How this industry is started?

• Formed from plankton
• Petroleum
  – Natural gas
  – Crude oil
  – Asphalt
  – Tar
• More than 200 types based on API gravity and sulfur content.
  – West Texas Intermediate (WTI)
Where dose oil exist?
Crude Oil production

- World oil consumption: 87 million bbl/d
- US consumption level of 19.5 million bbl/d
- US imports 9 million bbl/d
- SPR 700 m bbl.

<table>
<thead>
<tr>
<th>Country</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia (OPEC)</td>
<td>11.80%</td>
</tr>
<tr>
<td>Russia</td>
<td>12.00%</td>
</tr>
<tr>
<td>United States</td>
<td>11.10%</td>
</tr>
<tr>
<td>Iran (OPEC)</td>
<td>5.10%</td>
</tr>
<tr>
<td>China</td>
<td>4.80%</td>
</tr>
<tr>
<td>Canada</td>
<td>4.00%</td>
</tr>
<tr>
<td>Mexico</td>
<td>3.60%</td>
</tr>
<tr>
<td>United Arab Emirates (OPEC)</td>
<td>3.40%</td>
</tr>
<tr>
<td>Kuwait (OPEC)</td>
<td>3.00%</td>
</tr>
<tr>
<td>Venezuela (OPEC)</td>
<td>3.00%</td>
</tr>
<tr>
<td>Norway</td>
<td>2.80%</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.10%</td>
</tr>
<tr>
<td>Iraq (OPEC)</td>
<td>2.90%</td>
</tr>
</tbody>
</table>
# Crude Oil production Giants

<table>
<thead>
<tr>
<th>Company</th>
<th>Worldwide Liquids Reserves (10^9 bbl)</th>
<th>Worldwide Natural Gas Reserves (10^12 ft³)</th>
<th>Total Reserves in Oil Equivalent Barrels (10^9 bbl)</th>
<th>Production (10^6 bbl/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Saudi Aramco</td>
<td>260</td>
<td>254</td>
<td>303</td>
<td>11</td>
</tr>
<tr>
<td>2 National Iranian Oil Company</td>
<td>138</td>
<td>948</td>
<td>300</td>
<td>4</td>
</tr>
<tr>
<td>3 Qatar Petroleum</td>
<td>15</td>
<td>905</td>
<td>170</td>
<td>3.7</td>
</tr>
<tr>
<td>4 Iraq National Oil Company</td>
<td>116</td>
<td>120</td>
<td>134</td>
<td>2.7</td>
</tr>
<tr>
<td>5 Petróleos de Venezuela</td>
<td>99</td>
<td>171</td>
<td>129</td>
<td>2.6</td>
</tr>
<tr>
<td>6 Abu Dhabi National Oil Company</td>
<td>92</td>
<td>199</td>
<td>126</td>
<td>2.6</td>
</tr>
<tr>
<td>7 Kuwait Petroleum Corporation</td>
<td>102</td>
<td>56</td>
<td>111</td>
<td>2.5</td>
</tr>
<tr>
<td>8 Nigerian National Petroleum Corporation</td>
<td>36</td>
<td>184</td>
<td>68</td>
<td>2.3</td>
</tr>
<tr>
<td>9 Libya NOC</td>
<td>41</td>
<td>50</td>
<td>50</td>
<td>2.1</td>
</tr>
<tr>
<td>10 Sonatrach</td>
<td>12</td>
<td>159</td>
<td>39</td>
<td>1.9</td>
</tr>
</tbody>
</table>
Total World Reserves in Millions of Oil Equivalent Barrels
(Total reserves of 50 largest oil companies: 1.73 trillion OEBs)

- Saudi Aramco
- National Iranian Oil Company
- Qatar General Petroleum Corporation
- Iraq National Oil Company
- PDVSA (Venezuela)
- Abu Dhabi National Oil Company
- Kuwait Petroleum Corporation
- Nigerian National Petroleum Corporation
- National Oil Company (Libya)
- Sonatrach (Algeria)
- Gazprom (Russia)
- Rosneft (Russia)
- PetroChina
- Petronas (Malaysia)
- Egyptian General Petroleum Corporation
- Pemex (Mexico)
- Petrobras (Brazil)
- Sonangol (Angola)
- Dubai Petroleum Company
- PetroEcuador
- Pertamina (Indonesia)
- China National Offshore Oil Corporation
- Romanian National Oil Company
- Private sector total
Wells to Consumer:
Exploration & Production
Transportation
Refining
Delivery
Consumer
Refined products power the world.
Who first feels the oil price change?


\[ y = 3.5614x + 50.765 \]

\[ R^2 = 0.9489 \]

Mike Kimel
www.presimetrics.com/blog and
www.angrybearblog.com
<table>
<thead>
<tr>
<th></th>
<th>Company</th>
<th>Revenue ($million)</th>
<th>Profit ($million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wal-Mart Stores</td>
<td>421,849</td>
<td>16,389</td>
</tr>
<tr>
<td>2</td>
<td>Royal Dutch Shell</td>
<td>378,152</td>
<td>20,127</td>
</tr>
<tr>
<td>3</td>
<td>Exxon Mobil</td>
<td>354,674</td>
<td>30,460</td>
</tr>
<tr>
<td>4</td>
<td>BP</td>
<td>308,928</td>
<td>-3,719</td>
</tr>
<tr>
<td>5</td>
<td>Sinopec Group</td>
<td>273,422</td>
<td>7,629</td>
</tr>
<tr>
<td>6</td>
<td>China National Petroleum</td>
<td>240,192</td>
<td>14,367</td>
</tr>
<tr>
<td>7</td>
<td>State Grid</td>
<td>226,294</td>
<td>4,556</td>
</tr>
<tr>
<td>8</td>
<td>Toyota Motor</td>
<td>221,760</td>
<td>4,766</td>
</tr>
<tr>
<td>9</td>
<td>Japan Post Holdings</td>
<td>203,958</td>
<td>4,891</td>
</tr>
<tr>
<td>10</td>
<td>Chevron</td>
<td>196,337</td>
<td>19,024</td>
</tr>
<tr>
<td>11</td>
<td>Total</td>
<td>186,055</td>
<td>14,001</td>
</tr>
<tr>
<td>12</td>
<td>ConocoPhillips</td>
<td>184,966</td>
<td>11,358</td>
</tr>
</tbody>
</table>
What are the products?

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Boiling Range oC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquefied petroleum gas (LPG)</td>
<td>−40</td>
</tr>
<tr>
<td>Butane</td>
<td>−12 to −1</td>
</tr>
<tr>
<td>Petrol</td>
<td>−1 to 180</td>
</tr>
<tr>
<td>Jet fuel</td>
<td>150 to 205</td>
</tr>
<tr>
<td>Kerosene</td>
<td>205 to 260</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>205 to 290</td>
</tr>
<tr>
<td>Diesel fuel</td>
<td>260 to 315</td>
</tr>
</tbody>
</table>

Alkenes (olefins) which can be manufactured into plastics or other compounds
Lubricants (produces light machine oils, motor oils, and greases, adding viscosity stabilizers as required).
Wax, used in the packaging of frozen foods, among others.
Sulfur or Sulfuric acid. These are a useful industrial materials. Sulfuric acid is usually prepared as the acid precursor oleum, a byproduct of sulfur removal from fuels.
Bulk tar.
Asphalt
Petroleum coke, used in speciality carbon products or as solid fuel.
Paraffin wax
Aromatic petrochemicals to be used as precursors in other chemical production.
What Derives Crude Oil Price?

- Economy
- Weather
  - Devastating weather situations, Hurricane Katrina raised oil price to $70
- Geopolitics
- Supply and Demand
- OPEC: Controls oil production
- OECD: Organization for Economic Co-operation and Development
What Derives Crude Oil Price?
Non-OPEC production growth slowed in 2011, but EIA expects strong growth in 2012.

This chart shows that net increases in non-OPEC production were very small from 2005 to 2008. This lack of additional supplies from non-OPEC countries contributed to tighter markets in this period. Non-OPEC oil production rose in 2009 and 2010 and, after slowing in 2011, strong growth is expected in 2012.
During 2003-2008, OPEC’s spare production levels were low, limiting its ability to respond to demand and price increases.

OPEC spare production capacity and WTI crude oil prices

Spare capacity < 2.5 million barrels per day

Source: U.S. Energy Information Administration, Thomson Reuters. Updated: Monthly | Last Updated: 2/7/2012

Oil prices increased during 2003-2008 when OPEC’s spare capacity levels were relatively low. Low spare capacity limits OPEC’s ability to respond to demand and price increases, while high spare capacity indicates a withholding of production presumably for price management purposes.
OPEC production often acts to balance the oil market. Cuts in OPEC production targets tend to lead to price increases.

Changes in OPEC production targets and WTI crude oil prices

This chart shows changes in OPEC production targets compared to changes in oil prices. Reductions in OPEC production targets often lead to increases in oil prices.
Economic growth has a strong impact on oil consumption

Non-OECD liquid fuels consumption and GDP

percentage change (year-on-year)

Source: U.S. Energy Information Administration, IHS Global Insight.
Updated: Monthly | Last Updated: 2/7/2012

In this chart there is a strong relationship between GDP growth rates and growth in oil consumption in non-OECD countries. Since 2001, oil consumption in non-OECD countries declined only in the fourth quarter of 2008 and the first quarter of 2009. Increased demand pressure due to economic growth overwhelmed any downward pressure on oil consumption due to higher prices.
In OECD countries, price increases have coincided with lower consumption

In contrast to non-OECD countries, oil consumption in OECD countries fell from 2006-2009 after prices rose, and declined significantly during the economic downturn. Due in part to their relatively slower economic growth and more mature transportation sectors, the impact of prices on OECD consumption has been more evident than for non-OECD countries.
Inventory builds tend to go hand-in-hand with increases in future oil prices relative to current prices (and vice versa).

**OECD liquid fuels inventories and WTI futures spread**

In this chart, the price of the next (prompt) month's oil futures contract is subtracted from the price of the oil futures contract 12 months ahead. The change in this spread is then plotted over time. This difference is compared to the change in OECD petroleum inventories. The more positive the spread between the near term and longer term contracts, the greater the incentive to build inventories. Also, declining inventories tend to go hand-in-hand with increases in near term prices relative to prices further into the future.

Source: U.S. Energy Information Administration, Thomson Reuters.
Updated: Quarterly | Last Updated: 12/31/2011
The years 2003-2008 experienced periods of very strong economic and oil demand growth, slow supply growth and tight spare capacity.

**Changes in world liquid fuels production capacity and GDP, price of WTI crude oil**

In this chart, WTI price levels are graphed with world GDP growth rates (as an indicator of global oil demand growth) and quarterly changes in world capacity, defined as OPEC capacity plus non-OPEC production (as an indicator of global oil supply growth). From 2005 to 2008, economic growth remained strong while oil production capacity grew slowly and even declined in some quarters. The tight market conditions put upward pressure on oil prices.

*World capacity = OPEC capacity plus non-OPEC production
Source: U.S. Energy Information Administration, Thomson Reuters
Updated: Monthly | Last Updated: 2/7/2012
What Affects Oil Price? Cont.

• Political factors – Iraq, Afghanistan
Crude oil prices and key geopolitical and economic events

price per barrel (real 2010 dollars)


1: US spare capacity exhausted
2: Arab Oil Embargo
3: Iranian Revolution
4: Iran-Iraq War
5: Saudis abandon swing producer role
6: Iraq invades Kuwait
7: Asian financial crisis
8: OPEC cuts production targets 1.7 mmbpd
9: 9-11 attacks
10: Low spare capacity
11: Global financial collapse
12: OPEC cuts production targets 4.2 mmbpd

Oil prices have responded to geopolitical and other events over the past 40 years. Events that disrupt supply or increase uncertainty about future oil supplies tend to drive up prices.
Environmental impact

• Global warming: petroleum combustion is the largest contributor to the increase in atmospheric CO$_2$.
• Water pollution through by-products of refining and oil spills.
• Offshore extraction of oil disturbs the surrounding marine environment.
• Oil spills
BP Oil Spill

- 4.9 million barrels
Porter's 5 Forces Analysis

1. Threat of New Entrants
   - Expensive equipments
   - Specialized workers
2. Power of Suppliers
   - No serious competition
3. Power of Buyers
4. Availability of Substitutes
5. Competitive Rivalry
Thank you!

When you ride ALONE you ride with Hitler!

Join a Car-Sharing Club TODAY!