CONSUMPTION

Chemistry 321: Unit 5

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What affects consumption?

The total environmental impact (I) of humankind can be described by the Ehrlich-Commoner equation:

$$I = P \times A \times T$$

Where P = population

A = economic activity/person

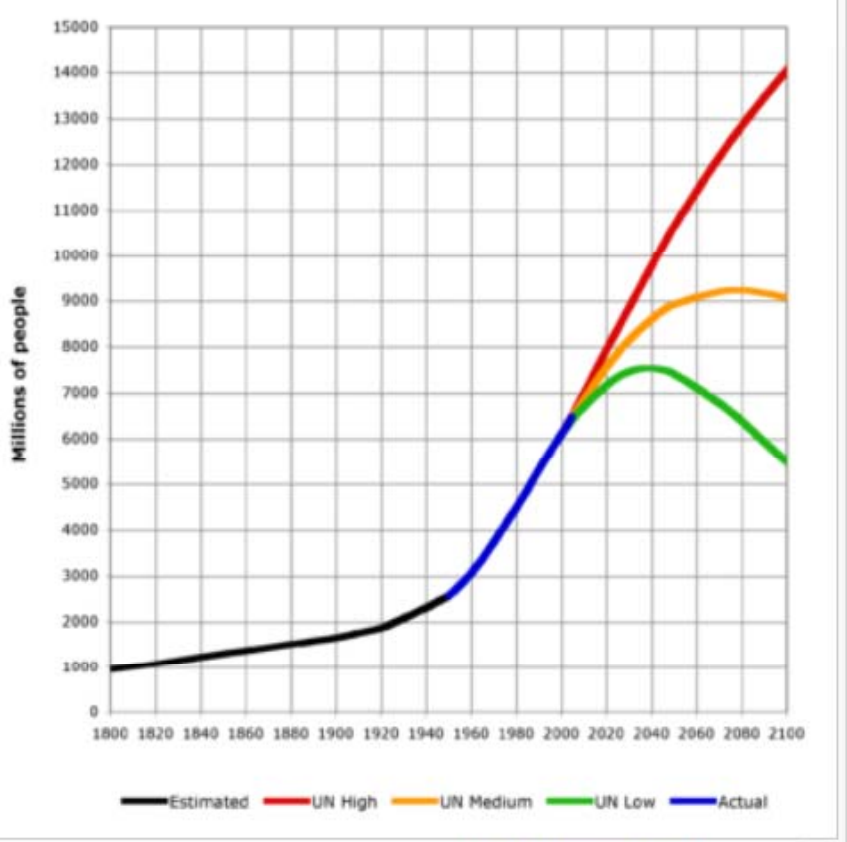
T = technological factor

If $T > 1$, technology adds to environmental impact

If $T < 1$, technology reduces environmental impact

Population (*P*)

- World population is predicted to continue increasing for some time.
  - If high fertility rates (red) persist, population will pass 10 billion by 2040.
  - If low fertility rates (green) predominate, population will peak soon at 7.5 billion, then begin to fall.
- Most growth will be in developing countries



World population from 1800 to 2100, based on UN 2004 projections (red, orange, green) and US Census Bureau historical estimates (black).

Chart by Loren Cobb, Wikimedia Commons, CC license.

Economic activity (*A*)

- Economic activity brings wealth, which gives a higher standard of living. This can pay for education, social welfare, infrastructure, etc.
- Economic activity has grown enormously since the start of the Industrial Revolution
- People in the developing world naturally want to attain the same standard of living as those in the developed world
- All of this growth means more resources used, and more environmental impact

Carrying capacity

- We can calculate how many "Earths" would be required to maintain a certain population at a certain value of A and T
  - If everyone on the planet had the same lifestyle as average people in the US, we would need five Earths to sustain that lifestyle.
- Does this imply we are doomed?
  - Stopping economic activity unrealistic
  - Therefore we must find ways to reduce T, and find ways to develop a less wasteful lifestyle

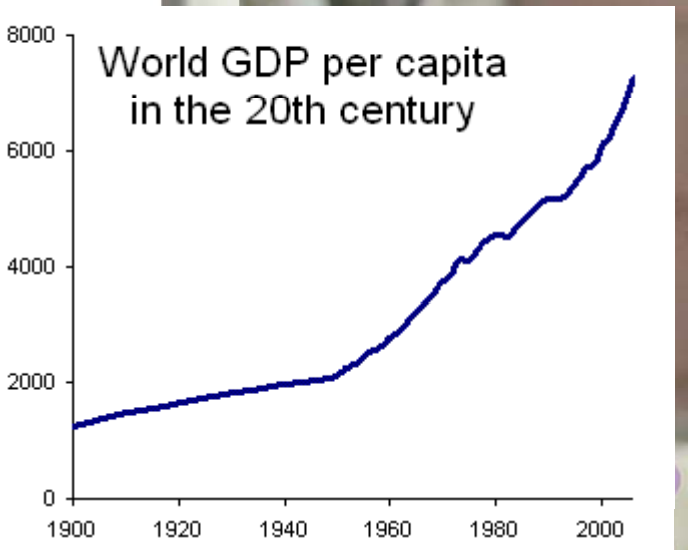
Can increased wealth lead to a reduction in environmental impact?

Some factors help to reduce /

- In prosperous countries, the birth rate falls to close to the death rate.
- The environmental Kuznets curve shows that as living standards rise, people demand higher environmental standards. But this does not apply universally to every aspect of the environment.
- As countries develop, they typically use fuels that are less carbon-intensive.

Economic growth

- Our free market system demands an economy that is continually growing. This also promotes consumerism.
- However, if our economic is tied to growth in resource use, then we will reach a limit. Some argue that we therefore cannot have continual economic growth – wealthy countries should switch to zero growth.
- Others make the case that technology improvements can disconnect GDP from resource use, by using resources more efficiently – "dematerialization" or the "Factor 10 hypothesis".
- The reality is more complex than either!



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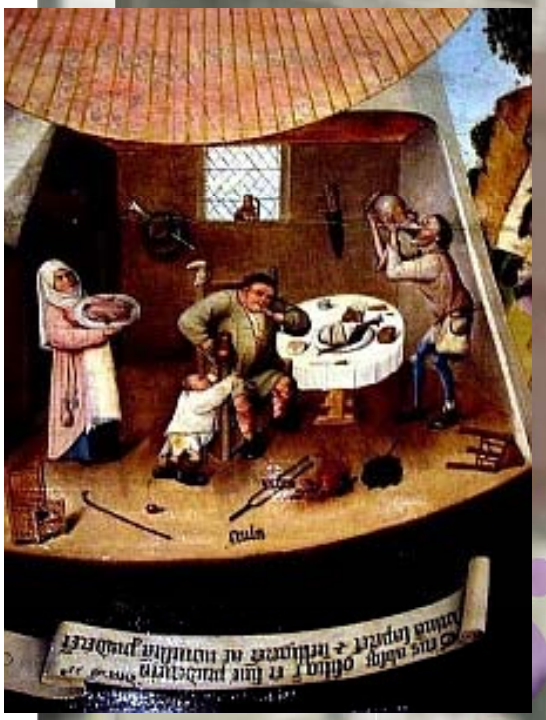
Consuming less

- **Substitution**: Technological improvements may allow us to replace a scarce or inefficient resource with a commoner or more efficient one. However, if cheaper, this can sometimes lead to a growth in demand
- **Dematerialization**: As a society moves beyond an industrial economy, it depends less on material resources to generate wealth; significant wealth comes from services and the knowledge economy. In addition, technology may allow *substitution* with a lighter or less burdensome material.



"Gluttony" by Bosch