12th Austrian Climate Colloquium:

Uncertainty in an Emissions Constrained World: Case Austria

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Vienna, Austria
21–22 September 2011
AustroClim
klima+ energie fonds

1. Contents

2. Historical background

April 2010 – March 2011: IIASA (GGI Project)	*The Climate Challenge for Industrialized Countries and Emerging Economies*	IIASA Science for Global Insight
September 2010: *3rd International Workshop on Uncertainty in GHG Inventories*	*Dealing with Uncertainty in an Emission Constrained World*	
April 2011 – Sept. 2011: ACRP (3rd Call)	*Dealing with Uncertainty in an Emission Constrained World: Case Austria*	klima+ energie fonds
May 2011: *11th SSC Meeting of the Global Carbon Project*	*Providing a Framework for Moving to a Low Carbon World*	Global Carbon Project

3. Motivation

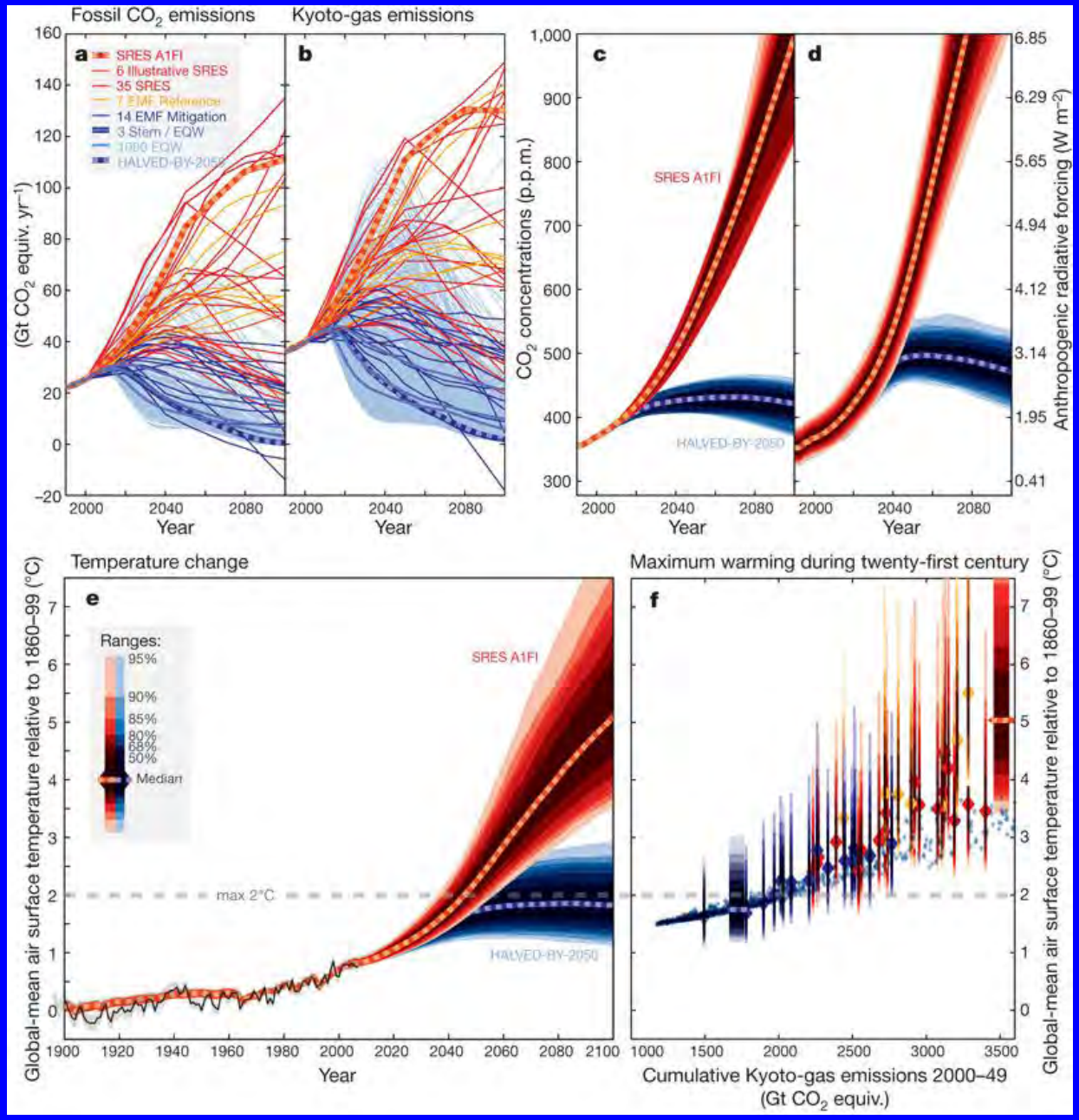
1. To bring a global long-term emissions-temperature-uncertainty issue (2°C-by-2050) to the here and now

   → to emission targets on the near-term time scale

   → to emission targets on the national scale

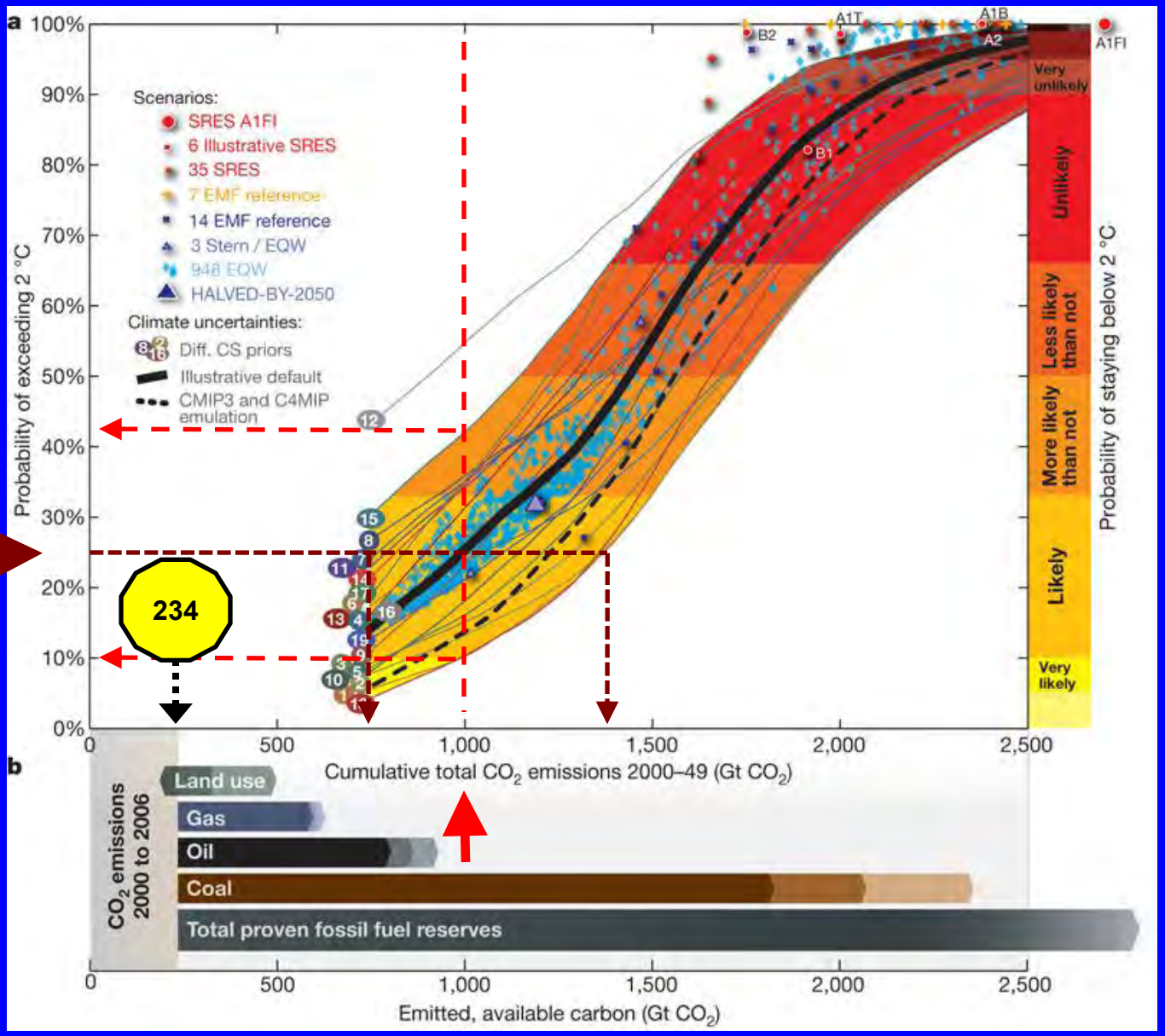
2. To put uncertainties that are associated with accounting emissions for compliance purposes into a wider quantitative context

4. Constrained cumulative emissions: unc + risk



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

4. Constrained cumulative emissions: unc + risk



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10

234

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

4. Constrained cumulative emissions: unc + risk

Probability of exceeding 2 °C:

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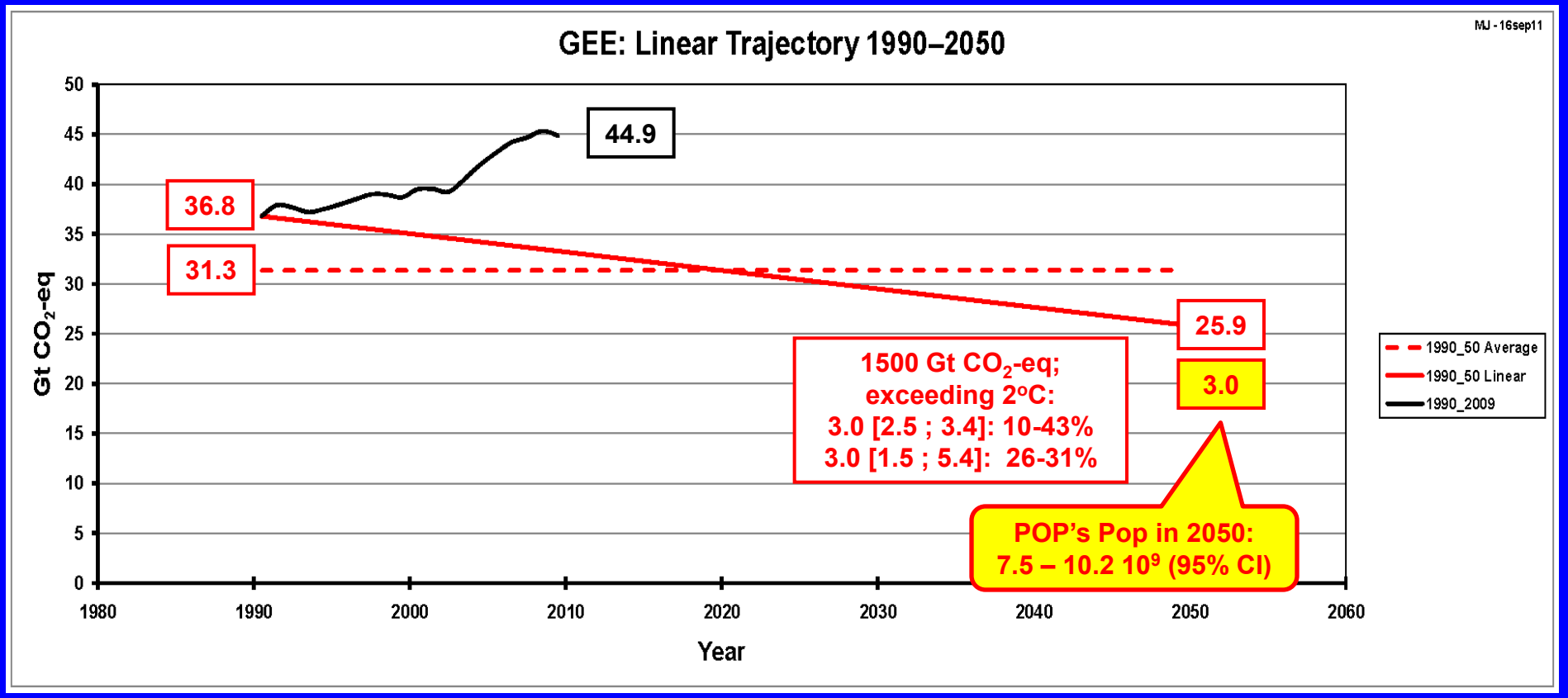
Indicator	Emissions	Probability of exceeding 2 °C[a]	
		Range	Illustrative default case[b]
Cumulative total CO_2 emission 2000–49	886 Gt CO_2	8–37%	20%
	1,000 Gt CO_2	10–42%	25%
	1,158 Gt CO_2	16–51%	33%
	1,437 Gt CO_2	29–70%	50%
Cumulative Kyoto-gas emissions 2000–49	1,256 Gt CO_2 equiv.	8–37%	20%
	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%)[c]	(21%)[c]
	35 Gt CO_2 equiv. yr^{-1}	(13–46%)[c]	(29%)[c]
	40 Gt CO_2 equiv. yr^{-1}	(19–56%)[c]	(37%)[c]
	50 Gt CO_2 equiv. yr^{-1}	(53–87%)[c]	(74%)[c]

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

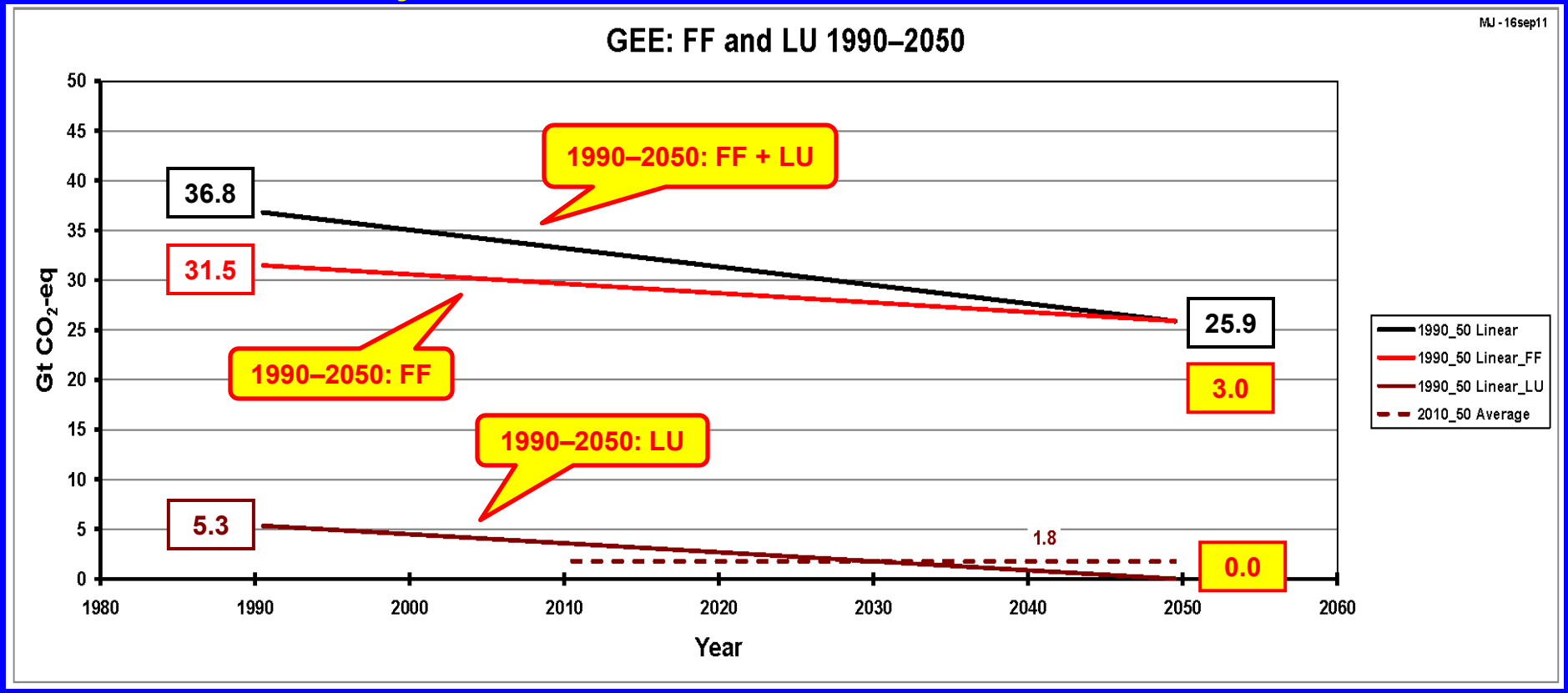
5. Global emissions equity (C&C)

GEE: Linear Trajectory 1990–2050

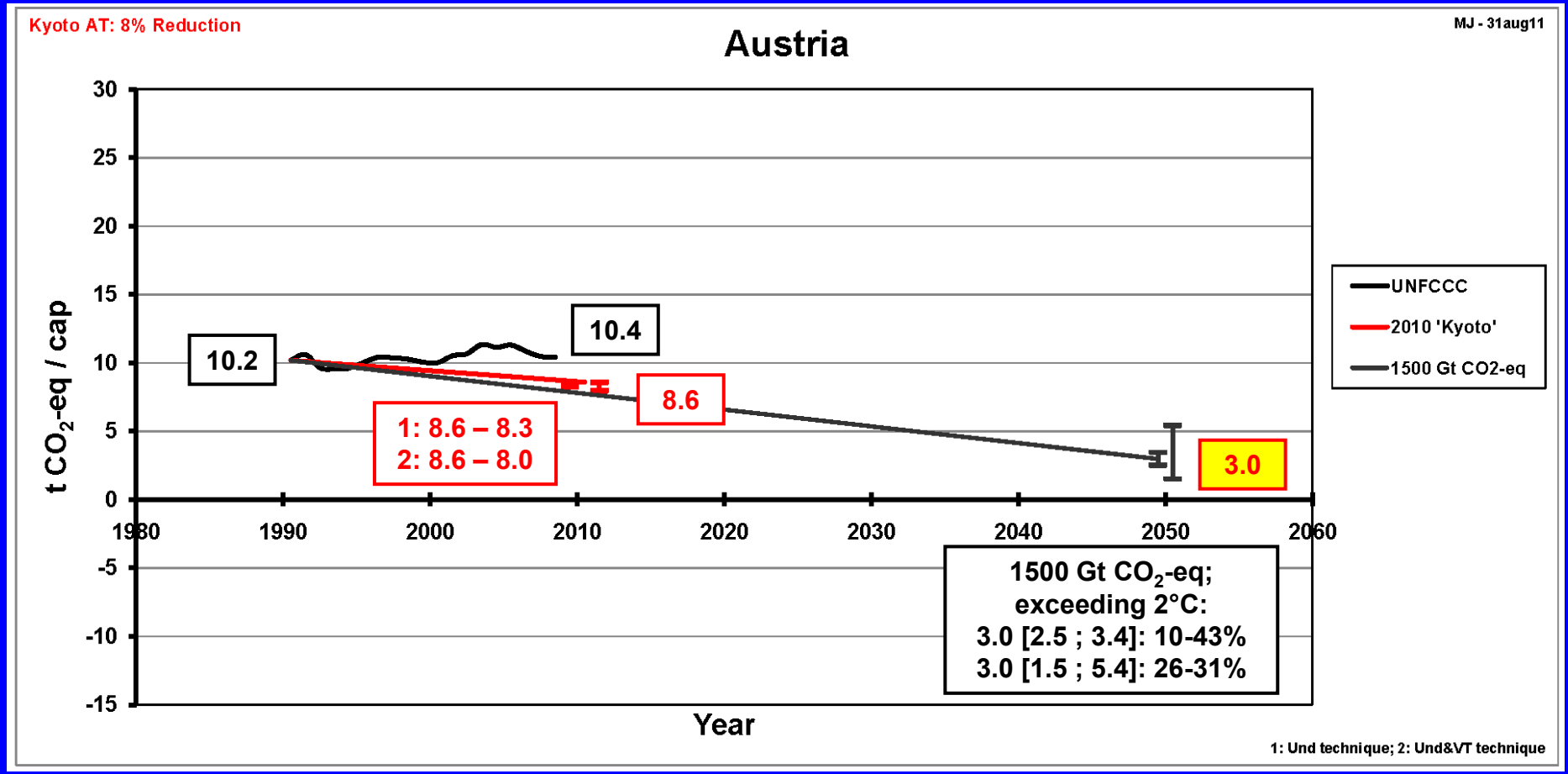


5. Global emissions equity (C&C)

GEE: Linear Trajectories 1990–2050 for FF and LU



6. Monitor compliance: targets + pledges

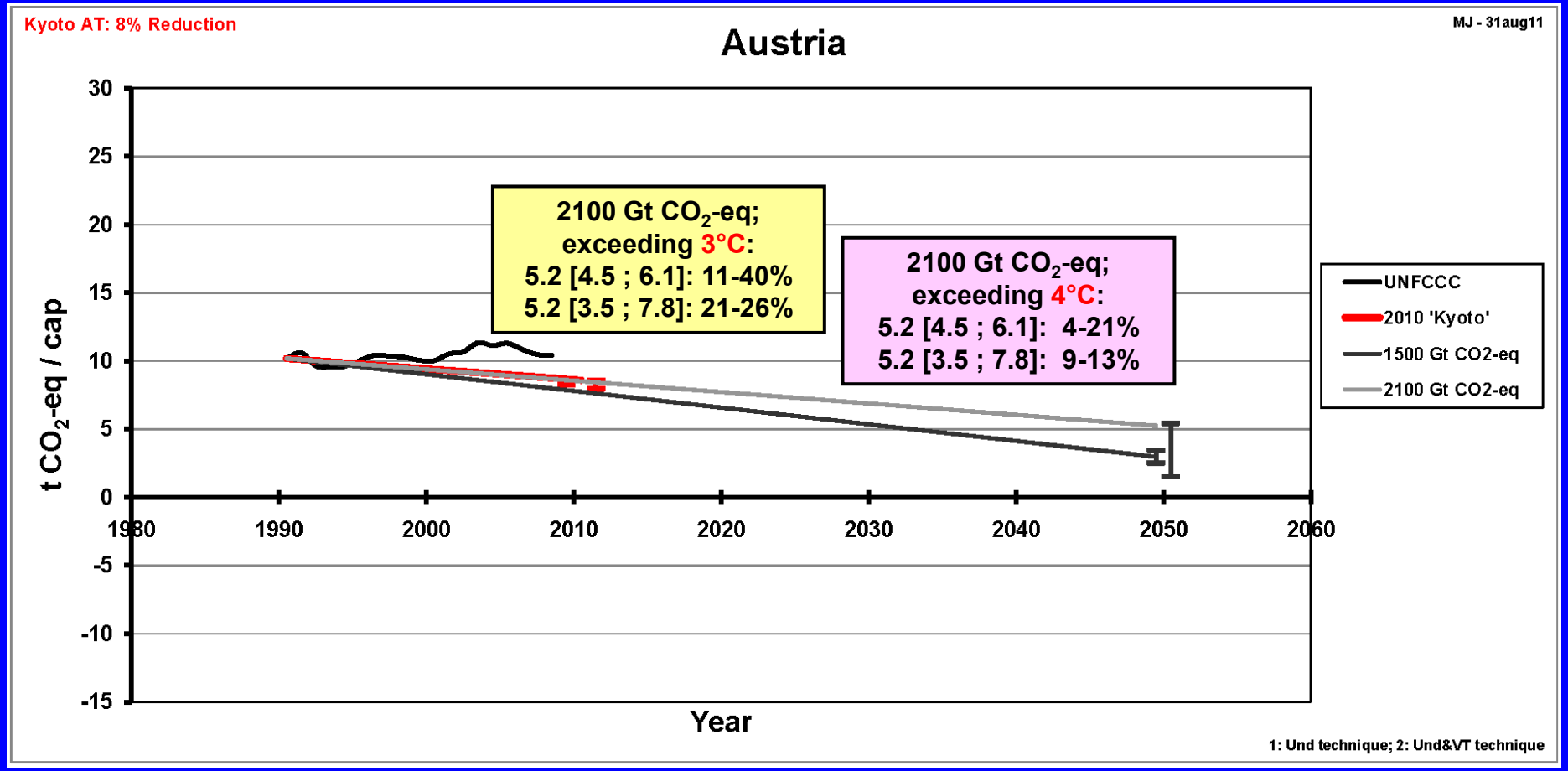


6. Monitor compliance: targets + pledges

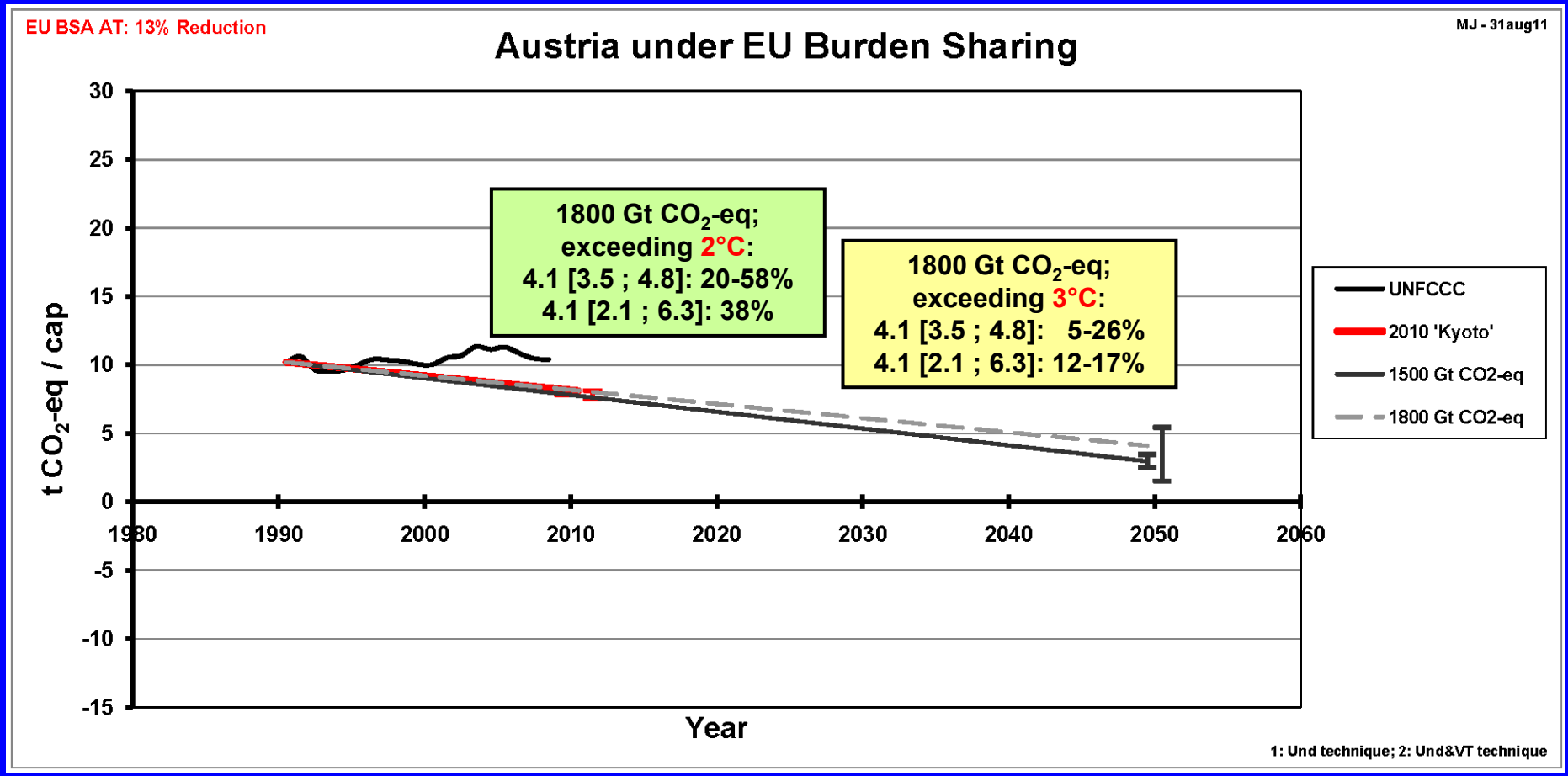
In 1990	In 2050 under a cumulative emissions constraint for 2000–2050 of			
	1500 Gt CO_2-eq	1800 Gt CO_2-eq	2100 Gt CO_2-eq	2400 Gt CO_2-eq
t CO_2-eq / cap	t CO_2-eq / cap	t CO_2-eq / cap	t CO_2-eq / cap	t CO_2-eq / cap
Reduction in units of	% / cap	% / cap	% / cap	% / cap
10.2	**3.0**	**4.1**	**5.2**	**6.4**
	71	**60**	**48**	**37**

T	Uncertainty and risk	In 2050 under a cumulative emissions constraint for 2000–2050 of			
		1500 Gt CO_2-eq	1800 Gt CO_2-eq	2100 Gt CO_2-eq	2400 Gt CO_2-eq
	Uncertainty in units of	t CO_2-eq / cap	t CO_2-eq / cap	t CO_2-eq / cap	t CO_2-eq / cap
°C	Risk in units of	%	%	%	%
2	Uncertainty in the emissions	**3.0 [2.5 – 3.4]**	**4.1 [3.5 – 4.8]**		
	Risk of exceeding **2°C**	**10 – 43**	**20 – 58**		
	Uncertainty in the emissions	**3.0 [1.5 – 5.4]**	**4.1 [2.1 – 6.3]**		
	Risk of exceeding **2°C**	**26 – 31**	**38**		
3	Uncertainty in the emissions		**4.1 [3.5 – 4.8]**	**5.2 [4.5 – 6.1]**	
	Risk of exceeding **3°C**		**5 – 26**	**11 – 40**	
	Uncertainty in the emissions		**4.1 [2.1 – 6.3]**	**5.2 [3.5 – 7.8]**	
	Risk of exceeding **3°C**		**12 – 17**	**21 – 26**	
4	Uncertainty in the emissions			**5.2 [4.5 – 6.1]**	**6.4 [5.5 – 7.4]**
	Risk of exceeding **4°C**			**4 – 21**	**8 – 36**
	Uncertainty in the emissions			**5.2 [3.5 – 7.8]**	**6.4 [4.5 – 9.5]**
	Risk of exceeding **4°C**			**9 – 13**	**17 – 21**

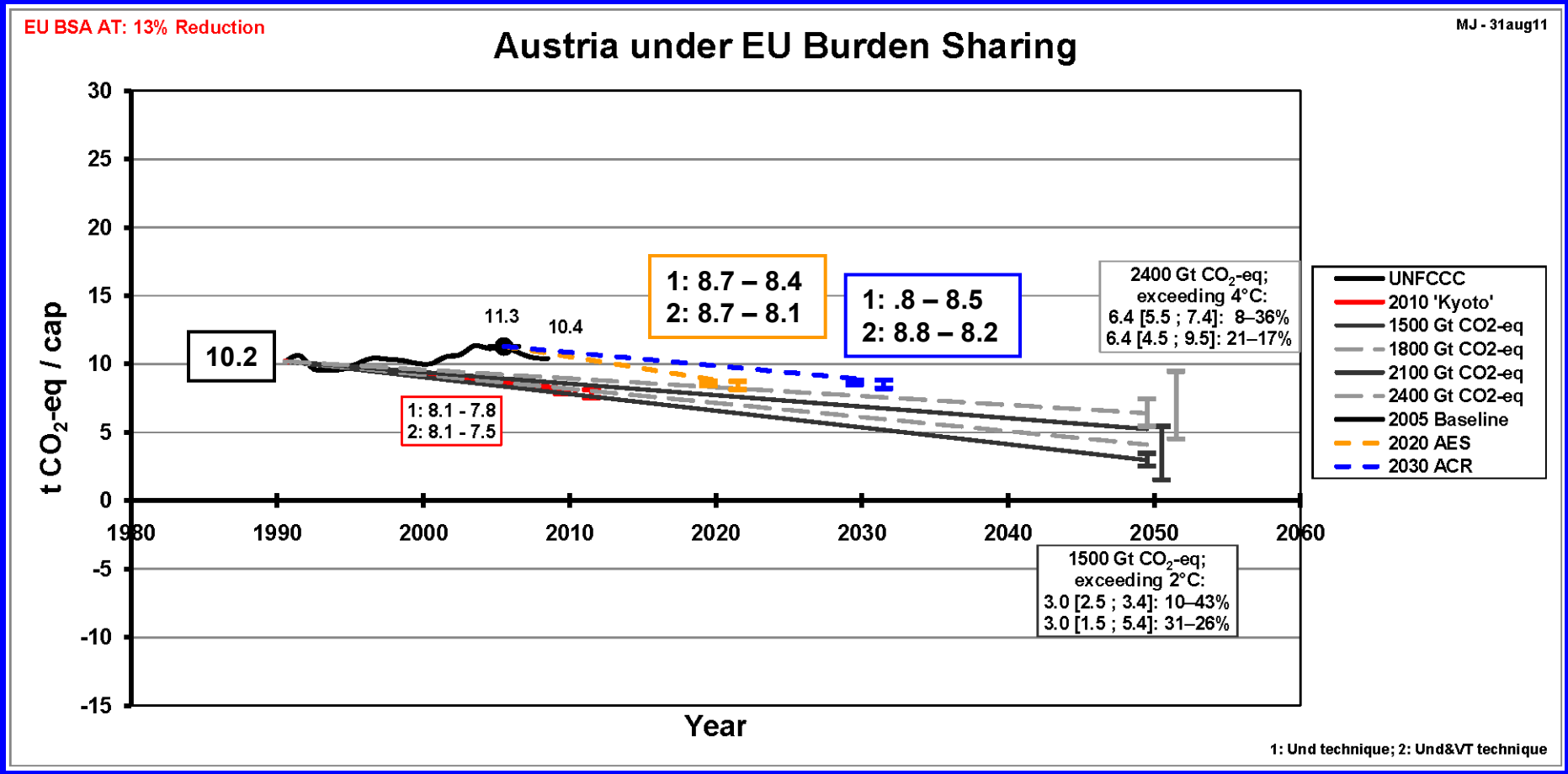
6. Monitor compliance: targets + pledges



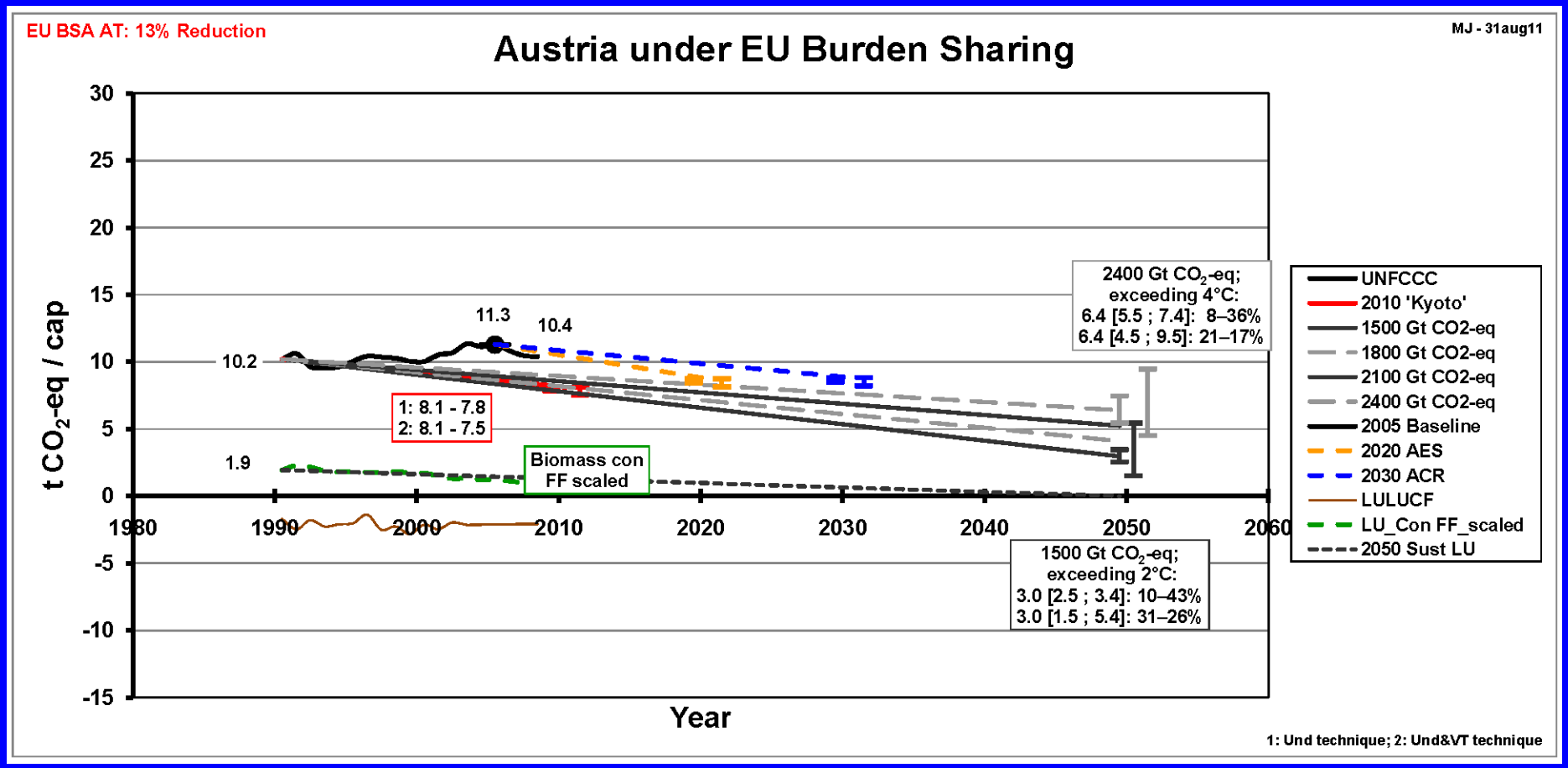
6. Monitor compliance: targets + pledges



6. Monitor compliance: targets + pledges



6. Monitor compliance: sustainability



7. Conclusions

1. Scientists can come up with a monitoring framework to help national decision-makers understand how their mitigation measures play out in a global, long-term 'global warming + uncertainty + risk' context.

2. Austria operates, like most other industrialized economies, beyond a global warming of 4°C.

3. Even if Austria buys emission certificates to comply with the 13% emission reduction under the EU BSA, this once-in-a-time purchase does not follow the notion of constraining cumulative emissions.

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