

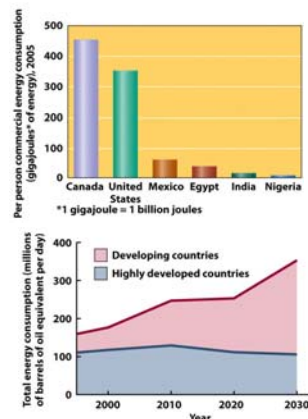
Lecture 14 - Energy

1. What are the Trends in Energy Consumption?
2. Fossil fuels: Today's dominant source of energy
3. What are the Alternatives to Fossil Fuels?
4. What are "New" renewable energy sources

Key Concepts

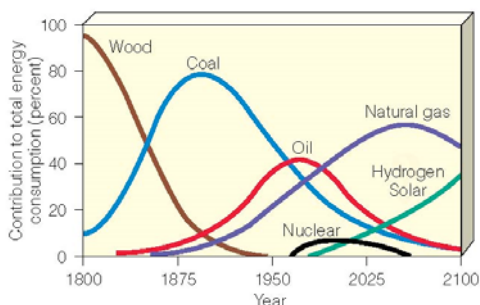
- Trends in Energy Use/Consumption and Historical Shifts
- Trends in use of Fossil fuels
- The future of oil and the potential of other fossil fuels as replacement; major impacts
- Conventional Alternatives
- Transition to renewable sources

1. What are the Trends in Energy Consumption?

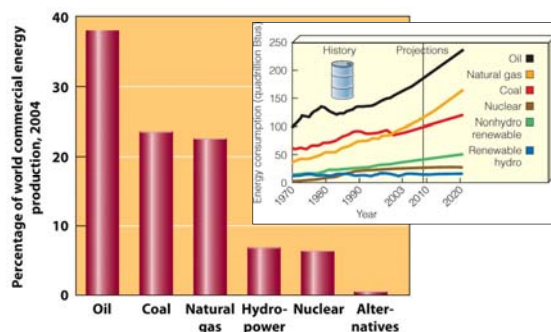


Historical Shifts in Energy Use

• e.g.:

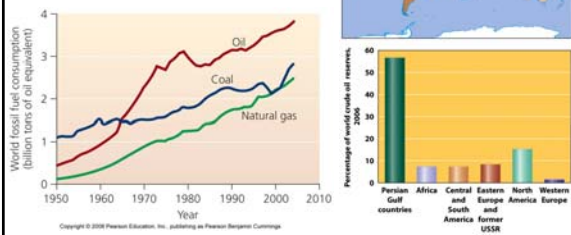


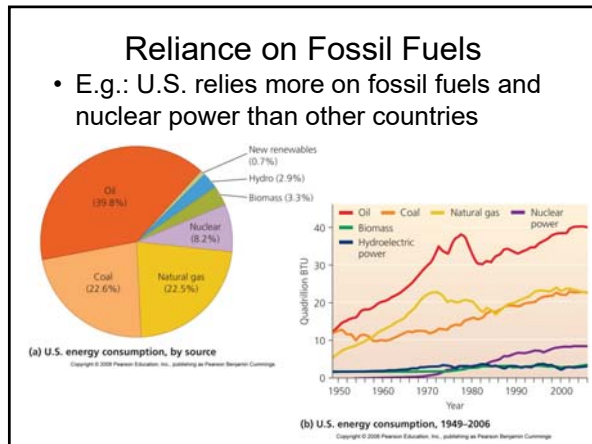
World Energy Use & Trends

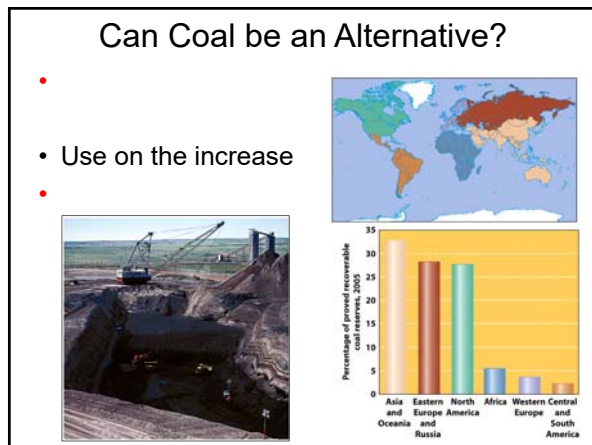


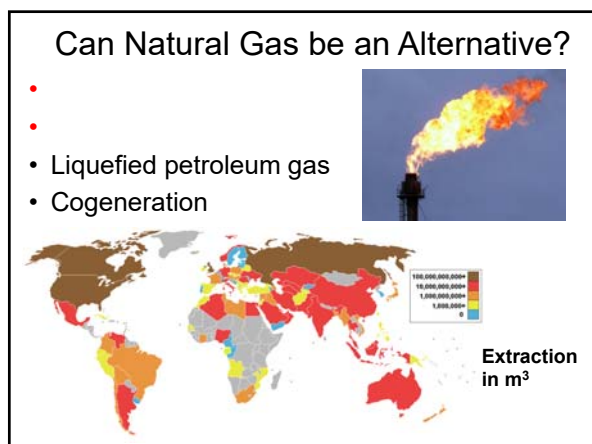
2. Fossil fuels: Today's dominant source of energy

• High-energy content of fossil fuels:









Pros and Cons of Natural Gas

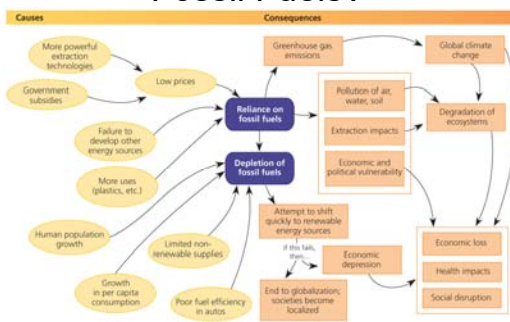
- **Transportation:**

- **Disadvantages**

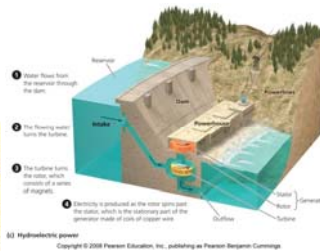
- Deposits located far from usage points



3. What are the Alternatives to Fossil Fuels?



What are Conventional Alternatives?



Nuclear Power Generation

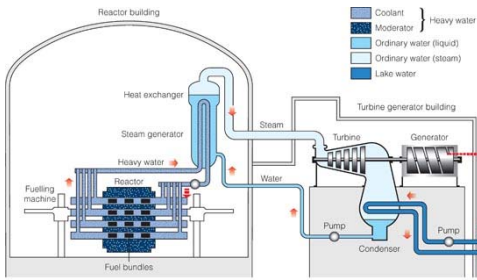


FIGURE 17-26 CANDU reactors employ three loops of water. The innermost loop carries heavy water reactor coolant. The middle loop is ordinary water/steam spinning a turbine. The outermost loop connects to an outside water source for cooling purposes. (© 2007 Jeremy Whitlock)

The Chernobyl Disaster

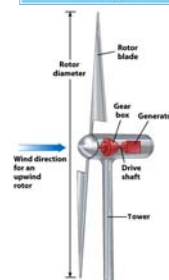
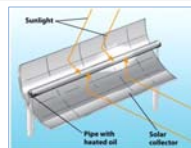
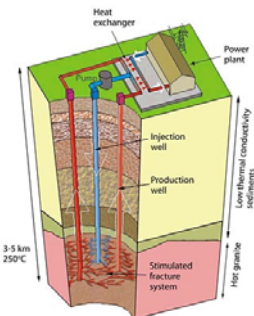
- World's worst nuclear power plant accident



(a) The Chernobyl sarcophagus

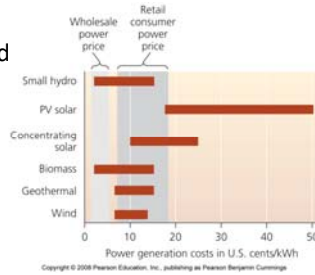


4. What are "New" renewable energy sources?



The Difficult Transition to Renewables

- Technological and economic barriers prevent an overnight switch to renewables



Conclusion

- Energy consumption is expected to grow globally, and particularly in developing countries
- Fossil fuels are the dominant source of energy globally, and also for the foreseeable future
- Despite the environmental concerns associated to their use, switching to alternatives is technologically challenging, will take time and suitable policies

TO DO!

1. Readings: chapter 13 in Textbook
2. Listen to Podcasts: Sustainability and Cities – Units 1 and 2
3. Tutorials **this week**: Debates week #2; bring the “Debate Evaluation Form”