Providing a Framework for Moving to a Low C World

Contribution to

New Activity Discussion

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3. Uncertainty (Td + Bu) and risk of exceeding T target

4. Monitor compliance: targets/pledges + sustainability

5. Linking ‘negotiation worlds’

6. Suggestion for a new activity

References

2. Orientation – how ideas developed

Dealing with Uncertainty in GHG Inventories in an Emissions Constrained World

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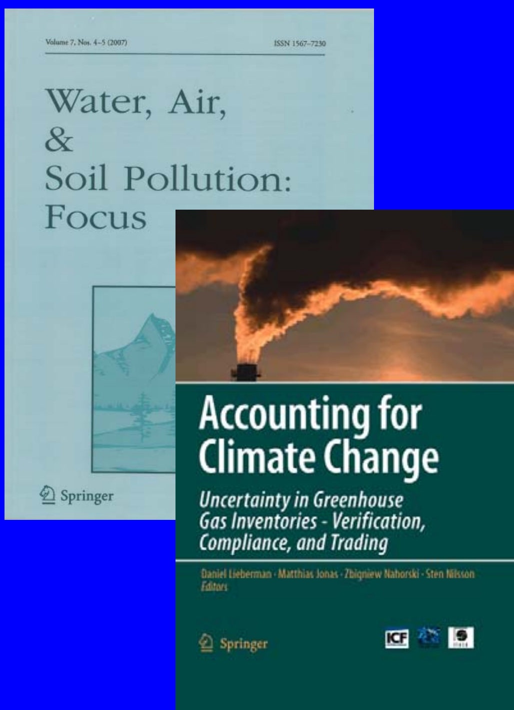
Lviv, Ukraine; 22–24 September 2010

2. Orientation – how ideas developed

International Workshops on Uncertainty in GHG Inventories:

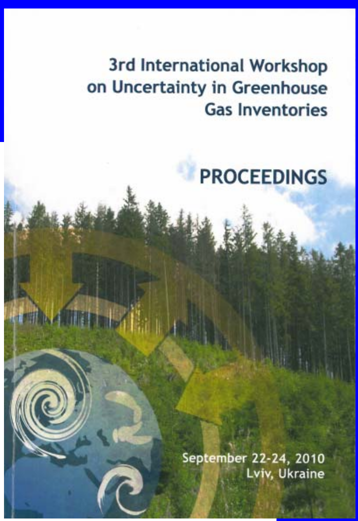
2004 (Warsaw, PL)



2007 (Laxenburg, AT)

Book
(2011)

2010 (Lviv, UA)



Policy Brief
(2011)

http://www.iiasa.ac.at/Research/FOR/unc_wshops.html

2. Orientation – how ideas developed

Diagnostics of the C Cycle

Vulnerabilities of the C Cycle

Low C Pathways

Research Priorities

Research Priorities	
Global C monitoring system	1, 2, 5
Global and regional budgets (cont.); attributing variability and trends to driv	1, 2, 5
Magnitude of the C-climate feedback	
Pathways to climate stabilization; uncertainties	1,2, 4, 6
Establishing global synthesis efforts	3
Communicating science and policy	3

Suggested for new Activity:

1. Merging diagnostic (Bu) and prognostic (Td) uncertainty
2. Target/sustainability monitoring
3. Linking 'negotiation worlds'
4. Learning (change in uncertainty)
5. Spatial disconnect between prod and cons
6. Robust pathways

Canadell *et al.* (2010)

2. Orientation – how ideas developed

Our motivation at the time of the 3rd Unc WS:

1. To put uncertainties that are associated with accounting emissions for compliance purposes into a wider quantitative context

   → Legacy of the 2nd Uncertainty WS

2. To bring a long-term emissions-temperature-uncertainty issue (here: 2 ^{o}C) to the here and now

   → to emission targets on the near-term time scale

   → to emission targets on the national scale

IIASA

2. Orientation – adjusted for the 11th GCP SSCM

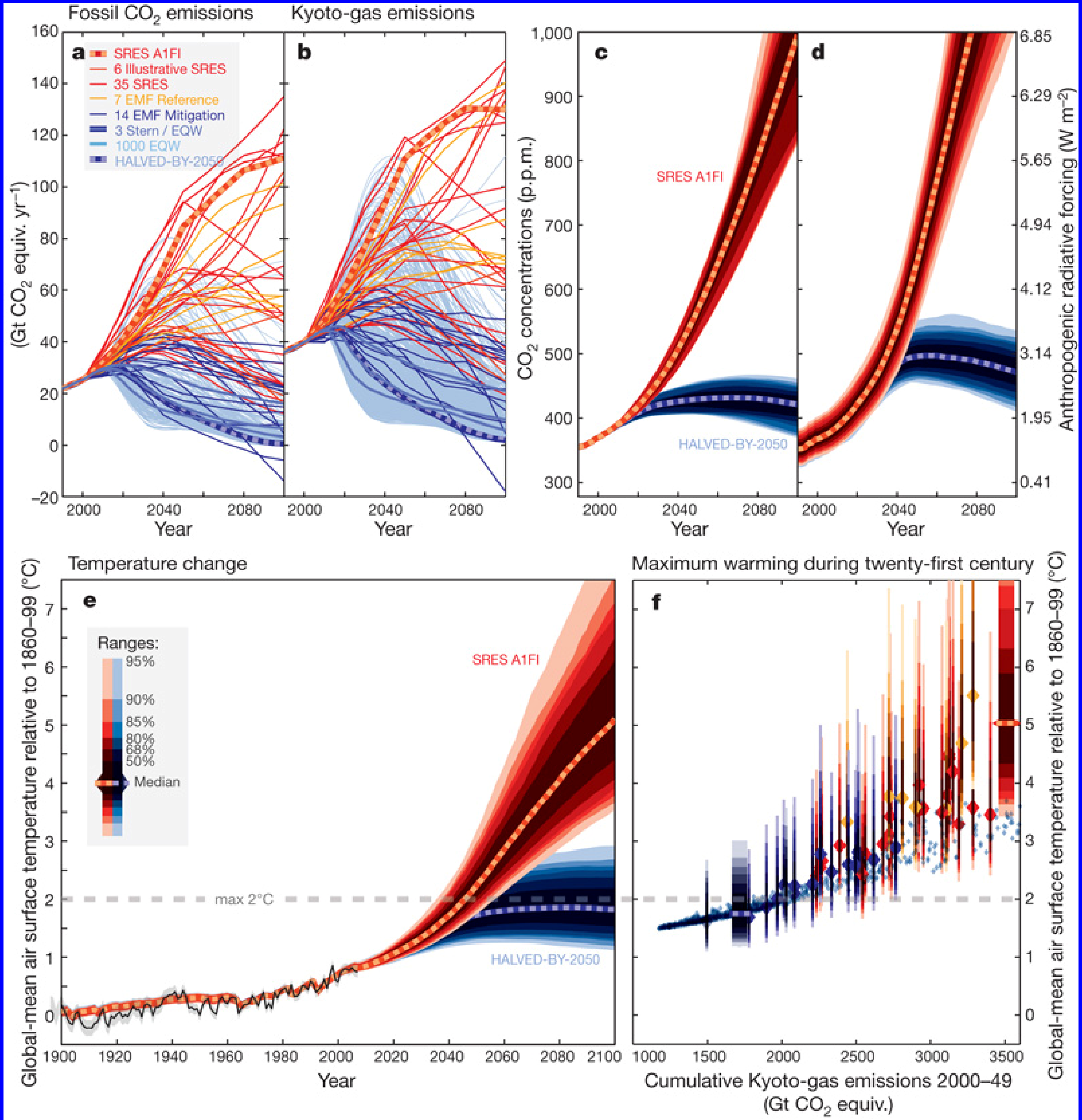
Moving to a Low-C World in 2050 – timely issues:

1. Introduce uncertainty: Bu and Td
   Ultimately: put costs on uncertainty … (robustness later)

2. Monitor compliance: targets/pledges & sustainability
   Convey the 'big picture' beyond the UNFCCC …

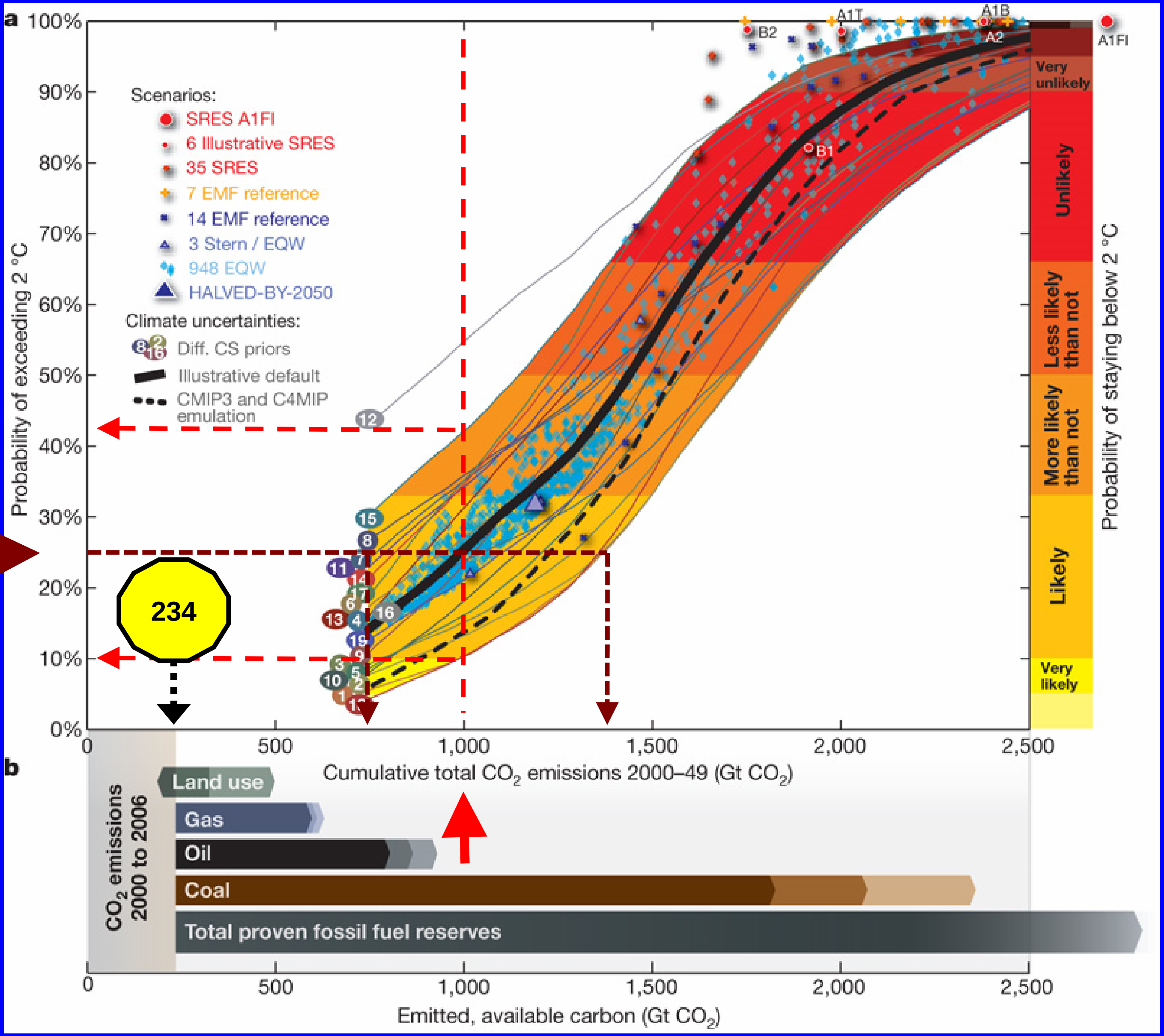
3. Do this for different 'negotiation worlds'
   Emissions per capita (prod now, cons later?)
   Emissions per GDP
   'Biomass draw' (LU, emissions, …?) per capita (other norm?)
   …

3. Uncertainty – emissions-constrained world



Meinshausen *et al.* (2009: Fig. 2)

3. Uncertainty – emissions-constrained world



Meinshausen *et al.* (2009: Fig. 3)

3. Uncertainty – emissions-constrained world

Probability of exceeding 2 °C:

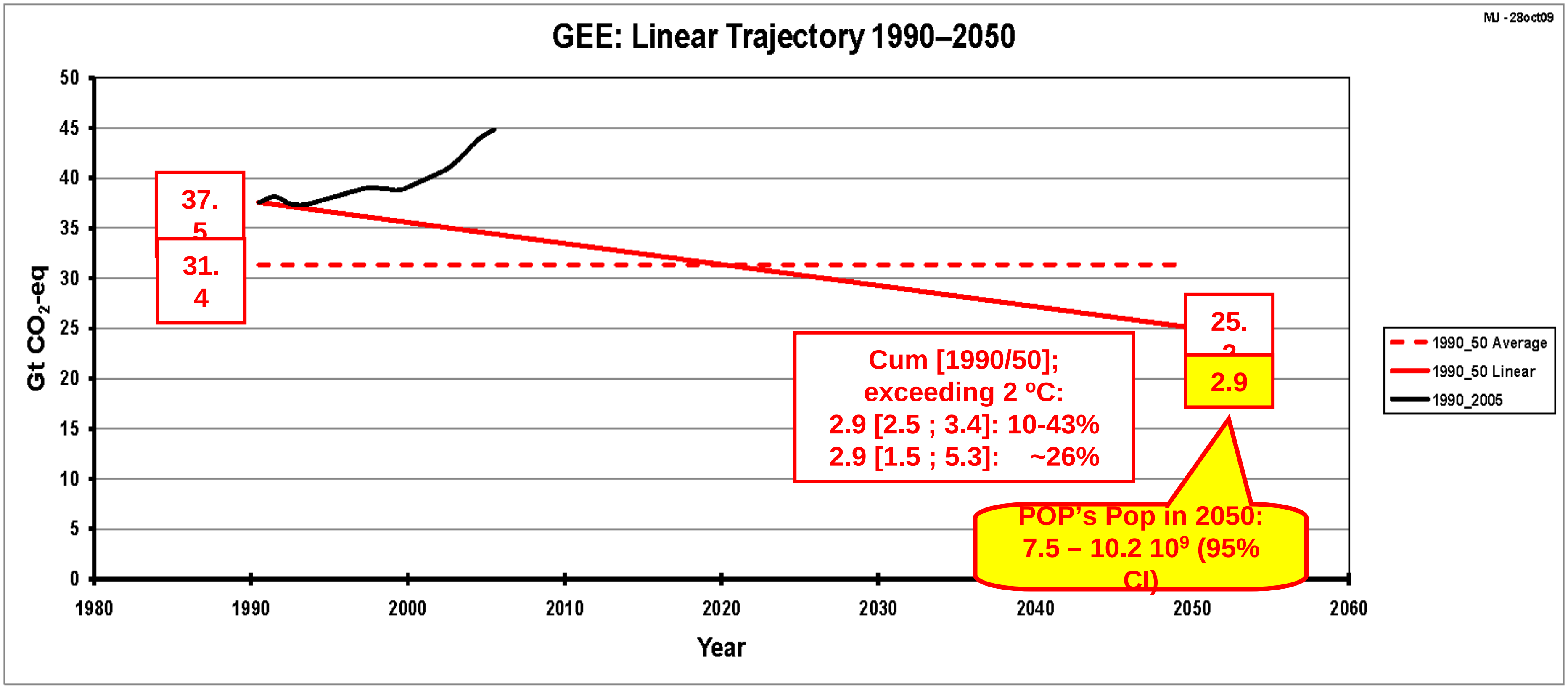
▲ Figures & Tables index

Indicator	Emissions	Probability of exceeding 2 °C[*]	
		Range	Illustrative default case[†]
Cumulative total CO_2 emission 2000–49	886 Gt CO_2	8–37%	20%
	1,000 Gt CO_2	10–42%	25%
	1,158 Gt CO_2	16–51%	33%
	1,437 Gt CO_2	29–70%	50%
Cumulative Kyoto-gas emissions 2000–49	1,356 Gt CO_2 equiv.	8–37%	20%
	1,500 Gt CO_2 equiv.	10–43%	26%
	1,678 Gt CO_2 equiv.	15–51%	33%
	2,000 Gt CO_2 equiv.	29–70%	50%
2050 Kyoto-gas emissions	10 Gt CO_2 equiv. yr^{-1}	6–32%	16%
	(Halved 1990) 18 Gt CO_2 equiv. yr^{-1}	12–45%	29%
	(Halved 2000) 20 Gt CO_2 equiv. yr^{-1}	15–49%	32%
	36 Gt CO_2 equiv. yr^{-1}	39–82%	64%
2020 Kyoto-gas emissions	30 Gt CO_2 equiv. yr^{-1}	(8–38%)[†]	(21%)[†]
	35 Gt CO_2 equiv. yr^{-1}	(13–46%)[†]	(29%)[†]
	40 Gt CO_2 equiv. yr^{-1}	(19–56%)[†]	(37%)[†]
	50 Gt CO_2 equiv. yr^{-1}	(53–87%)[†]	(74%)[†]

Meinshausen *et al.* (2009: Tab. 1)

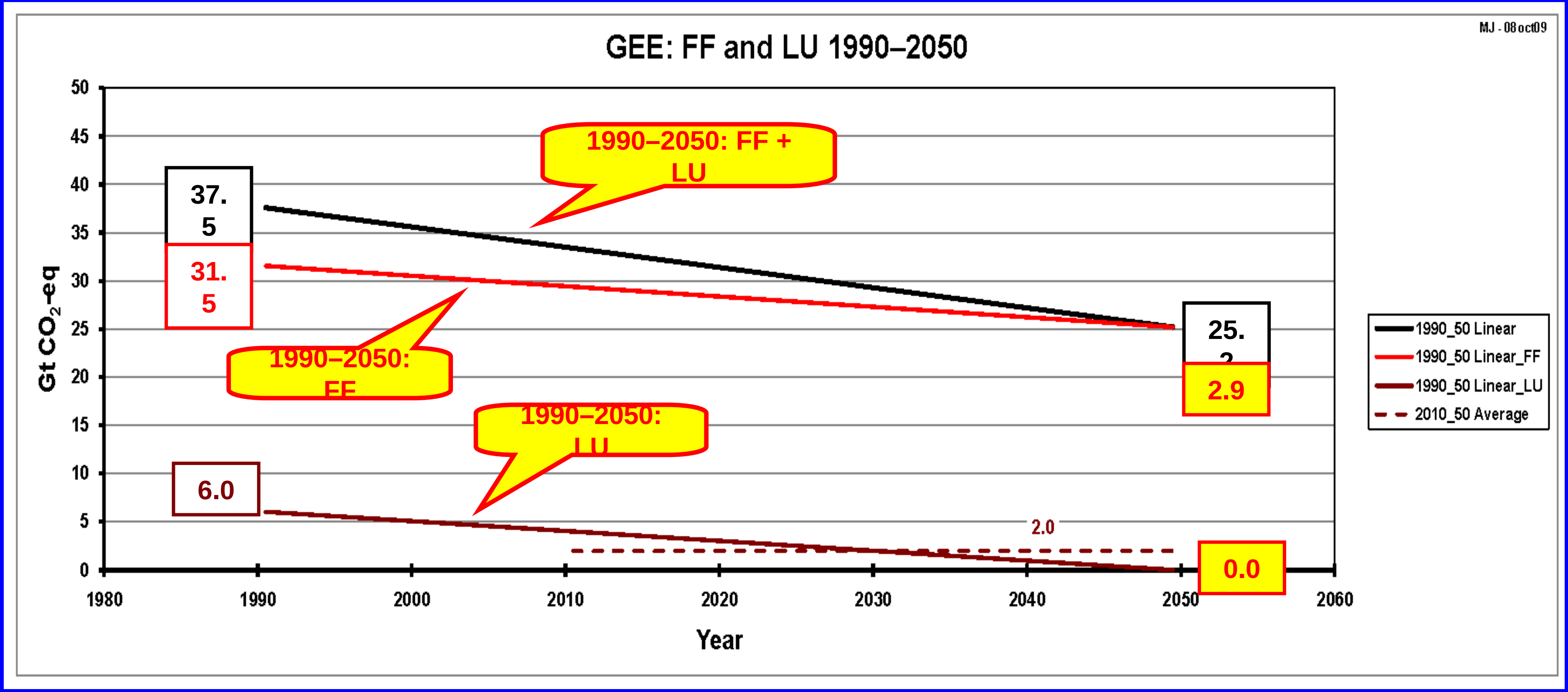
3. Uncertainty – emissions-constrained world

GEE: Linear Trajectory 1990–2050

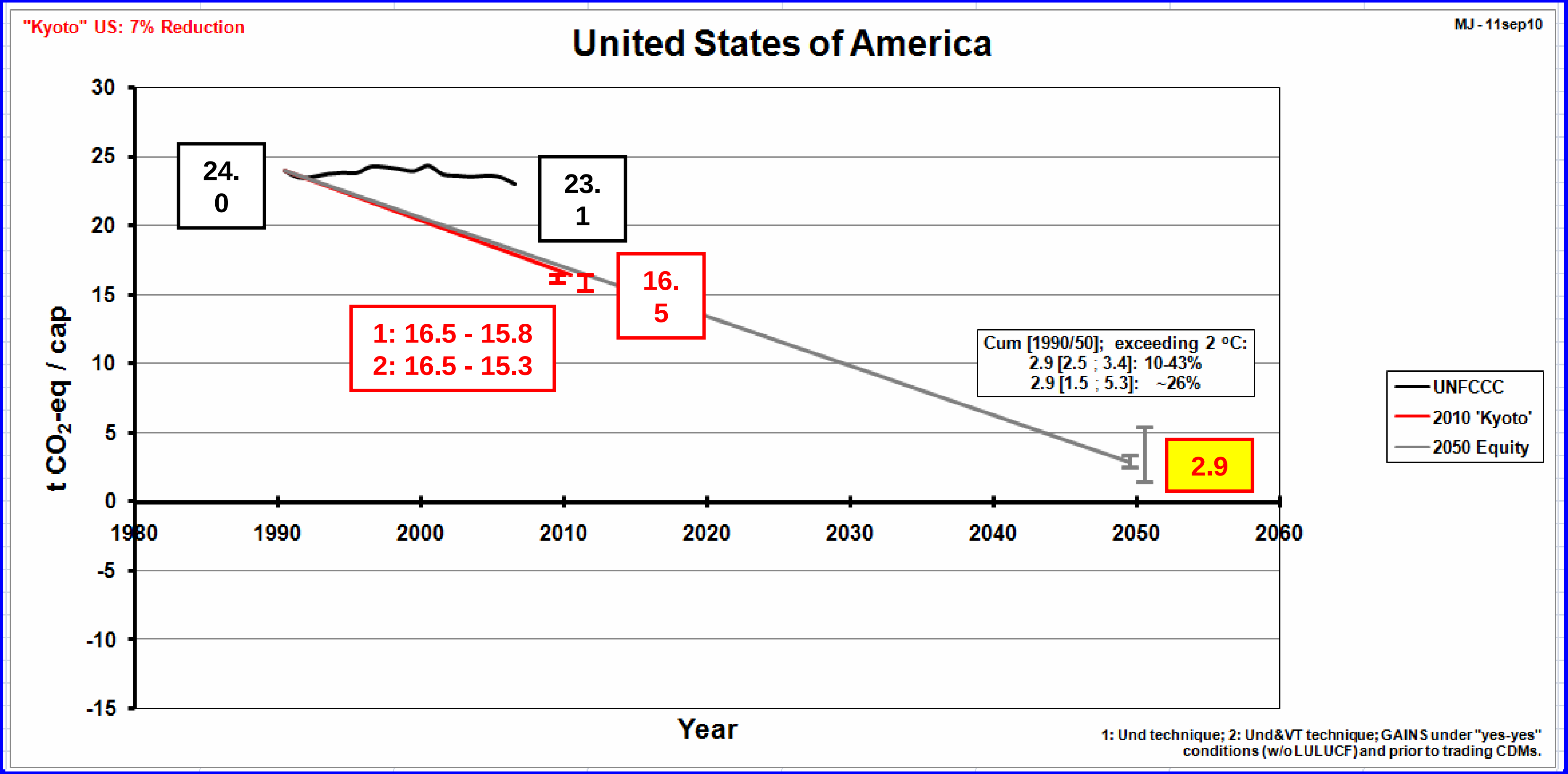


3. Uncertainty – emissions-constrained world

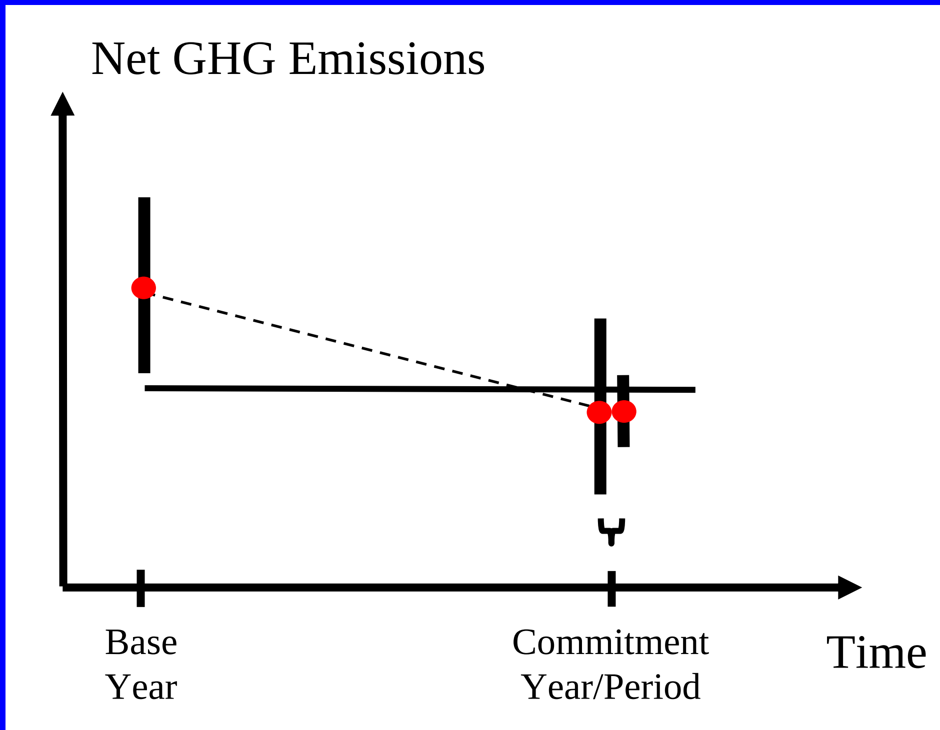
GEE: Linear Trajectories 1990–2050 for FF and LU



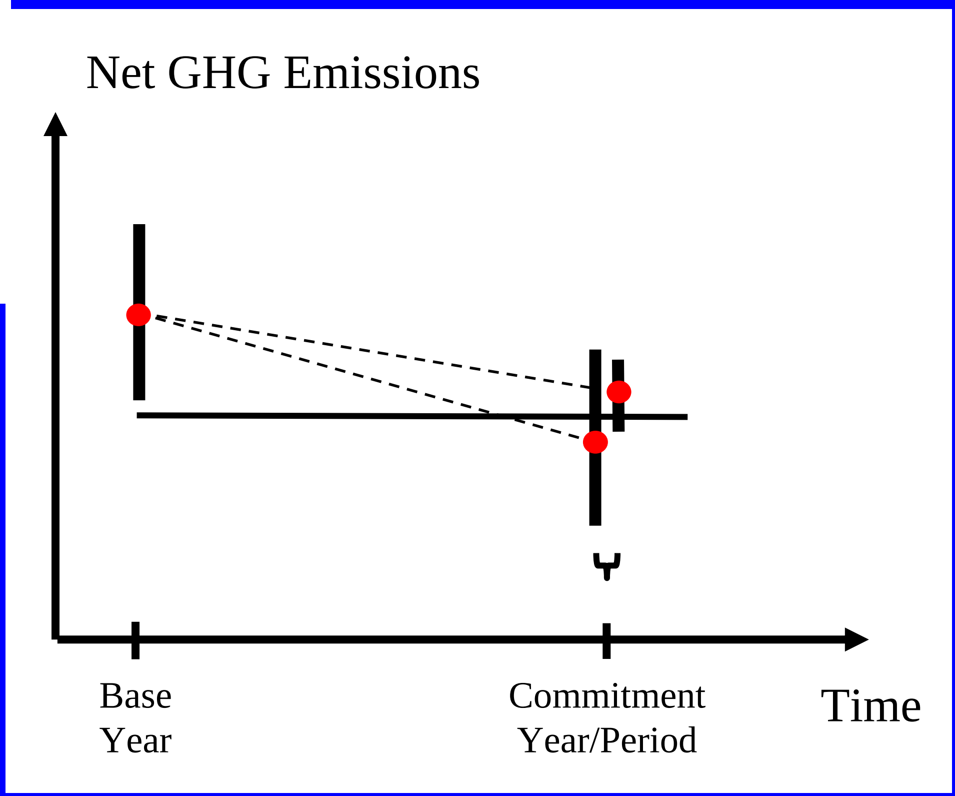
4. Monitor compliance: targets + pledges



3. Not forgotten: Bu Uncertainty



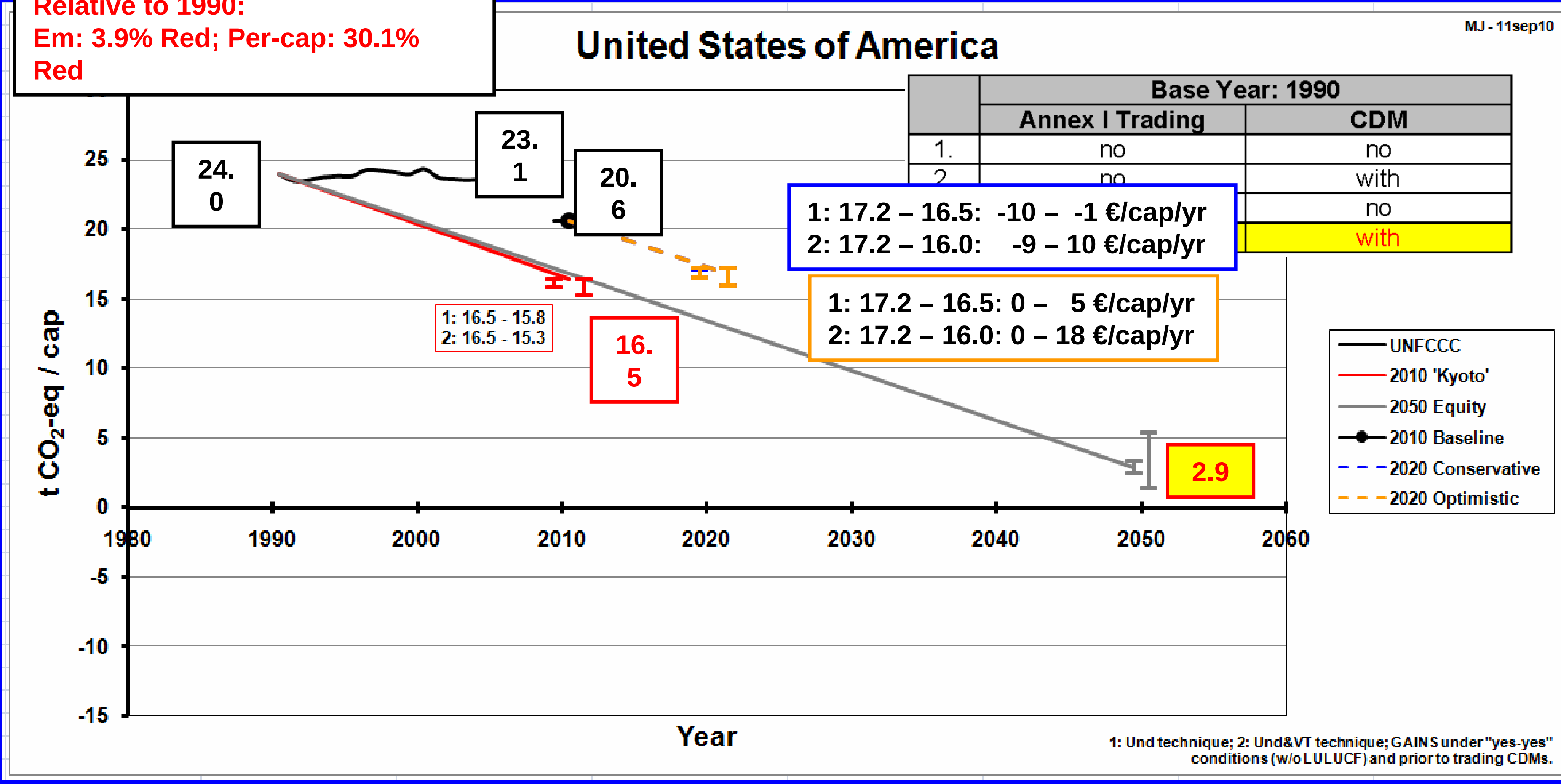
Uncertainty matters …
it can be priced!



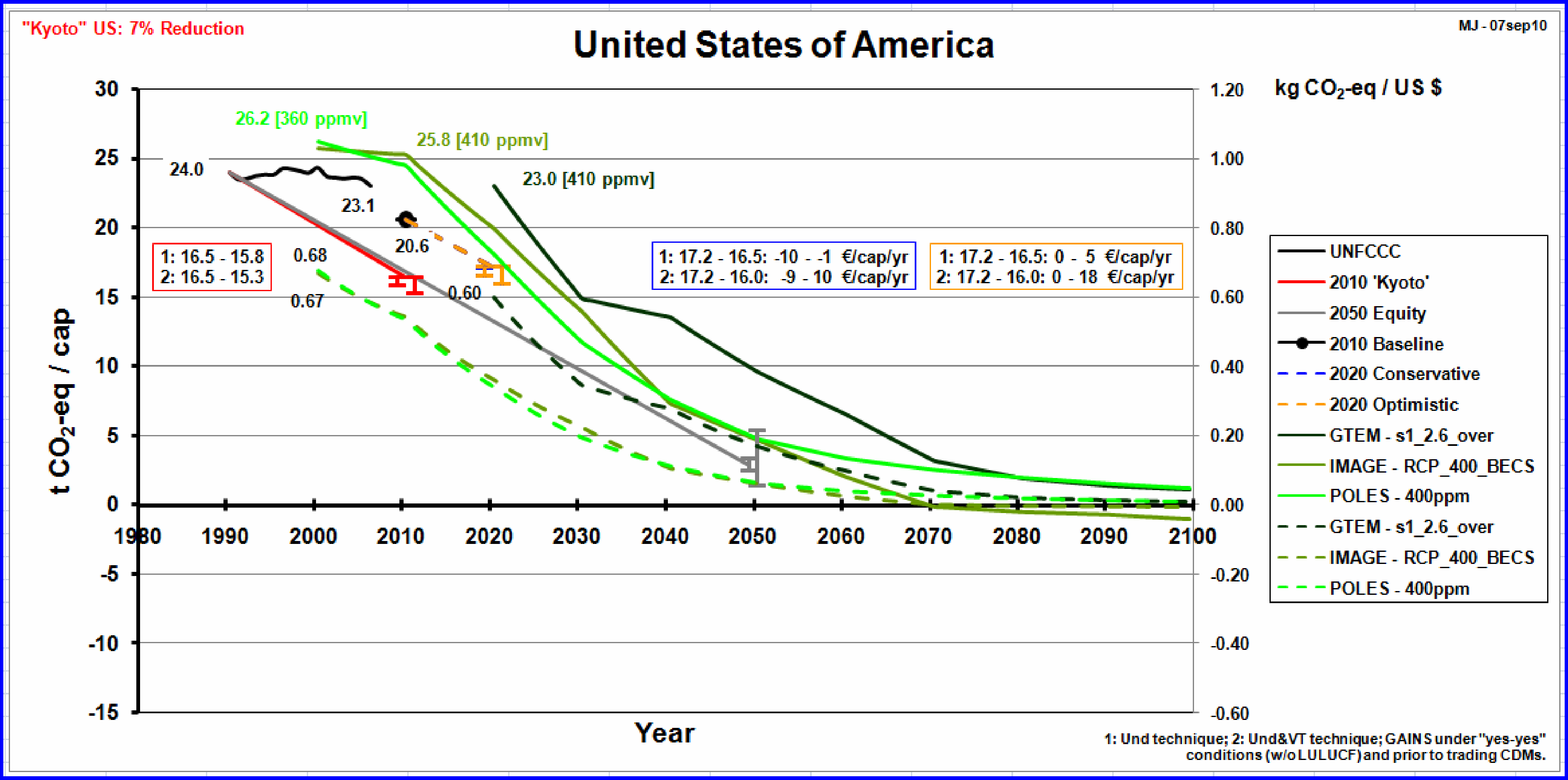
Jonas and Nilsson (2007: Fig. 10); modified

4. Monitor compliance: targets + pledges

2005 – 2020:
Con: 17% Red; Opt: 17% Red
Relative to 1990:
Em: 3.9% Red; Per-cap: 30.1% Red



5. Linking 'negotiation worlds'



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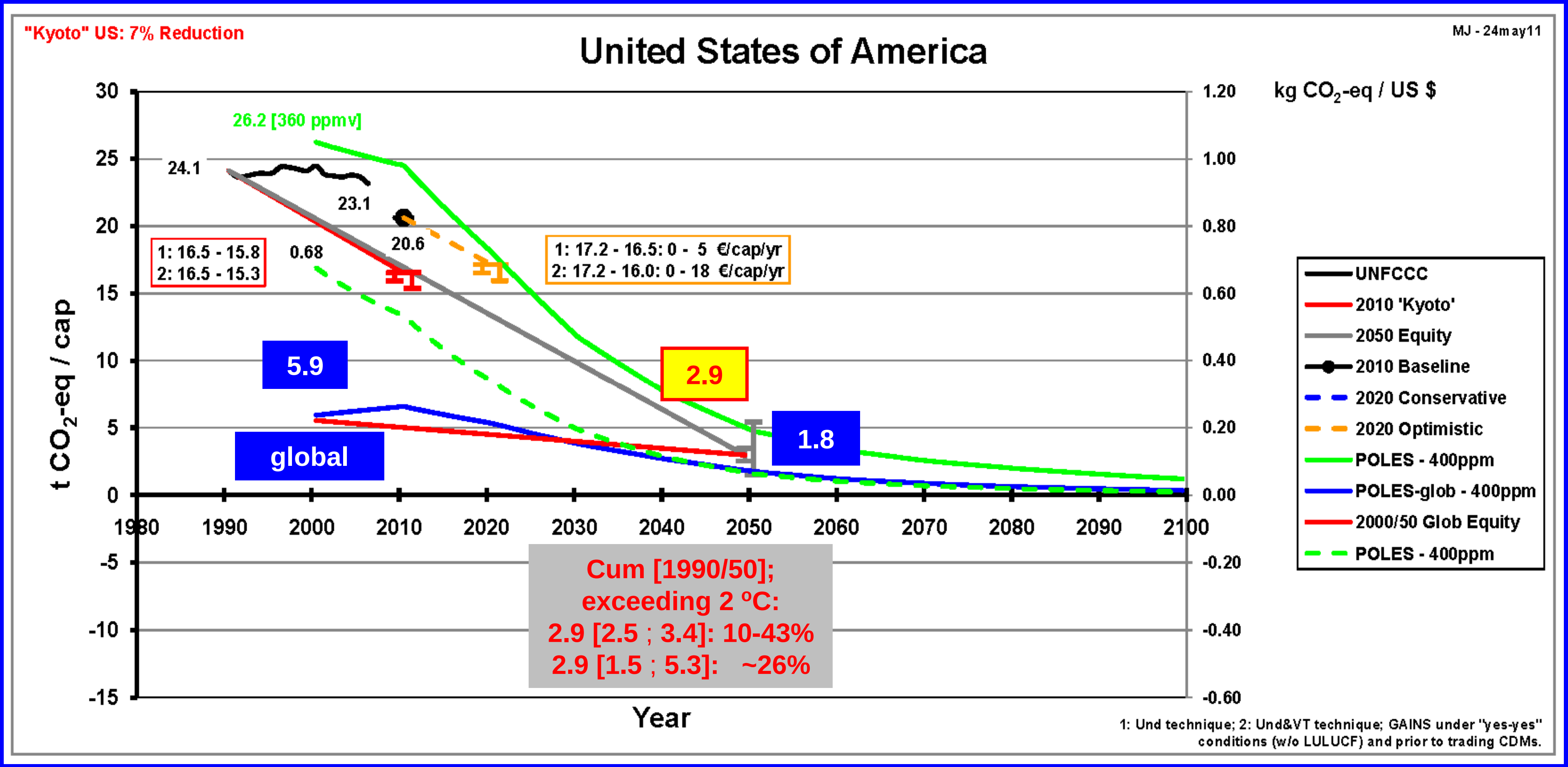


4. Not forgotten: Monitor sustainability

Make a difference between LU:

IPCC WG I (2007: Tab. 7.1)

(in Gt C yr^{-1})	1980s		1990s		2000–2005c
	TAR	TAR revised[a]	TAR	AR4	AR4
Atmospheric Increase[b]	3.3 ± 0.1	3.3 ± 0.1	3.2 ± 0.1	3.2 ± 0.1	4.1 ± 0.1
Emissions (fossil + cement)[c]	5.4 ± 0.3	5.4 ± 0.3	6.4 ± 0.4	6.4 ± 0.4	7.2 ± 0.3
Net ocean-to-atmosphere flux[d]	–1.9 ± 0.6	–1.8 ± 0.8	–1.7 ± 0.5	–2.2 ± 0.4	–2.2 ± 0.5
Net land-to-atmosphere flux[e]	–0.2 ± 0.7	–0.3 ± 0.9	–1.4 ± 0.7	–1.0 ± 0.6	–0.9 ± 0.6
Partitioned as follows					
Land use change flux	1.7 (0.6 to 2.5)	1.4 (0.4 to 2.3)	n.a.	1.6 (0.5 to 2.7)	n.a.
Residual terrestrial sink	–1.9 (–3.8 to –0.3)	–1.7 (–3.4 to 0.2)	n.a.	–2.6 (–4.3 to –0.9)	n.a.

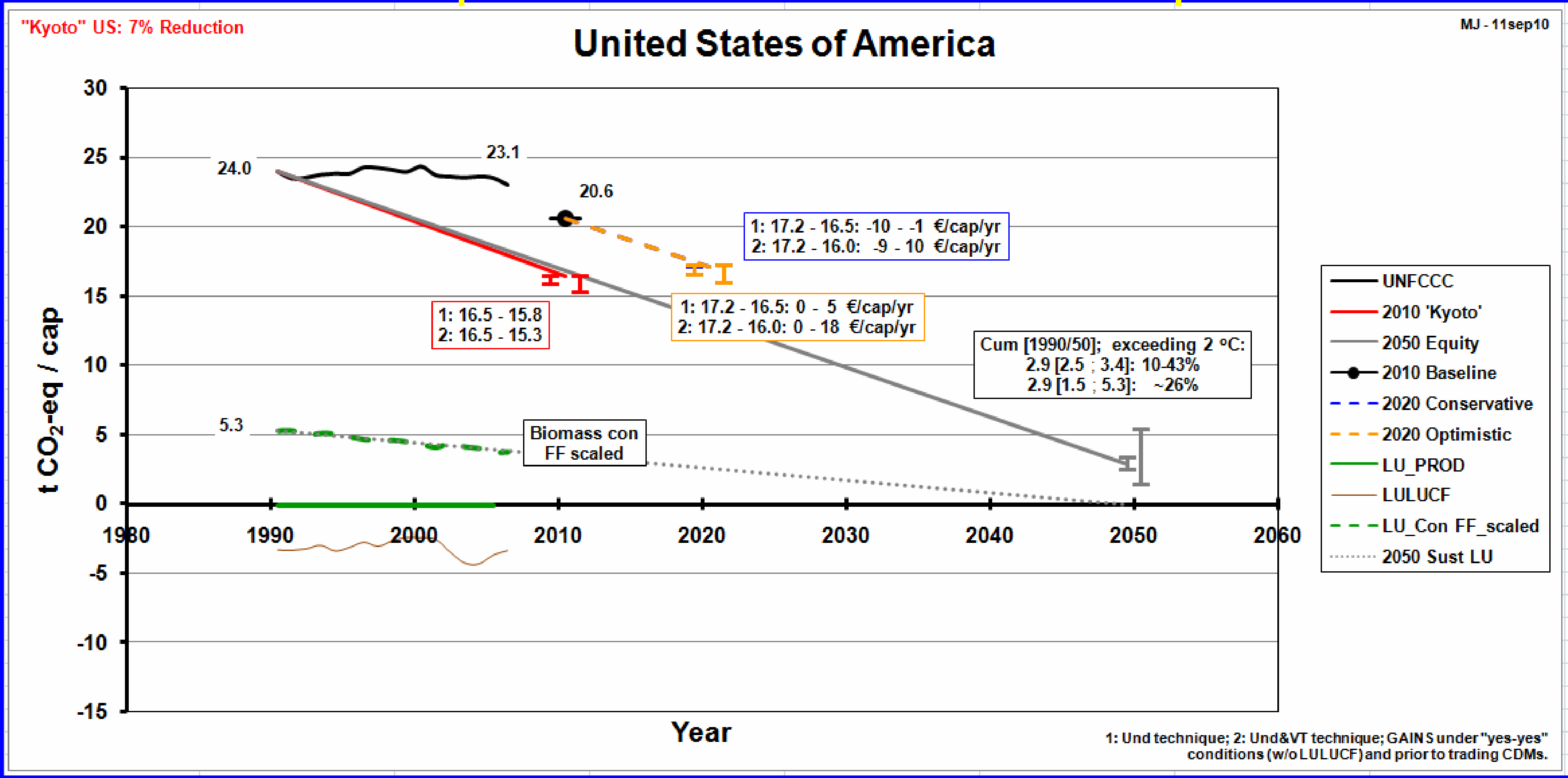
Atm. Inc. + FF – Ocean Uptake = Net Terr. Uptake

… and LULUCF:

Afforestation, reforestation, deforestation
Forest management, cropland management, grazing land management, revegetation

4. Not forgotten: Monitor sustainability

LULUCF vs LU production vs LU consumption:



6. Suggestion of a new activity on a

Monitoring Framework for Moving to a Low Carbon World

which can be defined either narrowly or broadly:

	Narrowly (~ 1 yr)
Introduces + merges uncertainty	… aim at specific funders (e.g., the Austrian Climate Research Programme; open call: 15 Sept. 2011)
Monitors compliance	
Links 'negotiation worlds'	
Resolves the spatial disconnect	
Grasps learning	
Identifies robust pathways	

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Supporting online material: (1) Mathematical background and numerical tables (pp. 26; Doc file); (2) Numerical results (Excel file). International Institute for Applied Systems Analysis, Laxenburg, Austria. Available at: http://www.iiasa.ac.at/Research/FOR/unc_prep.html.

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