Incorporating climate change

Strategy and Sustainability

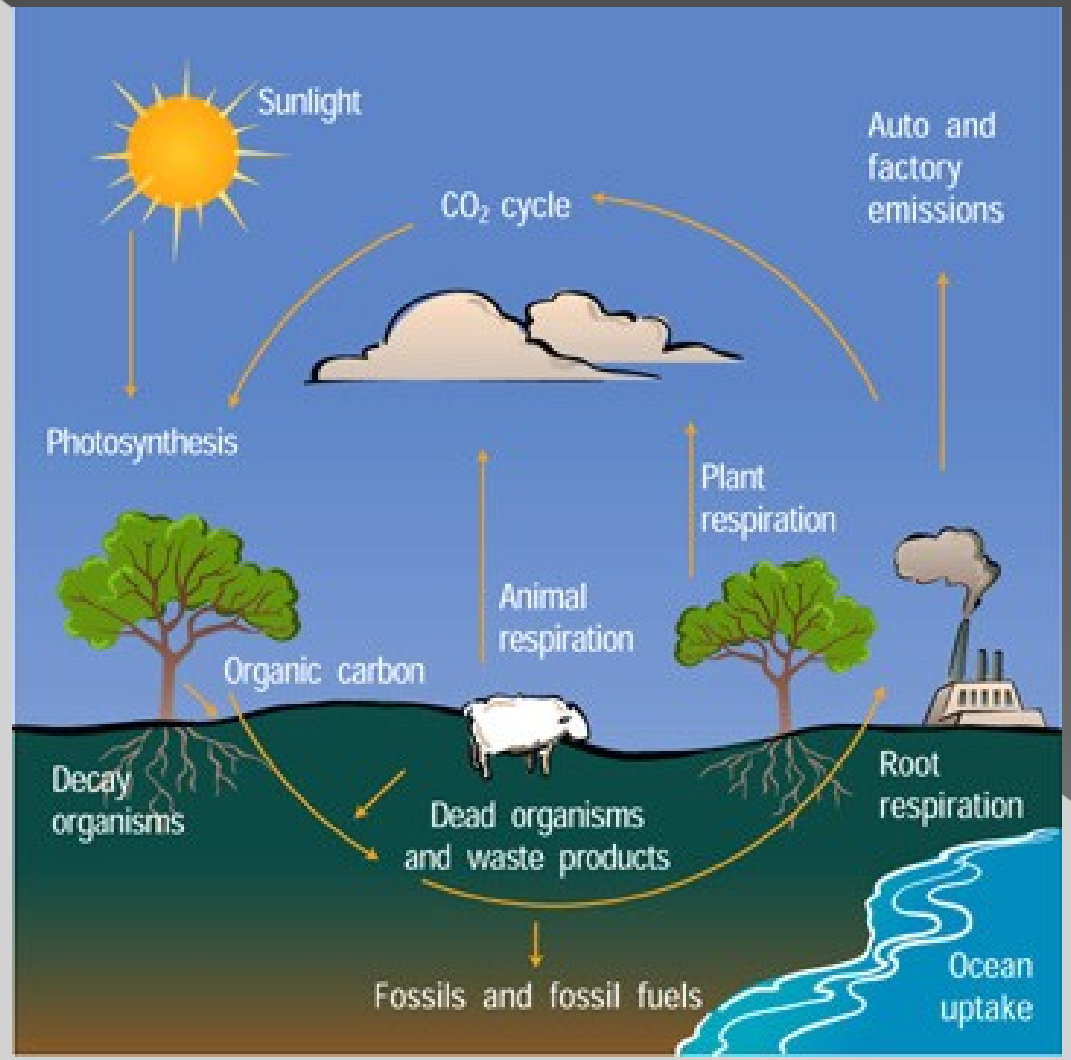
Environmental Crisis?

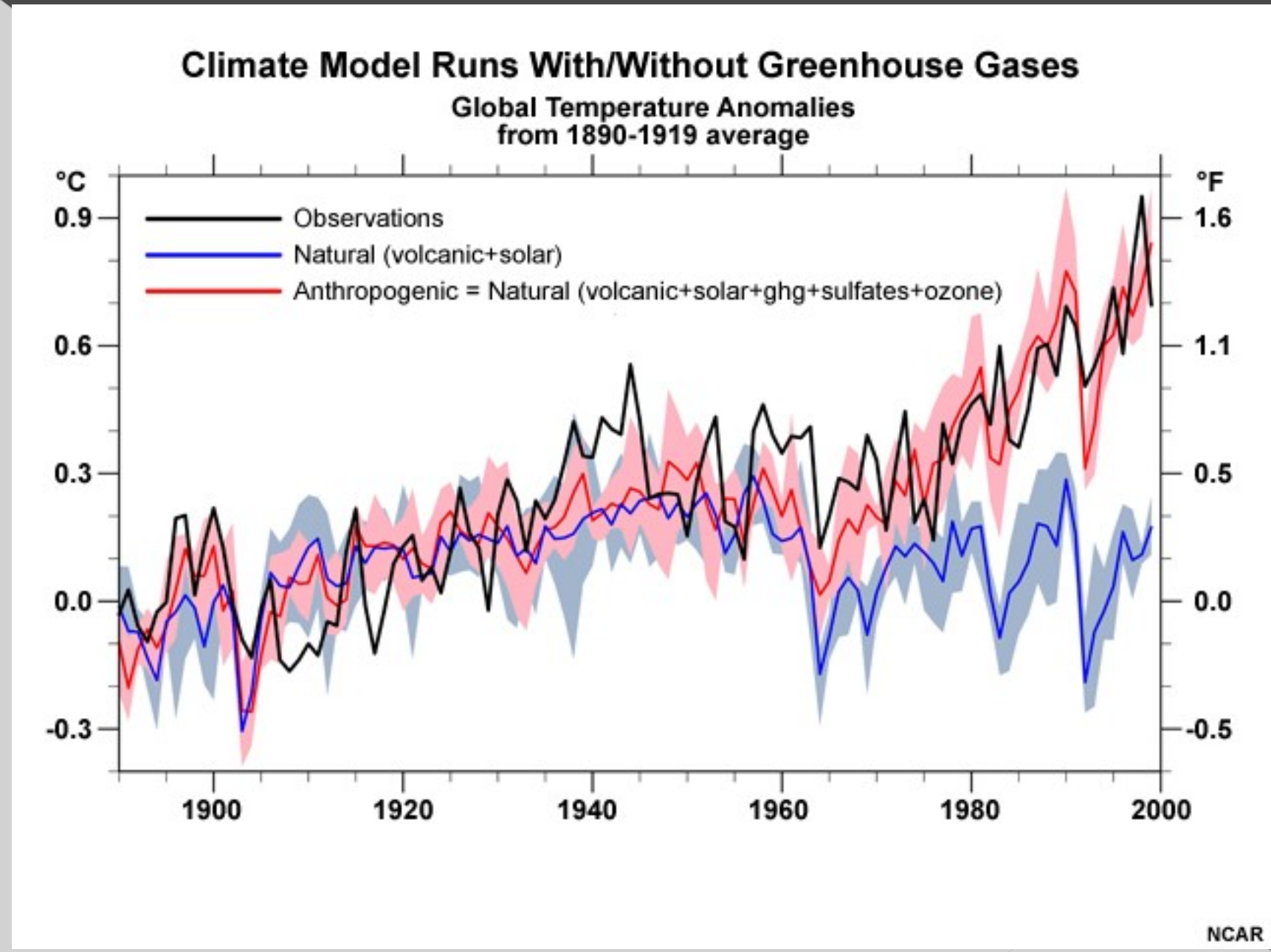
Problem	Agent
Climate change	Greenhouse gases
Ozone depletion	Emissions of CFCs
Species extinction	Loss of habitat
Fishery destruction	Over-fishing
Deforestation	Unsustainable agriculture
Land degradation	Over-exploitation; cash crops
Depletion of natural resources	Over-exploitation

It's the Economy, Stupid!

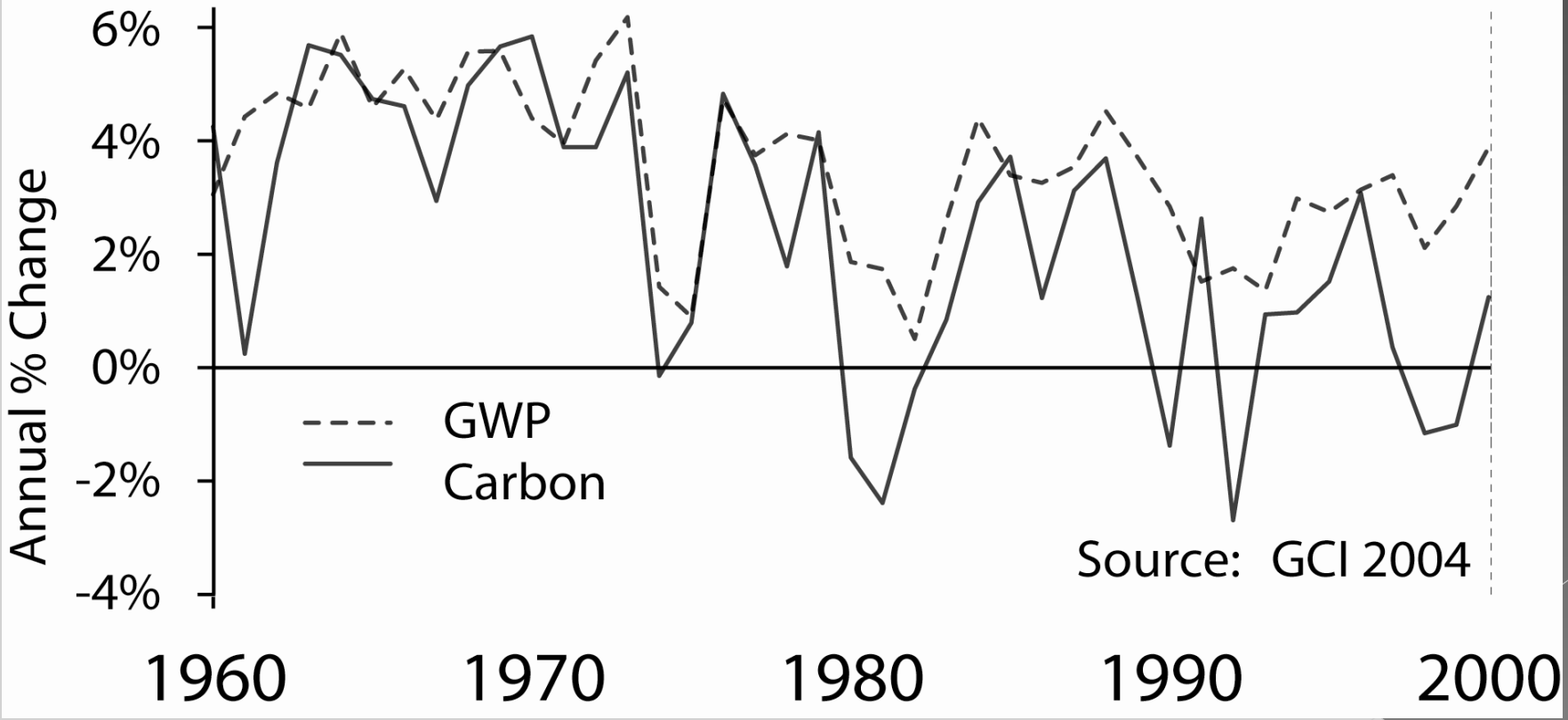
Problem	Agent
Climate change	Industrial production
Ozone depletion	Production of refrigerants
Species extinction	Production of cash crops
Fishery destruction	Over-fishing
Deforestation	Production of cash crops
Land degradation	Biofuels; over-production

The Carbon Cycle



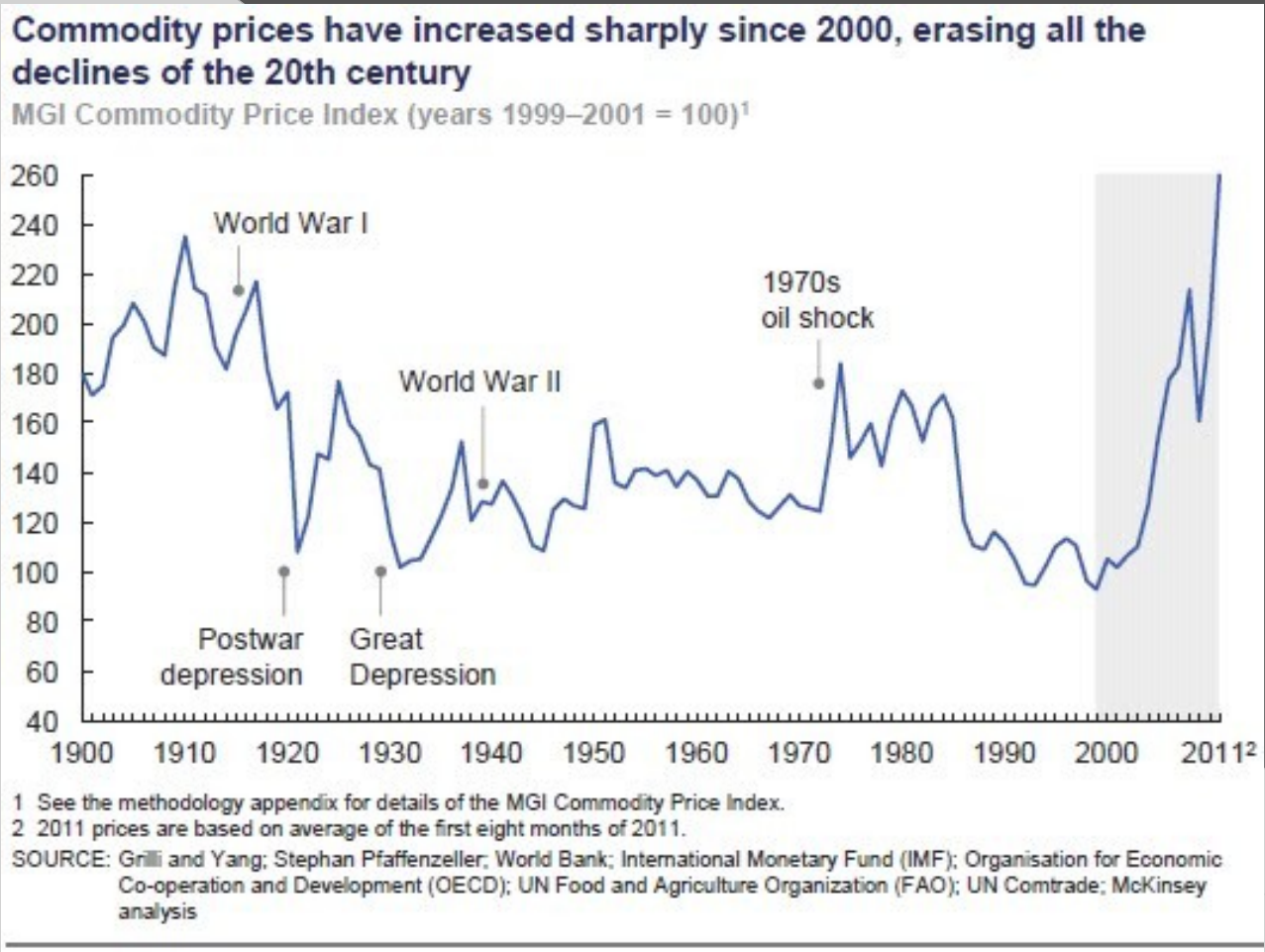

Climate Model Runs With/Without Greenhouse Gases
Global Temperature Anomalies
from 1890-1919 average
°C
°F
0.9
0.6
0.3
0.0
-0.3
1.6
1.1
0.5
0.0
-0.5
Observations
Natural (volcanic+solar)
Anthropogenic = Natural (volcanic+solar+ghg+sulfates+ozone)
1900
1920
1940
1960
1980
2000
NCAR

GWP, Carbon Lockstep

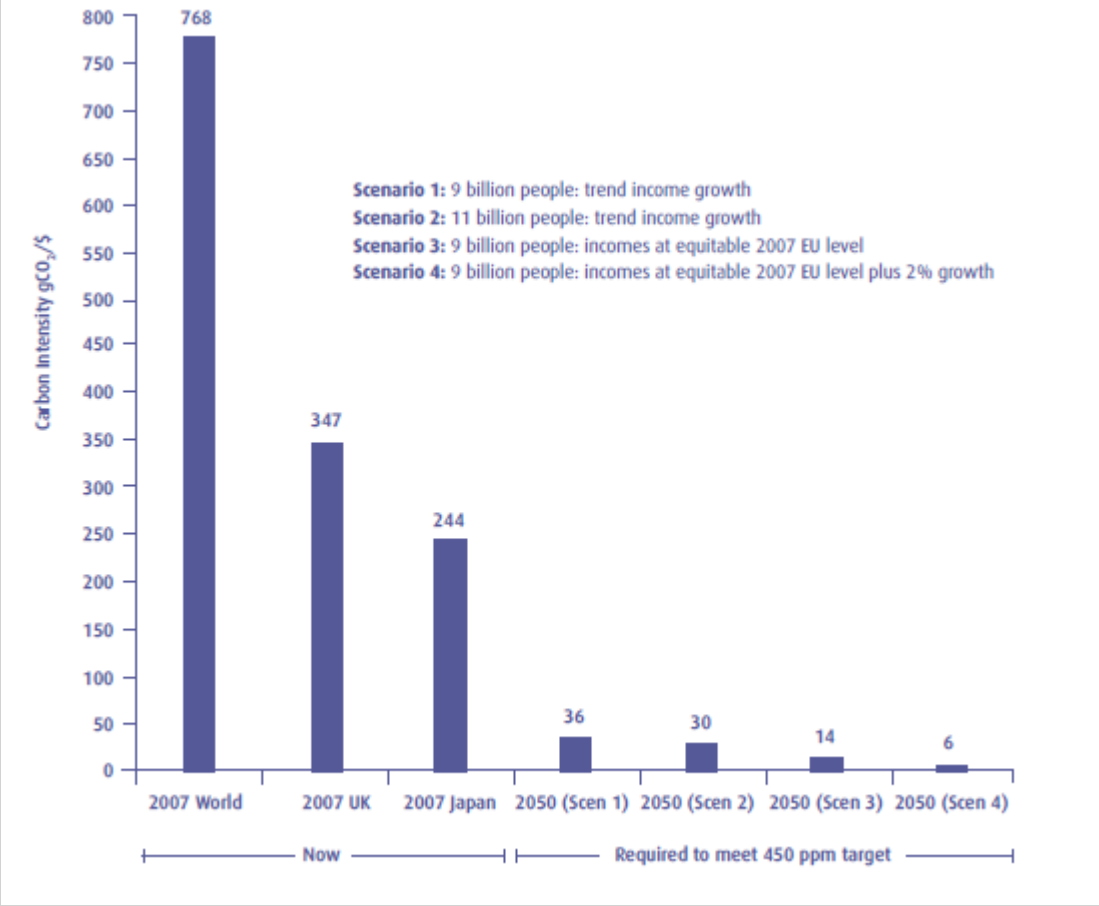


Cheat neutral

McKinsey: Resource Revolution



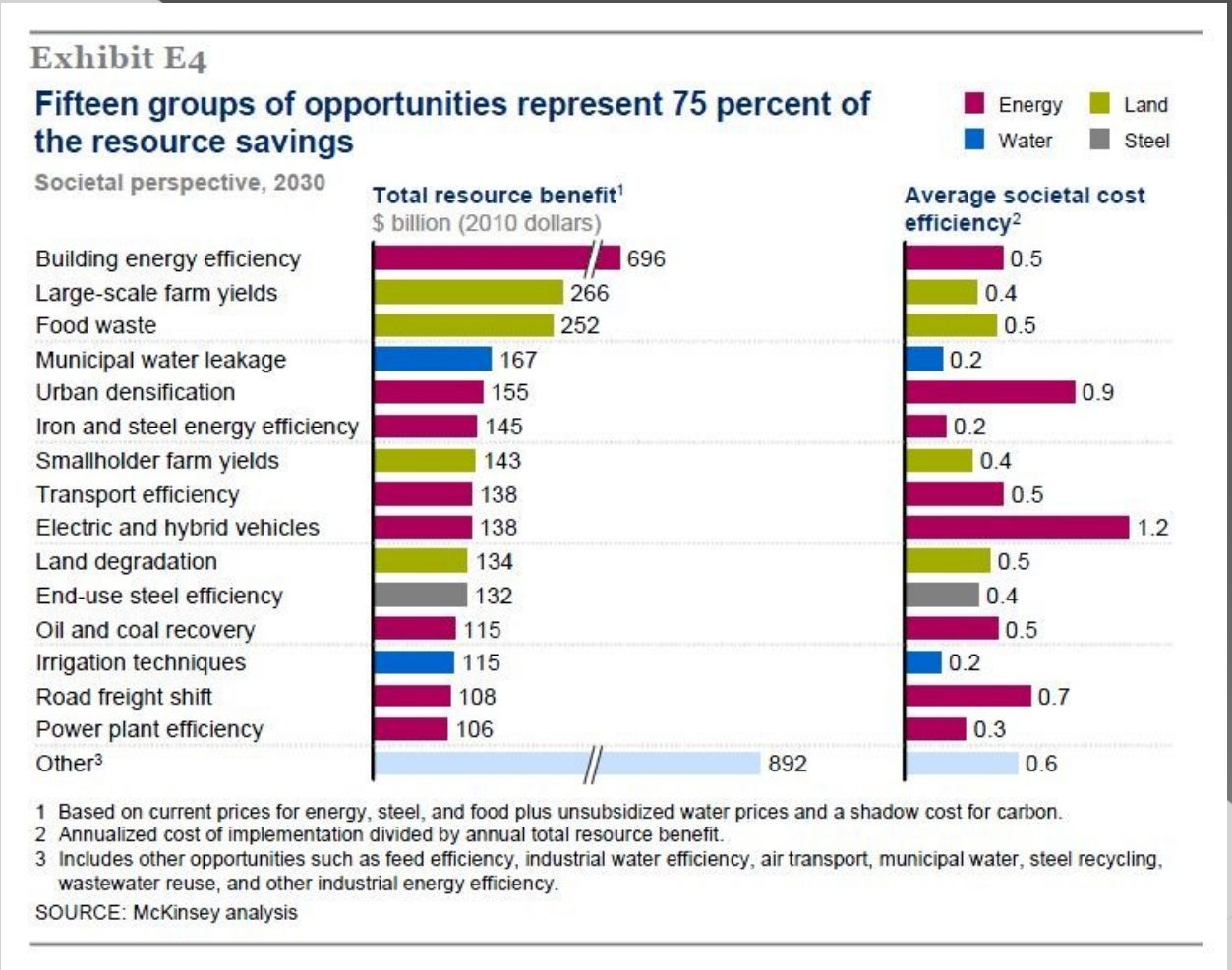
Carbon Intensities Now and Required to Meet 450 ppm Target



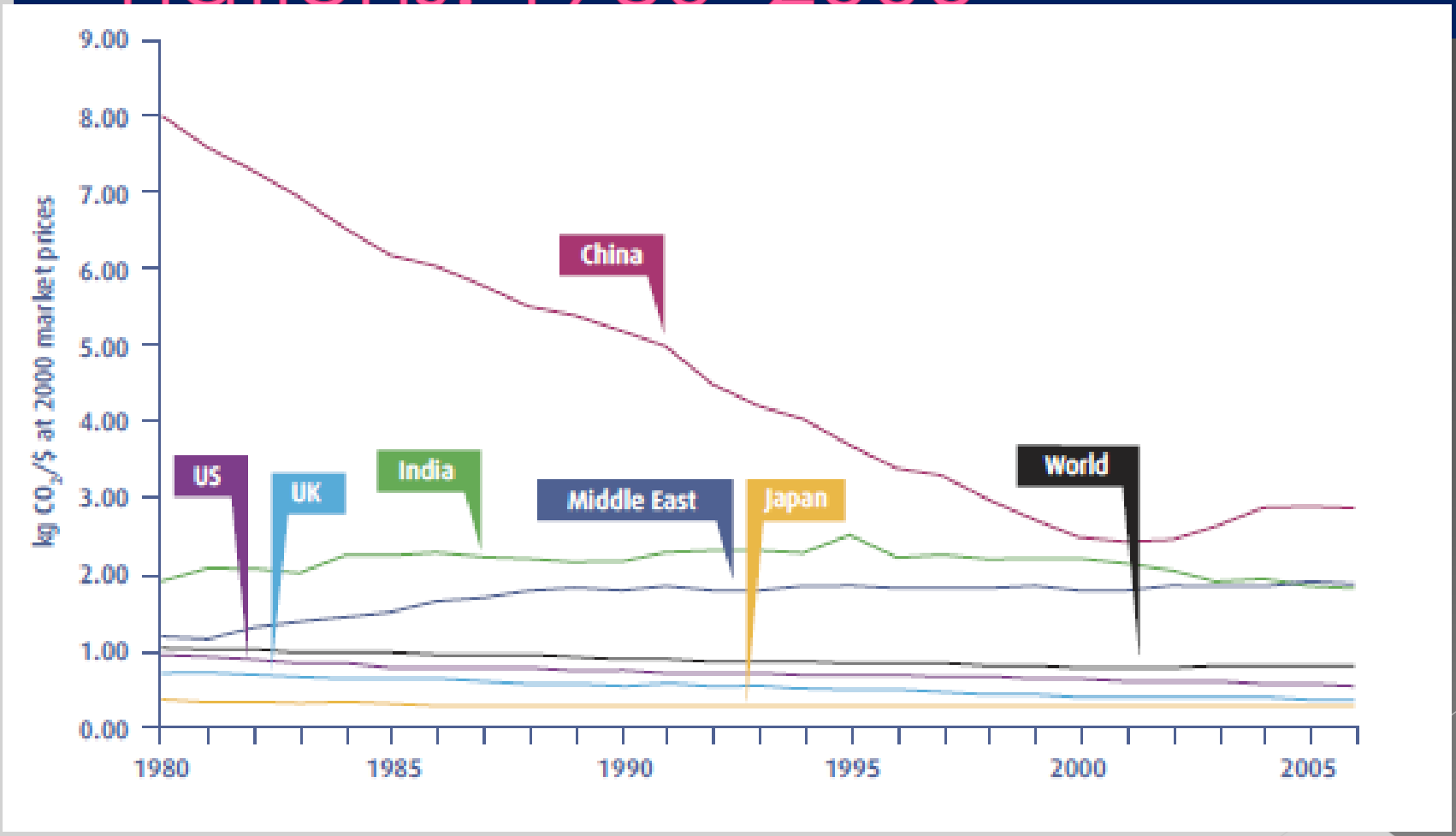
Key statistics

- 3 billion more middle-class consumers expected to be in the global economy by 2030
- 80% rise in steel demand projected from 2010 – 2030
- 147% increase in real commodity prices since the turn of the century
- 100% increase in the average cost to bring a new oil well on line over the past decade
- The report also identifies 15 opportunities that could deliver about 75% of the resource productivity benefits

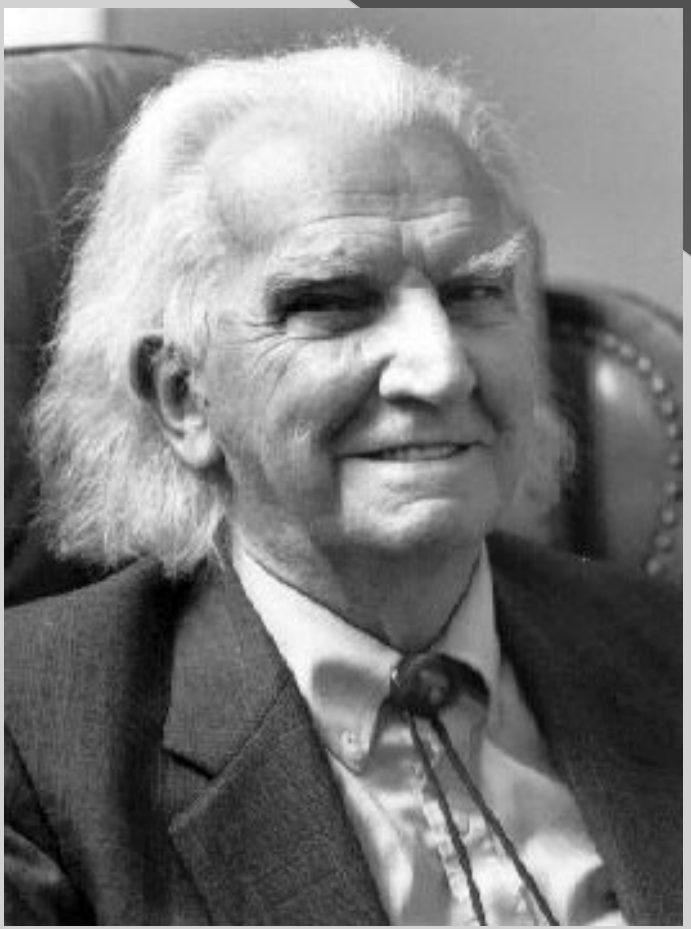
McKinsey: Resource Revolution



CO_2 intensity of GDP across nations: 1980–2006



From linear to cyclical economy



- ‘cannot turn pots back into clay’
- ‘extracts fossil fuels and ores at one end and transforms them into commodities and waste products’

‘The circular economy’

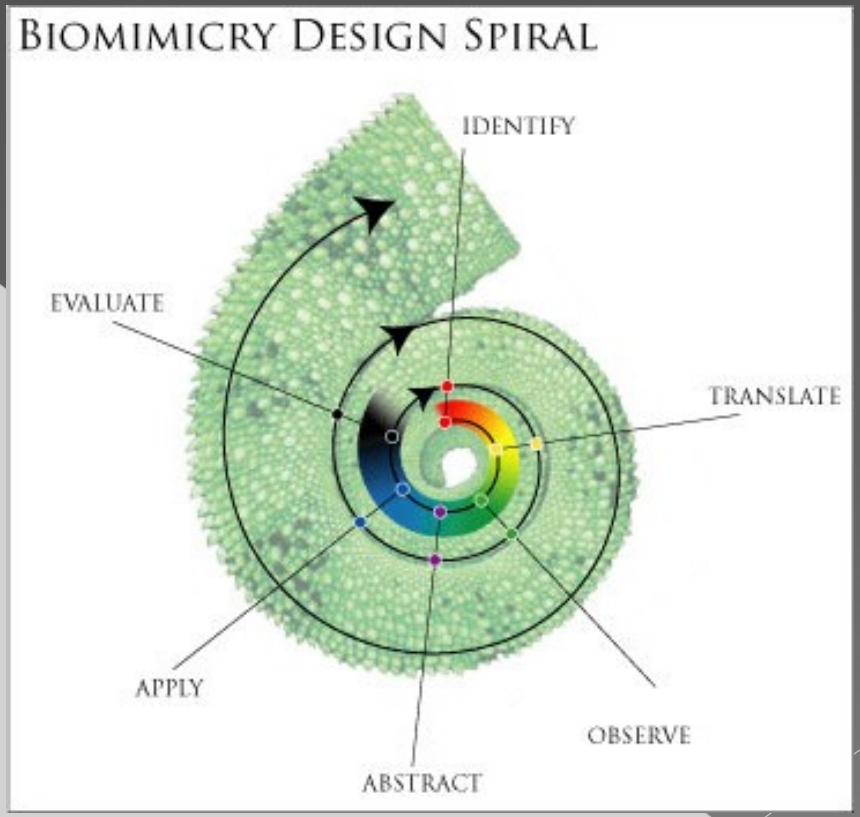
Ellen Macarthur Foundation: circular economy

Introduction to the circular economy

Reactions?

Industrial ecology: designing with nature in mind

- A powerful prism through which to examine the impact of industry and technology on the biophysical environment
- Examines local, regional and global uses and flows of materials and energy in products, processes, industrial sectors and economies

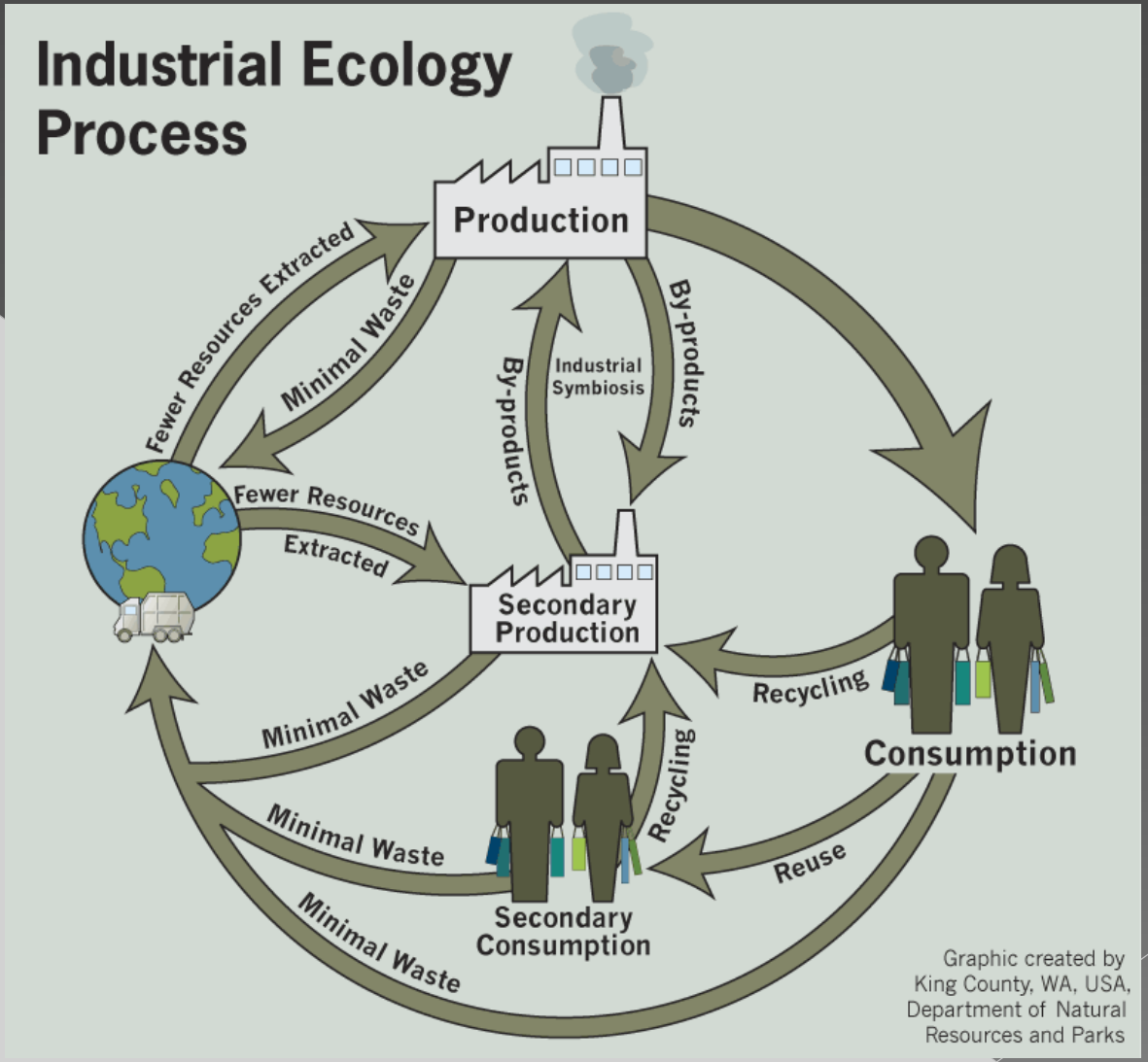


Natural metabolism

- Porritt encourages businesses to 'match the metabolism of the natural world'--biomimicry

- 'Buildings that, like trees, produce more energy than they consume and purify their own waste water'

- 'Products that, when their useful life is over, do not become useless waste but can be tossed on to the ground to decompose and become food for plants and animals and nutrients for soil'


Industrial Ecology Process
Production
Fewer Resources Extracted
Minimal Waste
By-products
Industrial Symbiosis
By-products
Fewer Resources Extracted
Secondary Production
Recycling
Consumption
Minimal Waste
Minimal Waste
Recycling
Reuse
Secondary Consumption
Minimal Waste
Graphic created by King County, WA, USA, Department of Natural Resources and Parks

Can we achieve economic growth without using materials and energy in such a way that is impossible within a limited planet?

- It depends on how efficiently we use the materials and energy in economic production
- Lovins gave the example of improving a pipe system by straightening the pipe and enlarging its diameter, thus reducing the energy needed to pump fluid through it.

Natural Capitalism: 'the next industrial revolution'

- 'The first of natural capitalism's four interlinked principles, therefore, is radically increased resource productivity. Implementing just this first principle can significantly improve a firm's bottom line, and can also help finance the other three. They are
  - redesigning industry on biological models with closed loops and zero waste
  - shifting from the sale of goods (for example, light bulbs) to the provision of services (illumination)
  - reinvesting in the natural capital that is the basis of future prosperity'

Factor 4/Factor 5 (not skin cream)

- *Factor 4* (von Weizsäcker et al. 1997); updated as *Factor 5* (2009)
- 'Picking up where Factor Four left off, this new book examines the past 15 years of innovation in industry, technical innovation and policy. It shows how and where factor four gains have been made and how we can achieve greater factor five or 80%+ improvements in resource and energy productivity and how to roll them out on a global scale to retool our economic system, massively boost wealth for billions of people around the world and help solve the climate change crises.'

Business Process Re-engineering (BPR)

- Focuses on the workflow within and between enterprises to improve time management and reduce costs. Seven principles:
  - 1. Organize around outcomes, not tasks.
  - 2. Identify all the processes in an organization and prioritize them in order of redesign urgency.
  - 3. Integrate information processing work into the real work that produces the information.
  - 4. Treat geographically dispersed resources as though they were centralized.
  - 5. Link parallel activities in the workflow instead of just integrating their results.
  - 6. Put the decision point where the work is performed, and build control into the process.
  - 7. Capture information once and at the source.

Re-engineering as a circular economy business

- Work in pairs
- Read through the case-study and consider the efforts the company has already made to address the sustainability agenda
- Now rethink the business entirely using the model of the circular economy: what changes could you propose to the CEO
- How would you justify these ideas strategically?

Decentred public ownership: the Danish renewables experience

Denmark as a renewables' success story:

'Denmark's emergence as a leader in the renewable energy sector represents a remarkable transformation. Despite lacking almost entirely in hydroelectric resources and without the strong biomass tradition of its Scandinavian neighbours, the government has used policies to build up one of the biggest renewable energy sectors in the world.' (IEA 2006, p. 9)

- 20,000 jobs
- 50% of world market in wind turbine manufacture

Supportive institutional framework

- Govt subsidy of 30% on all new wind power investment from 1980 – 1990
- 'Energipakken' – forcing electricity distribution companies to take quotas of renewable linked to rising targets
  - Feed-in-tariff (FIT) guaranteed price – 84% of costs for green energy from 1993
- Support for local and collective ownership
  - Distance regulation + consumption laws
  - Growth of coops = 84% of turbine ownership, 12% of population
  - Growth of democratic associations – Danish Wind Turbine Owners Assoc.

Multi-scalar organisation of public ownership

Table 10.1 Structure of the electricity power generation and distribution network in Denmark

	% share	Nature of ownership
Power generation		
Central generation plants	61	State: DONG, Swedish state subsidiary
Wind turbines	19	Co-ops, state, municipal and private
CHP/industrial /auto-producers	20	Mix of private and public
Electricity distribution		
Joint stock companies	26	- state owned under DONG Energy
Co-operative companies	55	- co-ops owned by consumers
Municipal companies	12	- co-ops or joint stock state owned
Other	7	

Source: derived from DEA 2007, p. 17.

Figure 10.1: Wind power electricity generation (MW) in Denmark 1986 - 2009