Trend Macrolytics, LLC
Donald Luskin, Chief Investment Officer
Thomas Demas, Managing Director
Michael Warren, Energy Strategist

INTELLECTUAL AMMUNITION

The Peak Oil Myth is Back (But This Time It's Demand)

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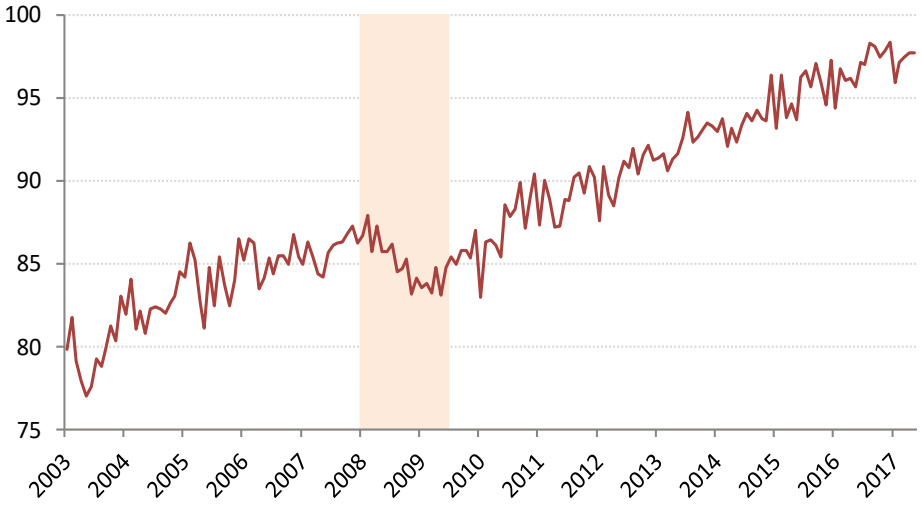
Michael Warren and **Donald Luskin**

With oil prices in mid double digits, electrics can't compete where sales growth is biggest.

Among the many narratives in the market keeping oil prices down is the idea the world is facing "peak demand." It's not new, the death of oil has always supposedly been just around the corner – but it now has a new rationale. Three years ago "peak oil" – by which was meant "peak supply" – was virtually an article of faith. *That* would lead to prohibitive prices which, in turn, would destroy demand. But now that a supply-side technology revolution has cut prices by more than half, you'd think the narrative would allow that demand should increase, not decline. But no – and never mind that the global consumption statistics show demand as robust as ever (please see the chart below). *There's a new peak demand rationale – exemplified by seeming authorities such as Stanford economist Tony Seba – that the proliferation of electric vehicles will displace oil in the critical transportation market that accounts for about 70% of global oil consumption.*

Global crude oil consumption Millions barrels/day **Recession**



Source: DOE IEA, TrendMacro calculations

We think it's mostly hype. Fake news. Ten, 25 years from now, maybe. But it seems to be part of the bearish atmosphere that's driving oil prices down right here and right now. It's one of many reasons why we see oil as priced to perfection in the low and mid 40's, and destined to move considerably

Update to strategic view

OIL, ASIA MACRO, EMERGING MARKETS MACRO, US MACRO: "Peak demand" for oil driven by rapid wide-scale roll-out of electric vehicles is mostly hype, and it plays into the present narrative that is mistakenly keeping oil prices low. Yes, cost reductions in battery technology have lowered the price for electrics and will continue to do so, but increasing shale supplies have cut global oil prices in half, making conventional vehicles unbeatably cost-effective. The bulk of automotive sales growth will come from China and the rest of the developing economies where first-time buyers in an emerging middle class will prize low cost above all, where electrics have to compete against legacy Western conventional models that can use primitive local fuels. Based even on IEA forecasts that assume implementation of the Paris Accords, peak demand is nowhere on the horizon.

[Strategy dashboard]

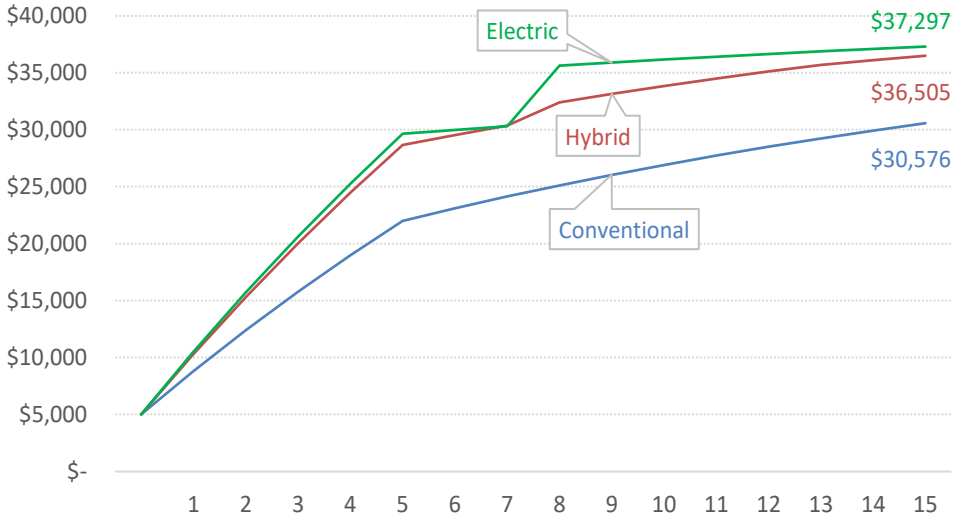
higher (see, among many, "The Crude Stocks Conundrum" June 28, 2017).

The hyping of electric vehicles was on full display last week when Volvo announced its cars would go "all electric" within two years. That deceptive phrasing led many press accounts to wrongly report that Volvo is abandoning the internal combustion engine – in fact, it is only *adding* an electric engine to its vehicles, making most of them just hybrids.

Tesla's lofty valuation – even after a recent correction, still matching or slightly exceeding iconic US automakers Ford and GM in market capitalization – is another case in point. To be sure, that may have more to do with Ford's and GM's own weaknesses, as Tesla's market cap is less than one-third of Toyota's. And by any other metric, such as sales volume, revenue or profitability, Tesla doesn't hold a candle (or a metal-air battery-powered LED flashlight) to GM or Ford, let alone mighty Toyota.

To justify Tesla's valuation – or, more generally, the whole electric hype – you have to ignore that today's lower oil prices have eliminated any economic incentive to pay a premium price for advanced automotive technology. For example, a 2017 Ford Focus with a conventional engine is about $6,000 to $7,000 cheaper in terms of total cost of ownership over 15 years, compared to a Ford Focus all-electric (without subsidies) or even a Ford Focus hybrid (please see the chart below).

Cumulative total cost of ownership by year 2017 Ford Focus



Source: University of Michigan, TrendMacro calculations

To be sure, the learning curve has narrowed the manufacturer's suggested retail price for an all-electric Ford Focus to only $14,000 more than the conventional version – while in 2012, it was about $16,000 more. That's some progress. But looking ahead over several years, while the learning curve will continue, we also expect oil prices – still high by historical standards – to fall to consistently below $30 per barrel in today's dollars, making the conventional engine more cost-competitive (see "Just-In-Time Energy" April 27, 2015), along with inevitable improvements in the

Contact TrendMacro

On the web at
trendmacro.com

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Donald Luskin
Chicago IL
312 273 6766
don@trendmacro.com

Thomas Demas
Charlotte NC
704 552 3625
tdemas@trendmacro.com

Michael Warren
Houston TX
713 893 1377
mike@trendmacro.energy

Terry Higgins
Ocean View DE
571 271 7743
terry@trendmacro.energy

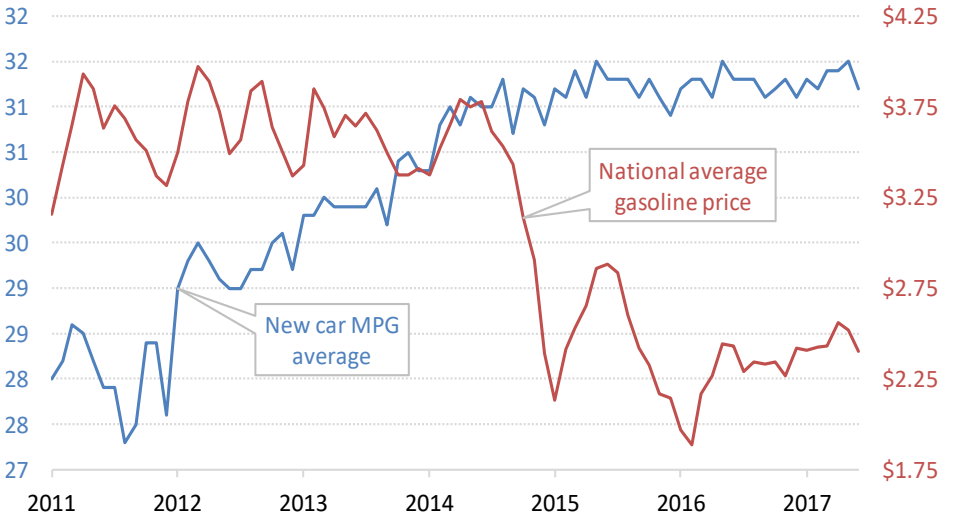
[About us]

efficiency of the engine itself. *Battery costs would have to come down from above $200 per kilowatt hour last year to about $100 to make all-electric cars competitive with today's internal combustion engines at today's still-high oil prices.*

The economics just aren't there yet for electric cars, and won't be for years. But mere cost-parity, even if it could be achieved, would be no guarantee of dominant market share gains for electrics, because consumers also worry about reliability, range, charging time and availability of charging stations. As energy economist Vaclav Smil has shown, large-scale "energy transitions" take generations to develop the necessary infrastructure and consumer acceptance.

In the meantime, over the past three years as oil prices have fallen, US SUV and truck sales have increased, halting years of seemingly relentless improvement in miles-per-gallon average for new vehicles sold (please see the chart below). US consumers prefer larger SUVs for many reasons, and when oil prices are not continuously rising, sales of smaller sub-compact and hybrid vehicles suffer. *So absent some kind of regulatory shock – such as a carbon tax or a gasoline tax, seemingly unlikely under the present administration – we don't see any economic incentives pointing toward a massive switch to electrical vehicles.*

Fuel efficiency versus gasoline price



Source: University of Michigan, DOE, TrendMacro calculations

China's automobile market, and its government's fascination with electric automobiles, is another element in the hype. China's 13th Five Year Plan (FYP) launches aggressive ambitions for domestic brands to dominate the market for "new energy vehicles" (NEVs) – battery electric vehicles, plug-in hybrids, and fuel cell vehicles. By 2020, the FYP's goal is to have 5 million NEVs on the road. Since the launch of the plan in 2016, China has sold 950,000 NEVs through year-end, with a target for 800,000 in 2017.

Even if Chinese NEV sales from 2018 to 2020 surpass 1 million units each year, to meet the FYP's target, they would still constitute only 4% of overall

light-duty vehicle sales of 25 million. The remaining 24 million, 96% of vehicles sold each year, will need gasoline. And remember, the NEV goals can be met with hybrids, which on average improve mileage by about one-third, but leave two-thirds of miles traveled still needing to be powered by gasoline.

On top of the FYP goals, the government has proposed a new "quota" – effectively a mandate, enforced by penalties – that NEVs make up 8% of new vehicle sales by as soon as next year. This strong-arm stuff suggests to us that the FYP's more modest goals are not being met. Then comes the recently announced target for NEV sales – seemingly jumping the gun on the *next* FYP – of 7 million per year by 2025, or 20% out of 35 million. But even if such a stretch-goal were accomplished, there would still be 4 million additional new gasoline-powered vehicles on China's roads that year compared to the 2020 estimate. So it's hard to see how any of this leads to peak oil demand. Besides, that goal won't be accomplished. To be blunt about it, it is comical. But it's probably why Volvo – now a Chinese-owned company – is distributing such deceptive press releases. For that matter, this week Volvo's parent company Geely Holding Group bought a start-up that makes flying cars. Seriously.

Most locally produced NEVs sold in China have been low-cost low-tech models that couldn't stand up to Western automotive standards – some cannot exceed 30 miles per hour. Chinese consumers find domestic brands lack not only capability, but style as well. So the broader auto market continues to buy foreign brands that formed joint ventures with the four largest Chinese auto makers, which utilize gasoline-fueled internal combustion engines.

Higher-end foreign electric vehicles can import their automobiles into China, but there is a 25% duty and no access to NEV credits. Tesla has been paying the duty, and has reportedly sold less than 12,000 vehicles in China last year. Its sales are down about 15% in 2017. In Hong Kong, Tesla's sales have reportedly fallen to literally zero because tax-subsidies have been removed.

Some cities such as Shanghai, Nanjing and Shenzhen have used non-cash incentives to increase sales of locally manufactured NEVs – such as immediate availability of license plates to register a vehicle, instead of entering a lottery to obtain one. But local governments and state-owned enterprises were told in 2016 that at least 30% of all new vehicles purchased must be NEVs, and now that mandate has been dropped to 20% for 2017 and 2018. This large but narrow market has been an important component of NEV demand, which explains why NEV sales can vary per month by a factor of 10.

A serious threat to the future of Chinese-branded NEVs is government policies have kept foreign battery manufacturers at a disadvantage in the local market. Those policies mean that less technologically advanced domestic producers are nevertheless able to dominate the market – which stunts efficiency gains in the most critical element of the economics of electric vehicles. The government first banned foreign automotive battery

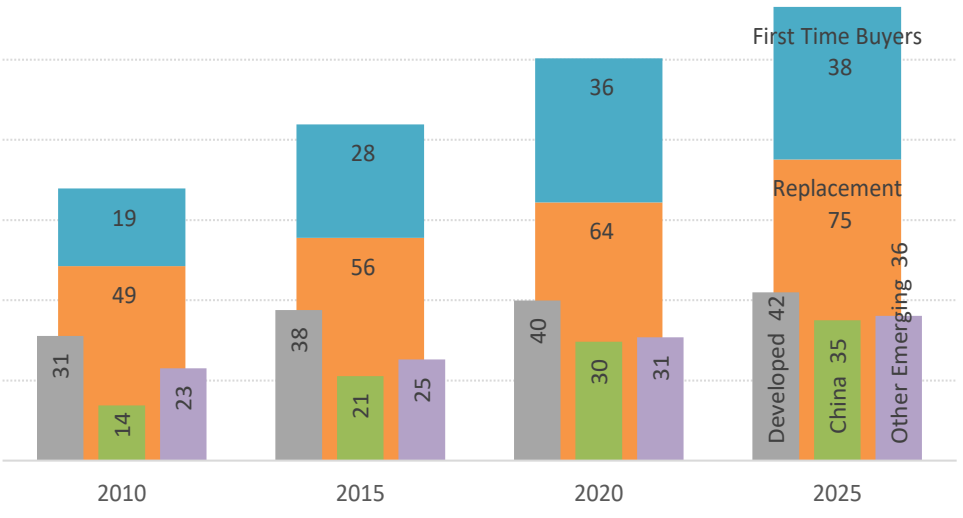
makers outright. Now they must have at least eight gigawatts of production capacity in the country to receive NEV subsidies. Facing this protectionist bias, no foreign firm has invested significant capital. South Korea's LG Chemical, plans to eventually ramp up capacity to 8 gigawatts at its Nanjing facility, but even then that plant will only supply enough batteries for 50,000 electric vehicles per year.

Making matters worse, many NEVs are built and sold in the same province, by regional "champion" automotive and battery manufacturers. Thus the widespread adoption of a standardized battery technology is unlikely, as crony capitalism will keep provincial officials purchasing their local electric vehicles regardless of the quality of the powertrain. That kills economies of scale, because the batteries of some of China's provincial manufacturers cannot be recharged with the nation-wide recharging infrastructure that the government is currently rolling out.

The ultimate question overhanging the future of NEVs in China is environmental impact, in a nation whose cities are already beset by crippling air quality problems. In the US, we think of the move the electric vehicles as progress toward a “greener” society, because energy consumption will be shifted to relatively clean-burning natural gas – the feedstock at the margin for new electricity production. But in China it’s likely the opposite, because new electricity production is going to have to come mostly from relatively dirty coal.

Despite hoopla over solar and wind contributing power to China’s grid, “green” power producers have only grown their combined production by about 1.2 million barrels-of-oil-equivalent per day from 2001 to 2015, while energy consumption overall grew 39.5 million. While China is expected to significantly increase liquified natural gas regasification capacity, that will only displace about 4.5 million boe/day of coal feedstock used in electricity generation and heating fuel demand. At the same time, domestic shale

Automobile sales Millions of units per year



Source: Bloomberg, Macquarie, Goldman Sachs, TrendMacro calculations

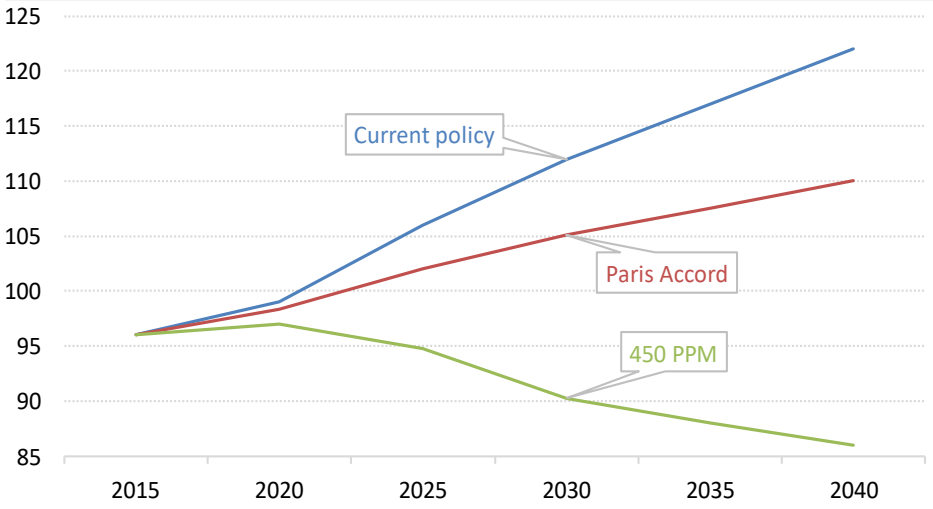
and coal-bed methane operators have significantly missed their government-set production targets. So even if China were able to get all those NEVs on the road, the lack of natural gas production and conversion will necessitate the increased use of coal.

Looking beyond China to the rest of the emerging world, we see a market for future automobile sales as large – and in the future, larger – than China itself (please see the chart on the previous page). In this market, first-time buyers will come of age with electric car technology that wasn't available when China's new middle class was born. You might think there is a "leap frog" opportunity for emerging economies to bypass conventional cars altogether, in the same way that some have skipped to wireless mobile telephony without the intervening step of wired land-lines.

Sadly, no. In telephony, wireless technology has the edge not just because it is better, but because it is cheaper. ***That's simply not the case for electric vehicles. They may or may not be better, but they are surely not cheaper, and won't be for a long time.*** This is all the more so in emerging economies in which automakers from Japan, Korea, Europe and the US make or assemble vehicles locally, less-expensive older-model vehicles for which the manufacturers' sunk costs have been written down to zero long ago.

These models use outdated engine technology that can still utilize relatively primitive local fuels that have not adopted the quality standards of developed economies. Local oil companies lack the know-how or the capital – or the incentives – to upgrade their refineries to produce modern high-quality fuels. Their obsolete fuels are not compatible with expensive state-of-the-art powertrains – turbocharged engines with optimal piston design, high pressure fuel injectors, advanced compression ratios, and so on – and emission control mechanisms such as oxidation catalysts and exhaust gas recirculation valves. Older models don't deliver fuel efficiency in terms of miles per gallon, but their initial costs are so low that the total cost of ownership is hard to beat.

Global oil consumption, by policy scenarios Millions of barrels per day



Source: IEA, TrendMacro calculations

So new electric vehicles in the emerging world are up against cheap-o competition from conventional vehicles optimized for primitive and inexpensive fuel supply chains. Elites in the developed world may wish for various reasons that the emerging economies would adopt electric vehicles – but a billion newly-middle class citizens just want to be able to afford to drive at all.

We conclude that peak demand cannot arise anytime remotely soon, thanks simply to the relentless arithmetic of the cost-comparisons between electric vehicles competing with continuously improving conventional ones. Even the Paris-based International Energy Agency – that exemplar of wishful thinking for the abolition of fossil fuels – would seem to agree with this.

Under current policies, IEA sees oil demand rising steadily throughout its forecasting period – to 2040. No peak (please see the chart on the previous page). Assuming full implementation of the Paris Accords on climate change, demand rises more slowly – but still never peaks. The only way to get a peak in the forecast is to assume a "450 PPM" carbon policy more draconian than Paris – which would entail a carbon tax and targeted fuel taxes to keep gasoline and distillate prices high, sector agreements for global light duty vehicle efficiency standards and mandated increased use of expensive alternative fuels. We're betting that even the IEA's "current policy" scenario is too conservative, and that oil demand in 2040 will be even greater than the agency fears.

Bottom line

"Peak demand" for oil driven by rapid wide-scale roll-out of electric vehicles is mostly hype, and it plays into the present narrative that is mistakenly keeping oil prices low. Yes, cost reductions in battery technology have lowered the price for electrics and will continue to do so, but increasing shale supplies have cut global oil prices in half, making conventional vehicles unbeatably cost-effective. The bulk of automotive sales growth will come from China and the rest of the developing economies where first-time buyers in an emerging middle class will prize low cost above all, where electrics have to compete against legacy Western conventional models that can use primitive local fuels. Based even on IEA forecasts that assume implementation of the Paris Accords, peak demand is nowhere on the horizon.