

PIONEER

NATURAL RESOURCES

Forecast the number of electric vehicles that will be on the road and determine the impact of electric vehicles on the global demand for oil

The Challenge:

Your challenge: create an adoption curve predicting the number of electric vehicles that will be on the road globally each year from now through 2050. Then, using your forecast determine the impact electric vehicles will have on the global demand for oil over the same time period.

Challenge Goals/Objectives:

1. Both models must be global forecasts; however, you may choose to separate or combine regions as you see fit (i.e. consider Europe a single group, break it down by country, etc.)
 - a. It is preferred that the models include the ability to look at the forecasts broken down by the regions you've identified
2. The models must be open and flexible. As new data is acquired, policies change, or assumptions are updated these should be easily incorporated into the models and rerun so new forecasts can be generated
3. The models should be linked, as you update the EV forecast the global oil demand forecast should update as well
4. You may submit as many or as few scenarios as you see fit (i.e. optimistic, most likely, pessimistic, etc.)
5. Any and all assumptions you make need to be stated clearly
6. Any and all resources you use must be cited

Background:

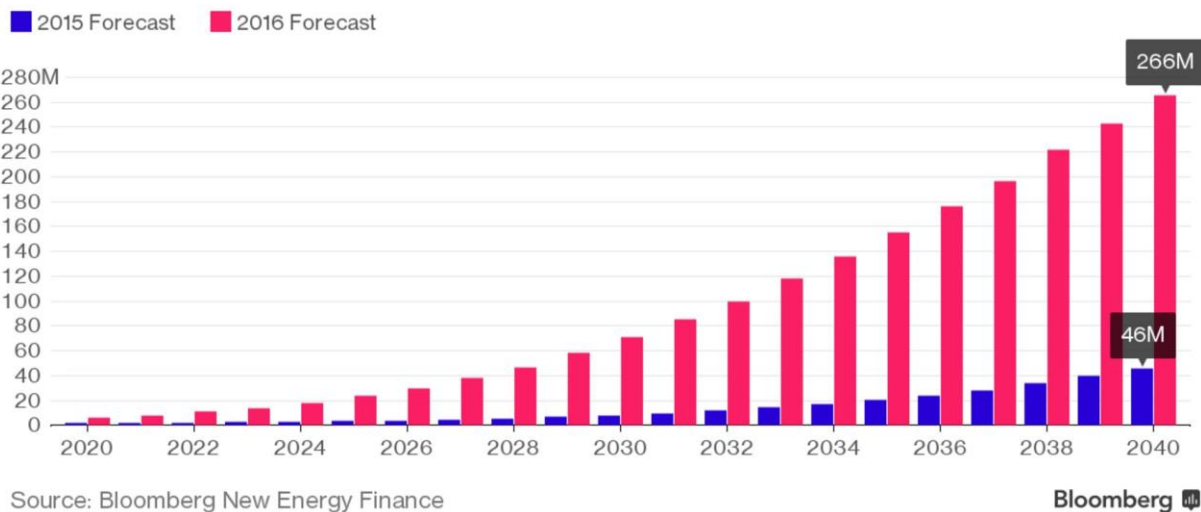
Future projections for electric vehicle adoption rates vary dramatically due to the large number of rapidly changing influencing factors. Overall, the future of electric vehicles globally depends upon multiple factors, some of them being:

- The support by governments of various countries in the form of subsidies, tax exemptions or other incentives.

- Initial vehicle cost, which would depend on cost of batteries and other manufacturing inputs along with profit margins.
- Maintenance costs, especially in terms of battery life.
- Availability of charging stations, distance between such points and charging time.
- Resale value of electric vehicles.
- Decrease in customer anxiety and increase in their awareness, enthusiasm and adoption.
- Infrastructure, permits, regulations on CO2 emission and industry standardization.
- Oil prices; a rise in oil prices would make the adoption of electric vehicles a more natural and attractive option for customers.
- The integration of electric vehicles in the product portfolio of original equipment manufacturers (OEMs). Currently, every major OEM has at least one model of EV in its portfolio.¹

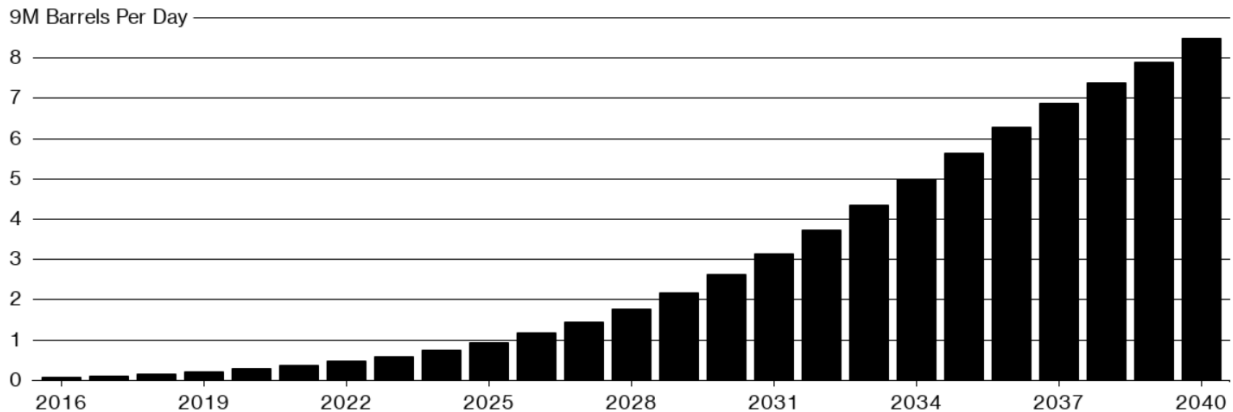
Growing Expectations

OPEC's electric vehicle forecast grew by almost 500% last year



Due to the high levels of uncertainty around these driving factors, it's no surprise there's a broad range of forecasts for future electric vehicle utilization (example shown above).² However, this range makes it very difficult to accurately predict global demand for oil and other fossil fuels, which has a large impact on the commodity price. See below for one prediction on how much demand for oil could be displaced by electric vehicles.³ As a result, oil & natural gas companies face the challenge of developing long term growth strategies under heightened levels of risk. Through improved forecasting model these companies will be able to make better long term decisions on growth rates today.

EVs could cut 8 million barrels of use, or 25% of current OPEC output



Suggested Resources:

Bloomberg New Energy Finance Electric Vehicle Outlook 2017 (download the report):

<https://about.bnef.com/electric-vehicle-outlook/>

Projecting light-duty electric vehicle sales in the National Energy Modeling System (NEMS) and World Energy Projection System plus (WEPS+):

https://www.eia.gov/conference/2017/pdf/presentations/melissa_lynes.pdf

EIA - Annual Energy Outlook 2017:

<https://www.eia.gov/outlooks/aeo/>

EIA - International Energy Outlook 2017:

<https://www.eia.gov/outlooks/ieo/>

EIA Short Term Energy Outlook:

https://www.eia.gov/outlooks/steo/report/global_oil.cfm

Vehicle Miles Traveled:

<https://fred.stlouisfed.org/series/TRFVOLUSM227NFWA>

Total Vehicle Sales:

<https://fred.stlouisfed.org/series/TOTALSA>

Light Weight Vehicle Sales: Autos and Light Trucks:

<https://fred.stlouisfed.org/series/ALTSALES>

Auto Inventory/Sales Ratio:

<https://fred.stlouisfed.org/series/AISRSA>

Domestic Auto Production:

<https://fred.stlouisfed.org/series/DAUPSA>

IMF Economic Data Search:

<http://www.imf.org/en/data>

IEA Global EV Outlook 2017 (reference section at end of document has additional resources):

<https://www.iea.org/publications/freepublications/publication/GlobalEVOutlook2017.pdf>

Dynamics in the Global Electric-Vehicle Market:

<https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/dynamics-in-the-global-electric-vehicle-market>

Citations:

¹ Bajpi, Prableen. "The Rise of Electric Vehicles: By The Numbers." NASDAQ. N.p., 21 Mar. 2016. Web. 16 Oct. 2017. <<http://www.nasdaq.com/article/the-rise-of-electric-vehicles-by-the-numbers-cm595564>>.

² Lacey, Stephen. "Everyone Is Revising Their Electric Vehicle Forecasts Upward—Except Automakers." Gtm. Greentech Media, 17 July 2017. Web. 16 Oct. 2017. <<https://www.greentechmedia.com/articles/read/everyone-is-revising-electric-vehicle-forecasts-upward>>.

³ Shankleman, Jess. "The Electric Car Revolution Is Accelerating." Bloomberg.com. Bloomberg, 06 July 2017. Web. 16 Oct. 2017. <<https://www.bloomberg.com/news/articles/2017-07-06/the-electric-car-revolution-is-accelerating>>.