

# Globale Perspektiven und Auswirkungen der Strategien zur Treibhausgasreduktion

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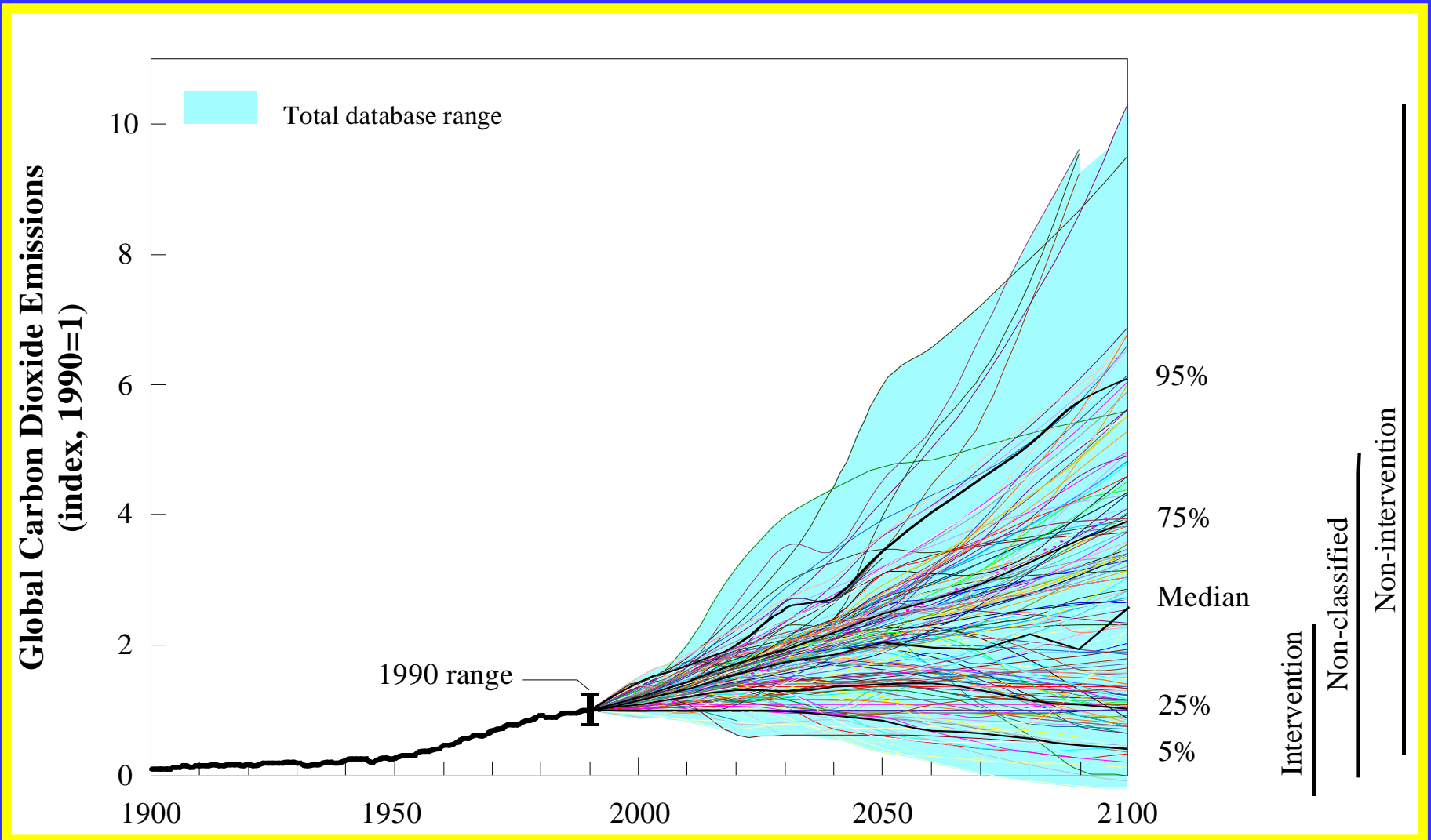
Emissionshandel - Von der Idee zur Umsetzung, Eine Veranstaltungsreihe  
von AAEE, IEW und EVA, Technisches Museum, Wien – 18 März 2003

# Herausforderungen

- Bereitstellung von nachhaltigen Energiedienstleistungen
- Technologiediffusionsdauer 20 bis 70 Jahre
- Finanzierung des Strukturwandels
- Energieeffizienz und Entkarbonisierung
- Langfristige Treibhausgasreduktion

# Carbon Dioxide Emissions

## Total All Sources

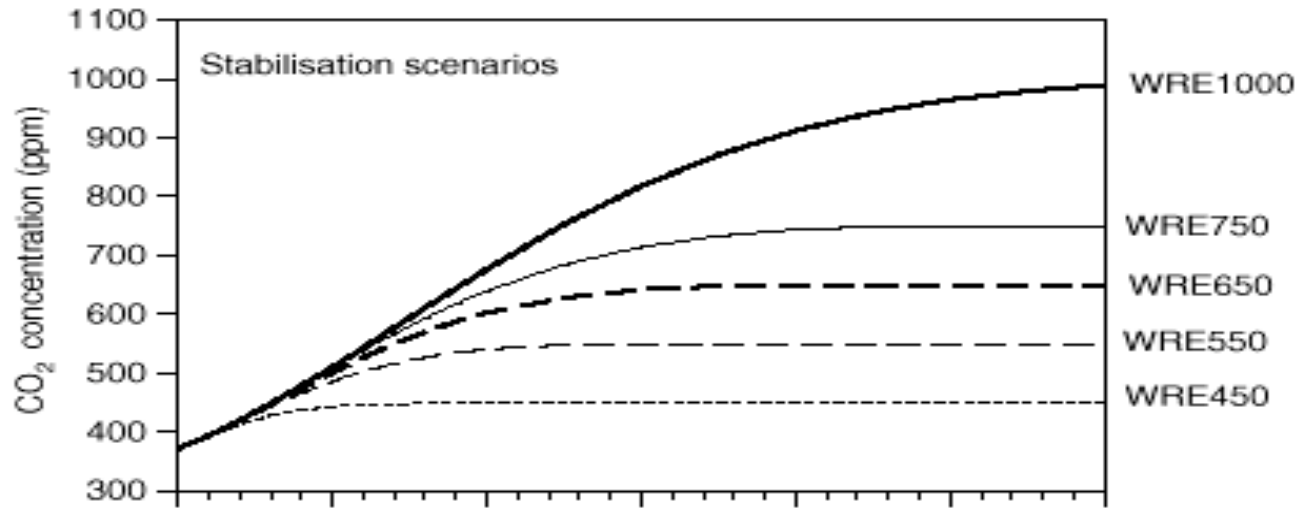


Nakicenovic *et al.*

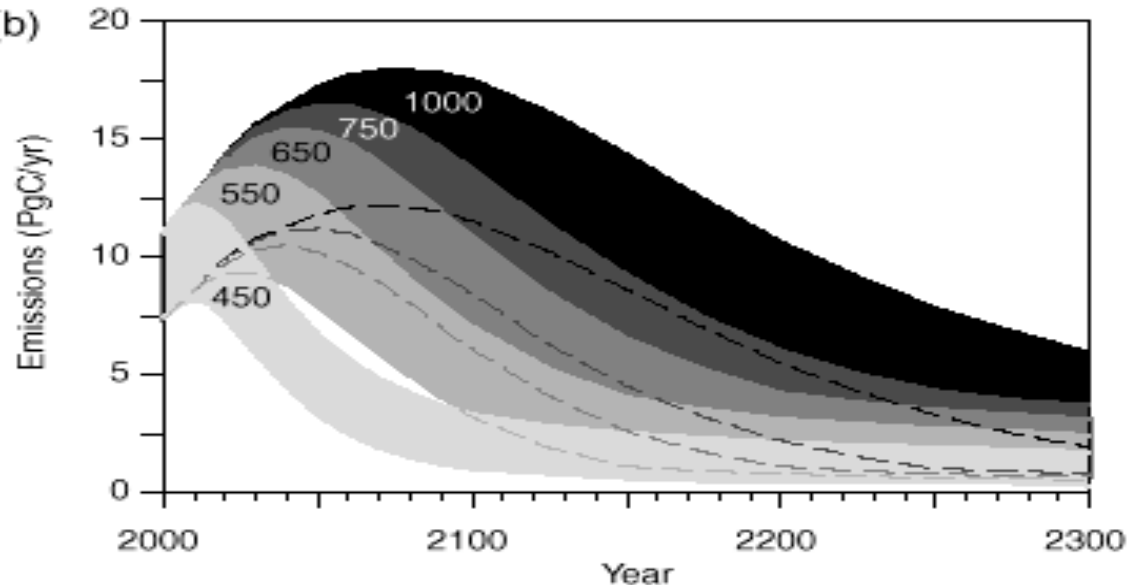
SRES 2000

# Stabilization of the Atmospheric Concentration of CO<sub>2</sub> Requires Significant Emissions Reductions

(a)



(b)

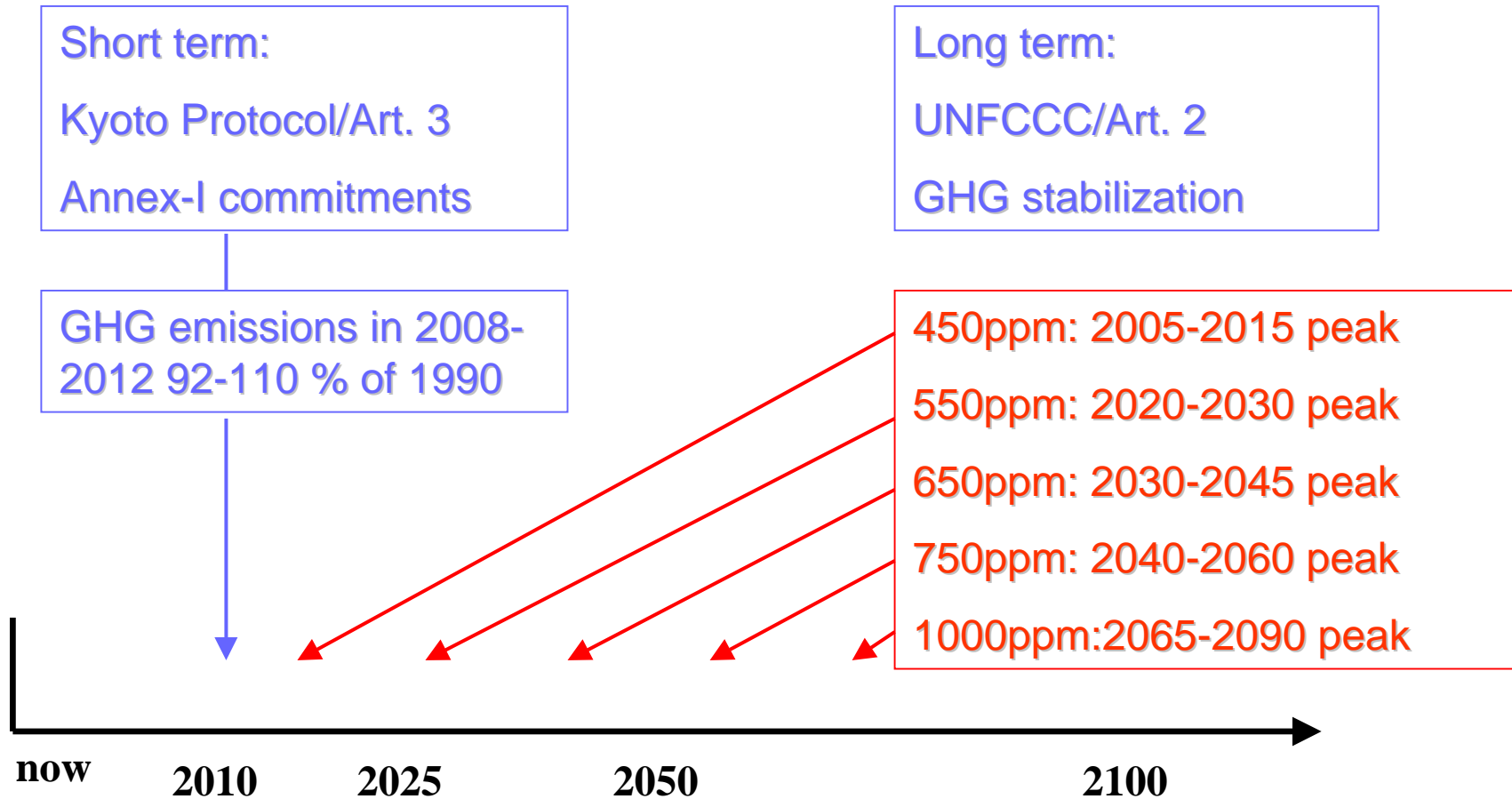


WMO



UNEP

# What is Needed to CO<sub>2</sub> Concentrations?



Blue: UNFCCC/KP; Red: IPCC



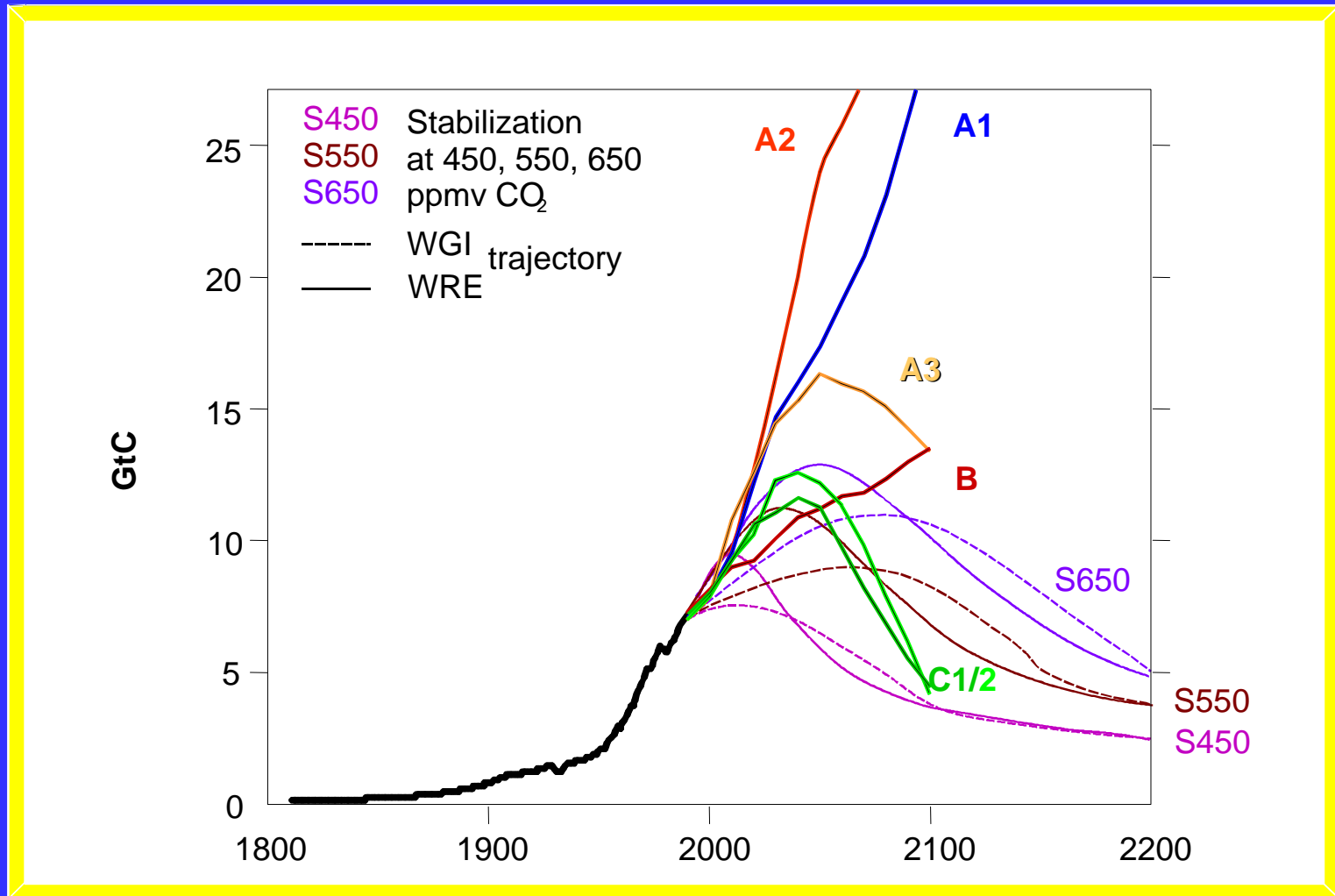
WMO

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

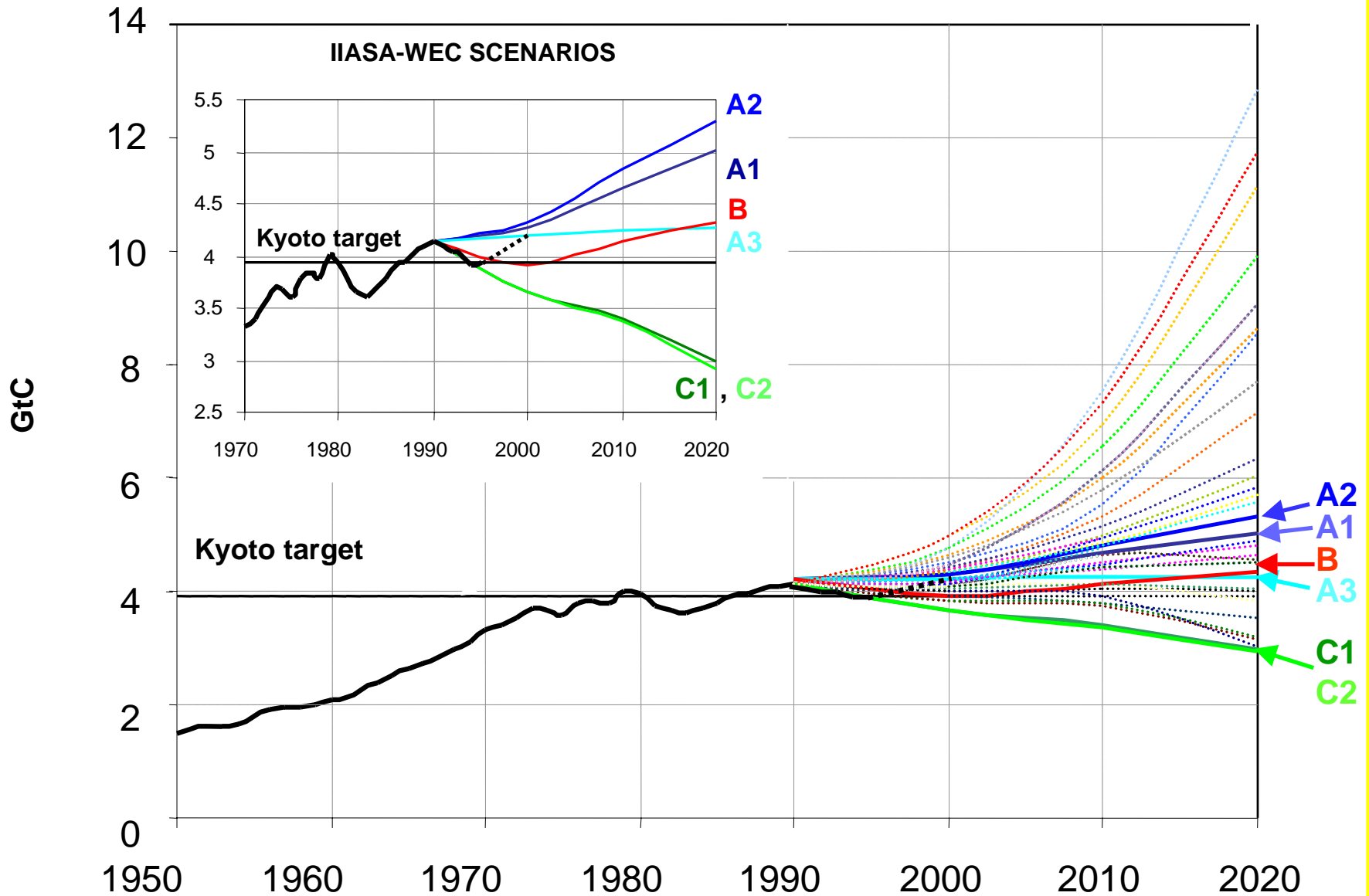


UNEP

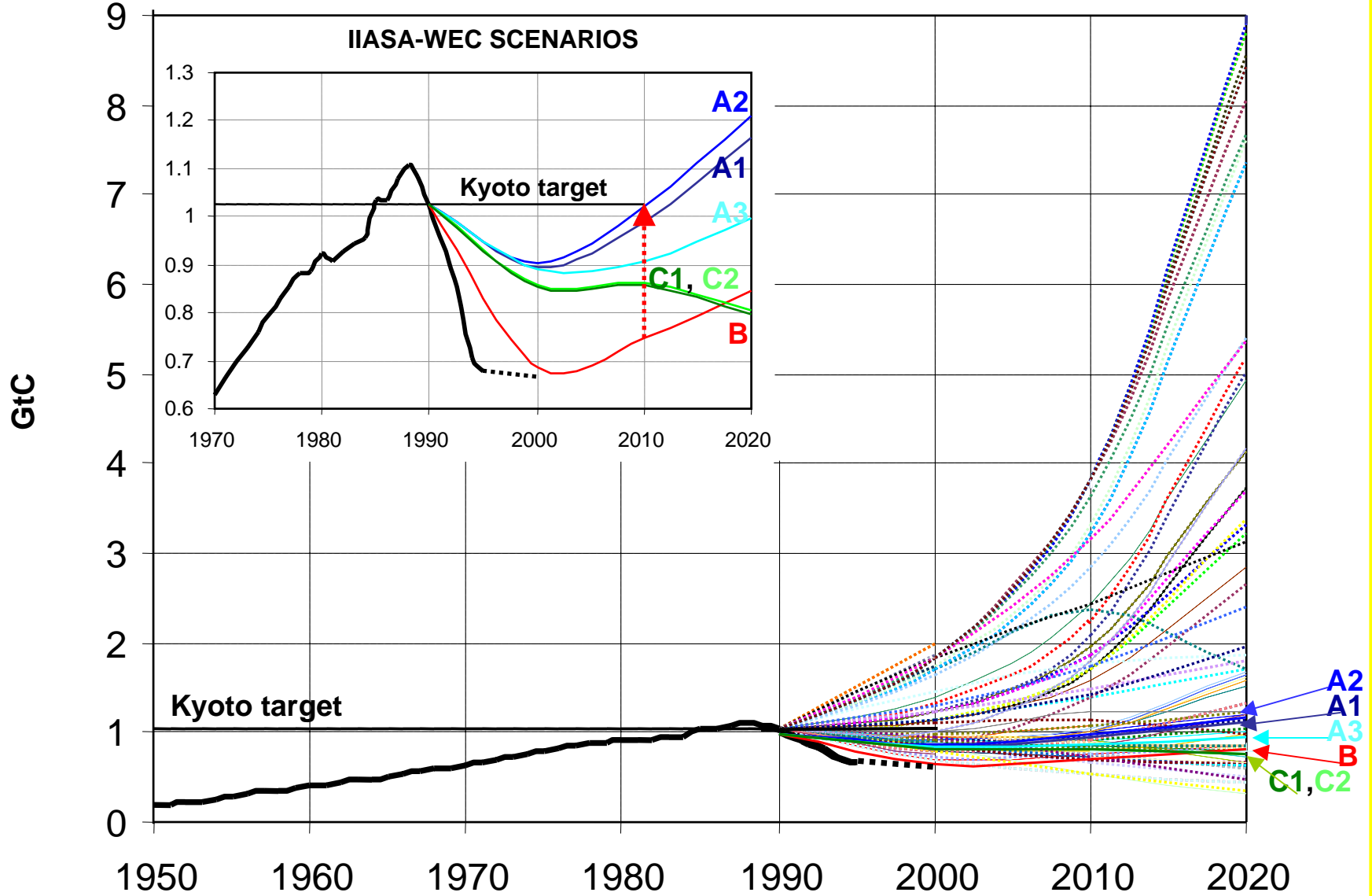
# Carbon Emissions Scenarios: IIASA-WEC Perspectives



# CO2 Emissions Scenarios: Annex I Countries



# CO2 Emissions Scenarios: Russia & Ukraine



# Kyoto and CO2 IIASA-WEC Scenarios

## Difference to Baselines 2008-2012

	(MtC)	(weighted)	A1	A2	A3	B	C1	C2
Western Europe	956	-7,8%	1093	1351	687	731	-378	-368
North America	1491	-7,2%	2388	2741	1402	1838	-940	-1135
Pacific OECD	372	-3,1%	295	329	221	128	-217	-207
Eastern Europe	284	3,3%	-60	-47	-258	-345	-374	-368
Former Soviet Union	1026	-0,2%	-154	-7	-572	-1377	-832	-864
ANNEX I, TOTAL	4130	-4,7%	3605	4411	1523	1019	-2697	-2898

# CO<sub>2</sub> Emissions 1990-2000 and Kyoto Targets

in million tons C, Source: IEA, 2002

Annex I	1990	2000	'90/'00	Target
EIT	1005.5	698.2	-30.6%	0%
Europe	904.0	939.1	3.9%	-8%
Japan	277.8	314.9	13.4%	-6%
Austria	15.4	17.1	10.3%	-13%

# CO<sub>2</sub> Trading and Permit Prices

Model	Permit price (2000 USD/ton CO <sub>2</sub> )	Share of hot air sold (%)	Trading	Sinks
<i>Cartel: Russia, Ukraine, and Eastern Europe</i>				
MACGEM	22	17	World wide	None
PACE	17	40	Annex B	B
POLES	19	36	Annex B	B, M
POLES&ASPEN	5	10	World wide	B, M
WORLDSCAN <sup>a</sup>	5	60	World wide	B, M
<i>Cartel: Russia and Ukraine</i>				
GTEM <sup>b</sup>	12	55	World wide	B
MIT-EPPA <sup>b</sup>	7	50	Annex B	B, M
POLES	11	34	Annex B	B, M

Source: Urs Springer, 2003

# Kioto ohne USA und mit Senken

- In Summe ist die Nachfrage an Emissions-Rechten in Annex-I Ländern kleiner als die „hot air“ in Russland und Ukraine
- Dies bedeutet es kommt zu keiner tatsächlichen Emissionsreduktion ( $\text{CO}_2$  Preis  $< \$12/\text{tCO}_2$ )
- Zusätzlich zum Handel mit „hot air“ sind langfristige Vermeidungsmaßnahmen notwendig

# Strategien zur Senkung von Kohlenstoffemissionen

Reduzierung der CO<sub>2</sub> Emissionen auf Null

- Verbesserung der Energie-Effizienz und Reduzierung des Endverbrauchs
- Einführung kohlenstoff-freier Technologien
- Reduzierung des Kohlenstoffgehaltes fossiler Technologien (Energieträger); Speicherung von Kohlenstoff über geologische Zeiträume.

Übergang zur einer Wirtschaft die auf Elektrizität und Wasserstoff als Energieträger beruht

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**Table 2. Total CO<sub>2</sub> Emissions from Fuel Combustion  
(million tonnes of CO<sub>2</sub>)**

	1990	2000	2000 target (1)		1990	2000	2000 target (1)	
<b>ANNEX I</b>	<b>13 858.2 a</b>	<b>13 711.3</b>	<b>1.1%</b>		<b>Economies in Transition</b>	<b>3 687.4 a</b>	<b>2 568.1</b>	<b>-30.8%</b>
					Belarus	-	55.5	.. none
<b>Annex II</b>	<b>9 871.3</b>	<b>11 151.2</b>	<b>13.4%</b>		Bulgaria	75.2	42.7	-43.2%
North America	5 255.0	6 192.2	17.9%		Croatia	-	17.8	.. -5%
Canada	430.2	526.8	22.4%	-6%	Czech Republic	153.8	118.8	-22.8%
United States	4 825.7	5 665.4	17.4%	(-6%)	Estonia	-	14.0	.. -8%
Europe	3 314.7	3 443.3	3.9%		Hungary	70.5	55.2	-21.7%
Austria	58.0	62.8	10.3%	-13%	Latvia	-	6.5	.. -8%
Belgium	107.2	120.3	12.2%	-7.5%	Lithuania	-	11.2	.. -8%
Denmark	50.8	50.1	-0.9%	-21%	Poland	344.2	292.8	-14.6%
Finland	55.0	54.8	-0.4%	0%	Romania	166.9	86.4	-48.2%
France (2)	352.7	373.3	5.8%	0%	Russia	-	1 505.7	.. 0%
Germany	964.1	833.0	-13.6%	-21%	Slovak Republic	55.8	37.9	-31.6%
Greece	70.8	87.7	24.3%	+25%	Slovenia	12.5	14.4	15.5%
Iceland	1.9	2.2	13.6%	+10%	Ukraine	-	301.0	.. 0%
Ireland	30.3	41.2	36.2%	+13%				
Italy	400.1	425.7	6.4%	-6.5%	<b>NON-ANNEX I</b>	<b>6 512.8 a</b>	<b>8 908.8</b>	<b>36.8%</b>
Luxembourg	10.5	8.0	-23.1%	-28%	Africa	540.8	685.7	26.8%
Netherlands	150.8	177.1	10.8%	-6%	Middle East	588.8	986.2	73.4%
Norway	28.5	33.6	17.7%	+1%	Non-OECD Europe (4)	113.9	79.1	-30.5%
Portugal	39.8	59.6	50.5%	+27%	Other Former USSR (4)	554.1	325.2	-41.3%
Spain	206.5	284.7	37.9%	+15%	Latin America (4)	388.3	1 208.1	30.0%
Sweden	51.2	52.0	1.6%	+4%	Asia (excl. CHns) (4)	1 557.2	2 587.1	66.1%
Switzerland (2)	40.6	41.7	2.7%	-8%	China	2 289.5	3 095.4	32.6%
Turkey (3)	128.8	204.1	58.5%	none				
United Kingdom	550.9	531.5	-5.1%	-12.5%	<b>MARINE BUNKERS</b>	<b>384.5</b>	<b>468.7</b>	<b>26.8%</b>
Pacific	1 300.7	1 515.8	16.5%		<b>AVIATION BUNKERS</b>	<b>285.3</b>	<b>343.4</b>	<b>20.4%</b>
Australia	259.7	329.3	26.8%	(+6%)	<b>WORLD TOTAL</b>	<b>20 728.7</b>	<b>23 422.3</b>	<b>13.0%</b>
Japan	1 018.7	1 154.8	13.4%	-6%				
New Zealand	22.3	31.7	41.9%	0%	<b>Annex B (5)</b>	<b>8 238.2 a</b>	<b>7 467.8</b>	<b>-9.5%</b>

(1) The targets apply to a basket of six greenhouse gases and take sinks into account. The overall EU target under the Protocol is -8%, but the member countries have agreed on a burden-sharing arrangement as listed. Because of lack of data and information on base years and gases, an overall "Kyoto target" cannot be precisely calculated for total Annex I or total Annex B.

- (2) Emissions from Liechtenstein are included with Switzerland, and emissions from Monaco are included with France.
- (3) While Turkey was recently removed from Annex II, it is still included in Annex II statistics in this publication.
- (4) Composition of regions differ from those shown elsewhere in this publication to take into account countries that are not members of Annex I.
- (5) Annex B countries are those that have emission targets under the Kyoto Protocol (listed in Annex B). Membership in Annex B is almost identical to that of Annex I, except for Australia, the United States, Turkey and Belarus (The United States and Australia have expressed their intention not to ratify the Protocol and Turkey and Belarus did not agree to a target under the Kyoto Protocol).