Oil Supply

- Role of Oil
- Oil as a finite resource
- M. King Hubbert
- Hubbert’s method of prediction
- References
Role of Oil

- Critical commodity in industrialized countries
  - Transportation
  - Heating
  - Fertilizer
  - Synthetic materials
- Explosive growth in world population roughly coincides with the start of large-scale oil production

Source: http://www.prb.org
Oil as a finite resource

- Oil judged to be a product of organic material
- Explosive proliferation of biologic activity at start of Cambrian Period (~600 m.y.)
- Consumption rate >> Generation rate (Generation rate is negligible)
- Oil resources are effectively finite
M. King Hubbert (1903-1989)

- Towering 20th-century Earth Scientist
- Vetlesen Prize, 1981
- Probably the best-known geophysicist in the world to the general public
- Seminal contributions in three areas
  - Mechanics of geologic structures
  - Physics of underground fluids
  - Earth's mineral resources and their significance in human affairs
Hubbert’s Method

- Assumes *recovery rate* curve increases from zero, peaks, and declines to zero as resource is exhausted
- Curve assumed to be bell-shaped and symmetric
- Curve can be fit to data
- Curve can be extrapolated into the future
- *Recovery* equals area under curve
Production Rate \( (r) \) as a Function of Three Variables

\[
r = Ae^{-((t-T)/S)^2}
\]

- \( A \) = peak value of \( r \)
- \( T \) = time where \( r = A \)
- \( S = T - t \) where \( r = A/e \) 
  \[\approx 0.37A\]
- \( r \), \((T-S)\) also is an inflection pt
Minimizing a Function of Three Variables

Find the values of A, T, and S to minimize $r$
References on M. King Hubbert

- [http://www.technocracyinc.org/webtv/articles/hub-gro.htm](http://www.technocracyinc.org/webtv/articles/hub-gro.htm)
- [http://www.hubbertpeak.com/hubbert/hubecon.htm](http://www.hubbertpeak.com/hubbert/hubecon.htm)