

Coexistence with Limits

Innovation of Social Structure for Harmonious Coexistence with Limits

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Plenary Session#1:

The 8th Conference for the
Promotion of BAG Collaboration
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Coexistence with Limits

Outline of My Speech

- What do you expect of the long-term future?
- Ecological footprint
- Nature and effects of limits
- Trends in GHG emissions
- Factors that determine CO₂ emissions
- Causes of the current crisis
- How can business, academia, and the government collaborate for effective innovation?

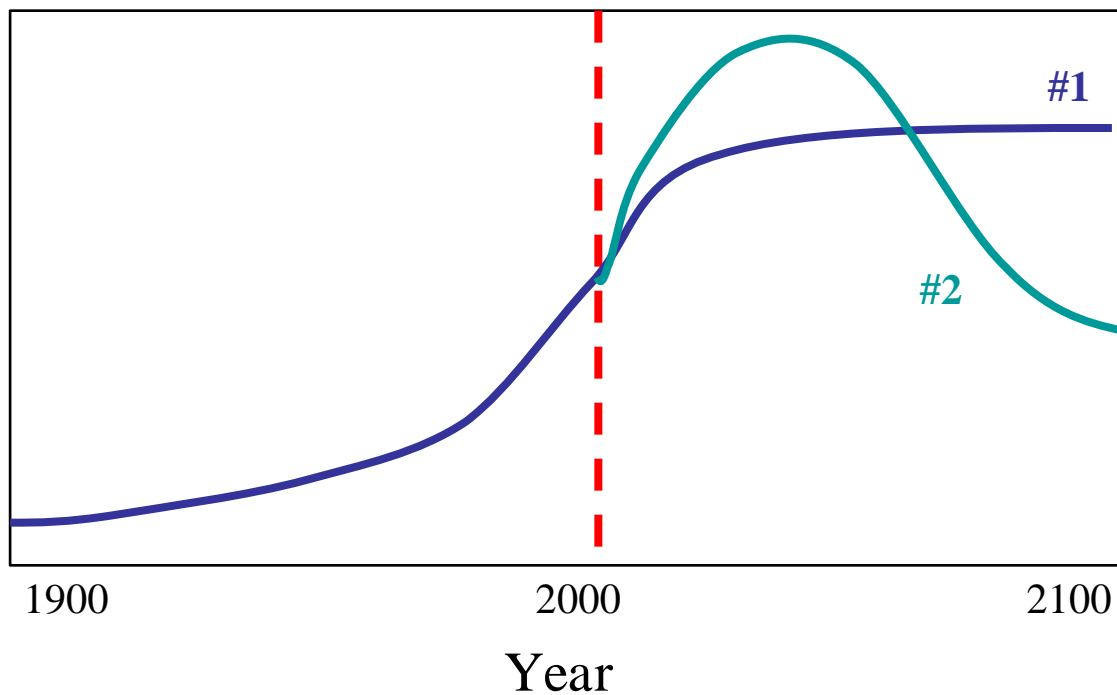
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What do you expect of
the long-term future?

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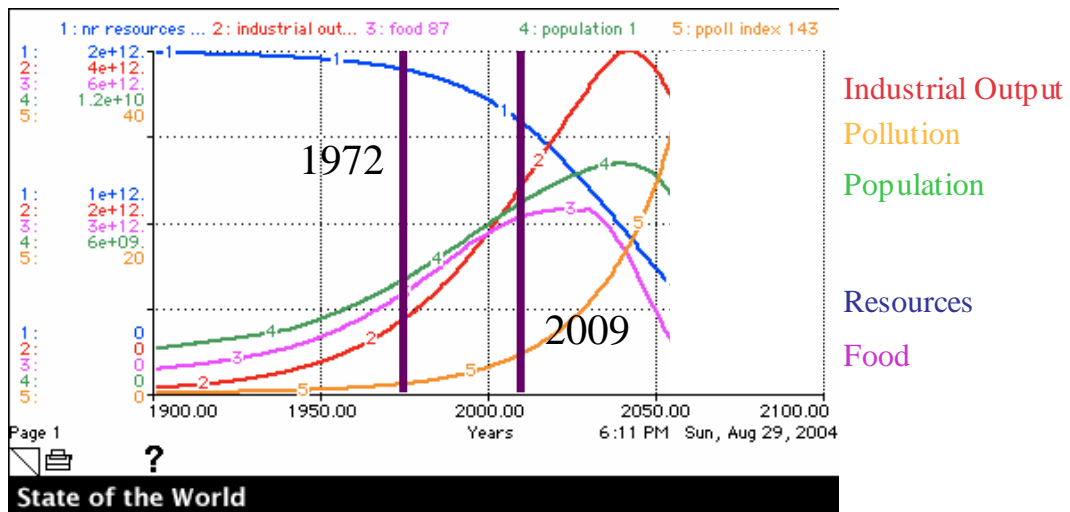
Two Options for Future Population



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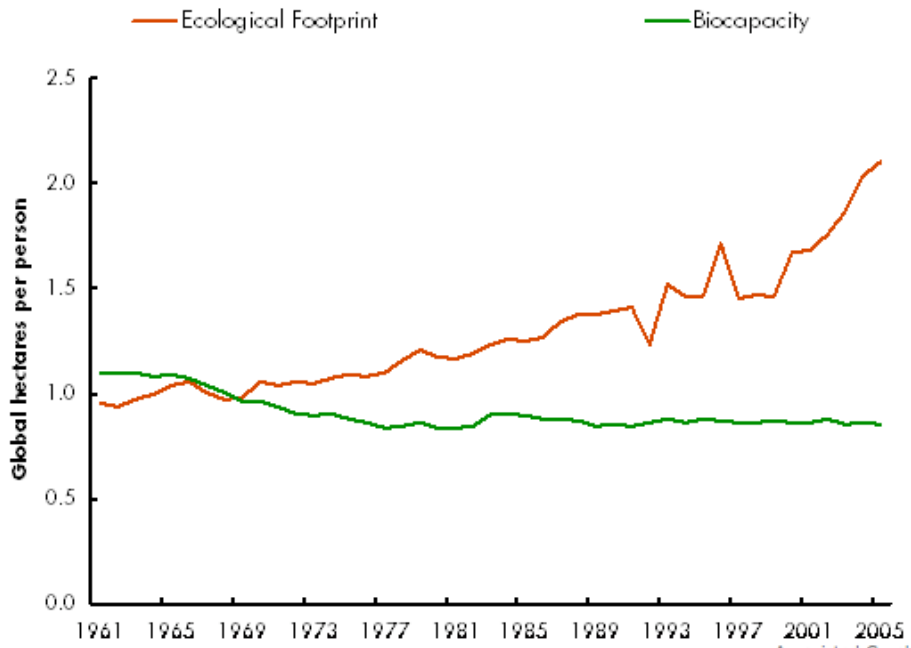
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Our1972 Standard Scenario



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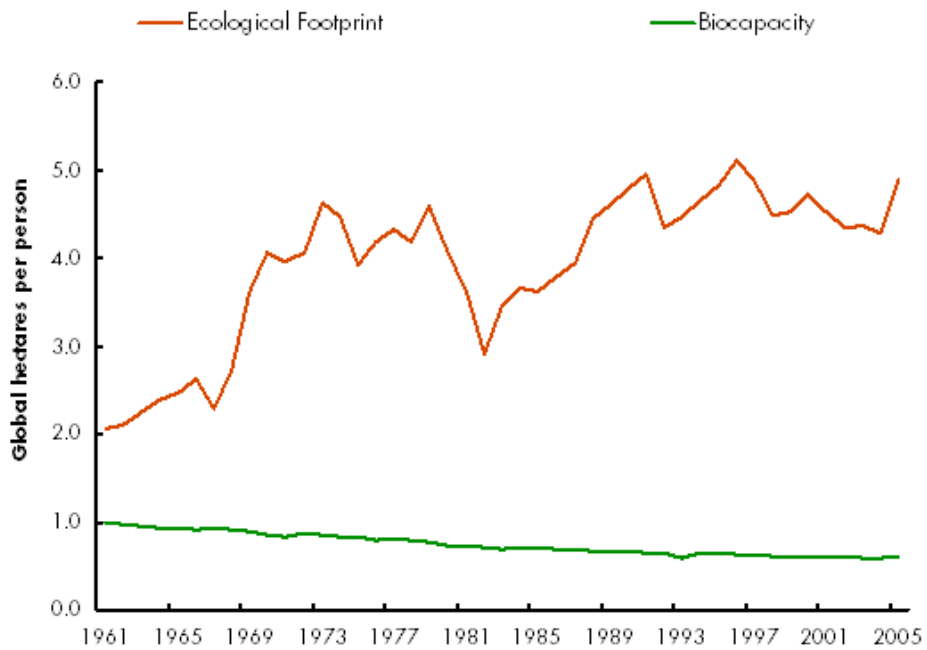
China's Ecological Footprint



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Japan's Ecological Footprint

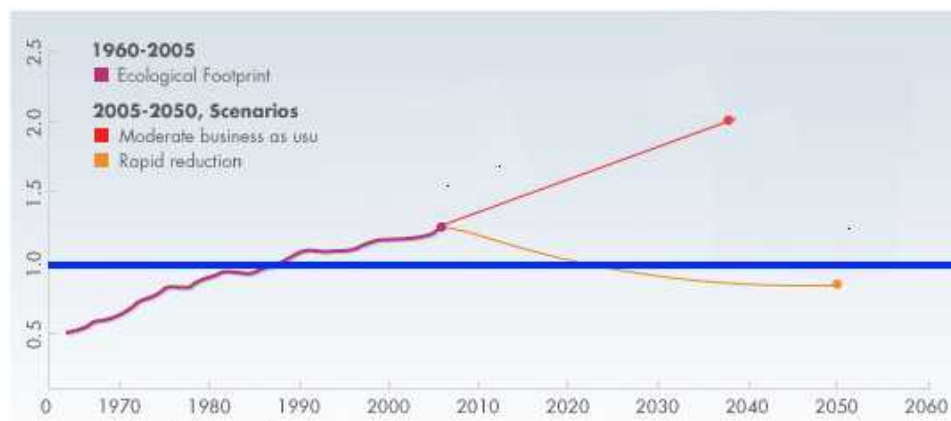


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The Global System is 35%
Above Sustainable Levels

Fraction of Sustainable Level



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People expect that the most difficult tensions in society will come after the growth trends have reached their maximum and started to decline. This is not true.

The most difficult tensions will come as forces grow strong enough to neutralize the political, economic, and biological forces that promote growth. We are entering that period now.

Those forces will create the need and the opportunity for radically new technologies and products.

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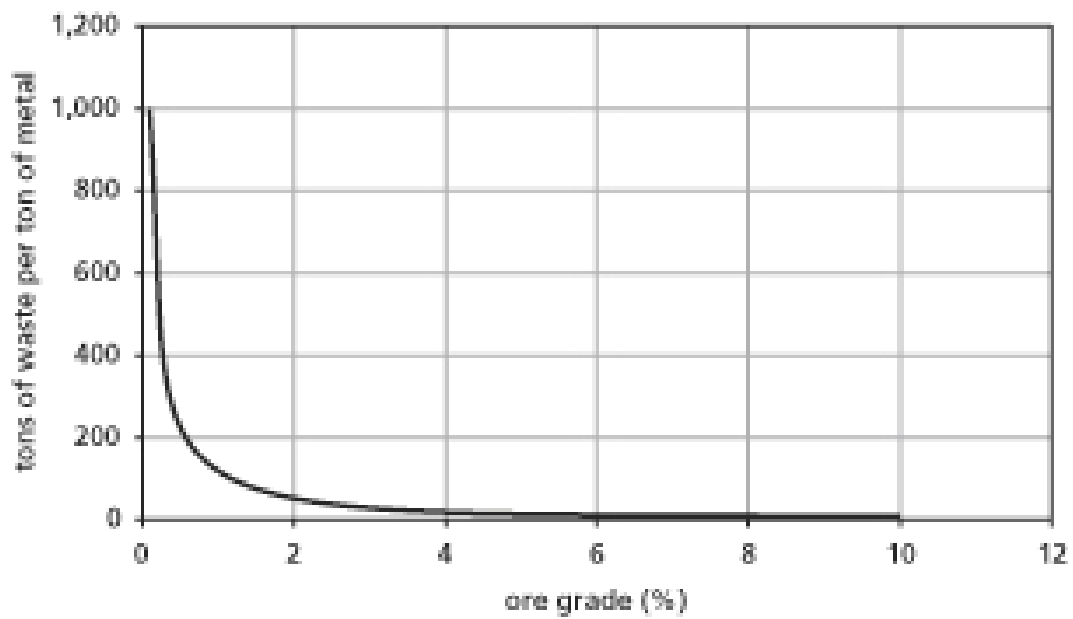
The Physical Limits to Growth

Energy & Materials Flow



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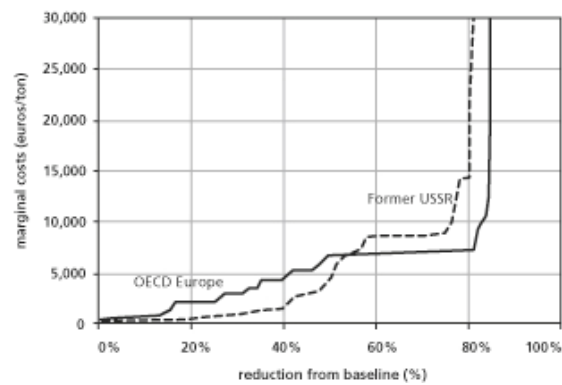
Cost to Obtain Resources



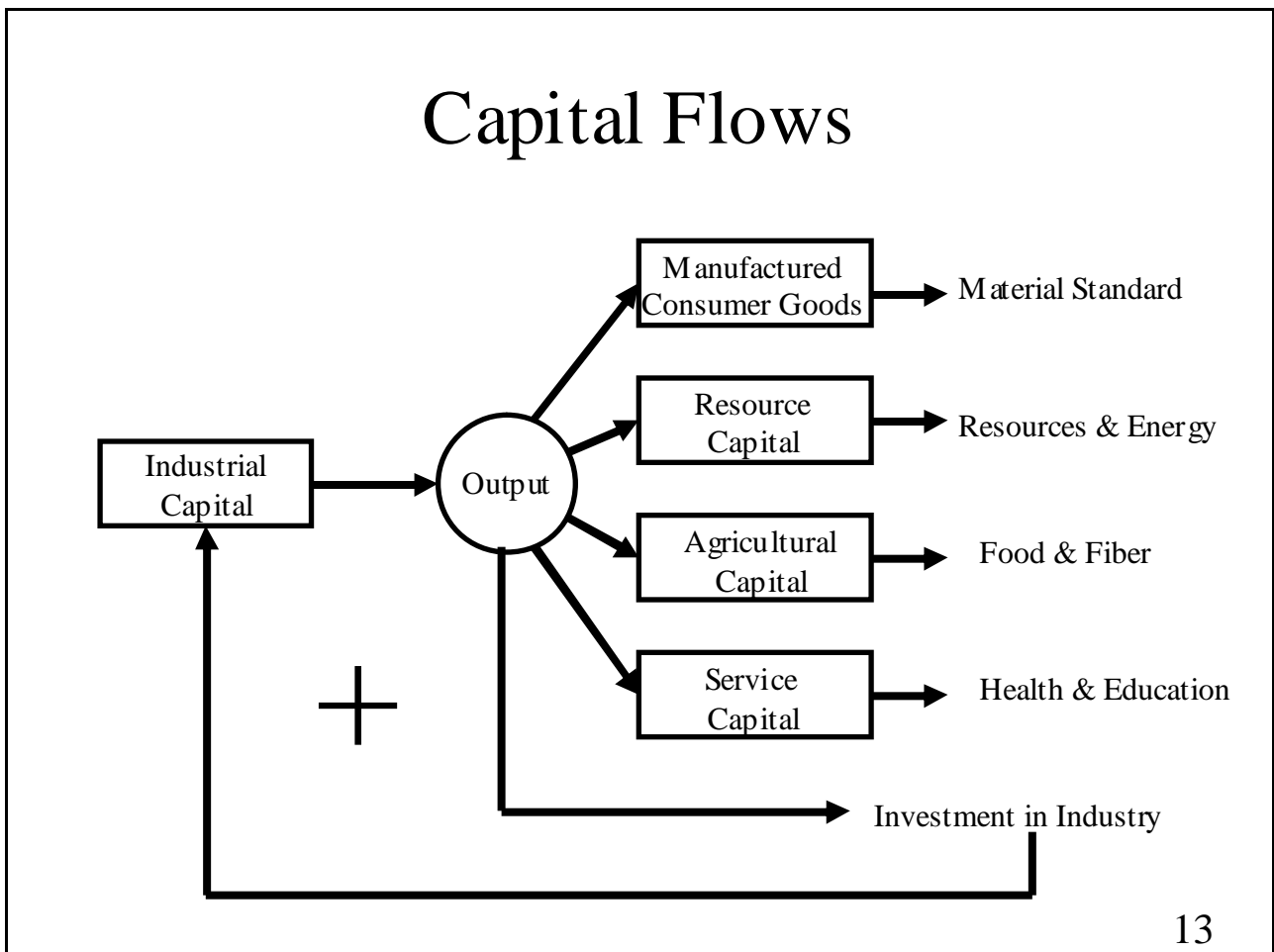
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Cost to Reduce Emissions



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Most Important Limits for Japan

- Climate change
 - Sea level rise, bigger storms, sea acidification, shifting pests and agriculture
- Fossil fuel depletion
 - Price increases, reduced reliability, decreased role for the market in allocating energy.
- Food scarcity
 - Price increases, political instability, migration pressures, rise of non-market allocation

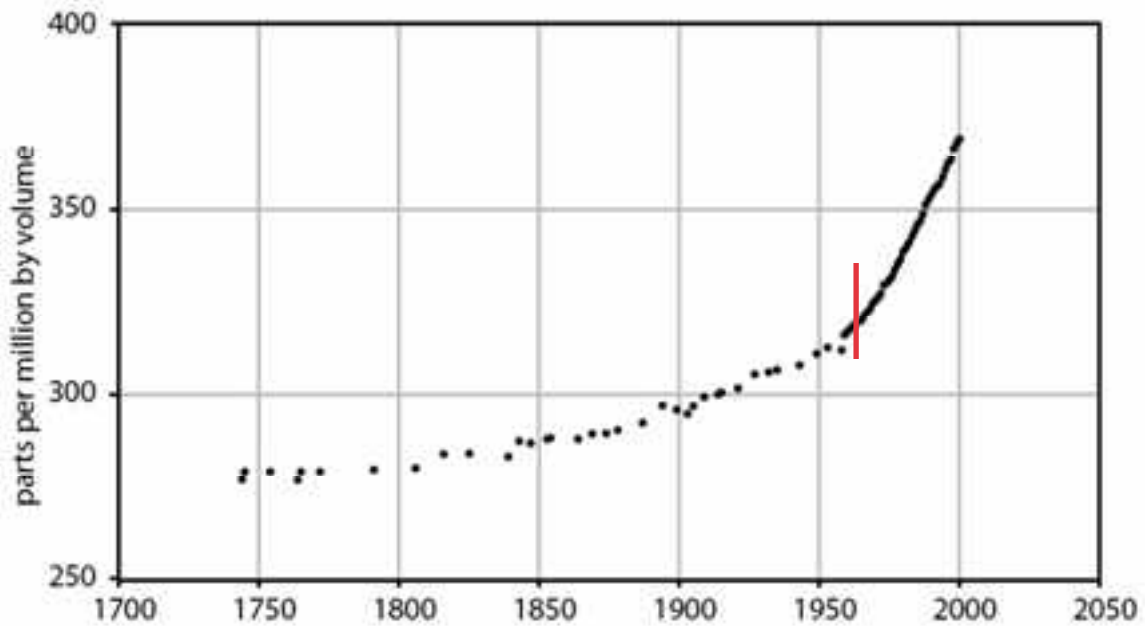
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Two Types of Policies

- **Preventive** – actions taken to reduce the magnitude of the problem
- **Adaptive** - actions taken to reduce the damages caused by the problem

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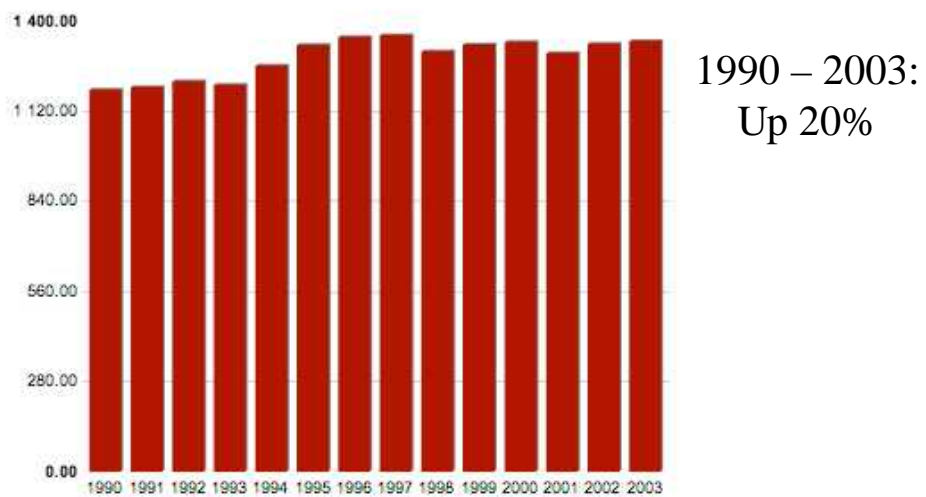
Global CO₂ Concentration is Rising



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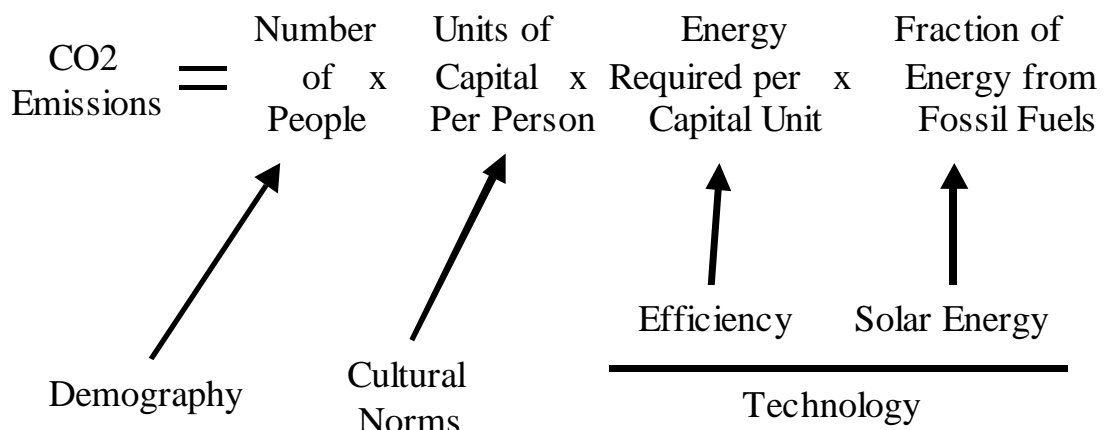
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GHG Emissions are Rising in Japan



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Four Factors Determine the Amount of CO₂ Emissions

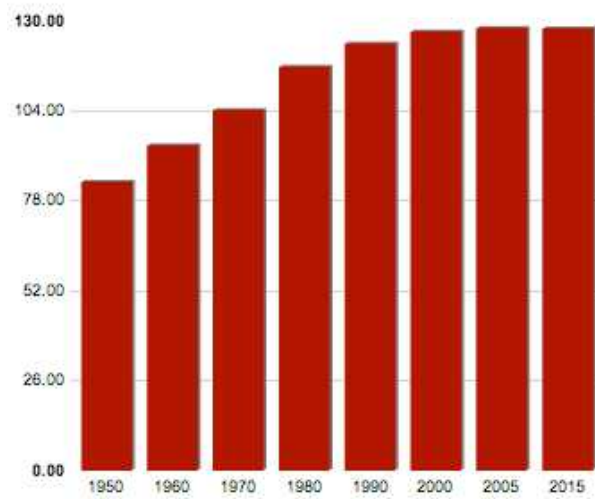


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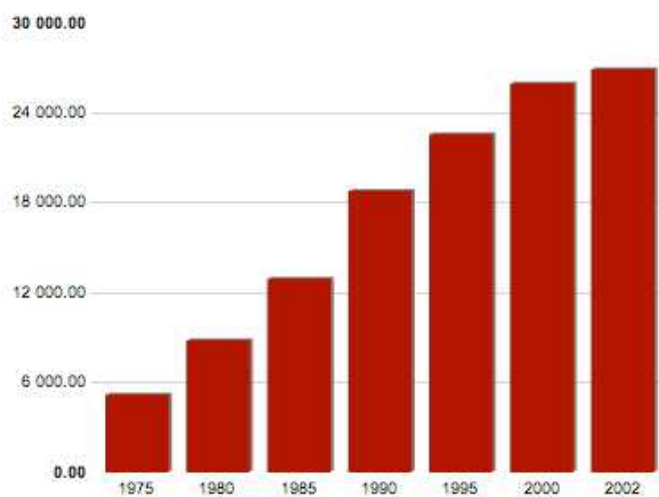
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Japanese Population



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GDP Per Person



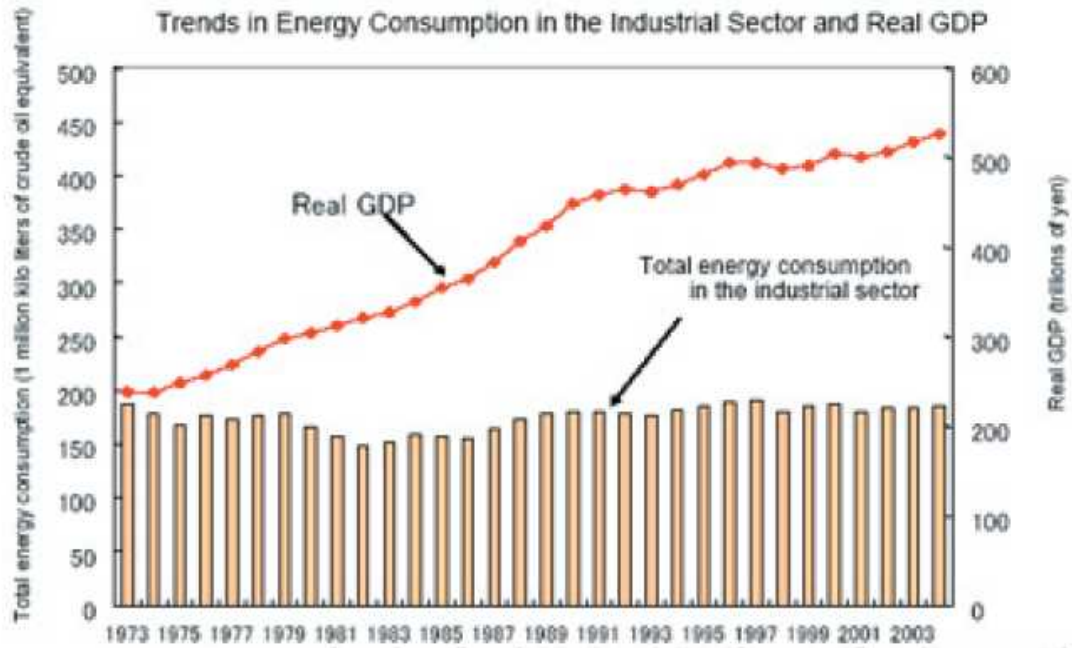
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Trends in Industrial Energy Efficiency in Japan

Between 1973 and 2005, the steel industry improved its energy efficiency by 20 percent, the papermaking industry by 52 percent and the chemical industry by 29 percent.

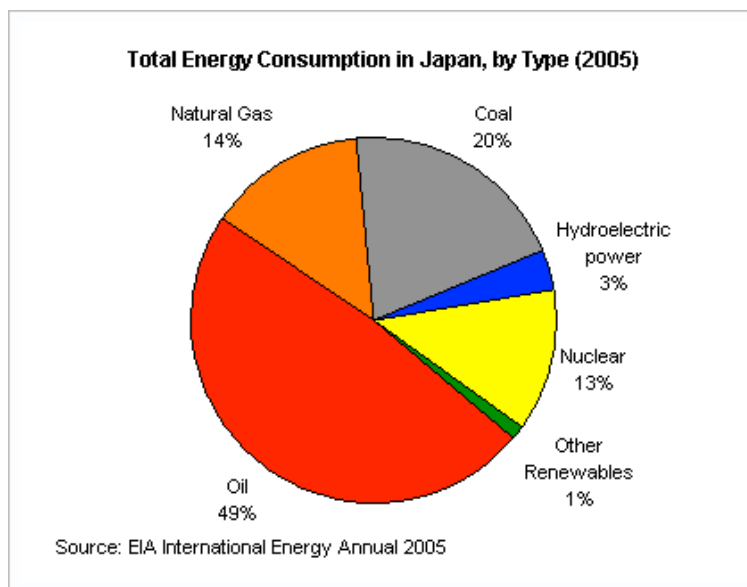
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The energy consumption in the industrial sector has stayed on the same level while GDP has doubled

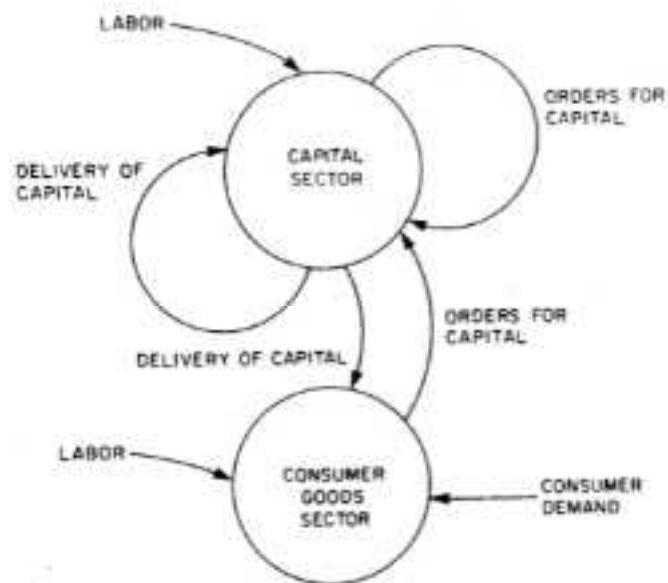


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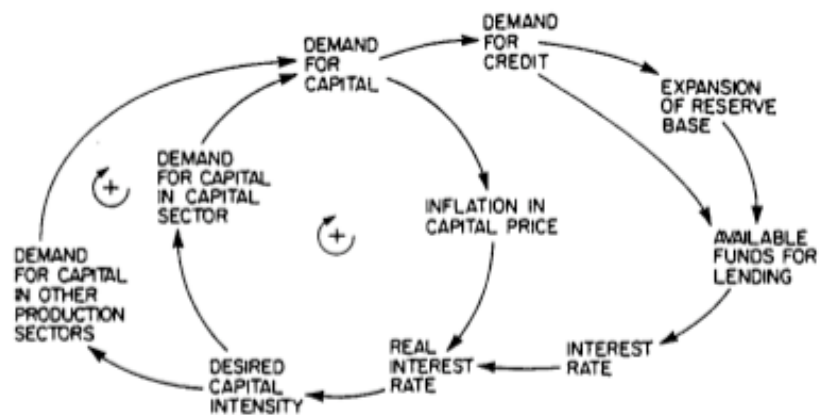
Japanese Use of Renewable Energy



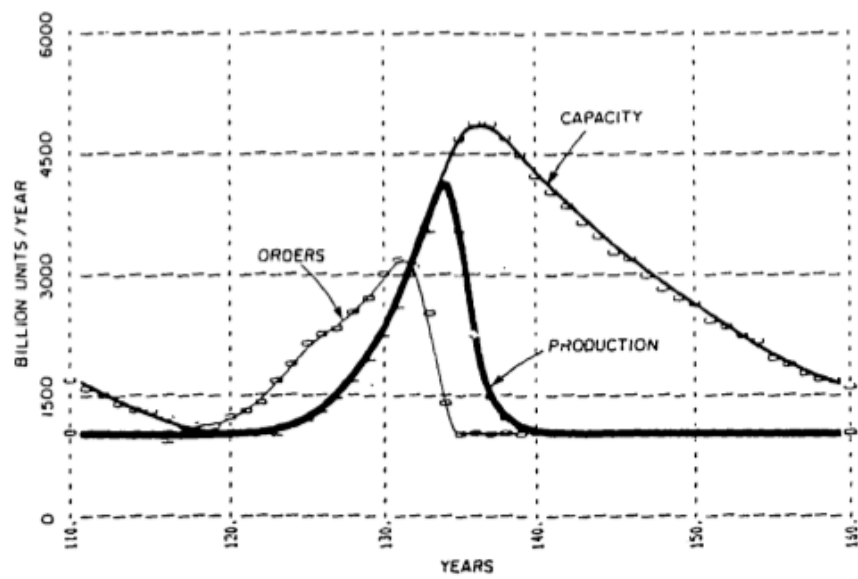
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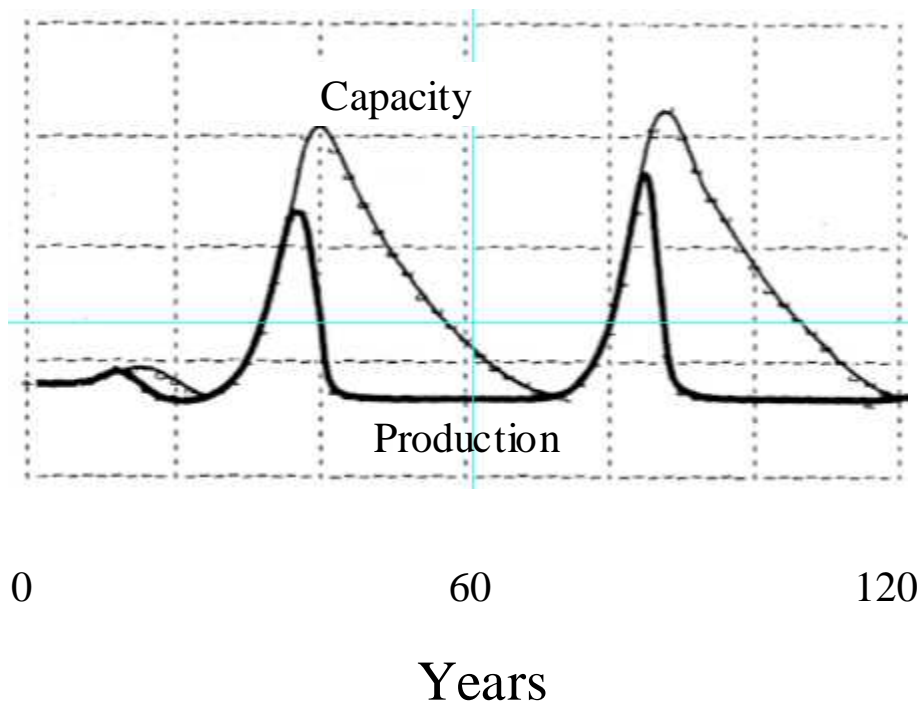
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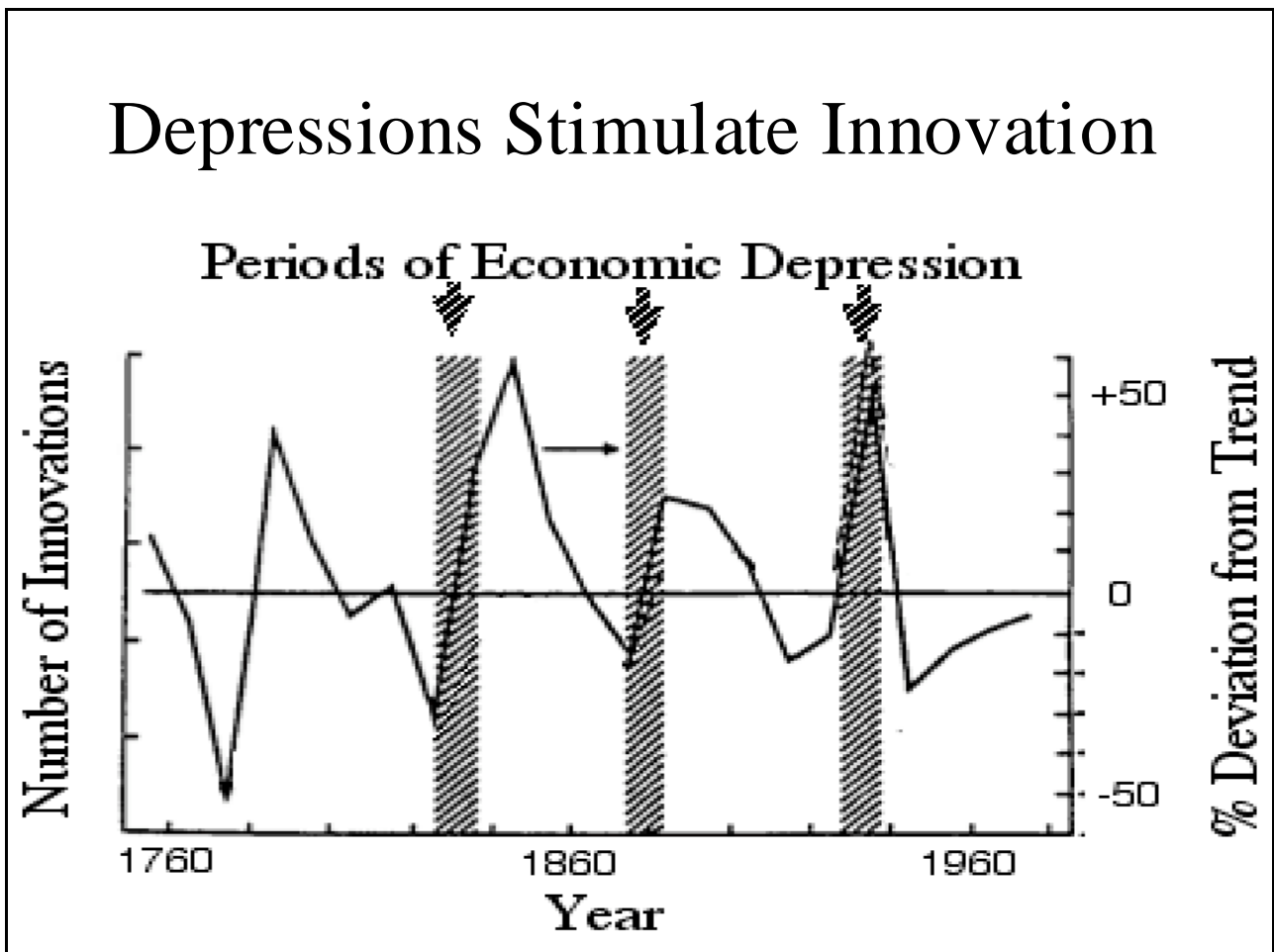
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Typical Cycle: 50-80 Years



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Main Ideas About Innovation for Living Within Limits

- We need new technical capabilities.
- The main obstacles to creating a low carbon society are social and political, not technical.
- Japan has enormous scientific resources and the possibility to develop important new products.
- The new products must be integrated with new social and political patterns.
- The major markets for products will come from efforts to adapt to crisis, not to prevent crisis.

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The Future Context for Innovation

- The global market and financial system will not return to conditions of the 1990s.
- Limits to growth are exerting their influence, but the main cause of the current crisis is the Kondratiev Wave – excess production capacity.
- It is useless to raise consumer demand or buy worthless assets; the solution is development of the next wave of technology.
- That wave will help nations adapt to global limits.

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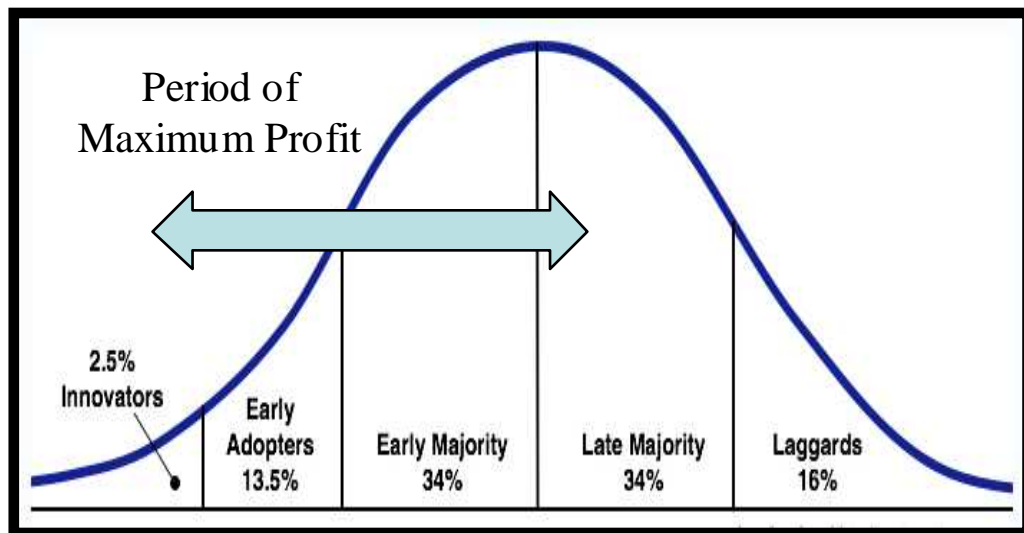
Facts Related to Innovation

- The big export markets will come from adaptation rather than prevention.
- Energy will become much more expensive.
- Problems will arise suddenly, not continuously.
- Research targeted to long-term goals is most productive.
- Economic rates of return will be much lower in the future.
- Success will require changes in the social and political system that match technology change.

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Profit & and the Innovation Cycle



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