



PESA OIL & GAS 101

October 3, 2019

PETROLEUM REFINING



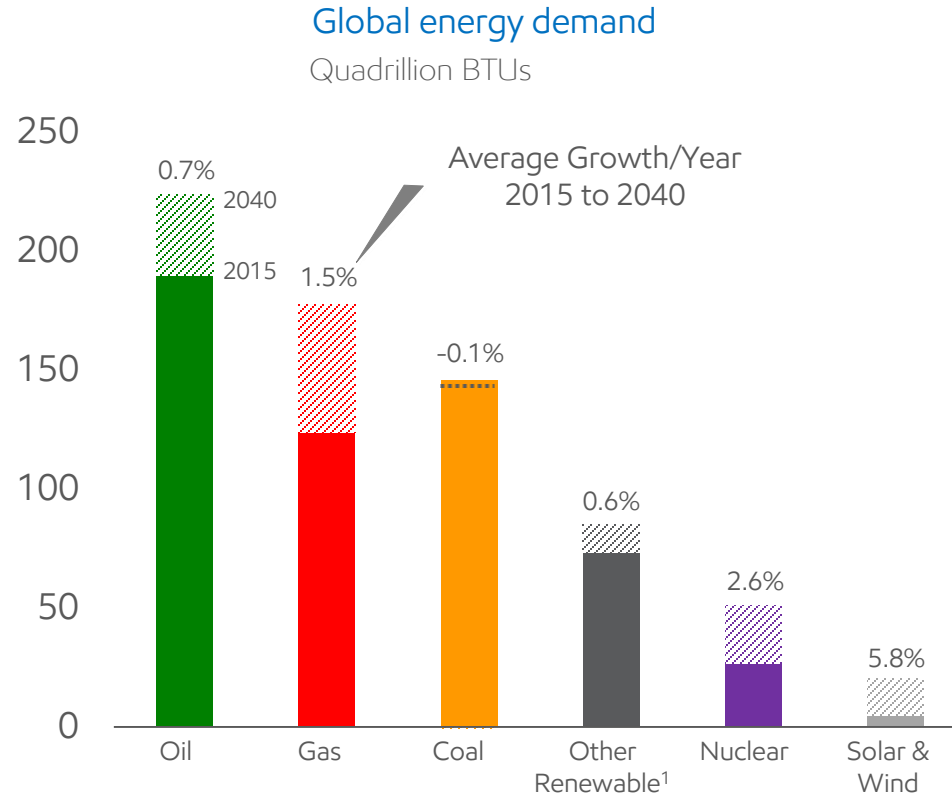
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What Drives the Demand for Energy?



- ✓ Population
- ✓ Living Standards
- ✓ Technology



Source: ExxonMobil 2017 Outlook for Energy



135

U.S. Refineries

18.6

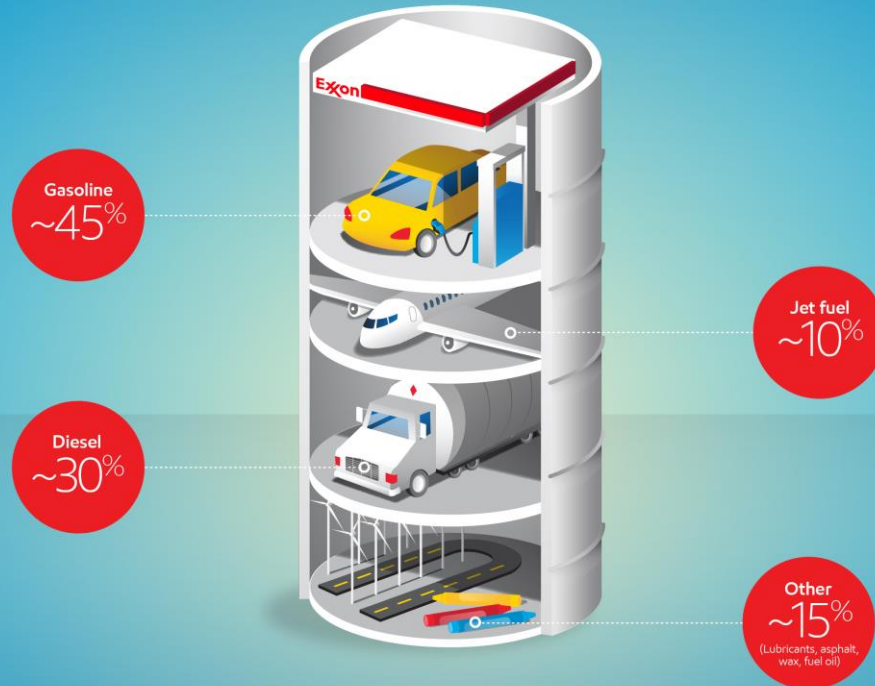
MBD operable
capacity

What's in a barrel of crude?



The barrel breakdown:

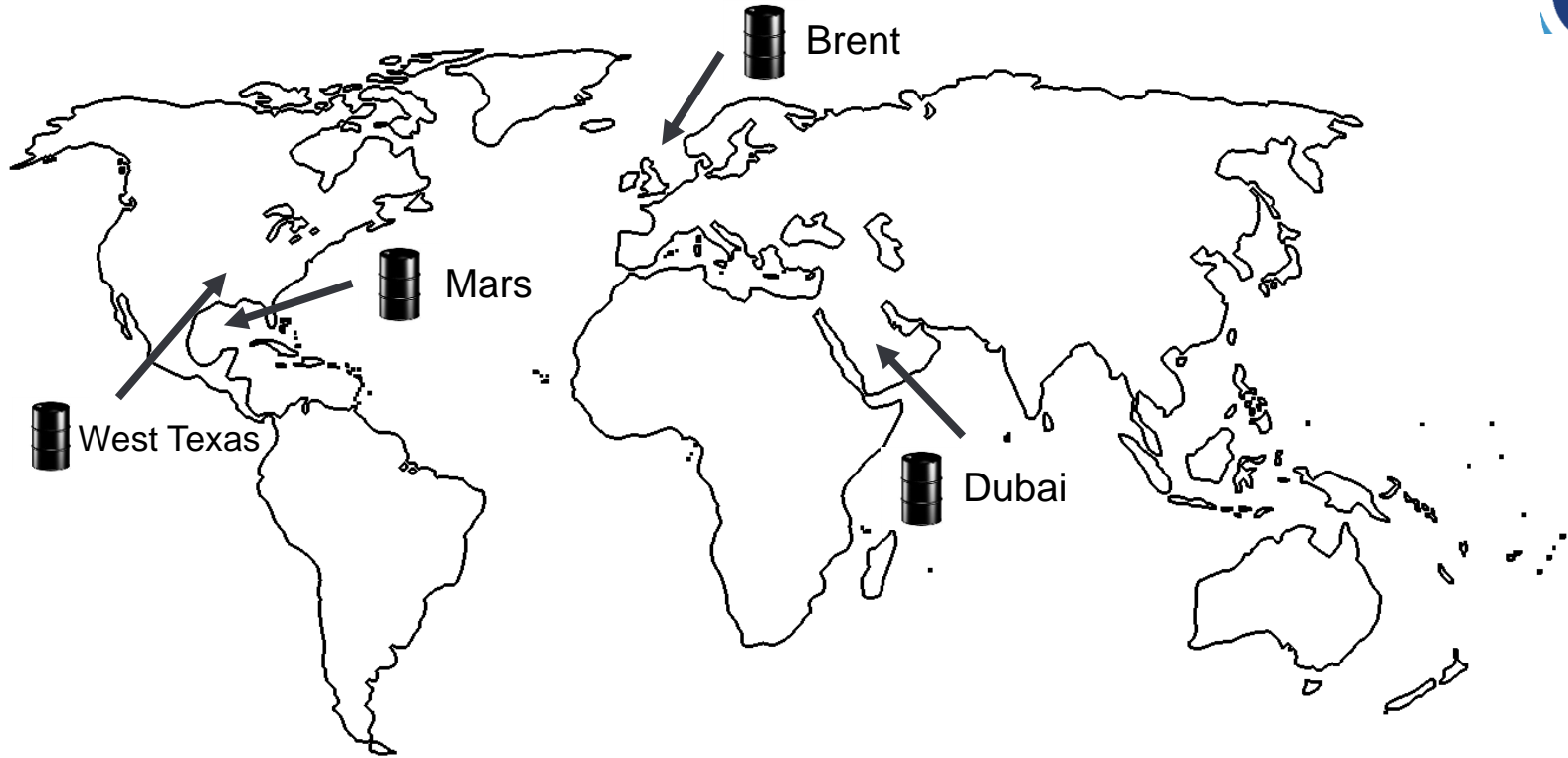
So what's in a barrel of oil anyway? About 42 gallons of petroleum products come from a barrel of crude oil. Take a look at the variety of uses below.



Source: U.S. Energy Information Administration; these U.S. estimates are based on the industry average.

ExxonMobil

“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.

SEPARATION CONVERSION PURIFICATION

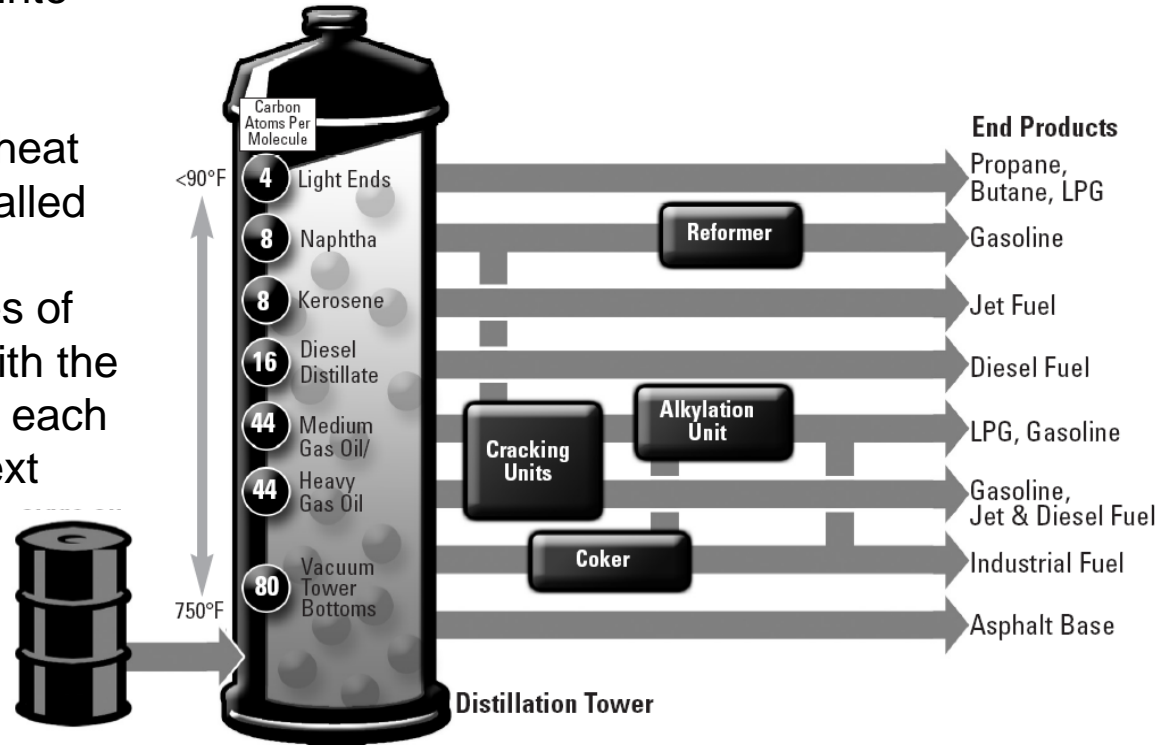
Refining Process



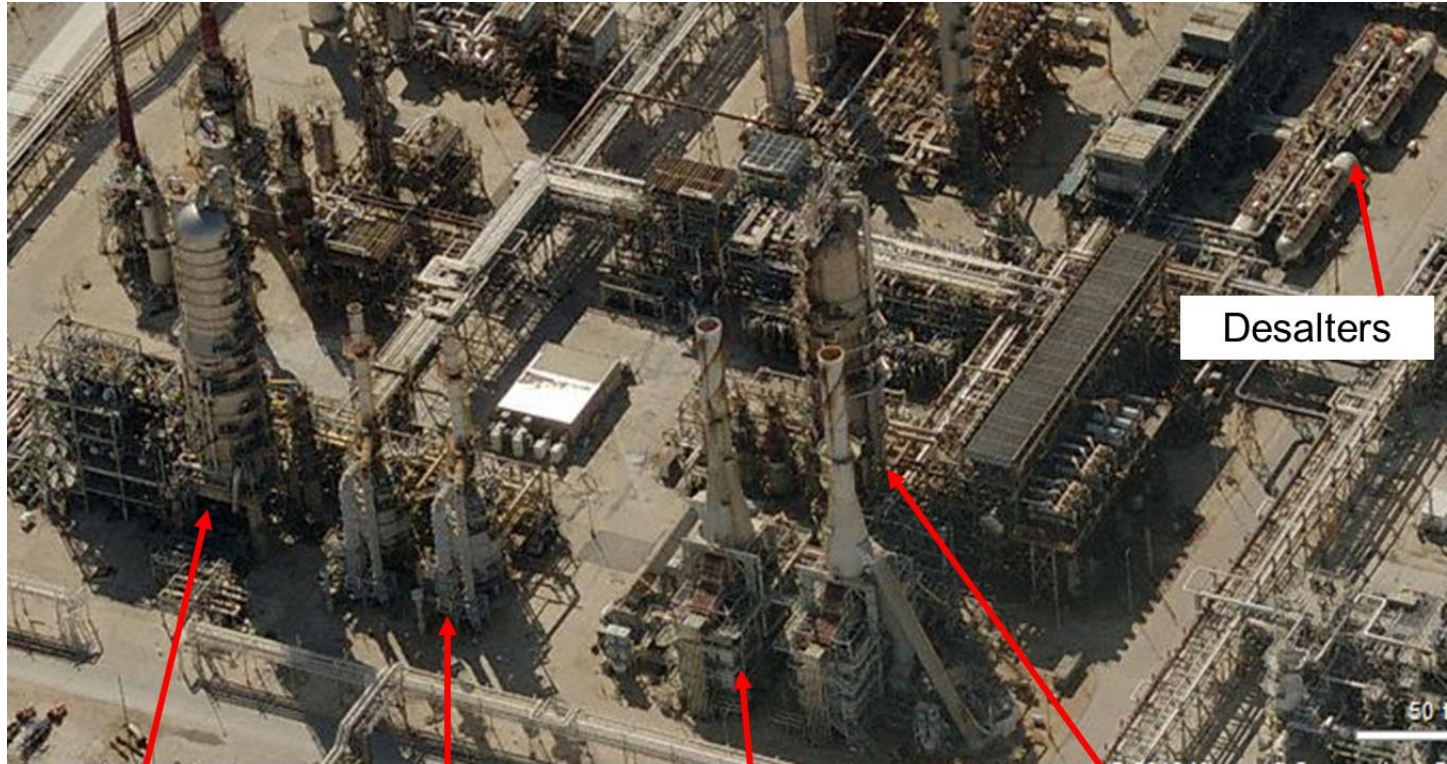
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Separation

- 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



FCC Unit

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



Hydrotreater



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?



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