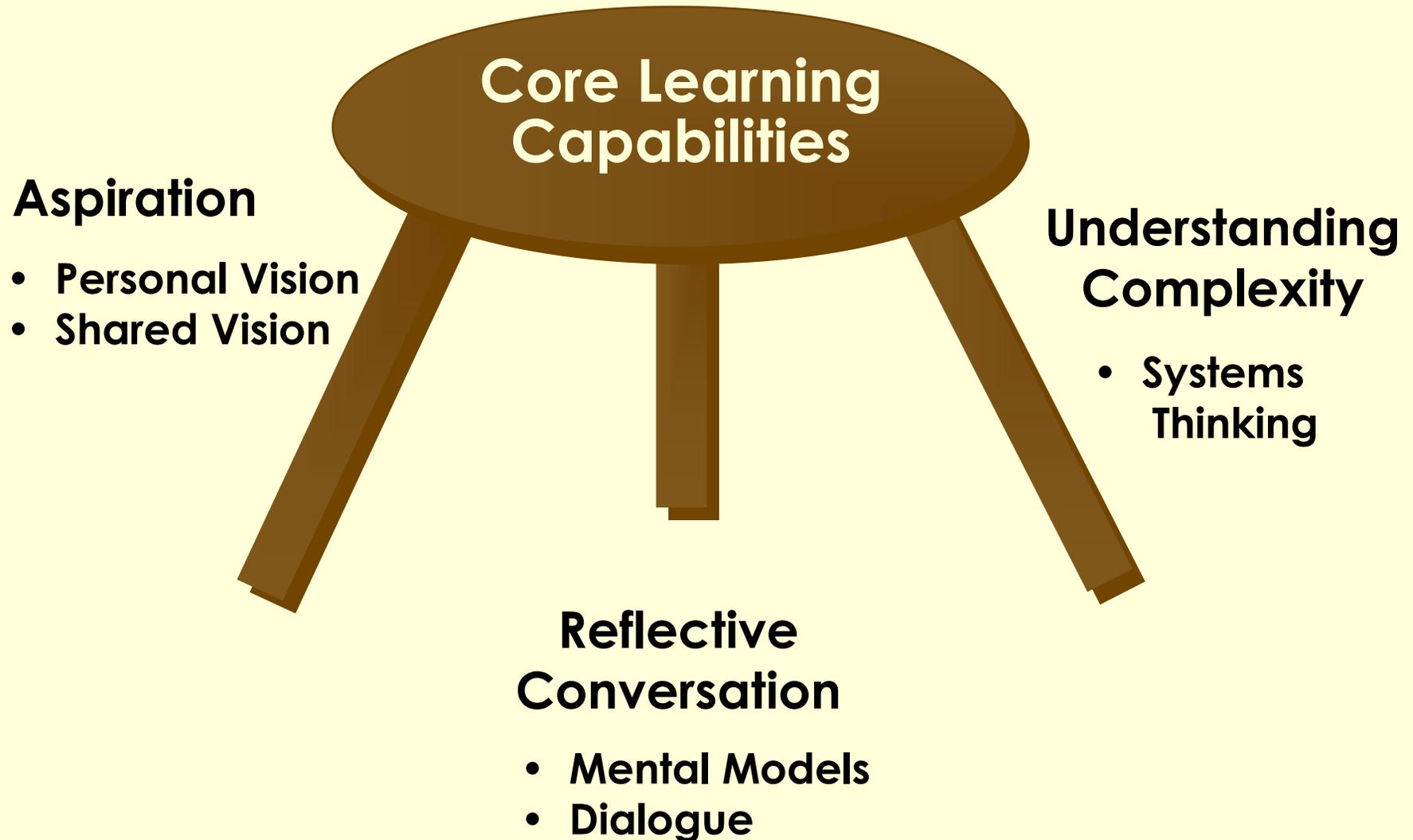


# Building Sustainable Organizations and Value Chains:

What is “systems thinking” and  
why does it matter?

The basics of the organizational learning movement: systems thinking as part of a larger set of core learning capabilities



(The Fifth Discipline, 2006)

# Thinking shapes perception and action

**If I reflect on what many organizations have been going through, the whole awareness of sustainability has been growing because systems thinking, in different forms, is enabling us to see much more interdependencies than we have seen in the past.**

**It is those interdependencies which make you conclude that it is more than stupid, it is reckless to think of commercial sustainability in isolation of either social or environmental sustainability. Ó**

Andre van Heemstra, Unilever  
Management Board

The Necessary Revolution, 2008

As a management discipline, systems thinking can help through:

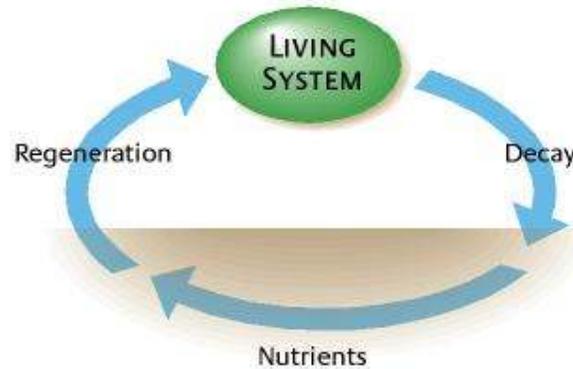
- Guiding images and metaphors
- Focusing attention on patterns of change
- Understanding feedback dynamics  
that shape forces driving change
- Providing basic thinking tools
- Basis for more advanced simulation tools

All are important for building shared understanding regarding the sustainability challenges we face

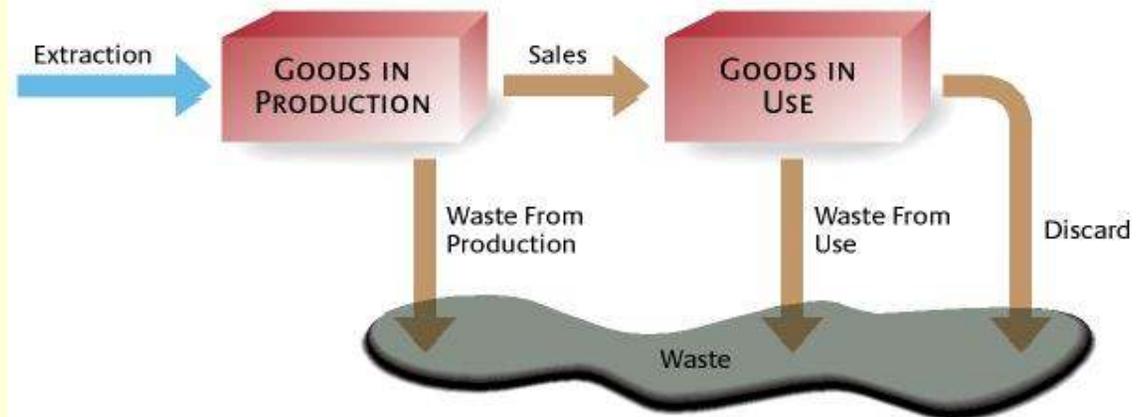
## Guiding Images

# Why Industry Produces Waste

LIVING SYSTEMS FOLLOW CYCLES



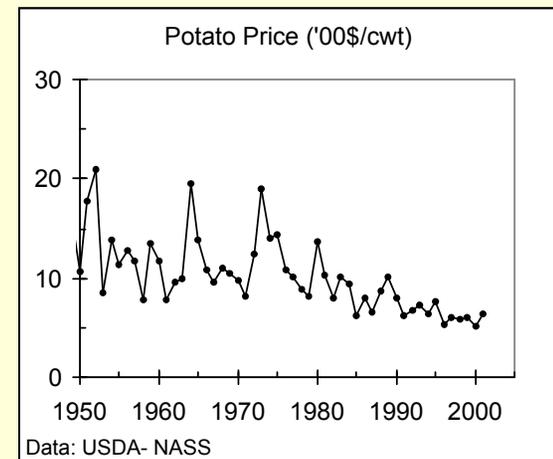
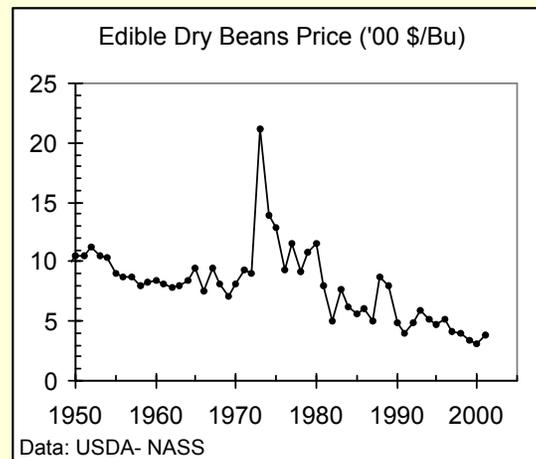
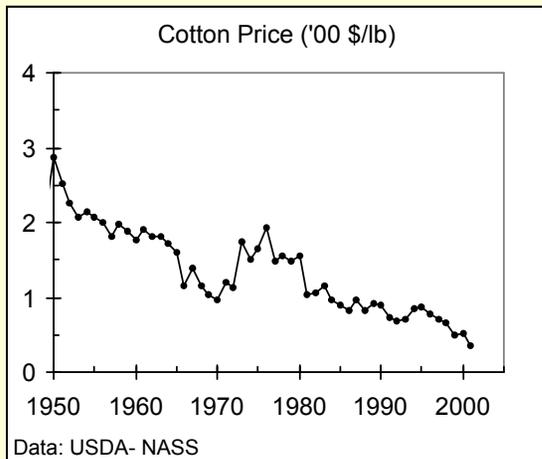
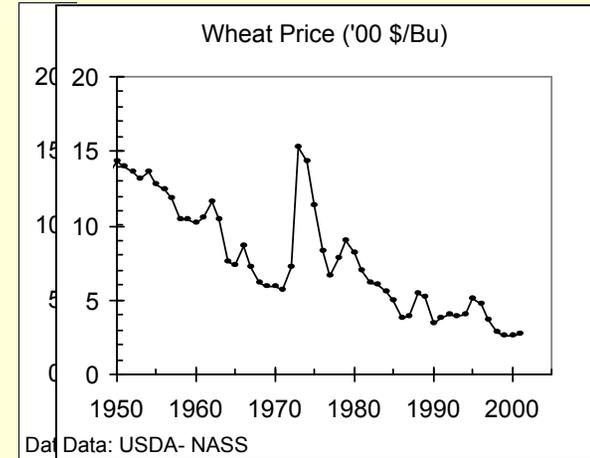
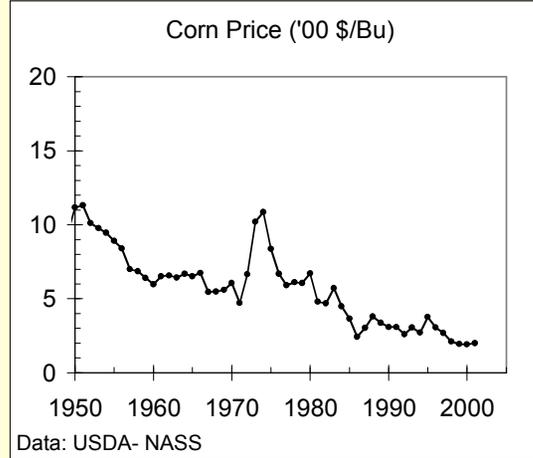
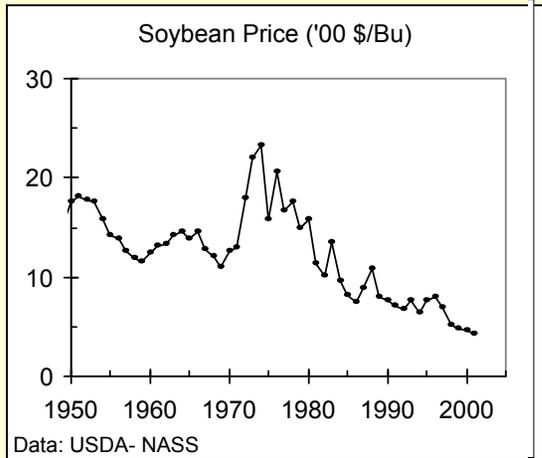
INDUSTRIAL-AGE SYSTEMS DO NOT



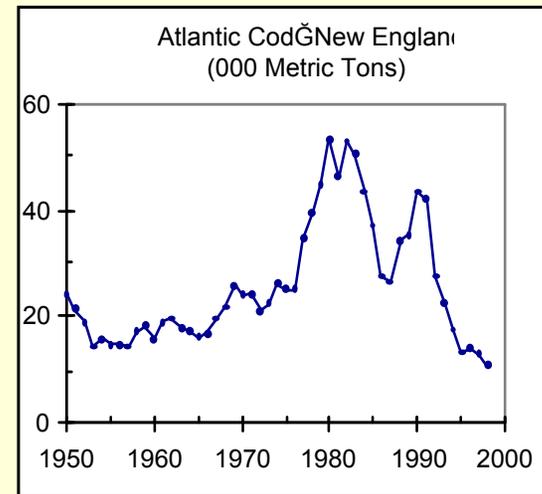
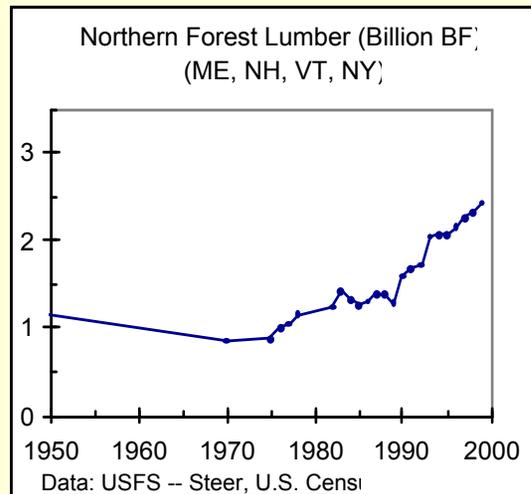
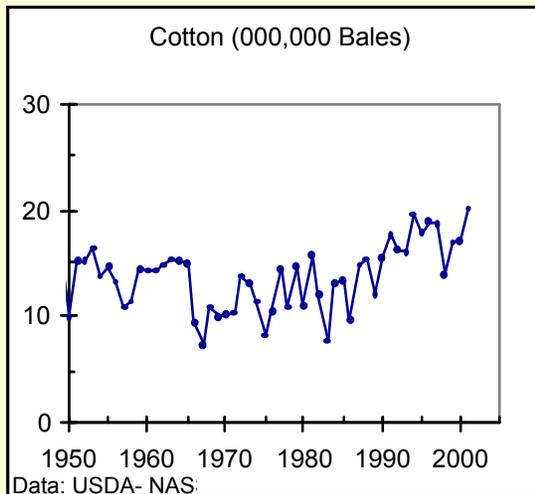
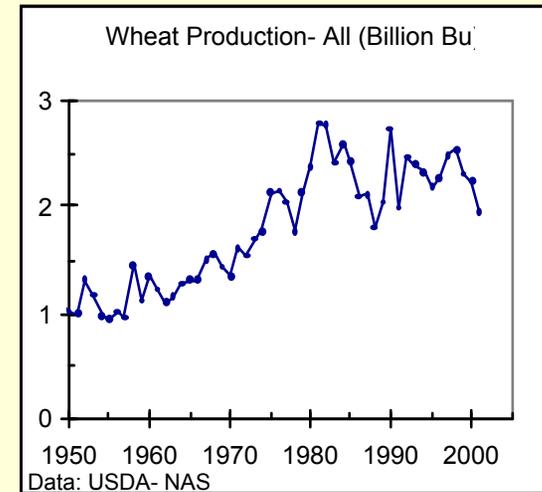
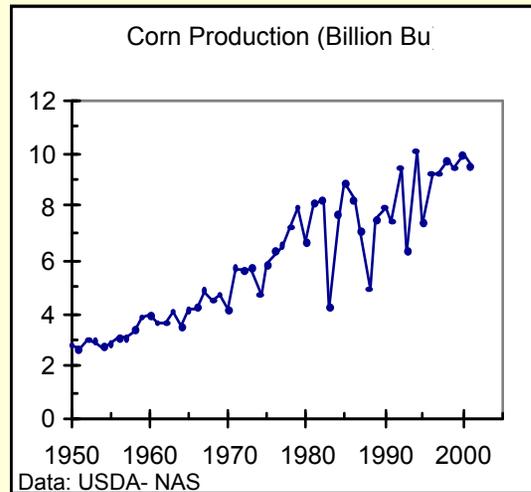
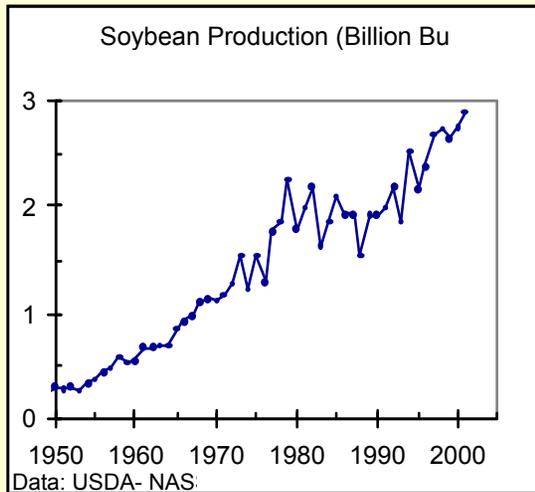


# Seeing Patterns of Change

## A pattern of falling prices across commodities

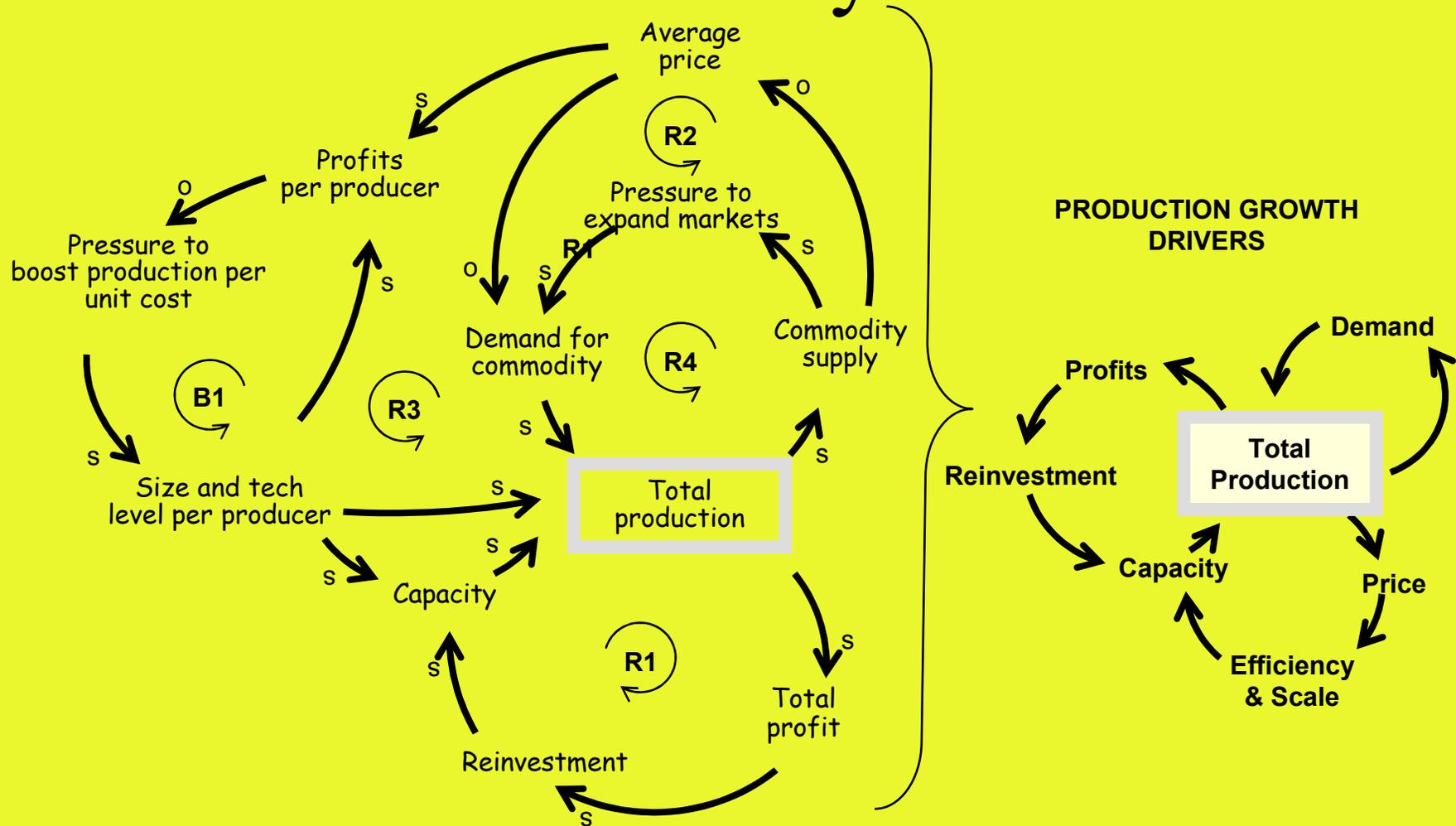


# And increasing production

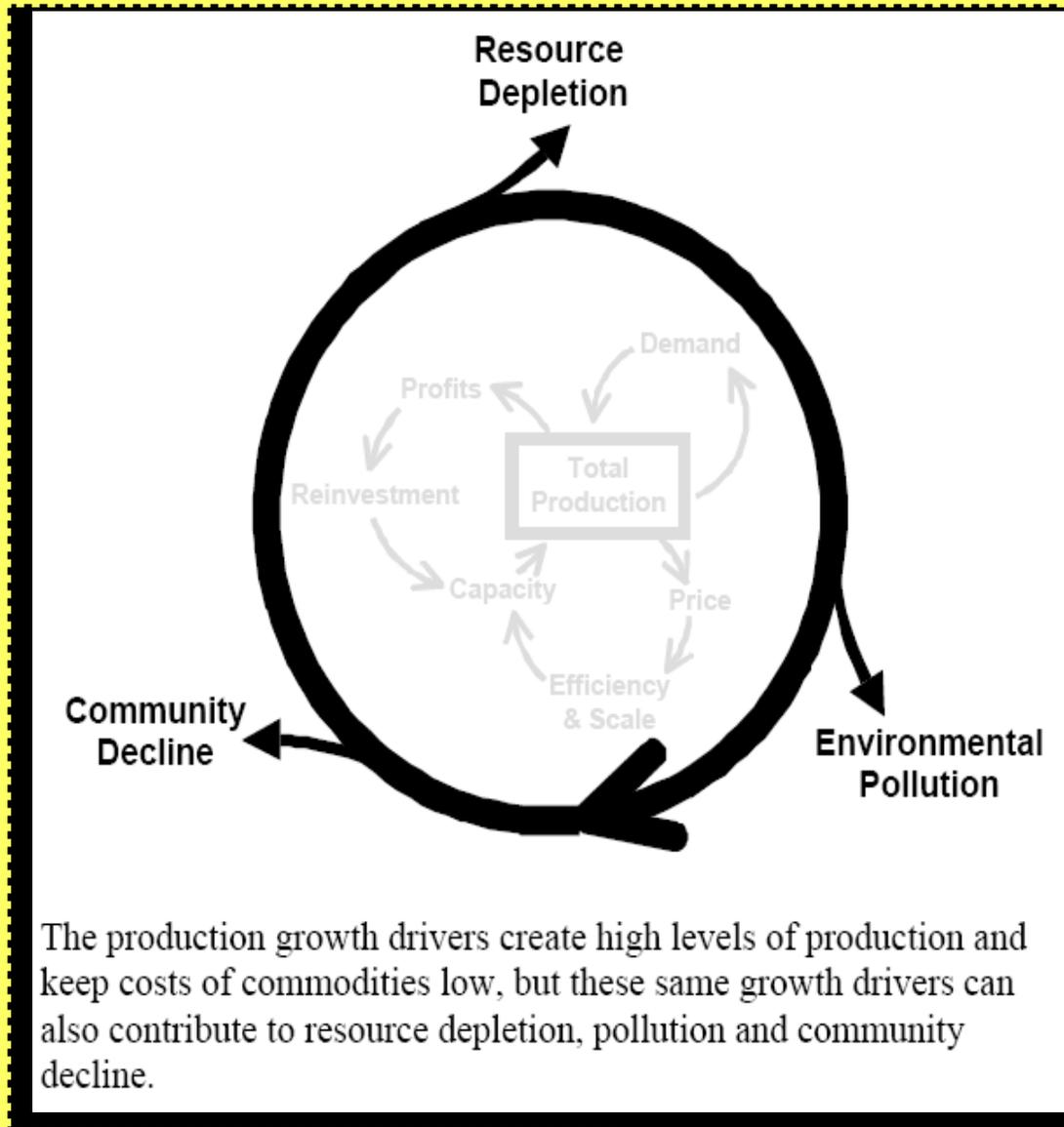


# Underling feedback dynamics driving forces shaping change

## The Productivity Dilemma

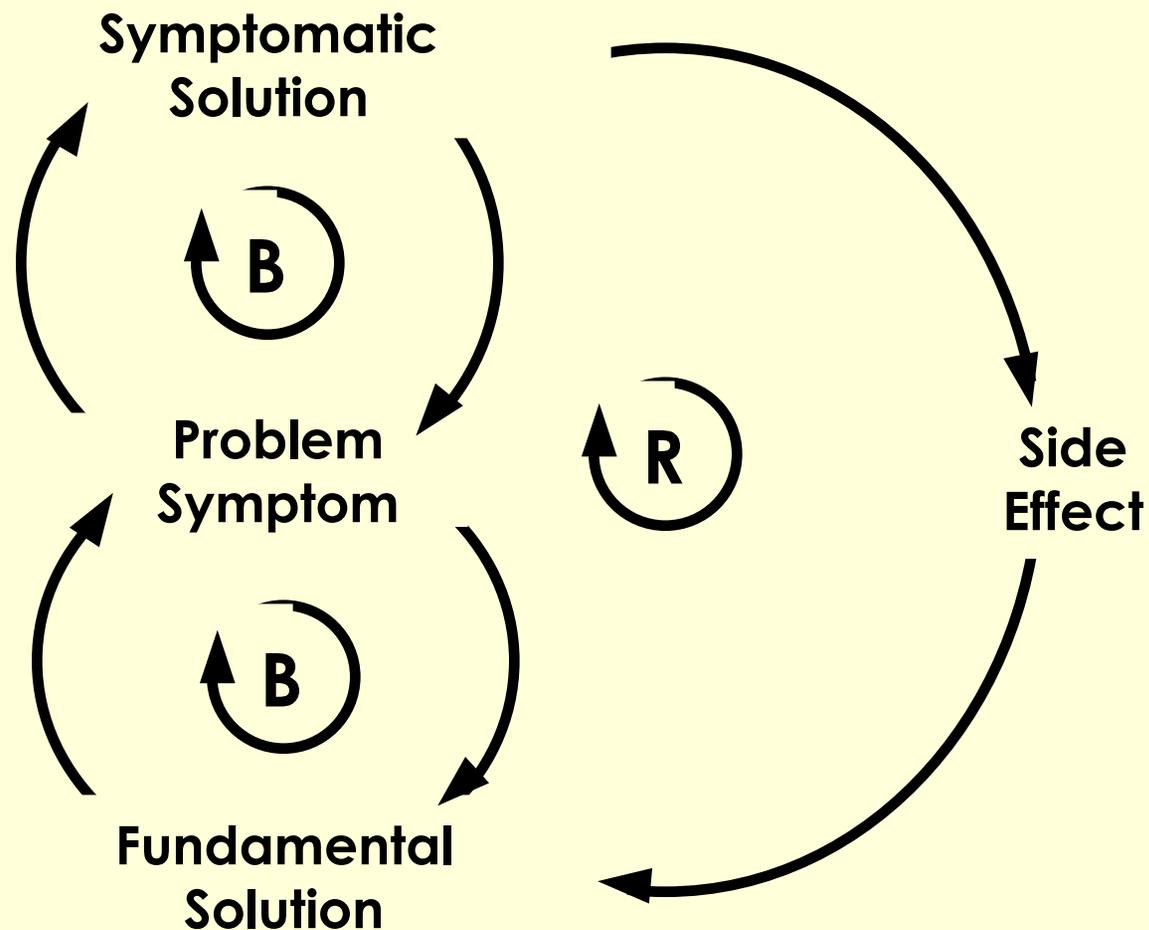


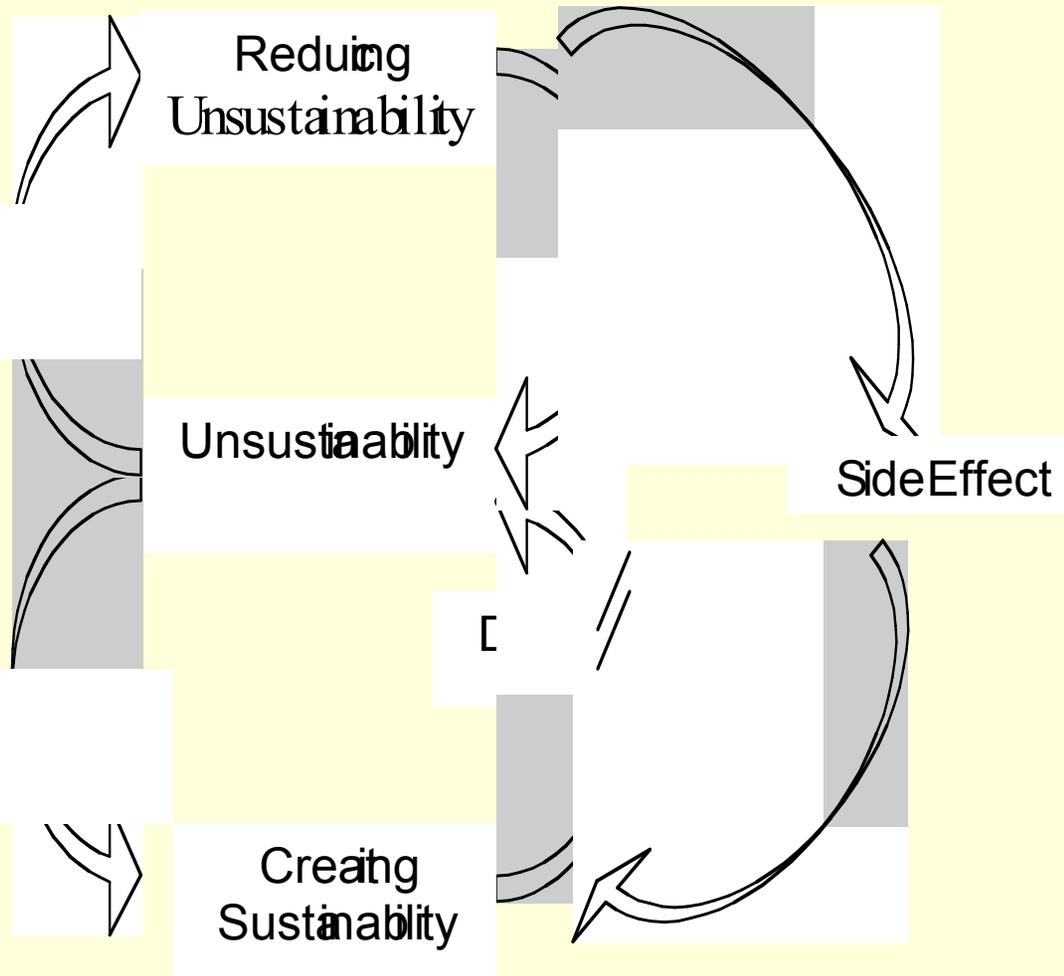
# Risks of the Overproduction Treadmill



# Basic Thinking Tools

## Shifting the Burden Systems Archetype

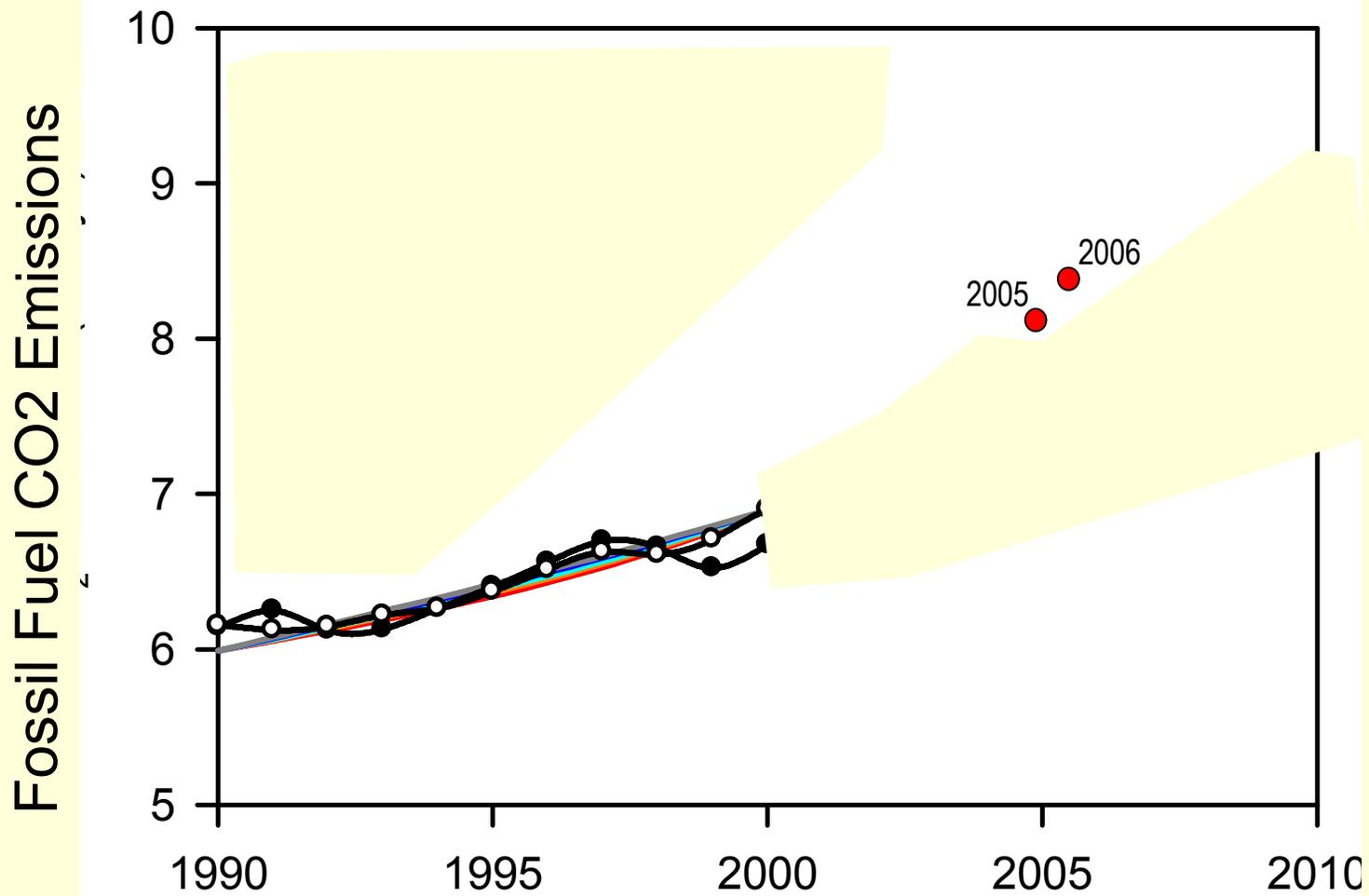




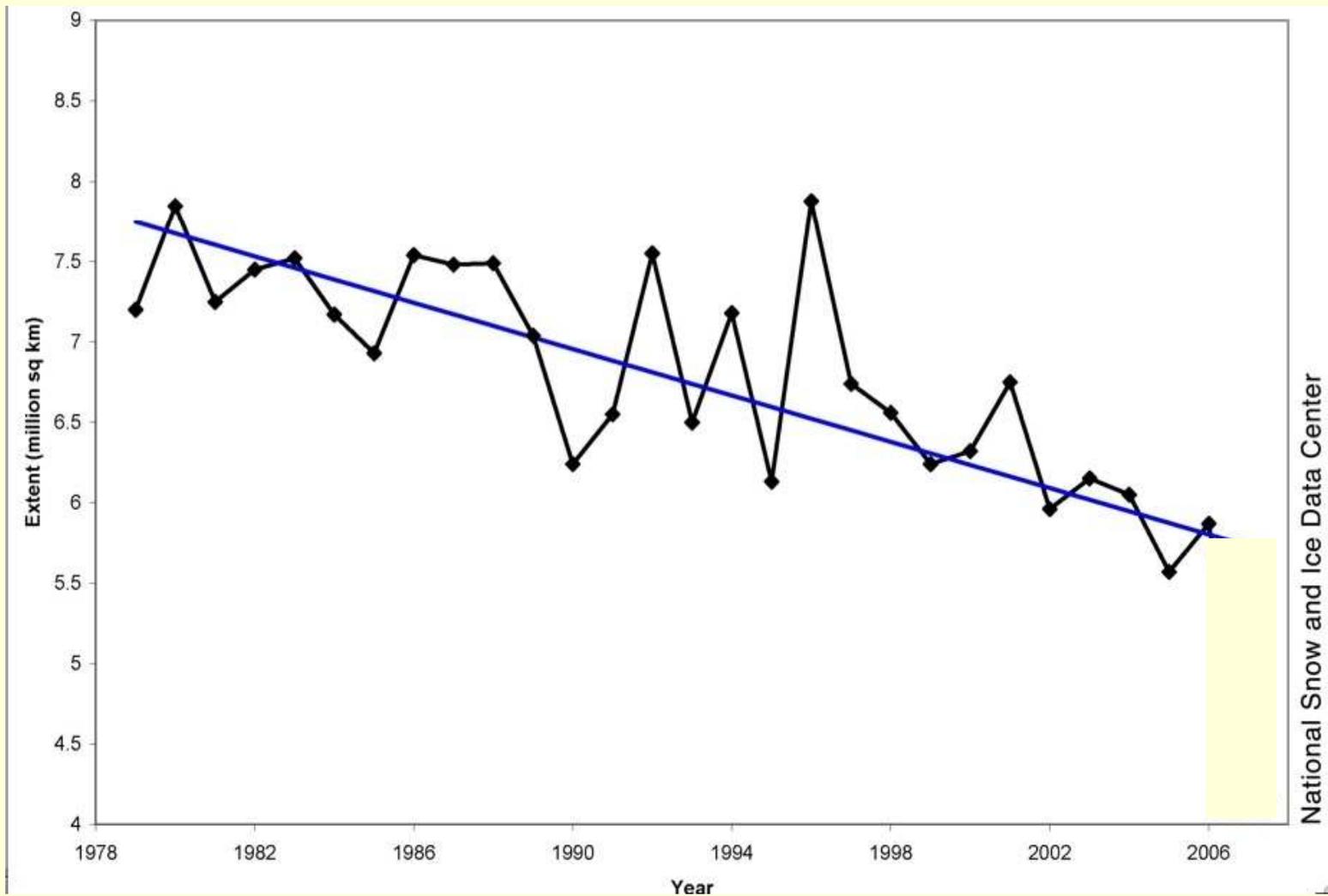
John Ehrenfeld, "Sustainability by Design," 2008

## Regarding Climate Change - basic patterns

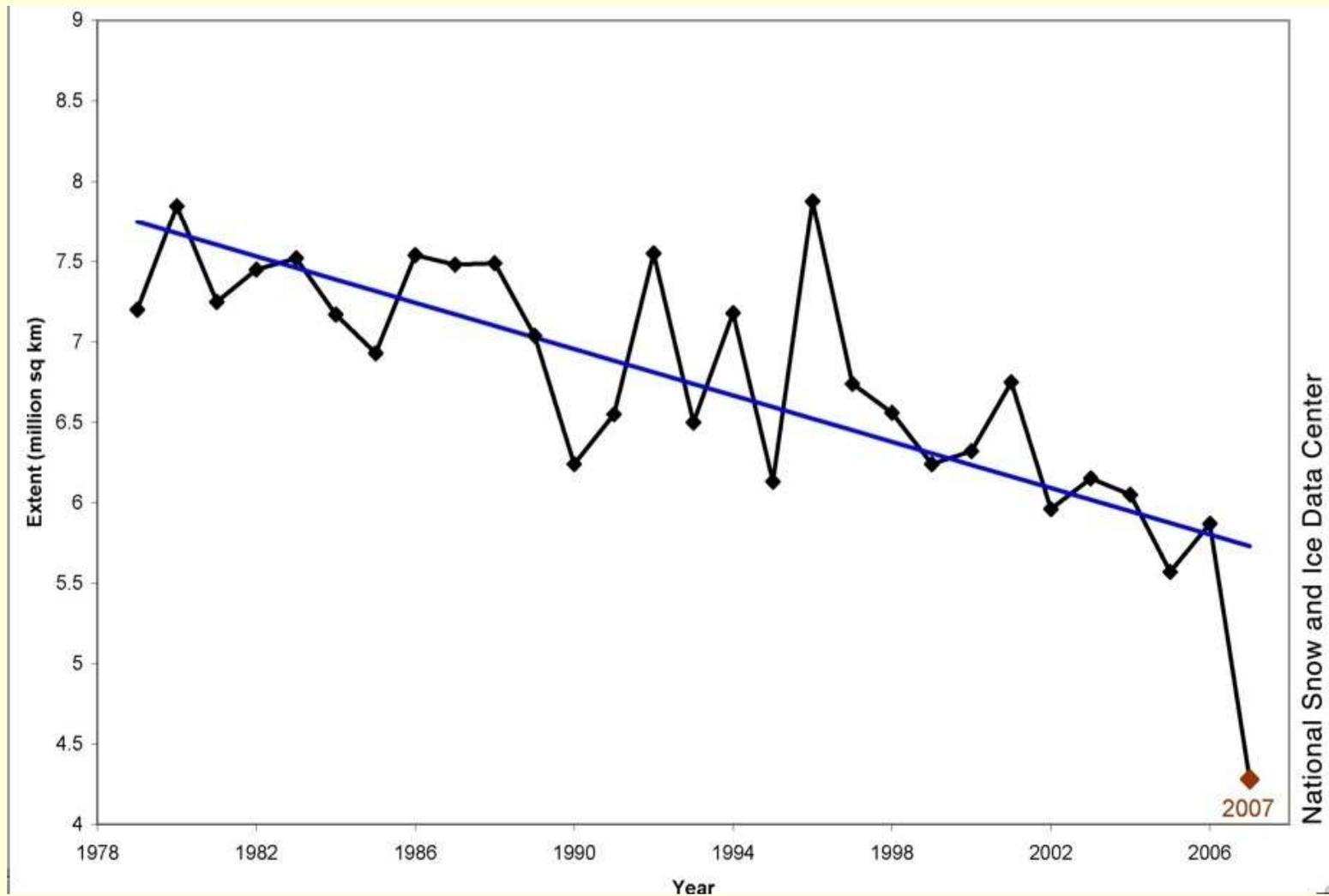
### Global Fossil Fuel Emissions and 2000 Forecasts



# Summer Sea Ice in the Arctic



# Summer Sea Ice in the Arctic

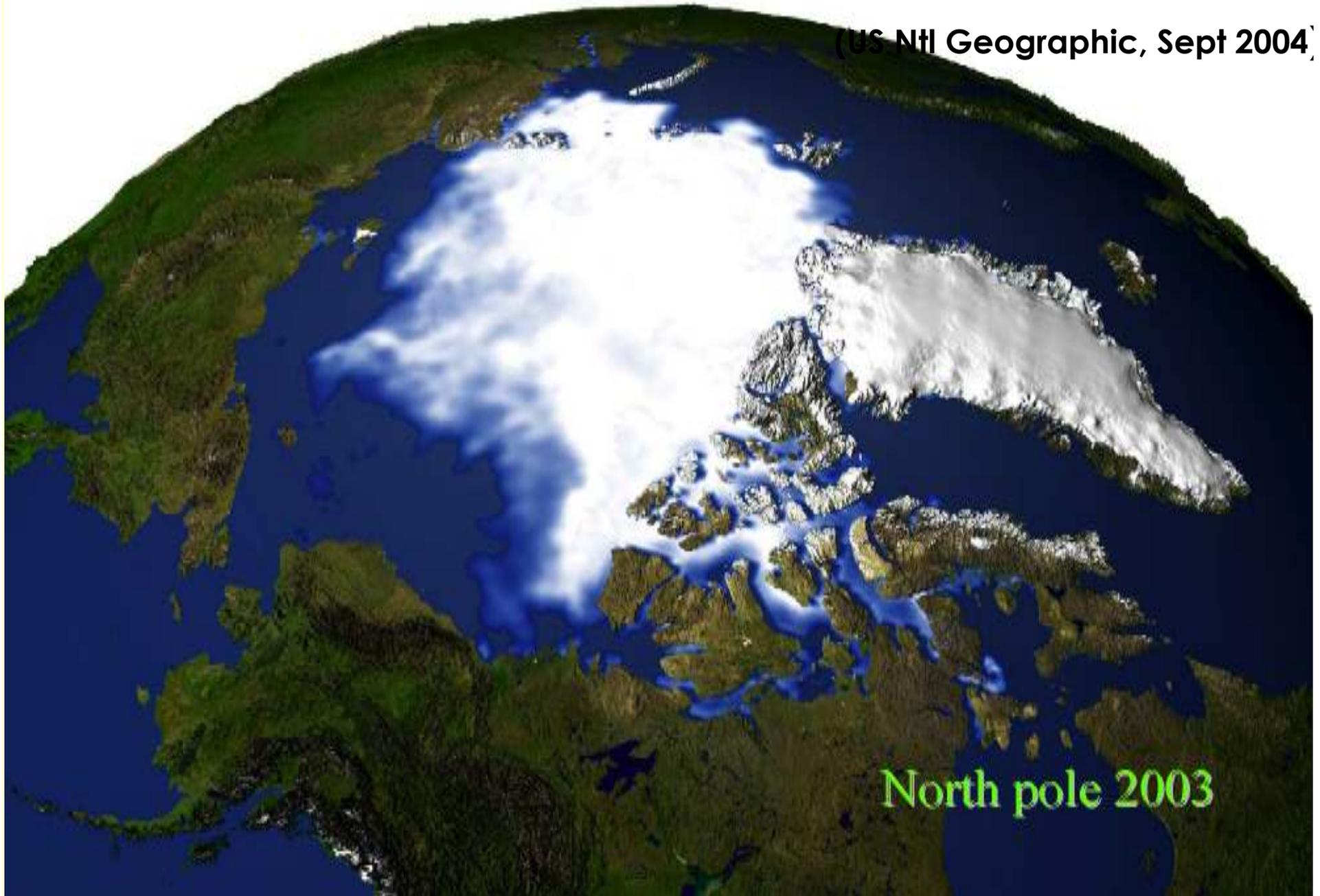


# The evidence for climate change is getting hard to ignore

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

# Polar ice in summer - reduced 40% in 30 years

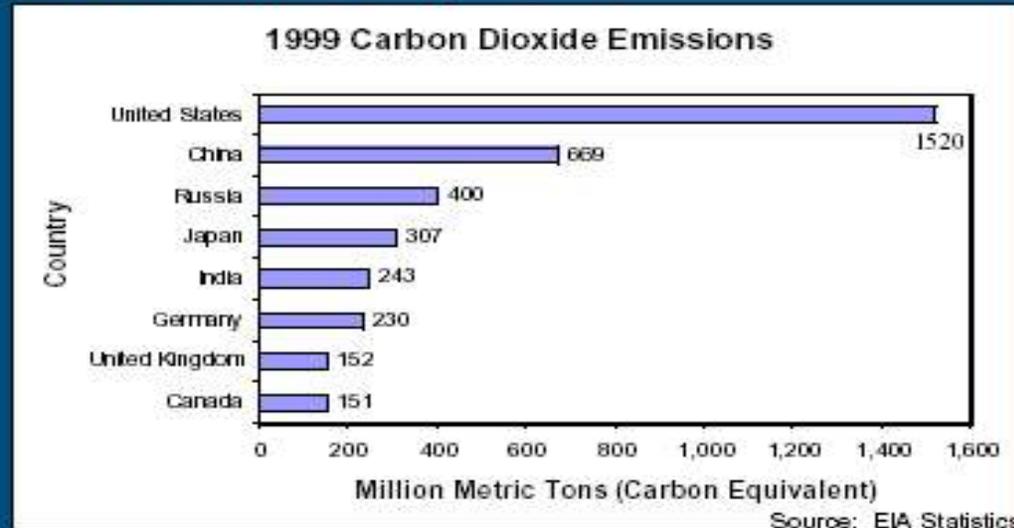
(US Ntl Geographic, Sept 2004)



North pole 2003

# Current State

- In 1999, global emissions of carbon dioxide from fossil fuels was 6.1 billion metric tons (carbon equivalent).
- With only 5% of the global population, the US emitted 25% of the global CO<sub>2</sub> emissions, or 1.5 billion metric tons.
- China's emissions are projected to increase to 1,683 MMTC by 2020, which represents an average annual increase of ~5%.



The US is the Largest Source of CO<sub>2</sub>, Which is the Most Significant Greenhouse Gas - And the One Most Closely Tied to Energy Use

In 2007, China passed the US in CO<sub>2</sub> emissions

The pattern that enabled climate scientists to argue for human-induced climate change:

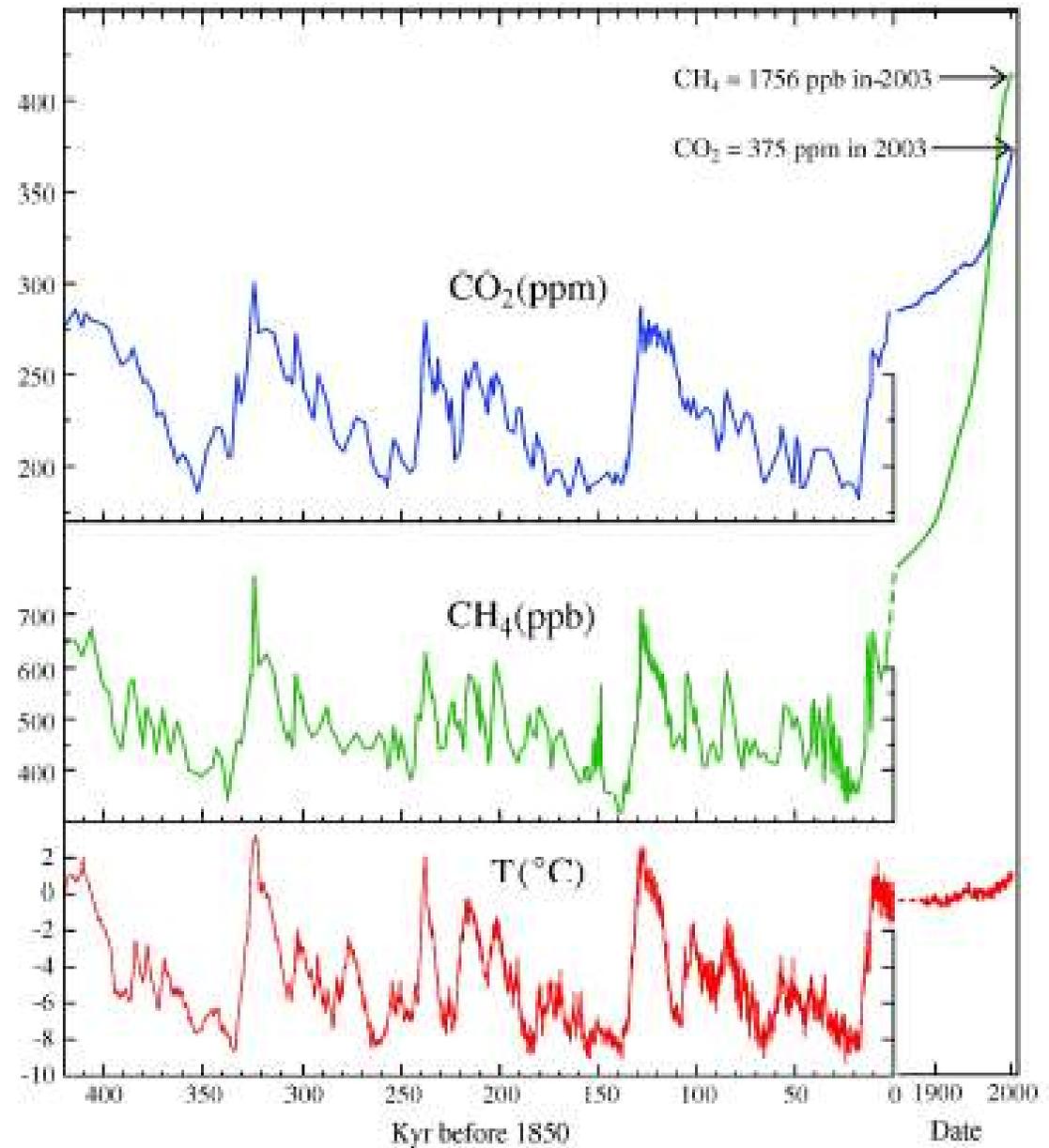


Figure 1. Record of atmospheric CO<sub>2</sub>, CH<sub>4</sub>, and temperature extracted from Antarctic ice core by Petit et al. (1999) and from in situ and other data for the past century. The temperature change for the past century, for comparability to the prior record is twice the global mean temperature change of Hansen et al. (2001). The temperature zero-point is the mean for 1880-1899.

# Understanding Feedback and Stocks & Flows

QuickTime™ and a  
Photo - JPEG decompressor  
are needed to see this picture.

Current rate at which emitted CO<sub>2</sub> is being removed from atmosphere is approximately 2 billion tons (gigatons)/yr (estimates vary by about 25-50% due to inability to measure directly and questions about 'saturating sinks' and sustainable rates of removal))

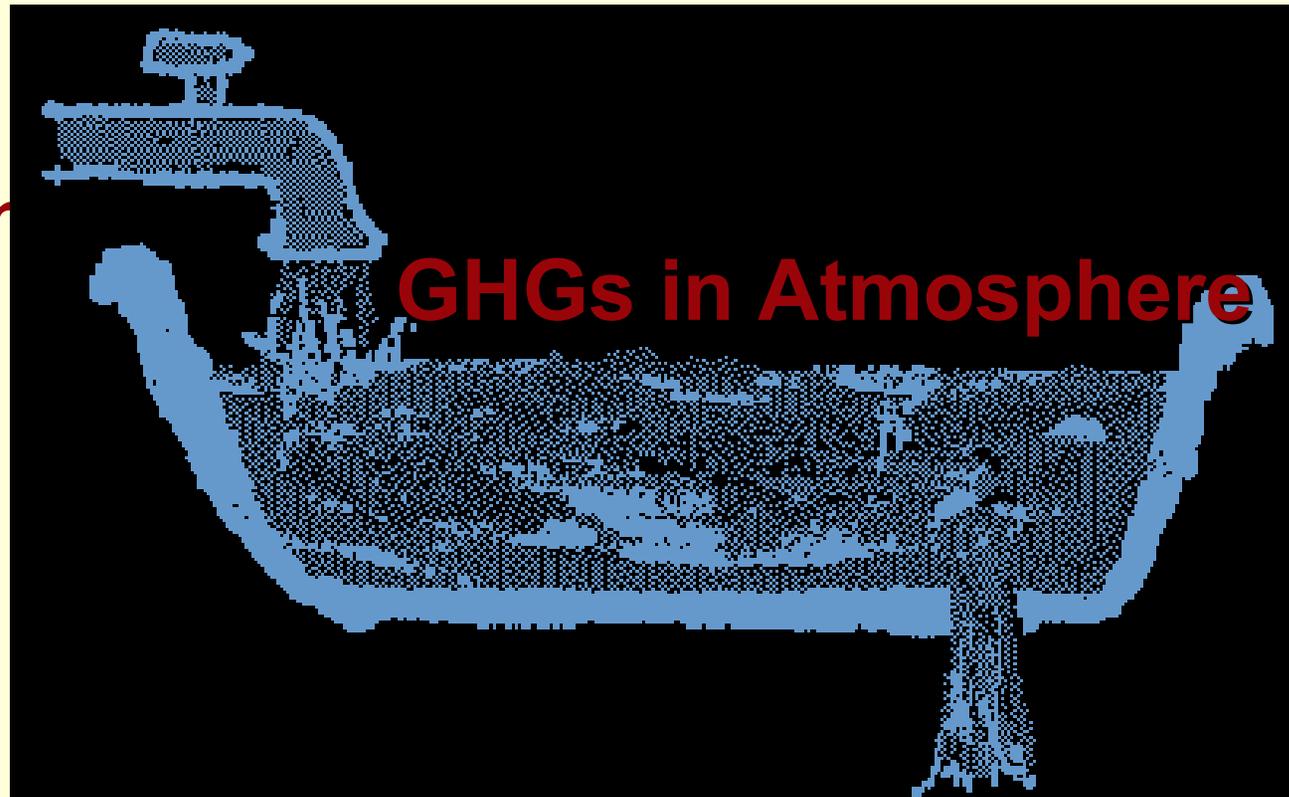
← Current rate of CO<sub>2</sub> removal  
(Scientific American 2005)

QuickTime™ and a  
Photo - JPEG decompressor  
are needed to see this picture.

## Stocks and flows

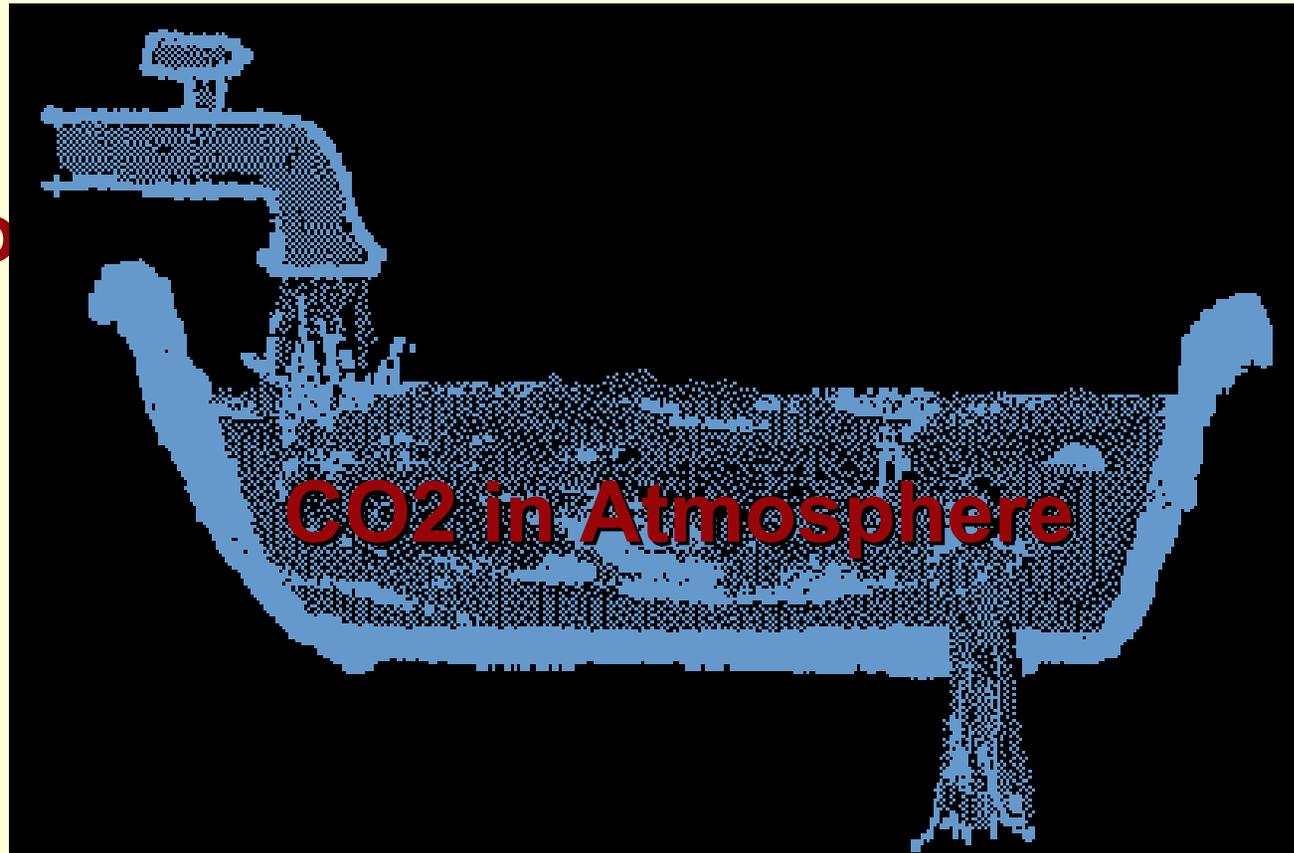
# Atmospheric Greenhouse Gases (GHGs)

**GHG  
Emission**



# Atmospheric Greenhouse Gases (GHGs) - CO<sub>2</sub>

**CO<sub>2</sub>  
Emission**

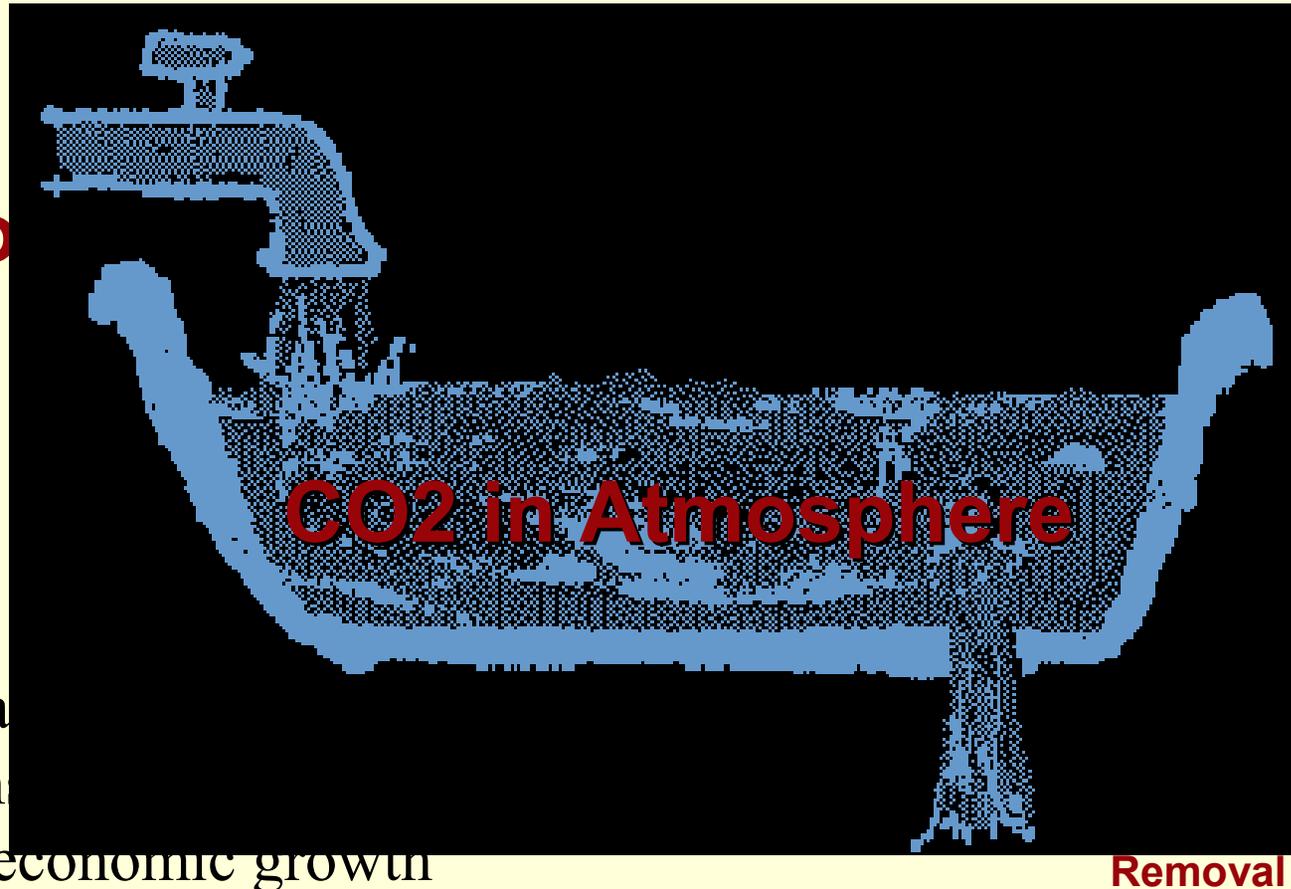


**Removal**

But Net Removal is less than  $\frac{1}{3}$  of current emissions - which are steadily increasing with economic growth

# Atmospheric Greenhouse Gases (GHGs) - CO<sub>2</sub>

**CO<sub>2</sub>  
Emission**

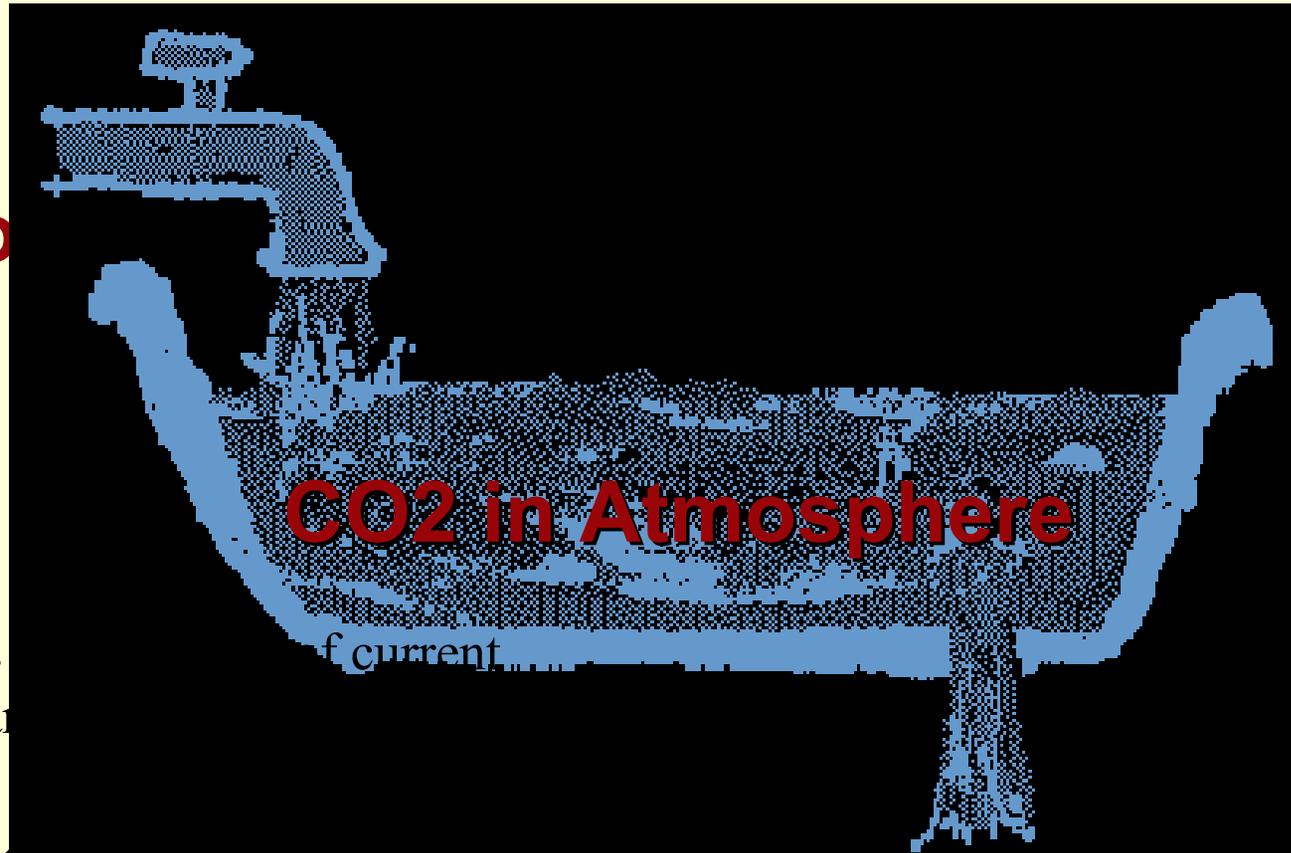


But Net Removal is less than  
current emissions and is  
increasing with economic growth

⇒ This means that stabilizing CO<sub>2</sub> in the atmosphere will require a **2/3** or greater **reduction** in emissions globally - far beyond any current plan

# Atmospheric Greenhouse Gases (GHGs) - CO2

**CO2  
Emission**



But Net Removal is  
emissions - which are  
economic growth

⇒ This means that stabilizing CO2 in the  
atmosphere will require a **2/3** or greater  
**reduction** in emissions globally - far  
beyond any current plan

⇒ This means that energy costs and  
alternative energy will become a major  
factor in all business' strategies

**In summary, seeing systems starts with**

## **The “Big Three”**

**Global systems we have created that shape today’s world and account for many of the social and environmental imbalances that make present globalization unsustainable:**

- Food & water
- Energy & transport
- Materials (products and services)

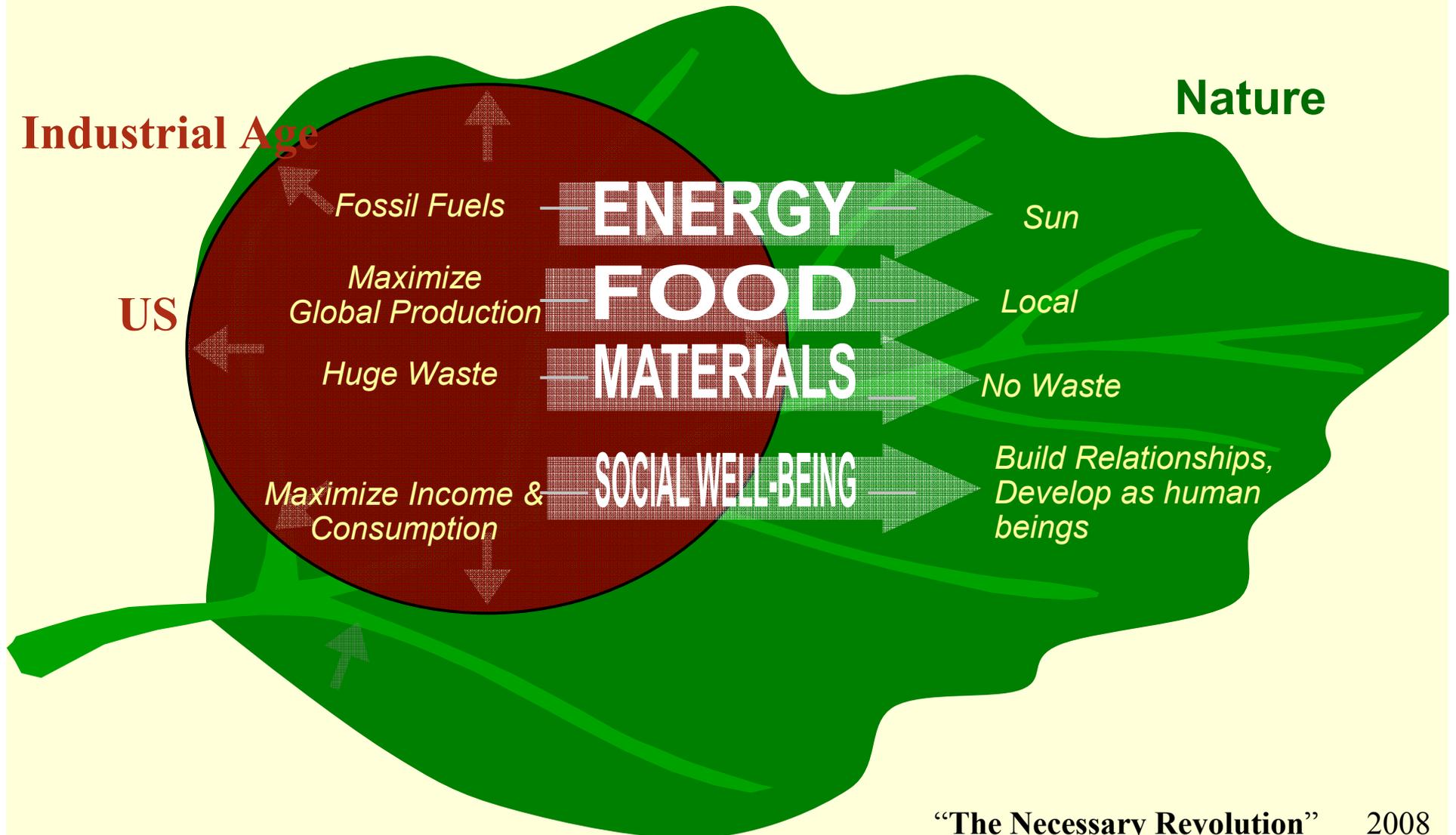
"I think there are good reasons for suggesting that the modern age has ended...

It is as if something were crumbling, decaying and exhausting itself – while something else, still indistinct, were arising from the rubble."

*Vaclav Havel*

# Life Beyond the Industrial Age Bubble

## HOW NEEDS ARE MET



## More and more businesses are awakening to this historic opportunity for innovation

- *Alcoa*: has reduced water usage by 50% since 2000, target: 70% by 2010
- *GE*: new “eco-imagination” businesses have >\$50 billion backlog of orders
- *BP, Shell*: broke the “conspiracy of silence” on climate change in 1997; BP’s alternative energy businesses now growing >100% per year
- *Dupont*: has shifted 25% of feedstocks to long-term bio-based from petro-based
- *Nike*: rates all new products based on embedded water, energy, waste and toxicity
- *Coke and WWF*: working together to promote integrated management of watersheds worldwide
- *USGBC and its LEED Certification*: spreading rapidly throughout construction industry worldwide as common standard for green building
- *Unilever*: developing business model of “small holder” sourcing for worldwide food chains
- *Costco*: prototyping six global food chains based on full transparency and well being of growing communities
- *Seventh Generation*: entire company based on products that educate consumers on reducing waste and toxicity through healthy products - growing at 40%/year for 25 yrs
- *Satyam Computer* (50,000 person IT outsourcing company): bringing “911” service to all of India; goal is to save 1 million lives per year.
- *Sweden*: to be first country free of fossil fuels by 2020; Northern Sweden is pioneering “bio-region,” to operate entirely on sustainably grown biofuels.
- *EU’s Extended Producer Responsibility*: producers of automobiles must recycle all cars.

Behind these many examples are new learning capabilities:



(The Necessary Revolution, 2008)

*An example of collaborating across boundaries*

# The Sustainable Food Laboratory: collaborating for systemic change



*Hal Hamilton*

*Director*

# Context

- Agriculture is the largest industry on the planet and employs an estimated 1.3 billion people and produces 1.3 trillion at the farm gate.
- About half of the habitable land on Earth is used for agriculture and livestock production.
- Food production has more than kept pace with global population growth, on average food supplies are 24% higher per person than in 1961 and prices are 40% lower. Over same period global population has doubled from 3 to 6 billion.

# The Unintended Consequences

- Since 1945 moderate, severe or extreme soil degradation has affected an area the size of China and India combined.
- More than 70% of the world's fishery resources (for which there is information) are now fully fished or overfished.
- Repeated food scares becoming norm as people worry about quality and safety.

# Despite Productivity Gains, Food Systems Don't Feed People Well

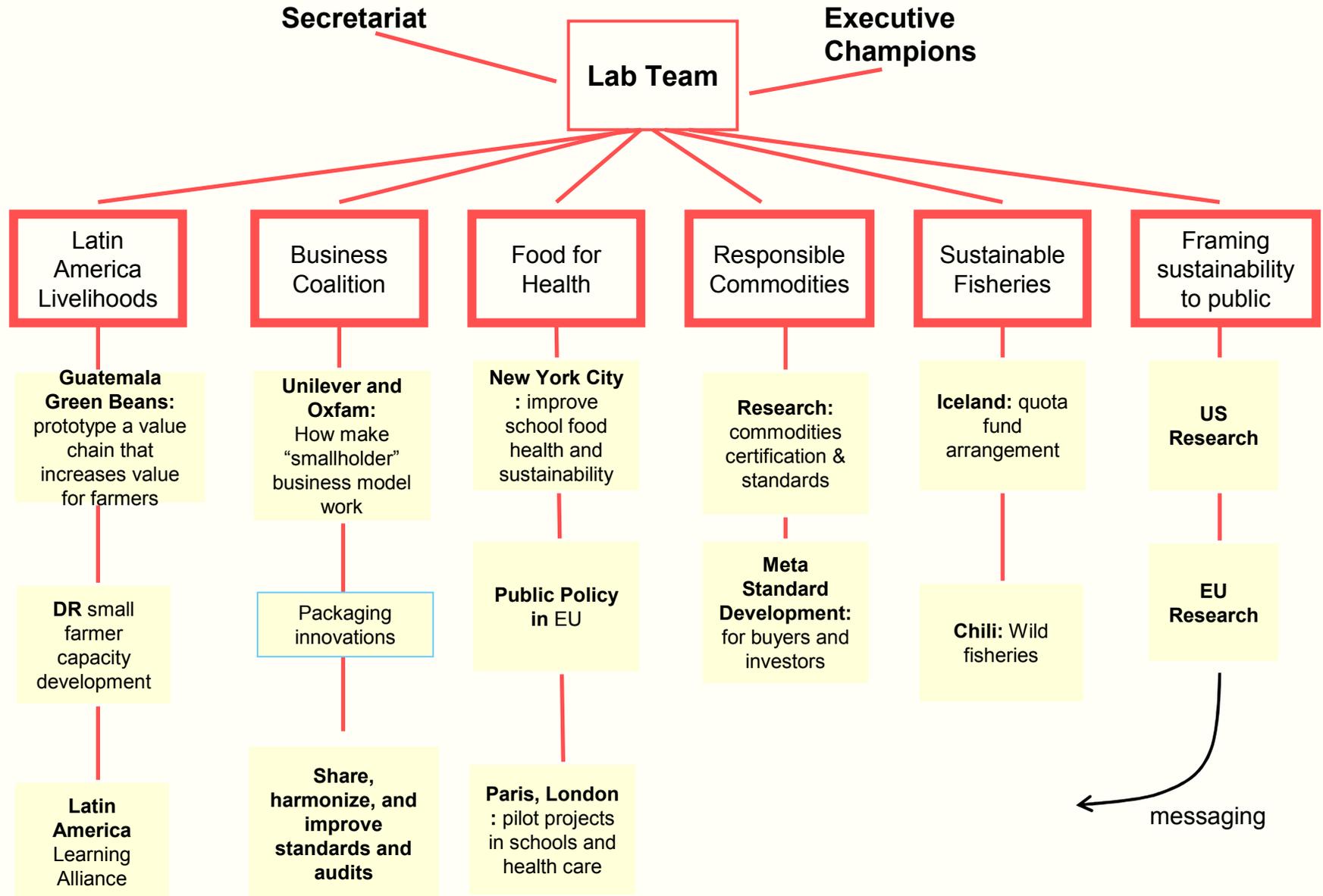
- FAO estimates that 800 million people in the world are seriously underfed.
- About 80% of world's hungry live in rural areas and 50% of them, or 400 million, - live in low income households who depend primarily on farming.

# The Food Lab Team is From Three Sectors and Three Continents

	Europe	North America	Latin America
<b>Government</b>	European Commission Dutch Ministry of AG UK National Health Ser	Canadian Parliament International Finance Corporation	Brazilian Ministry of Agrarian Development World Bank
<b>Business</b>	Carrefour Fjord Seafood Nutreco Rabobank Shell Foundation Royal Greenland Unilever	Cargill Costco General Mills Heinz Jasper Wyman Laura's Lean Beef Organic Valley Cooperative Starbucks SYSCO US Foodservice	Brazilian Speciality Coffee Association Sadia
<b>Civil society</b>	Alimenterra Center for Food Policy Charles Leopold Mayer Foundation Consumers International International Institute for Environment and Development King Baudouin Foundation	Institute for Agricultural and Trade Policy Leopold Center for Sustainable Agriculture Rainforest Alliance Society for Organizational Learning Synergos Institute W.K. Kellogg Foundation World Wildlife Fund	Caribbean Institute Brazilian Confederation of Agricultural Workers (CONTAG) International Center for Tropical Agriculture (CIAT) Oxfam The Nature Conservancy World Agriculture Forum World Forum of Fish Harvesters and Fish Workers

WORKING LIST

# The Lab Team Has Spawned Six Initiative Areas of Work



An example of value chain collaborative learning

## A participatory assessment of current production

We asked farmers about:

- What they liked
- What they didn't like
- Their livelihood sources
- Land allocations
- Community level problems



Thirty-nine farmers in five groups representing nine communities responded & quantified those responses

Mark Lundy,  
CIAT Intern'l Center for Tropical Agriculture  
(field partner for Costco)

## Participatory scoring of self-identified issues

**Community/farmer groups  
work, think, and discuss  
together to:**

- **Identify issues in response to the broad queries;**
- **Score or weigh the responses using 100 grains of maize, thus providing “percent” weightings of responses;**
- **All have to agree prior to moving on to the next query**

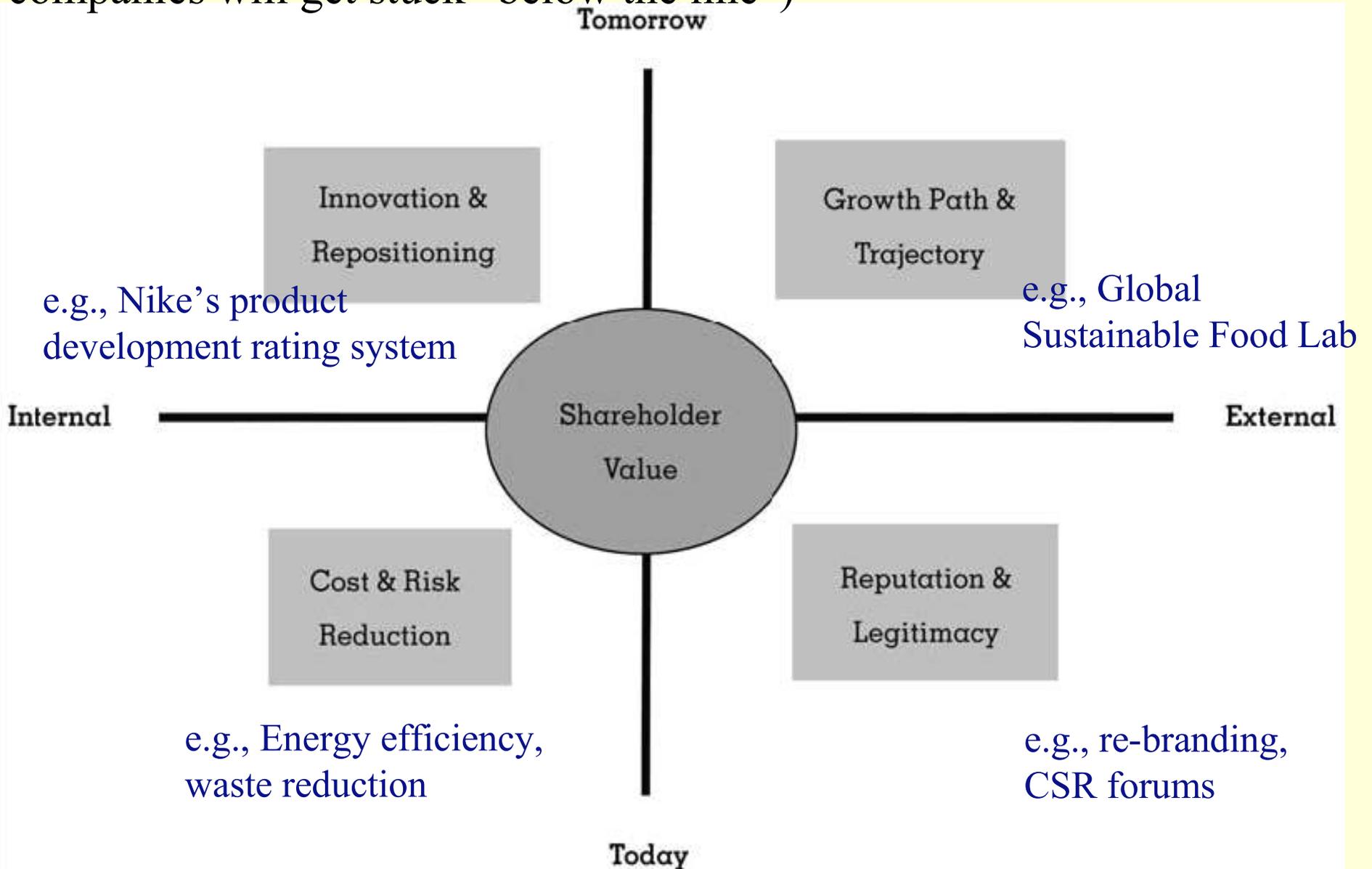


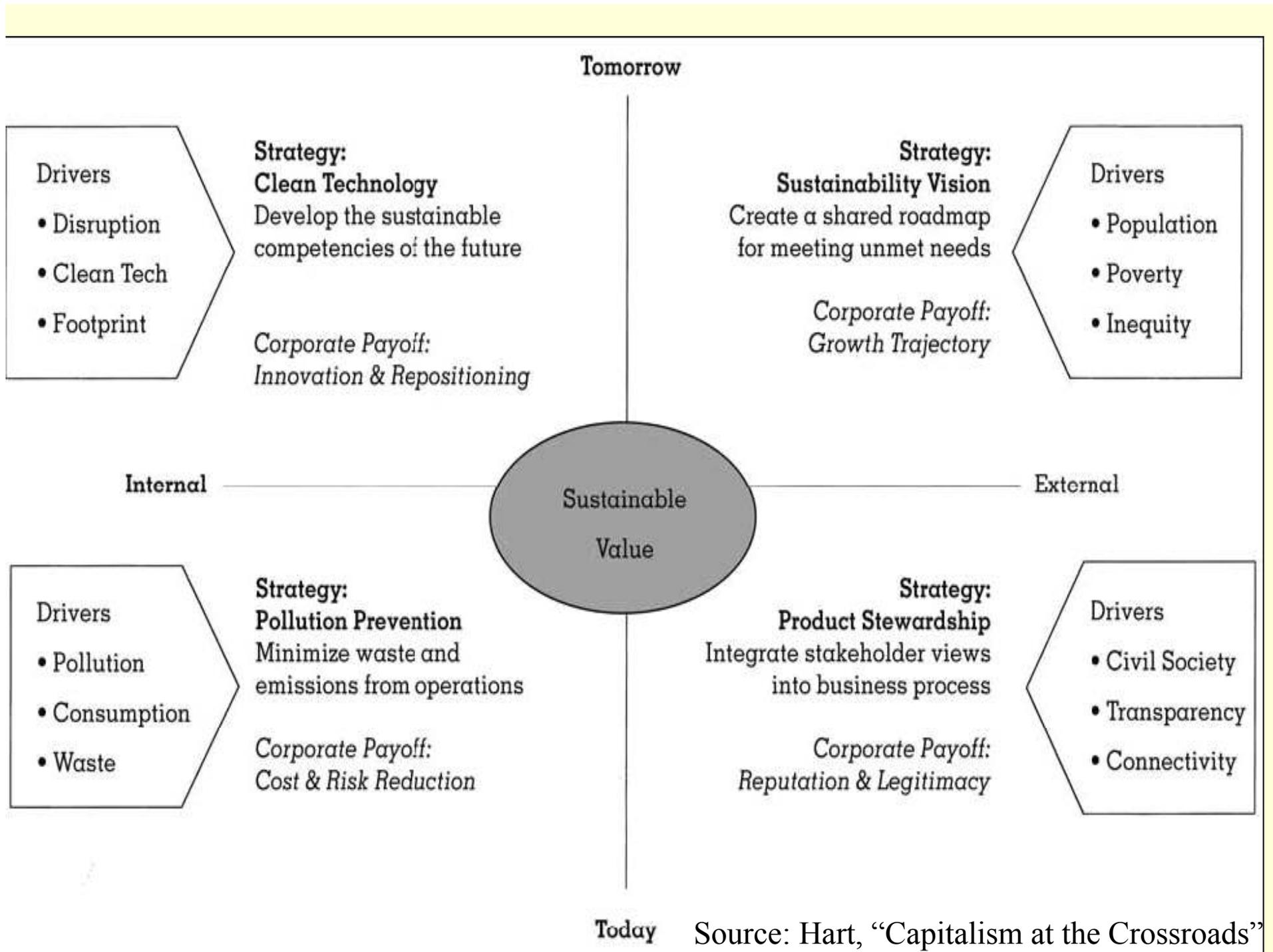
## **Problems associated with plant production & management**



<b>Problems</b>	<b>“%”</b>
<b>Parcels must be fenced &amp; protected (5/5)</b>	<b>23</b>
<b>Weeds (5/5)</b>	<b>16</b>
<b>Lodging &amp; plant rot with heavy rains (manzanilla 3/5)</b>	<b>14</b>
<b>Different pests &amp; diseases (4/5)</b>	<b>11</b>
<b>Others: Poor germination, long cycle (aloe), stunting in poor soils, delayed payments for product by Mabeli</b>	

Innovations usually start in lower quadrants and gradually migrate to more basic, long-term initiatives in upper quadrants (but many companies will get stuck “below the line”)





# The evolving global context behind such innovations will not change

The *future* appears alien to us.

It differs from the past most notably in that the Earth itself is the relevant unit with which to frame and measure that future.

Discriminating issues that shape the future are all fundamentally global. We belong to one inescapable network of mutuality:

- mutuality of ecosystems;
- mutuality of free movement of information, ideas, people, capital, goods and services; and
- mutuality of peace and security.

We are tied, indeed, in a single fabric of destiny on Planet Earth.

Policies and actions that attempt to tear a nation from this cloth will inevitably fail.

*Mieko Nishimizu*  
*Vice President, South Asia Region*  
*The World Bank*

*Keynote Address*  
*Symposium - The 50th Anniversary of Japan's Bretton Woods*  
*Embassy*  
*Tokyo, September 10, 2002*

## **(Some scientists believe it is already too late to avoid major dislocations)**

We Are Past the Point of No Return.

Before this century is over, billions of us will die, and those (who) survive will be in the Arctic where the climate remains tolerable.

We will do our best to survive, but sadly I cannot see the United States or the emerging economies of China and India cutting back in time, and they are the main source of [CO<sub>2</sub>] emissions

We have to keep in mind the awesome pace of change and realise how little time is left to act

Each community and nation must find the best use of the resources they have to sustain civilisation for as long as they can.

Dr. James Lovelock  
Pioneering Earth Scientist  
quoted in The Independent  
January 16, 2006  
The Revenge of Gaia (forthcoming)

# The time for large-scale change is now

A "catastrophic zone" of runaway climate change is immanent.

James Hansen, NASA, Science magazine, 2008

"If there's no action before 2012, that's too late. What we do in the next two to three years will determine our future. This is the defining moment."

2007

Rajendra Pachauri, Chair, IPCC (Intergovernmental Panel on Climate Change)

recipient, Nobel Prize