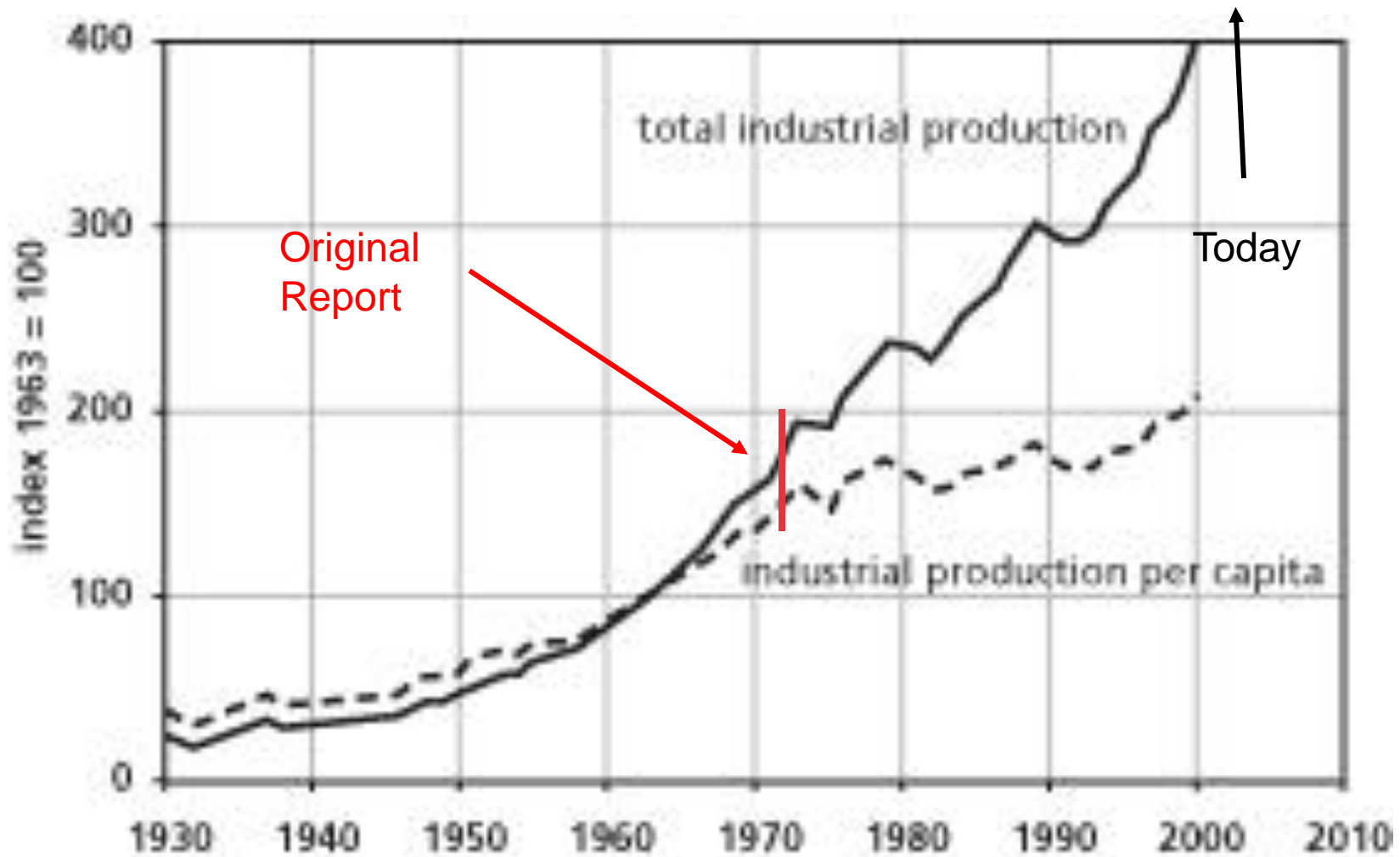




# Wachstum, Wachstum und kein Ende?

# Exercise

# Industrial Production

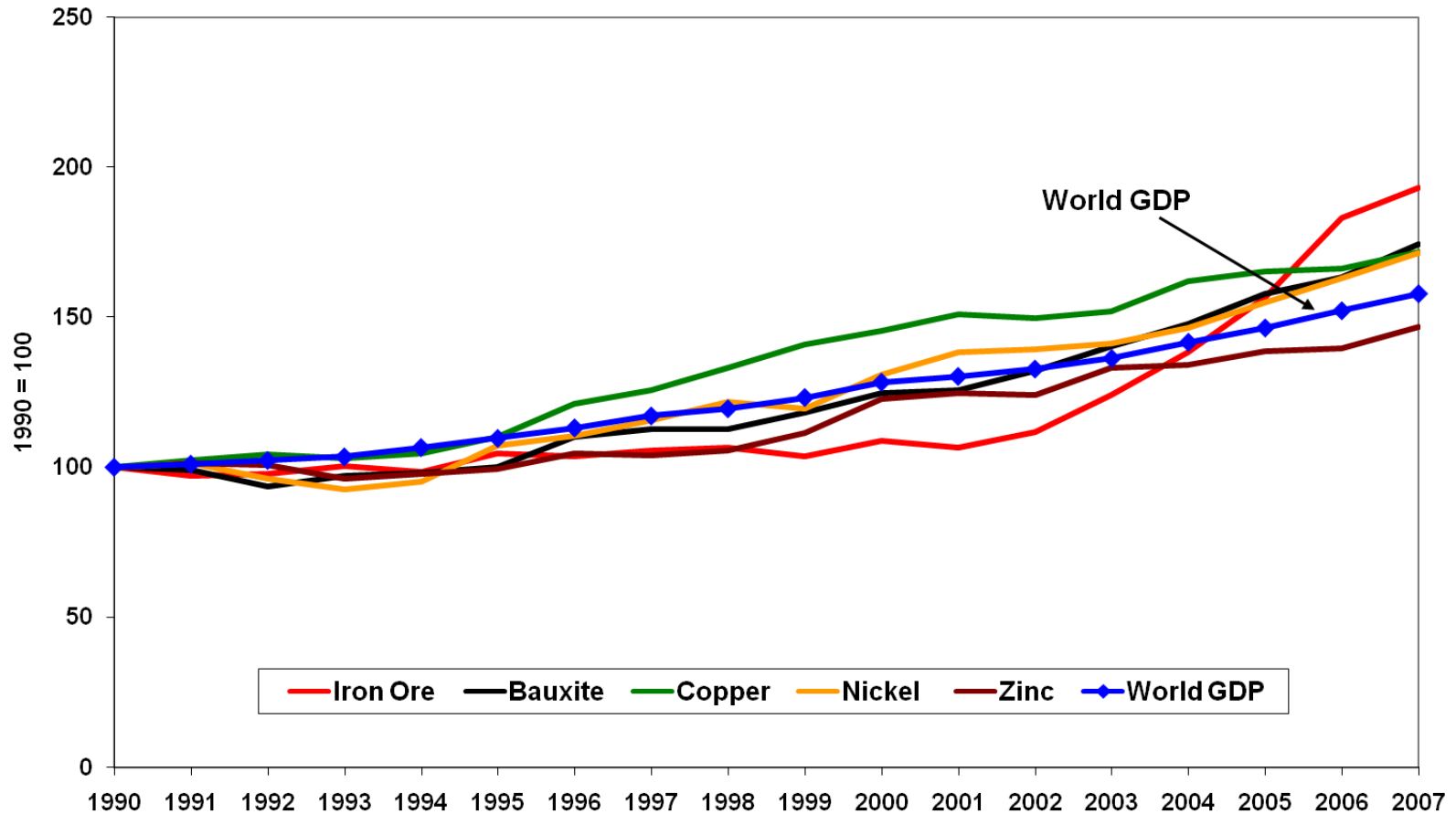


# The Creators of GNP Understood its Limitations

The abuses of national income estimates arise largely from a failure to take into account the precise definition of income and the methods of its evaluation ... As a result we find all too commonly such inferences that a decline of 30 percent in the national income ... means a 30 percent decline ... in its welfare. ... Such statements can obviously be true only when qualified by a host of “ifs.”

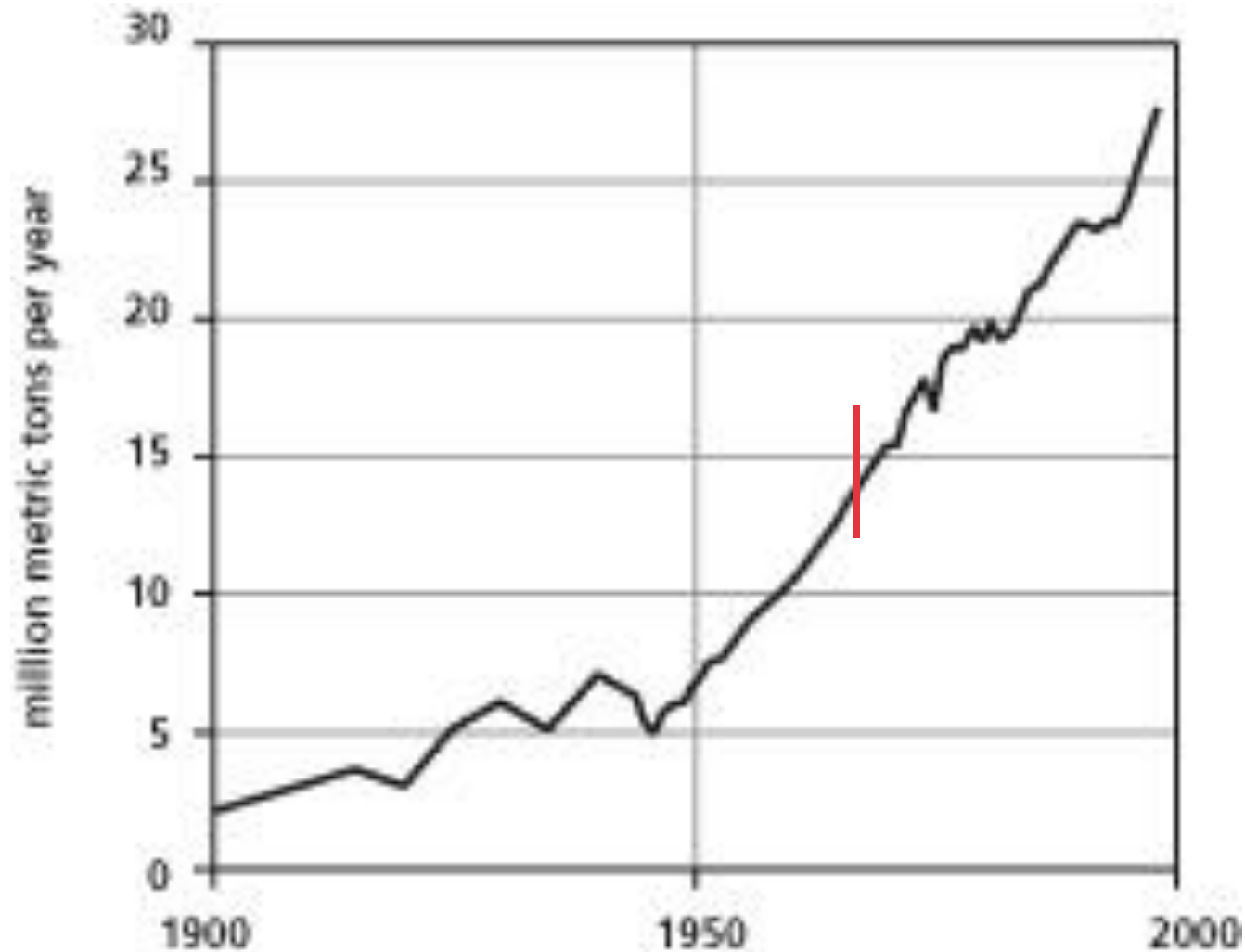
Page 7, *National Income, 1929 – 32*, US Government Printing Office, Washington, DC January 4, 1934.

# GDP and Metals Use

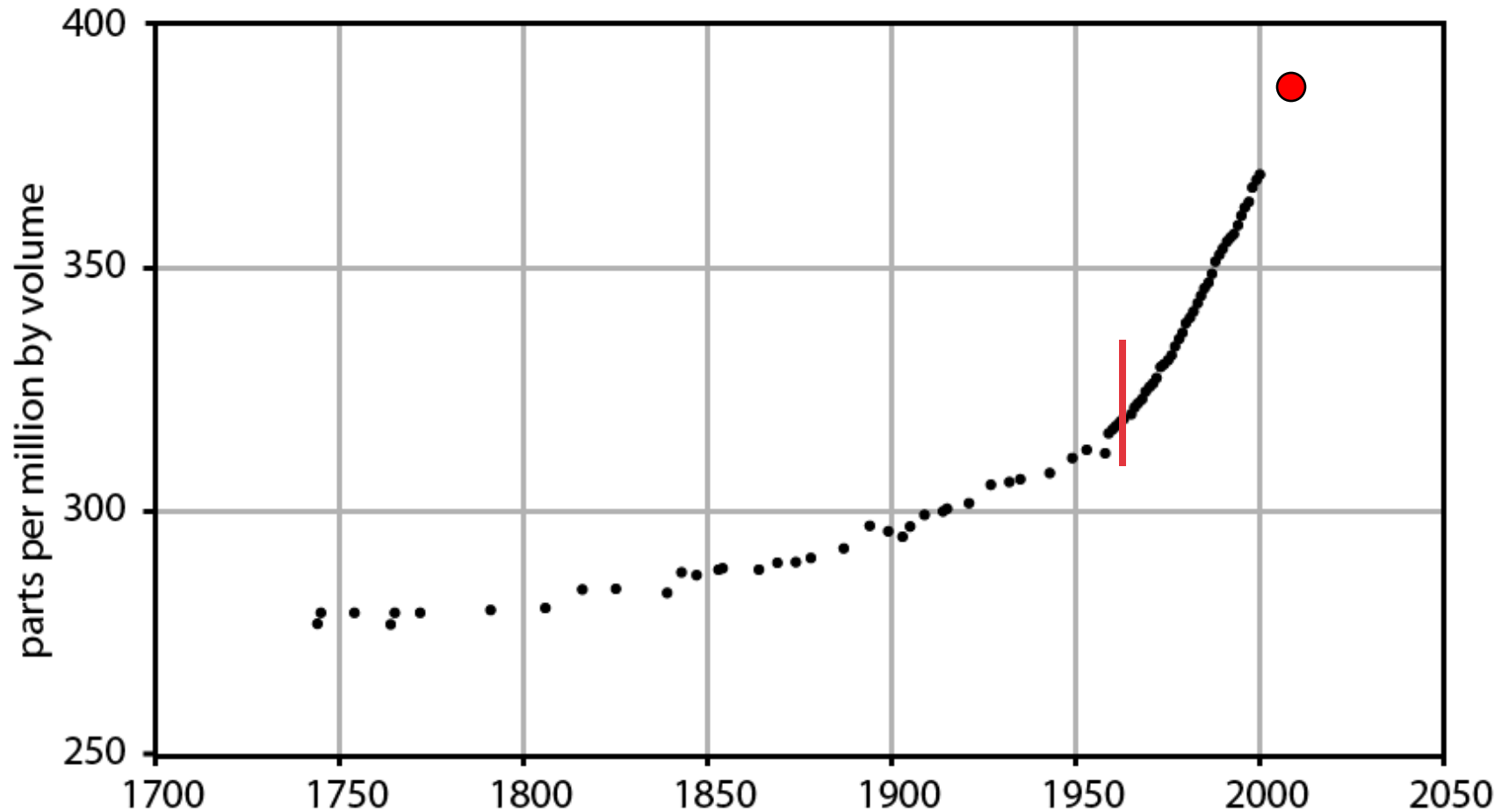


Source: *Prosperity without growth*, Tim Jackson (London, Earthscan 2009)

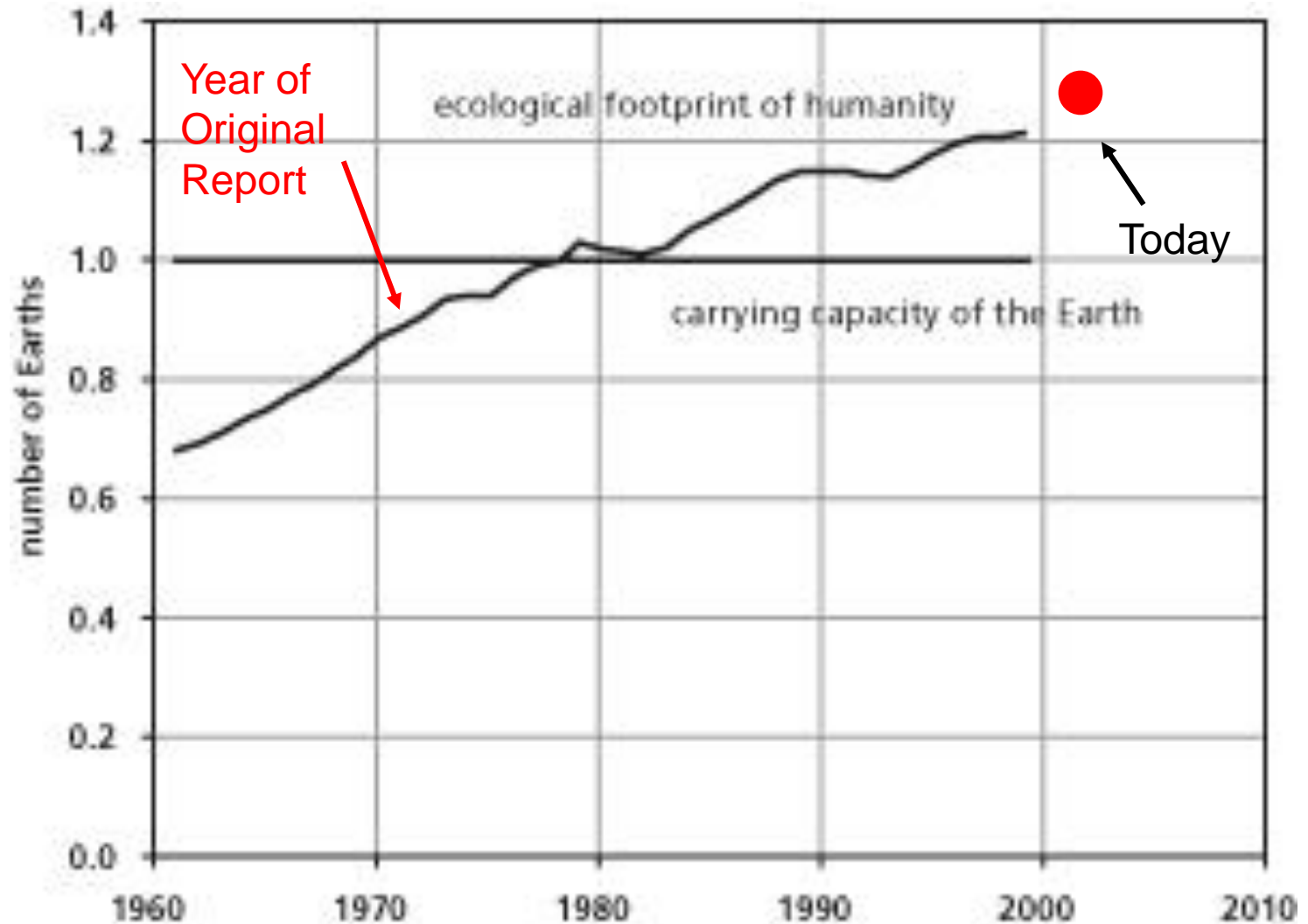
# Index of World Metals Use



# CO<sub>2</sub> Concentration

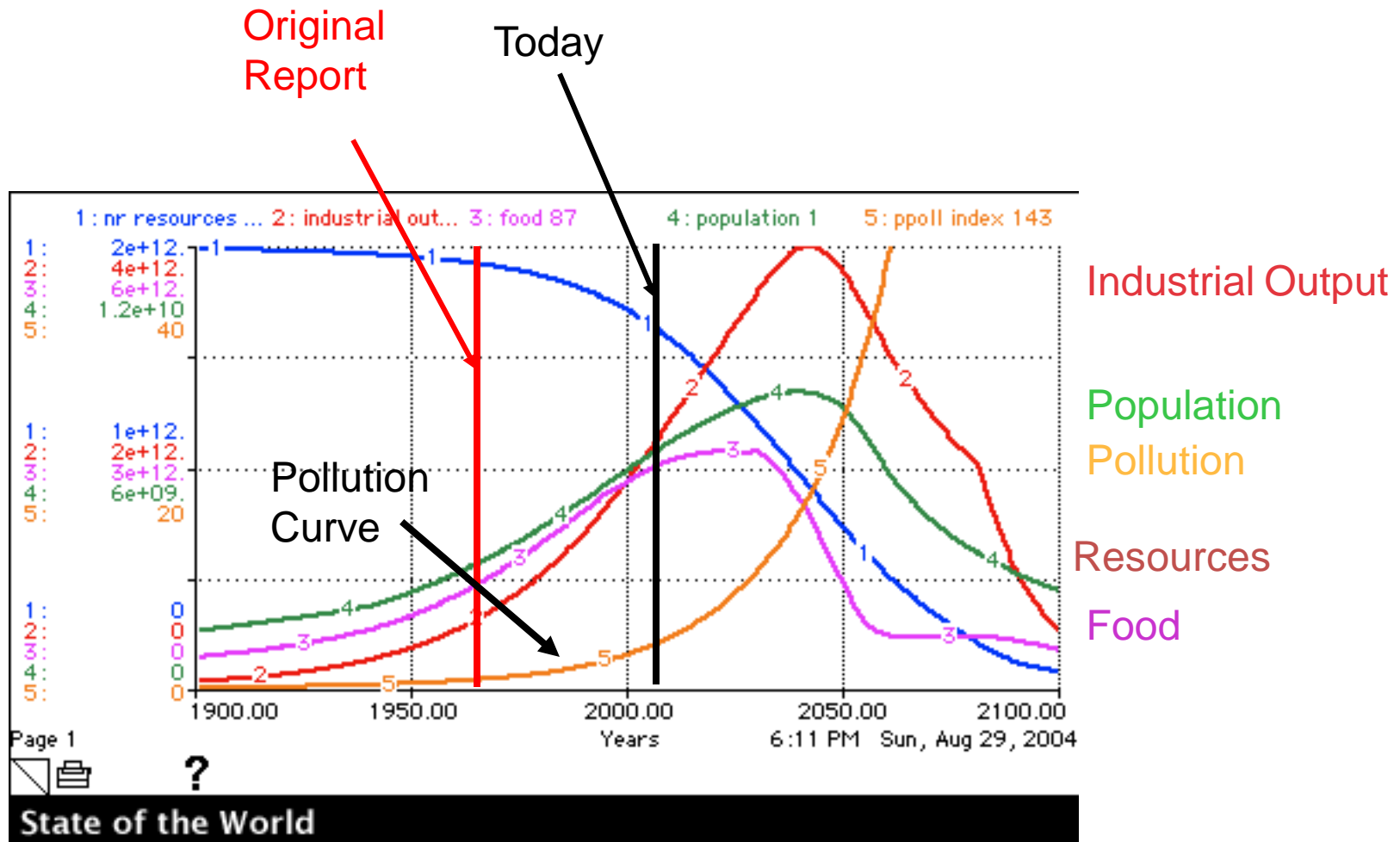


# One Indicator of Overshoot





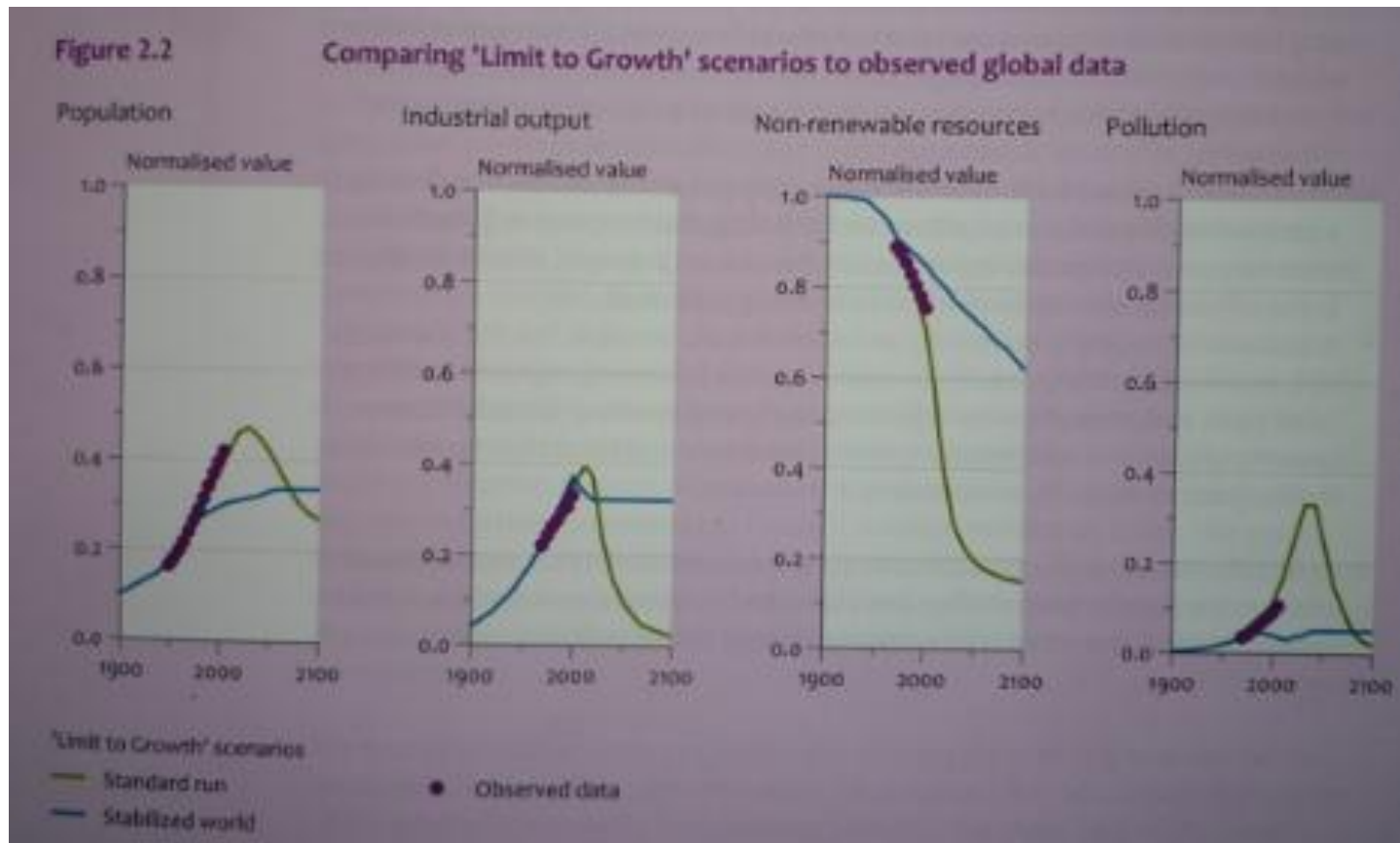
# A Collapse Scenario



# Main Insights from the Scenario

- In 1972 we projected another 40-80 years of growth.
- All our scenarios showed growth ending in the period 2010-2050.
- The most common behavior pattern was overshoot and decline, not gradual slowing within a limit.
- Changes in technology could delay the end of growth by a few years, but not eliminate it, and they did **not** avoid the decline.
- Social and economic changes are required for us to attain the most attractive futures.
- Today's difficulties are not problems; they are actually symptoms. The real problem is physical growth in material and energy flows pressing against the limits of a finite planet.

# We are taking the path to collapse



From: *Growing within Limits*, Netherlands Environmental Assessment Agency, October 2009, page 23.

# The Time of Greatest Stress

- Most people assume that the major global difficulties would occur after the end to growth.
- This is not correct.
- The globe's population would experience the most stress prior to the peak, as pressures mount high enough to neutralize the enormous political, demographic, and economic forces that now sustain growth.
- We are in the early phases of that period now.

“Sind die Menschen noch zu retten?” *Die Zeit*, 16.11.06

If current trends of overfishing and pollution continue, ..  
all seafood faces collapse by 2048.

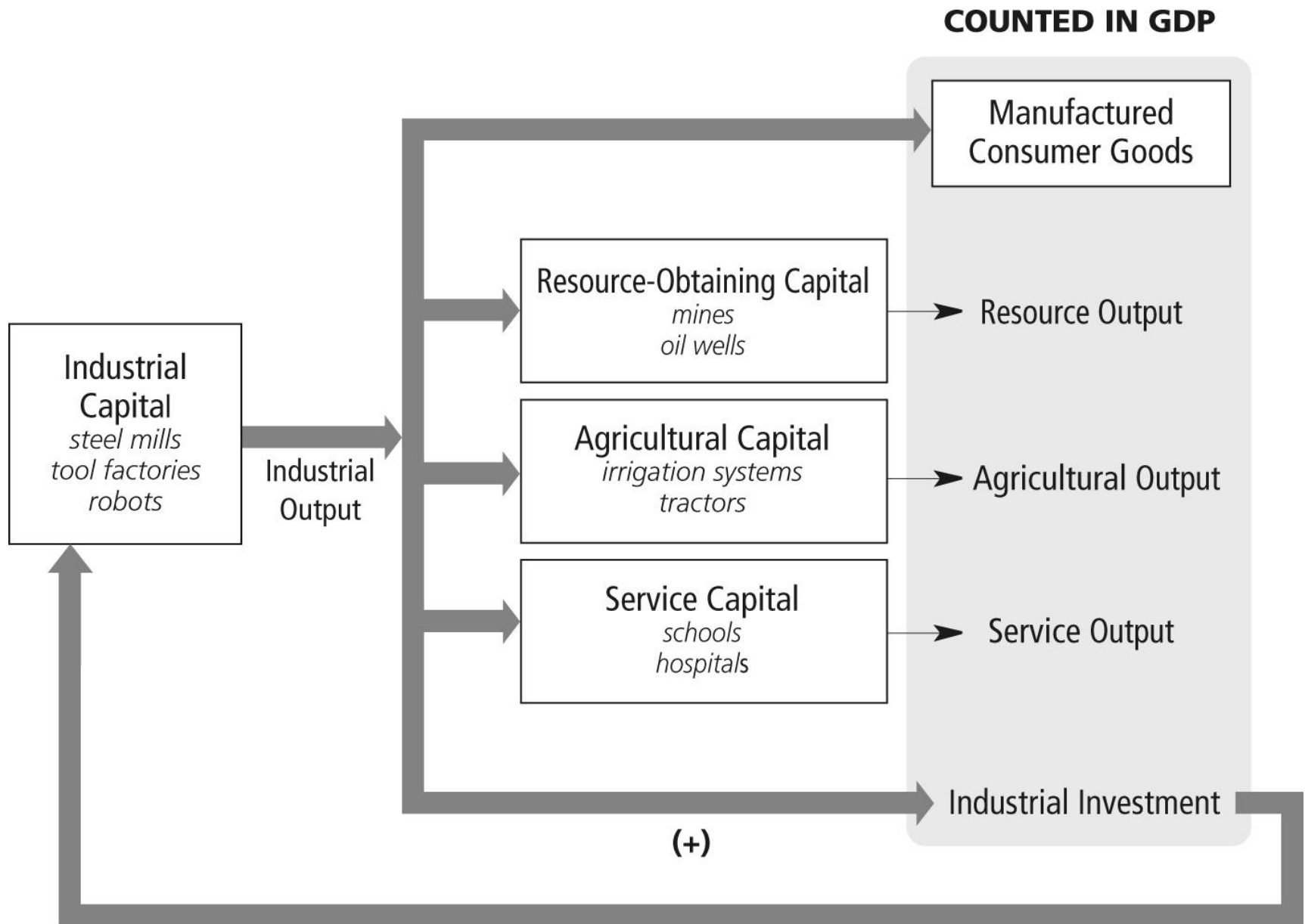
By the middle of the century ... no fewer than 7 billion  
people in 60 countries may be faced with water scarcity

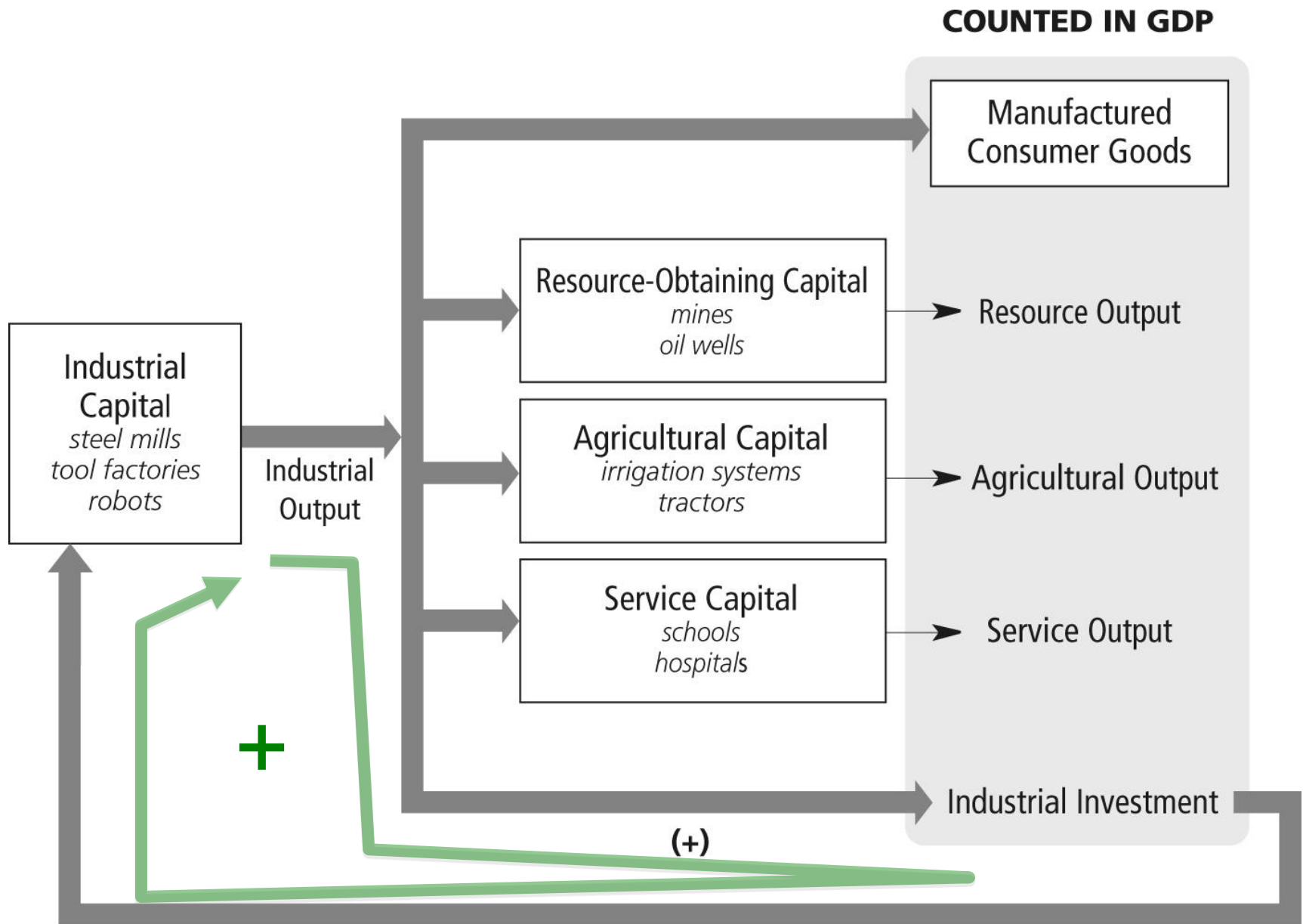
Human beings and the natural world are on a collision  
course. .. Fundamental changes are urgent....

- more than 1,600 scientists, including 102 Nobel laureates, from 70 countries

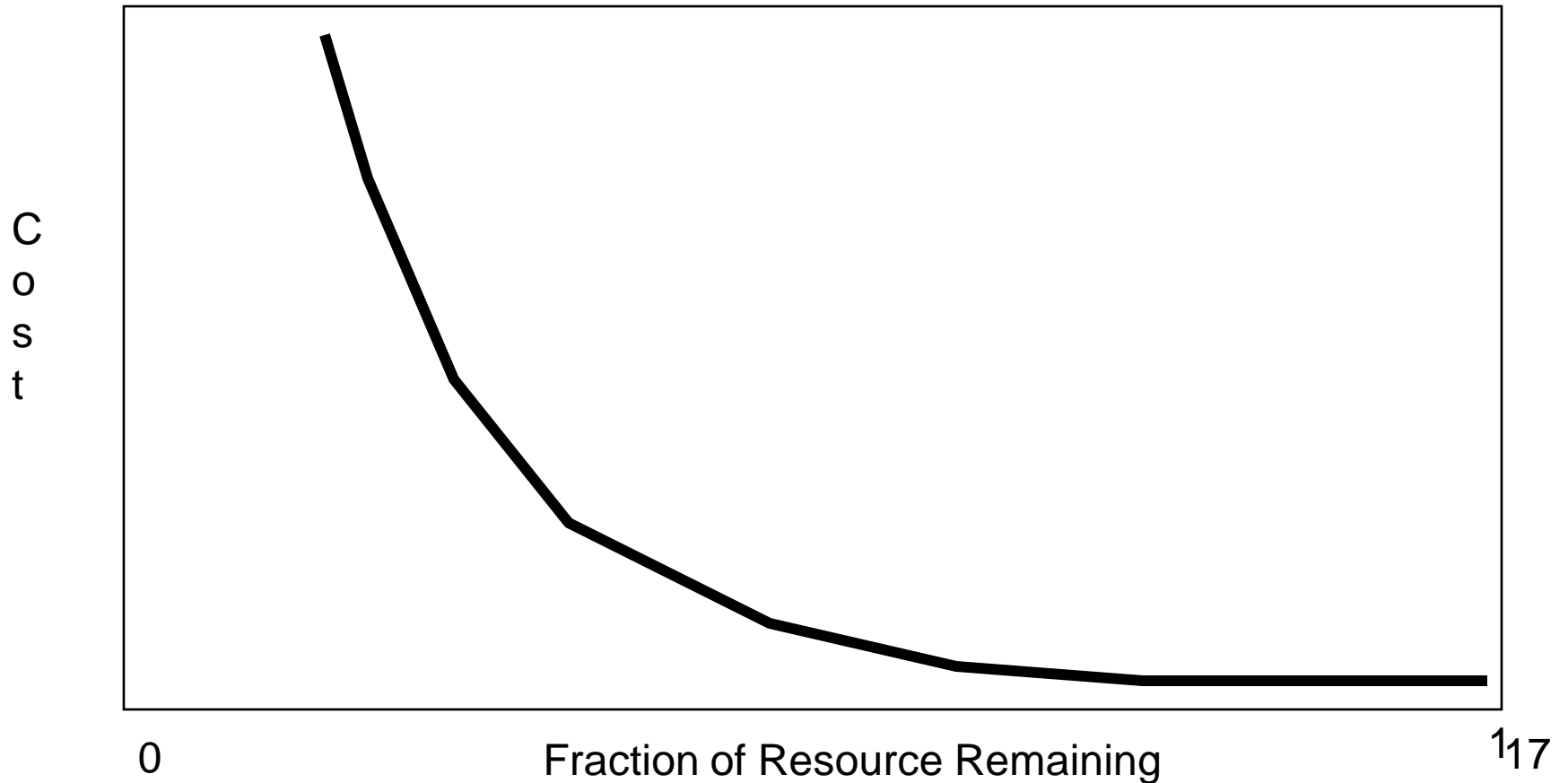
(Ignoring climate change) “could create risks of major  
Disruption to economic and social activity... on a scale  
Similar to those associated with the great wars.”

*Stern Review* October 2006



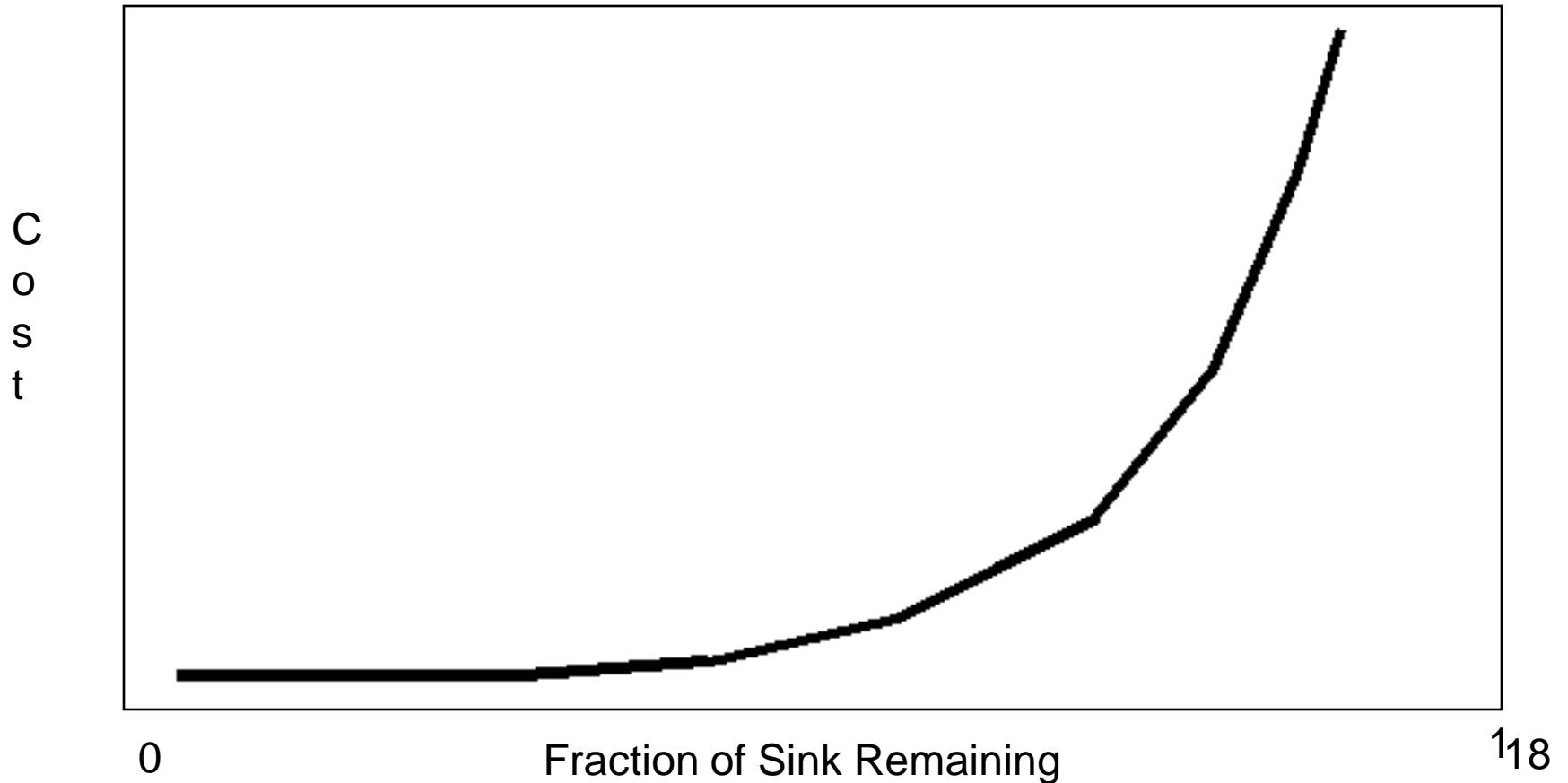


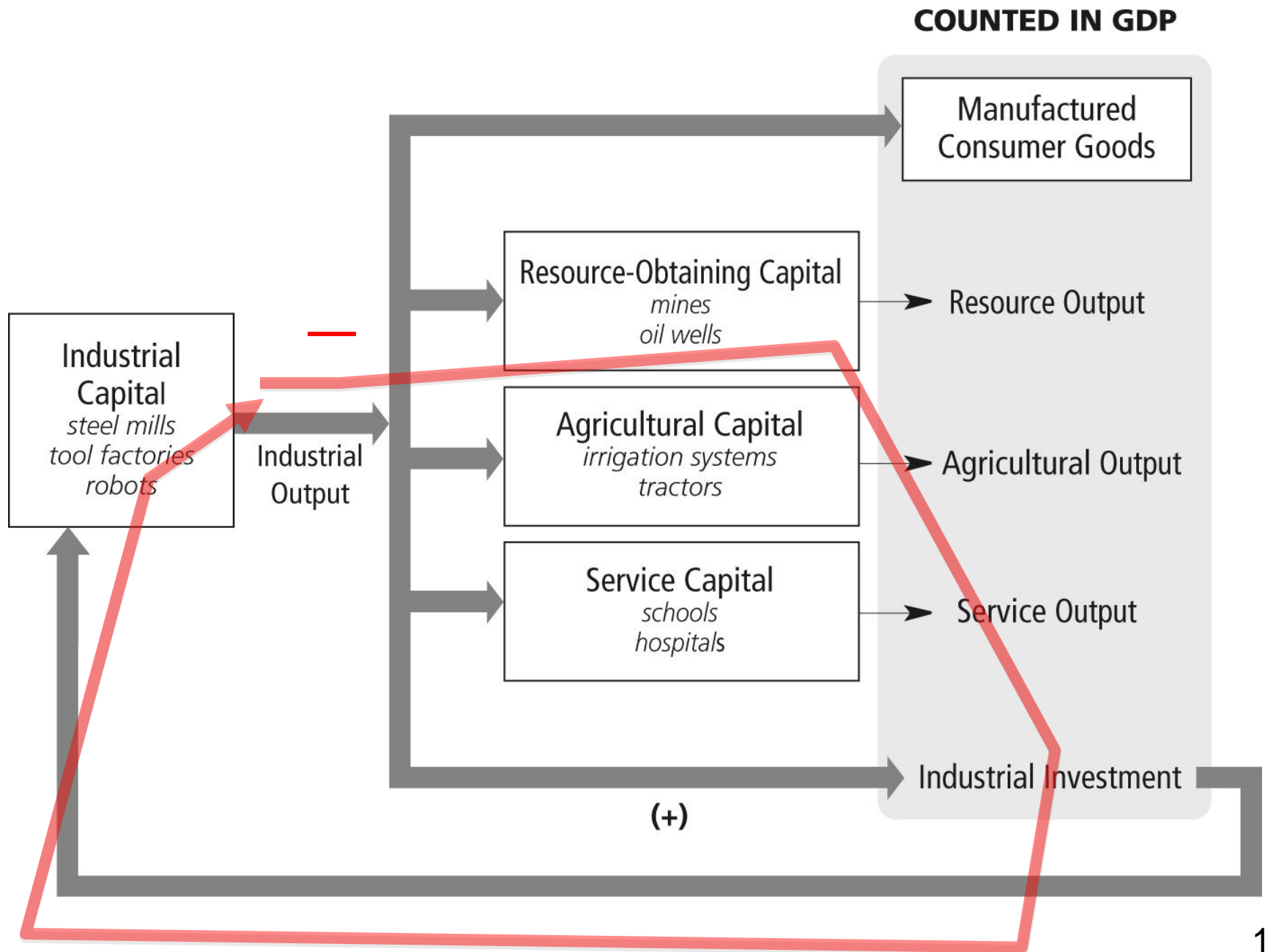
# Capital Cost of Discovery



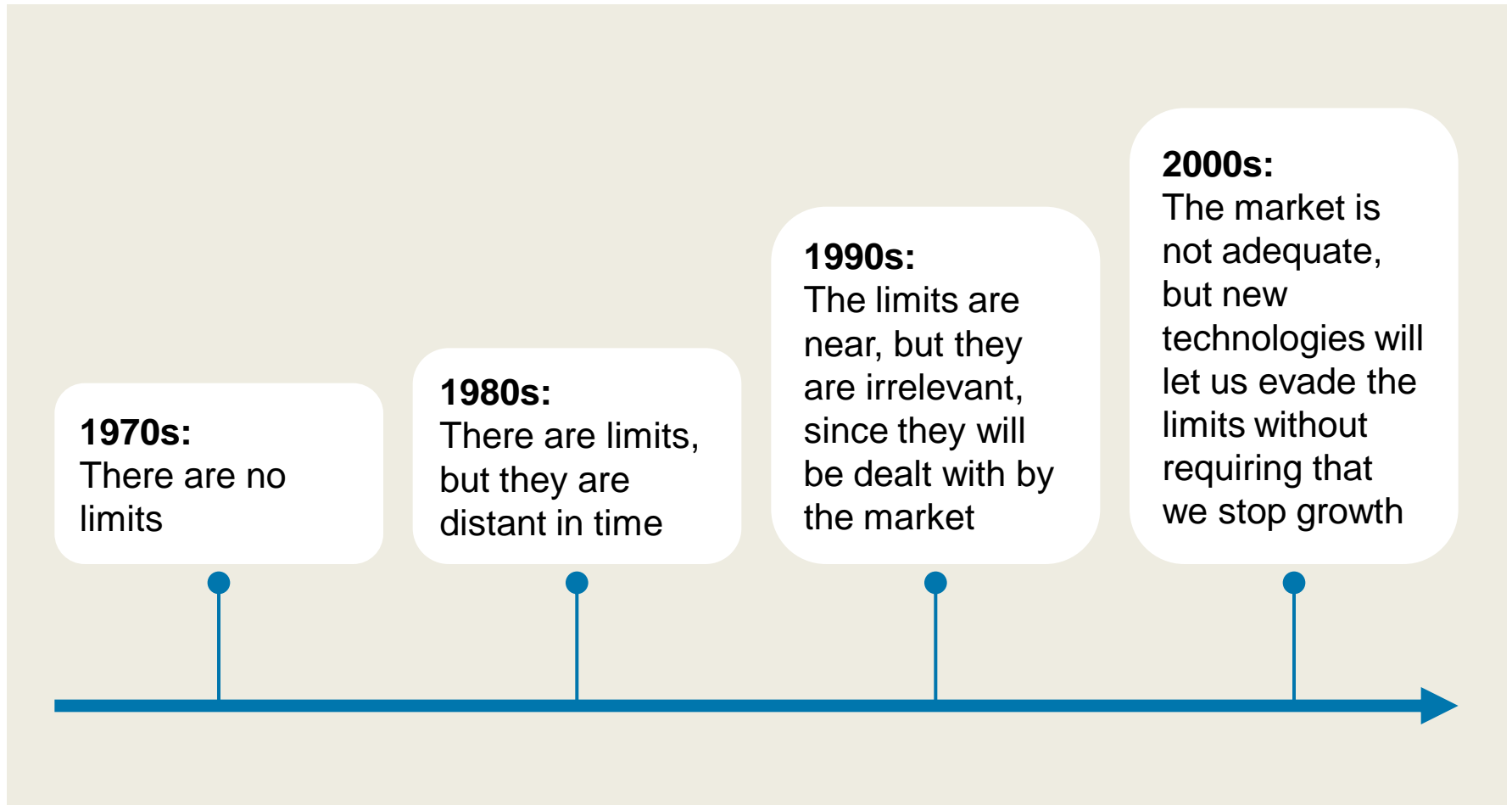


# Capital Cost of Abatement





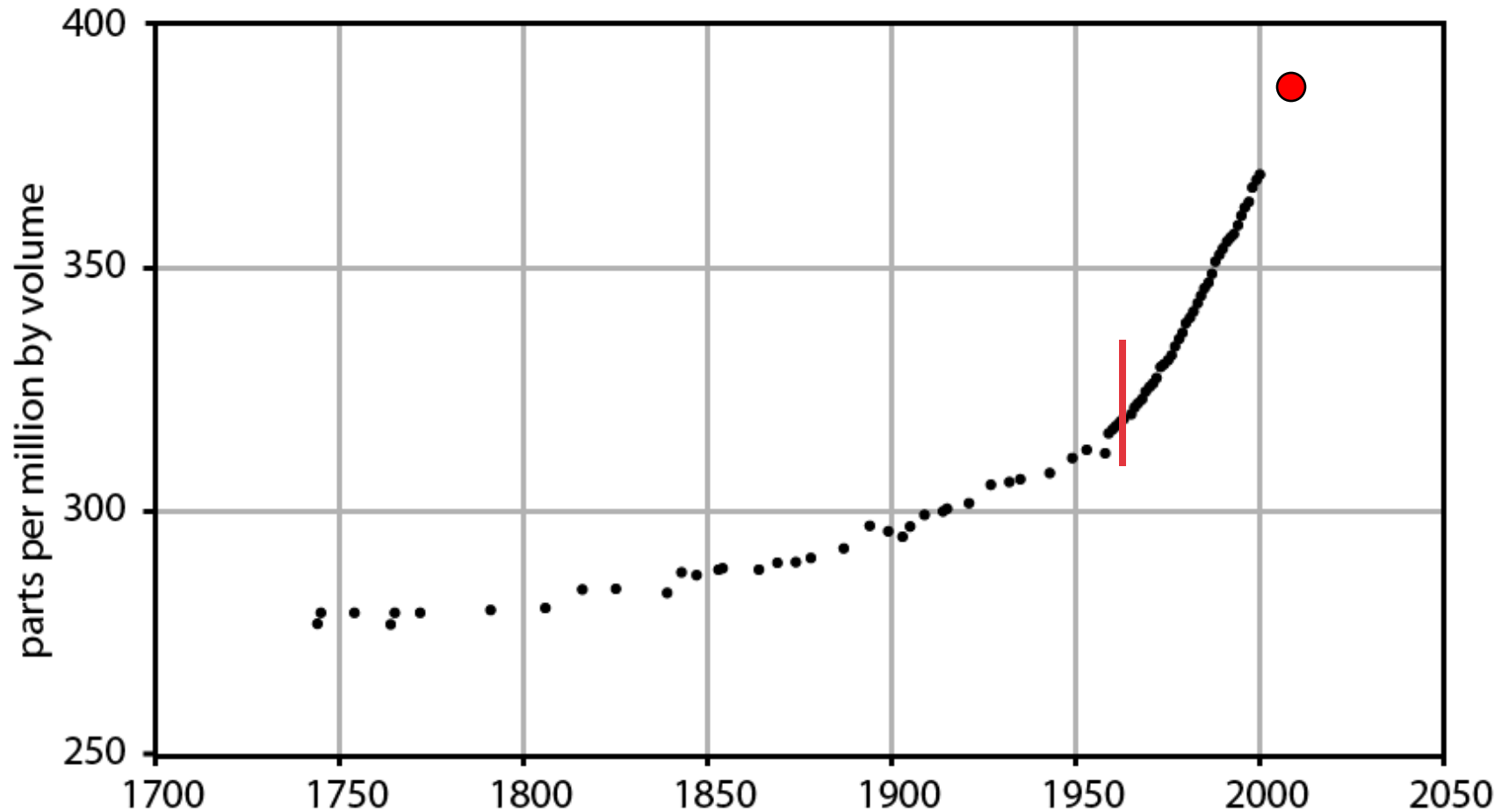
# The sequence of objections



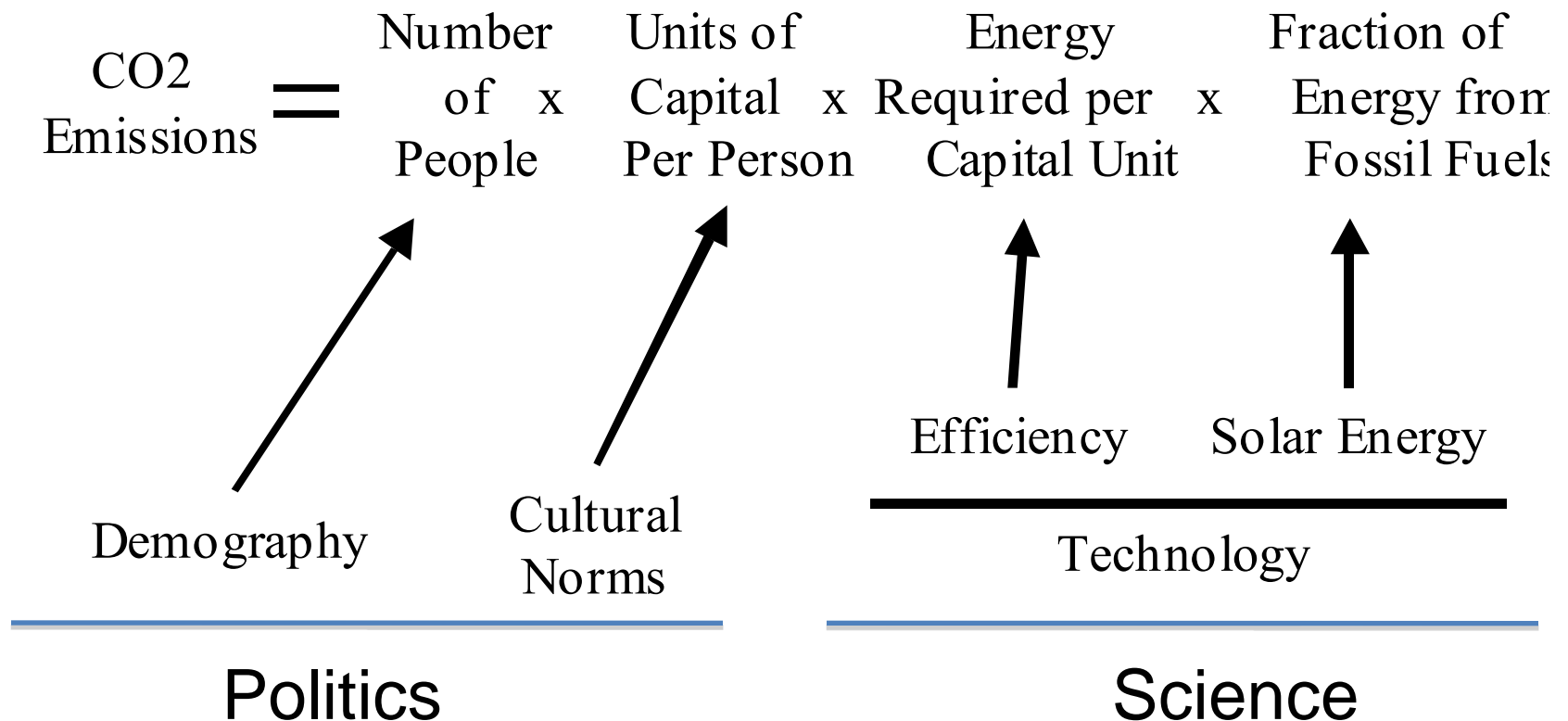
# I will use climate as an example

- It is not the first limit to growth experienced on the planet. Rather it is the first limit to threaten the rich countries. Thus it is the first to attract urgent attention from the powerful countries.
- It is not a problem. Rather it is a symptom.
- It will not long be the principal concern. Rather we will be focused on some other limit 3-5 years from now - energy scarcity, food shortages, the spread of a lethal virus, or some other.
- But if we do not succeed in controlling climate change, we will not have the chance to deal with other limits.

# CO<sub>2</sub> Concentration



# Four Factors Determine the Amount of CO<sub>2</sub> Emissions



# Negotiating Water's Freezing Point

It is often inconvenient for water to freeze at zero degrees.

Therefore politicians could negotiate a more convenient temperature for the freezing point of water.

Unfortunately this would not have the slightest influence on the behavior of water.

It will continue to freeze at 0 degrees.

# Negotiating CO<sub>2</sub> Emissions

It is inconvenient that the earth is heating up because of rising greenhouse gas emissions.

Politicians have decided to negotiate a convenient level of emissions for each country.

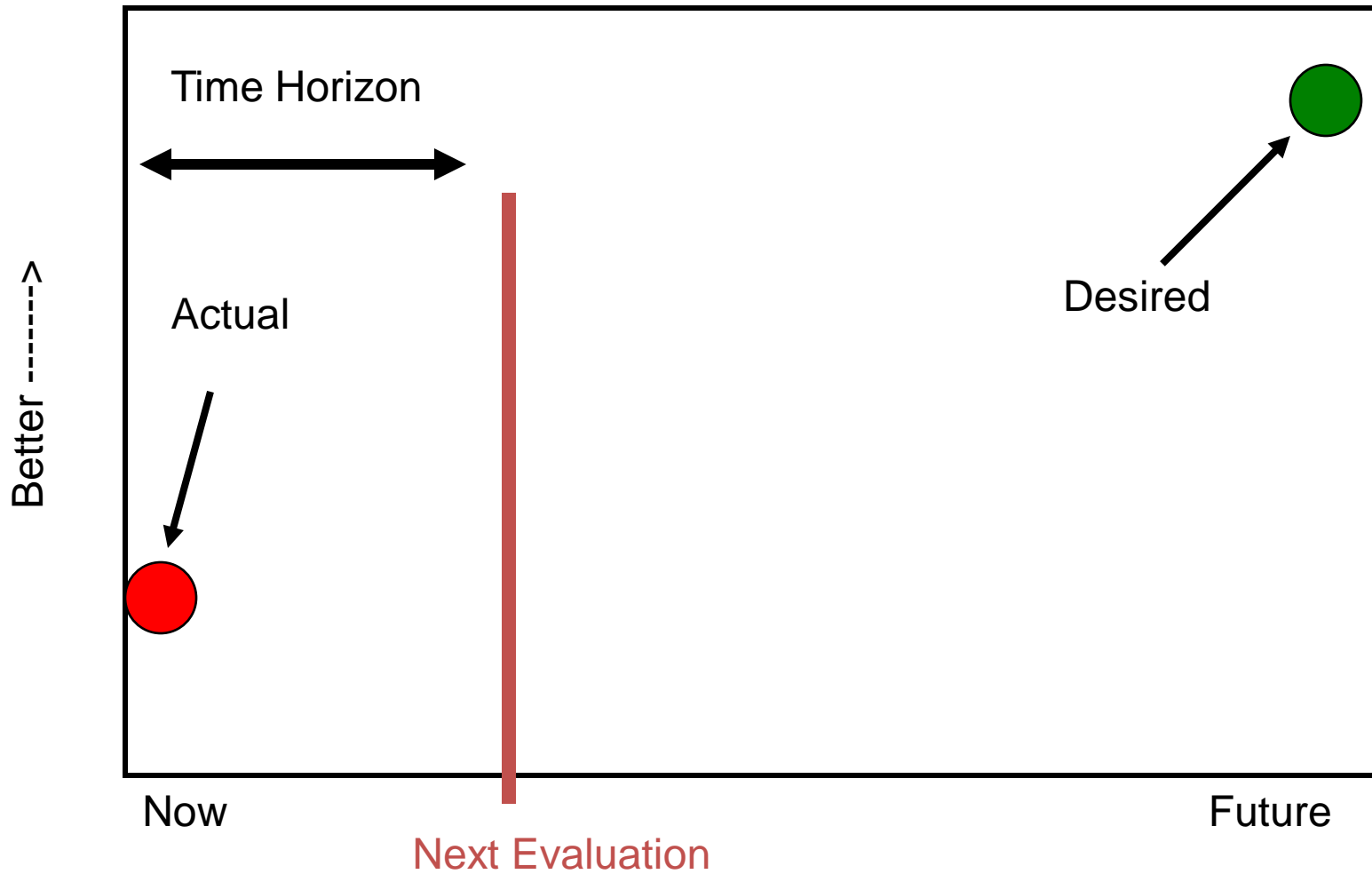
Unfortunately this will not have the slightest influence on the behavior of the planet's ecosystem.

It will continue to heat up as long as our greenhouse gas emissions rise.

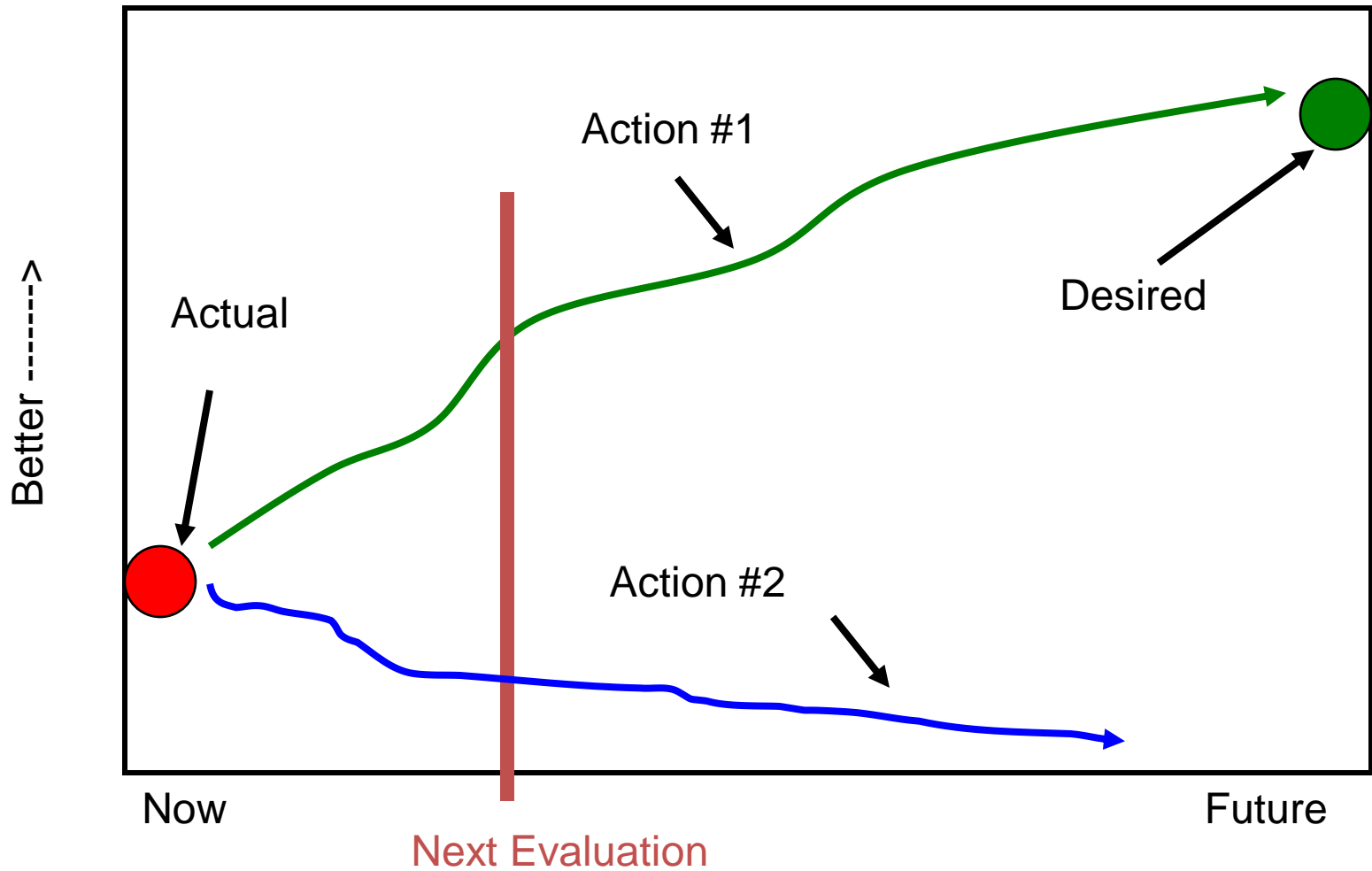


# Exercise

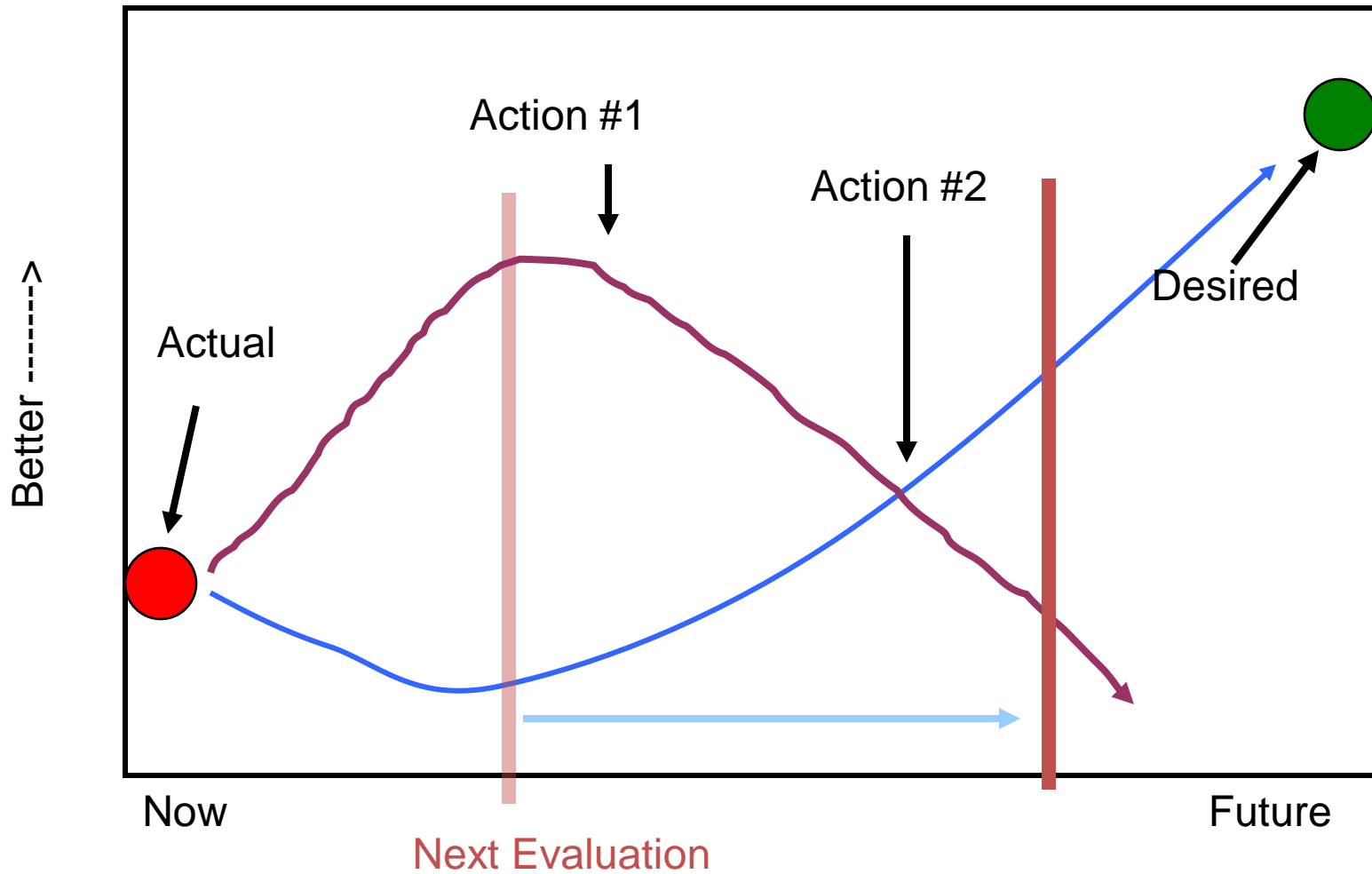
# A Problem



# Easy Problems



# Difficult Problems



# Relying on present Net value to choose assumes:

- All consequences of an action are known
- All consequences can be expressed in monetary units; they are commensurate
- We are the ones entitled to pick the interest rate
- Maximizing financial benefits is the main goal of society
- Current mistakes can be corrected by paying some cost in the future

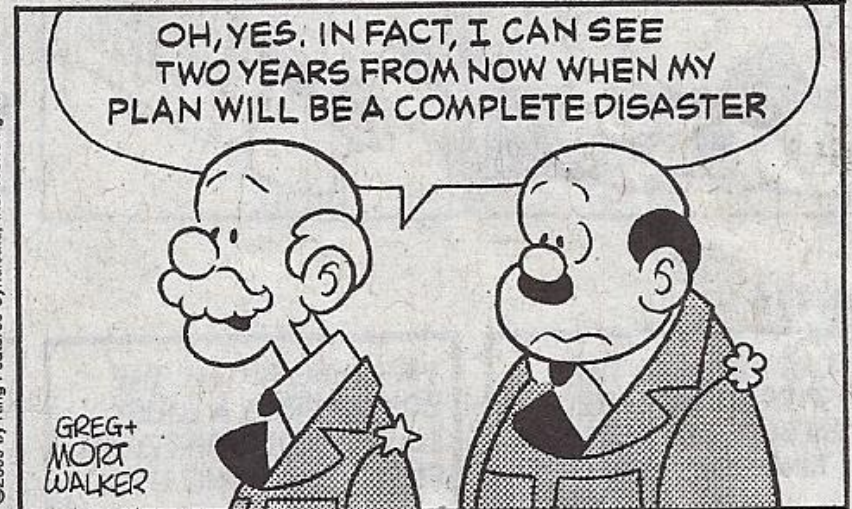
**Every single one of these assumptions is false for climate change and the other important global problems facing business and science**

BEETLE BAILEY



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MORT WALKER



# Politics versus Physics

A governance system that focuses on short-term gratification will not give attractive solutions to global problems – therefore the physical systems will continue to deteriorate.

When there is a conflict between physics and politics, politics will eventually have to change to be consistent with physics; physics will not change to be consistent with politics.

# Governance and Time Horizon

Democratic forms of choice could emphasize the long-term survival over short term gratification. But now they do not.

We have two choices.

#1: We can modify our governance systems to increase their time horizon. That will force us to give up the fantasy that growth will solve our problems.

#2: We can let the effects of global problems simplify the global system to the point where it is only possible to focus on short-term issues.



# Main Point

- It is too late to achieve sustainable development. Now we should seek resilient development.
- In the past proposals for alternatives to physical growth were justified, because they could help the poor or reduce environmental damage. Now they can be justified as an urgent strategy for personal, regional, and national survival.

**The crisis doesn't only make us free to imagine other models, another future, another world. It obliges us to do so.**

**President Sarkozy, September 2009**

# Exercise

› Denkwerk**ZUKUNFT**

Stiftung kulturelle Erneuerung