What Drives the Demand for Energy?

- Population
- Living Standards
- Technology

Global energy demand
Quadrillion BTUs

Average Growth/Year
2015 to 2040

Source: ExxonMobil 2017 Outlook for Energy
135 U.S. Refineries

18.6 MBD operable capacity

Source: U.S. Energy Information Administration
What’s in a barrel of crude?

The barrel breakdown:

So what’s in a barrel of oil anyway? About 42 gallons of petroleum products come from a barrel of crude oil. Take a look at the variety of uses below.

Gasoline ~45%

Diesel ~30%

Jet fuel ~10%

Other ~15%
(Lubricants, asphalt, wax, fuel oil)

Source: U.S. Energy Information Administration; these U.S. estimates are based on the industry average.
“Flavors” of Crude

Light, medium or heavy; sour or sweet
Transportation of Crude

Rail  Pipeline  Sea
The Refining Process

TURNING CRUDE OIL INTO GASOLINE

There are three major oil refinery processes that treat and convert crude oil into consumer and industrial products: separation, conversion and purification.

Tap one of the towers below to explore each process.
Refining Process

1 Separation

- Separates crude oil into naturally occurring components
- Occurs by applying heat through a process called distillation
- Performed in a series of distillation towers, with the bottom product from each tower feeding the next
Crude Distillation Unit

- Vacuum Tower
- Vacuum Fired Heaters
- Atmospheric Fired Heaters
- Atmospheric Tower
- Desalters
Refining Process

2 Conversion

Converts low valued heavy oils into higher valued gasoline, distillates and feedstocks

- **Hydroformers** change structure of naphtha molecules to improve octane and supply chemical feed requirements
- **Fluidized Catalytic Crackers (FCC)** convert heavy gas oils into gasoline, diesel and chemicals feedstock
- **Coker Units** convert asphalts into diesel and feedstocks
Refining Process

3 Purification

- Sulfur removal from products
- Hydrotreating – unfinished products are contacted with hydrogen under high pressure and heat to remove sulfur
- End products that meet and exceed environmental standards
Products
Both finished products and feedstocks/basestocks

Diesel/Motor gasoline
Jet fuel
Lubricants
Plastics
Tires
Car dashboard
Summary

• The world needs energy

• Refining produces a diverse set of products through a diverse set of highly technical processes

• Refining is a valuable part of our energy economy
Questions?