FONDAZIONE ENI ENRICO MATTEI

Mitigation, Adaptation and Sustainable Development

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COP XVIII Side Event

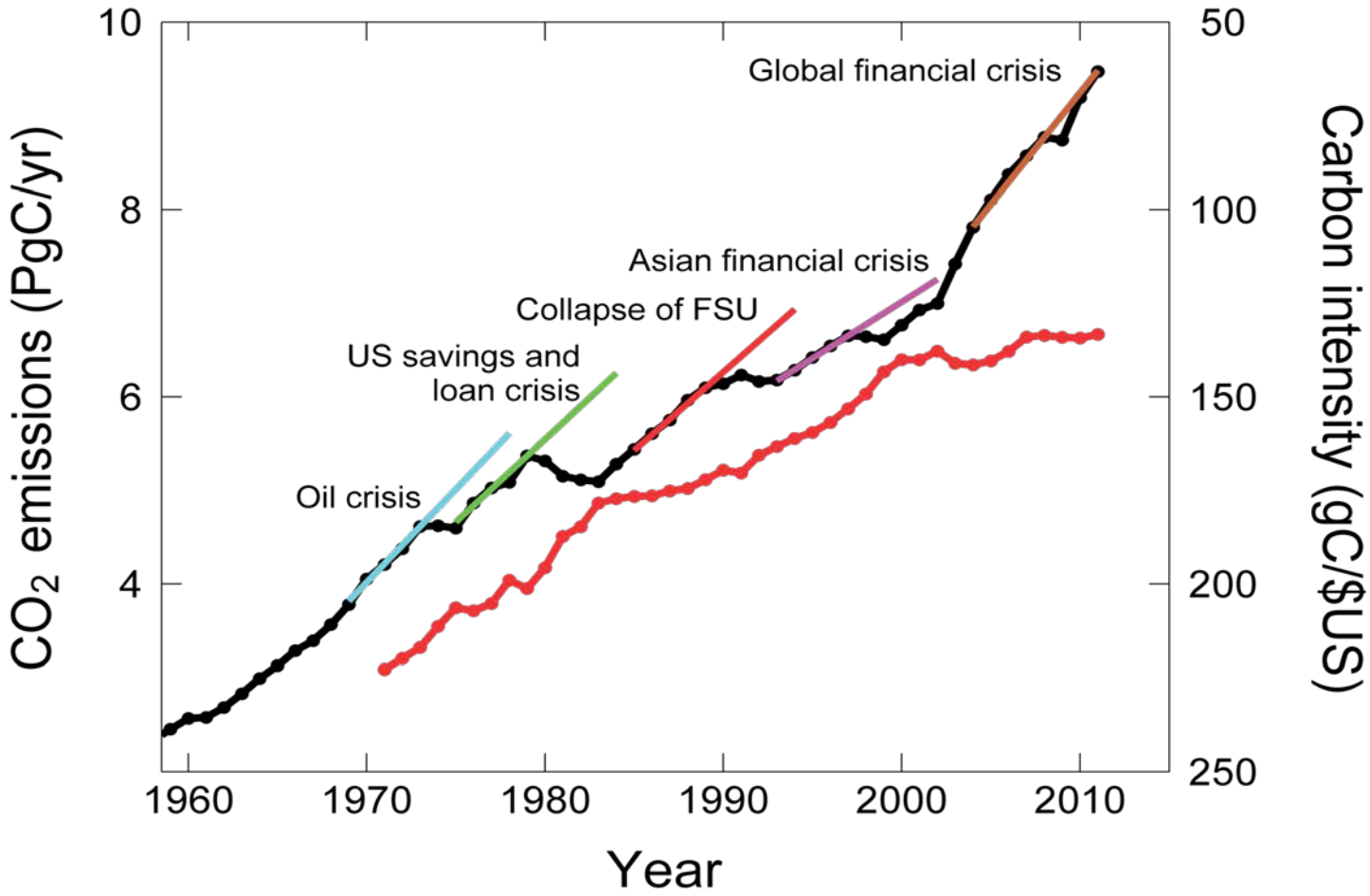
Thursday, December 6, 1:15-2:45 pm

“After Doha: Balancing adaptation, mitigation, and economic development”

Carbon Intensity of Economic Activity

The global financial crisis of 2008/2009 had no lasting effect on emissions

Carbon intensity has not improved with increased economic activity since 2005



Source: Peters et al. 2012a; Le Quéré et al. 2012; CDIAC Data; Global Carbon Project 2012

Far from a sustainable trajectory…

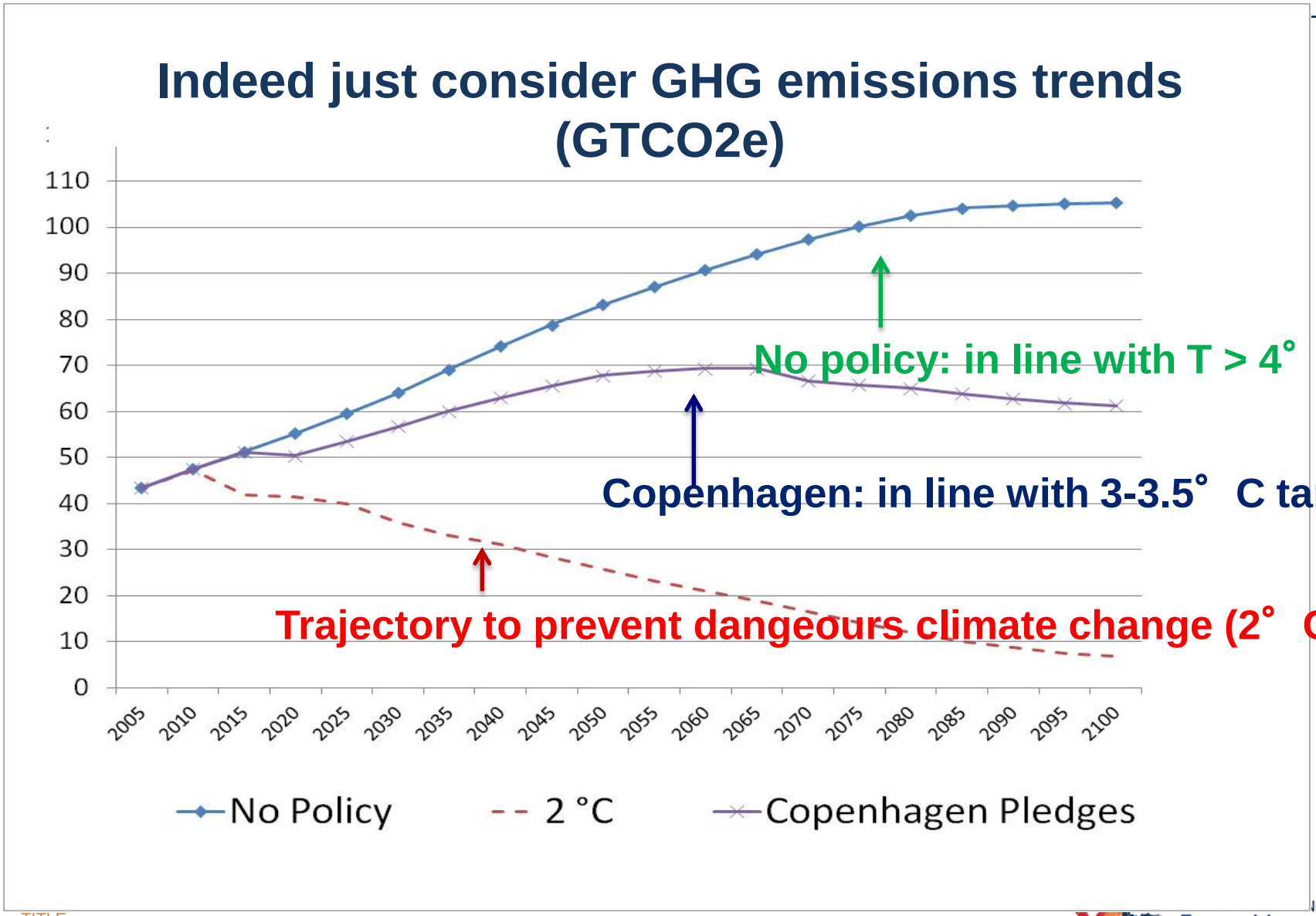
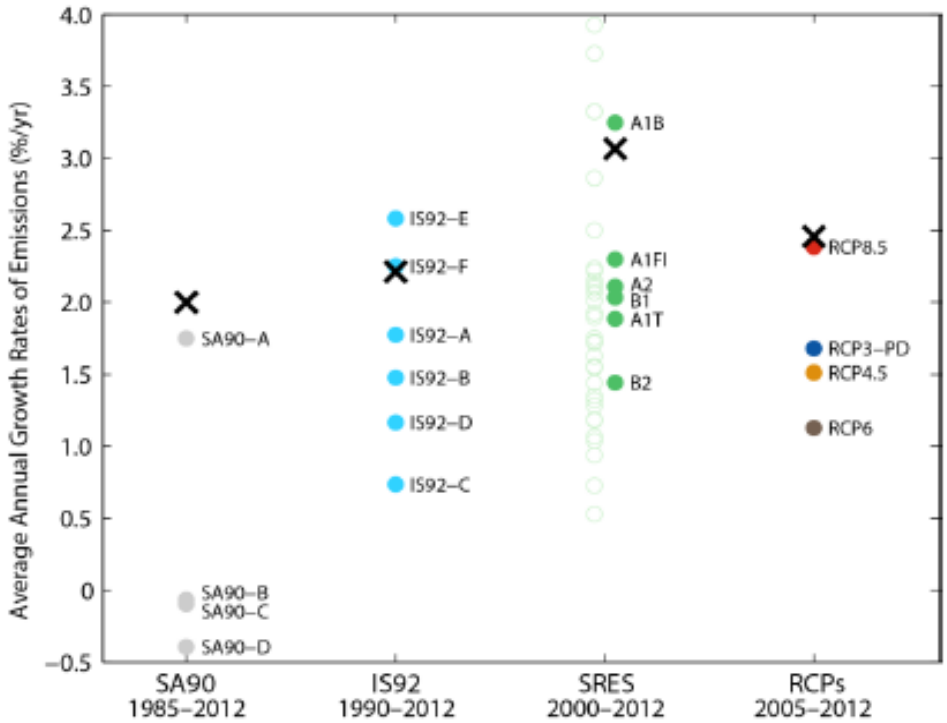


Figure Source: WITCH MODEL (FEEM)

Observed Emissions and Emission Scenarios

Observed emissions (X) continue to track the top-end of all scenarios (●)



Crosses (X) : Historical emissions growth over the period in horizontal axis

Circles (●) : Scenario emissions growth over the period in horizontal axis

Source: Peters et al. 2012; Le Quéré et al. 2012; Global Carbon Project 2012; CDIAC Data

Impacts of climate change

- Today GHG emissions, sea-level rise, and global temperature are in line with the **highest scenarios** projected in AR4 (Post-4AR)

- Major concerns: irreversible disruption of ecosystems, potential **damages caused by changes in "extremes"**. With medium confidence extreme droughts/floods, **sea levels rise**, precipitations will get worse, though with a lot of spatial variation (IPCC SREX 2012)

- Socio-economic trends will exacerbate the climate change challenge: **increasing pressure on natural resources for food**, energy production, and dwelling (OECD 2012)

Policy options to achieve 450-500 ppm CO2 - eq

1) Reduce (the **flow** of) emissions soon and cooperatively

2) Delay emission reductions and reduce the **stock** of emissions later => this requires **negative emissions technology**

3) **Adapt** to climate change

4) Invest in R&D to improve the effectiveness and cost efficiency of all previous options

Mitigation is hard to achieve ….

- Requires **large participation** to be effective => high transaction costs
- Has an externality + **global public good** nature => strong free riding incentive
- Requires strong commitments from developing countries (efficiency-**equity** trade off)
- Offers **uncertain future benefits** vs rather certain present costs
- Has to work against strong **technological lock ins** and path dependency (fossil fuel based societies)
- **Carbon dioxide removal technologies** unlikely to deliver the necessary size of negative emissions

Adaptation

- Focused on developing countries, which are much more vulnerable
- **Likely to be necessary whatever mitigation policy is undertaken**
- To a certaint extent, less costly
- Less international coordination is required, even though financing remains an issue

2.

Can Markets drive Adaptation?

- **Market driven adaptation can attenuate the total damage from climate change**, but not fully eliminate it. The global, direct impacts of climate change would lead to a loss of about 1.55 percent of the Gross World Product in 2050. Market-driven adaptation reduces this loss to 1.1 percent of GWP.
- Although market-driven adaptation has a strong damage smoothing potential, still global damage remain significant, especially in some less developed countries. The challenge for adaptation, therefore, lies in **tackling climate change impacts in developing countries.**

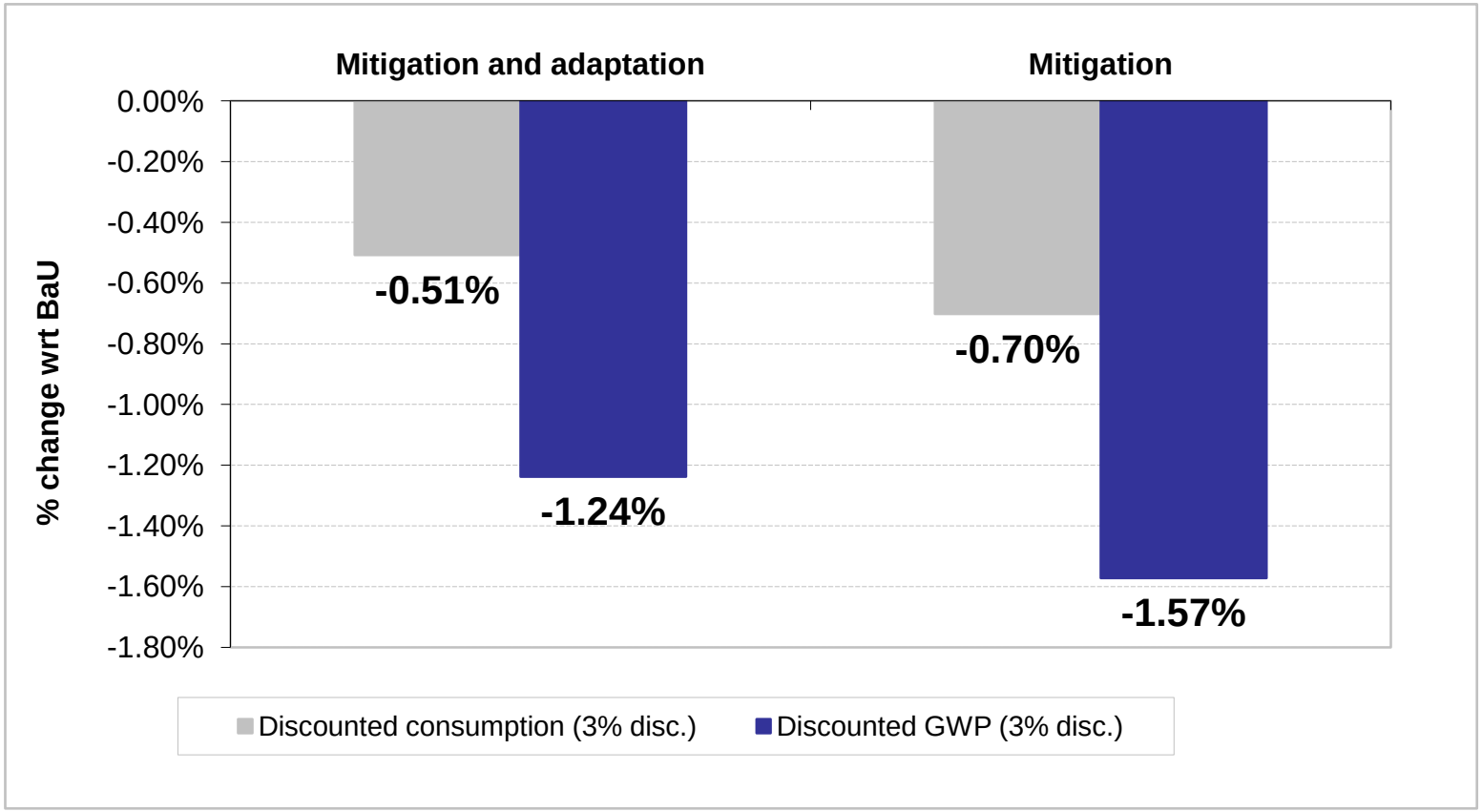
3.

Mitigation vs Adaptation

- There is a **trade-off between mitigation policy and adaptation policy**. The use of mitigation (adaptation) decreases the need to adapt (mitigate). In addition, resources are scarce. If some resources are used for mitigation (adaptation), fewer are available for adaptation (mitigation).
- In principle, mitigation should be carried out earlier, because of its delayed effects driven by environmental inertia, while **adaptation can be postponed** until damages are effectively higher. However, damages from climate change are already becoming considerable even in developed countries

Mitigation and Adaptation

Total Policy costs



Total climate change costs are lower when mitigation (the 2.5° C stabilization policy) is coupled with adaptation than when mitigation is alone. => Efficiency gain by coupling the 2 strategies

Source: Bosello, Carraro de Cian (2009)

4.

Adaptation policy in developing contries

- In NON-OECD countries, climate change adaptation needs are estimated to be relatively low in the short run, about 30 USD Billion in 2030. However, they will rise dramatically as the economic impacts of climate change increase over time. In 2050, they will amount to 78 US$ Billion, in 2065 they will be above 500 US$ billion, to peak to **more than 2 US$ trillion per year by the end of the century**.
- **International aid and cooperation on adaptation** and adaptation planning are likely to be necessary. This can also offer an additional opportunity **to foster economic development** itself when **adaptation takes the form of educational programmes, capacity building, easier access to bank credit for dedicated projects, etc**.

The magnitude of international cooperation on adaptation

- Even assuming international cooperation on ambitious mitigation, still there is need for cooperation on adaptation
- Developing countries are expected to spend on adaptation about:
  - US$ 112 Billion in 2050
  - US$ 800 Billion in 2100
- On a annuitized base developing countries would need about US$ 260 Billion for adaptation against the US$ 70 Billion of the developed ones
- To equalize adaptation expenditure over GDP, developed countries should transfer US$ 180 Billion to developing countries yearly (on a annuitized basis computed throughout the century)

  ⇒70% of the adaptation expenditure needed in developing countries

  ⇒ **0.2% of developed countries GDP**

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5.

R&D for Mitigation and Adaptation

- Countries still place little effort on mitigation and adaptation R&D and rely primarily on reactive adaptation.

- **More investments in R&D are necessary** (roughly four times the present level)

- **Richer countries can help developing countries also by supporting their climate related R&D** (e.g. by technology transfers).

- The success of this policy is crucially dependent on the design of the technology transfer program that must take into account developing country absorptive capacity.

5.

Cost-Benefit Analysis

- **A dollar spent on adaptation would achieve at least about $1.65 worth of positive changes for the planet.** The benefit-cost ratio is therefore largely above one.
- **A dollar spent on both mitigation and adaptation would even more beneficial.** The benefit-cost ratio is 2.25.
- **Economic development would be enhanced** and not undermined by an effective climate policy

Thanks!