

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

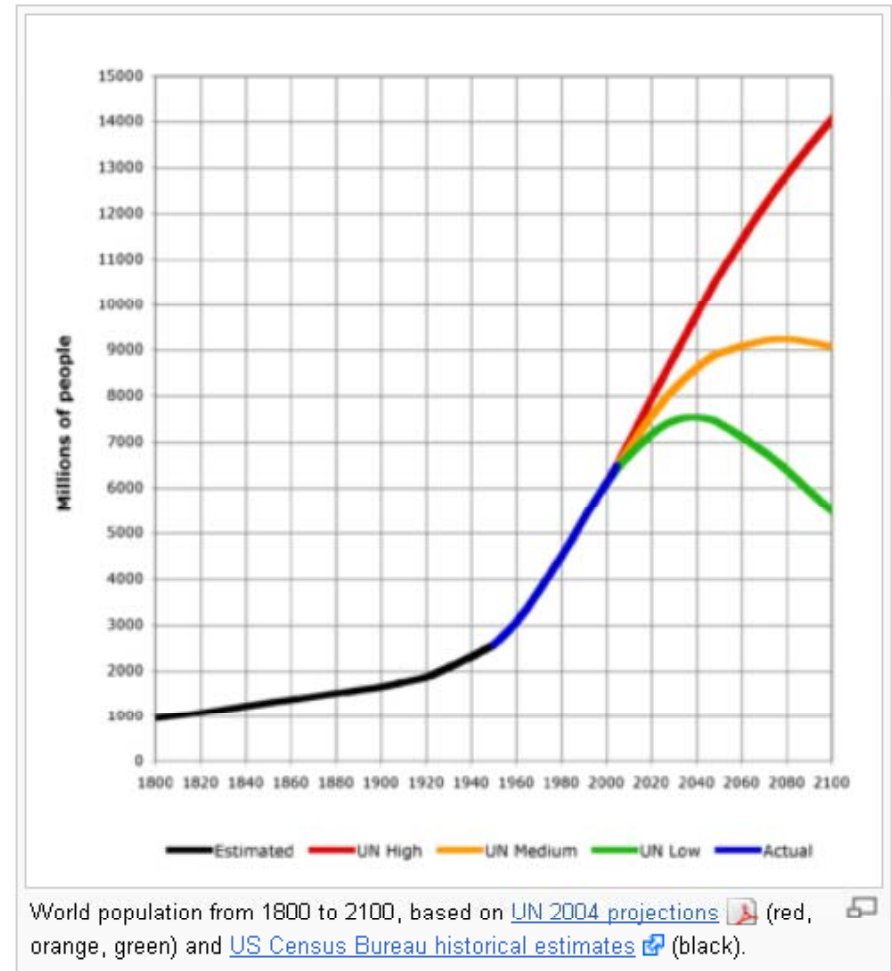
If $T > 1$, technology adds to environmental impact

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

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



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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

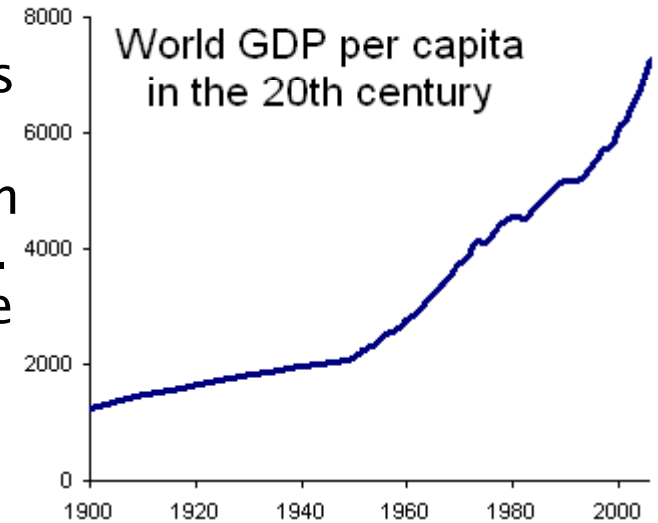
Can increased wealth lead to a reduction in environmental impact?

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

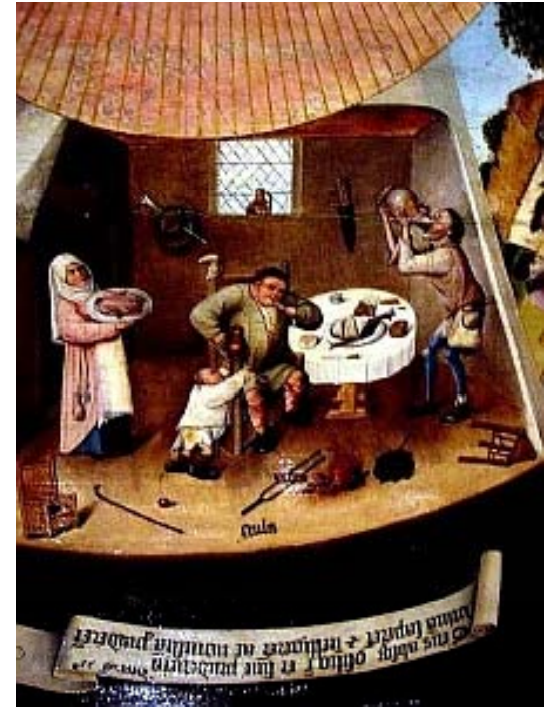
- Our free market system demands an economy that is continually growing. This also promotes consumerism.
- However, if our economic is tied to growth in resource use, then we will reach a limit. Some argue that we therefore cannot have continual economic growth – wealthy countries should switch to zero 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