Markus Amann, Chris Heyes
International Institute for Applied Systems Analysis (IIASA)

A first evaluation of the environmental impacts of the emission ceilings of the revised Gothenburg Protocol

Task Force for Integrated Assessment Modelling
Bilthoven, May 7-9, 2012

Contents

- Annex 2 emission ~~ceilings~~ reduction commitments
- Comparison with emissions of
  CIAM 4/2011 current legislation + MTFR scenarios
- Improvements in impact indicators
- The emission ~~ceilings~~ reduction commitments in a perspective towards 2050
- All results are provisional, due to short time for modelling

Emission ~~ceilings~~ reduction commitments for 2020 as agreed in Annex 2

PRELIMINARY RESULTS

The EB agreed on the following emission ceilings relative to 2005 (in %)

	EU27	CROATIA	NORWAY	SWITSERLAND	RUSSIA	BELARUS
SO2	59	55	10	20 **	5	19
NOx	43	30	23	43 **	5	28
NH3	6	1	7	13 **	5	7
VOC	28	40	40	32 **	0	21 *
PM2.5	22	18	30	26 **	3	9 *

Emission ~~ceilings~~ reduction commitments for 2020 as agreed in Annex 2: EU-27

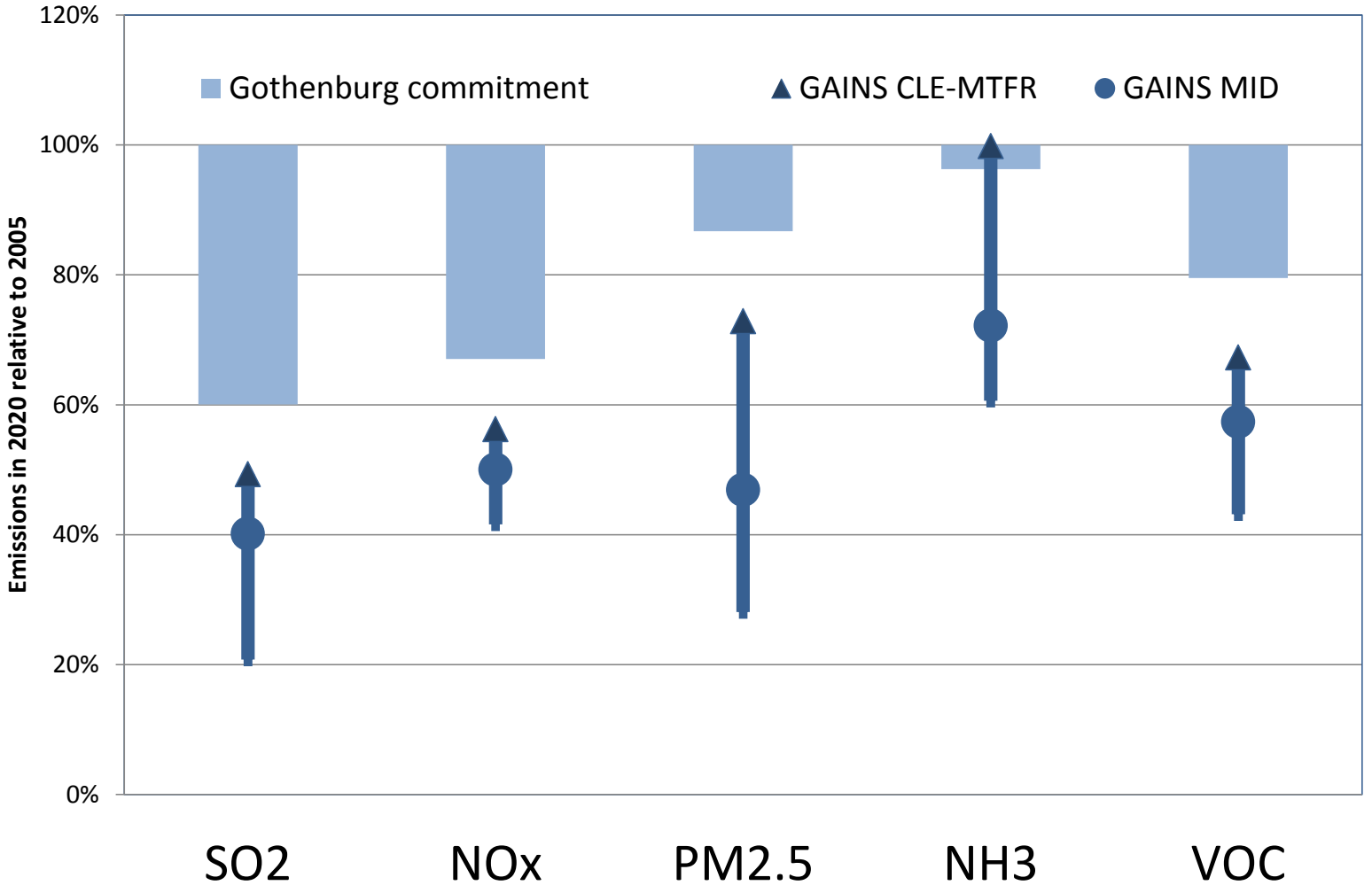
PRELIMINARY RESULTS

30/3 2012; 2 /5 2012	SO2		NOX		NH3		VOC		PM 2.5	
	Emission levels 2005	Reduction from 2005 level	Emission levels 2005	Reduction from 2005 level	Emission levels 2005	Reduction from 2005 level	Emission levels 2005	Reduction from 2005 level	Emission levels 2005	Reduction from 2005 level
Austria	27.3	26%*	236.8	48%*	62.7	**1%**	162.0	21%*	22.3	39%*
Belgium	145.2	**43%**	291.0	**41%**	71.3	**2%**	142.7	**21%**	24.4	**20%**
Bulgaria	776.6	**78%**	154.0	**41%**	59.8	**3%**	157.8	**27%**	44.4	**20%**
Cyprus	37.9	**83%**	21.1	**44%**	5.8	**10%**	13.9	**45%**	2.9	**46%**
Czech Rep.	218.6	**52%**	286.0	**46%**	82.0	16%*	181.8	27%*	21.7	**22%**
Denmark	22.9	**35%**	181.1	**56%**	82.7	**24%**	110.3	**35%**	25.4	**33%**
Estonia	76.3	47%*	36.6	31%*	9.8	9%*	41.1	29%*	19.9	35%*
Finland	69.2	**30%**	177.4	**35%**	38.8	**20%**	131.5	**35%**	36.0	**30%**
France	467.3	**55%**	1429.9	**50%**	660.9	**4%**	1232.3	**43%**	304.0	**27%**
Germany	517.0	**21%**	1464.0	**39%**	573.0	**5%**	1143.0	**13%**	121.2	**26%**
Greece	541.8	**74%**	419.1	**31%**	67.6	**7%**	221.8	**54%**	55.5	**35%**
Hungary	129.2	**46%**	203.1	**34%**	80.1	**10%**	177.5	**30%**	31.0	16%*
Ireland	71.1	**65%**	127.3	**49%**	109.1	5%*	56.5	**25%**	10.9	**21%**
Italy	402.5	**35%**	1212.2	**40%**	415.9	**5%**	1285.7	**31%**	165.8	14%*
Latvia	6.7	**8%**	37.3	35%*	15.6	**7%**	73.4	27%	27.4	18%*
Lithuania	43.7	**55%**	57.6	**48%**	39.4	**10%**	84.1	**32%**	8.7	**20%**
Luxemburg	2.5	**34%**	20.6	47%	5.0	**4%**	9.8	**29%**	3.10	**25%**
Malta	11.4	**77%**	9.32	49%*	1.60	**4%**	3.34	**23%**	1.34	**25%**
Netherlands	64.5	**28%**	370.0	**45%**	140.5	**13%**	182.0	**8%**	20.9	**37%**
Poland	1223.9	**59%**	865.8	**30%**	269.6	**1%**	593.2	**25%**	132.8	**16%**
Portugal	177.0	63%	256.2	36%	50.4	**7%**	206.7	18%	64.6	15%
Romania	642.6	**77%**	309.2	**45%**	198.5	**13%**	425.9	**25%**	105.4	**28%**
Slovakia	89.0	**57%**	103.5	**36%**	28.6	**15%**	76.0	**18%**	38.8	**36%**
Slovenia	39.9	58%*	46.7	42%*	17.7	4%*	37.4	22%*	14.0	27%*
Spain	1281.6	**67%**	1292.0	**41%**	364.8	**12%**	809.1	**22%**	92.8	22%*
Sweden	35.9	**21%**	174.1	**36%**	55.2	**15%**	196.7	**25%**	29.4	**20%**
UK	706.0	**59%**	1580.0	**55%**	307.0	**8%**	1088.0	**32%**	81.0	**30%**
EU27 PREL	**7828**	**59%**	**11362**	**43%**	**3813**	**6%**	8843	**28%**	**1506**	**22%**

Committed emission reduction commitments

vs. GAINS current legislation + MTFR estimates

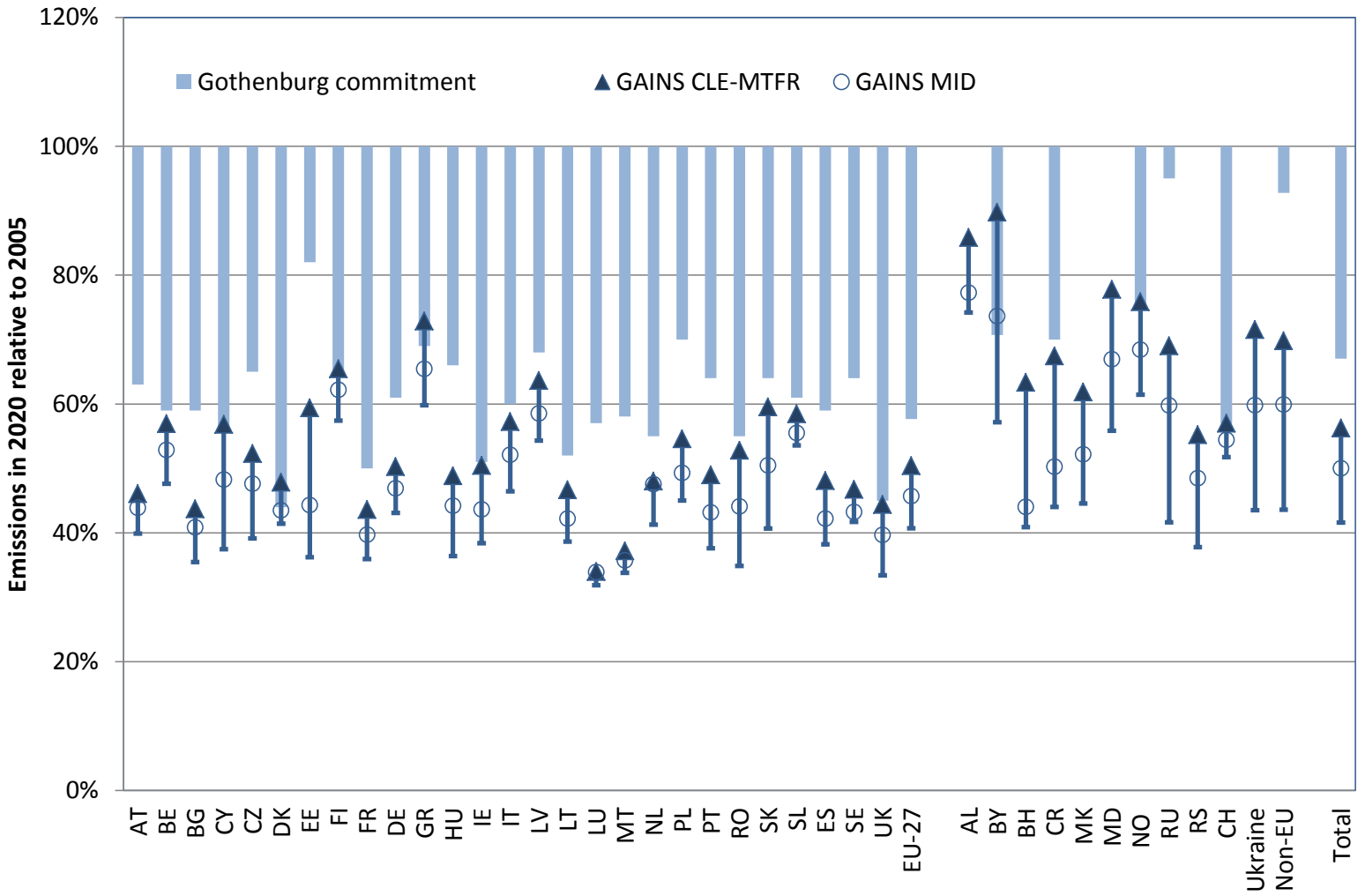
PRELIMINARY RESULTS



Committed emission reduction commitments for NOx

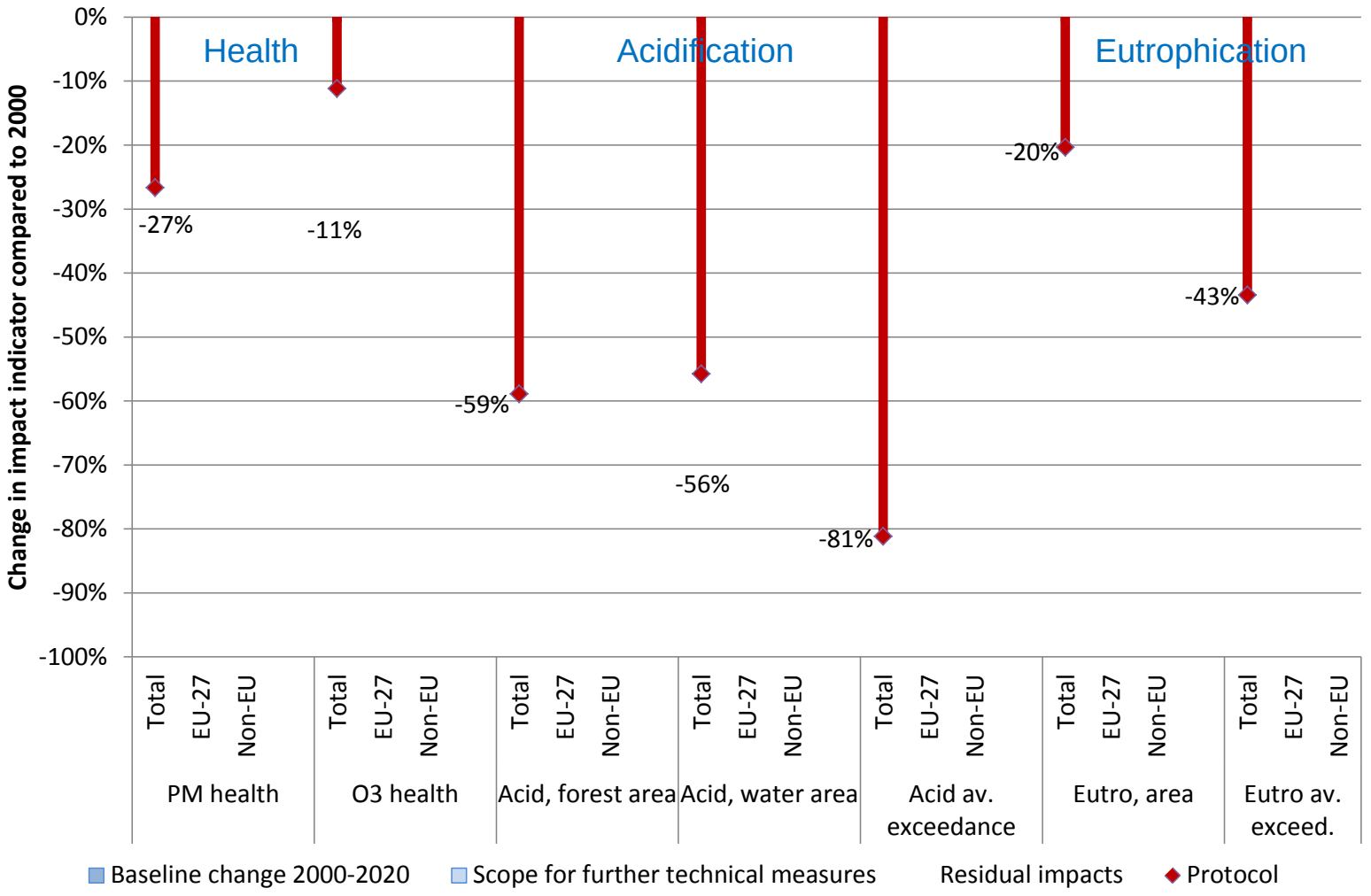
vs. GAINS current legislation + MTFR estimates

PRELIMINARY RESULTS



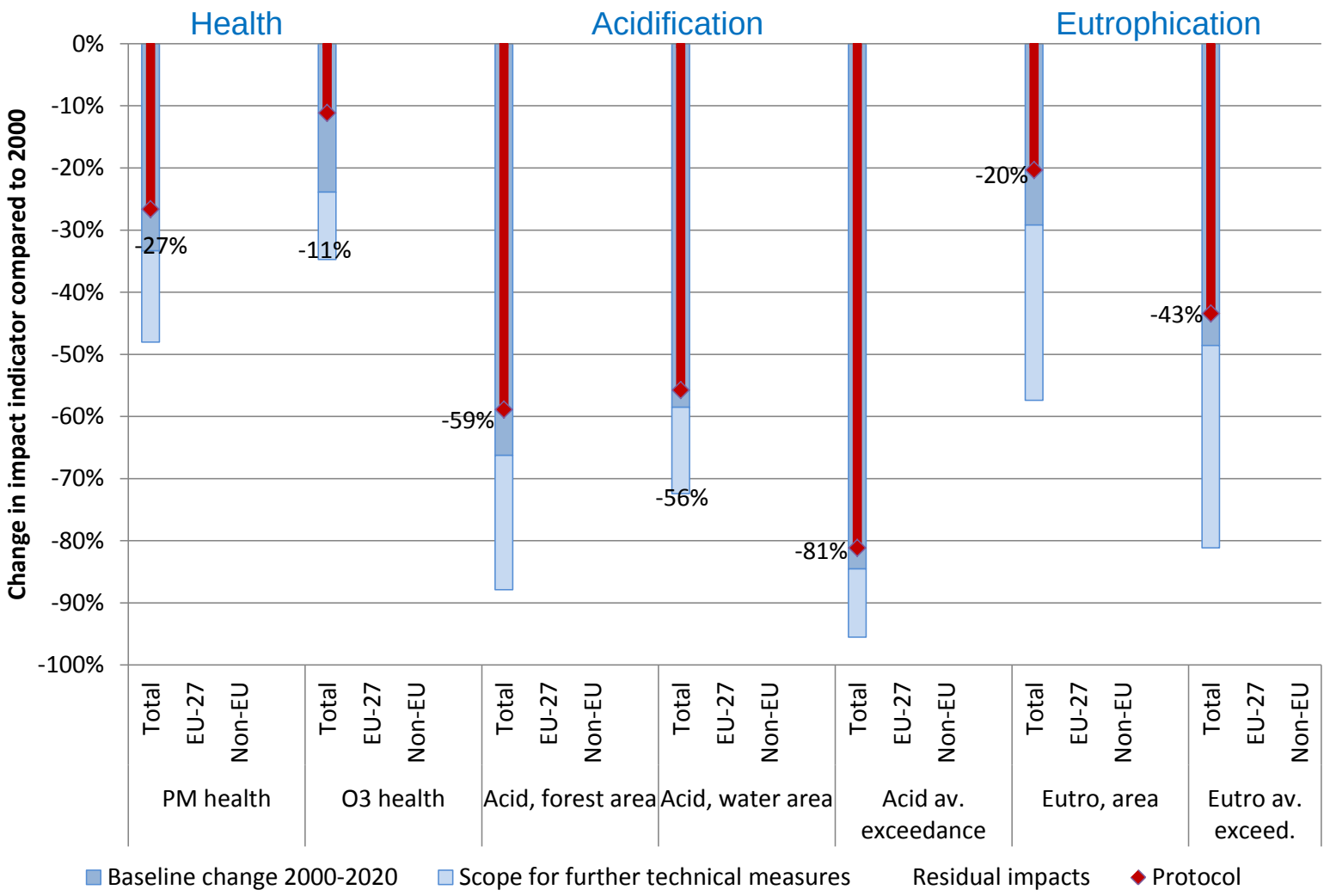
Change in impact indicators relative to 2000
(1) Revised Protocol

PRELIMINARY RESULTS



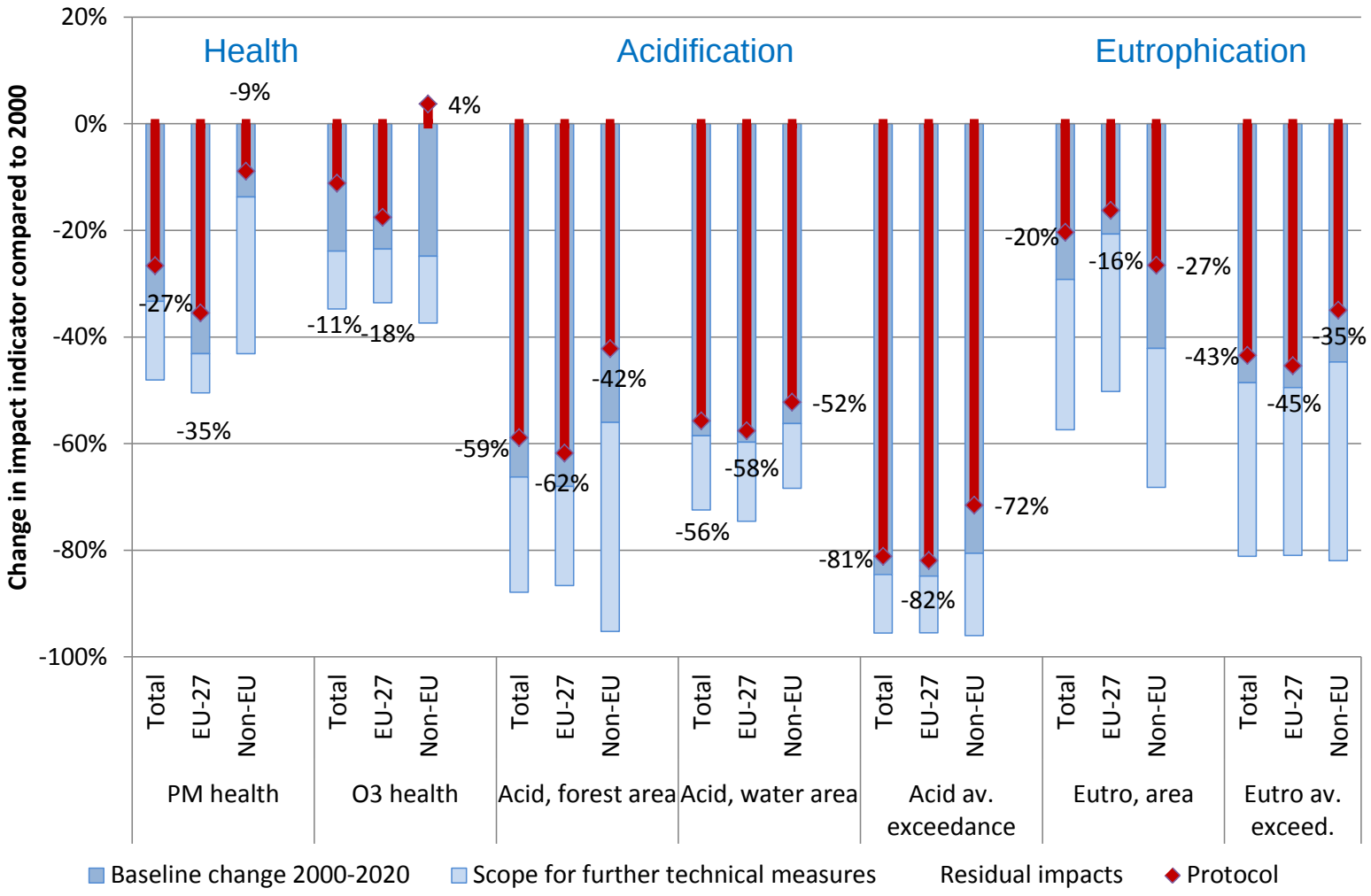
Change in impact indicators relative to 2000
(2) Revised Protocol vs GAINS current legislation + MTFR

PRELIMINARY RESULTS



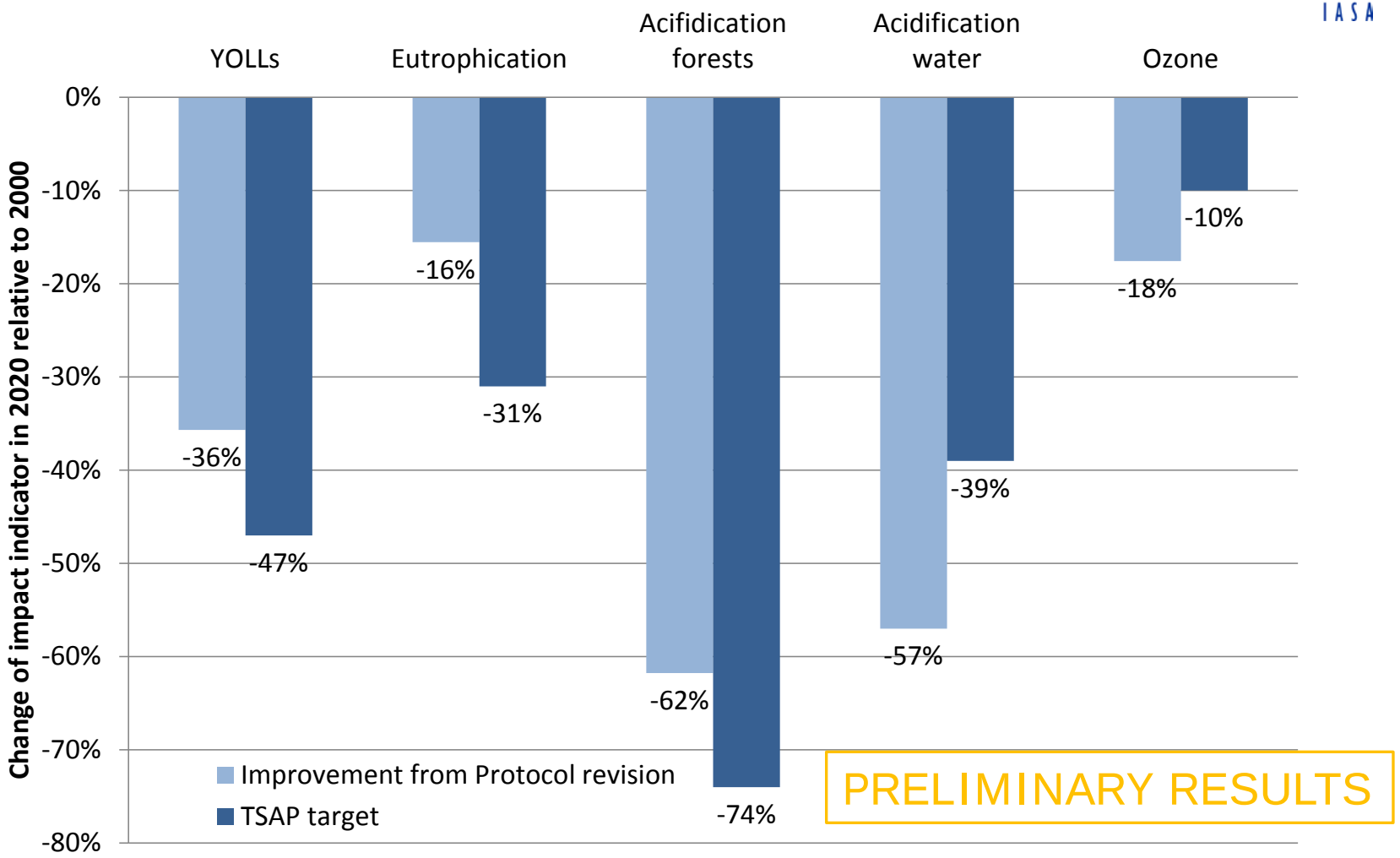
Change in impact indicators relative to 2000
(3) EU-27 and non-EU countries

PRELIMINARY RESULTS



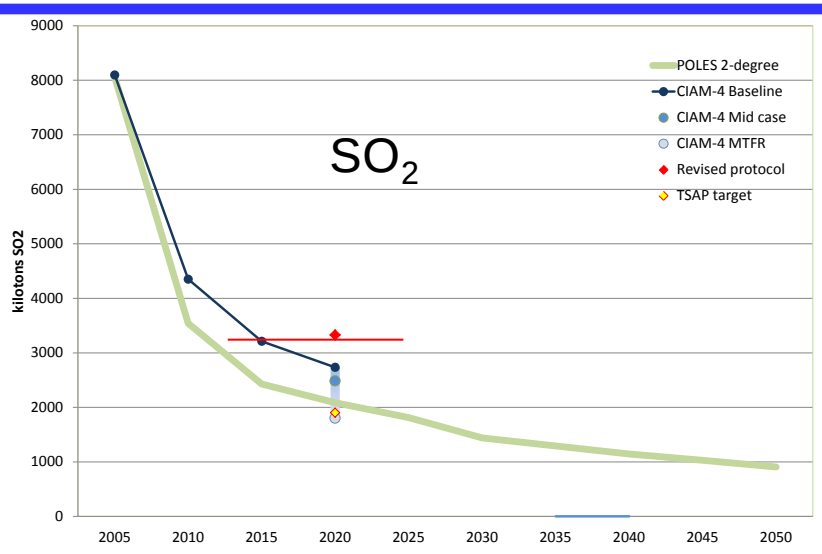
EU-27:

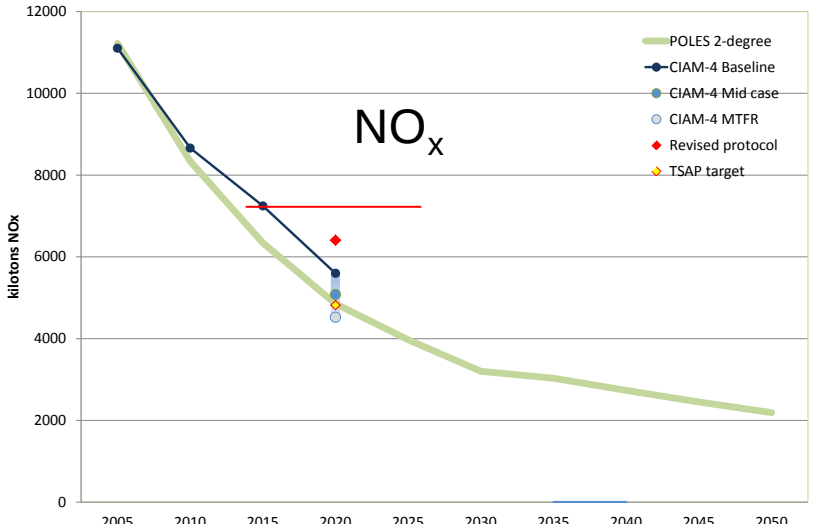
Protocol improvements vs TSAP targets for 2020

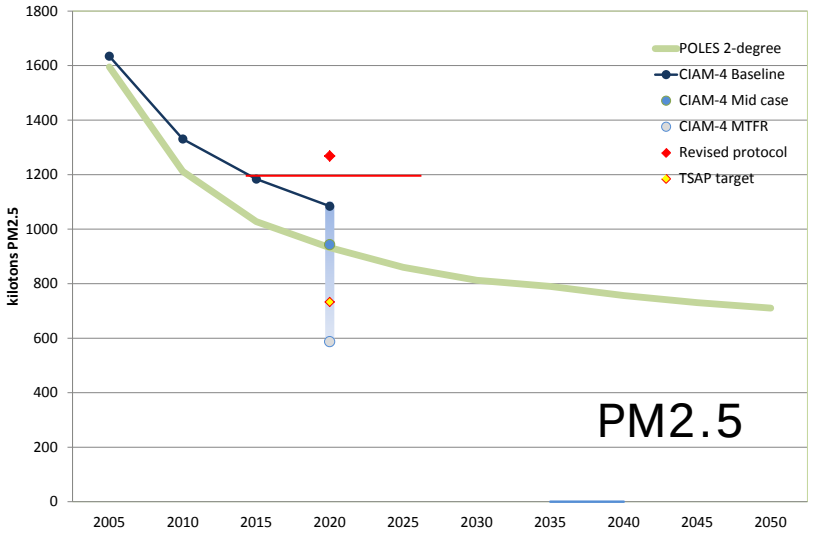


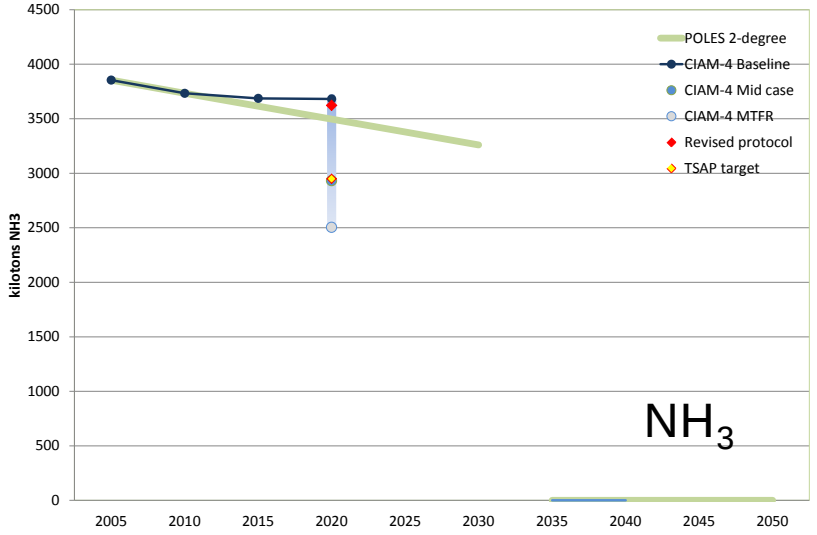
A long-term perspective on EU-27 emissions

The protocol vs TSAP targets vs a 2050 2-degree scenarios

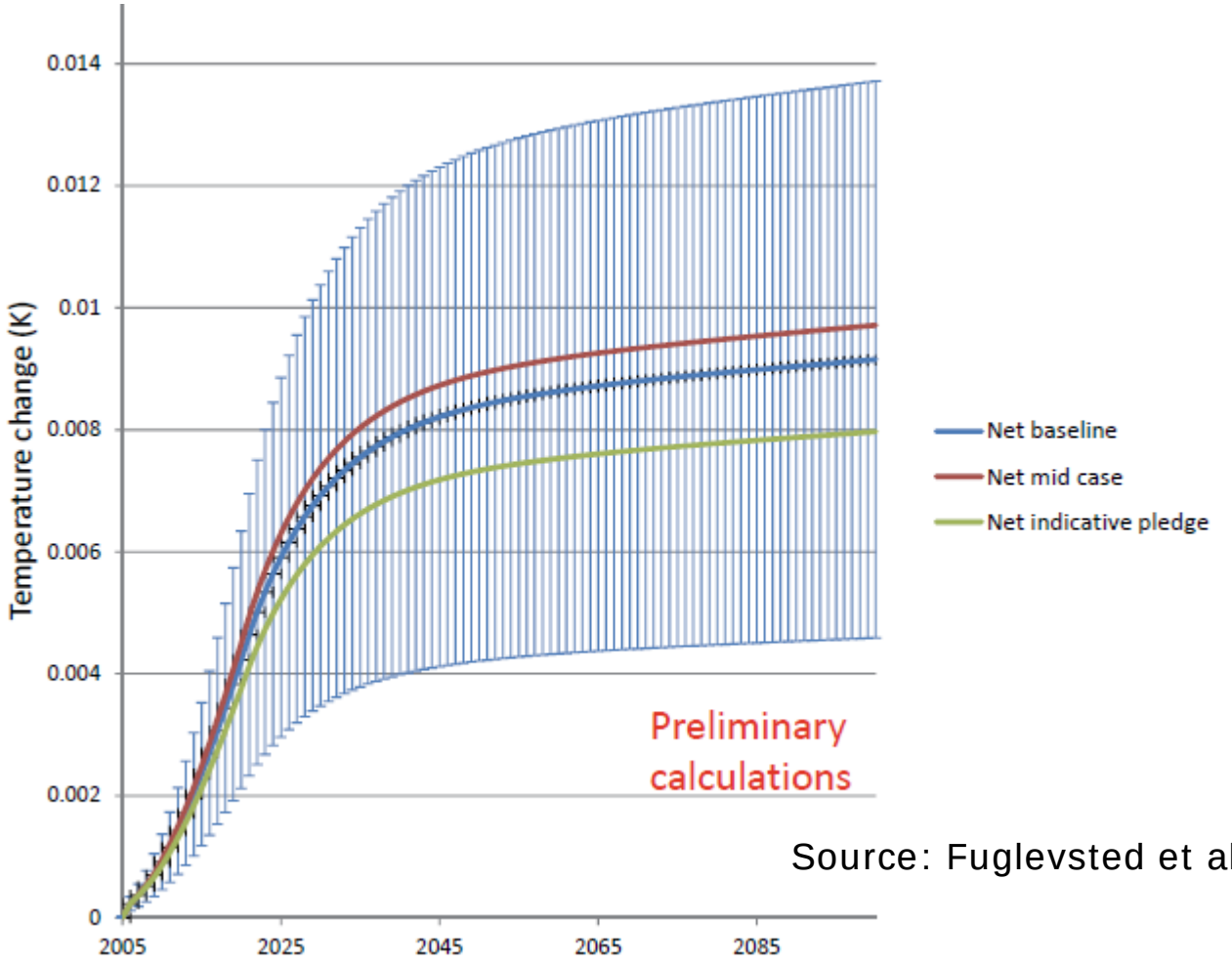








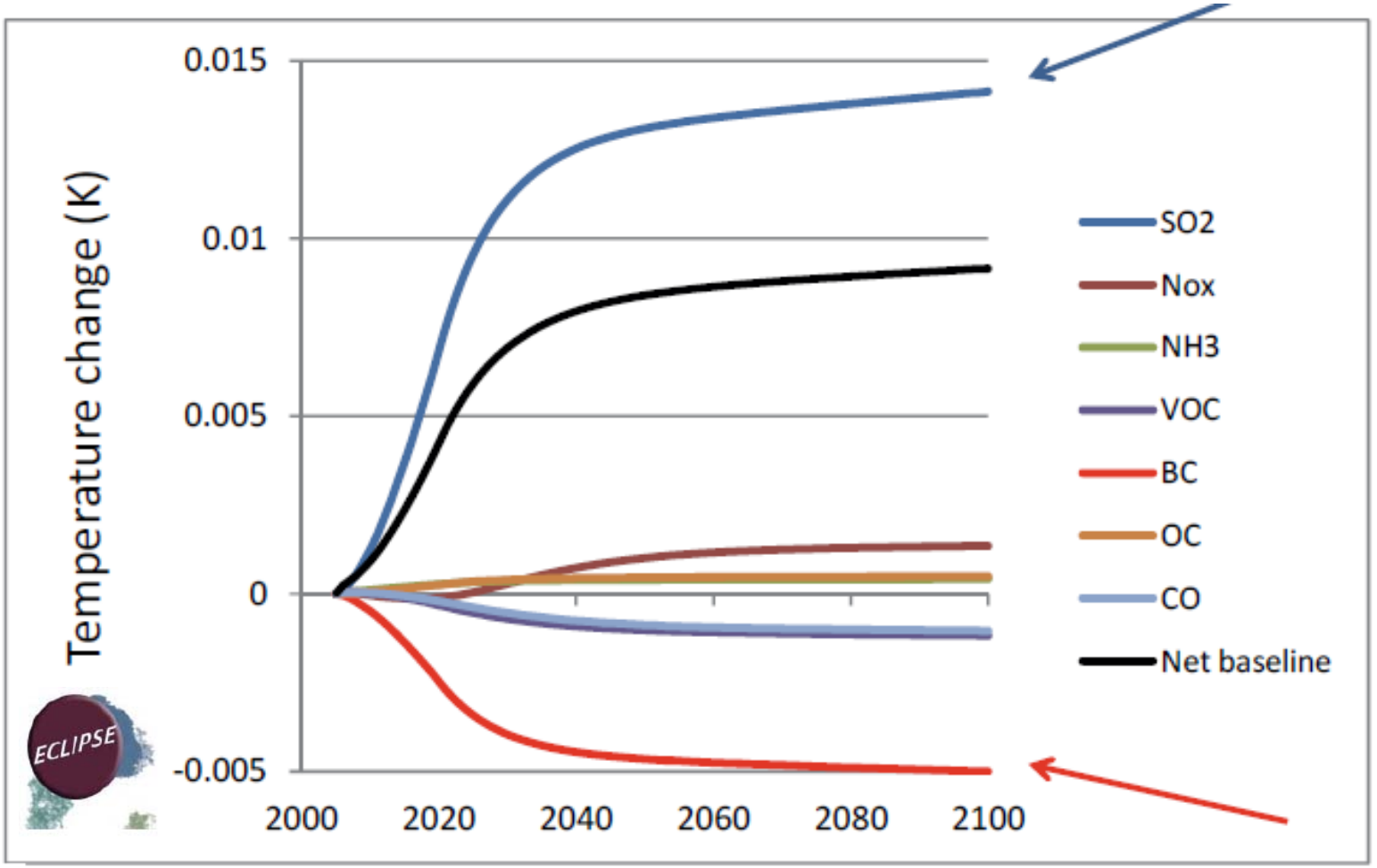
Net temperature change of emission reductions relative to constant 2005 emissions



Source: Fuglevsted et al., 2012

ΔT for baseline scenario

(relative to constant 2005 emissions)



Source: Fuglevsted et al., 2012

Conclusions

- Flexibility mechanisms make a robust quantitative analysis difficult
- Most 2020 reduction commitments are not much below current (2010) levels: they do not imply major additional emission reductions
- For most countries, reduction commitments are significantly above the ‘current legislation – no further policies’ estimates – for different reasons, to be discussed
- EU - TSAP targets will not be met by the agreed emission reduction commitments (e.g., 23 mio more life years lost than the TSAP target)
- Agreed reduction commitments are significantly above those of a climate stabilization trajectory
- However, due to low ambitions (especially on SO_2), global temperature increase from the changes in short-lived forcers is limited to about 8 mK