Earth Resources

Virtually everything you consume depends on earth resources.

Catagories

1. Energy
    a. Oil & gas (H + C :. Hydrocarbons)
    b. Coal (carbonized plant matter) } Fossil Fuels
    c. Uranium ^{235}U (*pitchblende*, *carnotite*)
    d. Geothermal (renewable)

2. Mineral
    a. Metals – Cu, Fe, Al, Au, etc.
    b. Non-metallic
        i. Sand & gravel
        ii. Cement (limestone)
        iii. Gems, abrasives, fertilizers, salt, chemicals, etc.

3. Not generally included
    a. Water
    b. Soil

Earth resources are generally NONRENEWABLE

Reserves = amount of a resource that is known to exist (discovered) and can be economically used.

Resources = amount of a resource that is estimated to exist. Includes future discoveries and currently non-economic deposits.

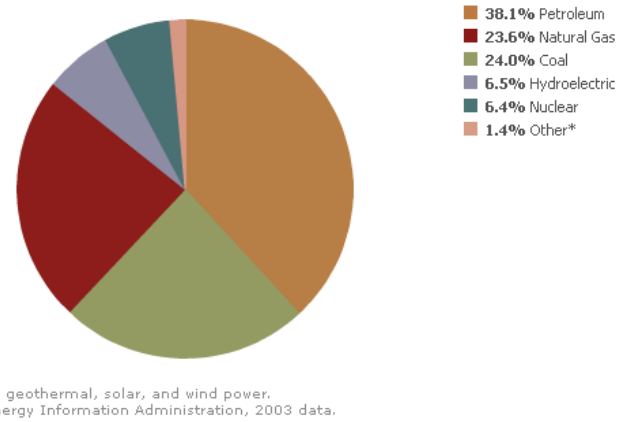
Resources >> reserves

Energy Resources

1. Non-renewable
    a. Fossil fuels (oil, gas, coal)
    b. Uranium (nuclear)

2. Renewable
    a. Hydro
    b. Solar
    c. Wind
    d. Wave & Tide
    e. Biomass

World Energy Production

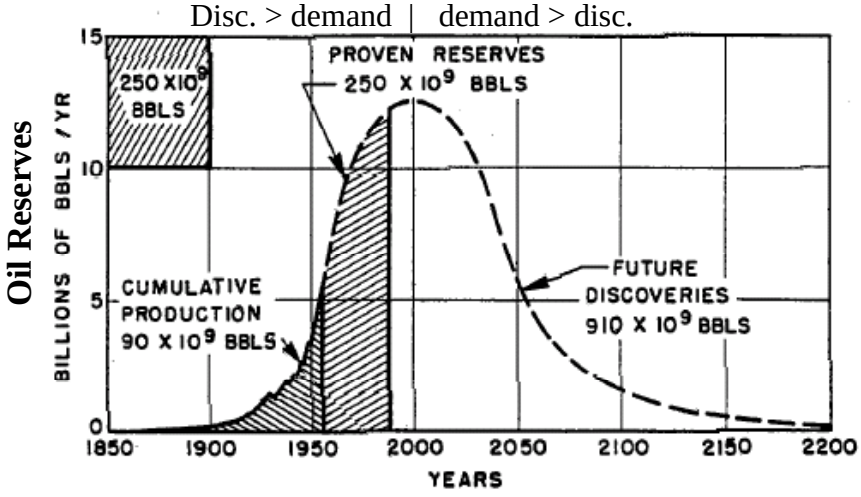


Petroleum (Oil)

Remember: reserves << resources – calculation is controversial

- World consumes
    - 81 Mbbl/day, 30 Gbbl/year
- U.S. consumes
    - 20 Mbbl/day, 7.3 Gbbl/year (24%)
    - 60% of our oil is imported (~16% from Canada)
    - 200 gigabarrels (31 km^3) 1859 and 1968
- Estimated reserves – Hubbert Curve
    - Discovery < increase in demand :. Reserve decreasing
    - "outgo" > "income" :. Spending "savings"
    - Will still last ~100 year

Disc. > demand | demand > disc.



Geology of Petroleum

1. Plankton grows in shallow ocean (solar energy)
2. Dies, sinks, quickly buried (else would oxidize)
3. Accumulates in great thickness – ooze → shale (source rock)
4. Organics "cooked" into hydrocarbons:
   a. Deeper than 2000m
   b. tar → oil → natural gas
5. Expansion causes pressure, oil flows upward (migrates)
6. Accumulates in structural traps; ss & ls (reservoir rock)