

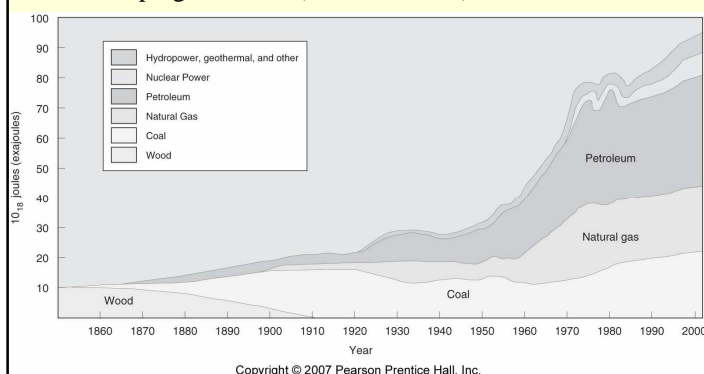
10. Oil

- Energy
- Oil
- Price of oil
- Global links
- Future oil supplies
- OPEC: the oil cartel

Readings: See 'Energy Information Administration: Oil Market Basics',
http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/intro.htm

1. Energy

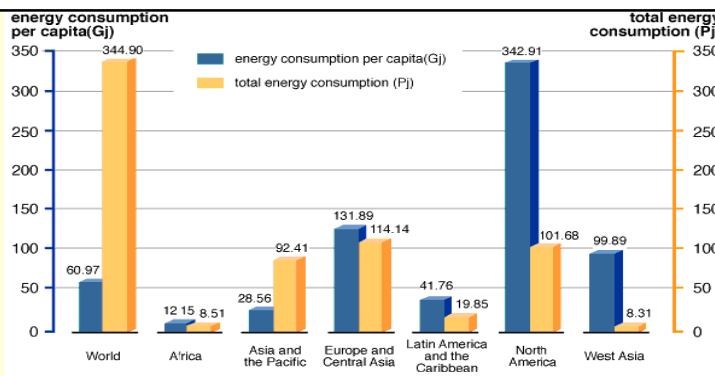
- The lifeblood of modern economies;
- The most important item in international trade with oil accounting for 25% of the volume of international trade;
- Developed countries consumes vast amount of energy especially fossil fuels for transportation, industrial production and for electrical power generation.
- Most commercial energy is produced from nonrenewable resources;
- Most renewable energy sources are so far used directly by poor people in developing countries (wood charcoal).



Oil is not the only source of energy but it is a very significant one;

Outside hydro-electricity, clean energy does not yet register.

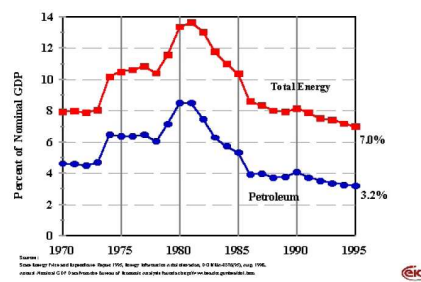
Energy consumption per capita: large geographical differences;
 Total energy consumption: function of economic activities.



The US has 5% of the world population but consumes 25% of the world energy. The developing countries with 80% of the population consumes 30% of the world energy.

Significant decrease in the share of energy in the economy;
 In 1995, each \$ of GDP consumed about 7 cents in energy, including 3.2 cents in oil.

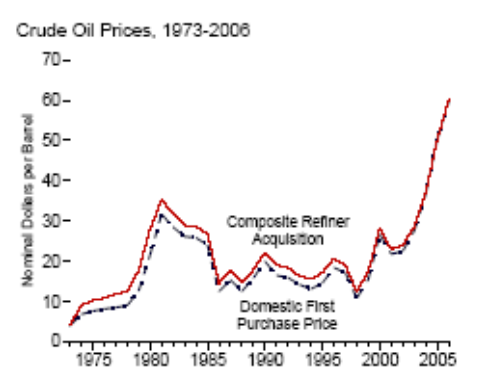
Energy Share of the Economy (Petroleum & Total Energies)



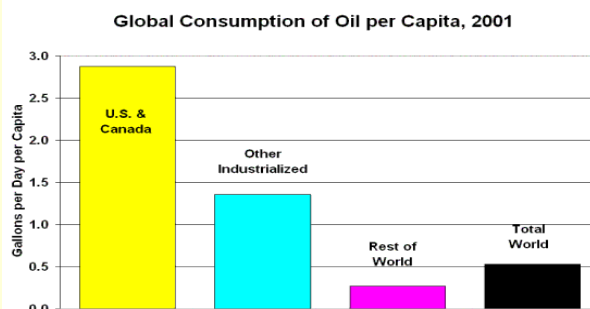
2. Oil

- Oil is a non-renewable material; exploration for new sources of oil makes oil quite different from other goods that are produced.
- Economic incentives to find new oil are driven by the prospect of profits and the simple fact that energy is a necessary input to production;
- New technology has had a major impact on the discovery process for new oil reserves

- The first major supply crisis that occurred in the 1970's led to very high prices which in turn stimulated a great deal of exploration for new oil.
- Alberta boom is closely linked to the increase in crude oil price.
- In real terms, oil prices last Summer was not as high as in early 1980s.



Oil Demand: about 85 Million Barrels per Day in the world in 2008:
 USA: 21mbpd
 China: 7mbpd
 EU: 15mbpd



The basic unit in the oil market is a barrel of oil currently priced near US\$35; see <http://www.bloomberg.com/energy/> for current price.

A barrel of oil has 42 gallons or 190.9 liters.

Hence, currently the price of one liter of crude oil is about CA\$.23!

The above Figure says a lot about North America and about the future if the rest of the world catches up with North America!

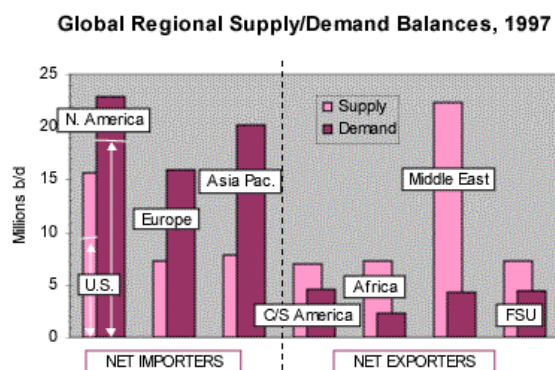
This is why we want to dig a little bit deeper in the oil market.

Trade in oil and import dependency

- Oil is the world's single most important traded **commodity** either by value or volume;
- Distance is important: oil tends to move from suppliers to the nearest demanders;
- Imports to US from Mexico and Venezuela take about a week; oil going to East Asia, Japan from Middle East takes about 30 days;
- Regional crises such as wars or port blockages can cause large shifts in patterns of trade;

Only few countries produce more energy than they consume. For oil, Saudi Arabia, Iraq, Mexico, Iran, Venezuela, Indonesia, Algeria, Kuwait, Libya, Qatar, Nigeria and the United Arab Emirates.

The regional supply and demand differences lead to either imports (demand > supply) or exports (supply > demand)



Import Dependency

- For much of the world-North America, Europe and Asia a substantial part of demand is met by imports; this creates **import dependency**
 - Germany, Japan import about 90% of consumption, US is near 50%
- Because middle east is major supplier and given instability in that region substantial concern about **security of foreign supply**;
- Countries are now engaged in attempts to get more secure sources of oil supply and to build strategic reserves;
- Much of this is high cost— offshore or tar sands (Alberta) and has triggered search for oil in more politically stable regions.
- Canada is today the largest US supplier of crude oil and of petroleum products.

3. Price of oil

The price of a oil-based product like gasoline is affected by a number of factors:

1. Costs at each stage reflect the prices of the various inputs to production:
 - raw material, transportation from producing field to refinery, processing that raw material into refined products (refining), transportation from the refinery to the consuming market transportation, storage and distribution between the market distribution center and the retail outlet or consumer.
2. Market conditions and government taxes.
 - **Spot prices at any stage are determined in a bid-ask market;**
 - When markets are “ strong”: the bid side tends to drive prices up (buyers “bid” by offering prices close to or above the “ask” price - an oil EBay !). When markets are weak the opposite occurs.
 - With strong demand, there are usually “limits to how much the market can bear”; as price goes up, buyers drop out.
 - **Prices in weak markets are driven by costs;** costs tend to put a floor under the price because if price gets below costs sellers not willing to meet demand.
 - In very weak markets, it will occasionally go through the floor set by costs; this is particularly true if sellers stuck with large unsold inventories (like in a sale).
 - Sales do not last very long as they imply sellers are losing money.

- **Taxes** are important in most of these markets and can be a very large part of the final consumer price.
- Note that **prices tend to exhibit a large regional variation the closer you get to final consumers; it is not the case at the raw material stage.**
 - For crude oil, the price of Venezuela crude is closely linked to North Sea (Brent) Price or Middle East Price but price of gas in Paris only partially related to price in New York.
- Thus globalization has substantially speeded up the pace at which prices are **arbitraged** between different parts of the world; there is a 'world price' of crude oil but not a 'world price' of gasoline.

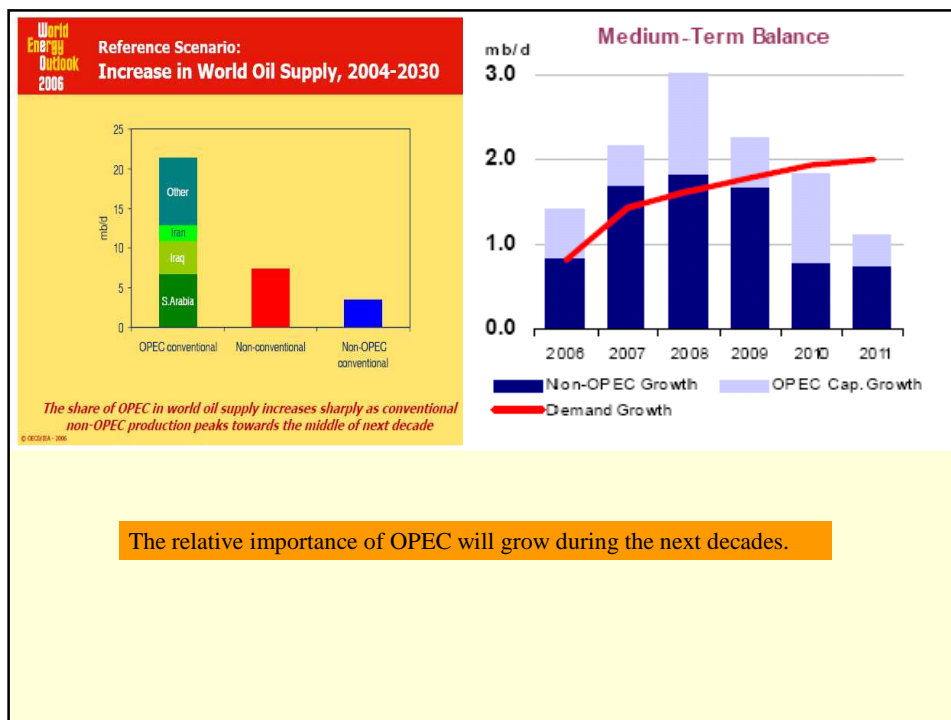
4. Global links

- World economies are linked primarily by the markets for the raw material-crude;
- Figuring out what is going on in this market is a major concern to all global citizens and governments;
- Three issues: future supply, demand and OPEC.

Table 2.4 World Petroleum (Oil) Demand, 2004-2008

(Million Barrels per Day)

	2004	2005	2006	2007				2008					
	Annual Average	Annual Average	Annual Average	Quarter				Annual Average	Quarter				Annual Average
				First	Second	Third	Fourth		First	Second	Third	Fourth	
United States ²	20.73	20.80	20.69	20.79	20.63	20.73	20.58	20.68	19.88	19.68	NA	NA	NA
Canada	2.31	2.34	2.30	2.38	2.29	2.40	2.39	2.36	2.37	2.25	NA	NA	NA
France	2.01	1.99	1.98	1.98	1.86	1.94	2.02	1.95	1.98	1.92	NA	NA	NA
Germany	2.67	2.65	2.69	2.37	2.37	2.55	2.54	2.46	2.47	2.41	NA	NA	NA
United Kingdom	1.79	1.83	1.81	1.80	1.78	1.75	1.73	1.76	1.72	1.72	NA	NA	NA
Total OECD	49.44	49.83	49.58	49.74	48.20	48.82	49.78	49.13	48.67	47.08	NA	NA	NA
Former U.S.S.R.	4.04	4.07	4.21	4.25	4.32	4.22	4.32	4.28	4.34	4.49	NA	NA	NA
Non-OECD Europe	0.74	0.76	0.78	0.85	0.78	0.73	0.79	0.79	0.86	0.80	NA	NA	NA
China	6.44	6.72	7.20	7.33	7.52	7.59	7.87	7.58	7.72	7.94	NA	NA	NA
Other Asia	8.37	8.53	8.66	8.74	8.83	8.64	8.93	8.78	8.91	8.97	NA	NA	NA
Total Non-OECD	32.97	33.99	35.38	36.11	36.68	36.72	37.16	36.67	37.40	38.18	NA	NA	NA
Total World Demand	82.41	83.82	84.95	85.84	84.88	85.54	86.94	85.80	86.07	85.27	NA	NA	NA



- Oil markets today are closely linked to what people think will happen in the future;
- Oil markets therefore share one of the fundamental characteristics of financial markets: the price today depends on what we expect the price to be in the future;
- If demand is expected to be high in the future, this will tend to increase prices today. This is the case because:
 1. buyers will try to buy ahead of the higher prices in the future raising demand today;
 2. suppliers anticipating higher prices in the future will withhold supply today hoping to cash in on the higher prices in the future.
- Because of the close link between future unknown events and current prices, oil prices move a lot in response to news about future oil developments;
- A lot of market participants face substantial risk due to these price fluctuations: oil companies, larger users of oil, people financing oil exploration etc.
- Futures markets are organized so that people can pay a known price today for oil delivered or purchased in the future.

Market forecasts

April 08, 2010, noon

Month	Open	High	Low	Last
May 10	84.90	85.73	84.80	85.30
June 10				87.13
Feb 11	88.60	88.86	88.60	88.86
Feb 12				74.73
Dec 13				90.65

<http://futures.tradingcharts.com/marketquotes/index.php3?market=CL>

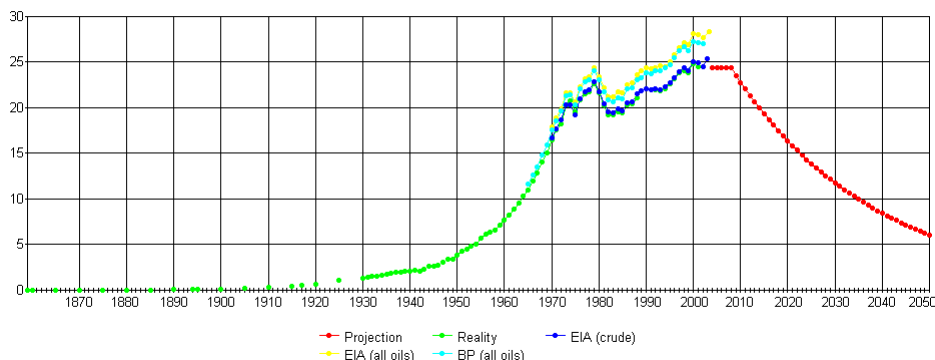
- Note that the December 2013 price for delivery is about \$90 while the current price is about \$85. Hence, 'the market' expects the price to rise slightly. Why? Because on average the Dec 2013 Futures Price represents what the average person in the market expects the spot (actual) price to be in Dec 2013.
- Thus if you believe the spot price in Dec 2013 to be \$110, you could make money by buying now future supplies (delivery) in the futures market at \$90. Then when Dec 13 arrives and you guessed correctly you will have bought your oil at a lower price than the then current price of \$110.
- As of April 8, 2010, 'the market' expects crude prices to be fairly stable of the next few years.
- The market however is composed of a lot of people with very different views some expect prices to be much higher than these prices and some much lower—they will not all be right!

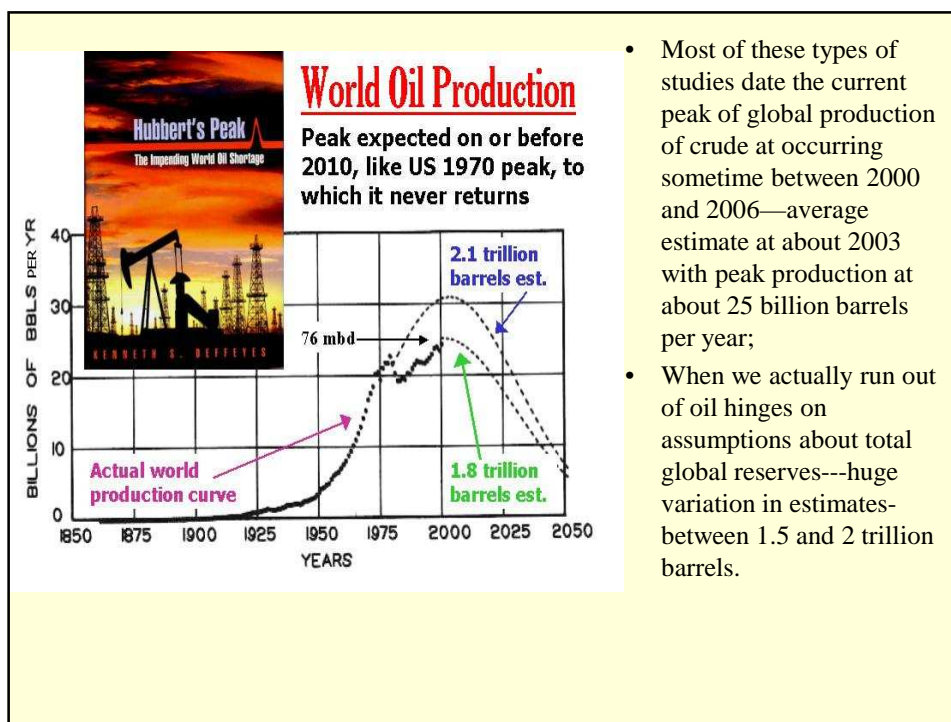
5. Future Oil Supplies

- Are we going to 'run out of oil'?
- On one side of this debate are those who use what is known as **Hubbert's peak** to forecast future declines in world oil reserves
- Hubbert was an engineer who accurately predicted the peak in US oil production has occurred in 1971—applying his methodology to the world leads to pictures such as the following

World Oil Production (GB/y) 1859-2003

It is a flow issue between supply and demand



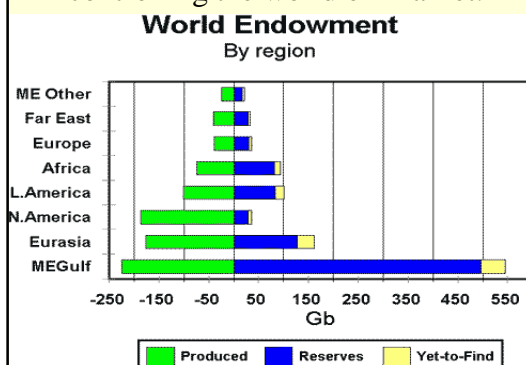


Opposing views: there is no impending oil shortage

- On the opposite side of this debate are those who take the view that as prices increase there are ample ways for adjustment in world economy to occur;
- Prices should rise far ahead of reduction in supplies leading to search for substitutes;
- New technologies which are more energy efficient will limit demand growth;
- New supplies of both oil and other substitutes will be found or invented;
- History thus far is on the side of the optimists!

6. OPEC: the oil cartel

- The world oil market is far from competitive;
- The OPEC countries (most of whom in the Middle East) act in coordination to control supply in an attempt to control the price—we call such a group of producers a CARTEL.
- Most Cartels try to keep prices above what a competitive market would deliver and closer to monopoly price;
- OPEC has had some success but also some big failures at controlling the world oil market.



A necessary condition to be a cartel is that you control the majority of the supply of the product.

OPEC meets that criteria on the basis of reserves.

The natural gas producers are currently trying to form a cartel of their own.

OPEC has a some big problems even if it does have a lot of the world's current reserves:

1. To limit supply they must allocate quotas to individuals members; each OPEC member is not supposed to produce more than their quota. But this creates large incentives for members to **cheat!** This is the case because if the cartel is successful and prices are high they can make a lot of money by selling more than their quota.
2. By managing to keep prices high, they encourage non-OPEC members to find and produce more oil. This is exactly what happened in early 1980's which led to a subsequent collapse of oil prices.
3. Most of these oil states have become very dependent on oil revenues and have failed to develop alternative industries to generate economic growth. Corruption and misuse of oil revenues rampant.

There is a close link between oil prices and global recessions. Oil shocks have caused and/or contributed to each one of the US and global recessions of the last thirty years:

1. The 1974-1975 US and global recession was triggered by the tripling of the price of oil following the Yom Kippur war and the following oil embargo.
2. The 1980-1981 US and global recession was triggered by a spike in the price of oil following the Iranian revolution in 1979.
3. The 1990-1991 US recession was partly caused by the spike in the price of oil following the Iraqi invasion of Kuwait in the summer of 1990.
4. The 2001 US and global recession was partly caused by the sharp increase in the price of oil in 2000 following the California energy crisis and the tensions in the Middle East (the beginning of the second intifada). However in this case, other factors were more important: the bust of the internet bubble, the collapse of real investment and, in smaller measure, the Fed tightening between 1999 and 2000.
5. Last 18 months high oil prices coupled with the financial crisis are at the roots of the current/coming recession.

So OPEC is mindful that if it sets oil prices too high, it might cause a **global recession** which in turn would reduce their oil revenues a lot; probably the only industry in the world which has this problem. OPEC now trades off a) higher prices (more revenue) vs. b) global growth and price stability.