



WILL ELECTRIC VEHICLES KILL THE ENERGY SECTOR?

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In August, we provided an update on the Auto Industry and highlighted some of the revolutionary changes taking place including autonomous vehicles, car sharing and electric vehicles. In that report, we stated that older gas combustion cars will gradually be phased out over the course of the cycle as electric vehicle costs decline and become more efficient. This evolution will likely lead to gasoline demand destruction, particularly in OECD countries.

However, there are equally powerful demographic changes taking place in non-OECD countries, which should mitigate the potential lost demand from the U.S., Europe and Japan. Below we outline the dramatic changes expected in transportation fuel consumption due to electric vehicle adoption and how that ultimately will influence crude oil consumption. We conclude that the energy sector faces significant threats in the intermediate term and will become increasingly reliant on non-OECD countries.

ENERGY SECTOR THREATS

Threat #1 – Government Sponsored Consumer Incentives

Prior to investigating how much change will take place in transportation fuel and crude oil consumption, it is critical to understand the catalysts behind rising electric vehicle sales. First, federal and state government policy in many countries has been and will likely continue to be supportive of electric vehicles. This is especially true of European countries. In Figure 1, we highlight several examples of recent incentives to encourage electric vehicle sales.

Figure 1: Incentives for Electric Vehicles

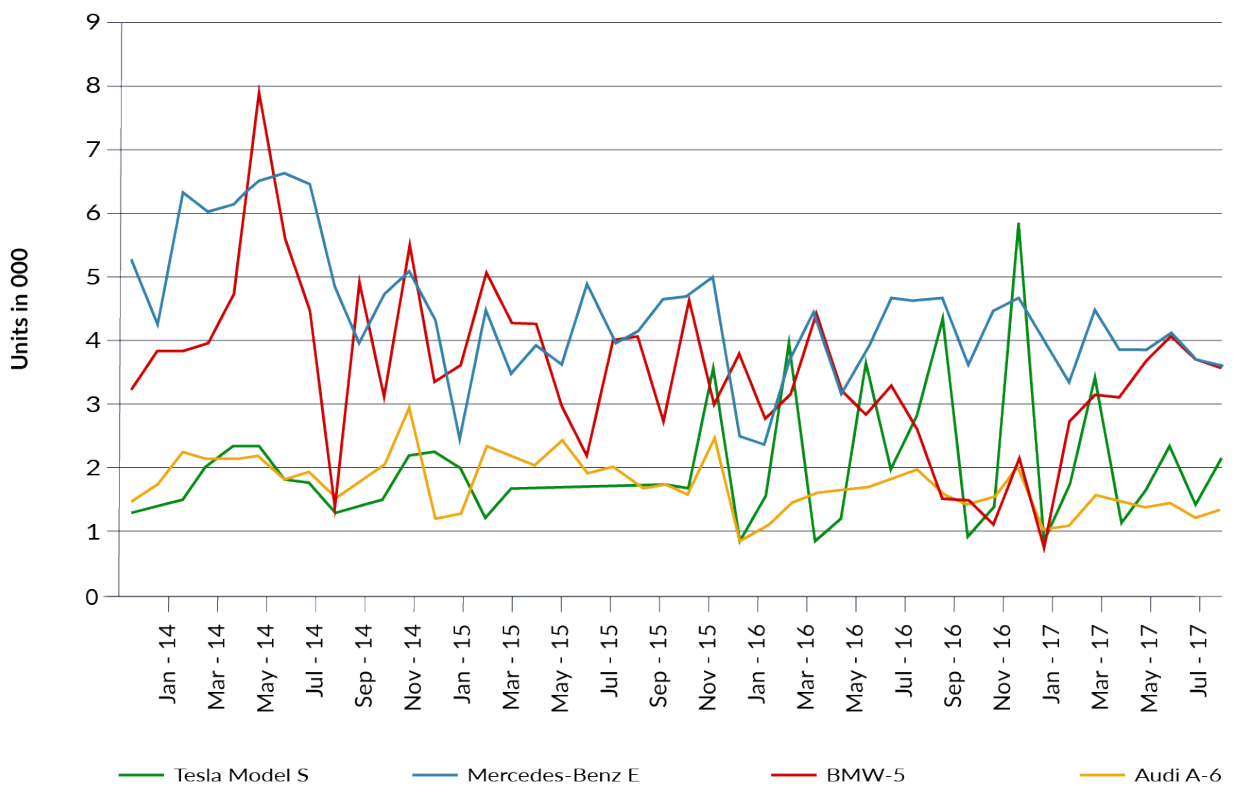
Incentives for Electric Vehicles	Result
US Energy Policy Act of 1992	Increases # of alternative fuel vehicles and alternative fuel use in federal, state and fuel-provided fleets
US Federal Tax Incentive	\$2,000 income tax deduction for hybrid vehicle
California's Advanced Clean Cars Program (ACCP)	ACCP and other states including CT, MD, MA, NY, OR, RI and VT commit to 3.3 million zero emission vehicles by 2025
China License Registration (1)	Waivers on regulations that limit the availability of license plates for internal combustion engine vehicles
UK; Ultra Low Emission Zone in London	All cars will need to meet exhaust emission standards or pay a daily charge to travel
France; Fleet Management	Government fleet commitment of 50% of renewals being electric vehicles and 20% for local authorities
Germany; Federal rebate & misc.	Purchase rebates of \$4,400 for battery electric vehicles, free parking and access to bus lanes
Japan; Federal rebate & misc.	Battery capacity and electric range-based purchase subsidy of \$7,700
Korea; Federal rebate	Central purchase subsidies of \$12,329 for battery electric vehicles

(1) Chinese cities where such measures have been adopted include Beijing, Guangzhou, Guiyang, Hangzhou, Shanghai, Shenzhen and Tianjin
 Source: AAM; Annual Energy Outlook 2017, US Energy Information Administration; Global EV Outlook 2017, International Energy Agency

Threat #2 – Increasingly Positive Reviews

In addition to supportive policies, the quality and desire for electric vehicles has improved. Tesla’s Model S, a luxury sedan, has won Motor Trend’s Car of the Year and received the highest score ever given in Consumer Reports’ road test. The positive reviews for the luxury vehicle have translated into strong demand in the U.S. that compares favorably to the competition as reflected in Figure 2. We are closely monitoring sales of the new and comparatively economic Chevy Bolt and Tesla Model 3 to determine whether electric vehicle demand for the non-luxury market will meet its lofty expectations.

Figure 2: Monthly Luxury Sedan Sales

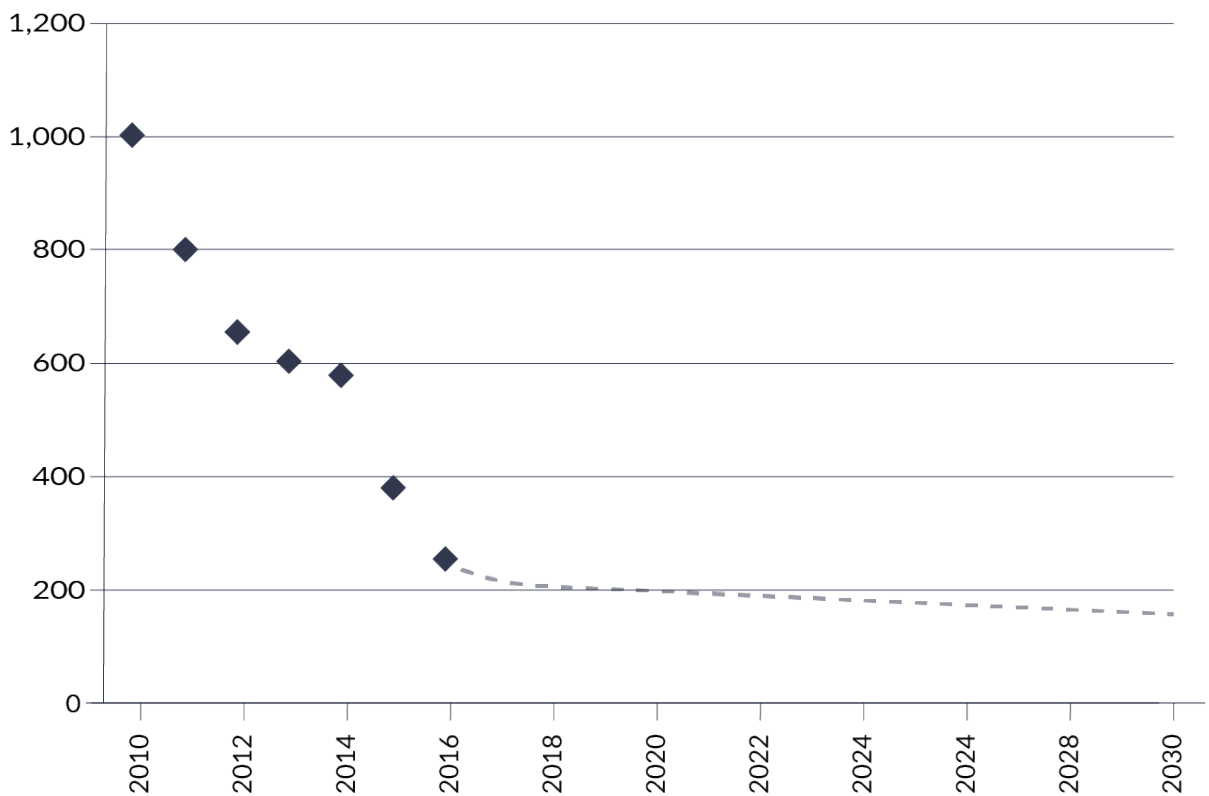


Source: Carsalesbase.com

Threat #3 – Declining Cost

The third and most significant reason we expect a transition to electric vehicles from internal combustion engines is cost. We believe that at some point in the next 10 to 15 years, electric vehicles will be less costly than internal combustion engine vehicles. The price of the most expensive component of electric vehicles, the lithium-ion battery, has declined by 80% in the past 7 years (Figure 3). Experts expect this trend to continue and reach a level in the next decade that would put the two types of vehicles on equal footing from a cost perspective.

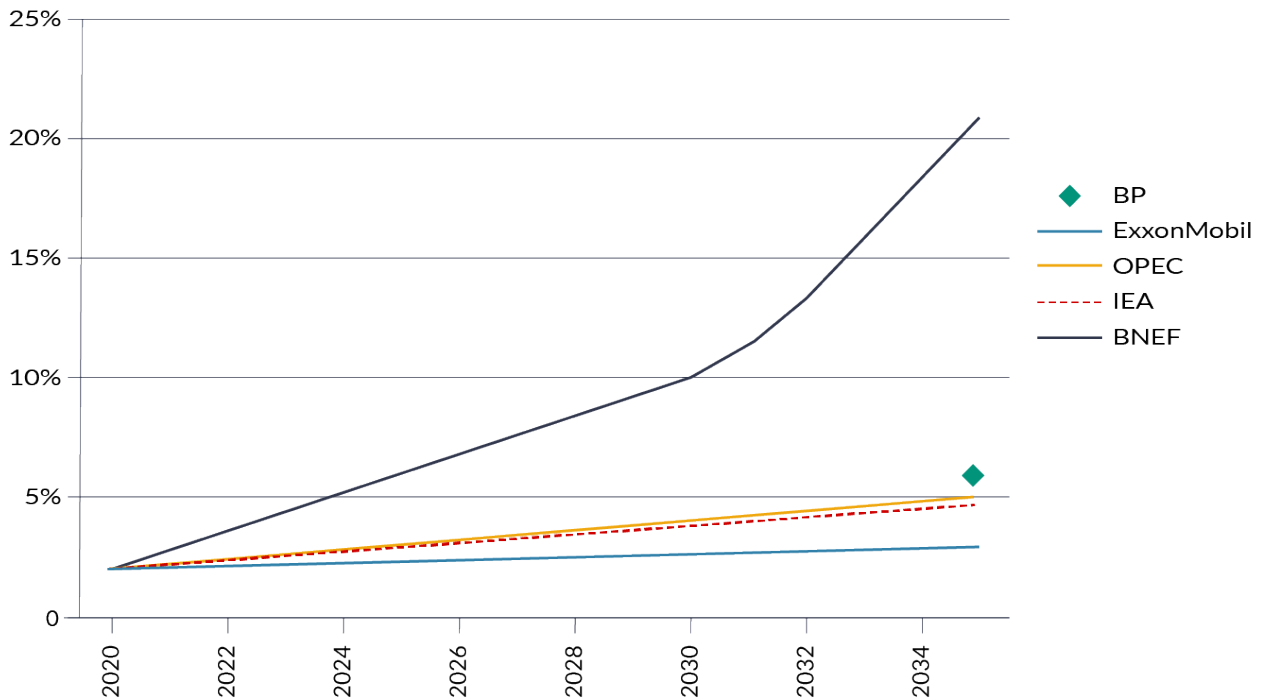
Figure 3: Lithium-ion Battery Price Forecast



Source: Bloomberg New Energy Finance

However, as future costs rise to comply with Corporate Average Fuel Economy Standards (CAFE) in the U.S., traditional internal combustion engine vehicles are forecast to eventually be more expensive than electric vehicles. When that occurs, it is expected electric vehicle adoption will accelerate, although as Figure 4 indicates there is a wide disparity of belief on when such a transition will take place. Notably, should gasoline prices rise meaningfully in the next decade, the cost comparisons would favor electric vehicles supporting quicker adoption.

Figure 4: Forecasts of Electric Vehicle fleet share of total passenger vehicle market



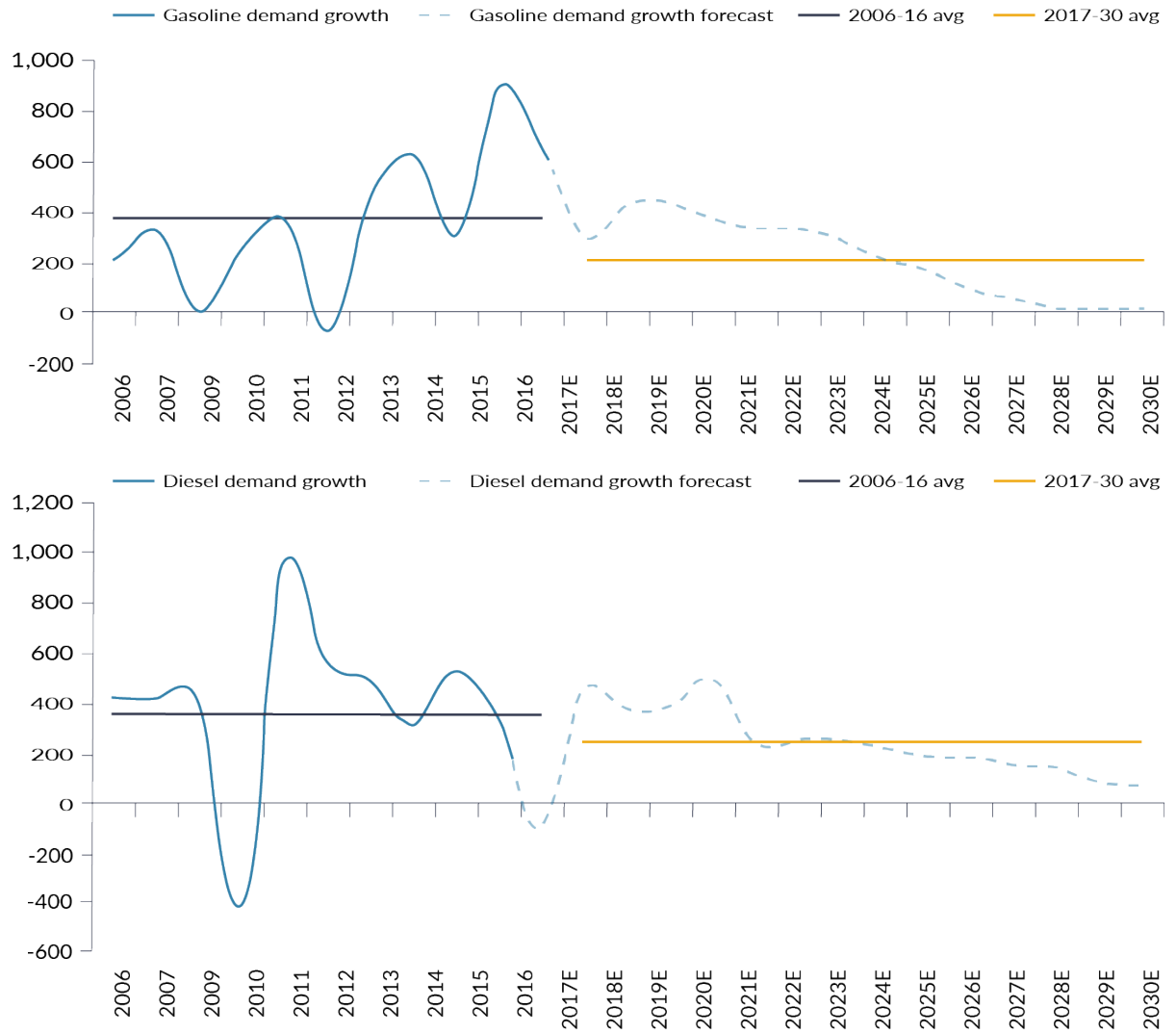
Source: JPM, BNEF, AAM

ENERGY SECTOR OPPORTUNITIES

Positive #1 – Growing Demand among China & India Middle Class

Notably, the economy and efficiency standards of OECD countries that make electric vehicles cost competitive are not expected to inhibit non-OECD demand for gas burning cars. Expansion of the middle class in China and India is expected to lead to more purchases of vehicles, increase miles driven and lead to greater gasoline consumption. Many believe consumers in non-OECD countries will opt for internal combustion engine vehicles. These will be relatively inexpensive because it is likely they will not have the burden of adhering to costly fuel economy standards. This incremental demand from non-OECD countries is expected to more than offset the shrinking consumption from wealthier OECD countries. So, while electric vehicles will result in lower gasoline and diesel growth trends, the overall expansion of the fleet and miles driven should nonetheless result in growth in consumption (Figure 5).

Figure 5: Gasoline and diesel demand growth, kbpd



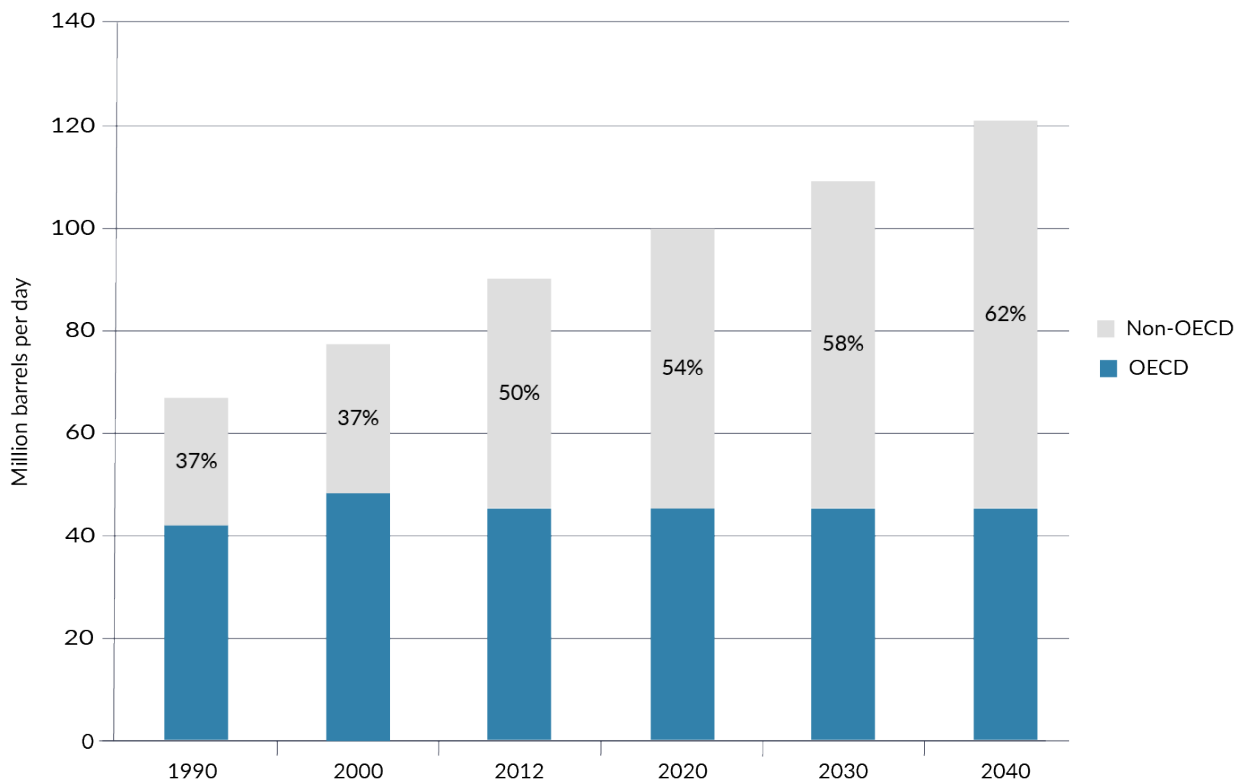
Source: Goldman Sachs Global Investment Research

Positive #2 – Rise of Petrochemicals

While oil is primarily a transportation fuel, it does have other uses such as its use in petrochemicals. In 2016, roughly 12% of all oil was refined into liquefied petroleum gases, which are used in economically sensitive items like plastics, electronics and clothing. By 2030, expectations are that the petrochemical industry will comprise about 17% of worldwide oil demand. A growing middle class in emerging markets and world wide economic growth of more than 3.25% are the catalysts behind this predicted petrochemical growth. This expansion would represent 6 million barrel per day increase by 2030, which should offset most lost U.S. or European gasoline consumption.

The argument for increased consumption lead by non-OECD countries is supported by the Department of Energy’s (DOE) International Energy Outlook provided in Figure 6. While we believe there are compelling arguments for why OECD demand could be weaker (quicker adoption of electric vehicles) or stronger (autonomous vehicles lead to increased mileage driven) than the outlook provided by the DOE, its views on non-OECD demand are consistent with the overall consensus.

Figure 6: World Petroleum Consumption (% market share)



Source: Goldman Sachs Global Investment Research, 2016 International Energy Outlook, Energy Information Agency; AAM

KEY TAKEAWAYS

The changes in the automotive industry will have profound effects on many other industries, including the energy sector. We believe that oil consumption should continue to grow, albeit at a slower pace in the next decade, based on several key items: supportive electric vehicle incentives, relatively lower costs of electric vehicles offset by rising demand of combustion vehicles in non-OECD countries, and rising use of oil in the petrochemical industry.

We will be closely monitoring monthly sales of non-luxury electric vehicle models like the Chevy Bolt and Tesla Model 3 to determine if our assumptions need to be altered. Additionally, any legislative and/or regulatory changes to encourage or discourage fuel economy standards could cause material changes to our cost comparison between electric vehicles and internal combustion engines, which would likely result in different views.

Patrick J. McGeever is a Principal and Corporate Credit Senior Analyst at AAM with 21 years of investment experience. Prior to joining AAM, Pat was a Senior Vice President at Deerfield Capital Management. He was responsible for leveraged loan investments in the Energy, Utility, and Metal & Mining industries. Prior to Deerfield Capital, Pat was Director of the Oil & Gas Sector at Fitch Ratings. Prior to that, Pat was a Vice President of High Yield Research for ABN AMRO Incorporated covering the Oil Service and Exploration and Production Sectors. Pat earned a BBA in Finance from the University of Iowa and an MBA in Finance, Economics and Accounting from the University of Chicago.



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