



# Synthesis and key challenges

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# Ground covered

- ◉ Taylor: Energy and labor productivities, growth and the environment  
Necessary energy intensity improvements not there
  - ◉ Kratena: Weak and strong sustainability: building in constraints, can we do so based on ecological limits?
  - ◉ Kallis: Degrowth propositions and discourses  
Different discourses, some are means, some are ends in itself, proposition for degrowth
  - ◉ Seidl: the way into a degrowth society  
degrowth already there to some extent, yet there are limits, growth addiction of policymakers, role of monetary system
  - ◉ Jackson: alternative options for a low growth society, institutions, growth the means rather than the objective, “flourishing”
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# Comments and reflection....

based on review paper and workshop discussions

- ◉ Discourse: many discourses, no or degrowth deliberations advanced, yet “green growth” dominates
  - ◉ Macro theory: some work
  - ◉ Macro policy: often under-illuminated
  - ◉ Macro analysis: lots of empirical work, less on modelling, one focus on interdisciplinary/integrated modelling
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# Discourses

- ◉ Debate over the last 4 decades
  - ◉ Groundbreaking analysis by Limits to Growth in 1972 (Meadows et al., 1972) , but suggestions largely rejected
  - ◉ Recently, new work: NEF's reports *Growth isn't working* (2006), *Growth isn't possible* (2010), Stiglitz, Sen and Fitoussi Commission report (2009), *Prosperity without Growth* (2009)
  - ◉ Urgency may have increased:
    - ◉ Crossing of eco boundaries: *Anthropocene*
    - ◉ Financial crisis plays a role
    - ◉ Climate change: IPCC, 2007
  - ◉ Many discourses and definitions on de/low/0-growth
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# Discourses

## Affordability and feasibility

- ⊙ Balancing “economic aspirations with ecological imperatives” (Weizsaecker et al., 2009)
  - ⊙ Important environmental and growth challenges
    - ⊙ Are we degrowing already?
    - ⊙ Challenges imposed by ageing society
    - ⊙ Relative and absolute decoupling,
    - ⊙ Climate change: -80-95% by 2050 will only cost 1% of GDP?
    - ⊙ Necessary energy efficiency improvements unheard of
  - ⊙ Strong Sustainability discourse quite pronounced, but weak in terms of impact: “green growth” prevails
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# Discourses Necessity

- ⊙ Proposals for a zero-growth economy have had practically no influence on public policy: Policymakers and business leaders consider modern economies structurally dependent upon continued GDP growth
  - ⊙ Yet, growth the silver bullet?
    - ⊙ Labor market: recent 4.1% contraction of EU market lead to “only” 1.8% increase in unemployment
    - ⊙ Trickle down and poverty: 166 USD in “production and consumption” necessary to contribute a single dollar of “poverty reduction”
  - ⊙ Role and importance of policy not always considered and understood
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# Discourses Desirability

- ⦿ Growth and happiness: diminishing returns to income after basic needs satisfied
  - ⦿ Reduction of work time
  - ⦿ Downshifting
  - ⦿ Focus on flourishing, social cohesion
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## Methodological perspective

- Theory
  - Macro Modelling
  - Empirical/green accounting
  - Integrated Modelling
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# Macro theory and the growth-environment nexus

- Strong sustainability paradigm has pointed to the laws of thermodynamics (Georgescu-Roegen, 1971)
  - Ecological economists have proposed that environmental and resource limitations imply constraints on economic activity and growth (Daly, 1972; Ekins, 2000; Harris and Goodwin, 2003)
  - Need for reconfiguration of macro aggregates (Jackson, 2009)
  - Yet, mainstream economics, has generally not accepted the notion of limitations
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# Macro models

- ◉ Growth models of the Ramsey-Keynes type can adopt equilibrium paths featuring stagnant or even falling GDP easily if the shadow prices of capital are sufficiently low, e.g. due to environmental cost or policy.
  - ◉ Little emphasis on applied work...
  - ◉ Victor and Rosenbluth (2006) and Victor (2008) examine growth and degrowth scenarios for Canada over a time horizon up to 2020 using LOWGROW, a dynamic simulation model.
    - reliance on economic growth is unnecessary and even in a zero growth society with the right policy mix, unemployment can be reduced dramatically, poverty eliminated and (weak) Kyoto set greenhouse gas emissions targets achieved at the same time
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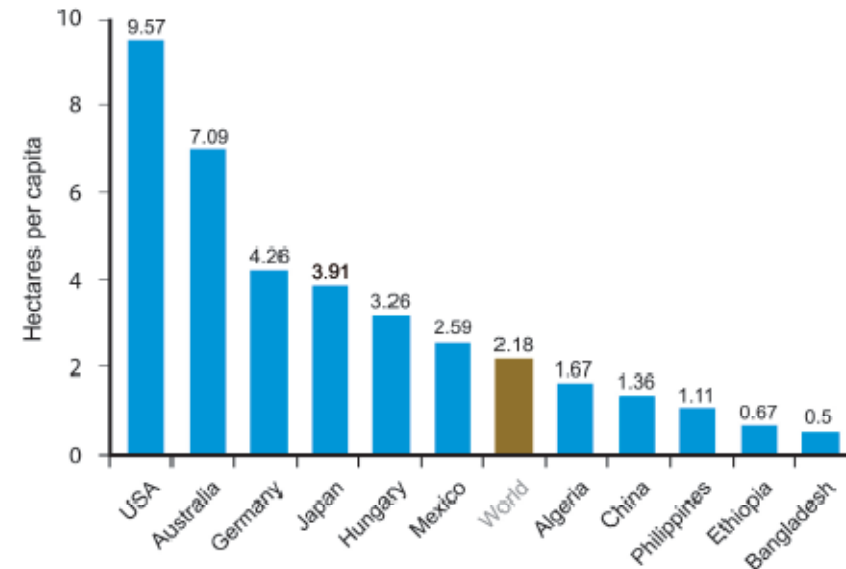
# Empirical/green accounting

- ◉ Lots of work...
  - ◉ Four types of approaches can be distinguished (see SSF, 2009)
    - ◉ “Dashboards” sustainability indicators augmenting traditional economic indicators
    - ◉ Composite indices aggregating indicators into one number
    - ◉ Indicators revising GDP
    - ◉ “Overconsumption” indicators
  - ◉ Policy seems to favour dashboards (see EC, 2009): separate economics from environment and go for weak sustainability?
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# Empirical: strong vs. weak sustainability

Ecological footprint:  
-> Richer is dirtier

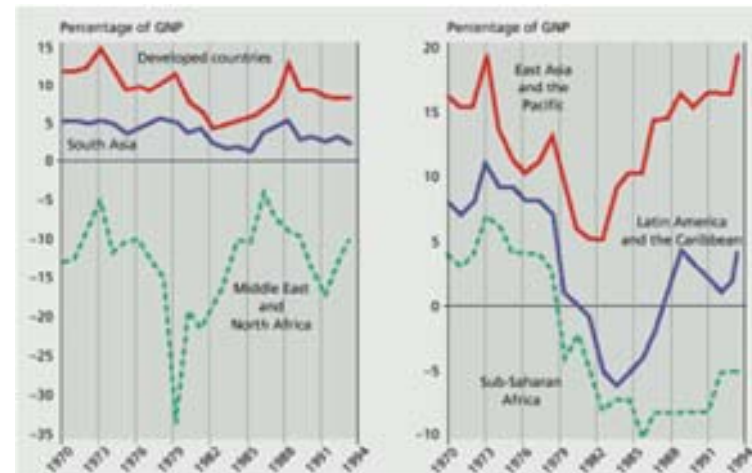
Source: Wackernagel, 2009



Genuine savings 1970-93

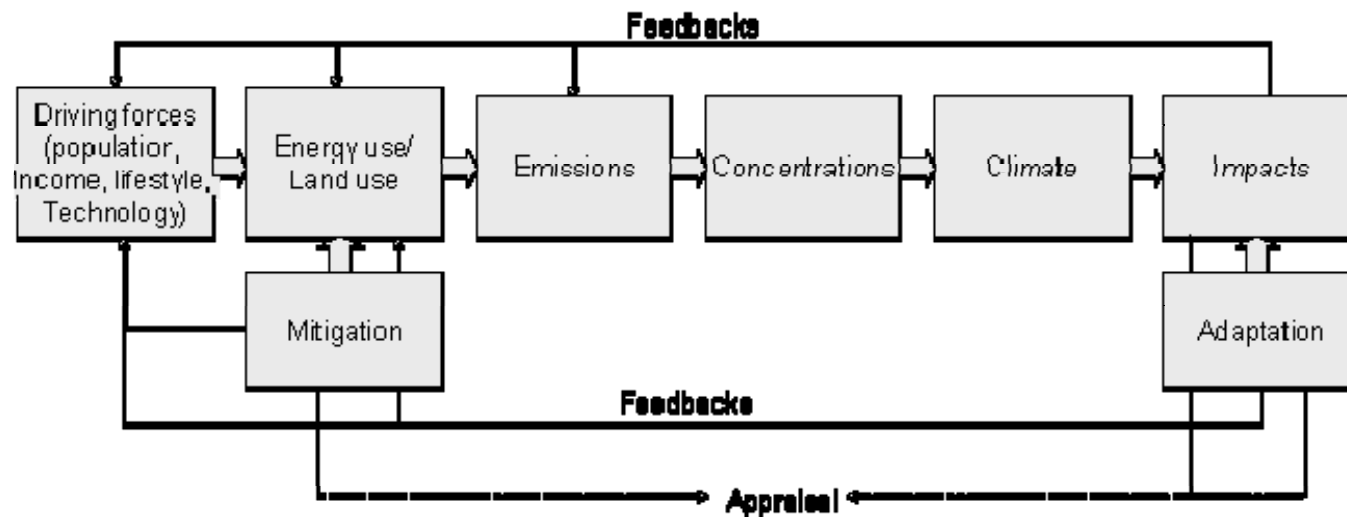
→ Richer more sustainable and stable

Source: World Bank, 2005



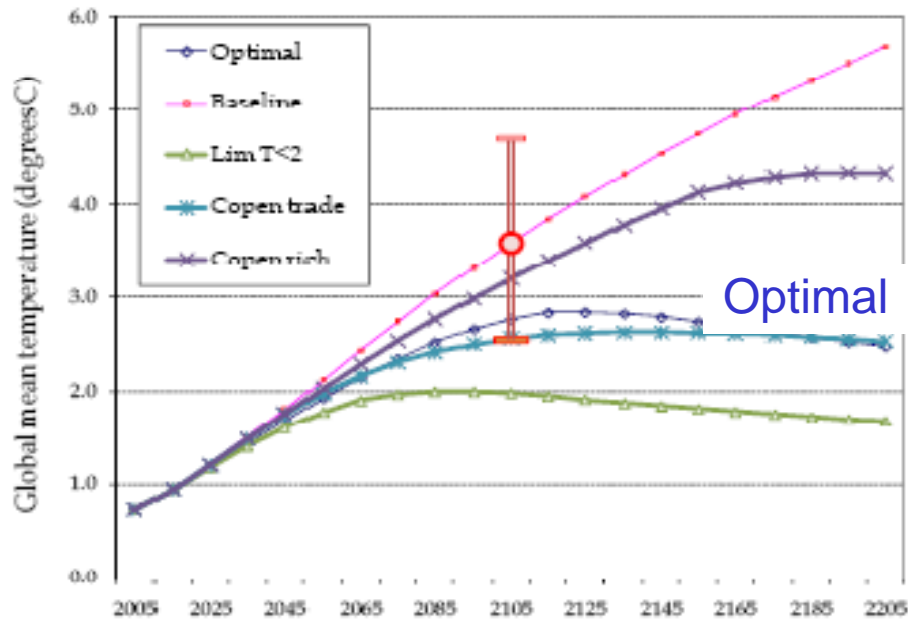
# Integrated assessment models

- ◉ Workhorses of environmental analysis and policy assessment
- ◉ 2 Types:
  - ◉ Integrated economic assessment model (IEAM):  
economy plus environment (such as for climate change: DICE)
  - ◉ Integrated assessment models IAM:  
Environment plus economy (IPCC-type assessments)

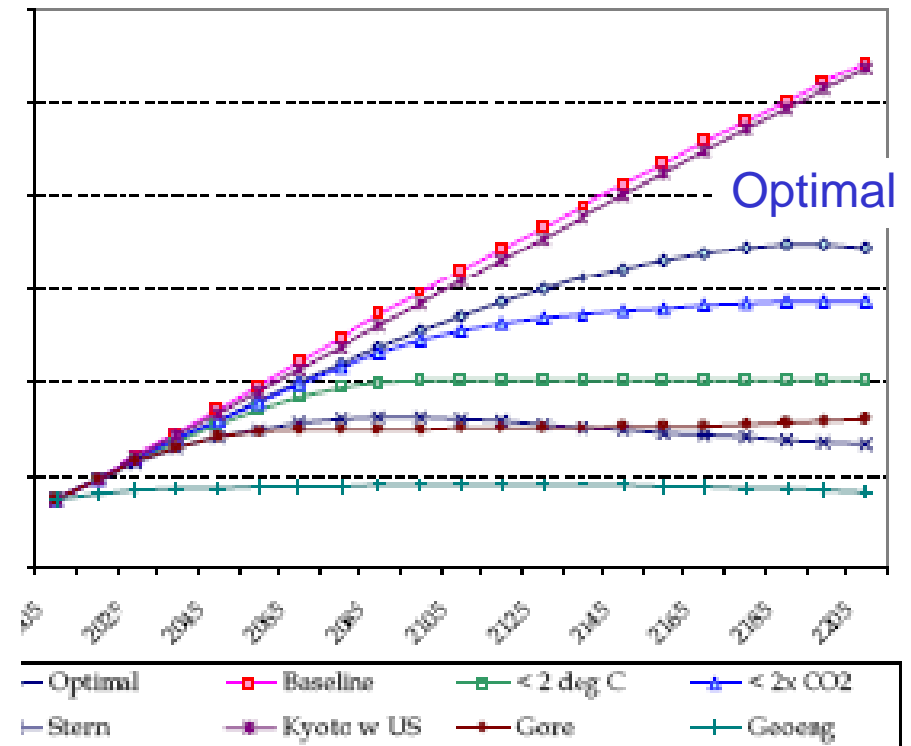


Source: Van Vuuren et al., 2010

# Models doing the "right" thing? DICE model runs



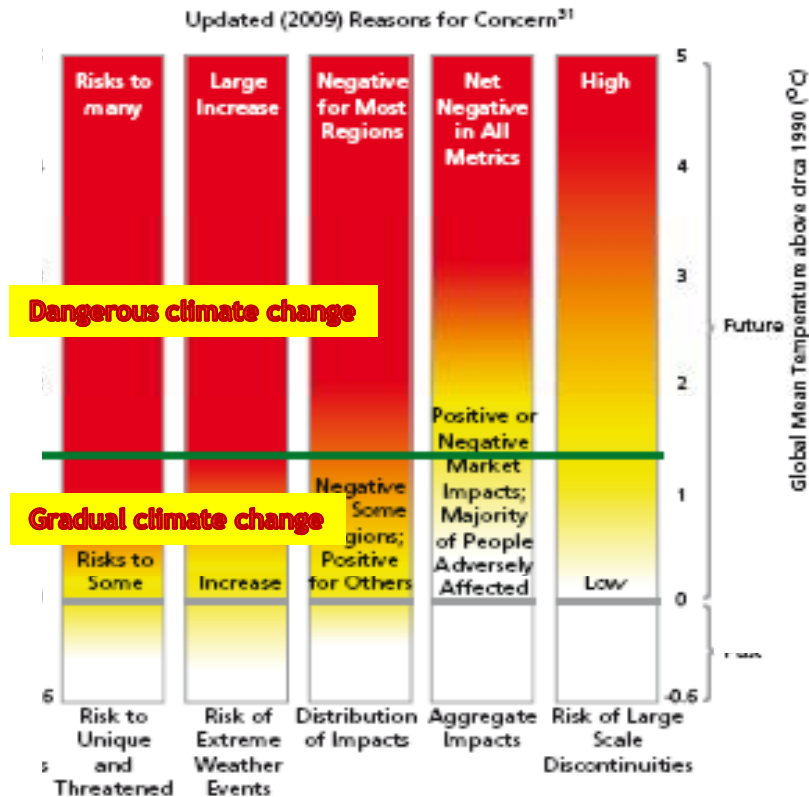
2010 model run:  
Optimal: stabilize at +2.8 degrees



2007 model run  
Optimal stabilize at +3.8 degrees

# Are the numbers right?

IPCC, 2007



Nordhaus, 2010

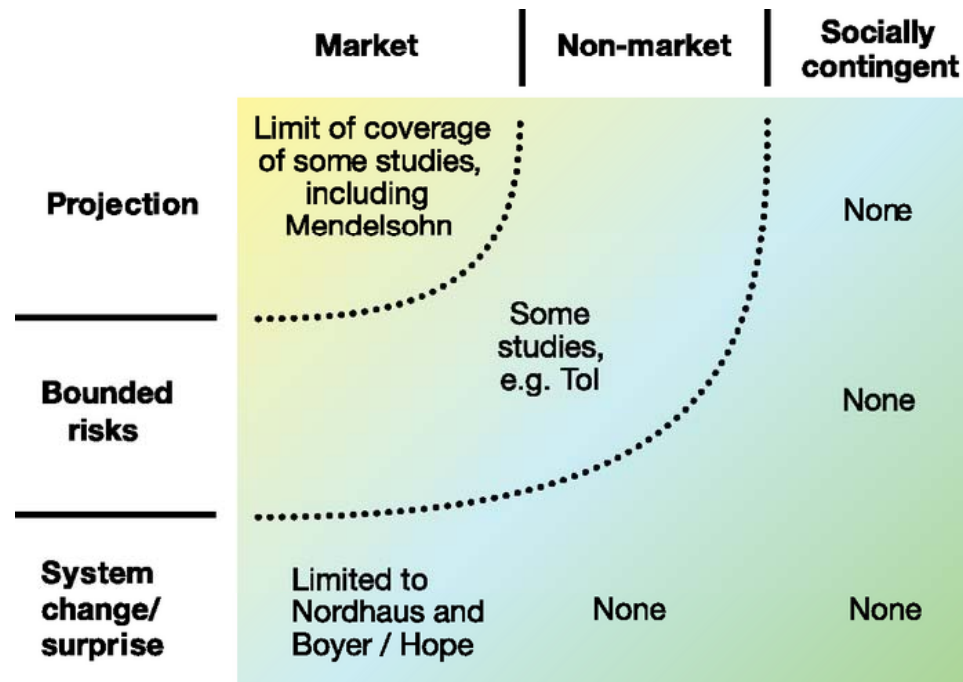
Policy scenario	PV Utility	Difference	
	[Trillions of 2005 \$]	[Trillions of 2005 \$]	Percent of base
Base	2,286.9	0.00	0.00%
Optimal	2,295.0	8.05	0.35%
Limit T < 2 °C	2,291.8	4.88	0.21%
Copen: Full Trade	2,293.8	6.85	0.30%
Copen: No trade	2,293.0	6.05	0.26%
Copen: Rich only	2,290.1	3.15	0.14%

\* Annual value of consumption at discount rate

Action vs. inaction: +0.35%  
Optimal vs. 2 degree: 0.14%

# Uncertainty in terms of damages and impacts

*Don't expect natural science and the impact community to provide the perfect answers!*



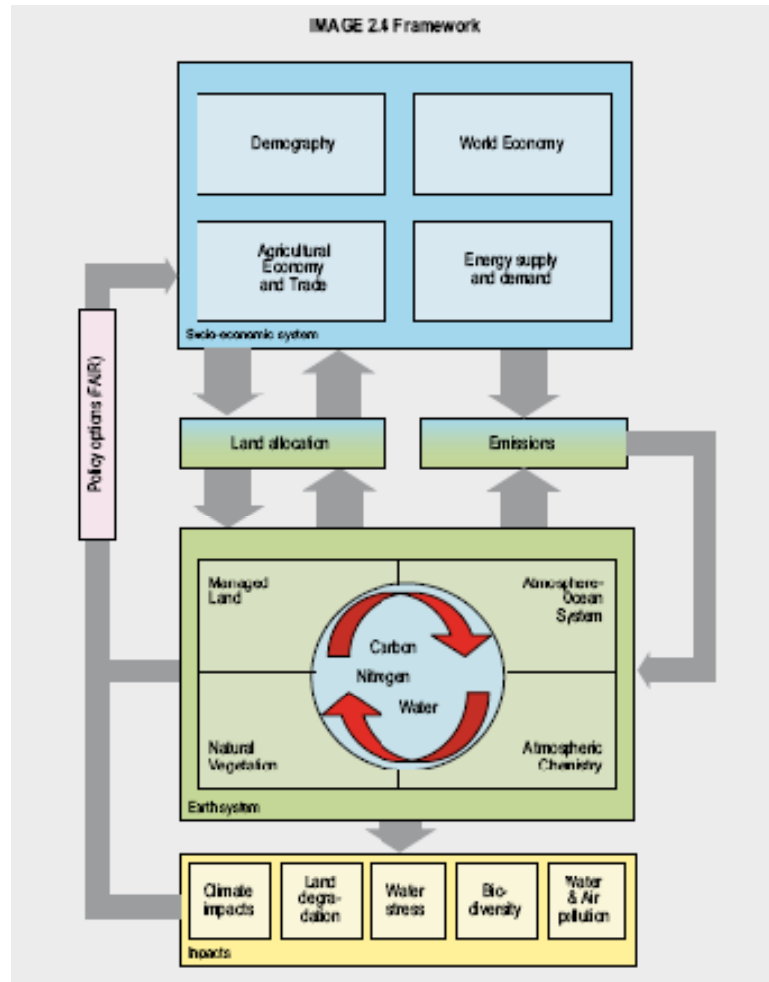
# Uncertainty and risk: Buying “insurance”?

• *Analyses using integrated assessment economic models present an unrealistically smooth and harmonious picture of the functioning of economic and political systems in much the way that global climate models miss the turbulence of small-scale weather systems.*

Nordhaus, 2010

• Weitzman (2007): cc risks may be infinite given uncertain damage and the small sample of observations/projections: In a changing, complex system with unbounded risks, the expected value of harm is infinite!

# Integrated assessment models



*The problem of avoiding dangerous climate change requires analysis from many disciplines. Mainstream economic thinking about the problem has shifted with the Stern Review from a single-discipline focus on cost-benefit analysis to a new inter-disciplinary and multi-disciplinary risk analysis, already evident in the IPCC Third Assessment Report.*

Barker, 2008

But, economics here mostly exogenous...  
(In *Limits to Growth* it was not)

IMAGE model

## Possible next steps after “next steps” workshop

*!Good news: there are lots of interesting research questions and more work...!*

### Some issues

- Better study different discourses: conflicts and synergies
  - Better establish evidence why zero or degrowth inevitable
  - Constraints and macro models
  - Run more cases
  - Better and more realistic modelling: IEAM and IAM
  - Further transcend “walls” of economic schools
  
  - Collaboration
    - Review paper (comments appreciated)
    - Papers, e.g. special issue
    - Modelling
    - More workshops including policymakers
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