Energy future...

U.S. Energy Use
- Oil 39%
- Gas 24%
- Coal 23%
- Nuclear 8%
- Renewable 6%

Resources vs. Reserves
- Resource
  - Petroleum believed to exist on the basis of geological parameters
- Reserves
  - Petroleum known to exist and which can be produced economically.

Norwegian Oil Production

How long will oil last?
- We don’t know exactly
- We will have SOME oil for a long time
- How do you measure something you can’t see?
**US Oil Production History**
- The oil industry started in the USA
- The US is the biggest oil market
- The US is the best explored part of the world
- Therefore….
  …we can use the US history as an analogue for the rest of the world

**Petroleum Basins in North America**
- Super Giants >5 billion bbls
- Giants 5 to 0.5 billion bbls

**US Oil Production**
US Oil Production was in decline from 1970 to 2008

**What about the future?**
King Hubbert's insight:
- You can only produce oil that you have already discovered
- This allows us to forecast future production

**Discoveries v. Consumption**
- 1970 to 2008
  - Consumption 4
  - Discoveries 1
- 90% of oil produced today was discovered more than 30 years ago
The area under the two curves must be the same

Annual Oil Discovery

Billions of Oil-Equivalent Barrels

This made it look like we are doomed but…

What happened in the nick of time?

Will we run out of oil soon?

- No, there is a lot of oil out there.
- However, demand will keep increasing
- As high demand drives prices up
- High prices allow more expensive technology
- Unconventional systems will come into play

What about the market place?

- Price of oil is tied to short term supply and demand
- Price of oil is deeply tied to global politics
- The price of oil determines how much exploration is done at any given time
**Sources of US Oil**

- US imported 58% of its oil (as of 2004)

**Top Sources (2011)**

- Canada (23%) ← 1/2 is from Tar Sands
- Latin America (33%)
- Africa (16%)
- Persian Gulf (18%)
- Russia (6%)
**US Crude imports**

US imports keep decreasing.

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**The investment in Exploration did not pay off in the 1998-2008 decade**

- EXXONMobil exploration = “Wealth destruction”
- Shell - Cut their reserves estimate by 20% in 2004
- Most big discoveries were gas not oil
- Most big discoveries were in deep water (expensive)

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**What is happening now?**

- Oil price has dropped
- US production has climbed for the first time in decades
- Global demand slowed down
- There is a crude surplus in the market
- How long will the down-turn last?

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**Better efficiency will extend the life of the resource**

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**Conclusions**

- Discovery Peak occurred in the 1960s
- Most large conventional fields have passed peak production
- Unconventionals are beginning to drive the market

**What we need to do:**

- Non-conventional resources are the future
- Move to gas
- Improve efficiency
- Move to renewables