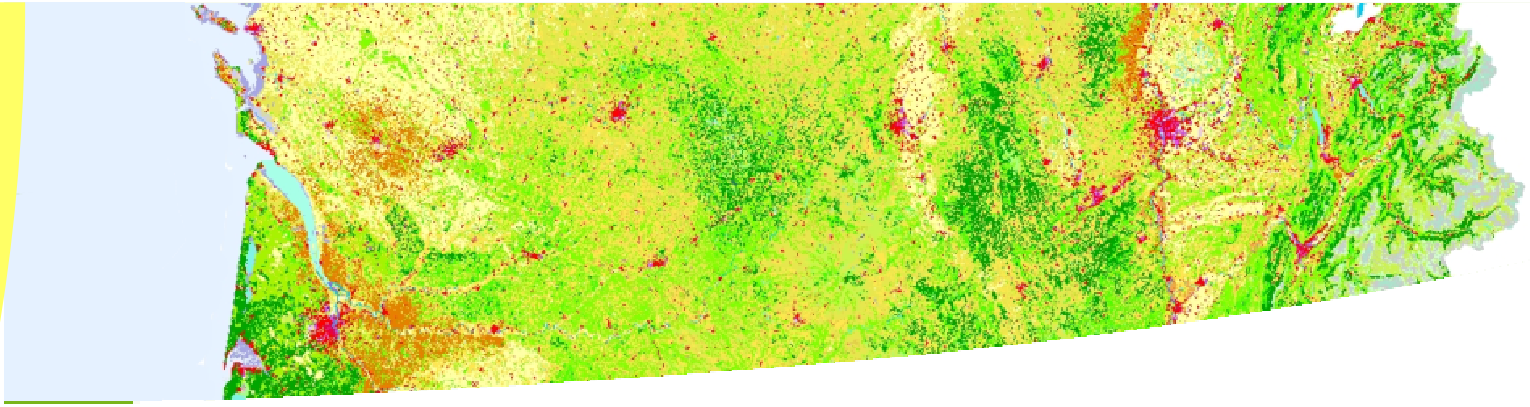
Conseil économique pour le développement durable



Cutting the Gordian Knot
Economic Development and Climate Policy
Dominique Bureau

1. **Introduction**
2. **Economic development (or recovery) first?**
3. **Cooperation for building a low-carbon economy**
4. **Conclusion**

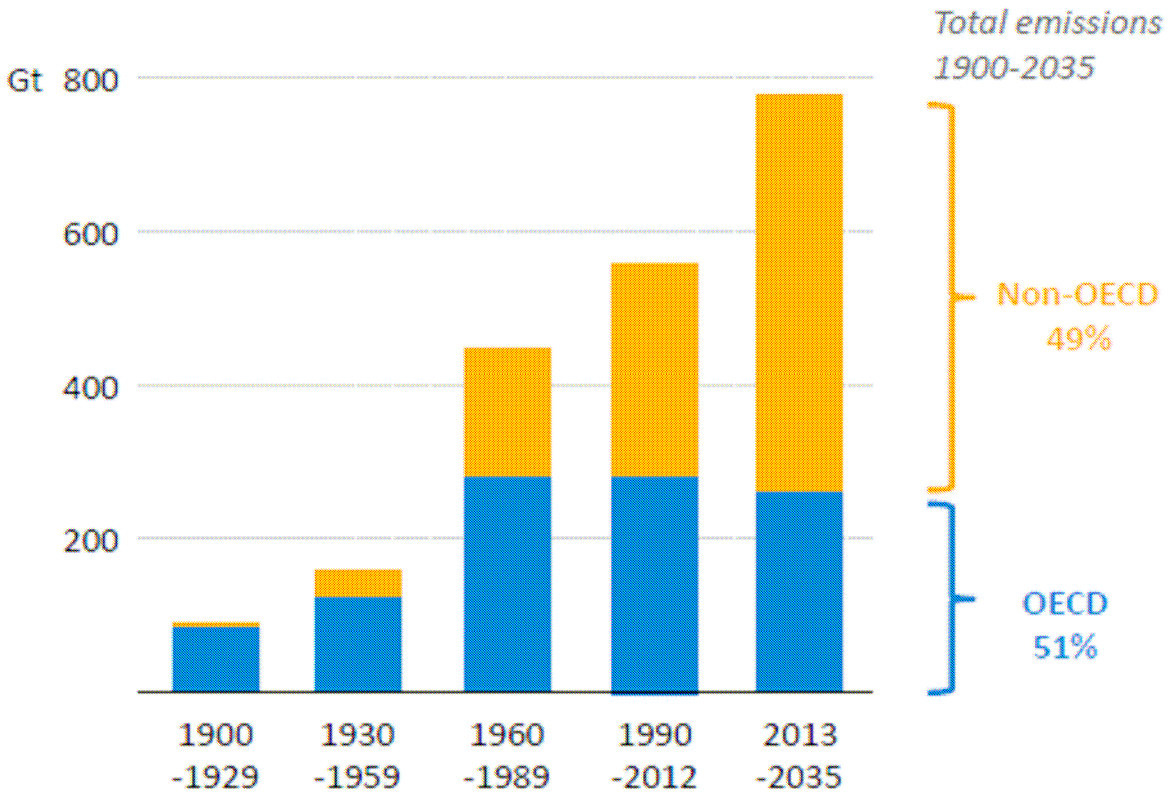
Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Common but Differentiated Responsibilities
The Kyoto Protocol

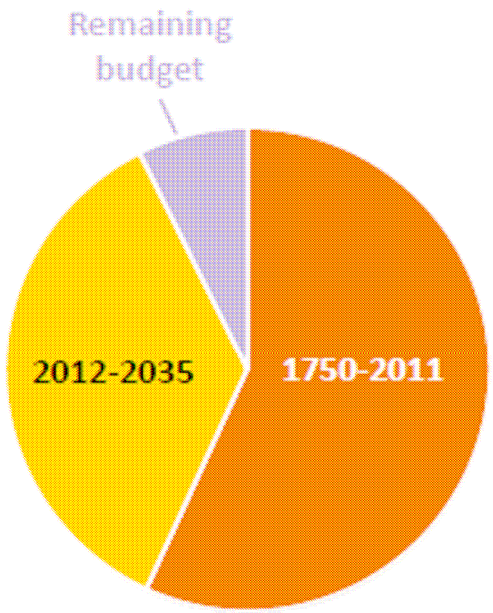
Emissions off track in the run-up to the 2015 climate summit in France

WORLD ENERGY OUTLOOK 2013

Cumulative energy-related CO_2 emissions



'Carbon budget' for 2 °C



Non-OECD countries account for a rising share of emissions, although 2035 per capita levels are only half of OECD; the 2 °C 'carbon budget' is being spent much too quickly

From « economic development/recovery first » to « growth with carbon prices »

The cost of non-action

- *Traditional view (EKC): Conciliation →Dashboard*
  - *-Partial equilibrium*
  - *-Environmenal quality as a superior good, but Porter?*

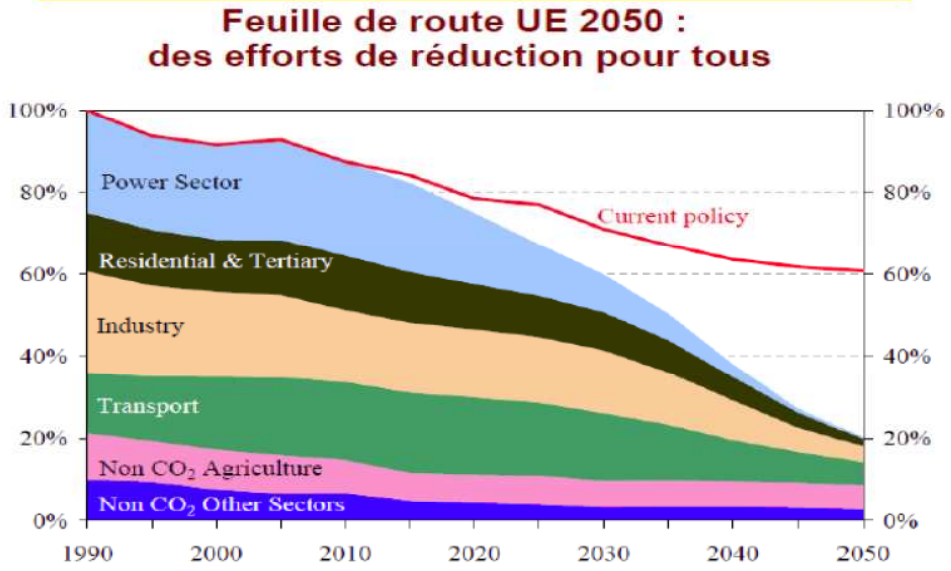
- *Emerging view:*

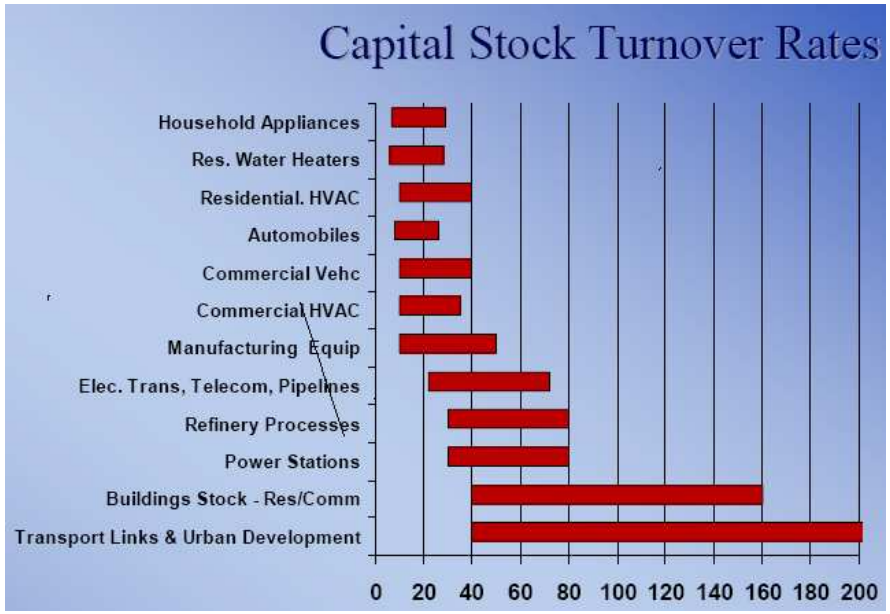
Integration →Green Ac.; Genuine Saving

-Global equilibrium view (all sectors concerned by transition to low-carbon economies)

-Early action justified (by infractructure irreversibilities; by learning curves, by option values)

Sectoral scenarios





Impacts (Ipcc wg2 AR5)

In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans. Evidence of climate-change impacts is strongest and most comprehensive for natural systems. Some impacts on human systems have also been attributed[7] to climate change, with a major or minor contribution of climate change

In many regions, changing precipitation or melting snow and ice are altering hydrological systems, affecting water resources in terms of quantity and quality (*medium confidence*).

Many terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances, and species interactions in response to ongoing climate change (*high confidence*).

Based on many studies covering a wide range of regions and crops, negative impacts of climate change on crop yields have been more common than positive impacts

At present the world-wide burden of human ill-health from climate change is relatively small compared with effects of other stressors and is not well quantified.

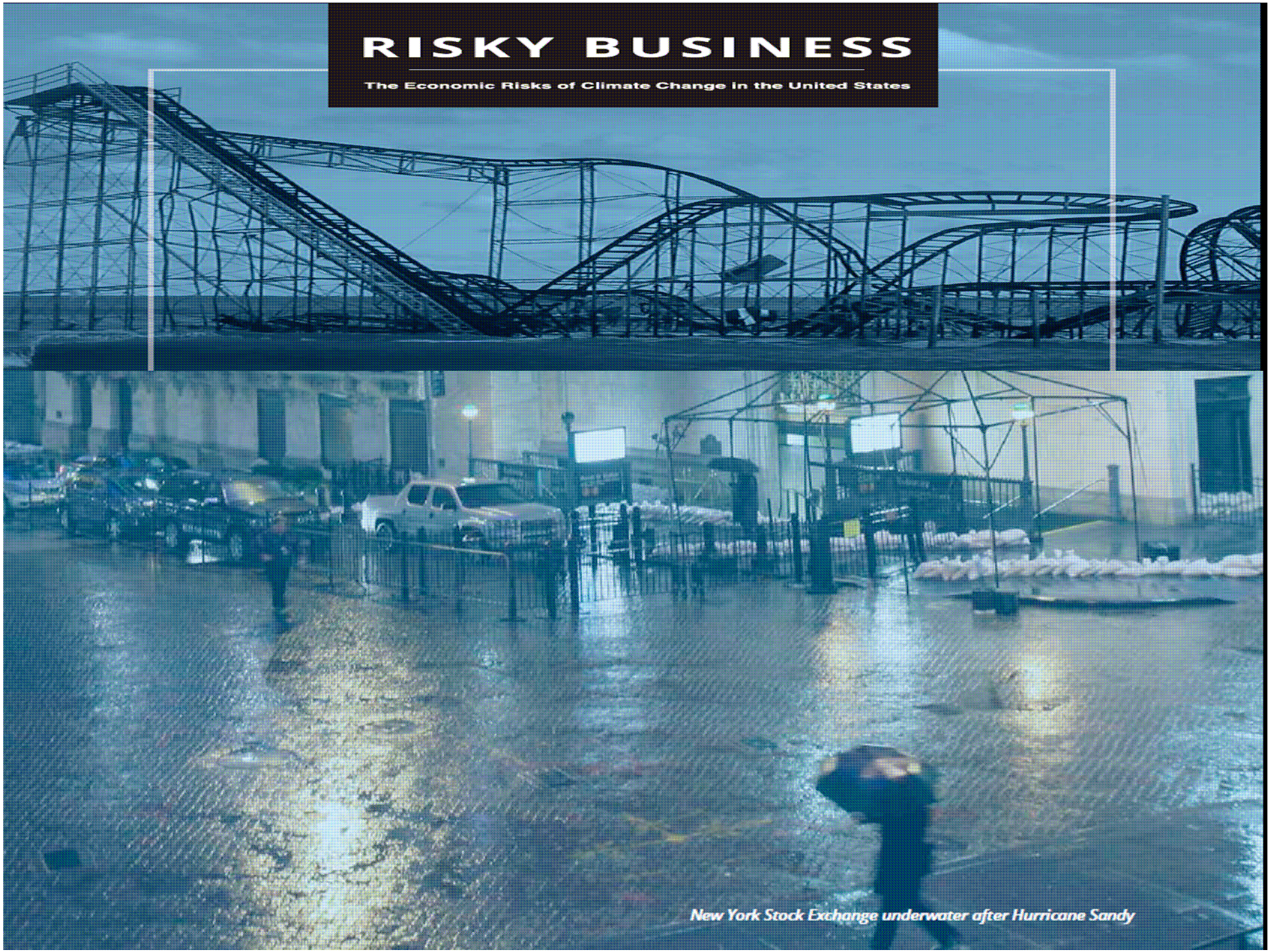
Impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability (*very high confidence*). Impacts of such climate-related extremes include alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, morbidity and mortality, and consequences for mental health and human well-being. For countries at all levels of development, these impacts are consistent with a significant lack of preparedness for current climate variability in some sectors.[14]

« [Economic models underestimate risk] because their assumptions come close to assuming that the impacts and costs will be modest and close to excluding the possibility of catastrophic outcomes »
Stern, JEL, 2013

- **Assumptions that drive this underestimation: exogenous drivers of growth in « one-good » models; « multiplicative » and quantitavely weak damage functions; very limited distributions of risks**
- **Direct agricultural losses (cf 3% on Indian GDP): leave out dramatic changes on the monsoon, the melting of Himalayan snows and disturbances of river flows and flooding; summer temperatures beyond human tolerance; population movement as a result of such effects and so on**
- **Ways forward in incorporating the scale and long-lasting effects: damage to stocks of capital or land; to social and organizational capital; to overall factor productivity; to learning and endogenous growth**

RISKY BUSINESS

The Economic Risks of Climate Change in the United States

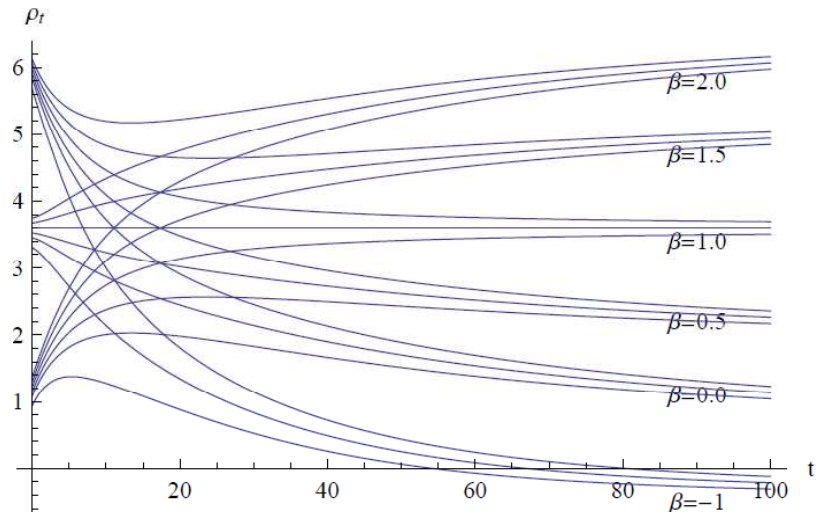


New York Stock Exchange underwater after Hurricane Sandy

Mitigation policies as ‘investments’ →CBA (with dificult methodological issues. cf Gollier)

Climate damages are uncertain. Risk premiums for the evaluation of mitigation policies depend on their correlation with growth.

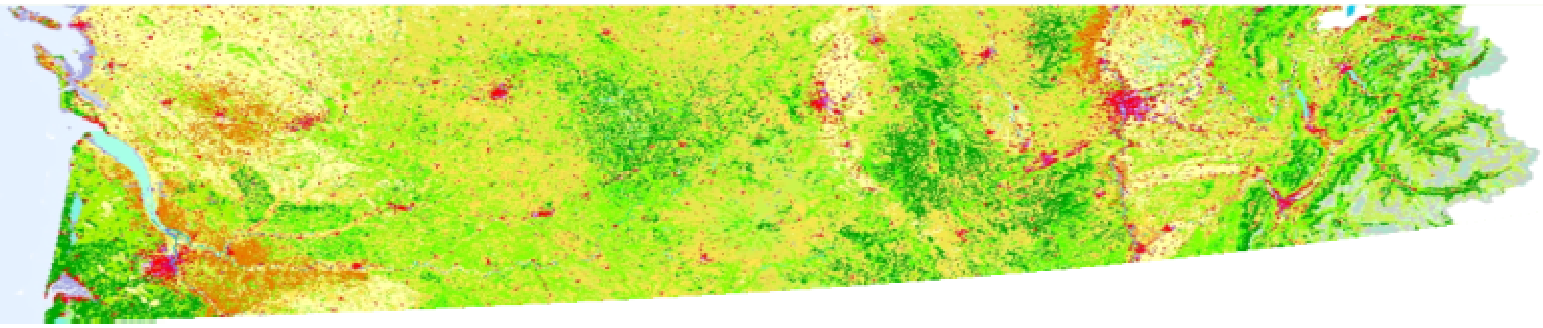
Term structures as a function of short-term expectations



Economic framework for sustainable growth

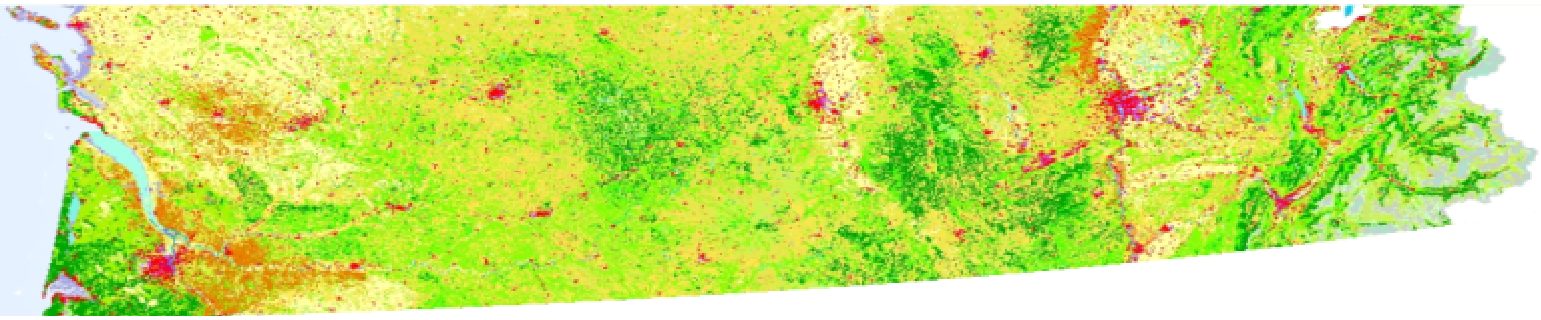
(RB; DR citations)

- **« All economies face significant and diverse economic risks from climate change »**
- **« We are capable of managing climate risk as we manage risk in many other areas of our economies, but only if we start to change our business and public policy today »**
- **« Long-term growth needs structural change: emergence and expansion of new industries, and movement of labor from traditional into modern industries »**
- **« We need to start with diagnostics of what is blocking structural transformation: human capital? labor market imperfections? credit constraint? financial markets performance? lack of investment protection… »**



What are the barriers to institutional investment in green infrastructure?

- **Weak, uncertain or counterproductive environmental, energy and climate policies**
- **Regulatory policies with unintended consequences**
- **A lack of suitable financial vehicles with attributes sought by institutional investors**
- **A shortage of objective information and data to assess transactions and underlying risks**

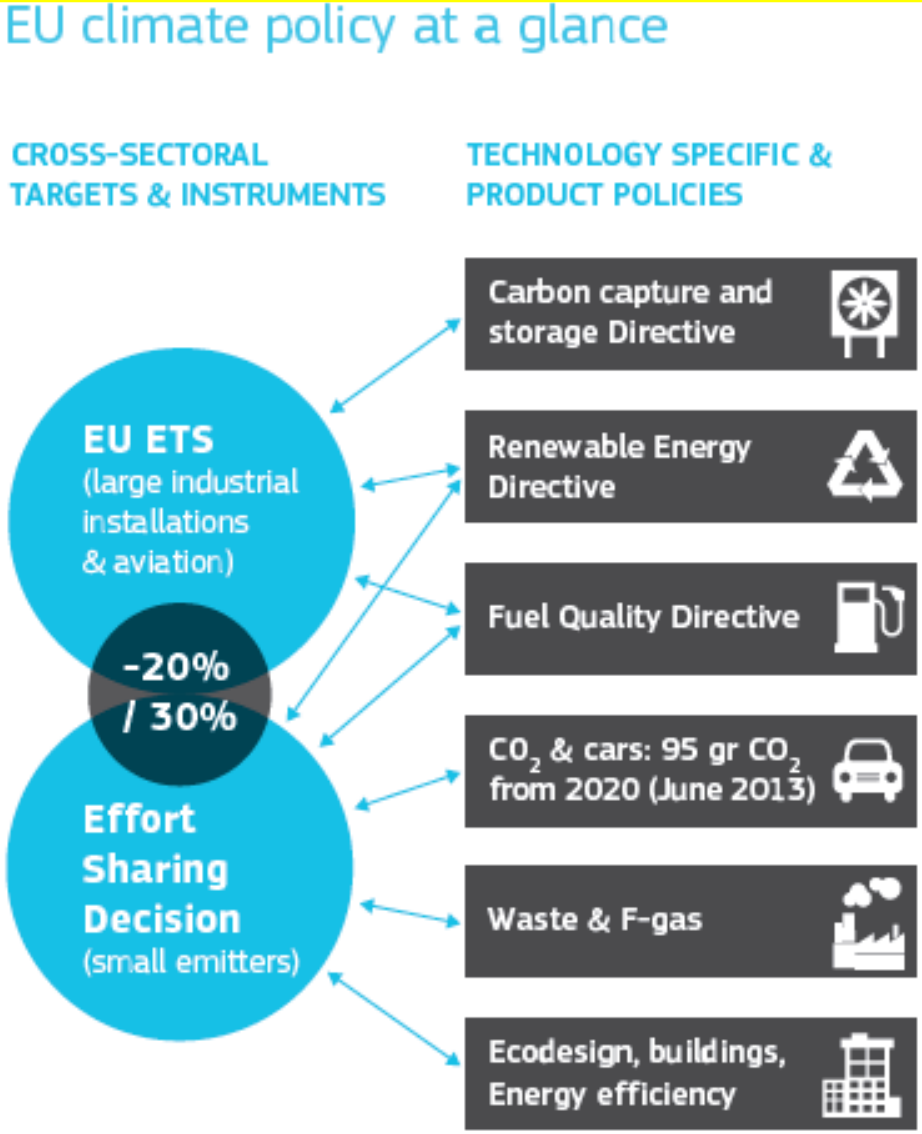


How to integrate climate & investment policies in a green investment policy framework

1. Strategic goal setting and policy alignment	• Clear, long-term and predictable policies • Align goals at all levels of governance • Engage the private sector
2. Enabling policies for green investment	• Put a price on carbon • Remove fossil fuel subsidies • Energy efficiency and product regulations
3. Financial policies, tools and instruments	• Financial regulations to drive long–term investments • Targeted subsidies with predictable phase-out • Leverage public finance (loans, guarantees, bonds)
4. Harnessing resources and capacity	• R&D for green technology • Capacity building to support LCR innovation • Monitoring and enforcement • Climate risk and vulnerability assessment
5. Promoting green business and consumers behaviours	• Information policies • Consumer awareness programmes, public outreach • Corporate reporting

Source: Corfee-Morlot *et al.*, 2012.

European 2009 Climate-Energy Package Experience



A carbon price vanishes…

Figure 1 – EUA prices (€/tCO$_2$) from 2005 to 2014

Source: CDC Climat Research from EEX data

Overlapping Instruments (from Marcantonini)

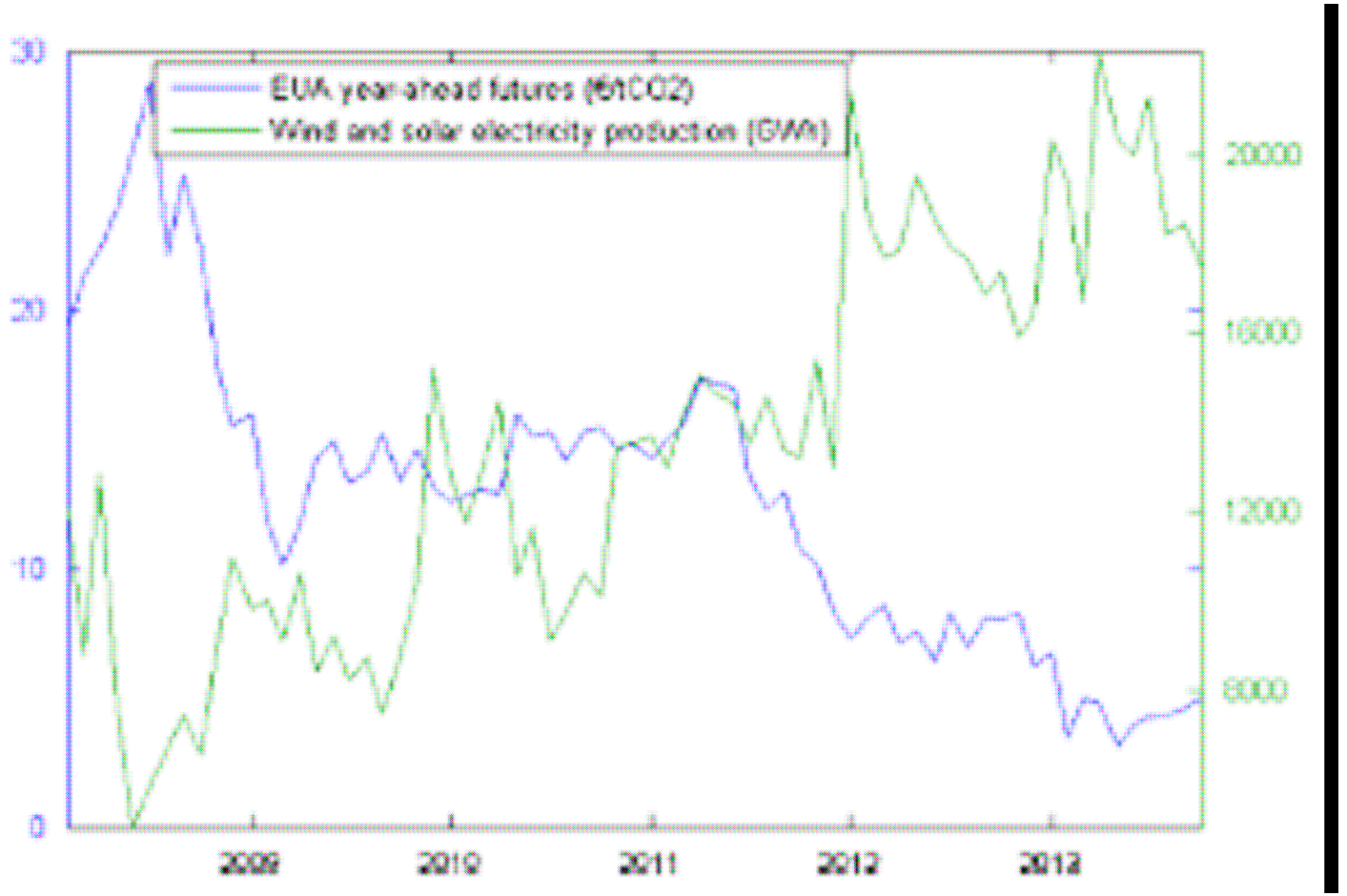
2020 Climate Target

- *Climate target*: 20% CO2 emissions reduction from 1990 levels
- *Justification*: mitigation of global warming
- *Main EU climate instrument*: CO2 carbon market (EU ETS)

2020 Renewable target

- *Renewable target*: 20% energy consumption from renewable energy (RE) sources
- *Main instruments*: renewable energy incentives (REI) at *national level*
- *Justification*: the first justification is that "*The increased use of energy from renewable sources constitute important parts of the package of measures needed to reduce greenhouse gas*" (Directive 2009/28/EC)
- Renewable energy incentives *is a climate policy instrument*:
- Has the REI been an efficient instrument?

Quantitative objectives drive out economic instruments… (from Koch et al., En.Pol., 2014)



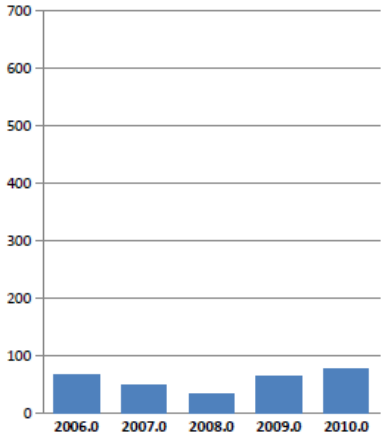
The Cost of Renewables Mandates (from Marcantonini)

GERMANY

Implicit carbon price

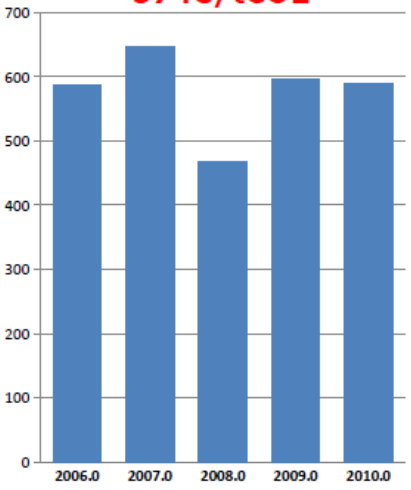
WIND

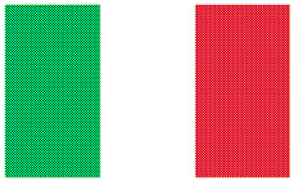
56€/tCO2



SOLAR

574€/tCO2



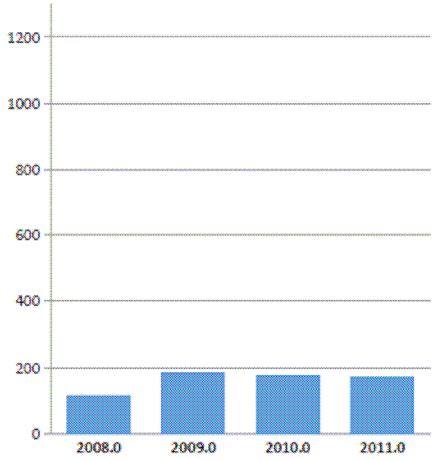


ITALY

Implicit carbon price

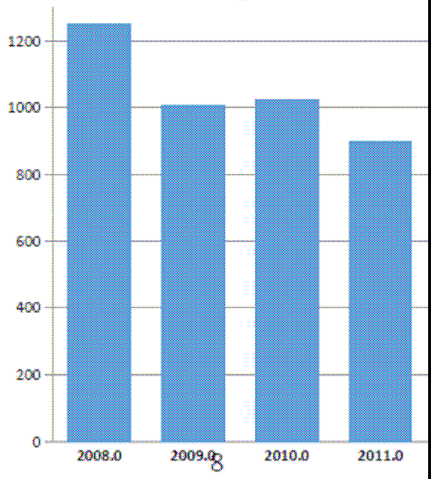
WIND

169€/tCO2

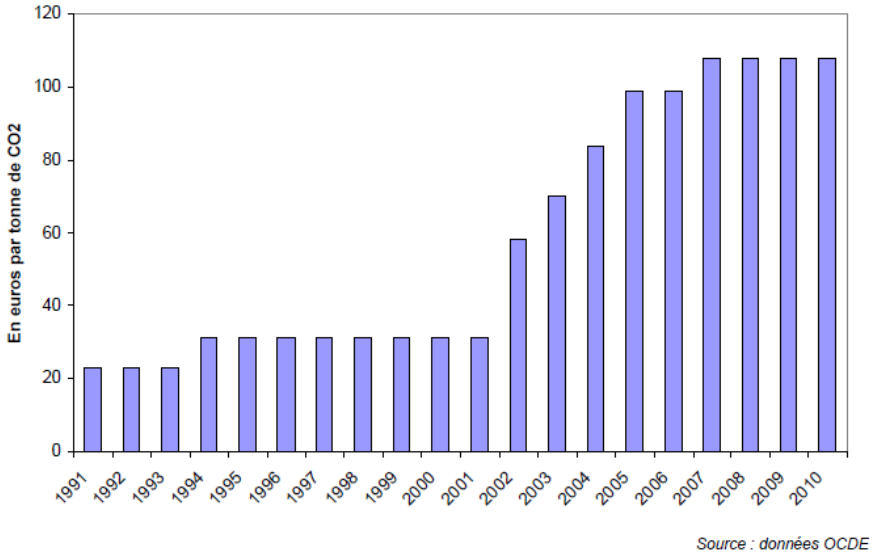


SOLAR

972€/tCO2

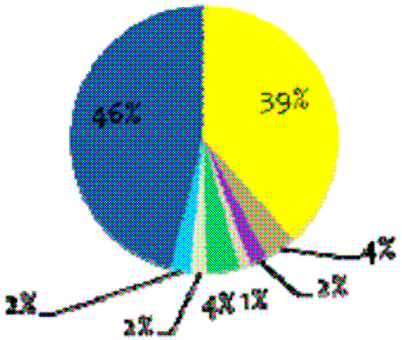


Sweden: carbon prices since 1991

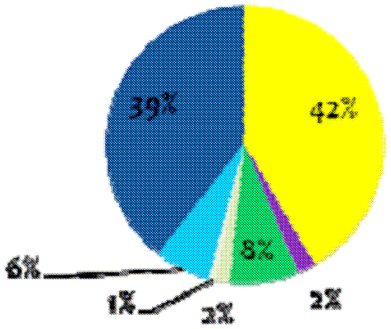


Source : données OCDE

Electricité produite en 2010 (145 TWh)



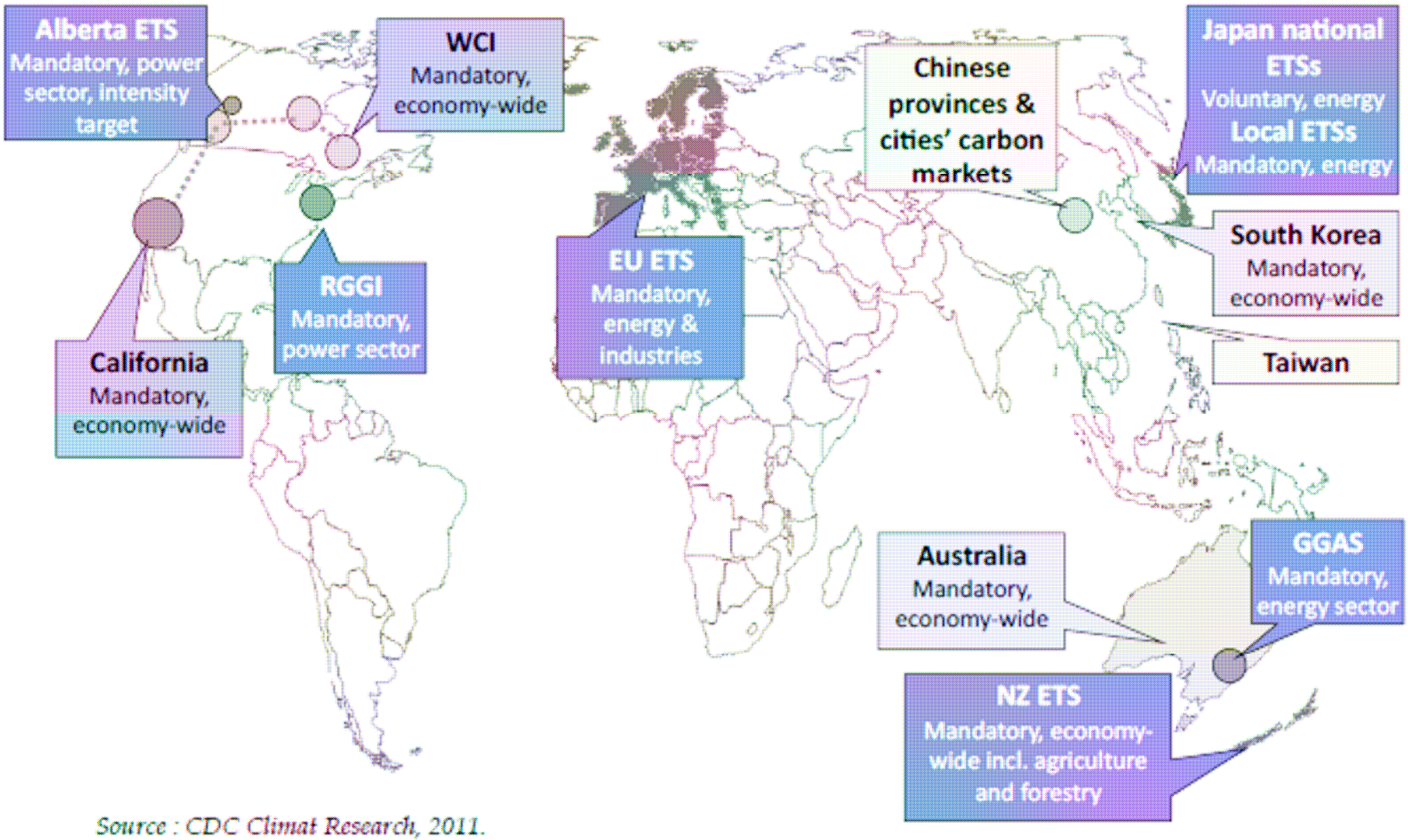
Electricité produite en 2020 (175 TWh)



Nucléaire Pétrole Gaz Autres fossiles Biomasse Déchets Tourbe Eolien Hydraulique

Sources : Energimyndigheten, El-, gas- och fjärrvärmeförsörjningen 2010 (2012) ; Energimyndigheten, Långsiktsprognos 2012.

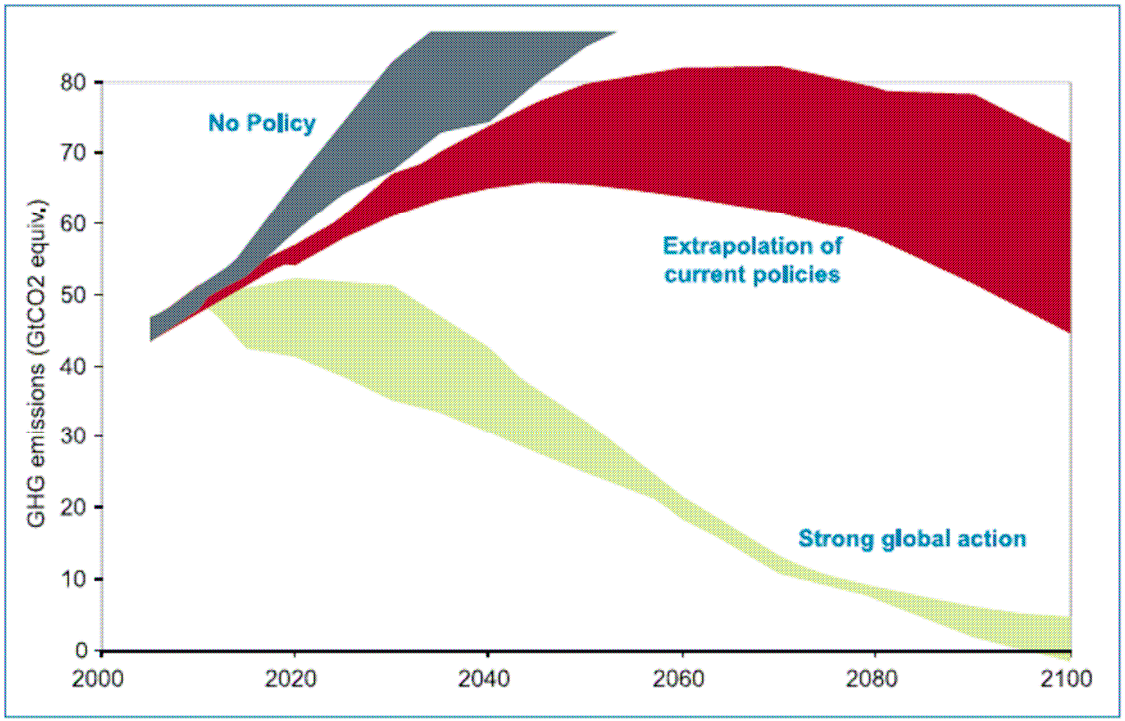
Towards the integration of local initiatives?

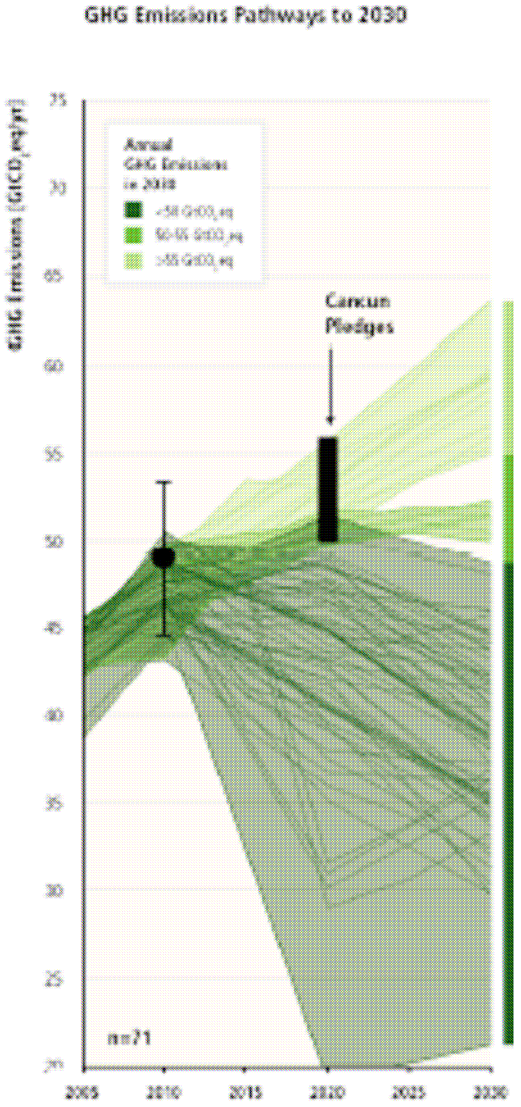


Source : CDC Climat Research, 2011.

Establishing long-term cooperative action for a global public good

Emissions pathways
How to explain their lack of ambition?





References (I)
Natural ressources economics

- **Overexploitation if free-access**
- **Need for efficient access incentives (price signals of scarcity, or of renewability constraints)**
- **Distributive choices to be made**
- **…but not a burden-sharing game: a « surplus » game!**
- **Success stories are associated with: common vision of scarcities by the different agents; global governance; acceptability of controls…**

References (II)
Game theory for the production of environmental quality

- **Externality: the subscription equilibrium is associated with underprovision of public good; need to internalize the positive externality (or to put in line agents objectives and collective surplus, for a cooperative action; cf partnerships)**
- **Free-Riding: informational rents; need for menus…**
- **Ex; Martimort, Sand-Zantman**
  - **Trade-off between incentives and participation**
  - **The optimal mechanism combines a market mechanism and contrbutions**

After Copenhague commitments

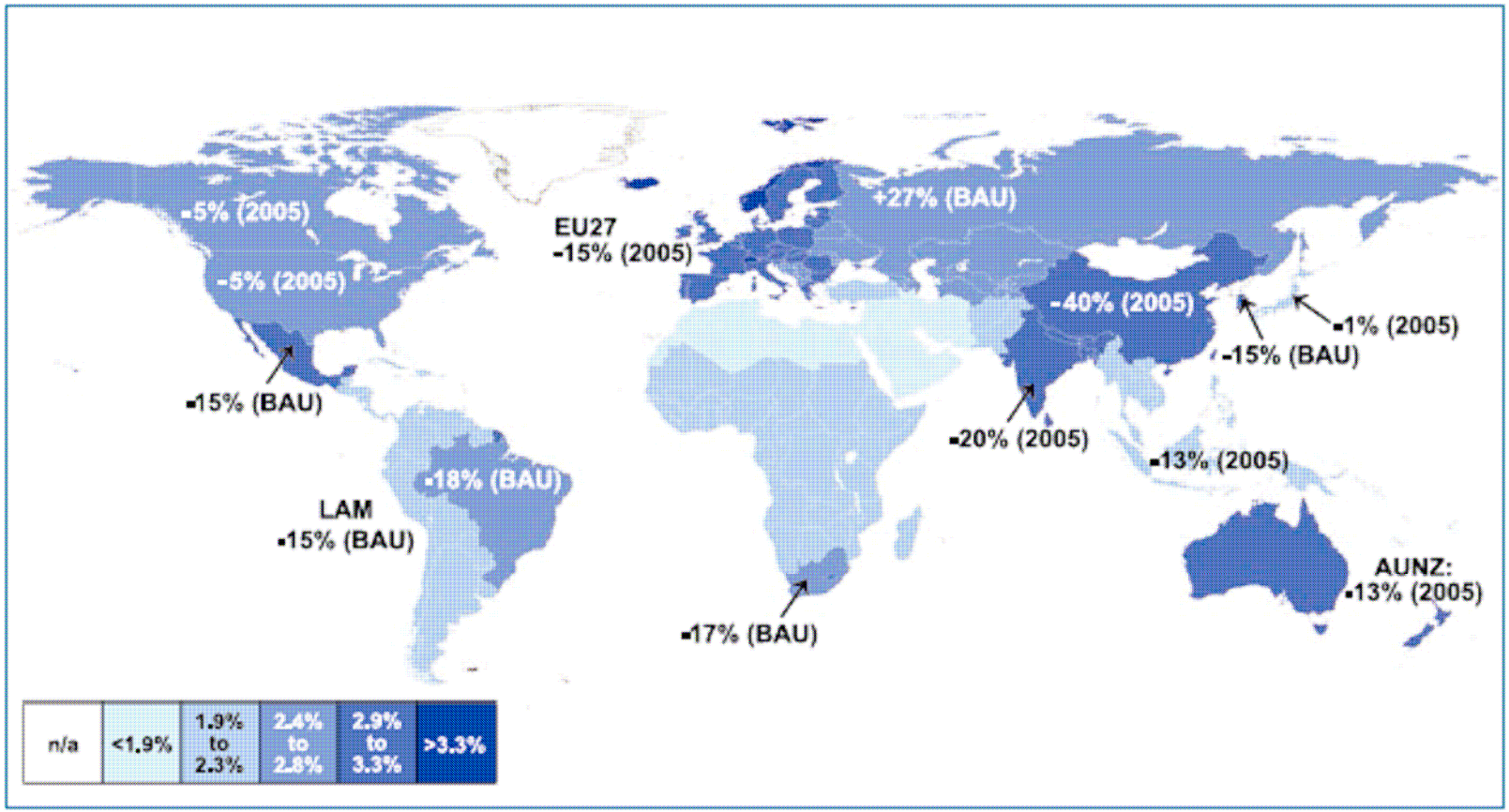
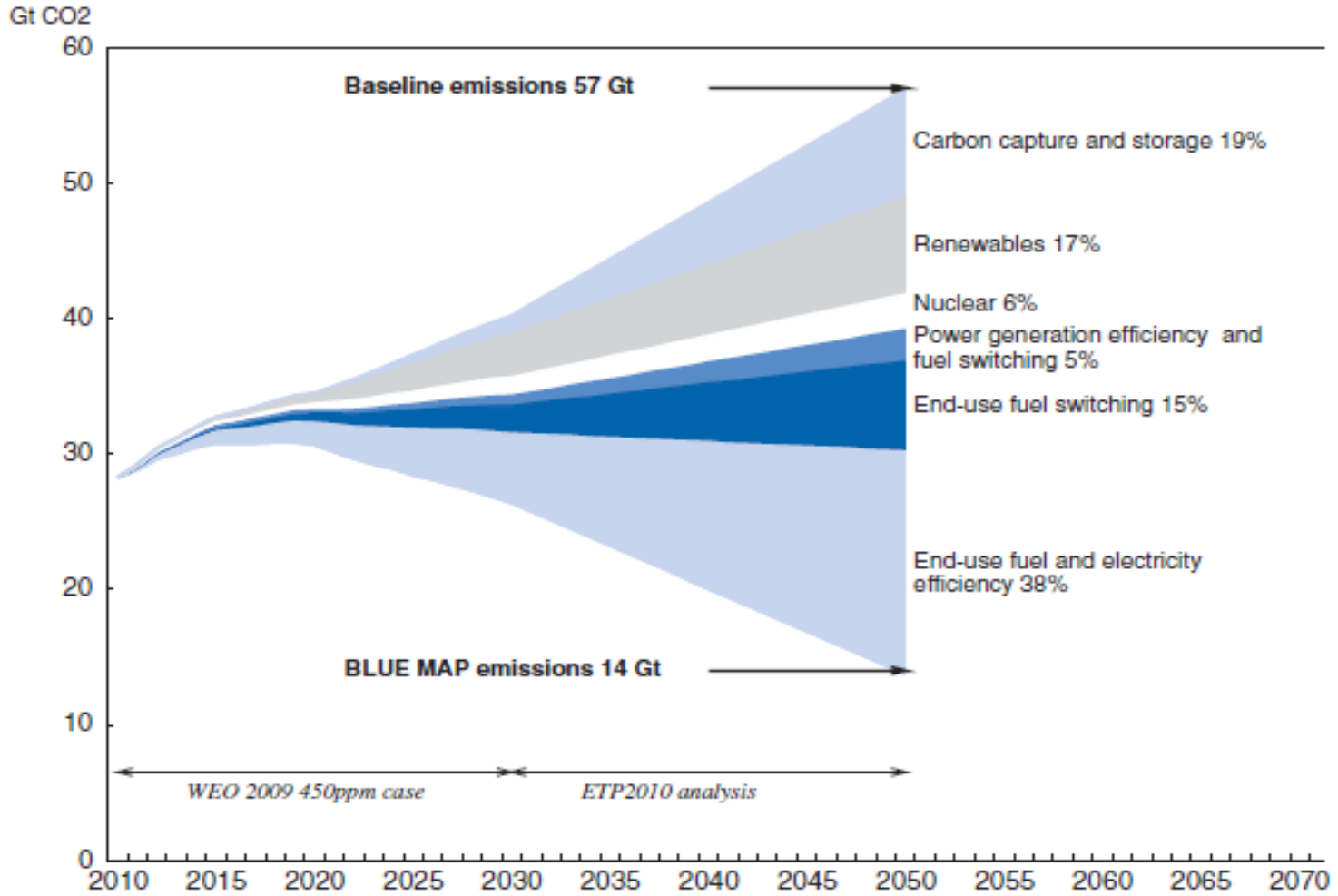
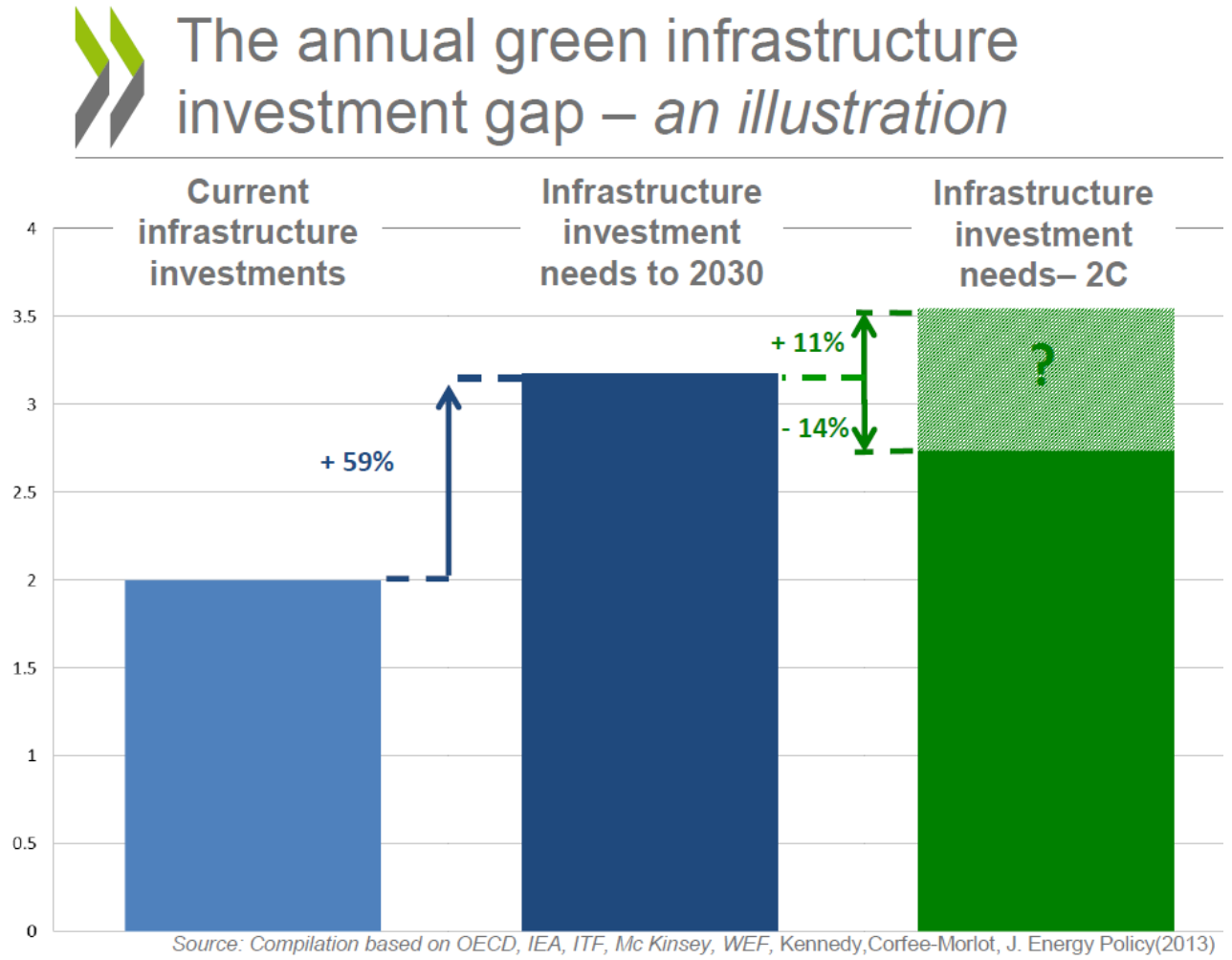


Figure 6: Climate actions in major world regions assumed for the AMPERE reference policy scenario. The numbers shown are assumed emission reduction targets for 2020 relative to 2005 or to the no policy baseline (BAU). In the case of China and India, the numbers refer to GHG intensity reductions. These 2020 targets are largely based on the pledges made by major emitters at the Copenhagen climate summit in 2009 but are weakened in cases where the implementation of needed policies remains uncertain (such as in the USA and Canada). The regional colouring indicates the assumed annual improvement of the GHG intensity of economic output after 2020.

Contractual pathways? (I)



Contractual pathways? (II)



Coming back to fundamental (exacerbated) problems

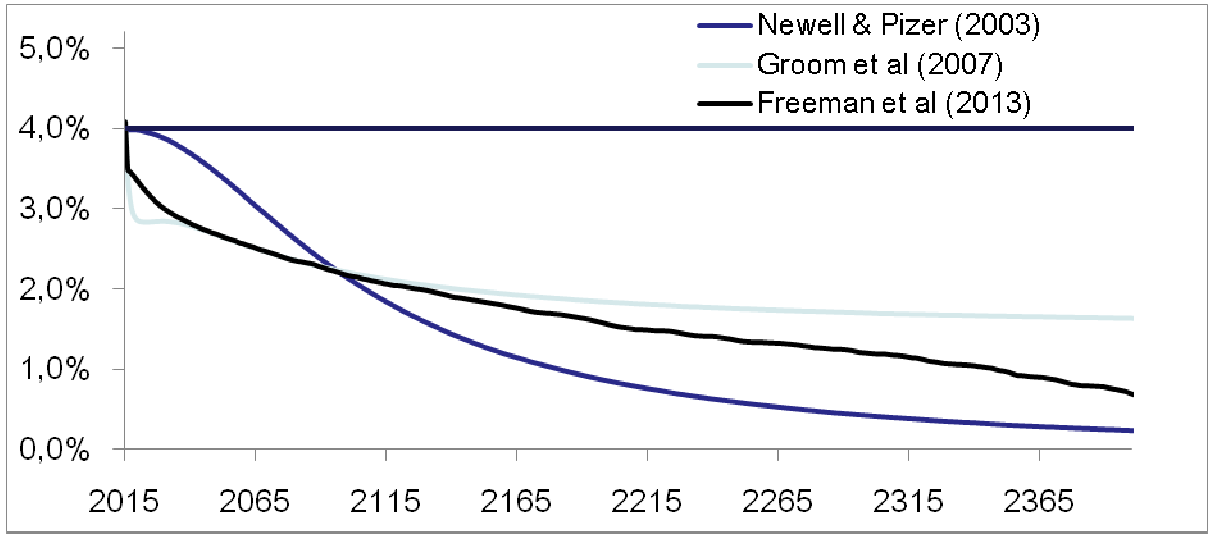
- **Long-term horizon (cf SO2)**
- **Heterogeneity of countries (cf allowances for artisanal fleets)**
- **Uncertainties (cf. anti-earthquake buildings)**

- **Countries: unability to commit; internal political economy constraints**
- **What will be the remainder of the emissions budget for the « new » emitters?**

Heterogeneous discount rates between countries?

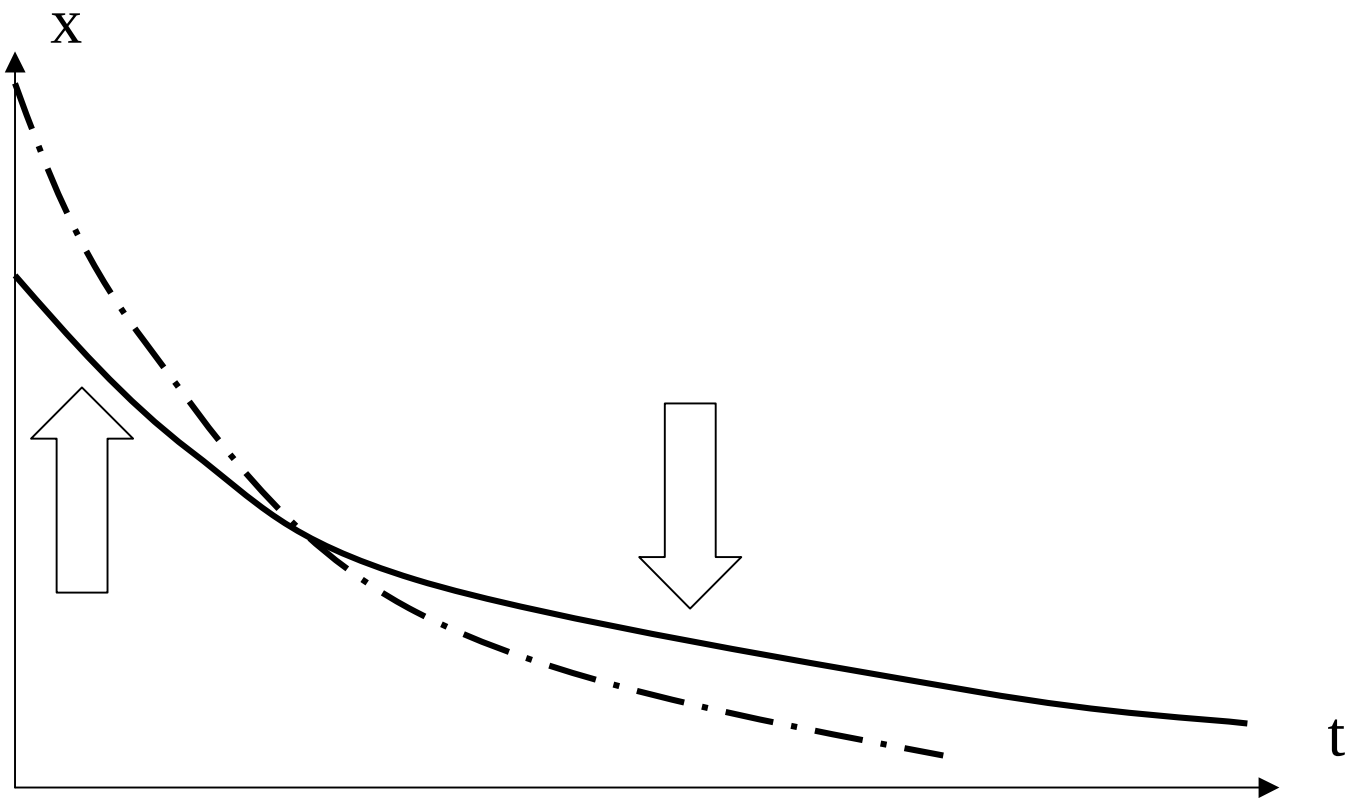
The use of a discount rate has a particularly crucial impact on the evaluation of projects, policies or investments for climate change mitigation (high agreement). The discount rate is the minimum rate of expected social return that compensates for the increased intergenerational inequalities and the potential increased collective risk that the action generates. Even if there is disagreement on the level of the discount rate, there is consensus for using declining risk-free discount rates over time

The social risk-free discount rate for consumption is between one and three times the anticipated growth rate in per capita consumption (*high agreement*). This is based on an application of the Ramsey rule



•La persistance des chocs sur le taux de croissance justifie une structure par terme décroissante. E

Impact of the discount rate on the pace of depletion of a carbon budget



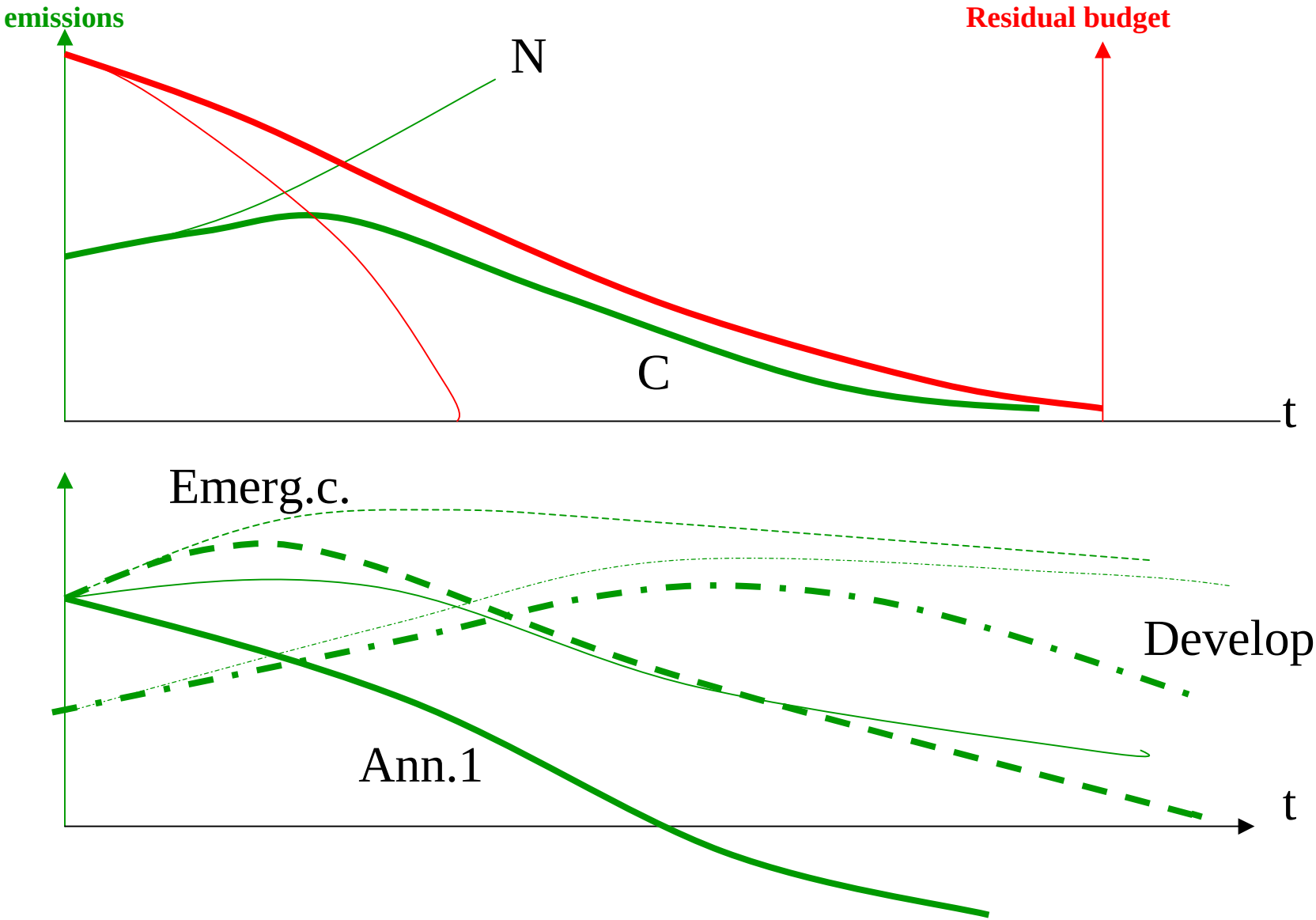
« Higher immediate rate of extraction with increased discount rate »

Orientation for a fast-changing energy world

WORLD ENERGY OUTLOOK 2013

- China, then India, drive the growing dominance of Asia in global energy demand & trade
- Technology is opening up new oil resources, but the Middle East remains central to the longer-term outlook
- Regional price gaps & concerns over competitiveness are here to stay, but there are ways to react – with efficiency first in line
- The transition to a more efficient, low-carbon energy sector is more difficult in tough economic times, but no less urgent

How to share our global carbon budget?



Negociations dynamics
not decide anything until everything is decided ?

Beccherle & Tirole analyse the strategic implications of delayed climate negotiations, and argue that countries will engage in suboptimal efforts to reduce their emissions in the next years. The authors consider a two-period framework, where the "date-1' policy choice affects the region's marginal cost of 'date-2' abatement, which in turn implies that the region's date-1 policy choice is made with an eye on future negotiations.

Short-lasting agreements lead to higher pollution than no agreement at all.

• Delaying negotiation always raises date-2 emissions compared to the first-best. Indeed, delayed negotiation may be worse than no negotiation at all.

• Delayed negotiations lead to high future emissions through an excessive issuance of forward or bankable permits. If an ambitious climate treaty is impossible today, countries should at least agree to limit banking and forward-selling.

• The more stringent the first-period pollution control policy, the lower the second-period pollution. In particular, applied to the case in which negotiations are delayed, by adopting loose pollution control policies in the first-period, a region can credibly commit to high date-2 pollution, were the negotiation to break down.

Climate policies for development

- **Mitigation is an investment, to reduce climate change risks. There is no need to hide immediate costs. What is important is to put the « (net) cost of non action » in sunshine.**
- **When effective, « command and control » policies are excessively costly. Establishing carbon prices today and for the future (and their governance) are top priorities.**
- **If not counter-productive, short-period objectives do not help for credible cooperative action . Cooperation must be established with the horizon of development.**