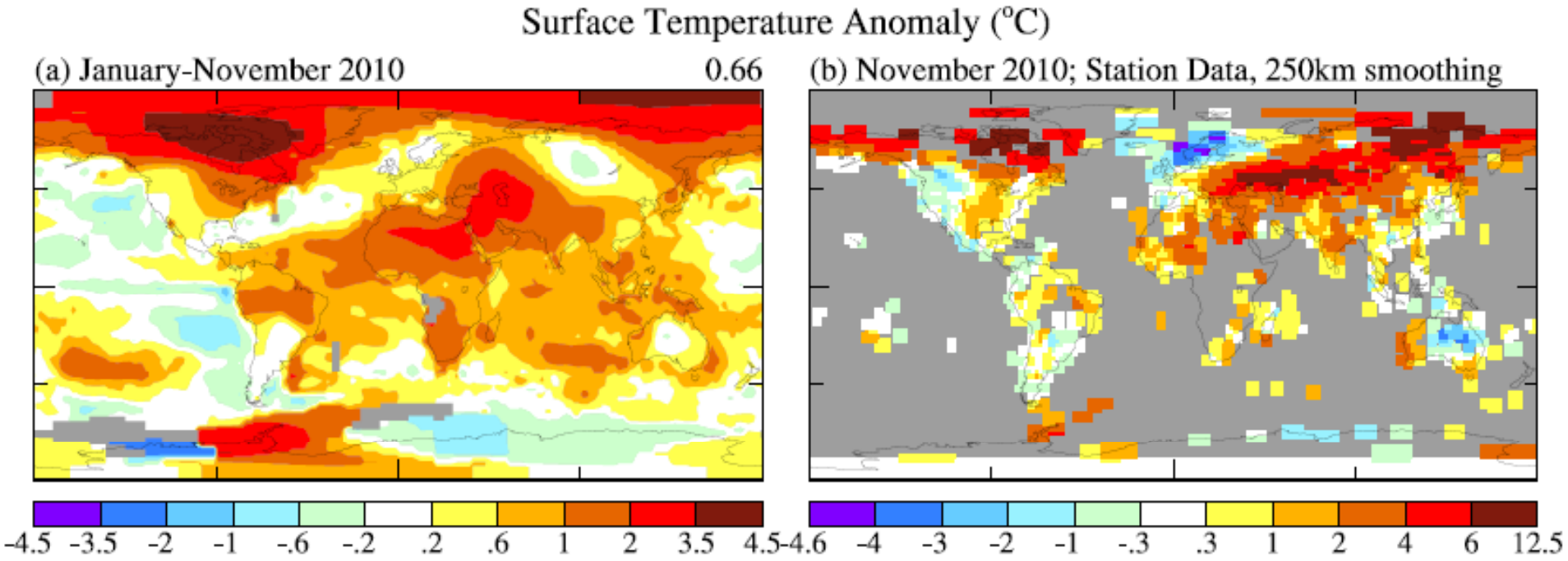
14th GTAP on Global Econ Analysis

"Green Growth - Post-Copenhagen"

Saturday, 18 June 2011
Ca' Foscari, Venice

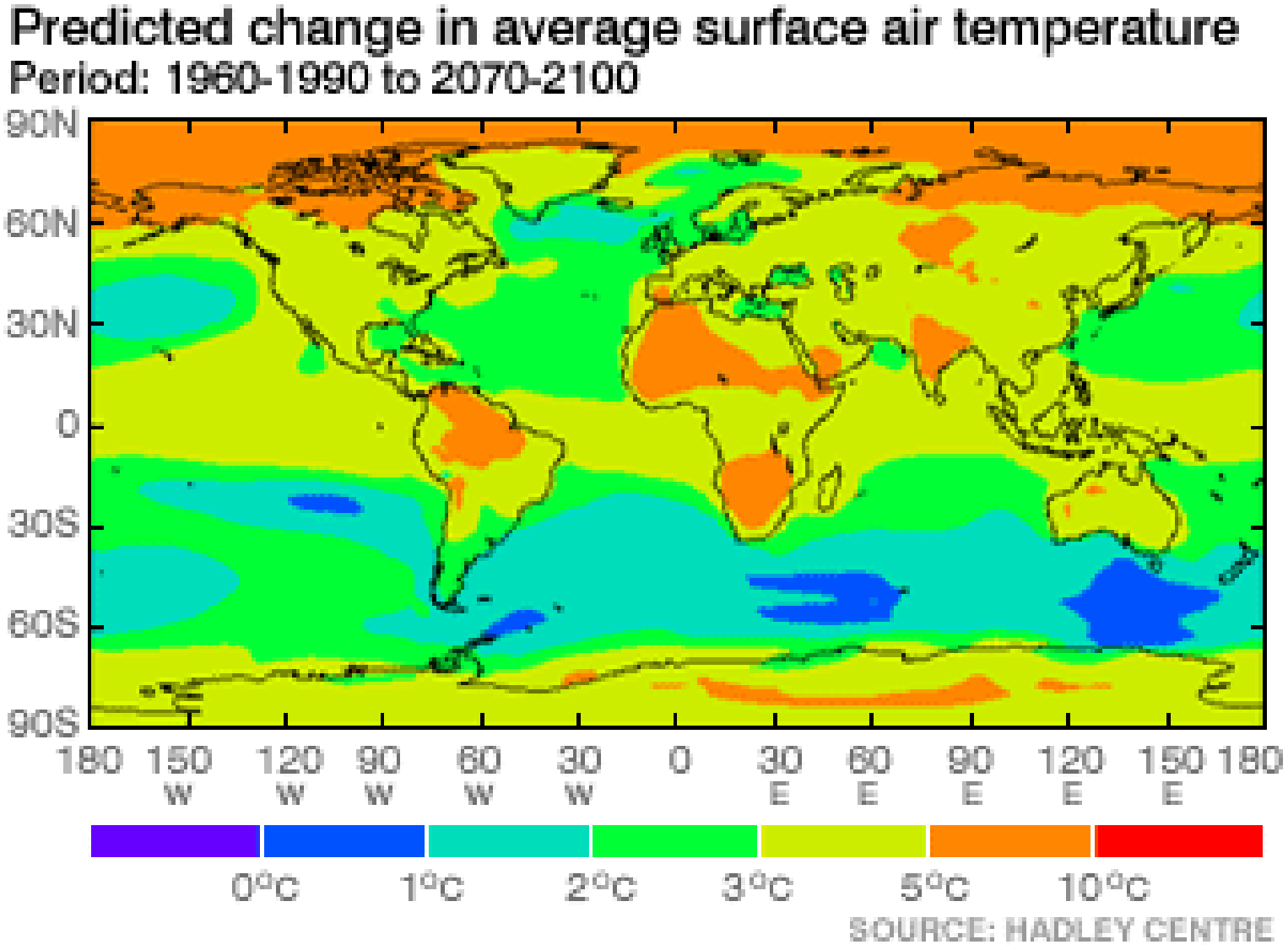
Thomas Sterner
Dept of Economics, GU

2010 Warmest in 131 Years and warmest November too. But cold in Europe.



China lifts 600 M

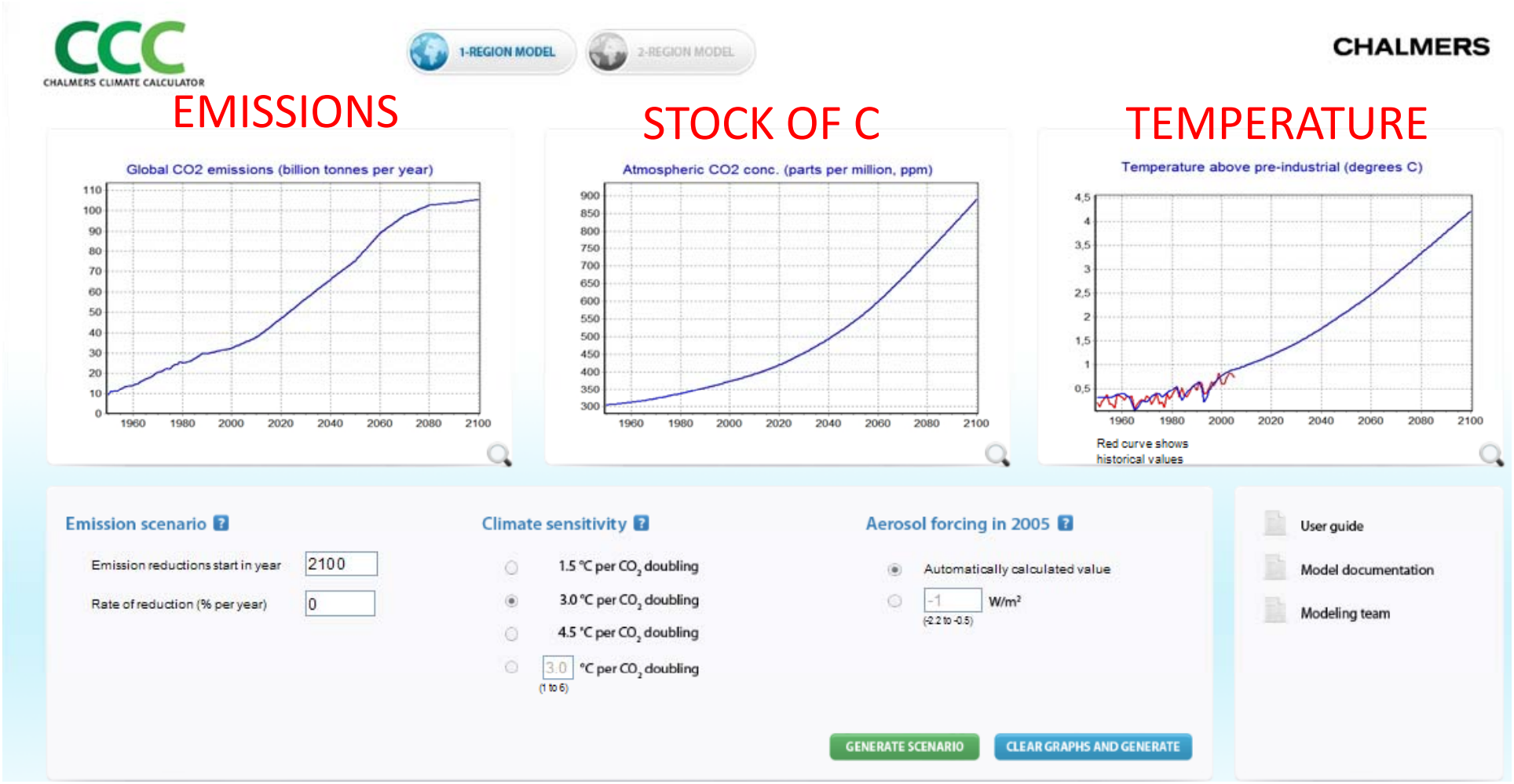
Growth Threatened

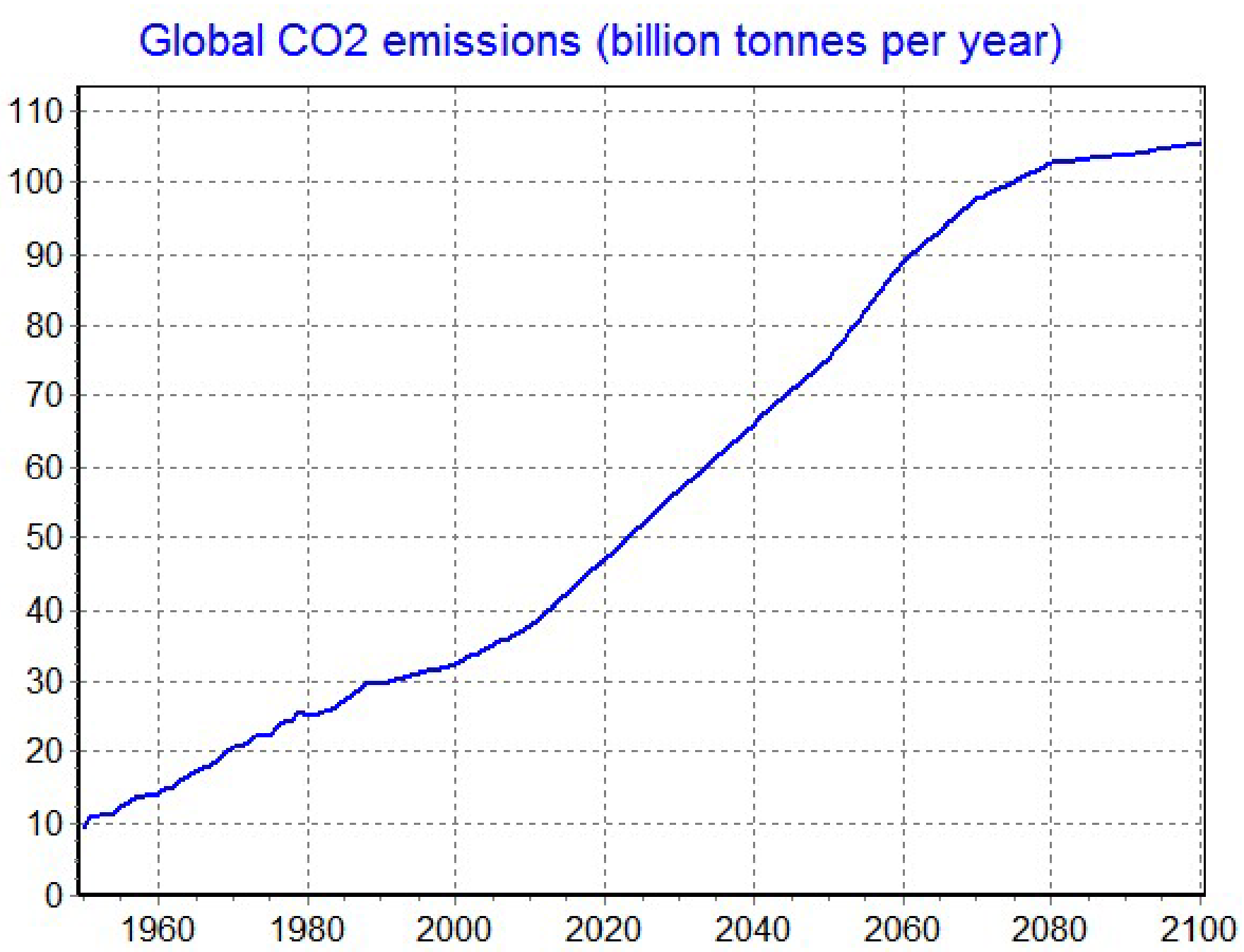


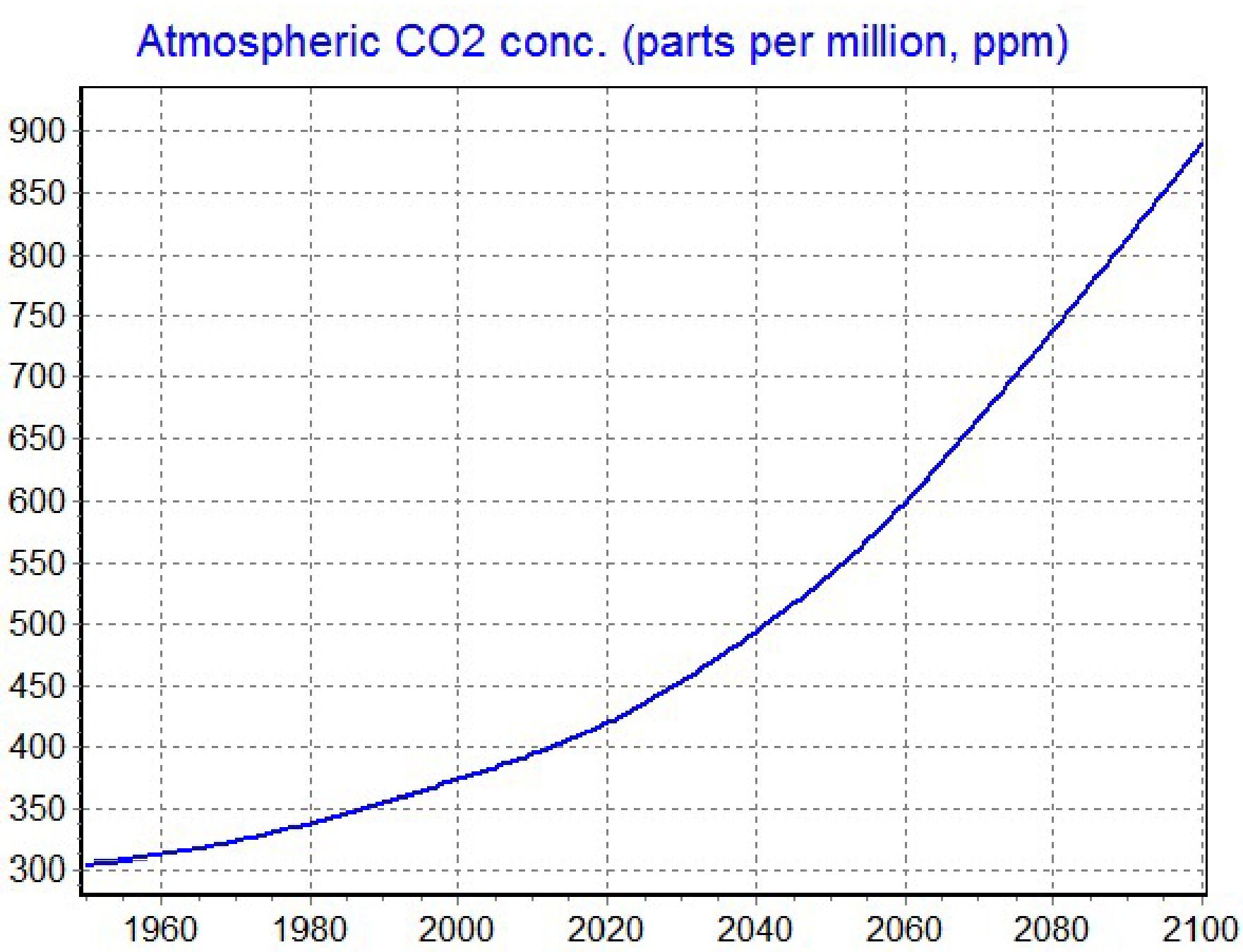

HELLESPONT TRIUMPH

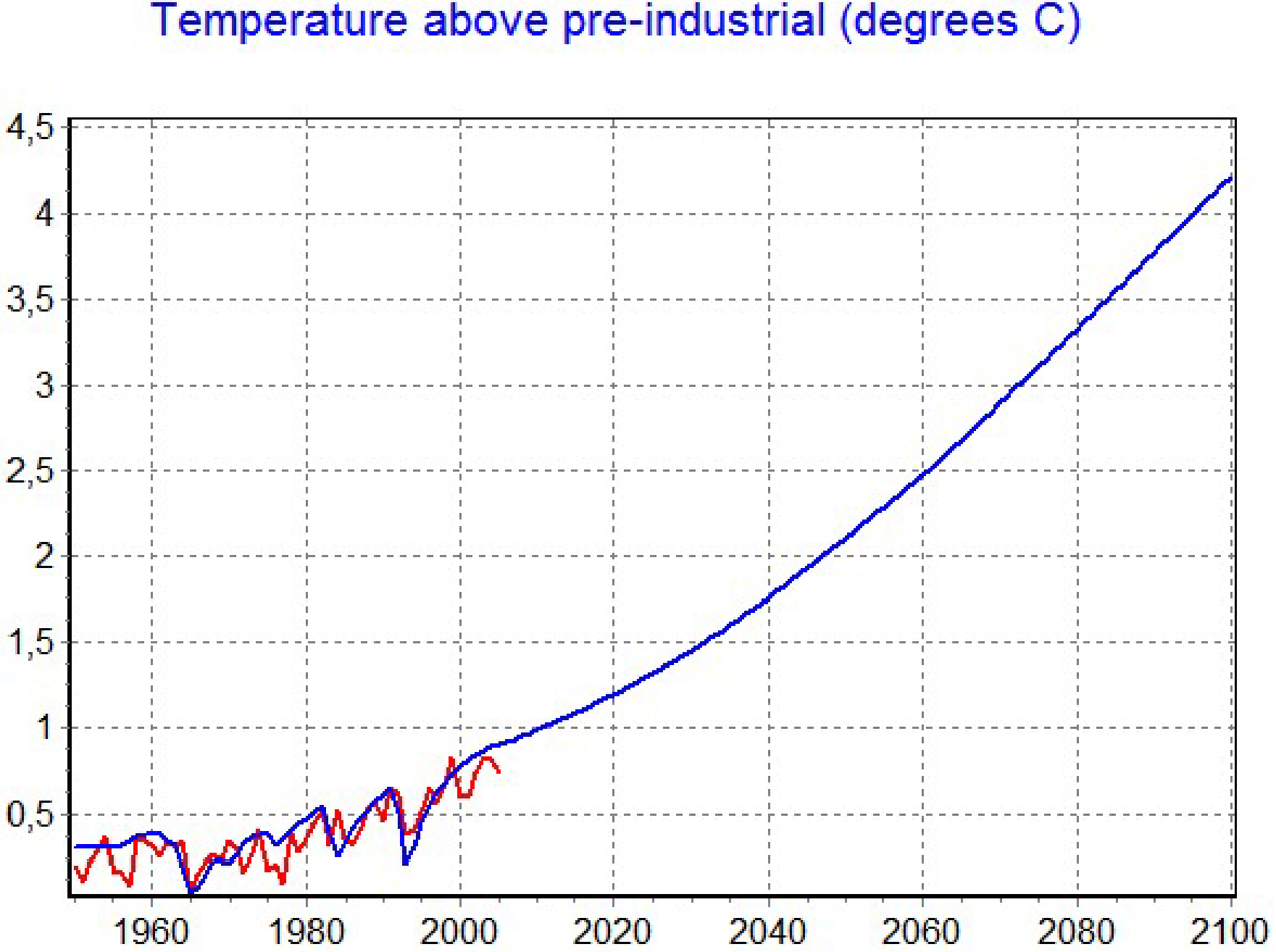
CHALMERS CLIMATE CALCULATOR

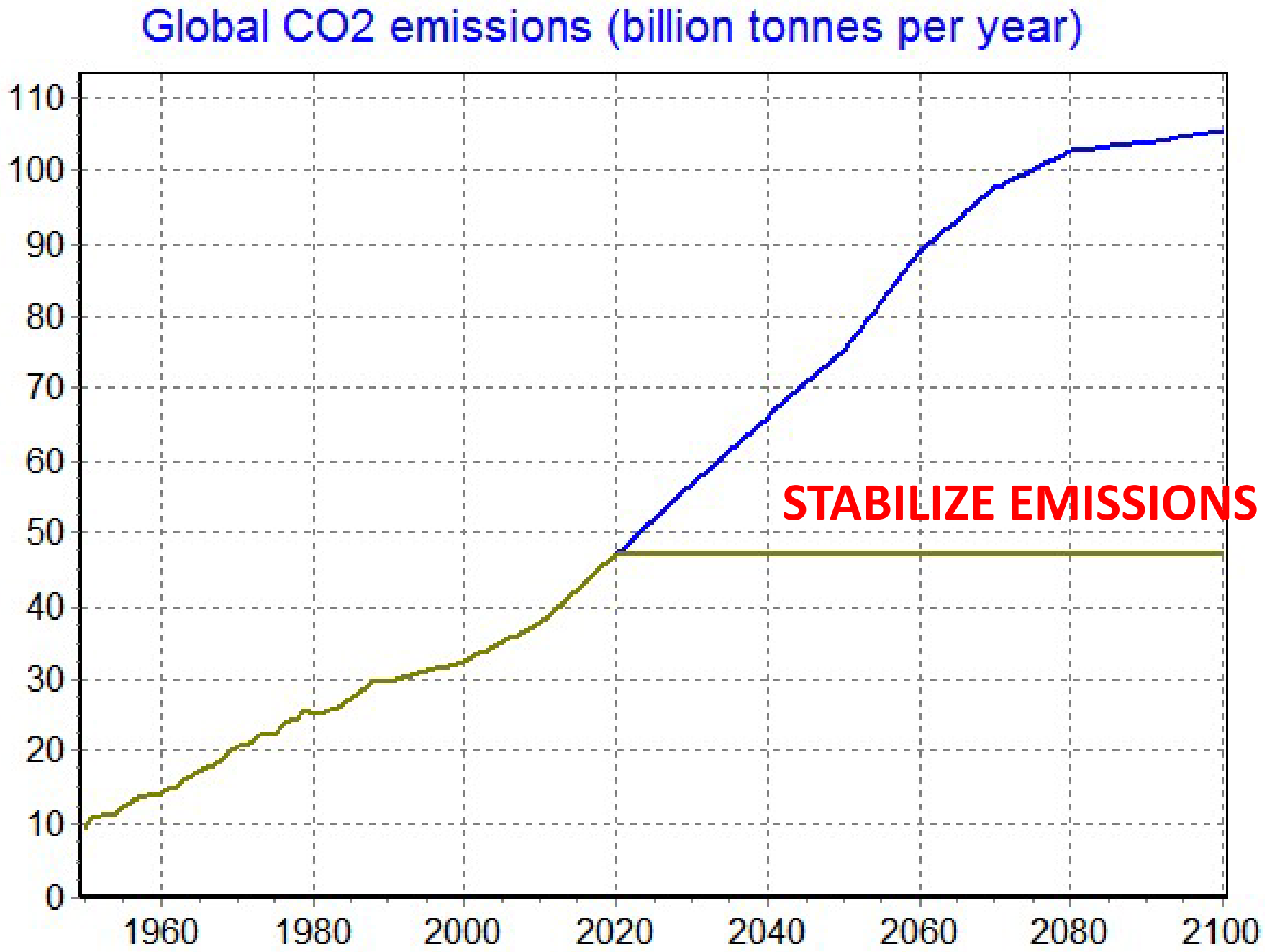
Christian Azar, Daniel Johansson (Frt) (1 region vs)

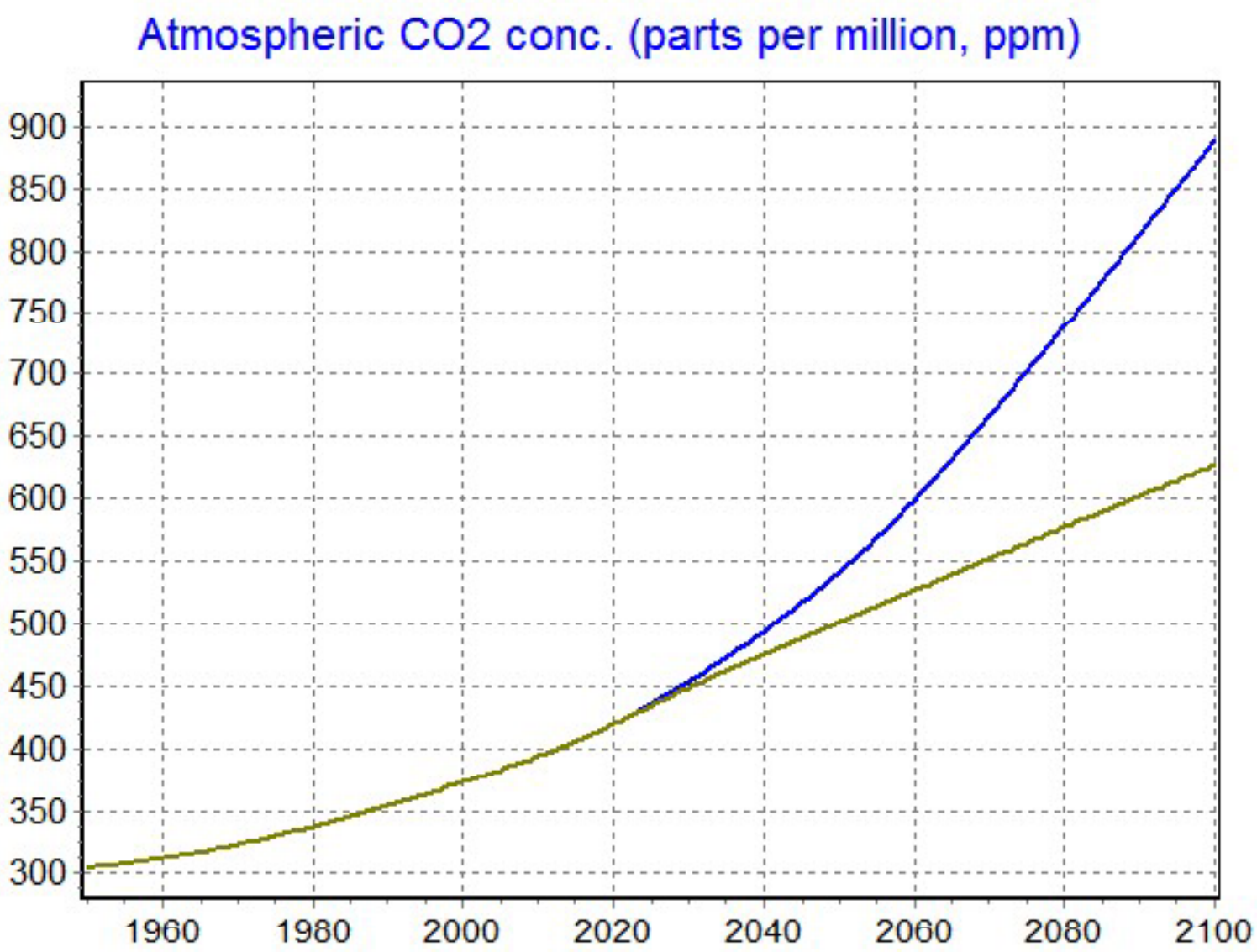


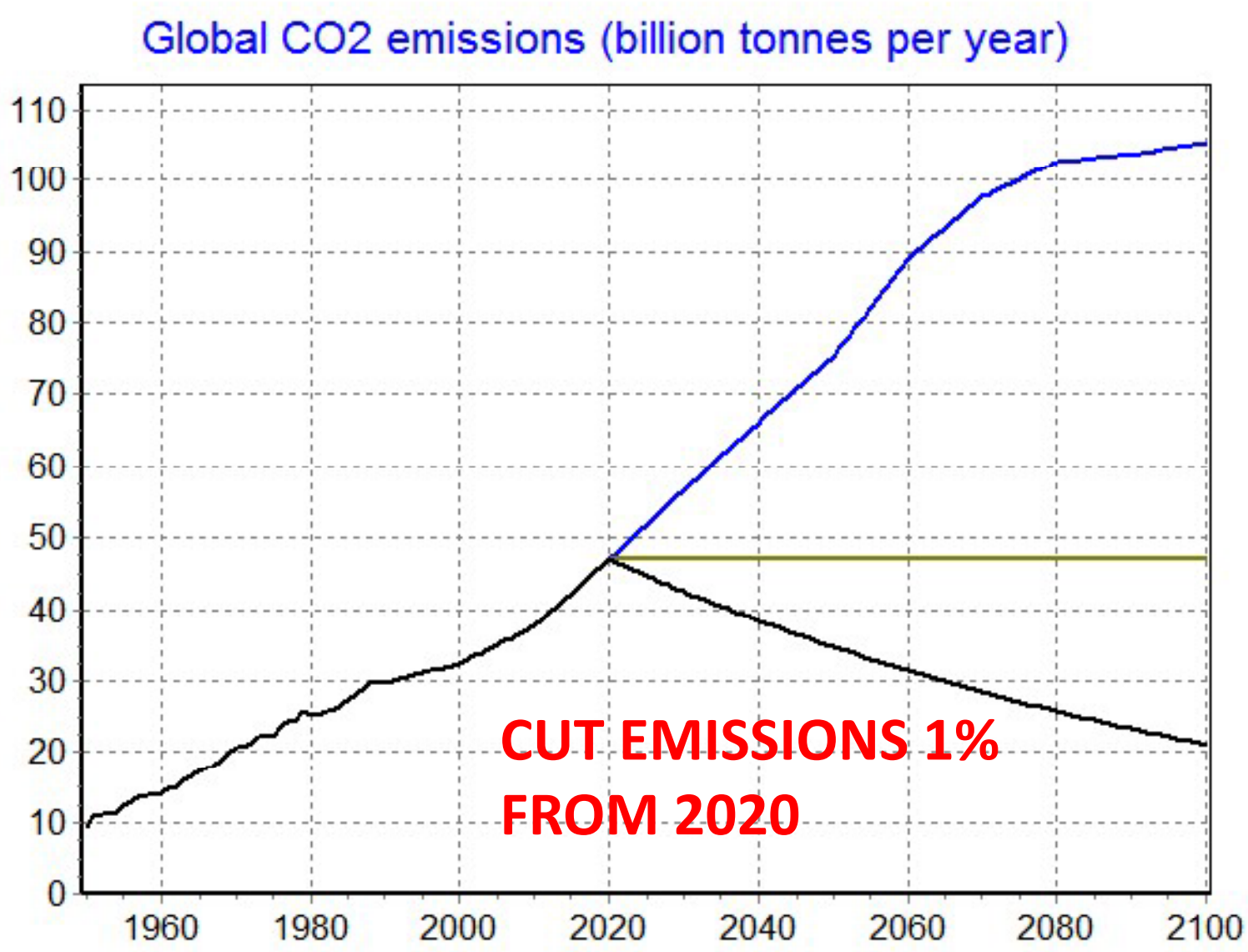

Global CO2 emissions (billion tonnes per year)
110
100
90
80
70
60
50
40
30
20
10
0
1960
1980
2000
2020
2040
2060
2080
2100

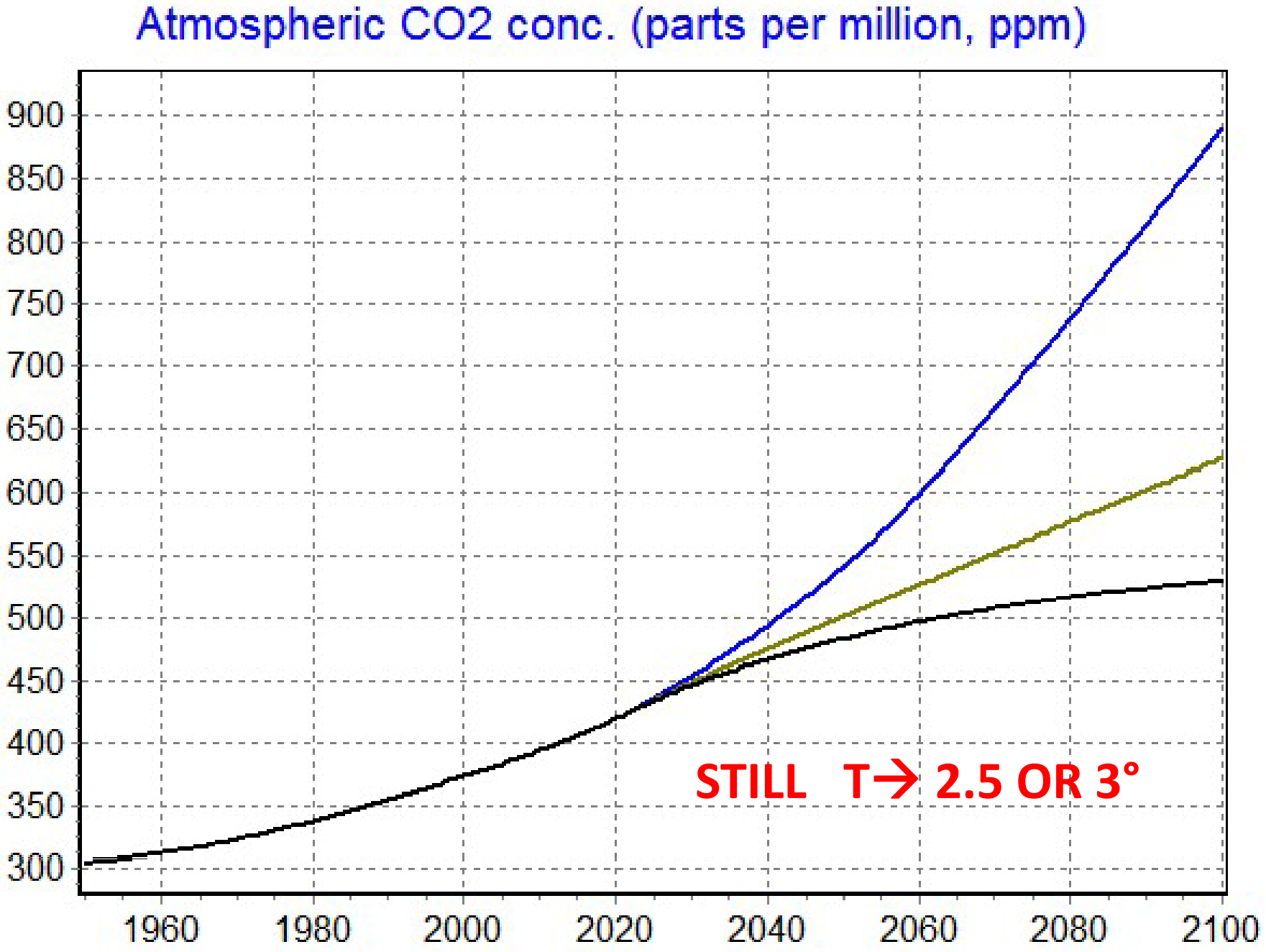

Atmospheric CO2 conc. (parts per million, ppm)
900
850
800
750
700
650
600
550
500
450
400
350
300
1960
1980
2000
2020
2040
2060
2080
2100

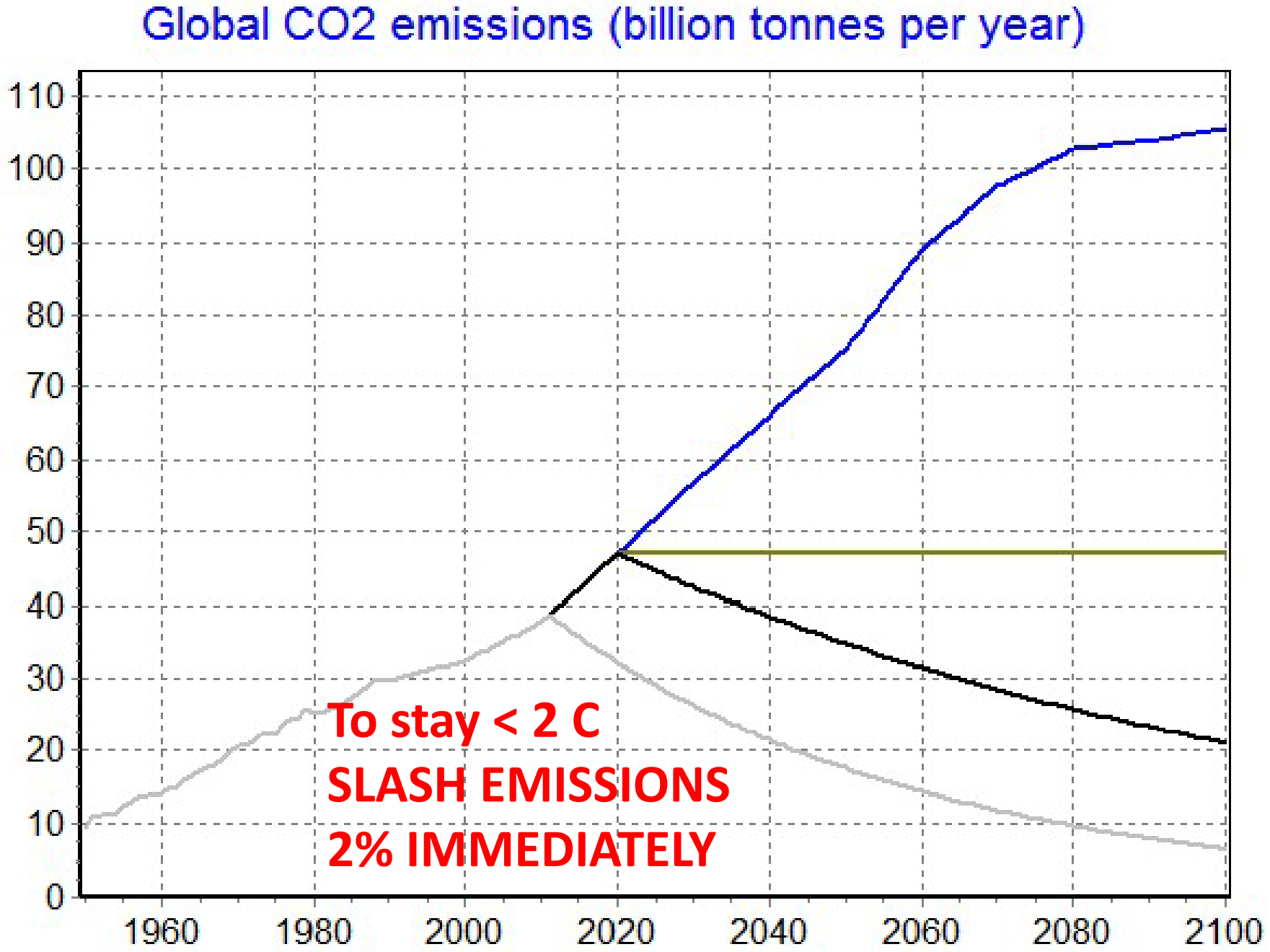

Temperature above pre-industrial (degrees C)
4,5
4
3,5
3
2,5
2
1,5
1
0,5
1960
1980
2000
2020
2040
2060
2080
2100


Global CO2 emissions (billion tonnes per year)
110
100
90
80
70
60
50
40
30
20
10
0
1960
1980
2000
2020
2040
2060
2080
2100
STABILIZE EMISSIONS


Atmospheric CO2 conc. (parts per million, ppm)
900
850
800
750
700
650
600
550
500
450
400
350
300
1960
1980
2000
2020
2040
2060
2080
2100


Global CO2 emissions (billion tonnes per year)
110
100
90
80
70
60
50
40
30
20
10
0
1960
1980
2000
2020
2040
2060
2080
2100
CUT EMISSIONS 1%
FROM 2020


Atmospheric CO2 conc. (parts per million, ppm)
900
850
800
750
700
650
600
550
500
450
400
350
300
1960
1980
2000
2020
2040
2060
2080
2100
STILL T→ 2.5 OR 3°


Global CO2 emissions (billion tonnes per year)
110
100
90
80
70
60
50
40
30
20
10
0
1960
1980
2000
2020
2040
2060
2080
2100
To stay < 2 C
SLASH EMISSIONS
2% IMMEDIATELY

Why Market Based Instruments?

Is GG possible? Decoupling

- Reduce E -2% & Growth +5%

- ε = E/Y MUST FALL

  FASTER THAN Y RISES!

Transport Sector

- Fuel demand $Q = Y^a P^b$
- Elasticities 1 for Y, –0.8 for P
- HOW

ANSWER: P + 9%

$$(1.05/0.98)^{1/0.8} = 1.09$$

Doubbling every 8 years; Possible??

→Very stringent policies needed

Also for electricity, airtravel, plastics, red meat, aluminium…

Transport Fuel Use in OECD
Gtons fuel (and ~C*(12/14))

	Real	UK prices	US prices
Fuel use	**1,13**	0,72	1,47
		-36%	+30%

Reactions?


SET US FREE
WITH MORE
UNITED STATES OIL
When Trucks Stop
AMERICA STOPS!
When Trucks Stop
AMERICA STOPS!

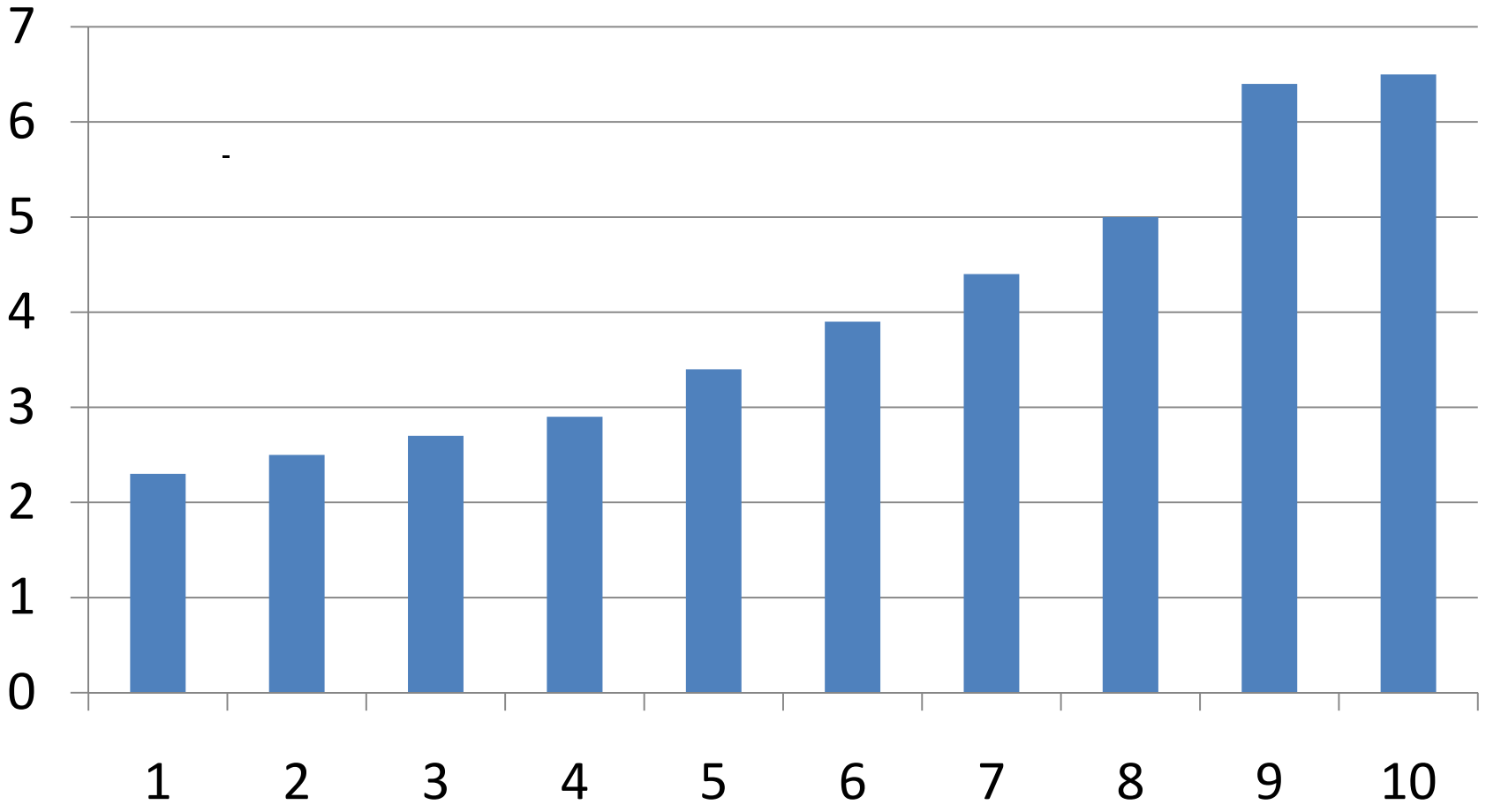

© PA


NO GAS TAX
Fill UP YOUR Caddy GOVERNOR
HONK NO GAS


ALISIN!
12% VAT
PETROLYO
KRUDO!


CPI
CPI(M)
RSF
© Reuters

Gasoline taxes Regressive in INDIA?



Budget shares of fuels

Conclusion

- For Green growth we must have PRICE on EMISSIONS

- Otherwise LEAKAGE

more ENVIRONMENTAL PROBLEMS

- Biodiversity, Ozone Depletion
- Spread of Toxic substances
- Manipulation of N & P cycles
- Acidification, Water
- **Biofuels, Nuclear**

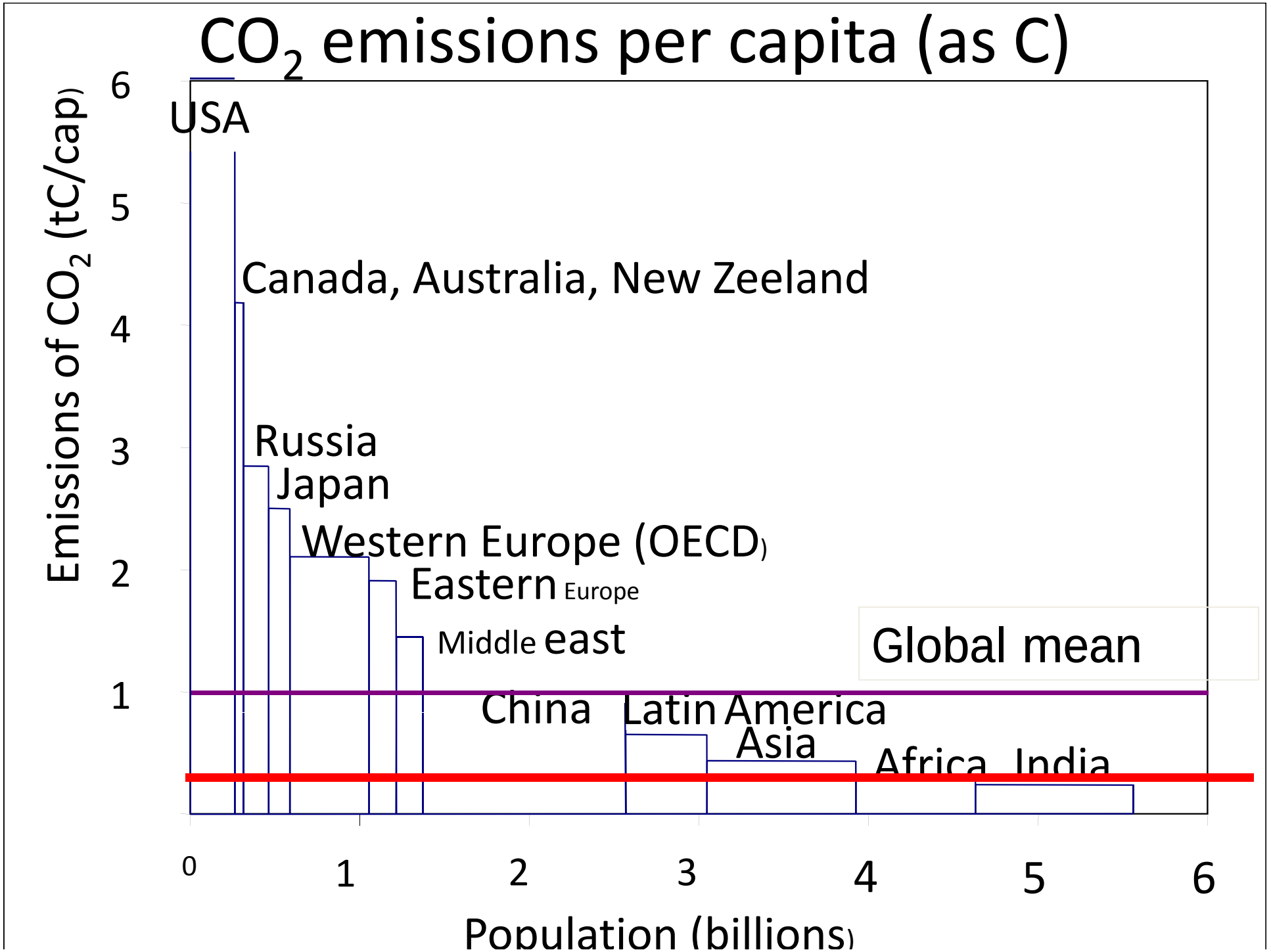
- **Biofuels**: State of debate quite schizo
- On the one hand enormous hopes:
- On the other hand – spectre of hunger riots…
- Zenebe: rural poor win urban poor loose
- Afr States shouldn't subsidize or allow landgrab

- **Nuclear**; Revival somewhat exagerated before
- After Fukishima, resistance higher, costs higher;
- Face the fact that this technology not very attractive in age of terrorism

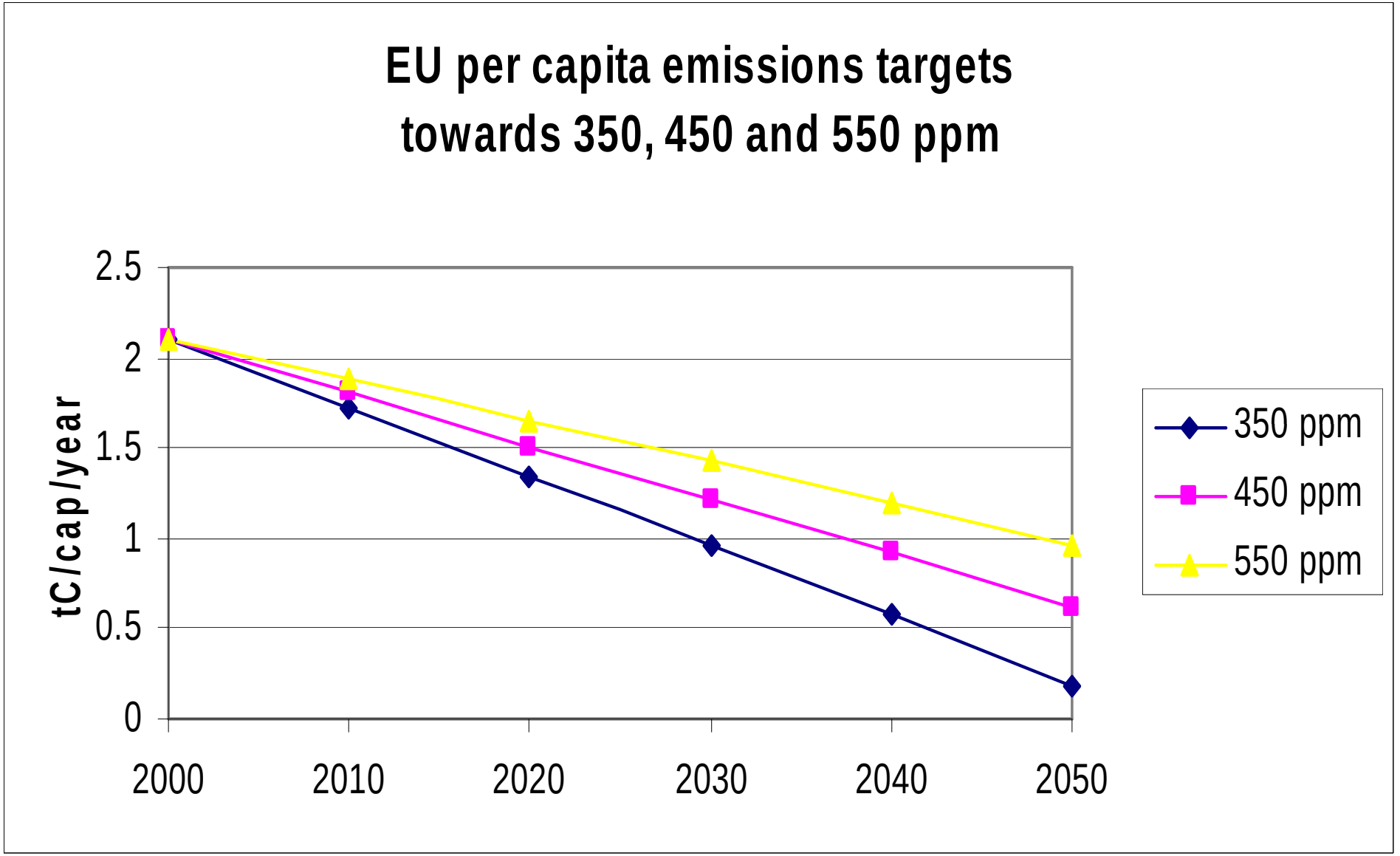
Generalizing Copenhagen failure

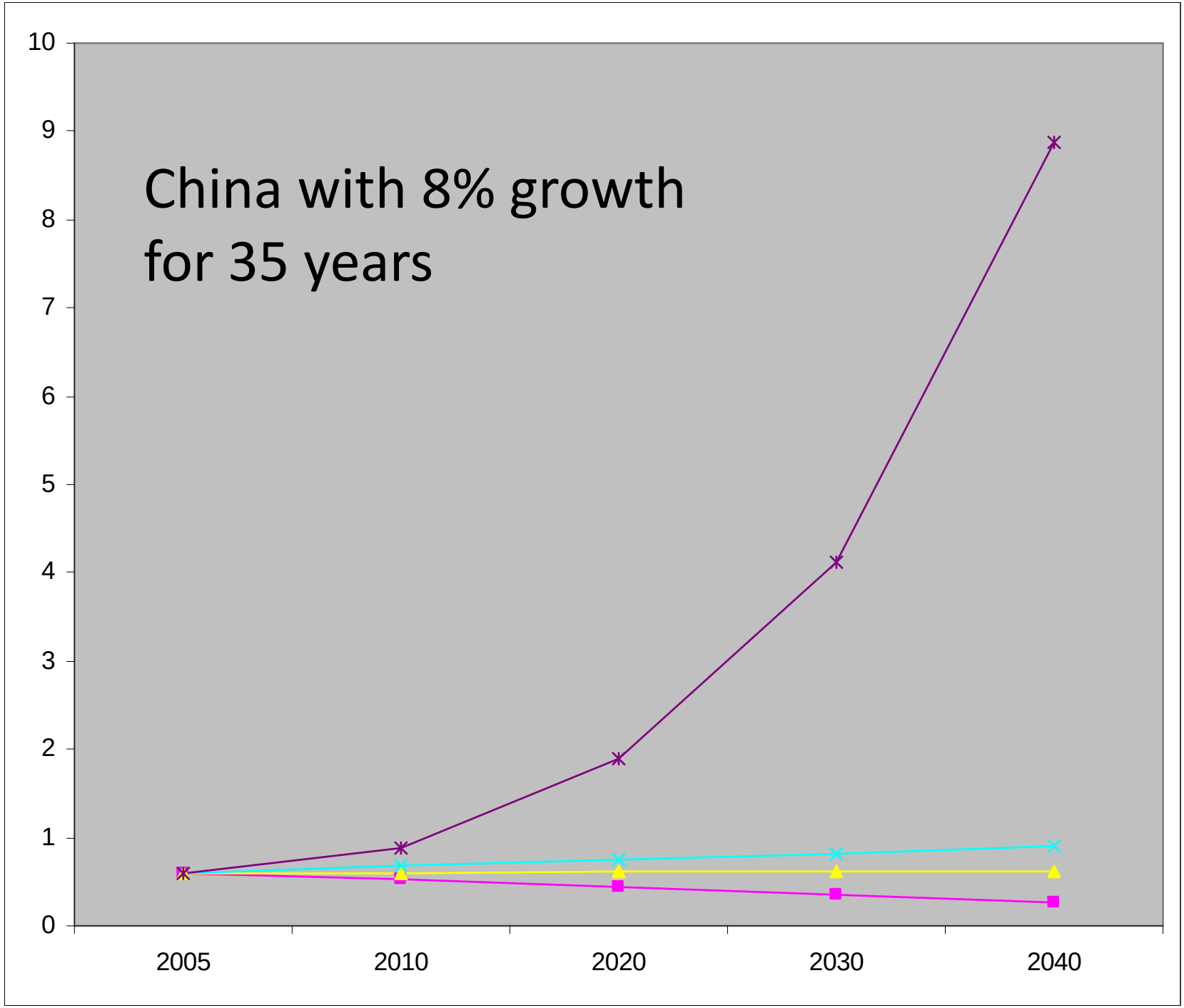
- ”Lets face it: we aren’t going to get a UN style agreement on reductions”
- Lets do green growth instead…

- Why would India build CCS, Germany build nuclear plants or the US stop driving big cars?
- Why should the poor do anything?
- Cop: Accord is voluntary provision of public G


CO_2 emissions per capita (as C)
Emissions of CO_2 (tC/cap)
6
5
4
3
2
1
0
1
2
3
4
5
6
Population (billions)
USA
Canada, Australia, New Zeeland
Russia
Japan
Western Europe (OECD)
Eastern Europe
Middle east
China
Latin America
Asia
Africa
India
Global mean

Per capita targets (EU)

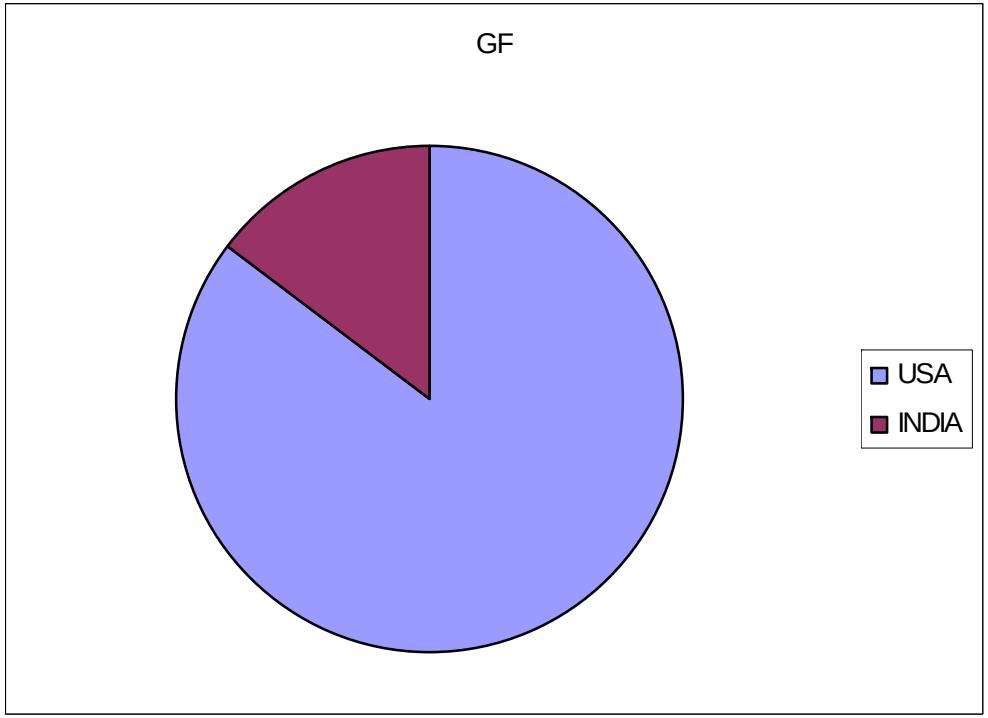


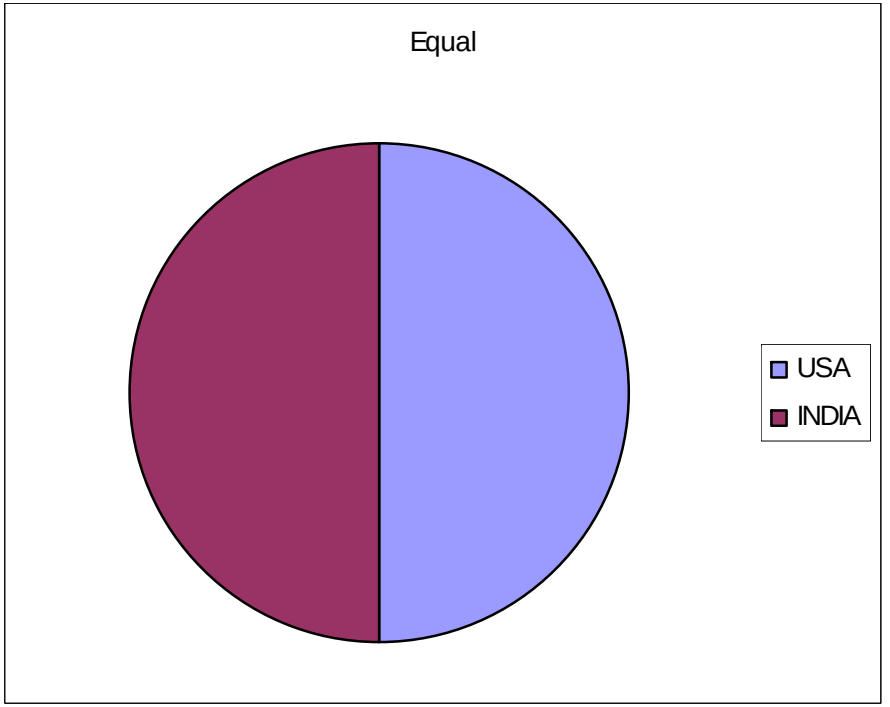

China with 8% growth
for 35 years
10
9
8
7
6
5
4
3
2
1
0
2005
2010
2020
2030
2040

Different burden allocations

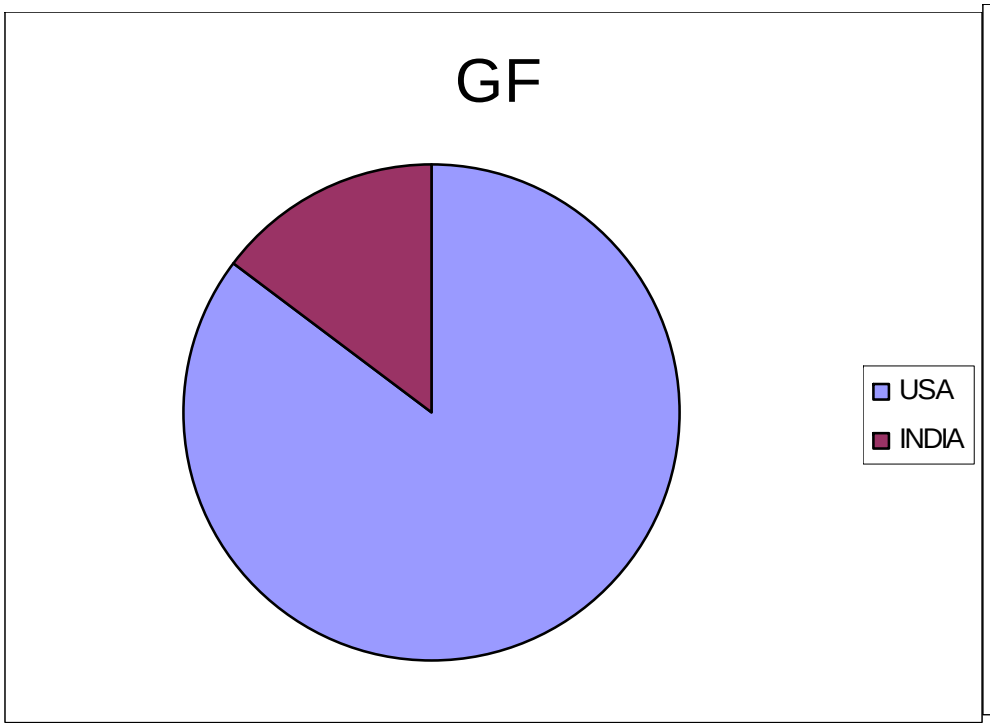
	Current	GF	Equal	Per Capita
USA	1750	875	512,5	170
INDIA	300	150	512,5	855
Total	2050	1025	1025	1025

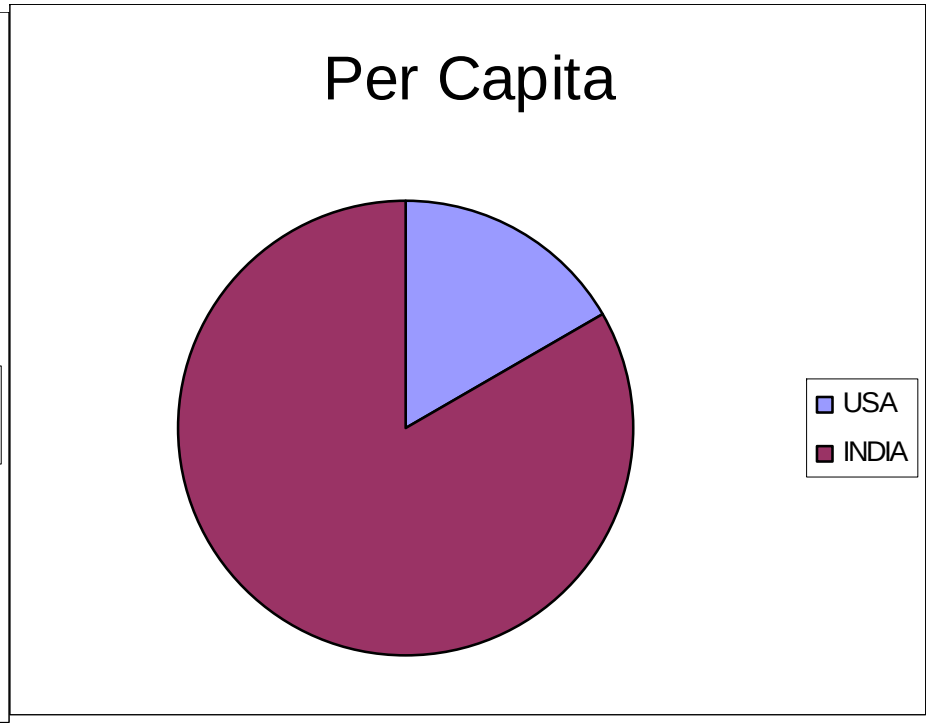
The allocation between US and India





The allocation between US and India





The right to emit **valuable**

20 Gtons CO_2 à 50 $/t = 1000 B$

	Grand father	Per capita
INDIA	4%	16%
USA	16%	4%

The coordinated domestic tax idea

	Current	GF	**TAX**	Per Capita
USA	1750	875	**575**	170
INDIA	300	150	**450**	855
Total	2050	1025	**1025**	1025

Importance of Public Opinion

Large majority in China, US & EU believe CC

- and that humans are responsible.
- Fewer in USA compared to China/EU
- WTP as % of income same for Americans and Chinese, higher for Swedes.
- **HIGH** WTP for **fairness** *as perceived locally*

Annual mean WTP in PPP-adjusted dollars.

Burden-sharing rule	USA	China
Historic emissions (US 67%, China 18%)	-9.10** (3.9)	141.37*** (21.6)
Equal per capita emissions (US 55%, China 38%)	-22.20*** (4.4)	-77.53*** (14.7)
Ability to pay (US 47%, China 29%)	9.4** (4.4)	90.26*** (15.6)
Current emissions (US 42%, China 40%)	21.90*** (4.3)	-154.11*** (26.6)

BINDING TREATY OR Pledges

	Reduction	t/cap
EU	20-30%	10
Jap	25%	11
Russia	20-25%	14
Canada	20%	25
Austr	5-25%	27
USA	17%	19
India	-25%	1,7
China	-45%	4,7

World Energy Outlook:

- Green growth by abolishing subsidies
- Most subsidies in weak, fossil producing states.. What's in it for them?
- Interests of joining a coalition; for fossil producers?
- Interest of really poor countries who are upset at broken promises of climate finance…

Africa, paying just for roads…

Africa has worst roads in the world. Physically larger than China, western Europe, India and the US, Has only 171,000 km of all-weather roads - less than Poland.

Now extra $183bn just to maintain its few paved roads over the next 60 years because of climate change. (**WELFARE Weights for EVALUATION)**

Have been promised resources but not seen much yet.

Thank you

RESEARCH

A Second Market Failure!

MASDAR 0-carbon and 0 waste city.

Feed-In tariffs?

”Ordinary Cleaning”

Abu Dhabi

- President Sheikh Khalifa bin Zayed Al Nahyan
- Area 67,000 sq km
- Population 1,6 M
- Oil reserves 92.2 Bbbl
- Water 0 (Desalinated 185,000 M. Imp Gal)
- Agriculture Dates… Camels: 400 000
- GDP AED 550 Billion = 150 B$
- Oil sector 49.4% (?)
- GDP/cap ~ 90 k$/cap or 37 k$/cap

But we all live in Masdar...

- Prices Wrong → Market undersupplies R&D
- R&D may also be inappropriate to conditions

- Subsidize R&D but....
- If you put billions into research.
- Researchers will write articles.

- But how do you make sure they develop the technologies that are just adequate for a shadow price of say 75$/ton CO2?

Thank You

Masdar City

- 0-carbon and 0 waste city.
- $22 billion city, covers 6 kilometres,
- Integrated "Green Community" pop 45,000
- Solar, wind and other renewable energy.
- Motor vehicles banned.
- 1,500 companies; transparent laws business-friendly atmosphere.

Special Strange Statistics

- Population/capita >3

Special Strange Statistics

- Population/capita >3
- Price of Energy ~ 0
- Price of Labour ~ 0

Special Strange Statistics

- Population/capita >3
- Price of Energy ~ 0
- Price of Labour ~ 0
- Price of Money ~ 0

Stern Review

- Costs of doing nothing considerable
- ~[5-20%] of GDP

- Costs of action smaller ~ 1%

SO WHAT ?

- Discounting:
- Hoel/Sterner: Relative Prices
- Sterner Review: CC costs bigger

- New work: Relative Income;
- More new work: Habit formation

The coordinated domestic tax idea

- GF: $\hat{e}_{i,GF} = S\ e_{i0}/E_0$
- EQUAL $\hat{e}_{i,eq} = S\ n_i/N$
- TAX $\hat{e}_{i,TAX} = S\ e_{i0}(1+g_i)^t(P+T_i)^{-\beta t}/E_t$