



# LONG TERM OUTLOOK: ENERGY CRISIS IN THE MAKING?

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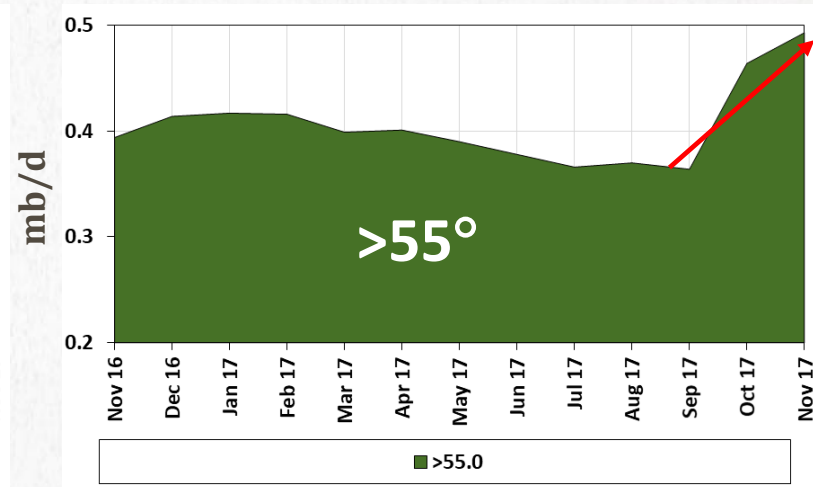
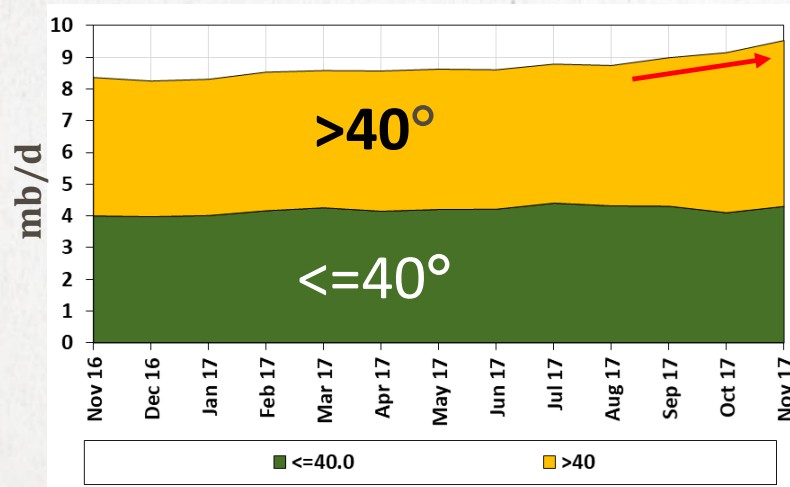
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# Crude Quality

# Most of the US Tight Oil Production Additions are Condensates

US

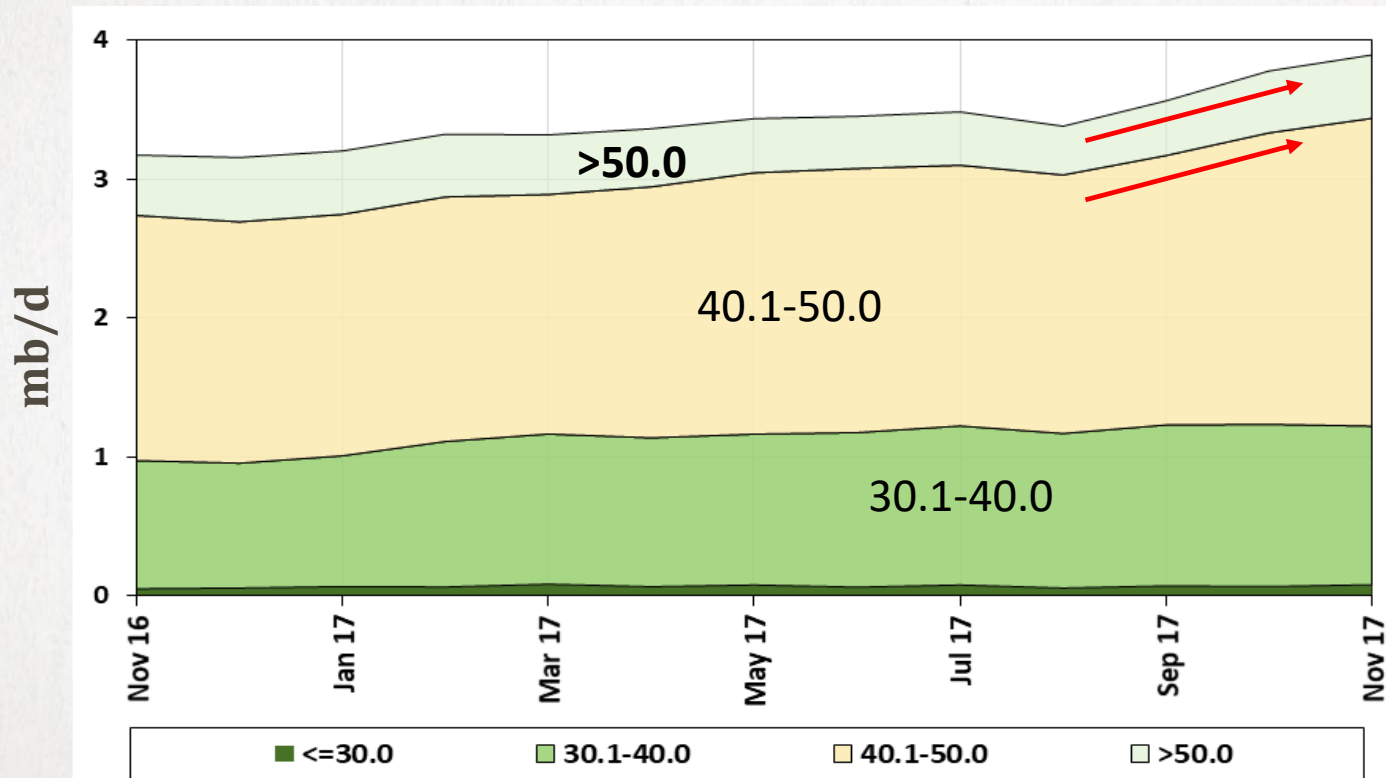
US Crude Oil and Condensates Production by API Gravity



# Most of the Production Additions in Texas are Condensates

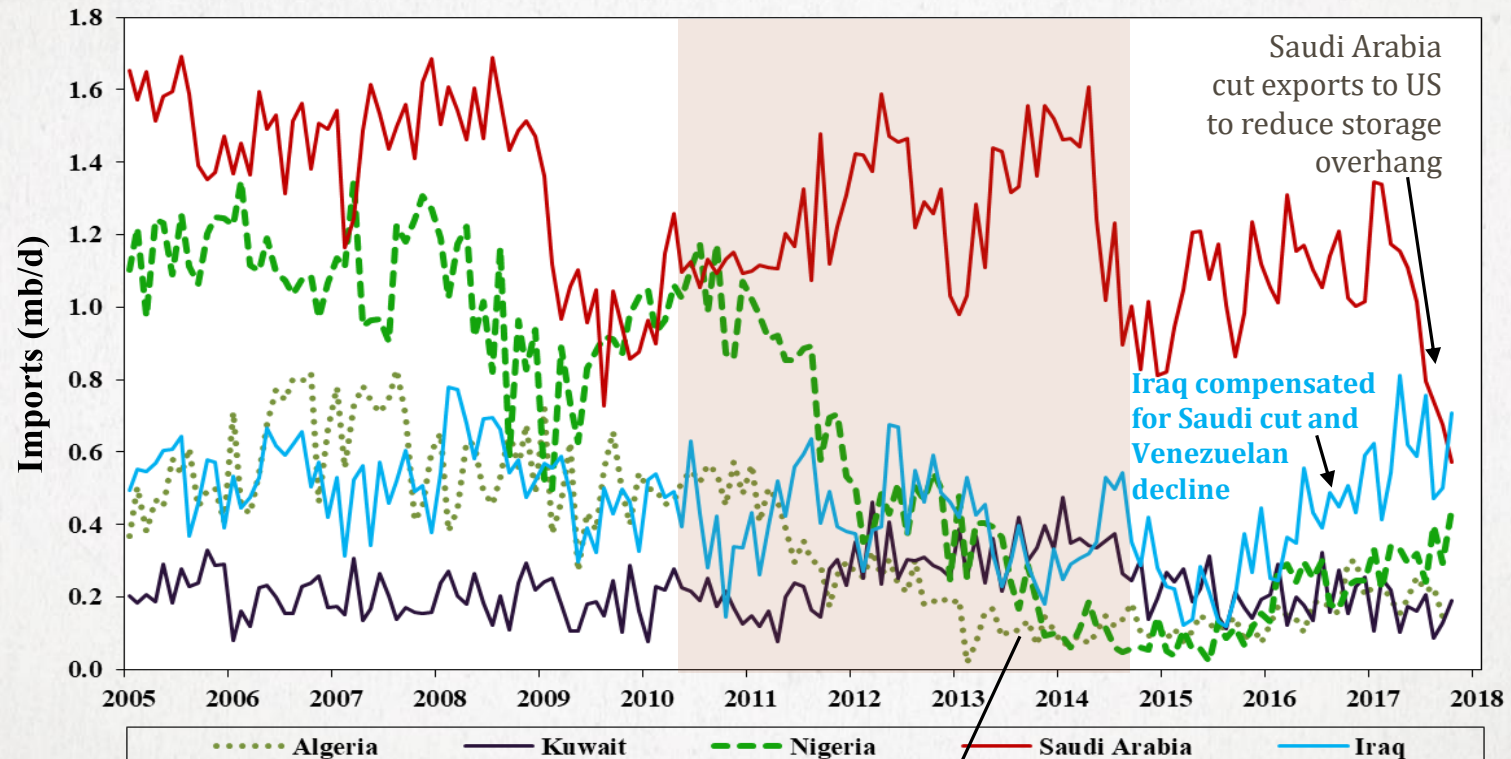
TX

Texas Crude Oil and Condensates Production by API Gravity



# Crude Quality Matters: Import Replacement : Energy Interdependence

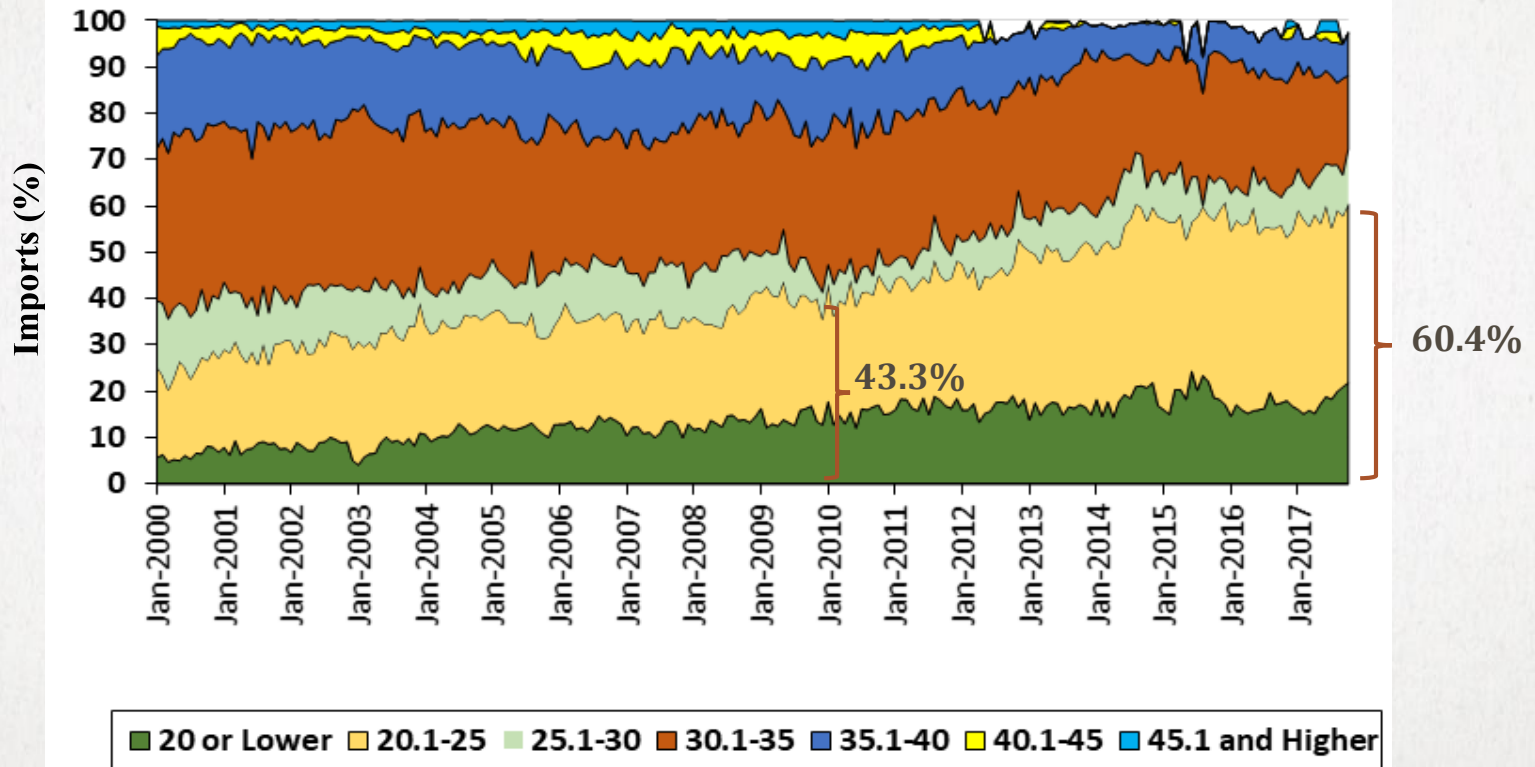
US crude Oil Imports from Five Selected Countries



Source: EIA, 2018 and EOA, 2018

# Crude Quality Matters: Imports are Heavier

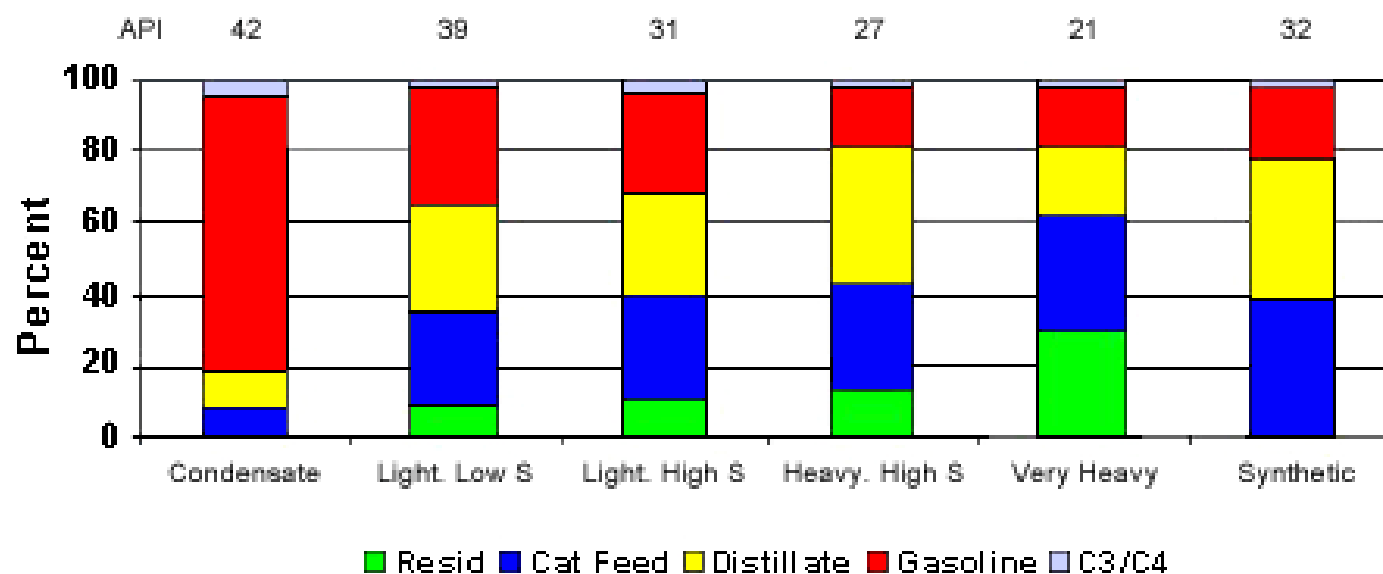
Percentages of US Total Imported Crude Oil by API



# Crude Quality Matters for refining

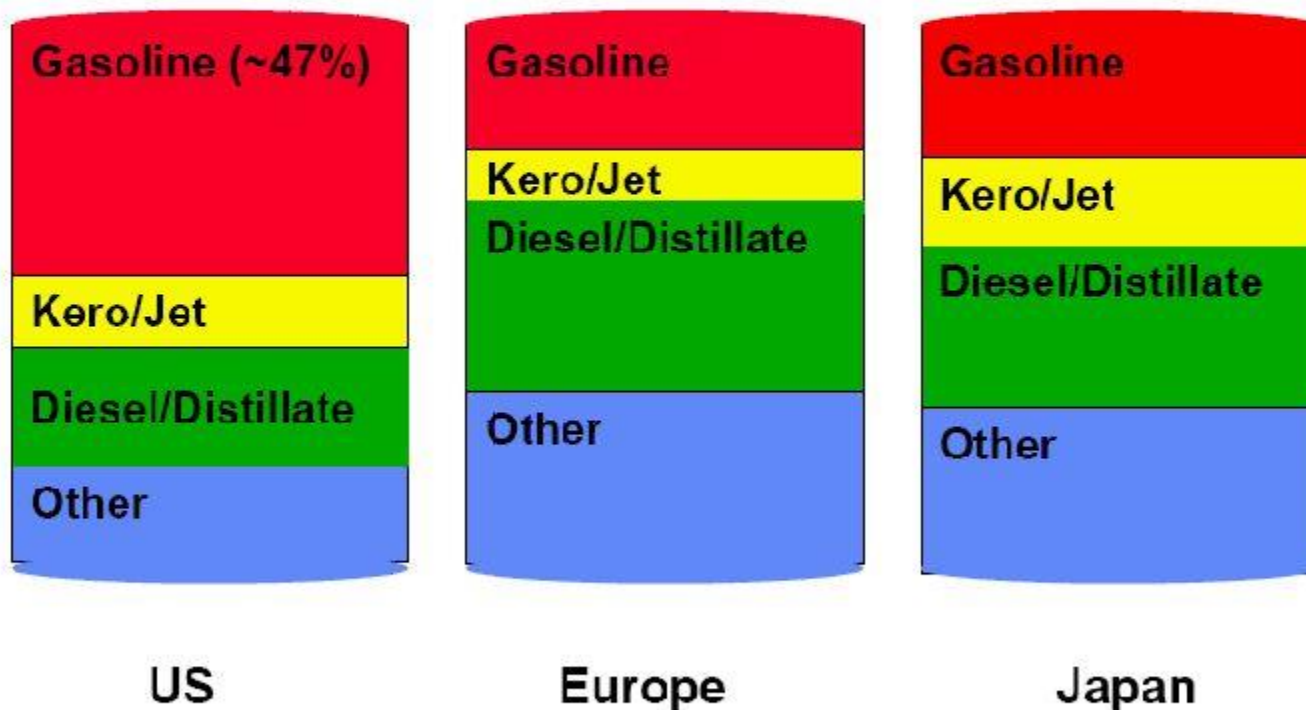
## Refinery Yields by Crude Type

### Comparison of Refinery Yields by Crude Type



# Refinery “Cut of the Barrel”: US vs Europe vs Japan

**US Refineries Are Designed and Constructed for Gasoline Production**



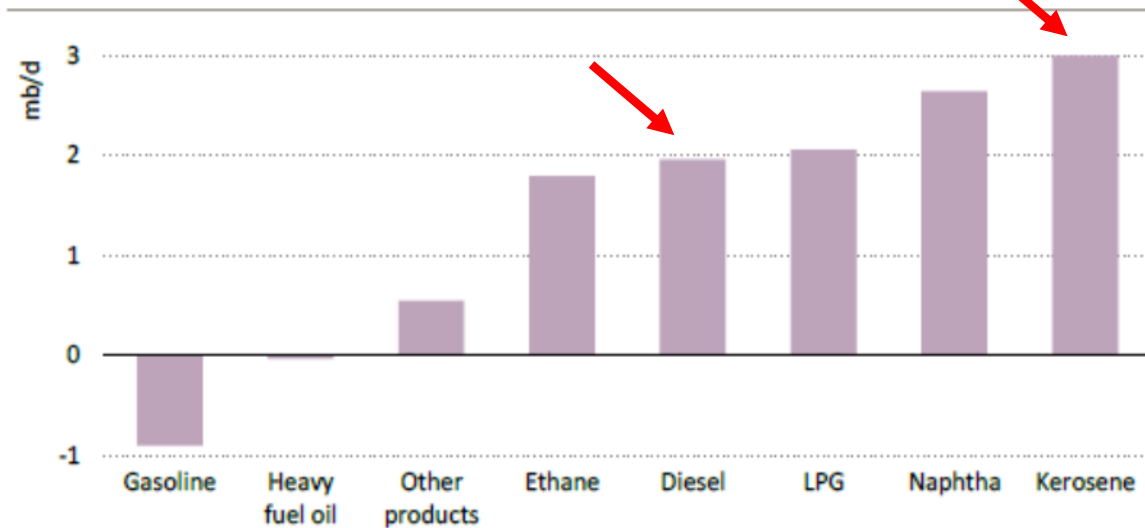
# Kicking the Barrel Down the Road



# Crude Quality Matters to Future Demand

## IEA Change in Global Demand

**Figure 4.9** ▸ Change in global oil product demand in the New Policies Scenario, 2016-2040

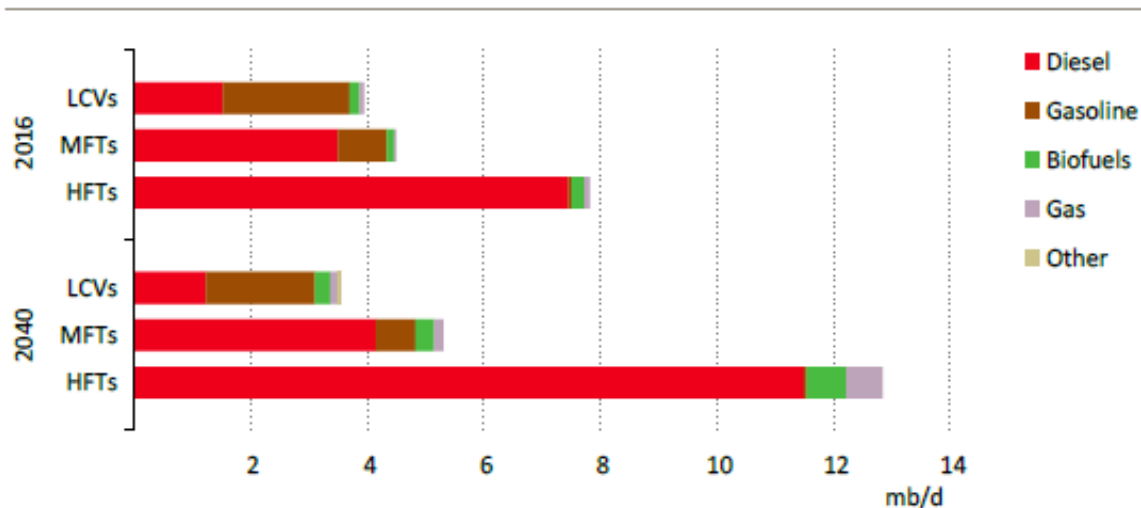


*Kerosene and petrochemical feedstocks register the largest demand growth; diesel demand increases, while demand for gasoline declines*

# Crude Quality Matters to Future Demand

## IEA Expects a Major Increase in Diesel Demand Gravity

**Figure 4.5** ▶ Global road freight fuel demand by vehicle category in the New Policies Scenario



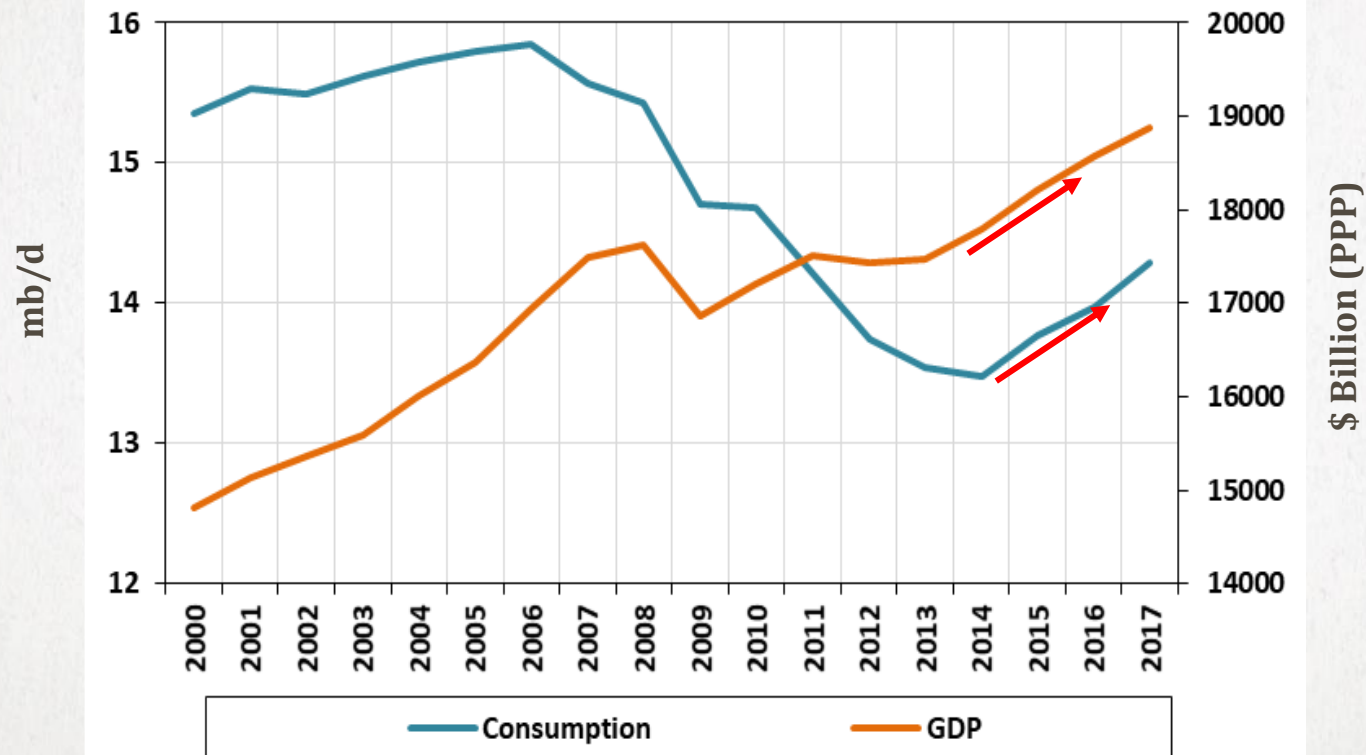
*Oil demand for road freight grows to 20 mb/d in 2040, stemming almost entirely from the strong growth in diesel demand for heavy-freight trucks*

Note: LCVs = light commercial vehicles; MFTs = medium-freight trucks; HFTs = heavy-freight trucks.

# Europe

# Do Not Write off Oil Demand Growth In Europe

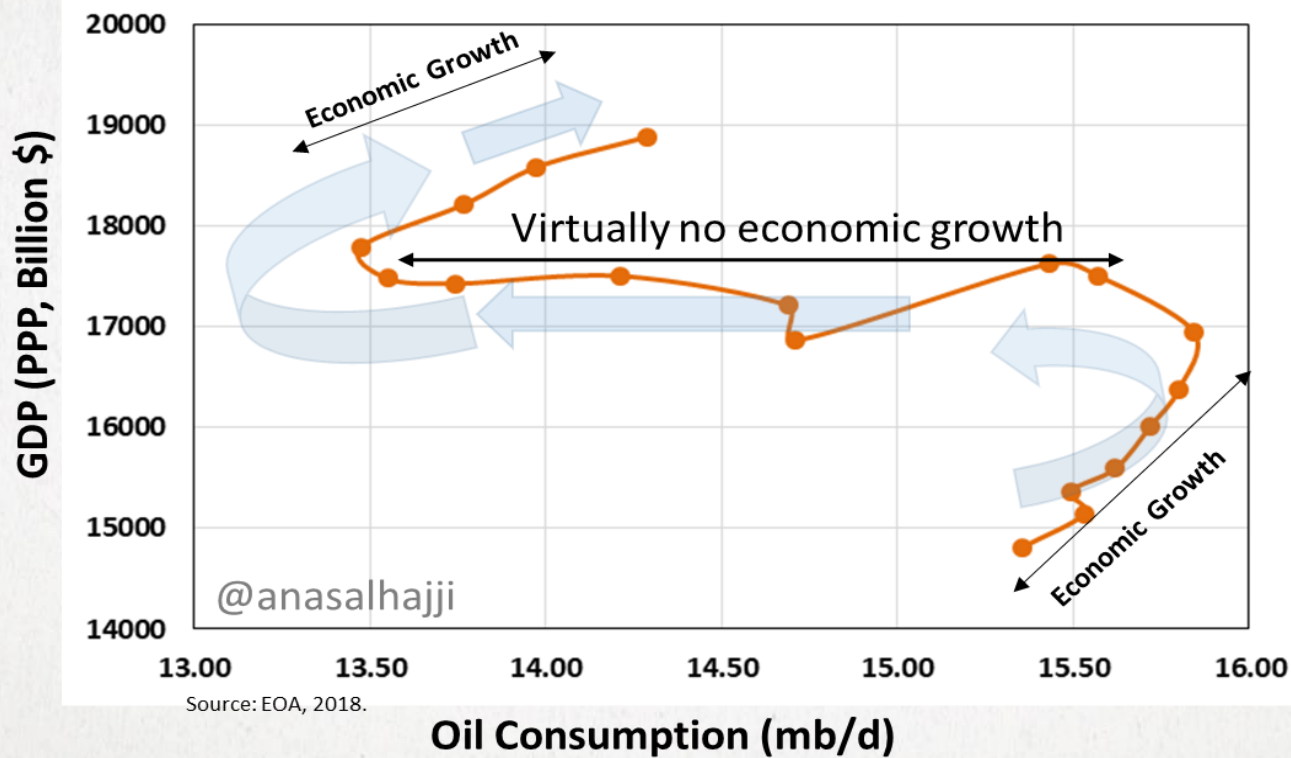
Relationship Between GDP and Oil Demand



Source: EIA, 2018, OECD, 2018, and EOA, 2018

# Do Not Write off Oil Demand Growth In Europe

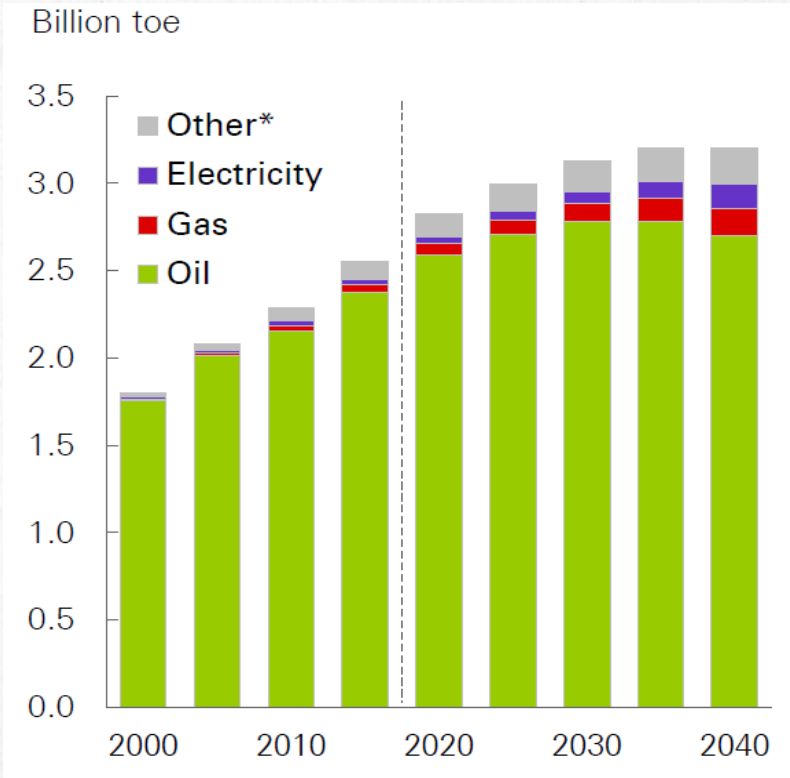
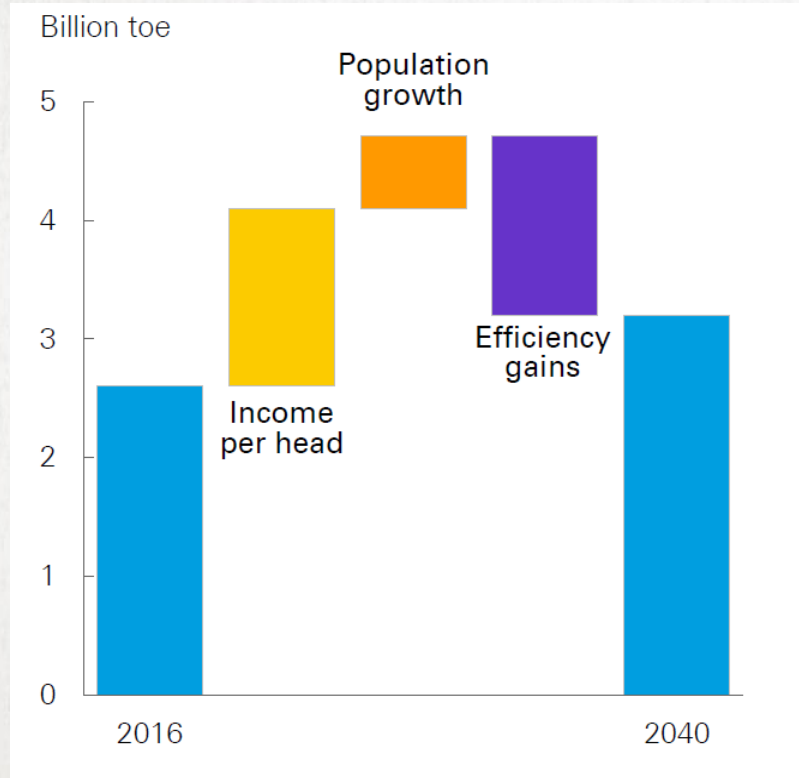
## Relationship Between GDP and Oil Demand



# Fuel Economy

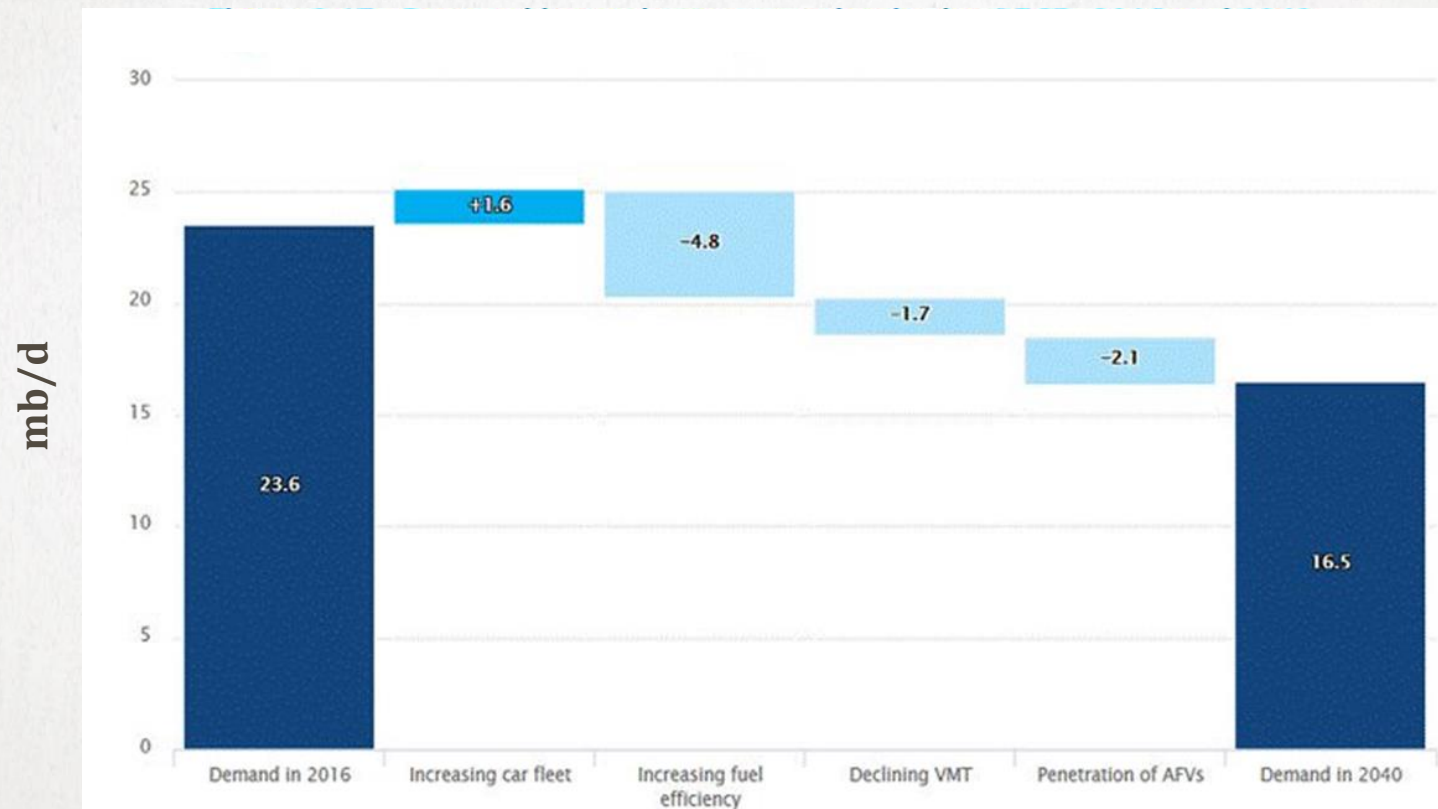
# Counting on Absolute Successes Of Government Policies

## Contribution to Transport Energy Consumption Growth



# OPEC's View of Road Transportations in OCED: -4.8 mb/d (Efficiency)

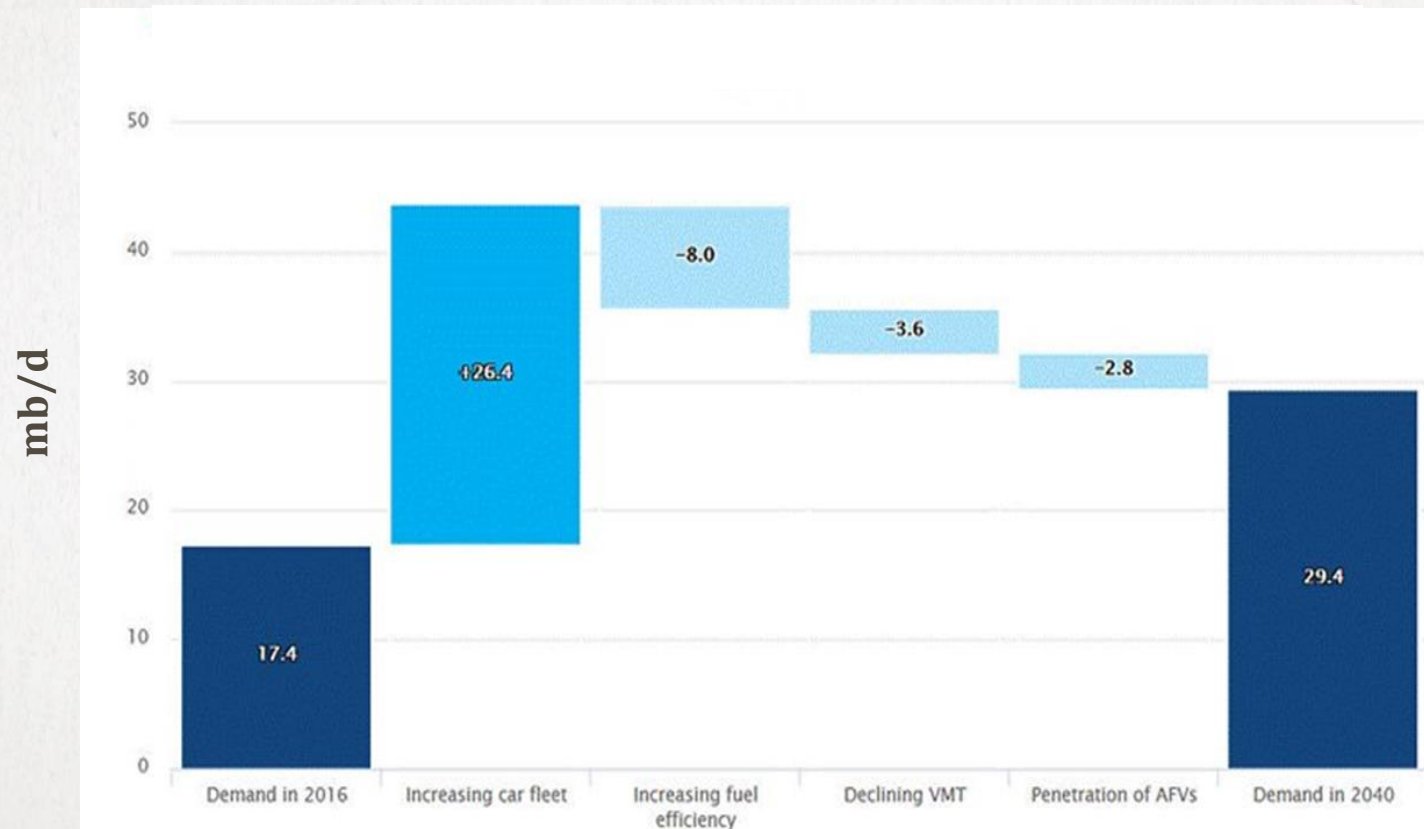
Demand in Road Transportation in the OECD: 2016-2040



Source: OPEC, 2018

# OPEC's View of Road Transportations in Developing Countries: -8.0 mb/d

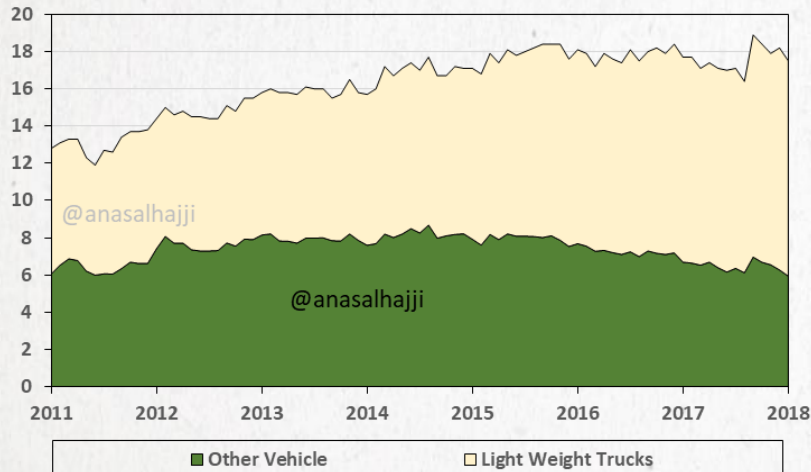
## Demand in Road Transportation in Developing Countries: 2016-2040



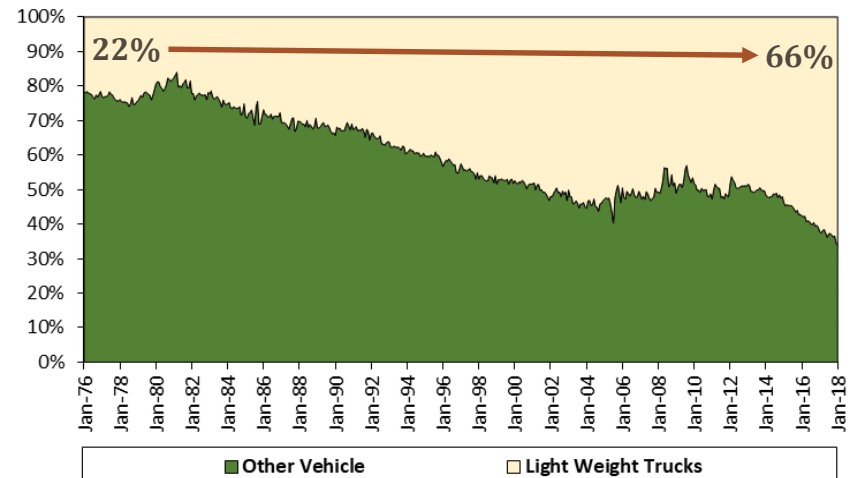
Source: OPEC, 2018

# But What People Want is Different from What Governments Want

## US Vehicles Sales (million units)

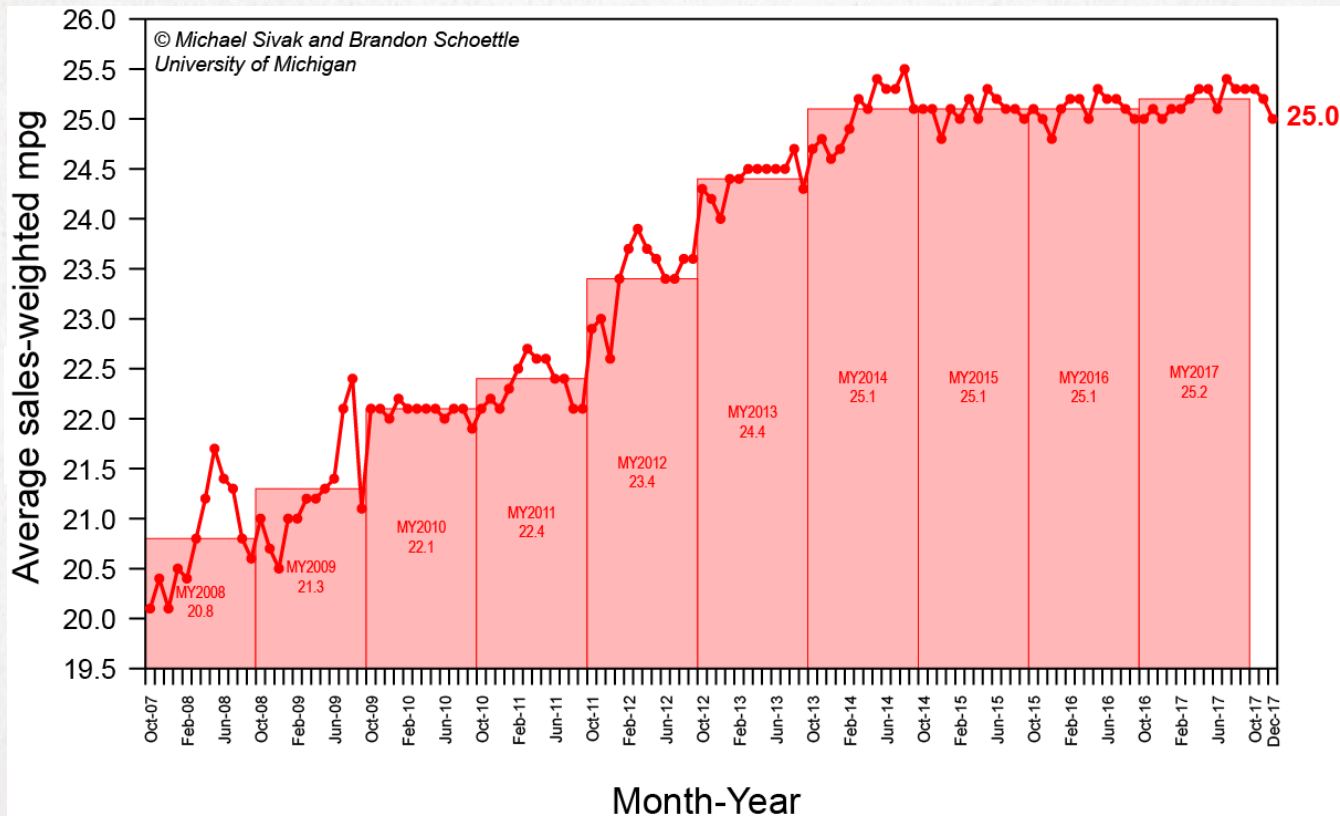


## US Vehicle Sales (%)



# As A Result, Fuel Economy has been Virtually Flat In the US & Declined In Recent Months

## Weighted Average of Fuel Economy of New Vehicles in the US



Source: University of Michigan, 2018

# Dreams Vs. Reality





## **F-22 RAPTOR**

**30 gallons of jet fuel per minute**

**Four-600  
gallon  
tanks**



# Conclusions

- ❑ Crude Quality matters (**need to unify definitions**)
- ❑ Europe will surprise on the upside
- ❑ Future demand growth is underestimated (**Oil Producing-Countries and Dollar Depreciations**)
- ❑ Upstream underinvestment
- ❑ We are heading for an energy crisis



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