Obstacles to Effective Climate Policy

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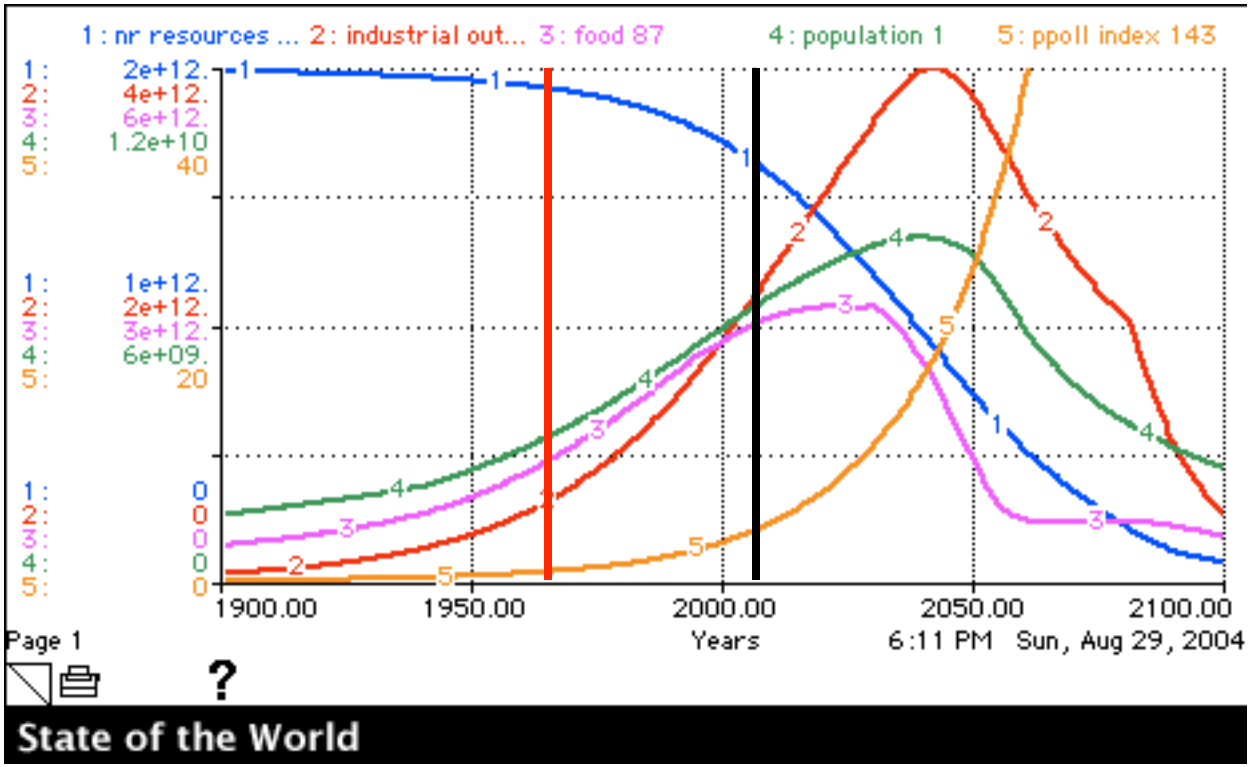
Santa Fe, NM: 23/7/09

The Reference Scenario



Pollution

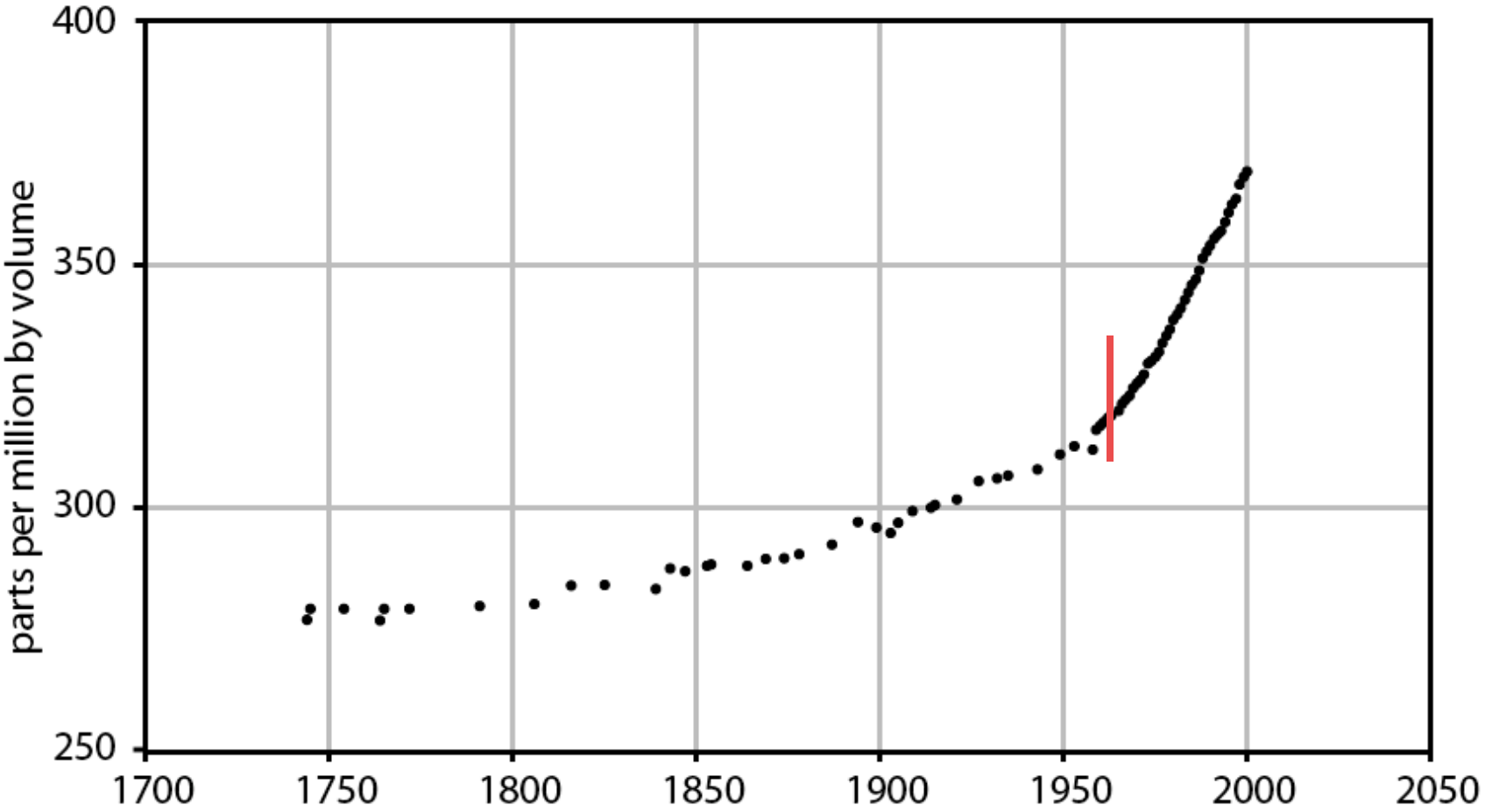
Population

Industrial Output

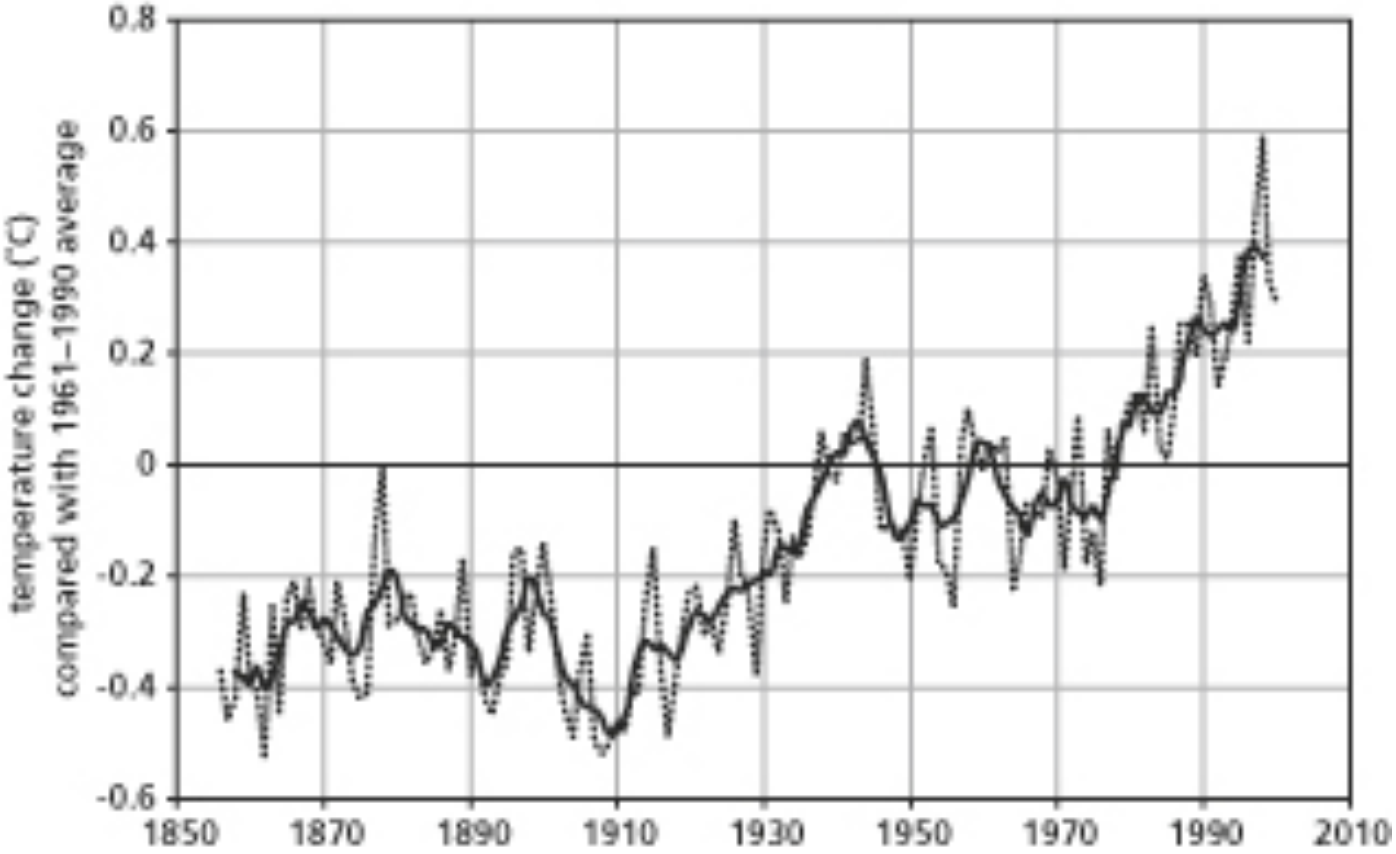
Food

Resources

CO_2 Concentration



Rising Global Temperature



Outline of My Remarks

five mistakes that block effective policies for combating climate change

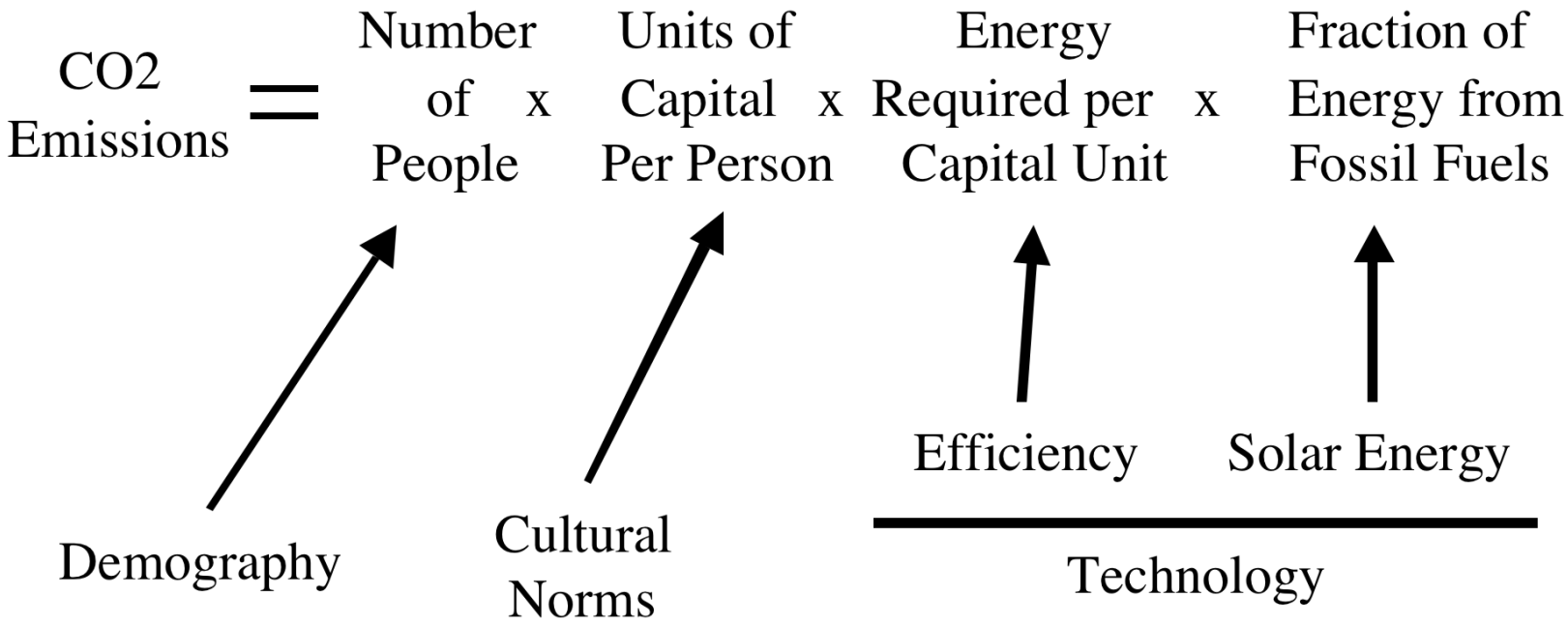
- Policy is directed at the wrong levers.
- Leaders do not understand the dynamics of climate change.
- The wrong criteria are being used.
- The time horizon is too short.
- Positive feedback loops have taken control out of our hands.

Climate Change Will Bring Many Changes:

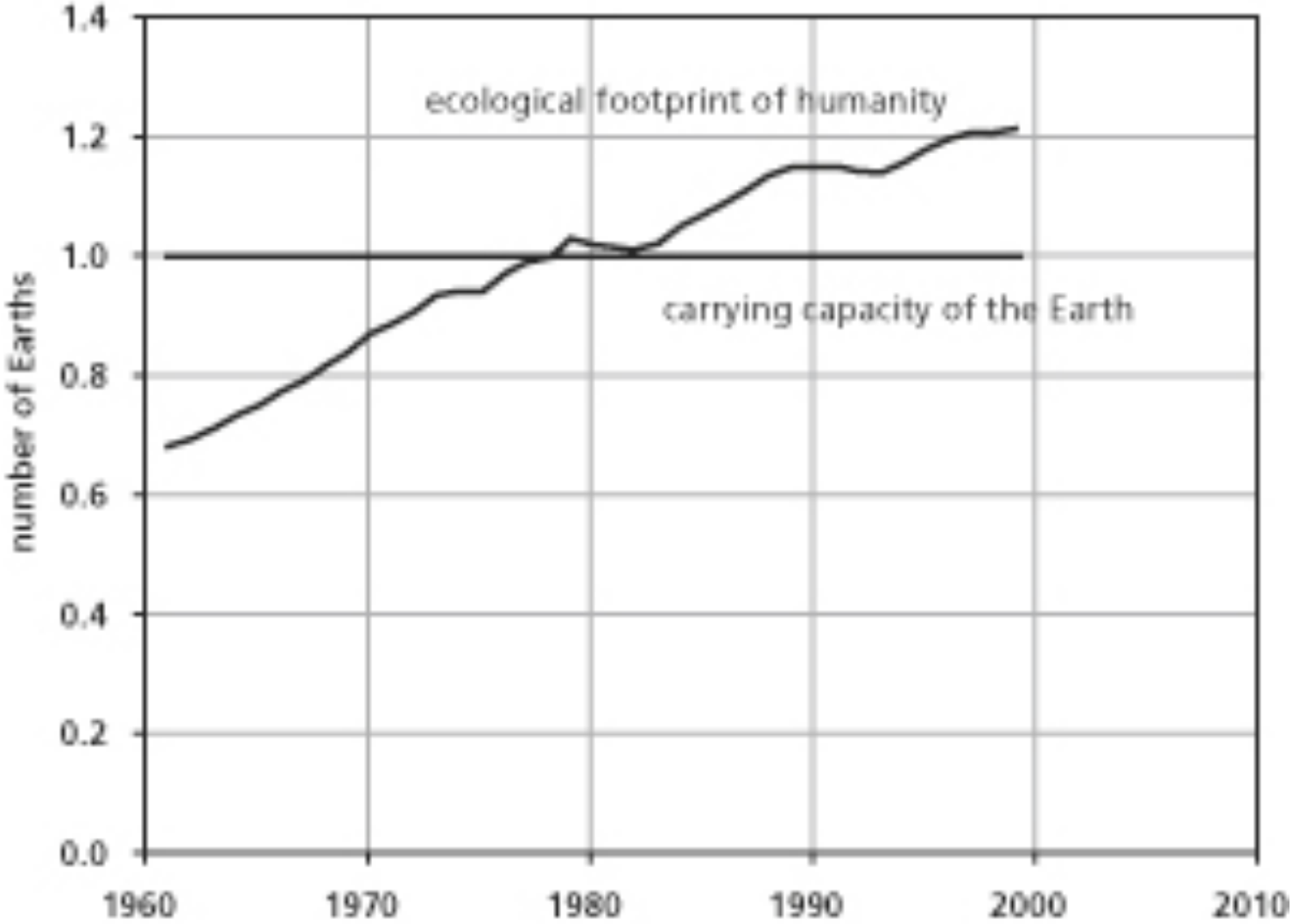
- Rising temperature
- Changes in precipitation and runoff patterns
- Shifting cultivation zones
- Growing acidity in the ocean
- Greater instability in winds
- Migration of ecological zones, pests, diseases
- Rising sea level
- Thus, massive changes in human settlements, human health, agricultural output, and industrial production

#1: Policy is directed at the wrong levers.

Four Factors Determine the Amount of CO_2 Emissions

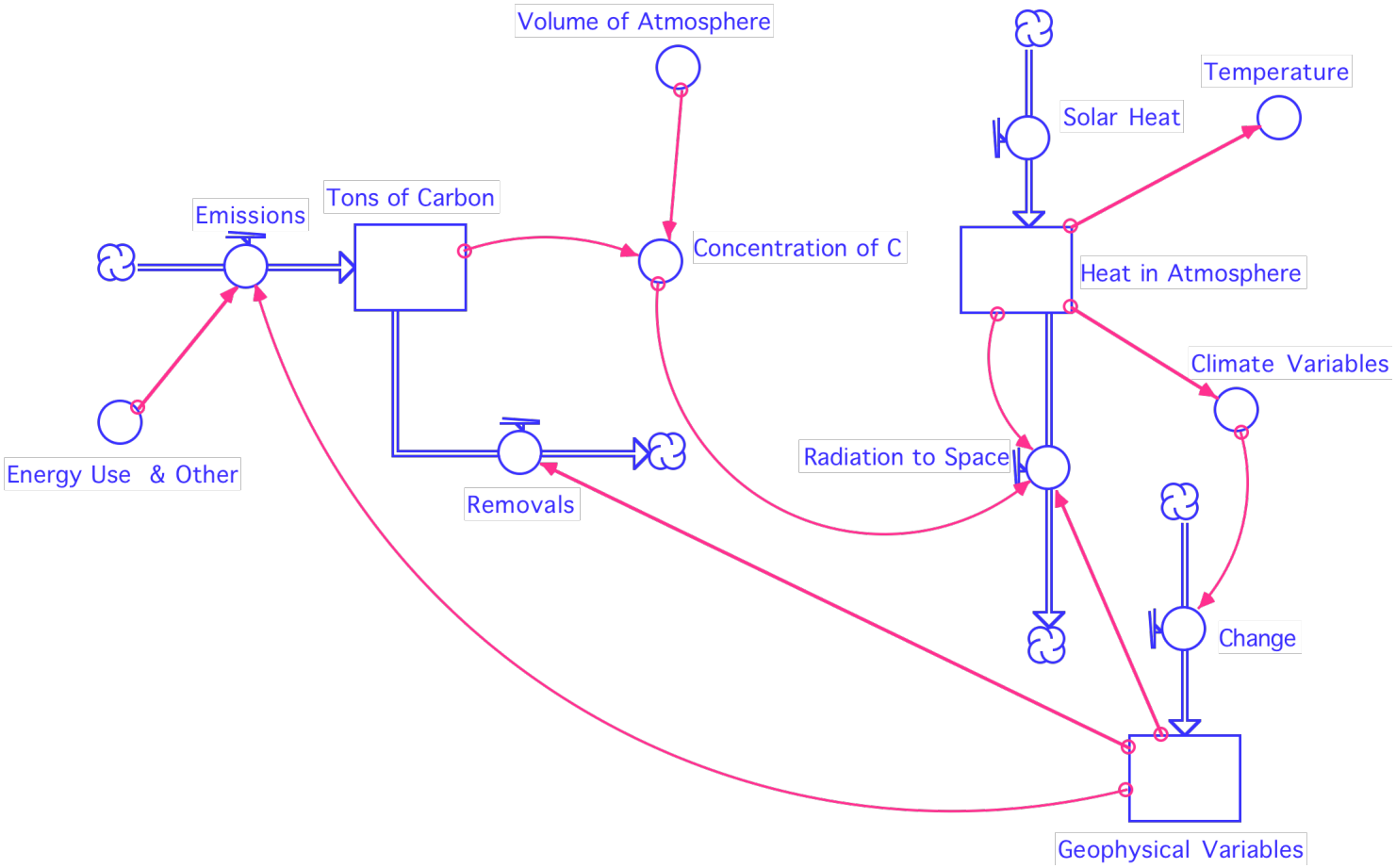


One Indicator of Overshoot

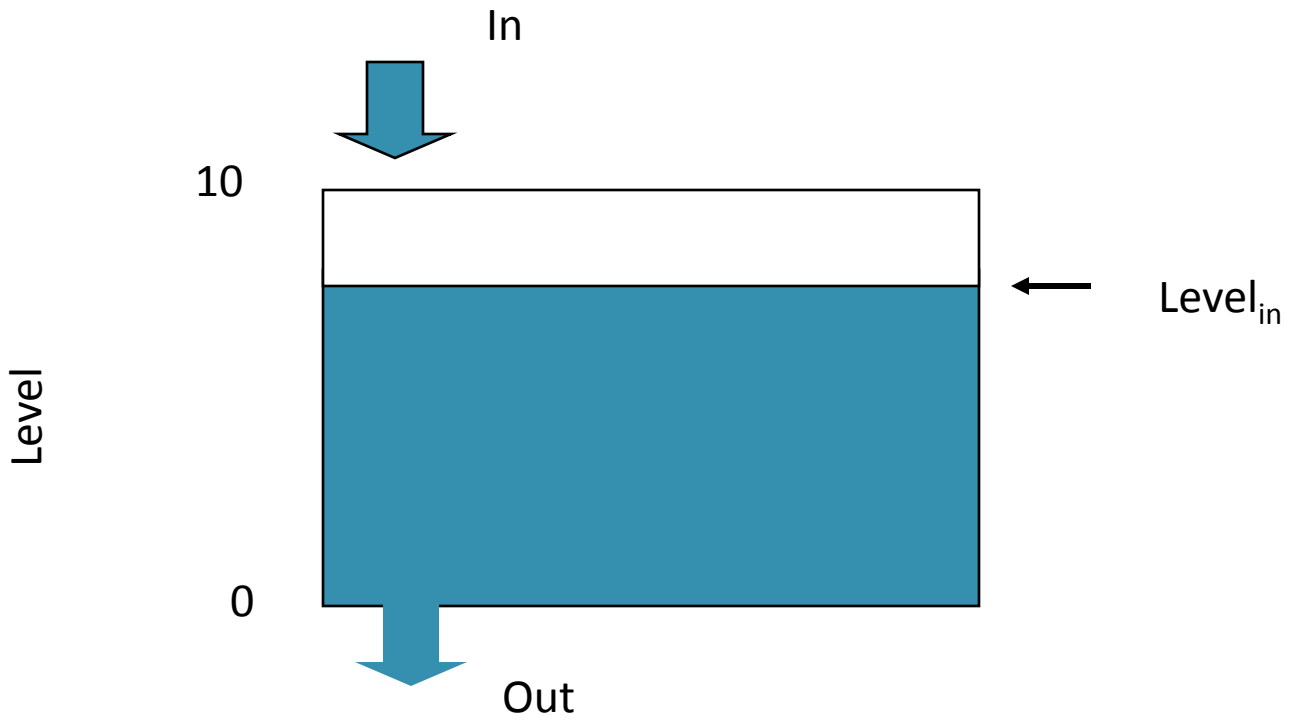


#2: Leaders do not understand the dynamics of climate change.

The Climate Change System

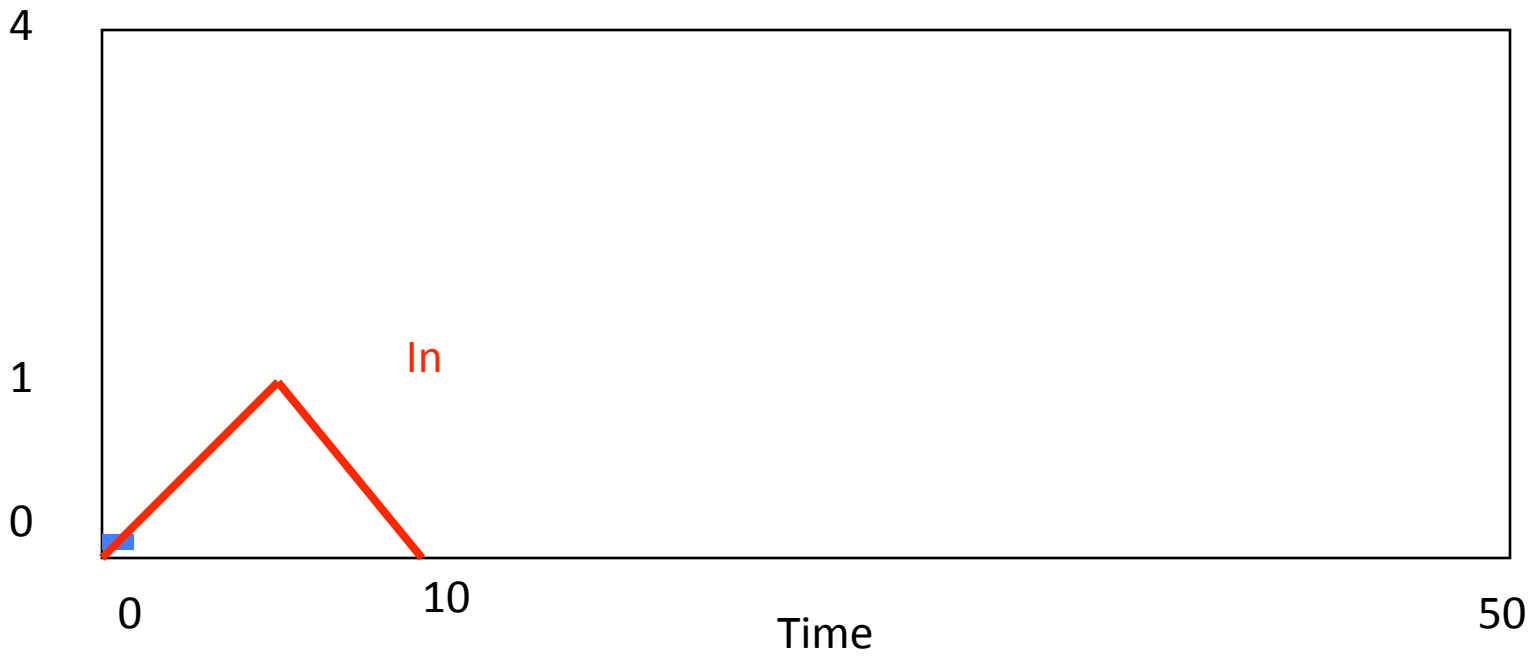


Bath Tub Dynamics



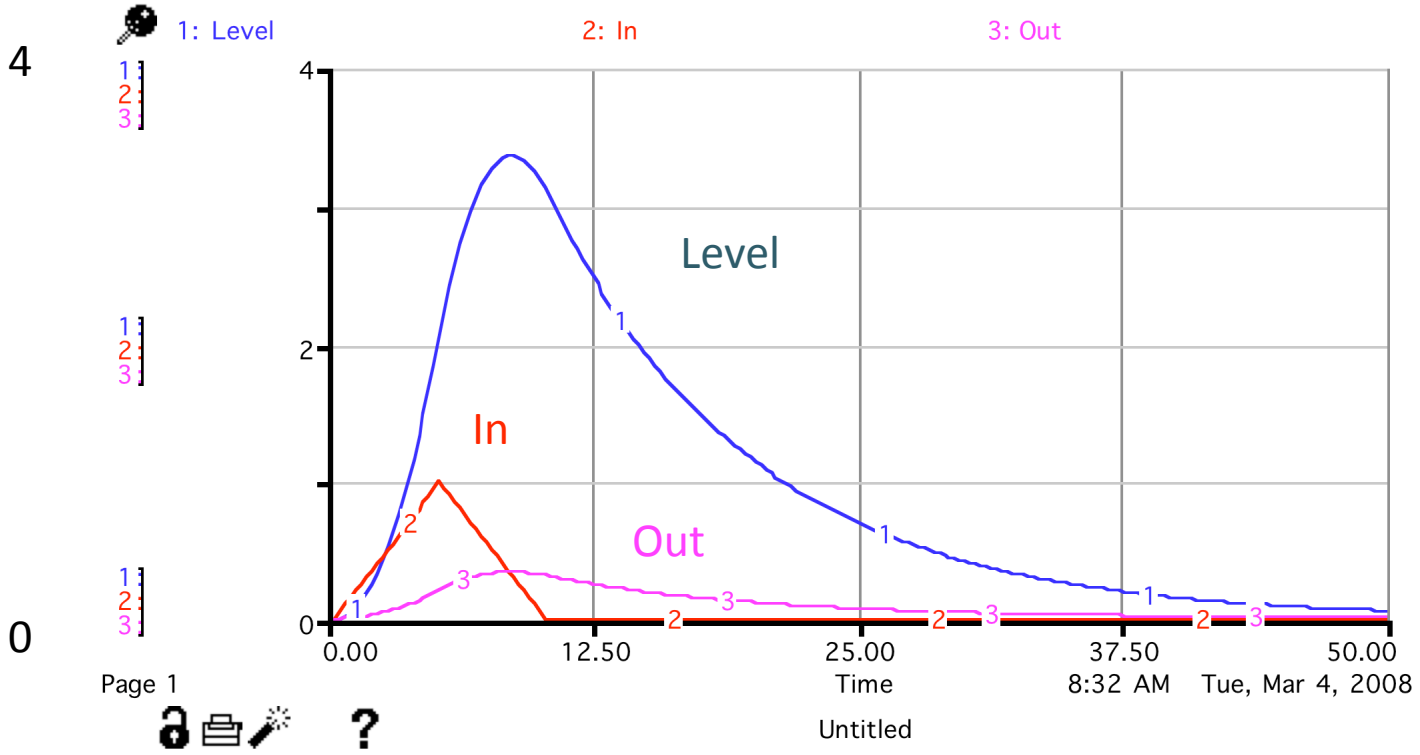
Behavior of the Water

- $Level_{in}$ = 0, Out = Level / 10,



Behavior of the Water

$Level_{in}$ = 0, Out = Level / 10,



Main Lessons From Bathtub Dynamics for the Issue of Climate Change

- The CO_2 concentration will continue to increase for an **extended** period even after the CO_2 emissions start to decline – perhaps centuries.
- Even if we could take GHG emissions to zero, the damage takes a **very** long time to disappear – probably never.

#3: The wrong criteria are being used.

Stern Review

- Preindustrial levels were 280ppm
- Now 430 ppm
  - So far experienced 0. 5 C
- Try to stabilize at 550ppm
  - Emissions peak 10-20 years, then fall 1-3%/year.
- If there is no action, 50% chance of 5 C increase in the next 50 years.

We Use Discounted Cash Flows to Select the "Optimum" Policy

The Stern Review recommended urgent, immediate, and sharp reductions in greenhouse-gas emissions. These findings differ markedly from economic models that calculate least-cost emissions paths to stabilize concentrations or paths that balance the costs and benefits of emissions reductions. Mainstream economic models definitely find it economically beneficial to take steps today to slow warming, but efficient policies generally involve modest rates of emissions reductions in the near term, followed by sharp reductions in the medium and long term. ….. Given that the Stern Review embraces traditional economic techniques ..), how does it get such different results and strategies? …I find that the difference stems almost entirely from its technique for calculating discount

William Nordhaus in *Science* July 25, 2007

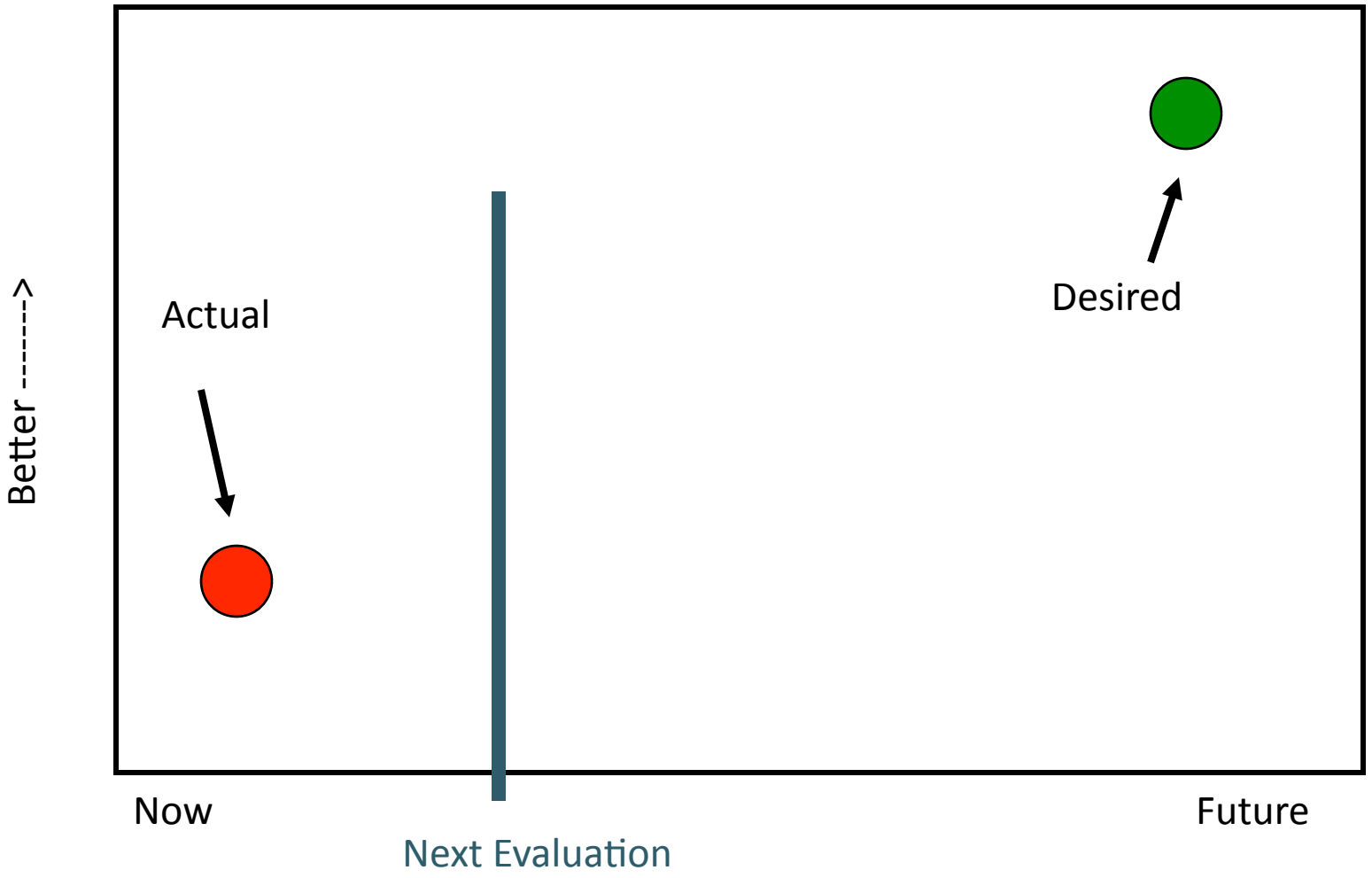
Relying on Present Net Value to Choose Assumes:

- 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, not the people who will suffer the most consequences of our actions
- Maximizing present financial benefits is the goal of society
- The bad results of current mistakes can be corrected by paying some (monetary) cost in the future

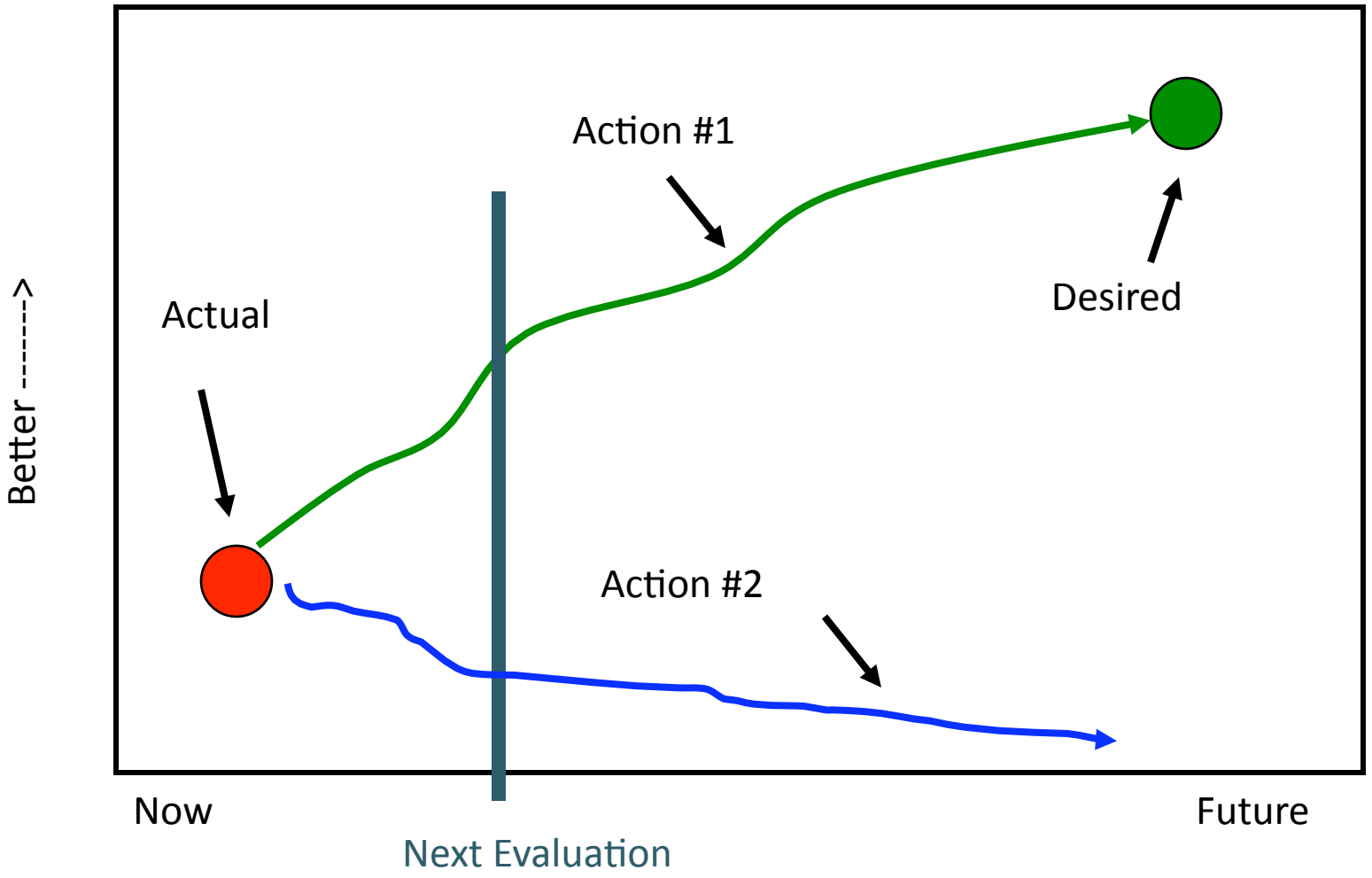
Every single one of these assumptions is false for the issue of climate change!!

#4: The time horizon is too short

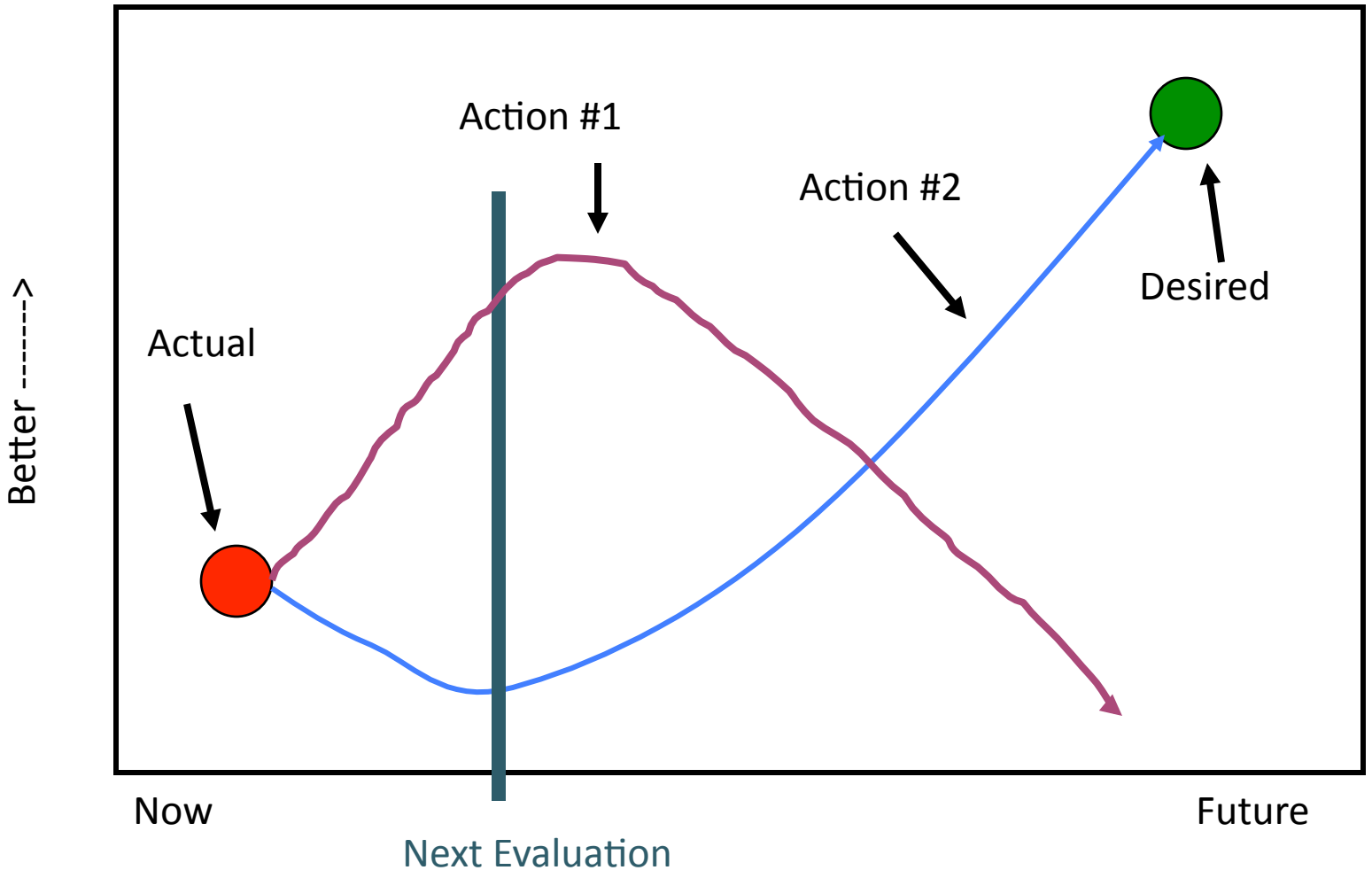
A Problem



Easy Problem

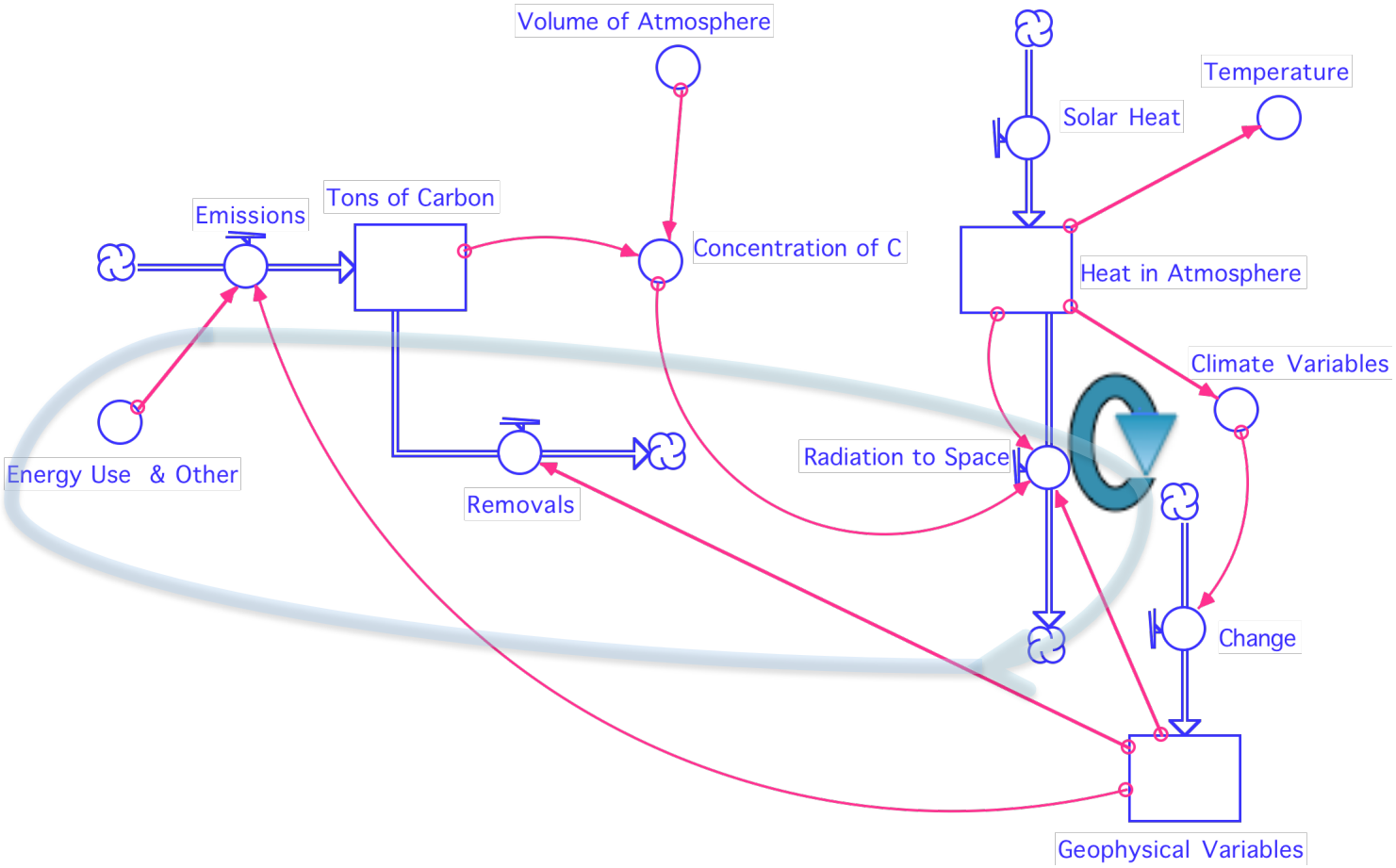


Difficult Problem



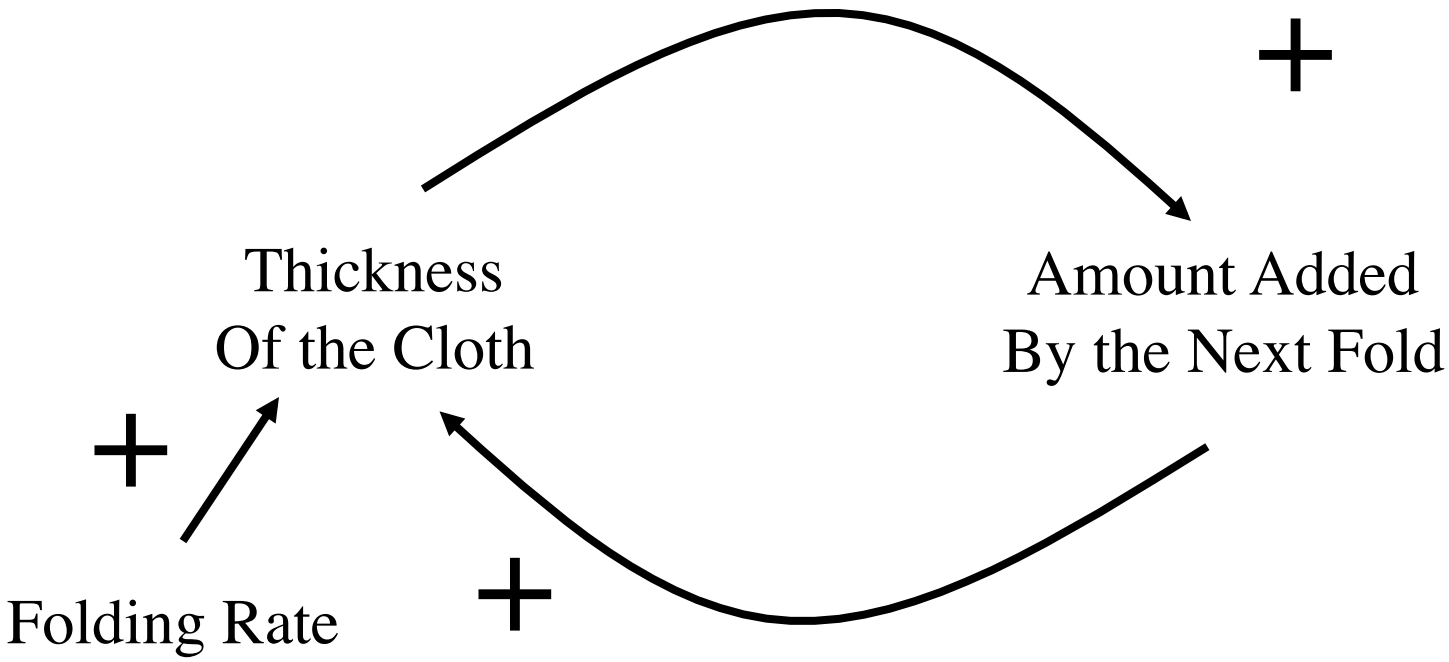
#5: Positive feedback loops have taken control of climate out of our hands.

The Climate Change System

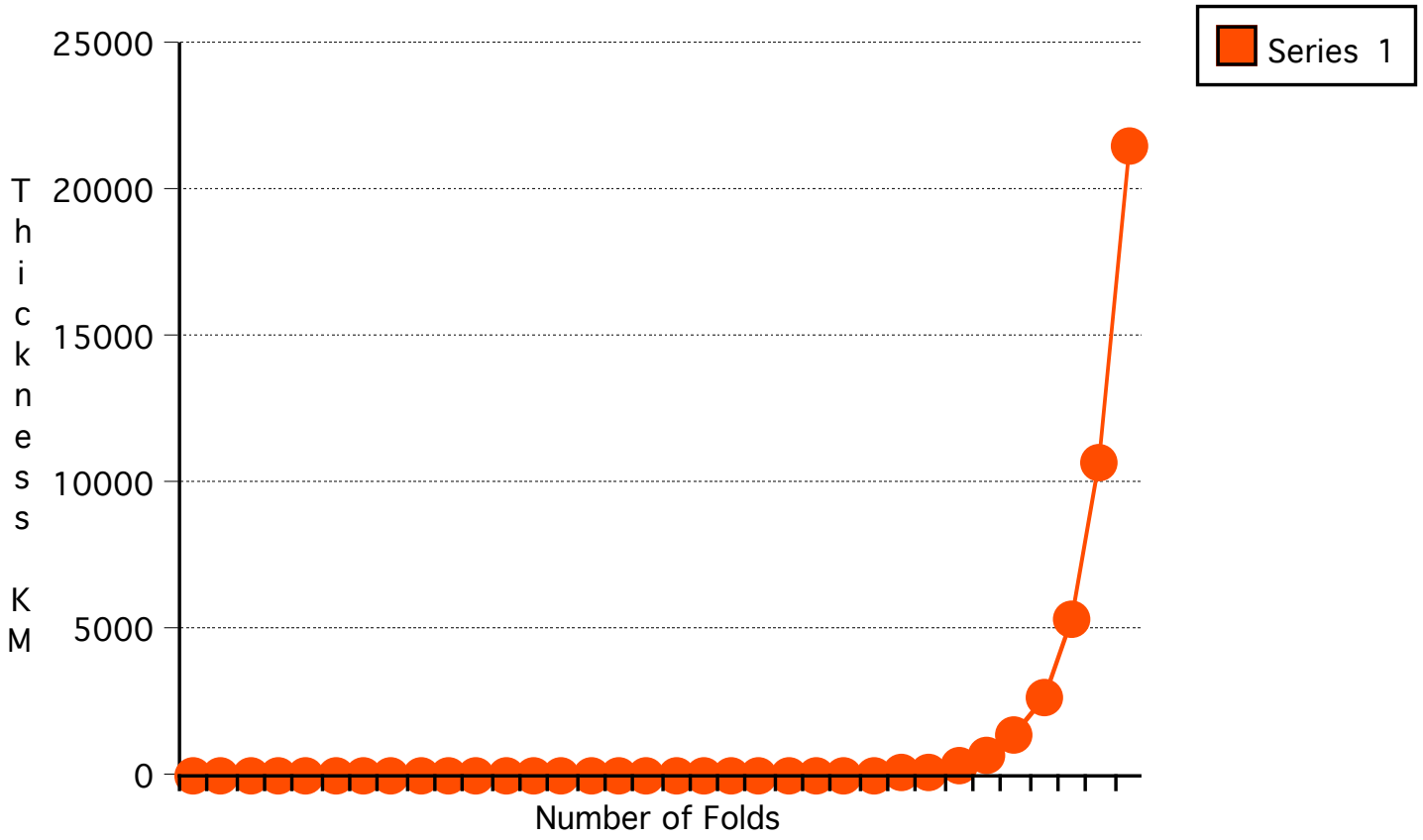


Exercise: Cloth Fold

Positive Feedback in Cloth Folding



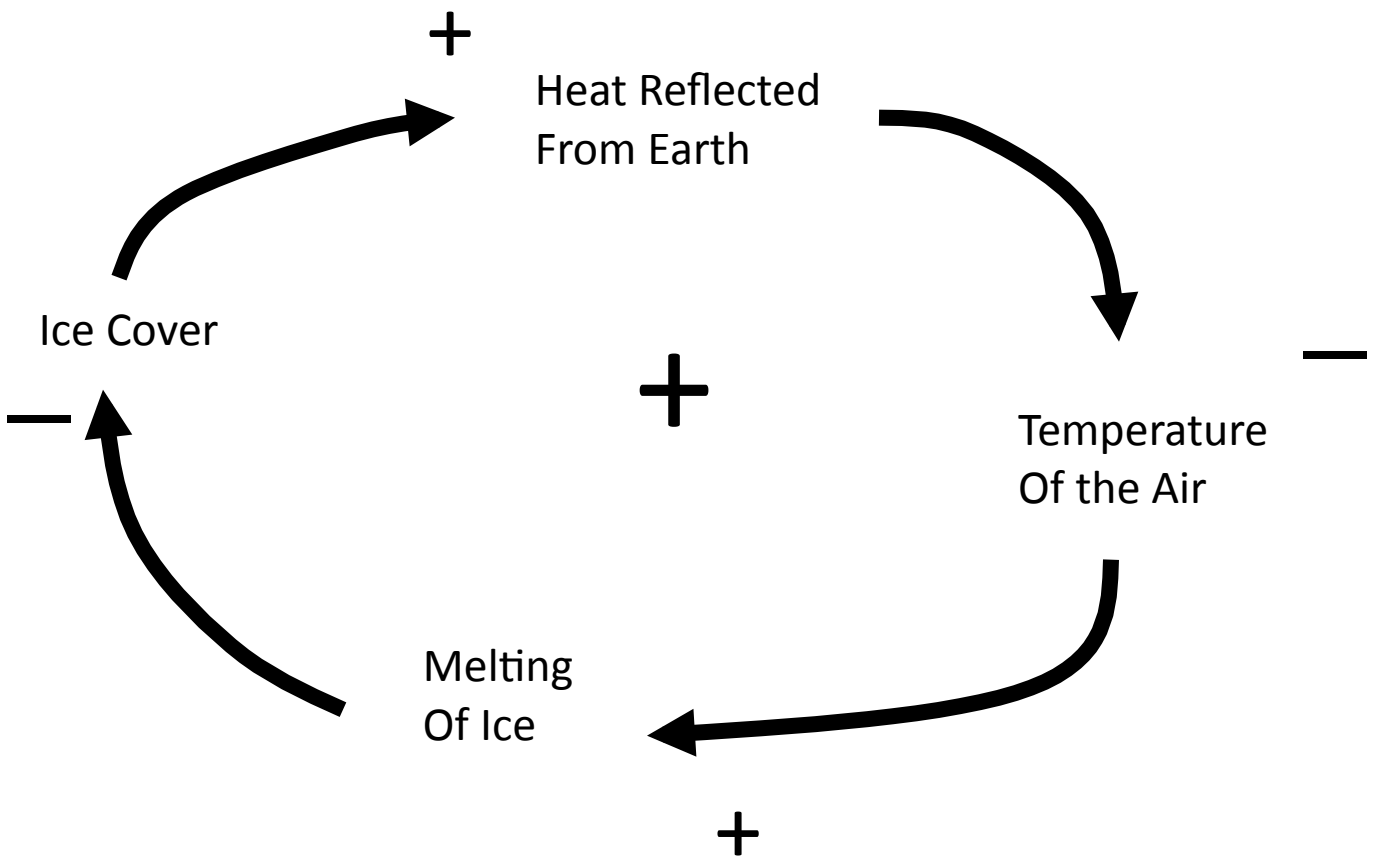
Thickness of the Cloth

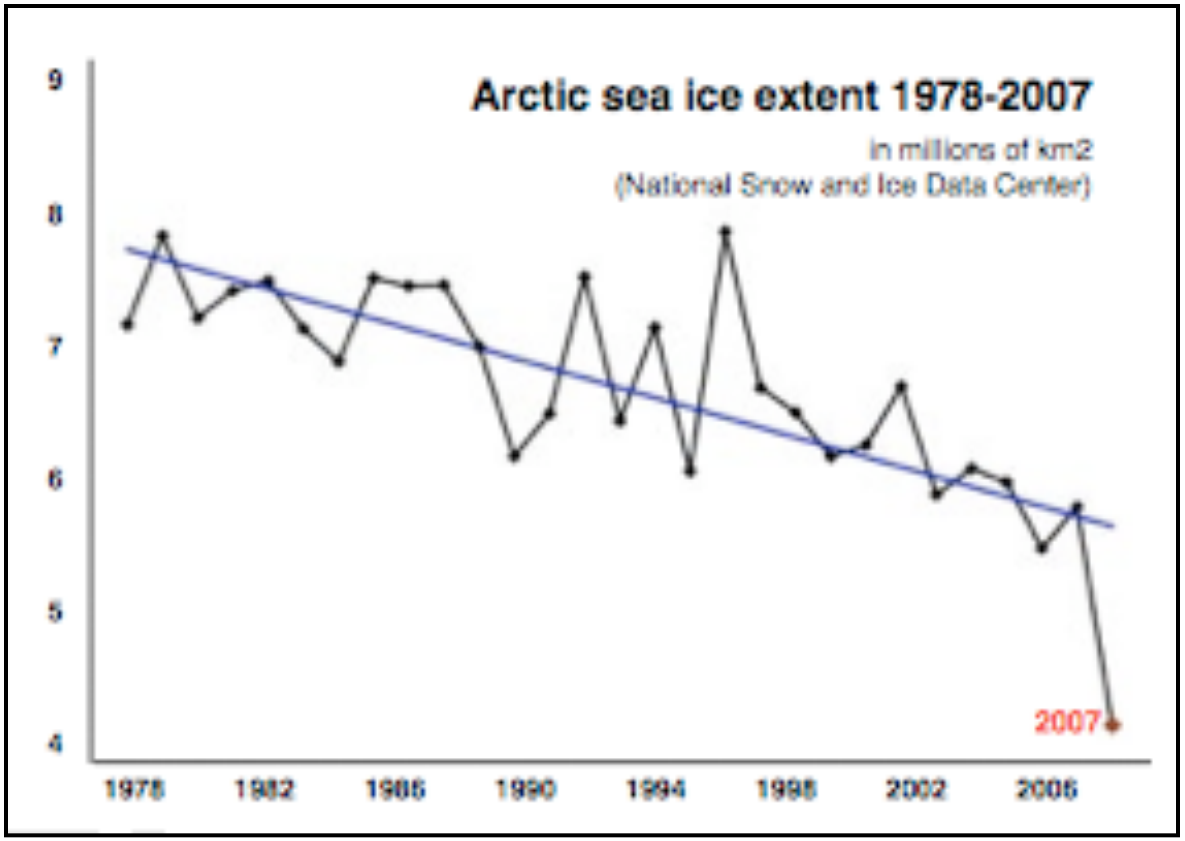


Sample Positive Climate Loops

- Ice cover -> heat reflection -> average temperature
- Tundra melt -> methane release -> average temperature
- Water vapor -> heat capture -> evaporation
- Temperature -> forest growth -> CO2 capture
- Sea temperature -> methane hydrate melt
- Climate disruption -> economic activity -> particulate emissions -> heat retained in the atmosphere

Ice Cover Feedback Loop




Arctic sea ice extent 1978-2007
in millions of km2
(National Snow and Ice Data Center)
9
8
7
6
5
4
2007
1978
1982
1986
1990
1994
1998
2002
2006