GY111 Introductory Geology

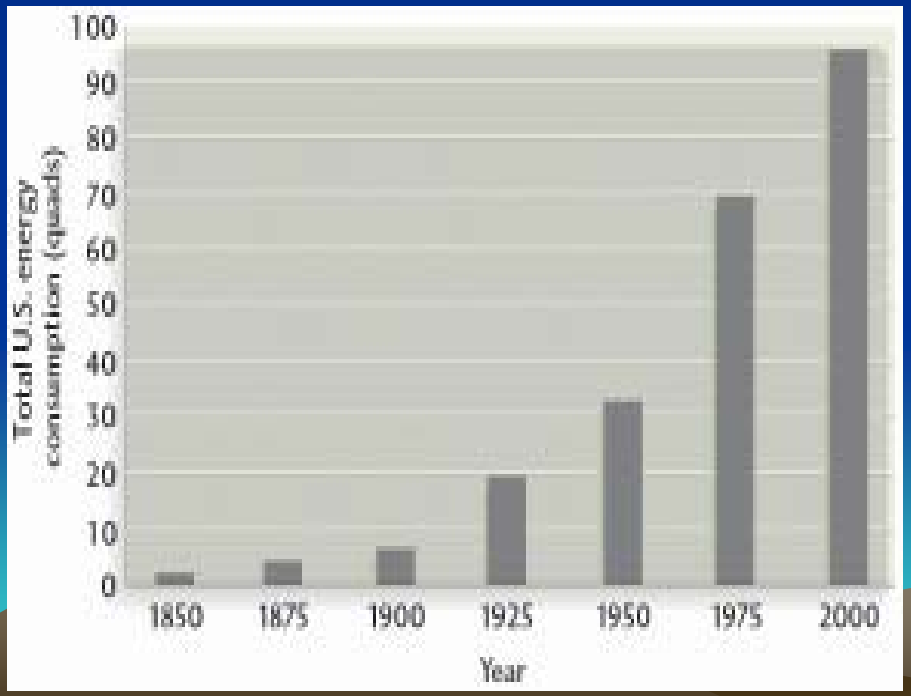
Lecture 12: Energy and Mineral Resources

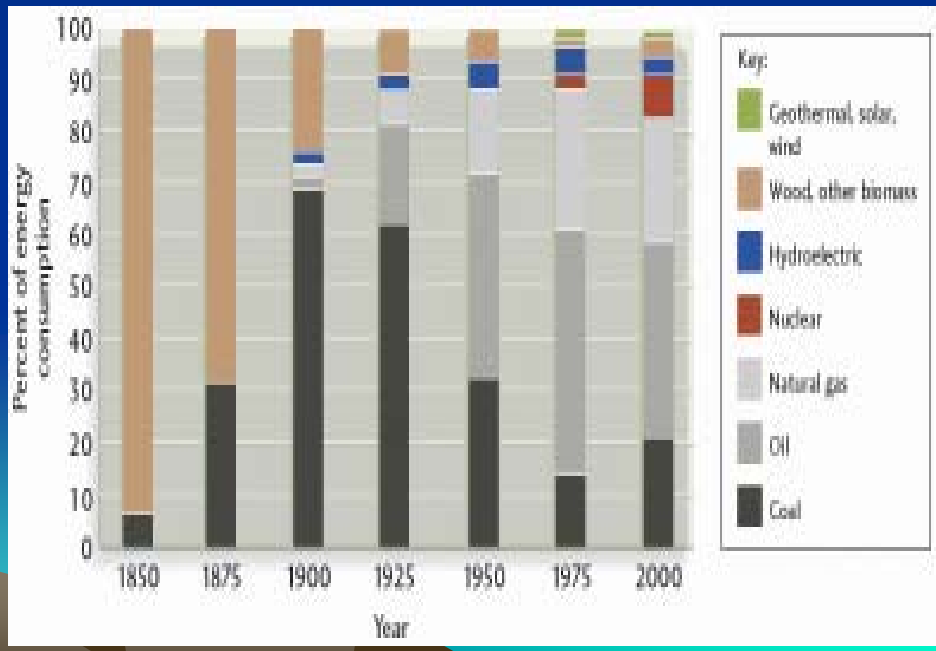
Resources & Reserves

- Energy & Mineral Resources: educated guesses on remaining deposits
- Reserves: proven by drilling and/or geophysical prospecting
- Non-renewable: once used will not be replaced because of long generation cycle (i.e. Petroleum, Coal, Ore Deposits)

U.S. Energy Consumption

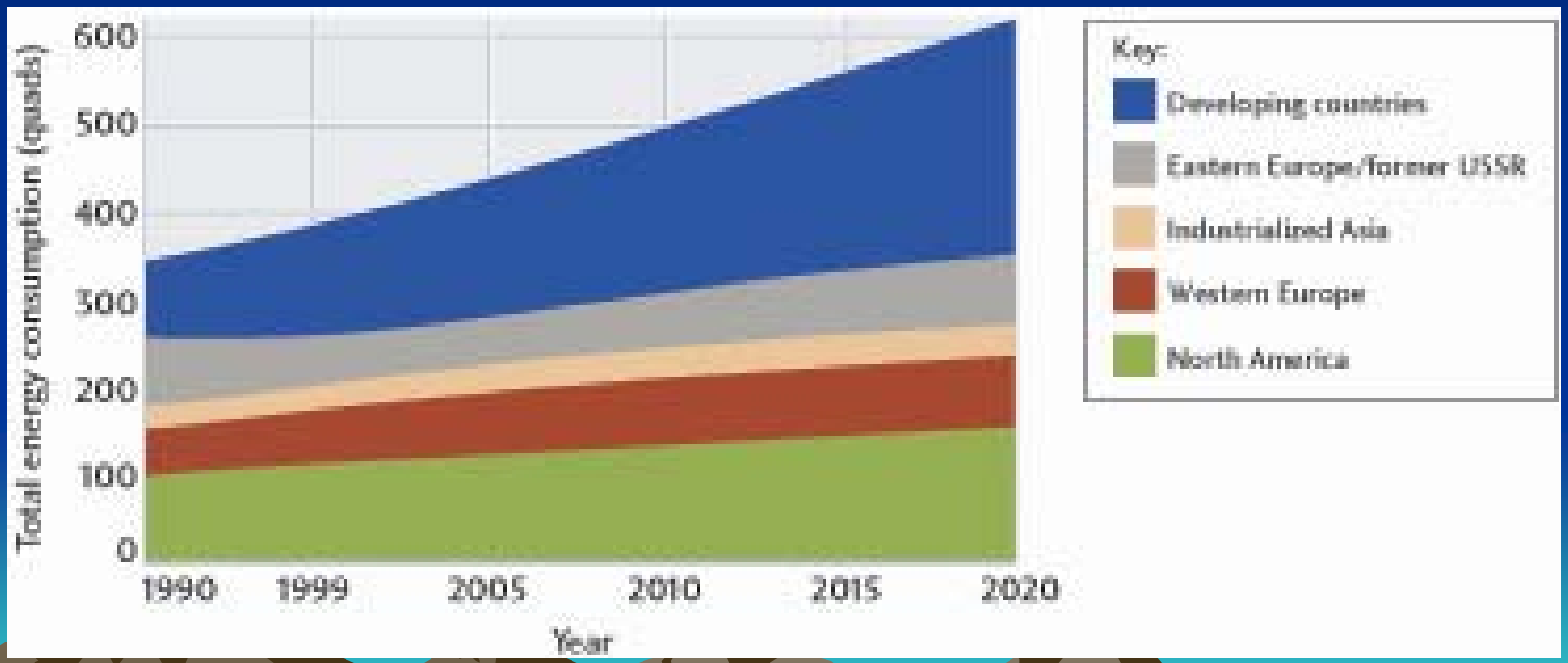
- Exponential growth of demand matches population growth





Global Energy Consumption

- India & China are major consumers of developing countries

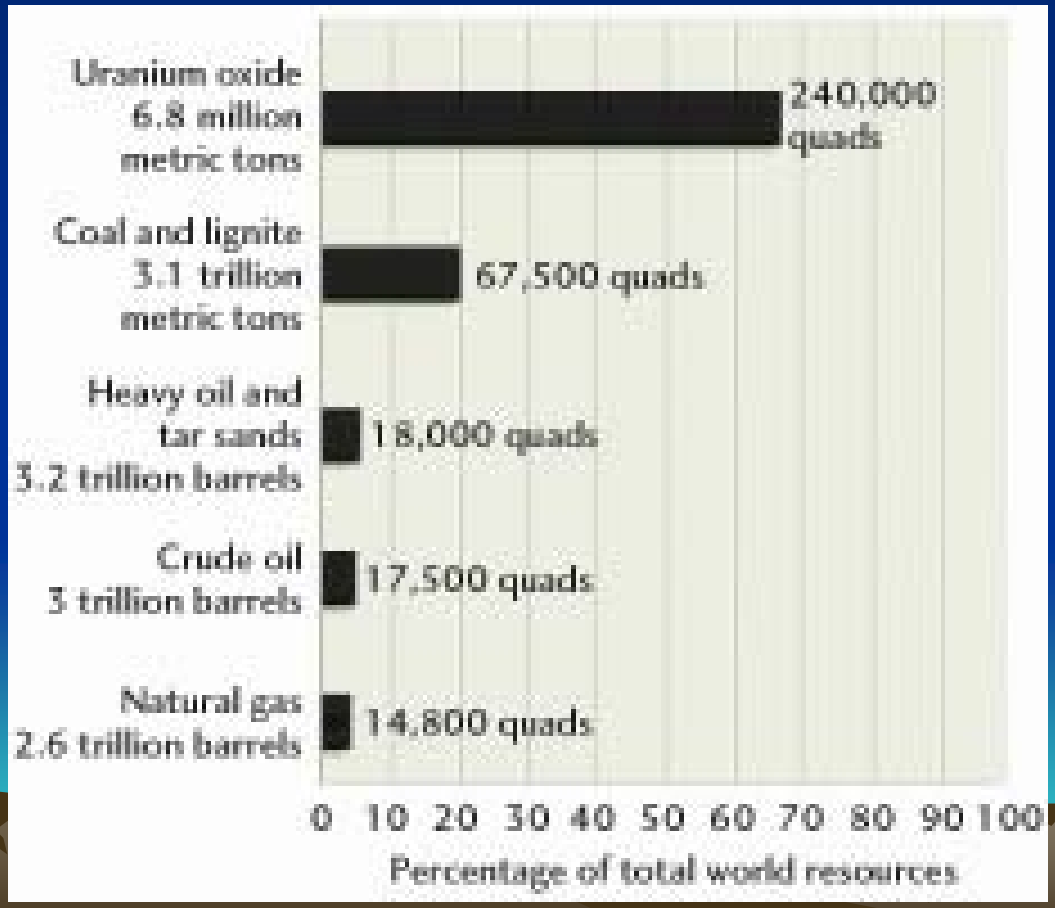


Combustion

- Combustion oxidizes hydrocarbons releasing energy
- By-products include CO_2 and H_2O
- Example: $CH_4 + 2(O_2) = CO_2 + 2H_2O$
- Unfortunately coal and gasoline have other components (N,S) that produce pollutants (NO_2,H_2SO_4,H_2S,etc.)
- Coal is by far the “dirtiest” fossil fuel, methane the “cleanest”

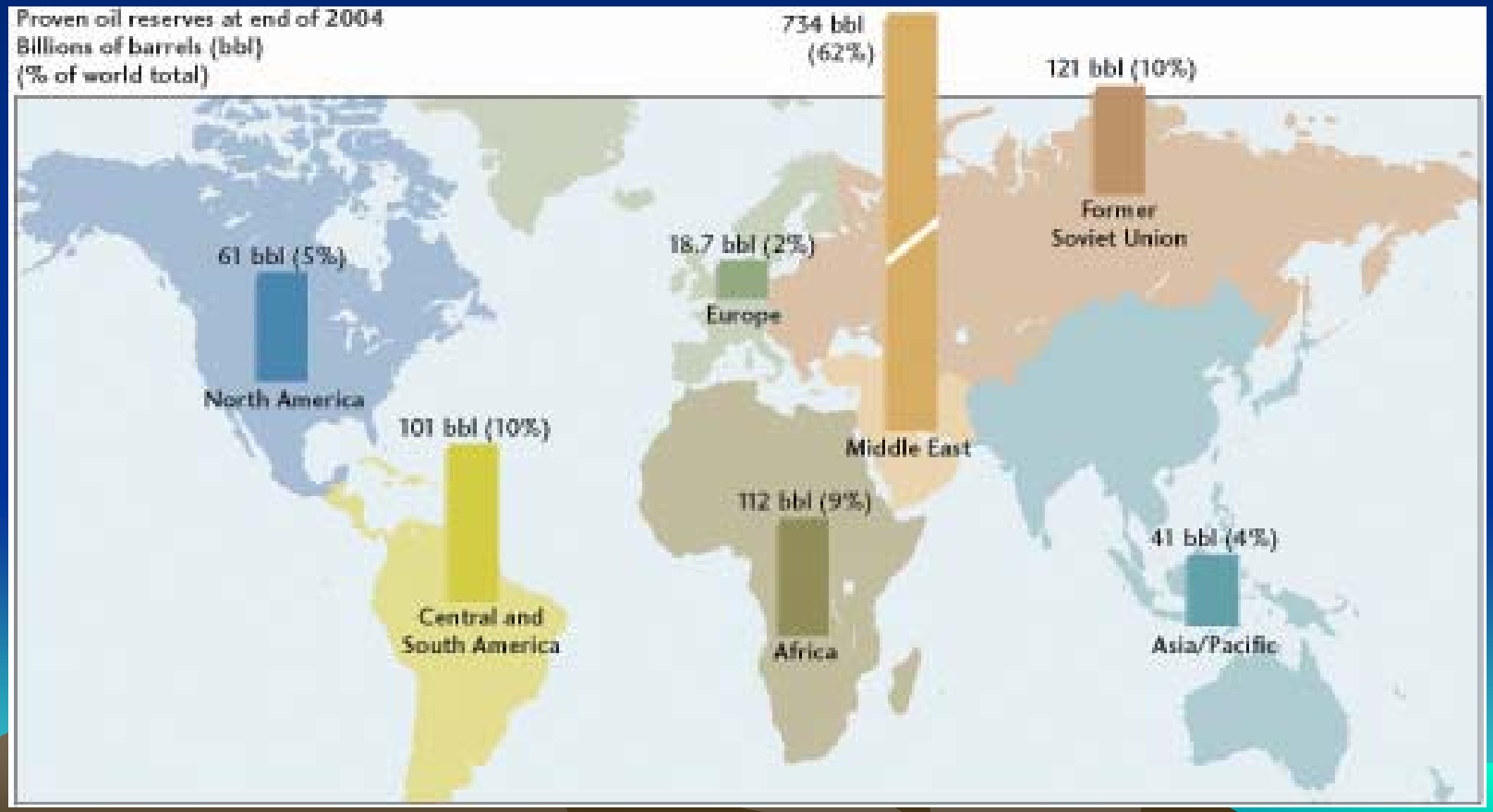
Potential Energy Resources

- Based on educated guesses!



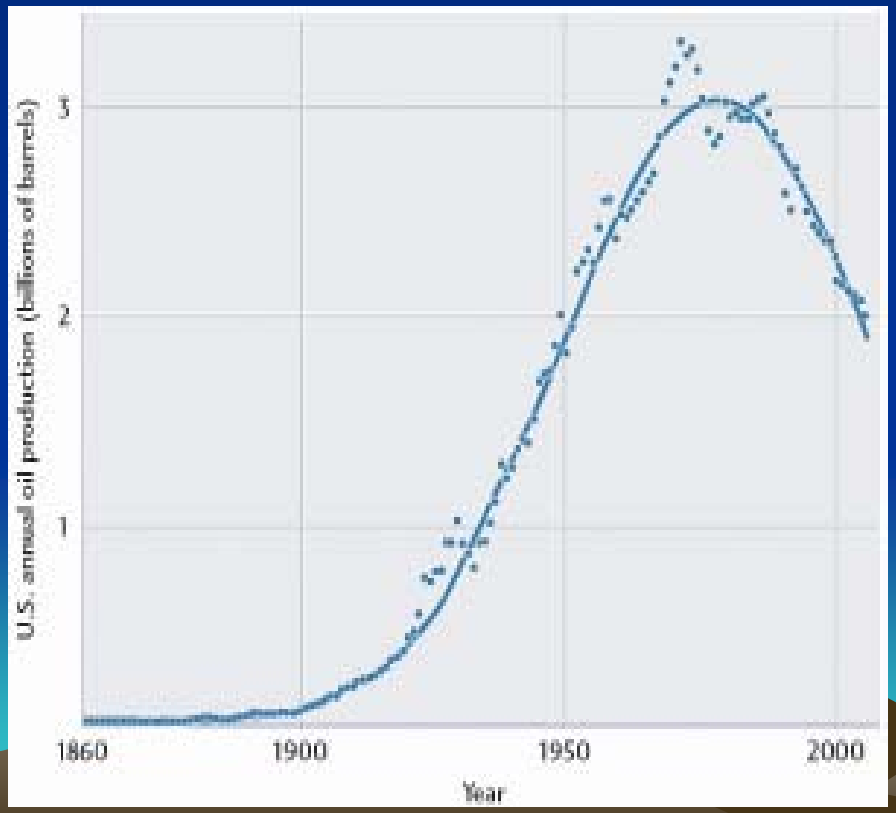
Global Distribution of Petroleum Resources

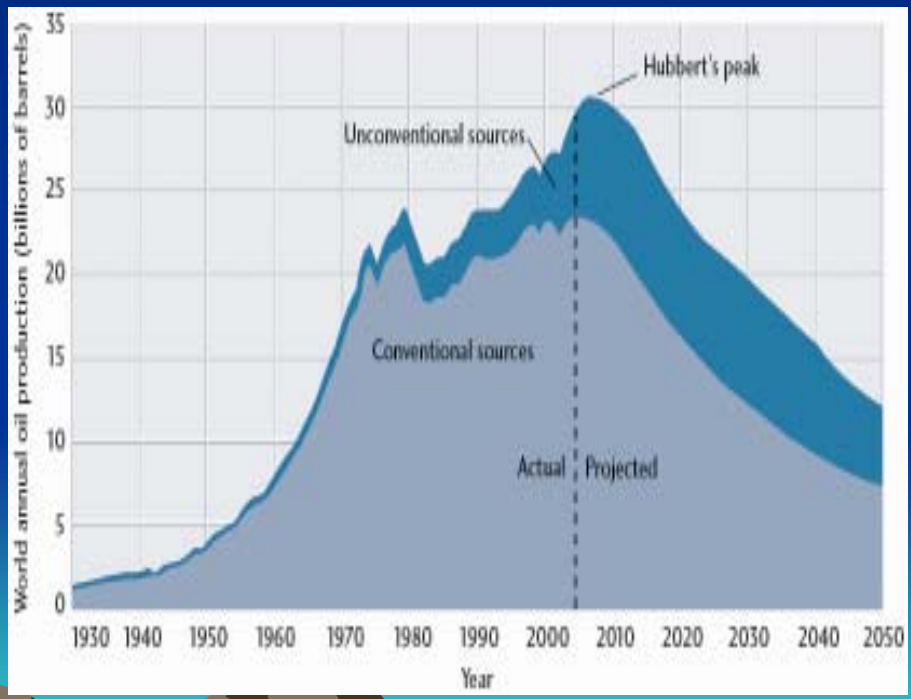
- Middle East Dominates this Resource



Decline of Petroleum as an Energy Resource

- US production peaked in 1970's
- World production is peaking now (2006)





Energy Fact Matrix

	Advantages	Disadvantages
Petroleum	• Proven tech., easy transport	• Decreasing supply, pollutes
Coal	• Abundant in US, 200 year supply	• Dirty, difficult to transport
Natural Gas	• Clean, easy transport	• Decreasing supply
Nuclear	• Proven tech., very efficient, no pollution, 500 year supply from US reserves	• Radioactive waste

Final Exam Review

- Final will have same format as other Lecture Tests
- Concentration will be on material not yet tested (Material covered since Test 2)
- Potential Discussion Questions:
  - Seismic waves
  - Energy resources
  - Geologic Time scale
  - Brittle vs. Ductile mechanical behavior
  - Wilson cycle
  - Appalachian and/or Cordillera Physiographic Provinces
  - Radiometric Dating