FOOD FOR ALL

FOOD FOR SUSTAINABLE GROWTH

FOOD FOR HEALTH

FOOD FOR CULTURE

BARILLA CENTER FOR FOOD & NUTRITION

1ST INTERNATIONAL FORUM ON FOOD AND NUTRITION

ROME, DECEMBER 3, 2009

Senato della Repubblica

MINISTERO DELLE POLITICHE AGRICOLE ALIMENTARI E FORESTALI

Comune di Roma

The European House Ambrosetti

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CARLO CARRARO
CLIMATE CHANGE, AGRICULTURE AND SUSTAINABLE GROWTH

COP XV AT COPENHAGHEN

- The most likely option is a set of cap and trade schemes, directly linked, or indirectly linked through CDMs.
- No room for other options, e.g. carbon tax, R&D based agreements, hybrid mechanisms, etc.
- Possibly a long term global target may be agreed upon, but no global policy.
- Weakness of US negotiating position without Senate approval of Waxman-Markey bill

WHAT QUESTIONS FOR COPENHAGHEN?

- The debate will therefore focus on the optimal design of this set of cap and trade schemes rather than on alternative options
- E.g. What is the long term target to be achieved? How to design carbon markets and their links?
- What kind of price signal is necessary to induce the drastic changes in the energy sector required by GHG stabilisation?

AND MORE…

- Are carbon prices to be complemented by other policies? R&D policies? Adaptation measures?
- What is the timing of action? Is 2012 the last chance for an ambitious and effective climate policy or can action be delayed?
- For how long can the EU and possibly the US continue with unilateral policy measures?
- How can major developing countries be induced to participate in a global scheme?

LONG TERM TARGET: SOME BASIC NUMBERS

- According to IPCC, in order to keep temperature increase below 2° C with good probability, concentrations of GHGs should not exceed 380-390 ppm CO2-eq.
- If we accept the possibility of overshooting the target, the level of concentrations can be higher but not greater than 450 ppm.
- The present level of GHG concentration is 430 ppm CO2-eq (390 CO2 only), well above the 380-390 ppm level necessary to make a temperature increase above 2° C unlikely.
- 450 ppm CO2-eq will be reached within six years, whatever world leaders decided in L'Aquila and will decide in Copenhagen.
- If 550 ppm CO2-eq are reached, there is little chance to stay below 2° C.

LONG TERM TARGET: SOME BASIC NUMBERS

Concentrations of GHG (ppm CO_2-eq)	Most Likely	Very Likely Above (>90%)	Likely in the Range (>66%)
350	1.0	0.5	0.6 - 1.4
450	2.1	1.0	1.4 - 3.1
550	2.9	1.5	1.9 - 4.4
650	3.6	1.8	2.4 - 5.5
750	4.3	2.1	2.8 - 6.4
1000	5.5	2.8	3.7 - 8.3
1200	6.3	3.1	4.2 - 9.4

Table 1. Most likely, likely and very likely bounds/ranges of global mean equilibrium surface temperature increase in degrees Celsius above pre-industrial temperature for different levels of CO_2 equivalent concentrations (ppm). Source: IPCC Fourth Assessment Report, WG I, Chapter 10, Table 10.8 .

CURRENT POLICY TRENDS…

- The emission reduction path proposed at L'Aquila is not consistent with the 2° C target.
- If we assume that emissions will halve by 2050, declining at a constant pace from 2010, concentrations of CO2 in the atmosphere will be 40 ppm higher in 2050.
- This implies that all GHG concentrations will reach 470 ppm CO2-eq in 2050, assuming that emissions of non CO2 gases are heroically cut to zero starting from 2010.
- The emissions path envisaged by MEF leaders at l'Aquila is thus more in line with a 525-550 ppm target by the end of the century. Hence, more than 2 degrees…

BELOW 550 PPM CO2-EQ?: A VERY DIFFICULT TASK....

Given the projected dynamics of world population and economic growth, the objective of limiting concentrations below 550 ppm CO2-eq implies that average per capita emissions in the second half of this century are to be reduced from about 2 to about 0.3 tC per year.

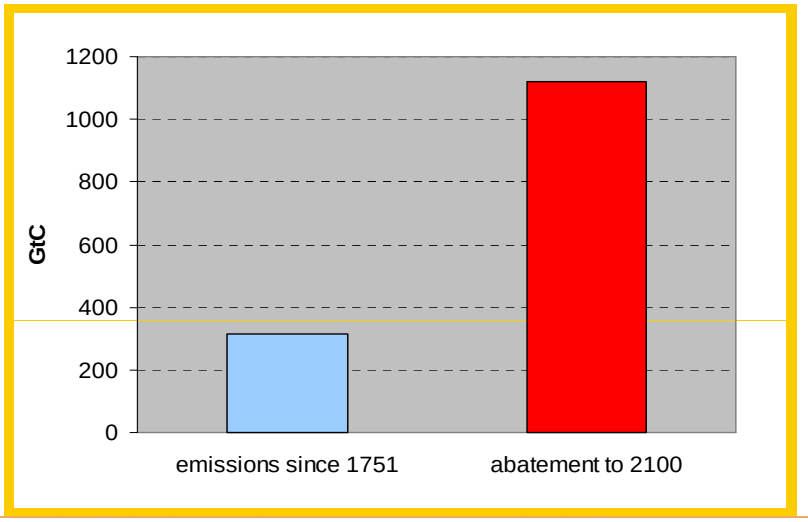
In other words, the world will have to emit not more than today's India's average - quite a significant reduction for most industrialised countries (US average per capita emissions are about 6 tC) and for countries that aim at similar lifestyle standards.

Just to provide another benchmark, 0.3 tC is the amount of GHGs emitted by an individual flying - one way - from the EU to the US East coast!

REQUIRED EMISSION REDUCTIONS

	BAU	450ppmCO2	% reduction
2005	**7.8**	**7.8**	
2030	**13.0**	**8.0**	**38%**
2050	**17.0**	**4.9**	**71%**
2100	**23.6**	**3.6**	**85%**

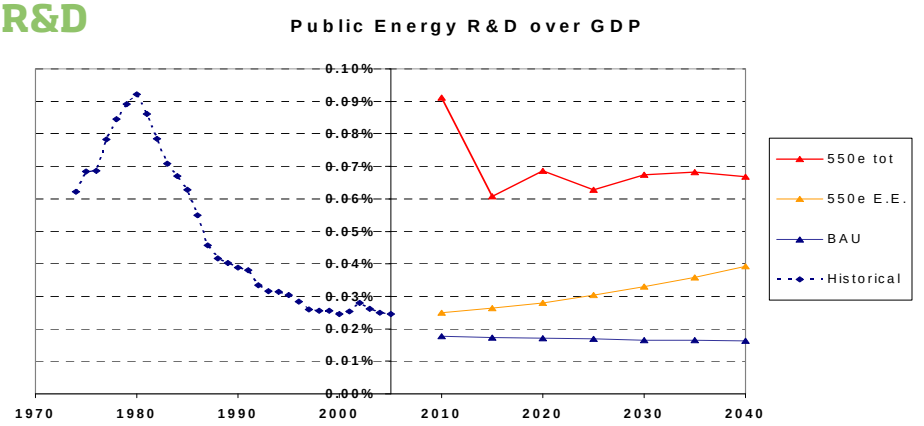
REQUIRED EMISSION REDUCTIONS



THE FINANCIAL PROBLEM

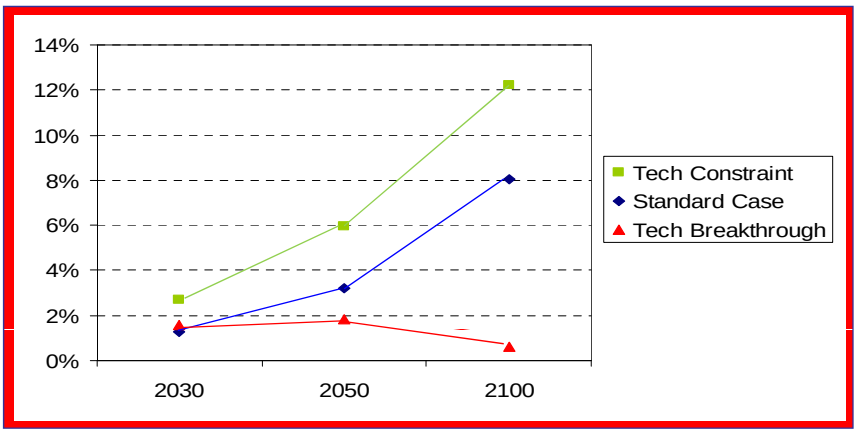
- Cumulative new investment in energy-supply infrastructure is projected by IEA to be $22 trillion by 2030 (to meet increasing energy demand). Will the $22 trillion energy-supply infrastructure investment stream already in the baseline be deployed mostly in fossil fuel projects?
- Can government policies be developed that will "redirect" the $22 trillion investment stream from high carbon to low carbon primary energy?
- To accomplish this task those policies must incentivize private capital (the source of the $22 trillion) to turn away from high carbon toward low carbon energy investments. Is this feasible? How?

ENERGY R&D



4 fold increase in public energy R&D investments needed (roughly 40 Billions/yr).
Return to 1980s figures (yet 2 order of magnitude smaller than physical investments in commercial technologies -> cheap insurance policy).
Focus on both improving efficiency but mostly on innovation in low carbon technologies.

COST OF STABILIZATION POLICY



- With constraints on CCS-renewables-nuclear climate policy bill increases significantly;
- Innovation is key to decoupling economic activity and climate protection but requires initial investments.

ONLY A LARGE COALITION CAN MAKE IT…

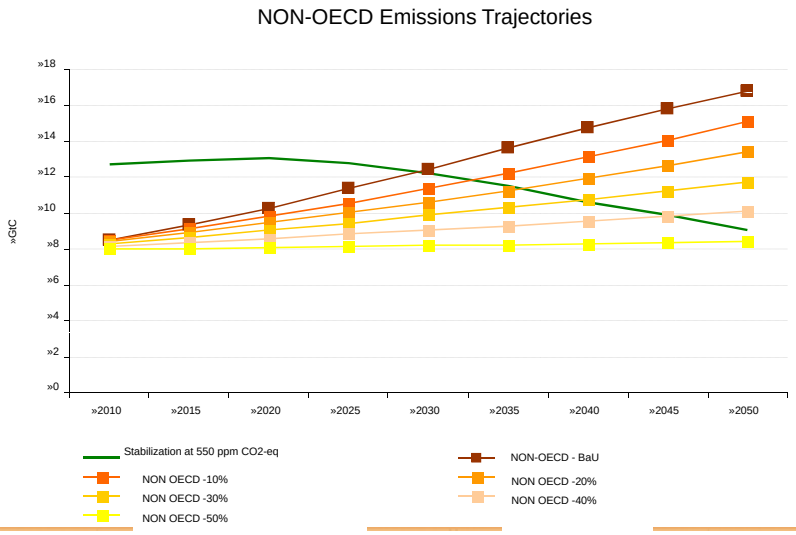
If **present large emitters do not join a climate coalition**, then the 2050 and 2100 targets cannot be achieved even under the extreme assumption of zero or negative emissions for coalition's members.

The participation of both **China AND India** is needed to attain the 2100 target.

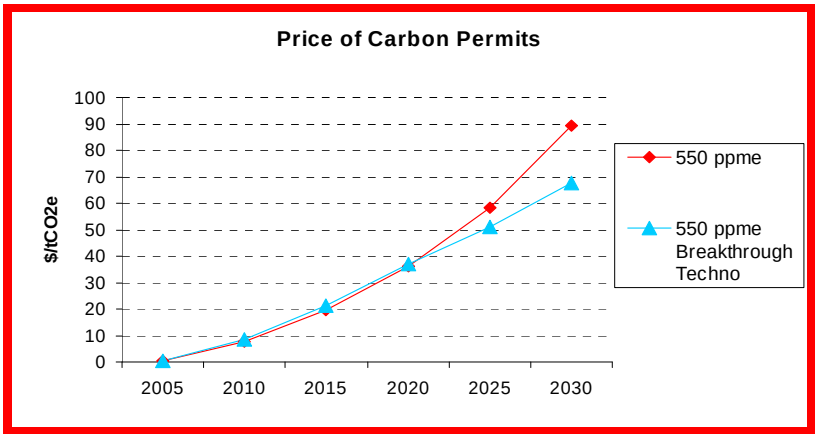
When the goal is GHG stabilization in 2100, effective coalitions are subsets of the 12 regions in which at most three regions are not included (SSA, TE, SEASIA).

Generally, only SSA , or SSA plus another region (LAM, TE, MENA, SEASIA) can be singletons.

OECD COUNTRIES NEED COOPERATION WITH DEVELOPING COUNTRIES



CARBON PRICE SIGNAL



Significant **carbon price signal** is needed to 2030 irrespective of innovation outcome

THE ROLE OF THE FOOD AND AGRICULTURE SECTOR

Mitigation

- Better land use management
- Controlling deforestation
- Bio fuels
- Production targeted to dietary changes

Adaptation

- Climate resistant seeds
- Water management
- Crop relocation

CONTROLLING DEFORESTATION THROUGH ECONOMIC INCENTIVES

REDD Estimates	NO BANKING	BANKING
BRAZIL (Woods Hole Research Center)	-13%	-11%
IIASA Cluster Model	-25%	-23%
Sohngen (GTM EMF-21)	-24%	-21%

RELATIVE COSTS OF BIOFUELS

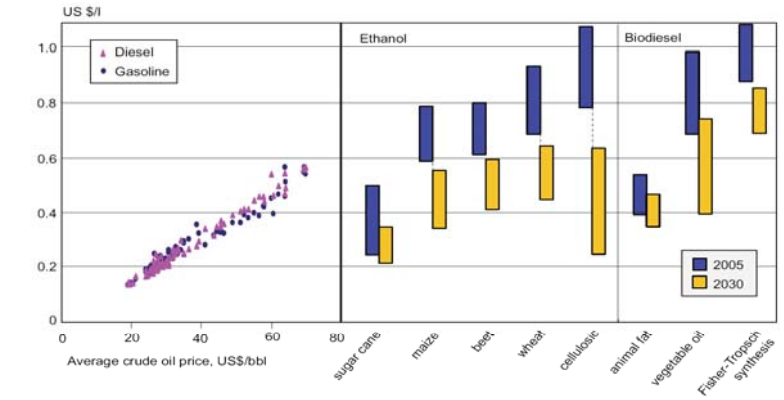
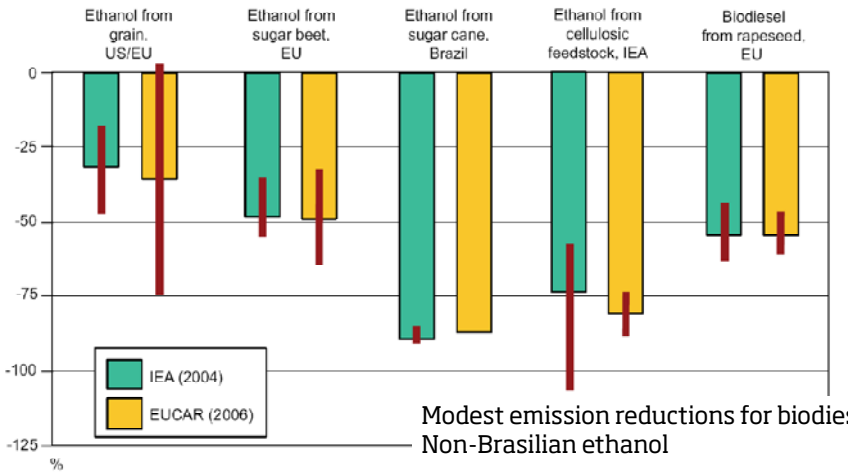


Figure 5.9: *Comparison of cost for various biofuels with those for gasoline and diesel*
Source: IEA, 2006b.

- High costs for EU production
- Cellulosic ethanol with high potential

EMISSION REDUCTIONS FROM USING BIOFUELS



Modest emission reductions for biodiesel and Non-Brasilian ethanol

Figure 5.10: *Reduction of well-to-wheels GHG emissions compared to conventionally fuelled vehicles*
Note: bars indicate range of estimates.
Source: IEA, 2004c; EUCAR/CONCAWE/JRC, 2006.

WHAT FUTURE FOR BIOFUELS?

With present technologies, negative side effects are large:

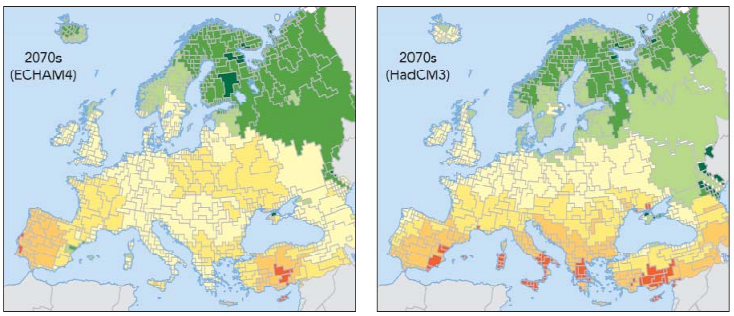
- Excessive water use;
- Use of fertilizers and related N_2O emissions.
- Competition with other crops
- Deforestation
- Loss of biodiversity

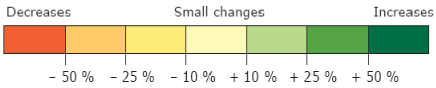
EU Policy on biofuels (2003 / 30 / EC):

- Small share: 2% in 2005, 5.75% in 2010;
- Unreached 2005 target. Likely similar outcome for 2010;
- More stringent rules to avid negative side effects

Second generation biofuels?

IMPACTS ON WATER

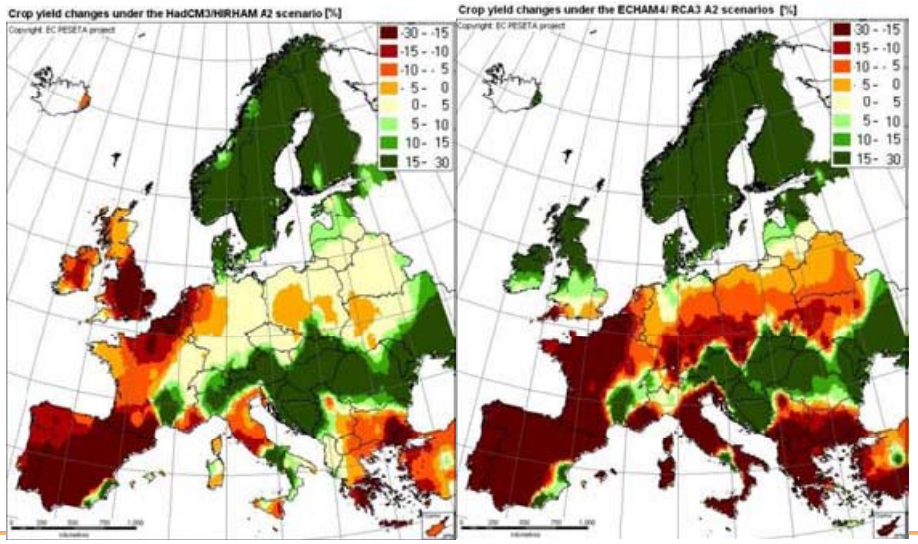




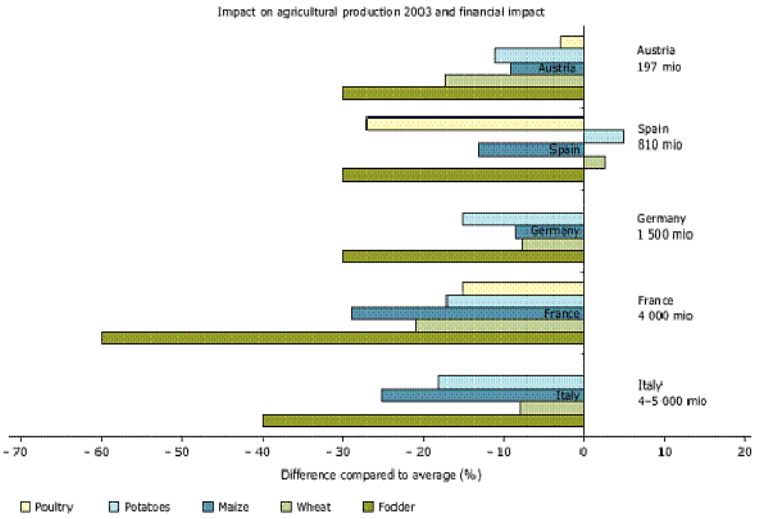
Note: Note that larger changes in seasonal averages are expected in some regions.

Source: Lehner *et al.*, 2001; EEA, 2001.

IMPACTS ON CROP YIELD



SUMMER 2003



HENCE ADAPTATION

- New investments in irrigation
- Crop changes and relocation
- Technological innovation
- Enhanced productivity
- Incentive mechanisms

WITHOUT FORGETTING MITIGATION

- Improvement of energy efficiency (even though this is short-term option with decreasing returns)
- Decarbonisation of the energy sector, in particular power and transport sectors
- Large investments in the deployment of (quasi) carbon free technologies (wind&solar, nuclear, CCS) and in avoided deforestation
- Four fold increase in energy R&D expenditure
- Improved land use
- Sustainable lifestyles
- Global cooperative effort (including at least major developing countries)

THANK YOU!