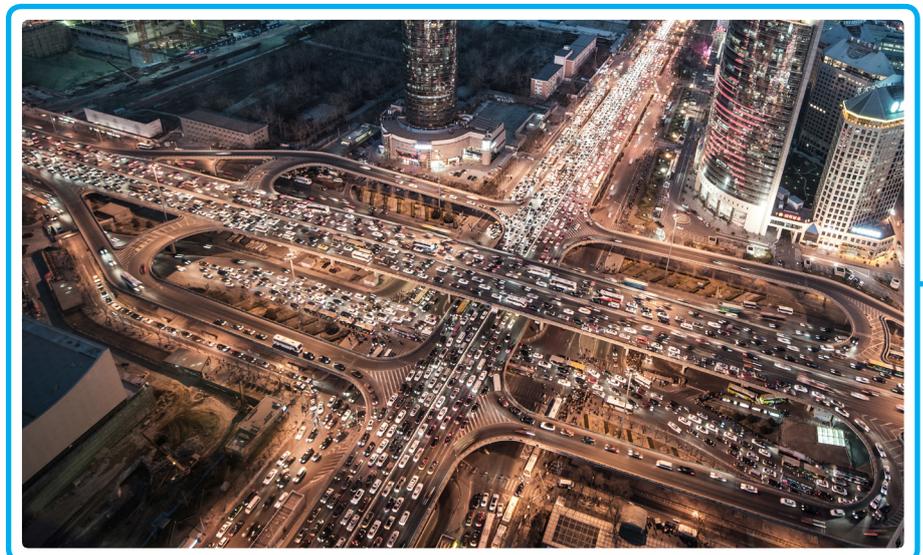
Cities in China, and across many other emerging markets, may be too densely populated to cope with the projection for new cars. We estimate that, of the 100 largest cities globally, those situated in emerging markets have three times the average population density of developed market cities. To reach equivalent levels of car penetration

strikes us as a big challenge – there may simply not be enough space, or enough roads, to cope. This is an area we intend to spend more time researching in the coming months.

THE BOTTOM LINE

Barring government intervention, particularly across densely populated emerging markets, we believe that the demand for oil from passenger vehicles is likely to outstrip consensus forecasts. This suggests that excluding unanticipated factors that we have outlined, peak oil demand is still some way in the distance. This could have negative implications for climate change, although trends in power generation are likely to prove more influential.

From a capital markets perspective, our analysis suggests that if oil demand does continue to grow through the remainder of this decade, production trends are going to be increasingly important. Meanwhile, oil-producing companies and countries are likely to remain an active opportunity set for long-term investors.



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