

DEN STORA FÖRNEKELSEN



"Grand Challenges"

Presentation by Anders Wijkman, Senior Advisor, Stockholm Environment Institute, Tällberg Foundation and Linköping University, at NORDTEK in Åbo on June 18th, 2011.

World Economic Forum Risk Report, february 2011

- Rapidly increasing gaps in terms of income and wealth
- Global Governance Failures
- Macroeconomic unbalances, like finance bubbles, debt and currency crises
- International Crime
- Provision of water / food / energy



Add to that

- Large scale Migration
- Demography – both continued growth and major imbalances in terms of distribution
- Antibiotic resistancy
- Both economic and political systems are short term in nature; Risk management lacking
- Consciousness levels differ greatly
- Role of media
- Black Swans that we don't know about



We live above our means– in the economy as well as in nature

- No generations have borrowed as heavily from the future - Gvts as well as households;
- Environmental space shrinking:

Climate change

2/3 of major ecosystems used beyond capacity

Planetary Boundaries

”Peak oil”, ”Peak Phosphorus”, ”Peak rare earths”

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It all boils down to the way we use resources!



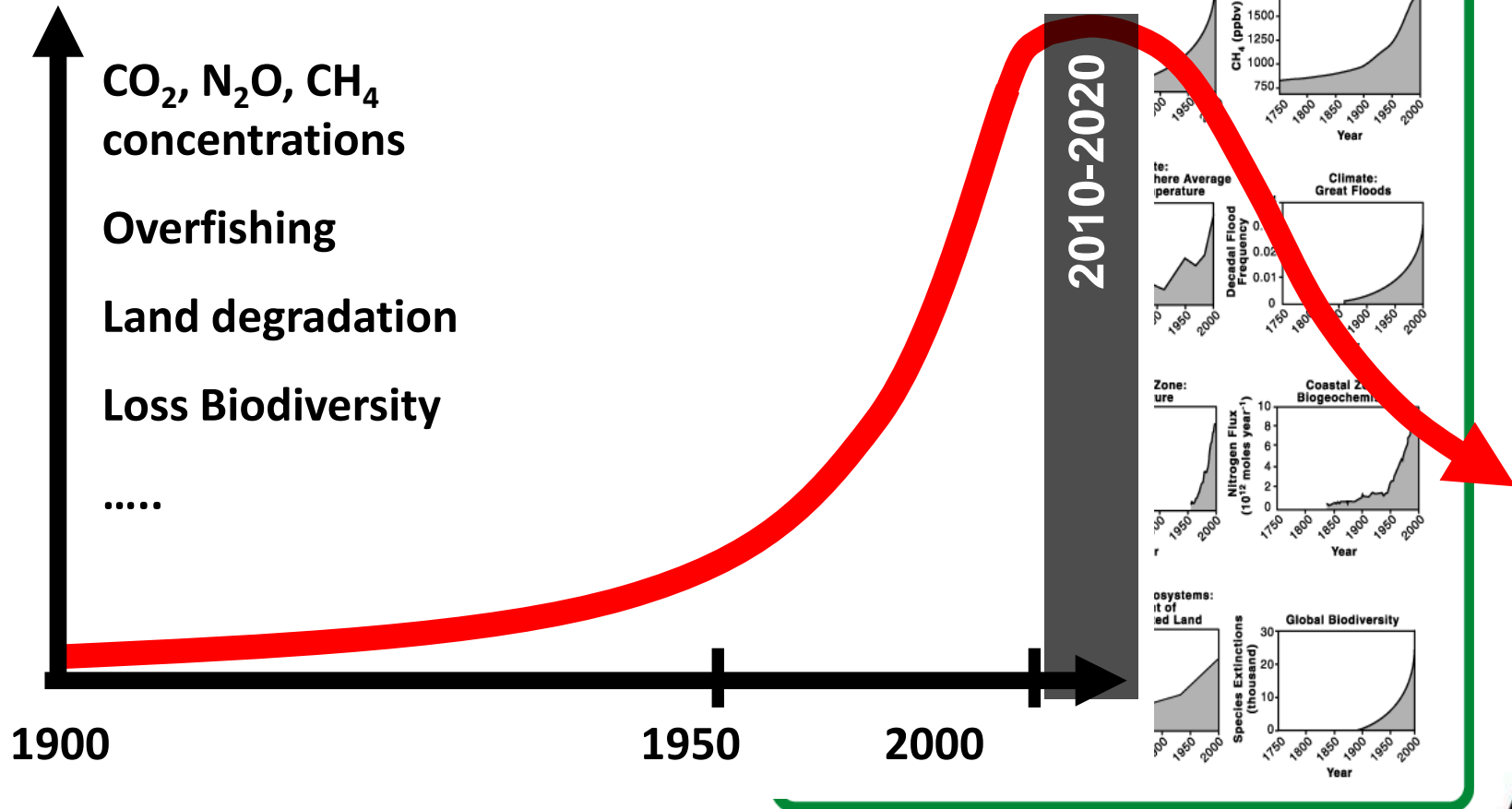
Denial in society

- like the perception that there are no resource limits
- like the notion that environmental conditions automatically improve with growth of GDP
- like the perception that natural capital can be substituted for by industrial and/or financial capital
- like ideological and cultural blockages to scientific information



The Great Acceleration

"the great



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From: Steffen et al. 2004

nature

FEATURE

SUMMARY
- New approach proposed for defining preconditions for human

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- New approach proposed for defining preconditions for human activities from causing unacceptable environmental change, in 2004

- development
- Crossing certain biophysical boundaries could have dire consequences for humanity
- Three of nine interlinked planetary boundaries have already been stepped

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Planetary boundaries
To meet the challenge of maintaining the Holocene state, we propose a framework based on 'planetary boundaries'. These

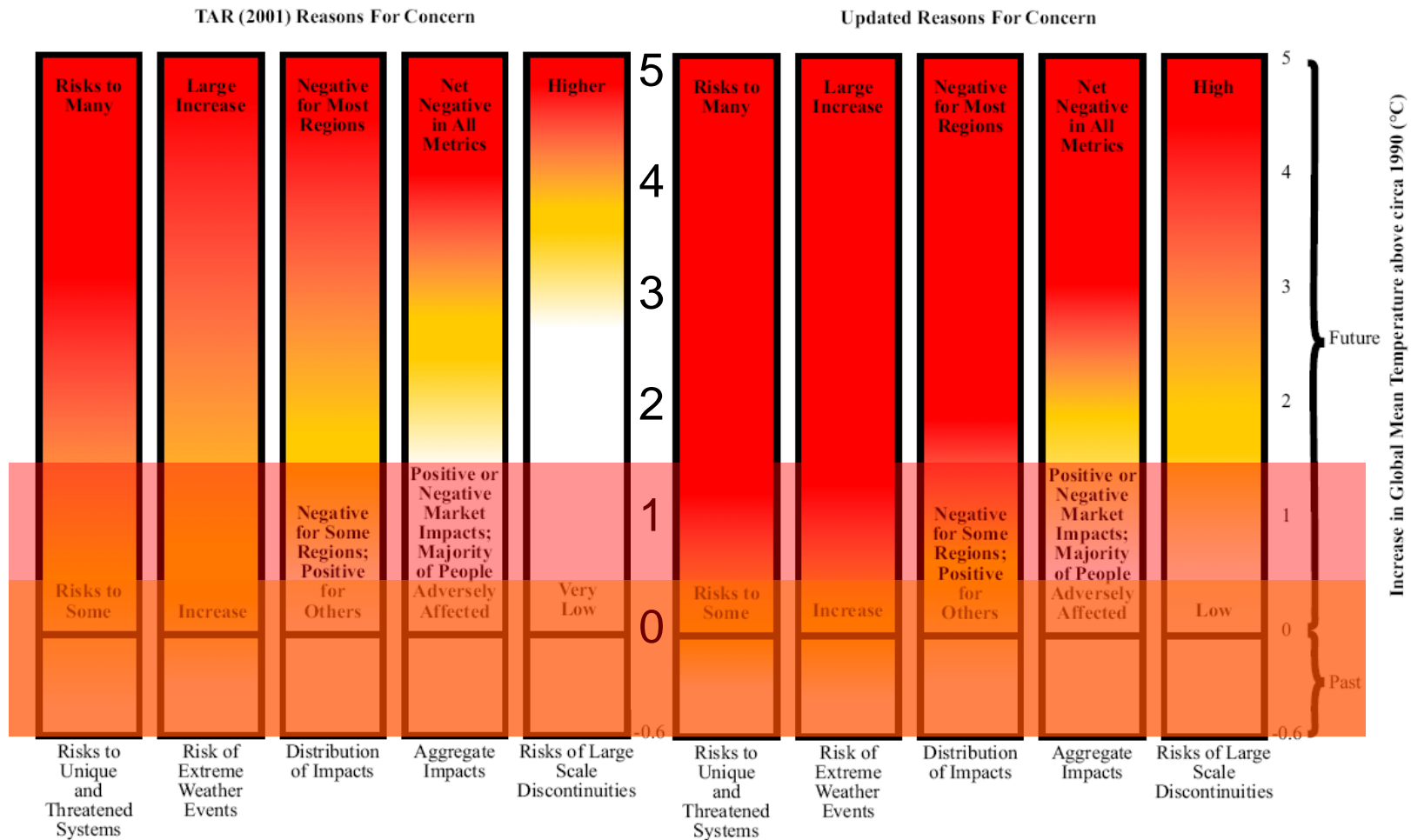
and the boundary. The inner green-shading represents the proposed safe operating distance with evolution at dangerous distance. The red wedges represent an estimate of the current position for the rate of biodiversity loss, climate change and human

space for nine planetary systems. The boundaries in these systems, each variable. The boundaries in these systems, each variable. The boundaries in these systems, each variable.



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Climate risks getting more serious

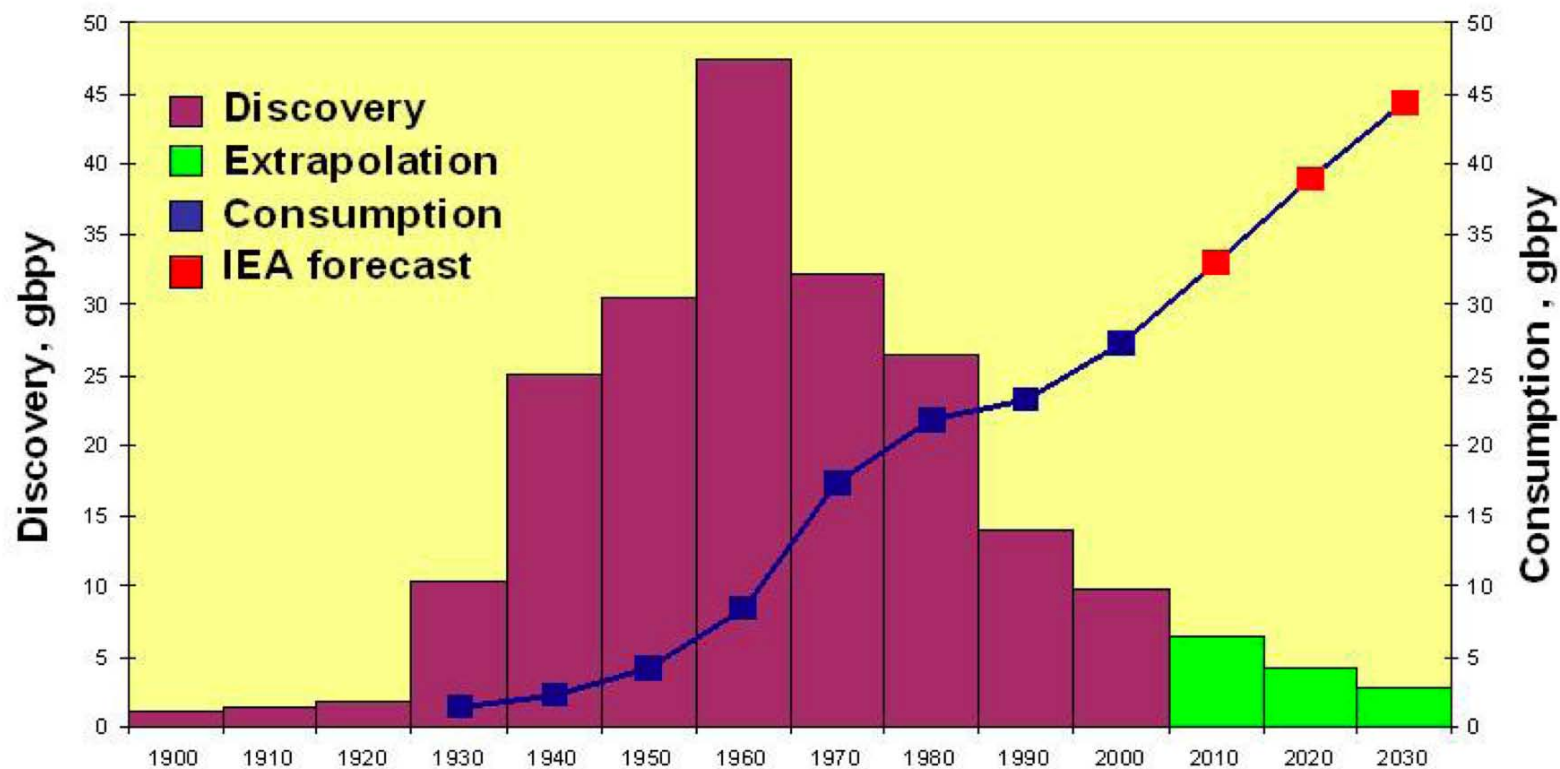


”Peak oil” major threat to prosperity

- Cheap oil is the main reason behind rapid increase in standard-of-living
- Projected increase in demand will require a new Saudi every third year
- Large risk of growing gap between demand and supply
- Serious consequences for world economy – not least transportation and agriculture
- To replace crude oil with other energy sources will take decades to achieve
- Limited debate about peak oil but military and security think tanks have issued repeated warnings



Comparison between discovery and consumption



EROI will become increasingly important:

- EROI for crude oil until 1970 – 1:50 till 1:100
- Today < 1:20
- EROI for tar sand in Canada – c:a 1:5
- EROI for wind – > 1:10
- EROI for "ethanol from corn" – 1:1
- EROI for nuclear – ?
- EROI for solar energy – > 1:15

Critical issue: energy cost relative to GDP



Peak everything?

- Resource constraints likely in many areas – fuelled by growth of emerging economies
- China's share of World Commodity Consumption:

Cement 53 %, Iron ore 48 %, Coal 47 %, Aluminium 40 %, Eggs 37 %, Rice 28 %, Soybeans 25 %, Oil 10 %, Cattle 10 %

- India to follow
- BUT: OECD countries still dominate in terms of per capita consumption

Food, water and energy

- 1 billion people undernourished, 2 Billion in need of better diets and 2 Billion increase in population
- Growing water scarcity
- To expand farm land difficult
- Peak Oil, Peak Phosphorus
- "Evergreen Revolution" needed
- There are solutions but they require massive investments in research and new practices

”Can the planet support more Americas?” (op-ed IHT 7/6 2011)

- If the Chinese and Indians were to use as much energy per capita as Americans do, their total power consumption would eventually be 14 times bigger than that of the US
- If car use would be the same in developing countries as in the Western World, the number of cars would easily quadruple – reaching more than 3 Billion a few decades from now.
- Conclusion: ”Do more with less”.



Shortcomings in conventional economic policy framework

- The Environmental Kuznetz Curve
- GDP growth confused with increase in welfare
- Natural capital is not accounted for
- Resources are treated as if easily substitutable
- Role of High-Quality Energy largely ignore
- Externalities neglected + Perverse Subsidies (this problem is primarily a policy failure)
- Unemployment – and underemployment – are not proactively addressed



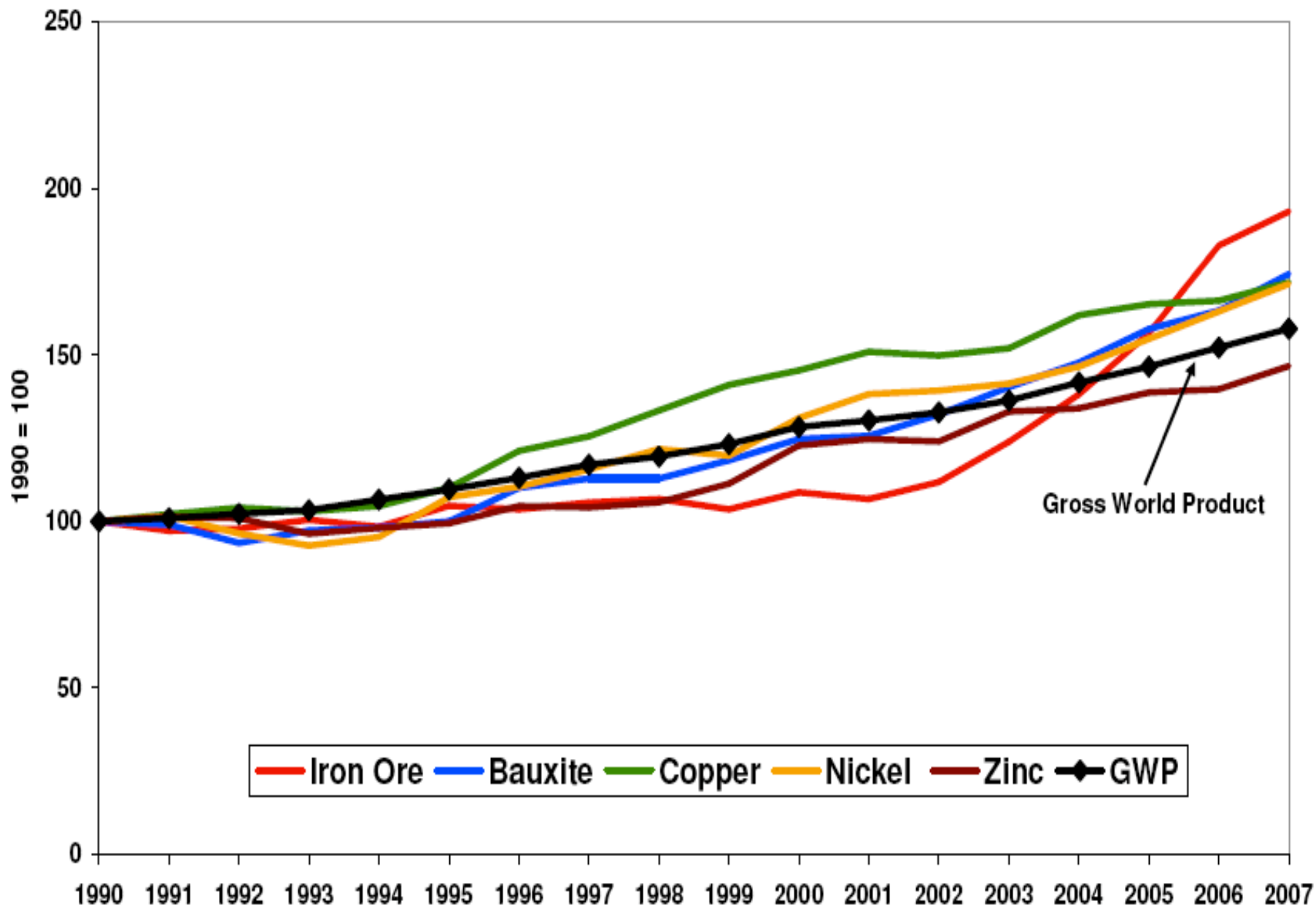
”De-coupling” – a challenge

- Ever since Bruntland Report ”de-coupling” has been seen as THE SOLUTION to address environment and resource constraints
- Relative de-coupling is happening – but Absolute de-coupling is far away
- It is like ”chasing one’s own tail” according to researcher Christer Sanne
- The Rebound Effect is a fact

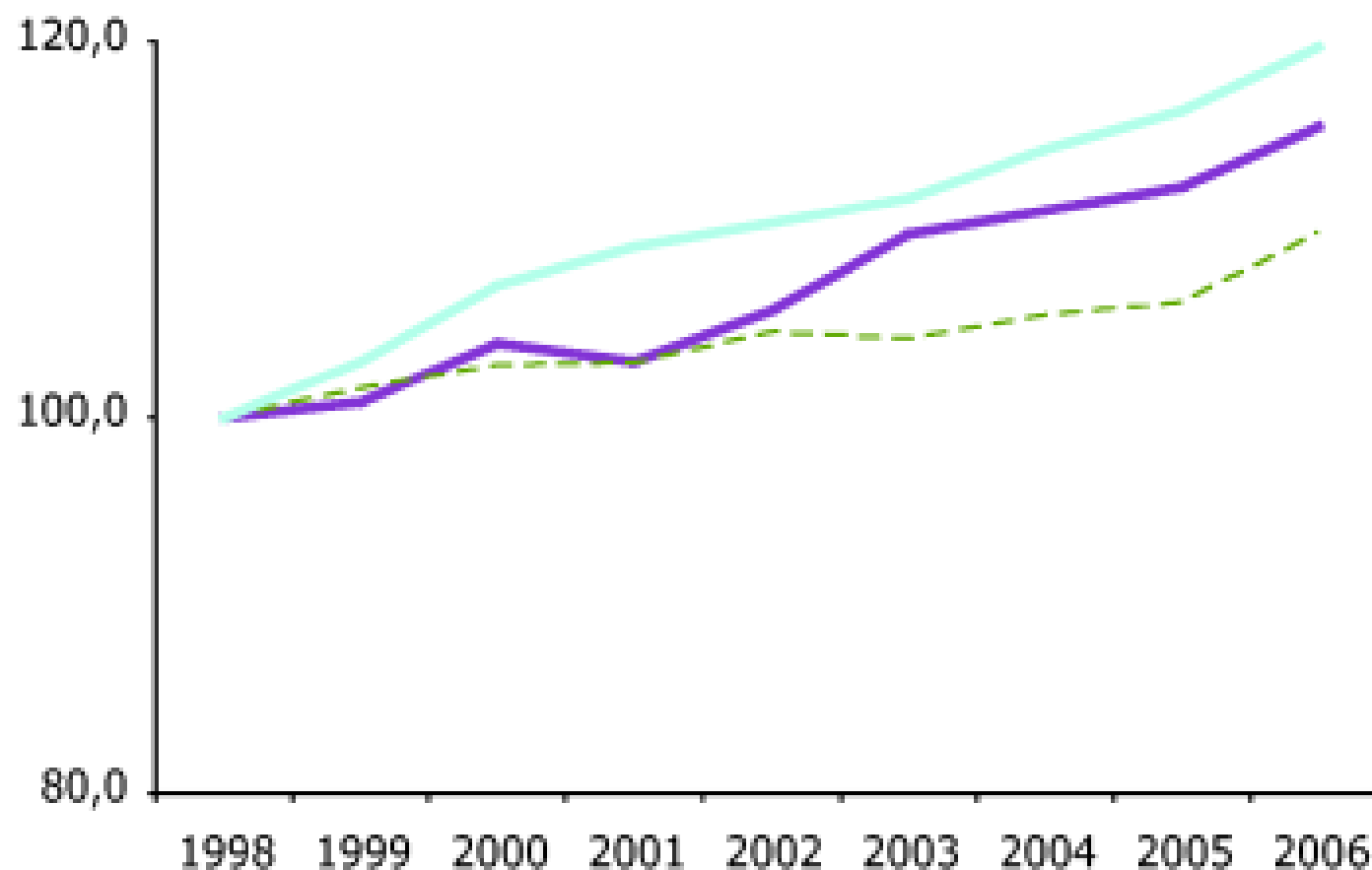


- It took 56 years to double energy efficiency in the world – in spite of that it took only 37 years to double primary energy demand
- Global Carbon Intensity of the World Economy has been reduced from 1 kg CO₂ per dollar output in 1980 to 770 gr in 2006
- But global CO₂ emissions have grown by 80 % since 1970 and by 40 % since 1990





Index (1997=100)



- EU 15 - Total packaging waste generation - index
- GDP growth rate EU 15 index
- - EU 15 - Packaging waste generation (glass, metals, paper, plastics) - index



The Dilemma of Economic Growth

- Continued growth, as presently structured, is not possible from the point of climate, ecosystems, resource constraints and planetary boundaries
- Negative growth is not possible from the point of the economy and social stability
- Few politicians want to discuss this dilemma
- The question is whether we can come out of this dilemma by tinkering with the present economic framework or ????

We cannot continue like this – a terrible disconnect with nature

- We do all contain millions of microorganisms – and yet we don't seem to understand the **interconnections** to all the other species
- Our focus is to "have" – not to "be"
- Well-being is more than material stuff
- Environment Impact = $A \times T \times P$
- Affluence should be replaced by Wellbeing
- Technology should be about sust innovation
- Population is all about empowering women



Sustainability requires a Systems Approach – Role of Science critical

- Strengthen cross-disciplinary work
- Public Sector R&D must increase
- Role of Behavioral Sciences critical
- Both economists, lawyers and engineers have to learn much more about nature
- Rethinking education of economists urgent
- Critical issue is to reduce energy and material throughput

Sustainability requires political and economic systems that are more long term

- Most political party programmes are still based on the industrial society logic
- Economics as a discipline has not changed much since the time of Adam Smith – and has little to offer to address many of today's most burning issues
- We live in a different world



Strategy for Sustainability

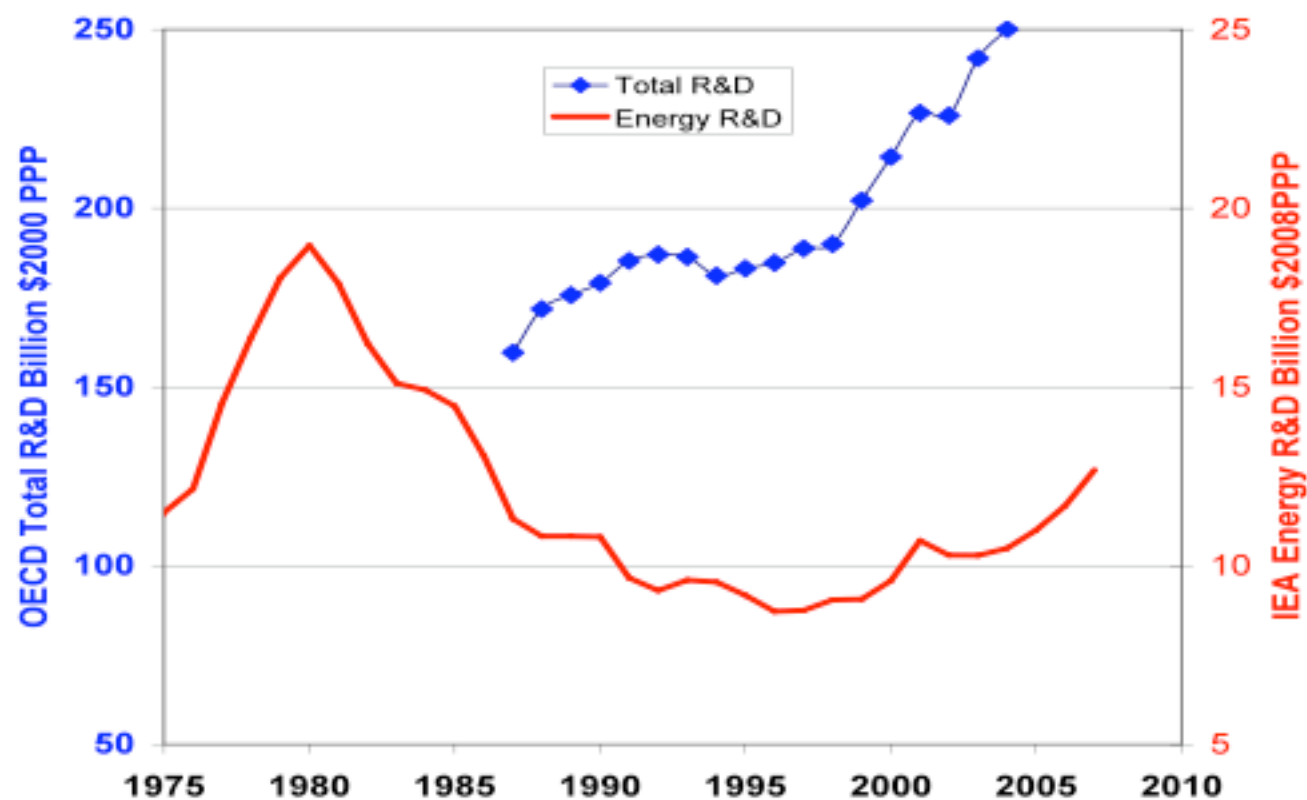
- **Stop having Economic Growth as main target ! Focus on specific welfare goals.**
- Rethink organisation of science and education
- Strengthen Global Governance
- Global Marshal Plan – merge poverty reduction w climate and ecosystem protection
- Reform economic and finance policy frameworks
- ~~Public-Private Partnerships, like in health and sustainable infrastructure~~

Strategy for Sustainability II

- The world needs a binding climate agreement
- In the absence we need a Plan B – that gives priority, as well, to Energy Security
 - Multiply support for Energy R&D and investments in renewables and efficiency
 - Global Feed-in Tariff for Renewables
 - Remove perverse subsidies
 - Establish special fund for Energy Access
 - Land use reforms



Public R&D expenditures versus public sector energy R&D in IEA countries

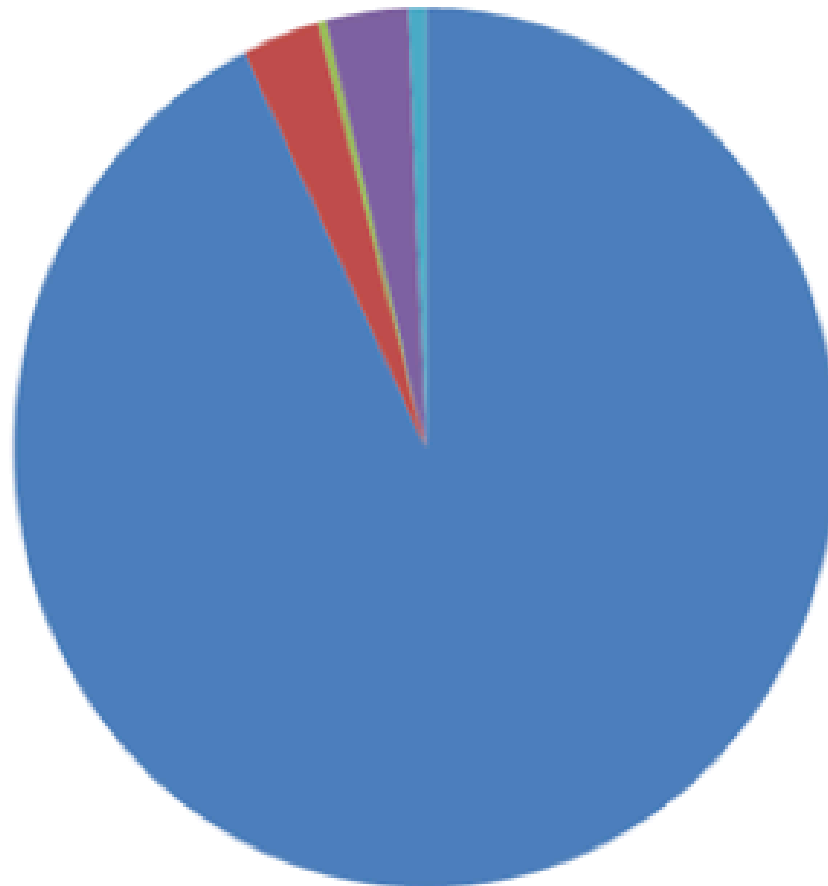


Sources: Doornbush and Upton, 2006; IEA, 2009



Global Energy Subsidies

(source Bloomberg New Energy Finance)



- Global Fossil Fuel Subsidies 2008
- US Clean Energy Subsidies 2009
- China Clean Energy Subsidies 2009
- Europe Clean Energy Subsidies 2009
- Rest of the World Clean Energy Subsidies 2009

Strategy for Sustainability III

- **Crash Programme for Sustainable Innovation:**

”Nature does not have a design problem – Humans do”



Areas of Innovation

- Enhanced energy- and resource efficiency – including addressing the Rebound Effect
- Valuation of ecosystem services
- From Cradle to Cradle – closed material loops
- No waste – all residue materials should become inputs in new production
- From products to services – extend wealth – recycle, reuse
- Biomimicry
- Turn Farming from carbon source to carbon sink
- ICT for sustainability
- Transformative solutions – use Public Procurement to stimulate

Functional sales do happen in B2B

- Rolls Royce leases jet engines
- Interface leases carpets
- Michelin leases tyres for trucks
- Xerox offers copying services

Resource and energy use + CO2 emissions have decreased significantly. The companies have benefitted financially.

Now is time to move into the area of B2C – cars, appliances, electronic equipment, textiles etc



Labour productivity has increased twentyfold since 1850. It is not utopian to think of **resource productivity** increasing tenfold in 100 years and fivefold in 50 years!

For that to happen, policy frameworks must change and Business Models undergo significant change, giving real priority to alternative energy as well as energy and resource efficiency



At the end of the day, what we face are
existential issues

