



Energy Policy

Lecture 23 – Basic Energy Economics

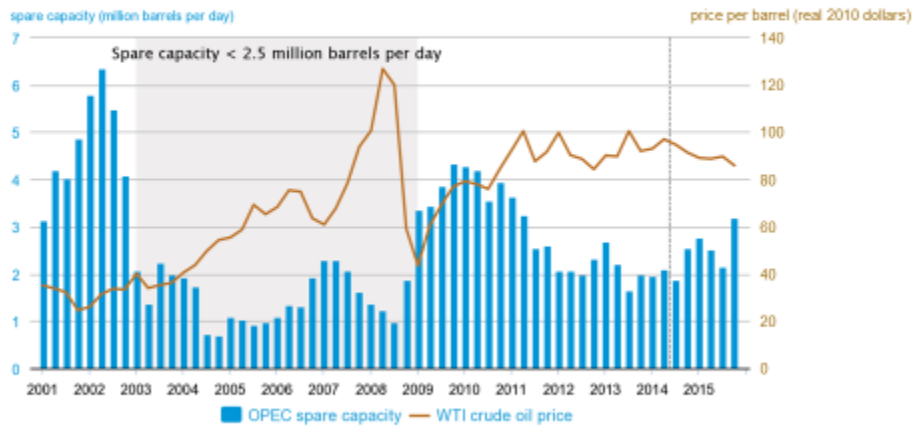
Week 9 – Energy Policy

-Learning Objectives-

- ▶ Explain the pros and cons of current energy policies for fuels and bioenergy.
- ▶ Identify an impact of current energy policy on an industrial or agricultural sector
- ▶ Suggest a fuel or emissions regulation you would make if you could and explain how it would improve things.

Volatility of crude oil price

OPEC spare production capacity and WTI crude oil prices



Source: U.S. Energy Information Administration, Thomson Reuters.
Updated: Monthly | Last Updated: 8/12/2014

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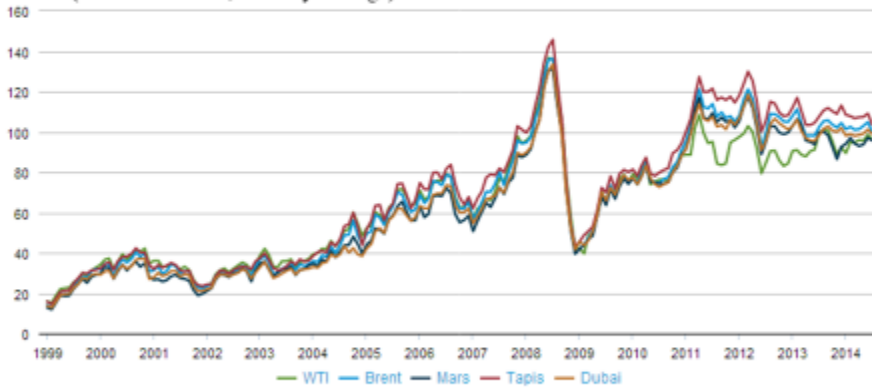
Spare capacity is the volume of production that can be brought on within 30 days and sustained for at least 90 days.

Major oil-supplying countries, such as Saudi Arabia, have been keeping 1.5 - 2 million barrels per day of spare capacity for adequate response to market volatility. From 2003 to 2008, low spare capacity drove the oil price high.

Volatility of crude oil price

World crude oil prices

\$/bbl (real 2010 dollars, monthly average)



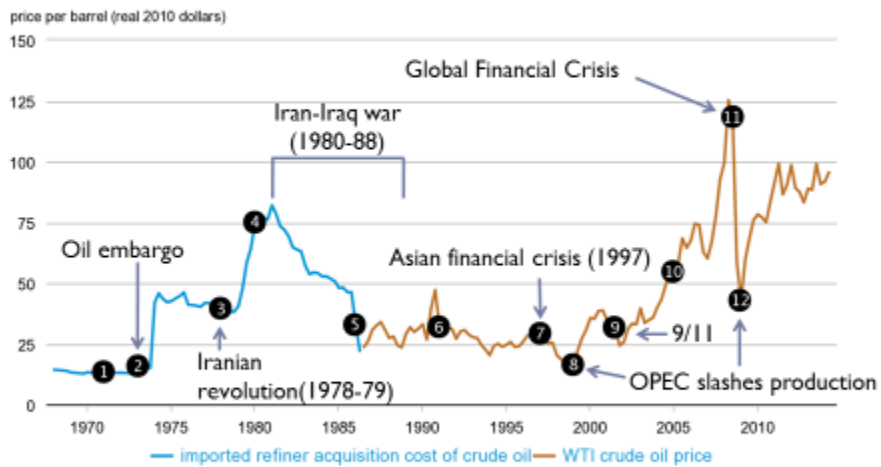
Sources: Bloomberg, Thomson Reuters. Published by: U.S. Energy Information Administration.
Updated: Monthly | Last Updated: 07/31/2014

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Oil prices tend to move together globally, it is a linked market. 100 years ago this may not have been the case, but today globalism has linked us all. Nothing happens in the global fuel economy without having rippling effects on something else.

Geopolitical events affect oil prices



Source: U.S. Energy Information Administration, Thomson Reuters.
Updated: quarterly | Last Updated: 06/30/2014

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.... Particularly wars.

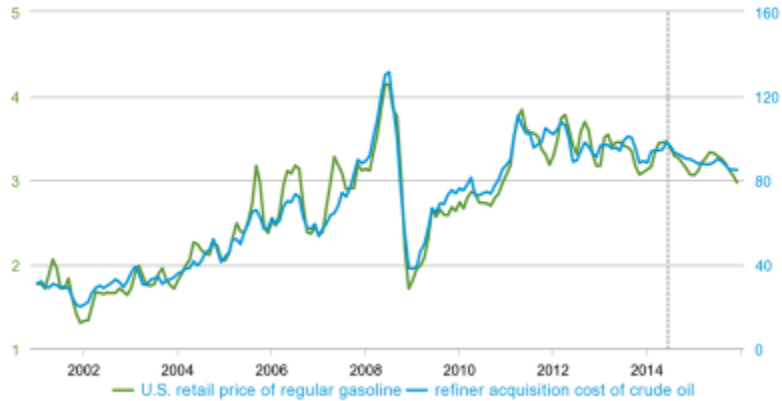
- 1: U.S. spare capacity exhausted
- 2: Arab Oil Embargo
- 3: Iranian Revolution
- 4: Iran-Iraq War
- 5: Saudis abandon swing producer role
- 6: Iraq invades Kuwait
- 7: Asian financial crisis
- 8: OPEC cuts production targets 1.7 mmbpd
- 9: 9-11 attacks
- 10: Low spare capacity
- 11: Global financial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

.... and oil prices are linked to gas prices

U.S. retail regular gasoline price, refiner acquisition cost of crude oil

dollars per gallon (real 2010 dollars, monthly average)

\$/bbl (real 2010 dollars, monthly average)

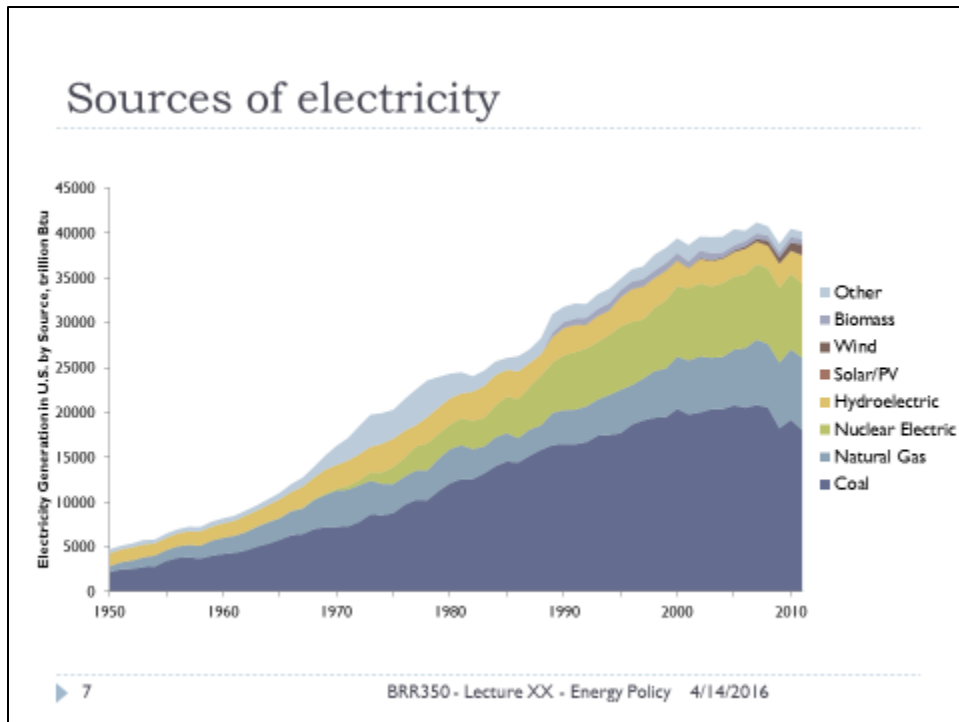


Note: Assumes a typical \$1 per gallon markup of gasoline over the refiner acquisition cost of crude oil.
Source: U.S. Energy Information Administration, Thomson Reuters
Updated: Monthly | Last Updated: 8/12/2014

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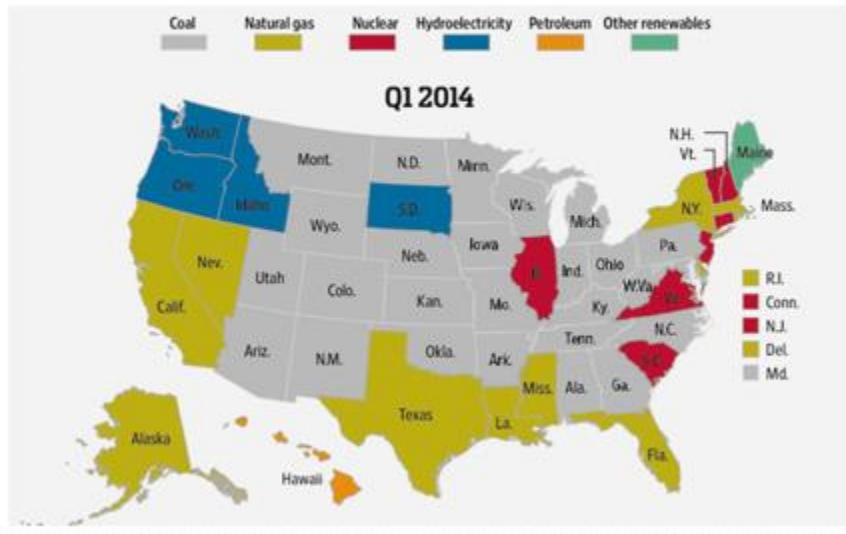
Like most of us know, oil prices and gas prices are pretty closely linked. So, when oil goes up, gas goes up and vice versa. This is not ever a direct relationship because of reserves that build up downstream and upstream of refineries, but from a zoomed out monthly perspective its pretty close.



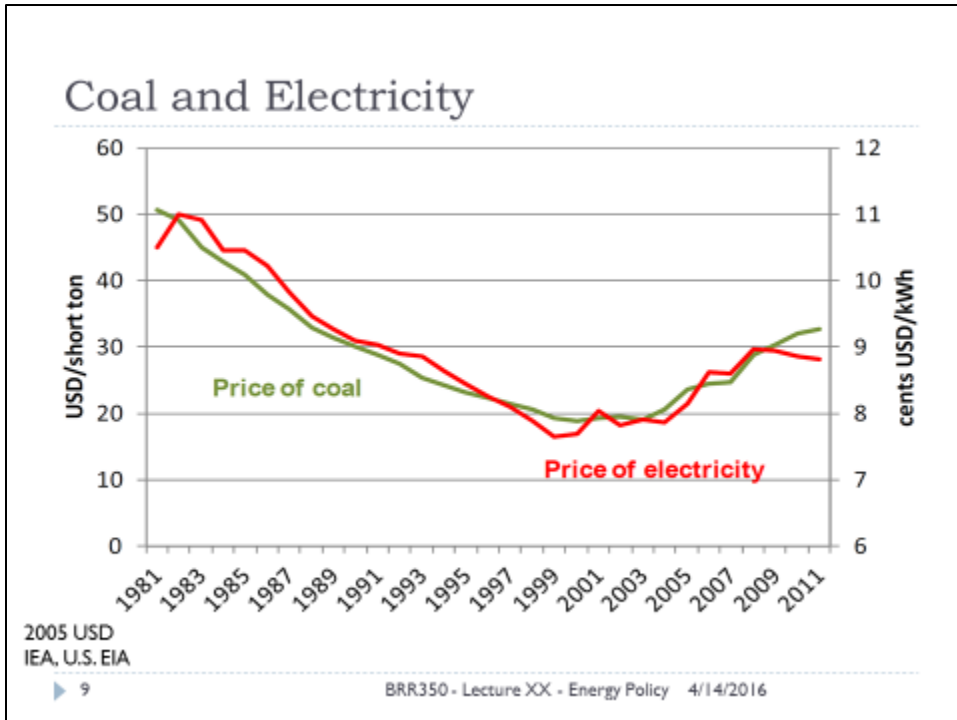
Electricity is often regarded as a clean power, due to its low emission of CO₂ when used by end users. The generation of electricity, however, often involves the use of large amount of fossil fuels, and incur significant amount of CO₂ emission. Over 50% of the electricity generated in the U.S. comes from power stations fueled by coal and natural gas. As a result electricity generation is responsible for 32% of the GHG emissions in 2012.

Notice how petroleum is not on this graph. Domestic oil production, oil prices and biofuels have very little direct effect on coal prices and utilization of coal for energy. The largest threat to coal as an energy source comes from natural gas because of its low price and the relative simplicity of natural gas turbines compared to coal power plants. If we want to get off coal, the solution has nothing to do with oil production. If we want to reduce power costs, the solution has nothing to do with the price of oil.

Where does your electricity come from?

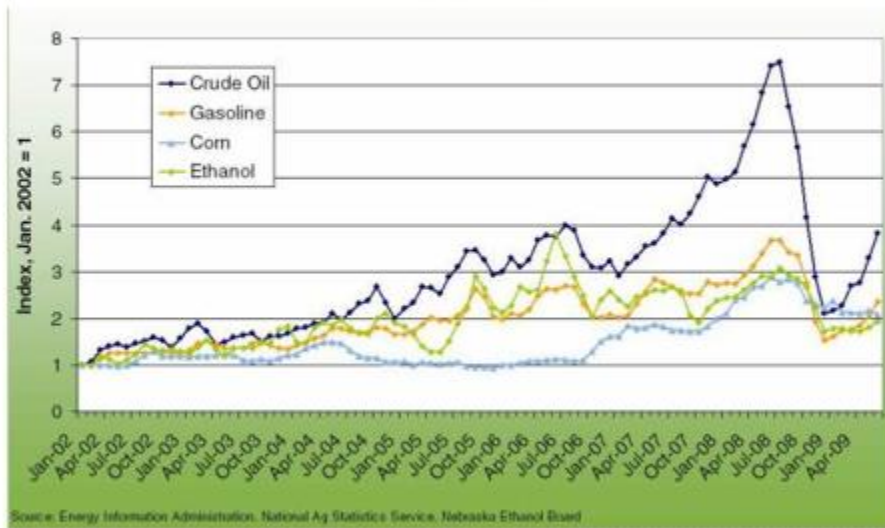


This map makes some important points about where the energy comes from for different states and there are good reasons for this distribution. Notice how pretty much only the PNW has a lot of hydro. Also notice where the nuclear power plants are and consider population densities, as well as emissions considerations. Finally, notice how the entire center of the country is mostly coal, but a lot of the coastal areas and the Northeast are mostly gas. Coal is so common because it is so cheap, but it takes a lot of space and we use it in a fairly dirty way. Gas is present in places that have large oil reserves and also places that are capable of receiving imported LNG. Gas is often a more popular energy source in places with high population density and high land prices because it is much simpler to use than coal and gas turbines, and can be placed in something as small as a house.



Fossil resources are playing important roles in electricity generation, therefore the price of electricity is closely linked to the fuels from which the electricity is generated. The divergence that is starting to happen in 2011 is due to natural gas, but the price of coal is also starting to rapidly drop, which will change availability since it is already produced at fairly minimal profit margins

Trading of Energy



Futures trading is very common (zero-sum game). The speculative community flocked to the energy market after 2000.

Crude oil futures and gasoline futures are traded at New York Mercantile Exchange (NYMEX) and Tokyo Commodity Exchange (TOCOM). Ethanol futures are traded at Chicago Board of Trade (CBOT).

Notice what speculation did to the price of oil around the time of the recession in 2008. During that period speculation led to a massive increase in the value of oil, pushing the price of a barrel up to around \$140. This stood in stark contrast to the internal value of oil in most large oil companies, which is more on the order of \$30-40/barrel. If an oil company can't make money on an oilfield at \$30-40/barrel they probably won't develop the resource. So, you can imagine how thrilled they were and how great the profits became when fuel traders and speculation drove the price of oil to \$140/barrel.

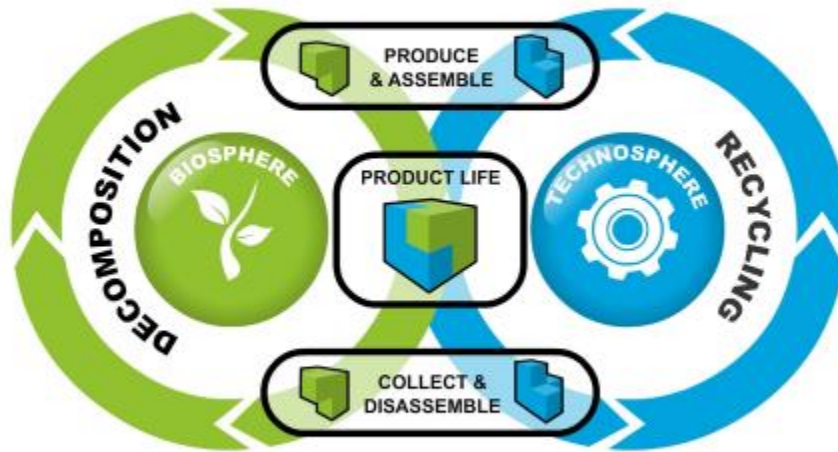
Fuel smuggling and stealing



Prime Numbers: Pain at the Pump - By Gerhard Metschies | Foreign Policy
http://www.foreignpolicy.com/articles/2007/06/11/prime_numbers_pain_at_the_pump

A quick note on an aspect of fuel economics not often discussed. These kinds of price differences support gasoline smuggling at the cost of the country with the higher prices. Not all fuel economics is handled in the board room, or the trading floor, or the government. In some cases the economics are based on smuggling and stealing. In places where fuel is highly valued, but not easily available, fuel can be acquired by more than just legal means. Even though we are globalized, national laws are relative to the country and this absolutely affects supply and demand economics.

Next Lecture – Life Cycle Assessment



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BR350 - Lecture 2 – Common Denominators 4/14/2016

<http://www.cleanbiz.asia/image/cradle-cradle>

Please take a moment to read and understand this image depicting the cradle-to-cradle cycle. It will help in the upcoming lectures.