LONG TERM OUTLOOK: ENERGY CRISIS IN THE MAKING?

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FEBRUARY 27, 2018
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Crude Quality
Most of the US Tight Oil Production Additions are Condensates

Source: EIA, 2018 and EOA, 2018
Most of the Production Additions in Texas are Condensates

Texas Crude Oil and Condensates Production by API Gravity

Source: EIA, 2018 and EOA, 2018
Crude Quality Matters: Import Replacement

US crude Oil Imports from Five Selected Countries

- Saudi Arabia cut exports to US to reduce storage overhang
- Iraq compensated for Saudi cut and Venezuelan decline
- Under the US export ban on crude, shale replaced imports from Algeria and Nigeria

Source: EIA, 2018 and EOA, 2018
Crude Quality Matters: Imports are Heavier

Percentages of US Total Imported Crude Oil by API Gravity

Source: EIA, 2018 and EOA, 2018
Crude Quality Matters for refining

Refinery Yields by Crude Type

Source: EIA, 2018 and EOA, 2018
Refinery “Cut of the Barrel”:
US vs Europe vs Japan

US Refineries Are Designed and Constructed for Gasoline Production

- **US**
  - Gasoline (~47%)
  - Kero/Jet
  - Diesel/Distillate
  - Other

- **Europe**
  - Gasoline
  - Kero/Jet
  - Diesel/Distillate
  - Other

- **Japan**
  - Gasoline
  - Kero/Jet
  - Diesel/Distillate
  - Other
Kicking the Barrel Down the Road
Crude Quality Matters to Future Demand

Source: IEA, 2018 and EOA, 2018

**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.*

Source: IEA, 2018 and EOA, 2018
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

![Graph showing the relationship between GDP (PPP, Billion $) and Oil Consumption (mb/d).](source)

Fuel Economy
Counting on Absolute Successes Of Government Policies

Contribution to Transport Energy Consumption Growth

Source: BP2018
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

Source: OPEC, 2018
But What People Want is Different from What Governments Want

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