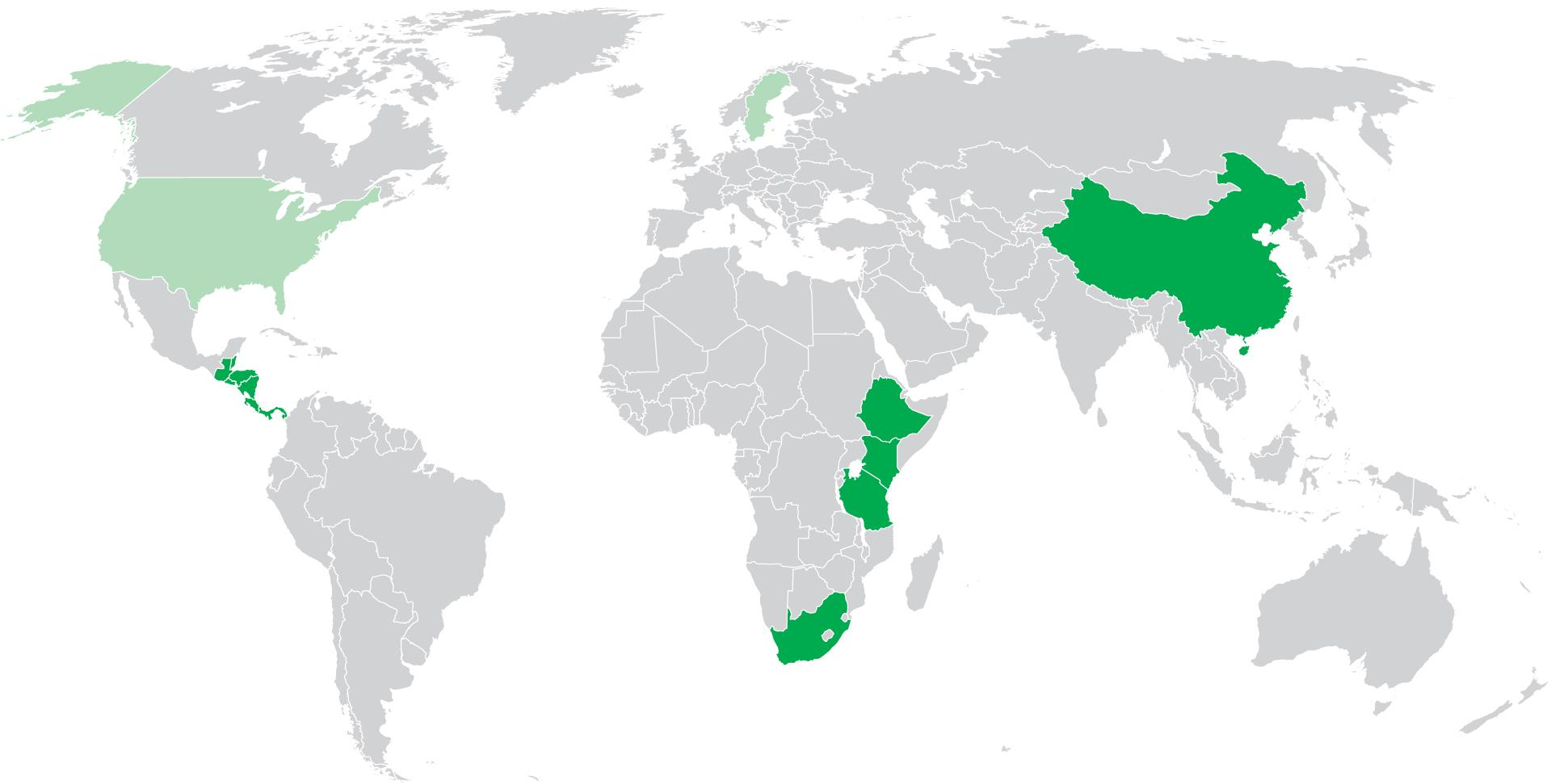


Harmonised Carbon taxes: Distributional consequences..

- Thomas Sterner
- Göteborg
- RFF Washington
- Statistics Norway, Oslo
- Cape Town
- EDF, New York
- Collège de France, Paris





+ Chile, Vietnam, India,
Colombia, Ghana,...

Transport and Climate: policy instruments

Thomas Sterner
Gothenburg

Policy design

Equity

Discounting

Policy Instruments
for Environmental and Natural
Resource Management



Thomas Sterner and Jessica Coria

FUEL TAXES AND THE POOR

THE DISTRIBUTIONAL EFFECTS OF
GASOLINE TAXATION AND THEIR IMPLICATIONS
FOR CLIMATE POLICY

EDITED BY
THOMAS STERNER



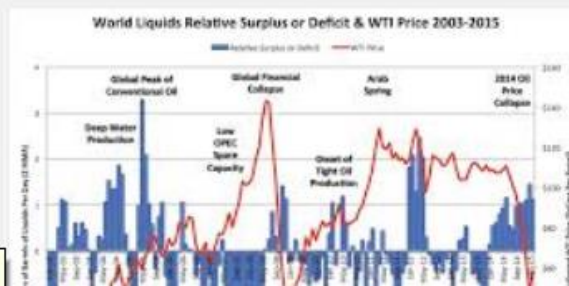
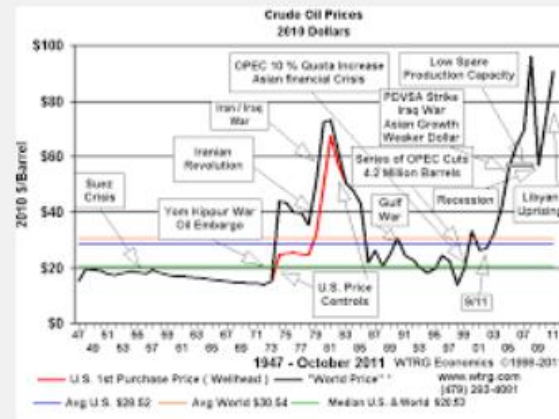
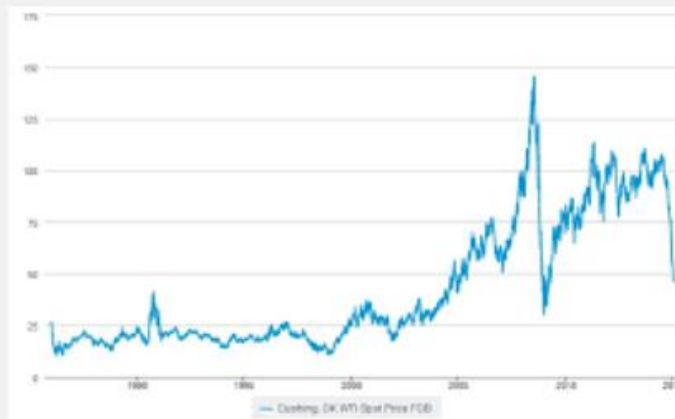
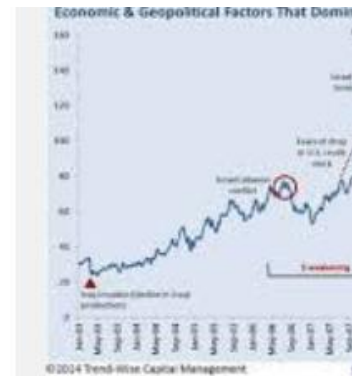
2015 Bonne Année pour le Clima?

IPCC

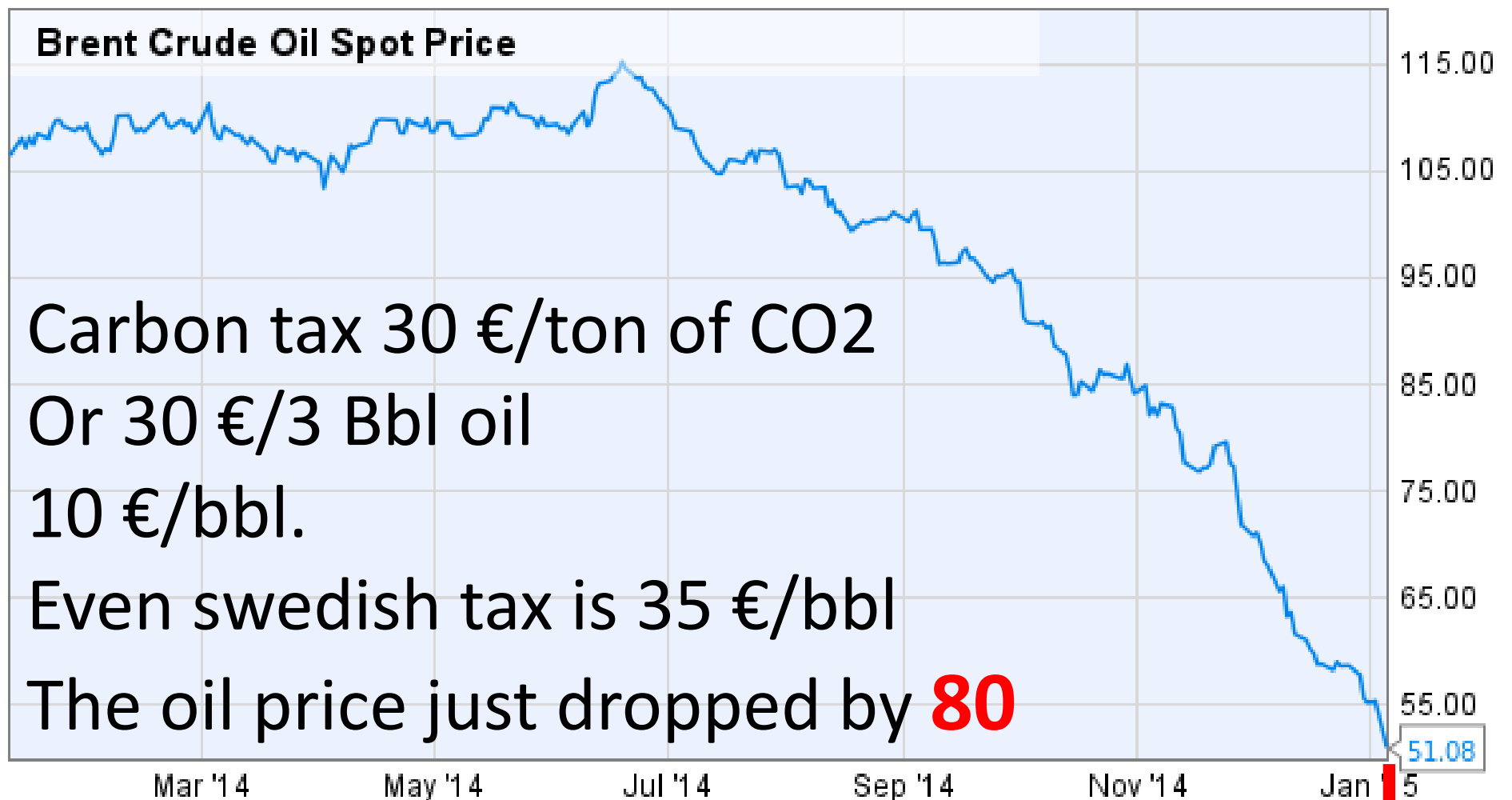
COP21

Mais les PRIX

Google: Oil Prices



Real oil prices falling



Gasoline prices \$/Gallon

- Date 2/8/2016
- U.S. 1.759
- PADD 1 - East Coast 1.794
- PADD 1a - New England 1.842
- PADD 1b - Central Atlantic 1.879
- PADD 1c - Lower Atlantic 1.716
- PADD 2 - Midwest 1.518
- PADD 3 - Gulf Coast 1.561
- PADD 4 - Rocky Mountain 1.753
- PADD 5 - West Coast 2.312
- California 2.486
- Weekly Retail Gasoline Prices, Regular Grade, by Week and PADD (Self Service Prices per Gallon, Including Taxes)

The age of cheap energy?

- Oil Prices falling
- US Gas never been cheaper
- (fracking) prices falling
- Renewables prices falling

Heureux si les prix sont bas?



Fossil prices low **BAD** because:

- Stop renewables research and deployment
- Stop Efficiency investments
- Encourage waste,
- Stop insulating houses
- Encourage fertilizers, aluminium, gasguzzlers, sprawl
- Frighten solar investors
- **So oil price fall means more to ALCOA than Paris**

Fossil prices low **good** because:

- Keep oil and gas in the ground
 - Dont build Xcel pipeline
 - Dont develop heavy tarsands,
 - Stop fracking and drilling...
-
- Frighten investors with stranded assets

What do we need or hope for for the climate?

- Low producer prices
- AND
- High consumer prices
- le carbon pricing

Copenhague Echoué



Paris: Succé

Nations Unies
Conférence sur les Changements Climatiques 2015
COP21/CMP11
Paris, France

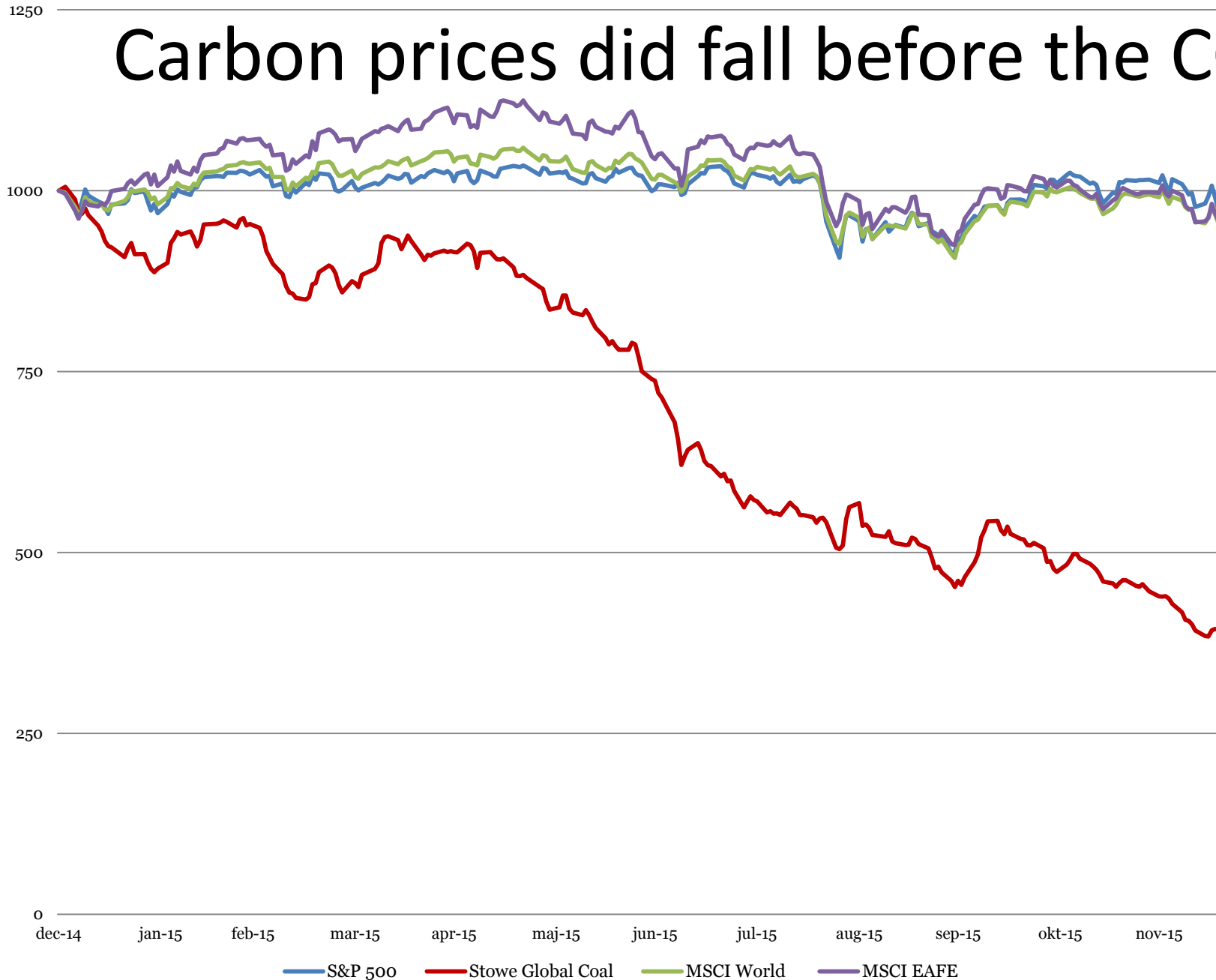


Comment evaluer Paris COP 21?

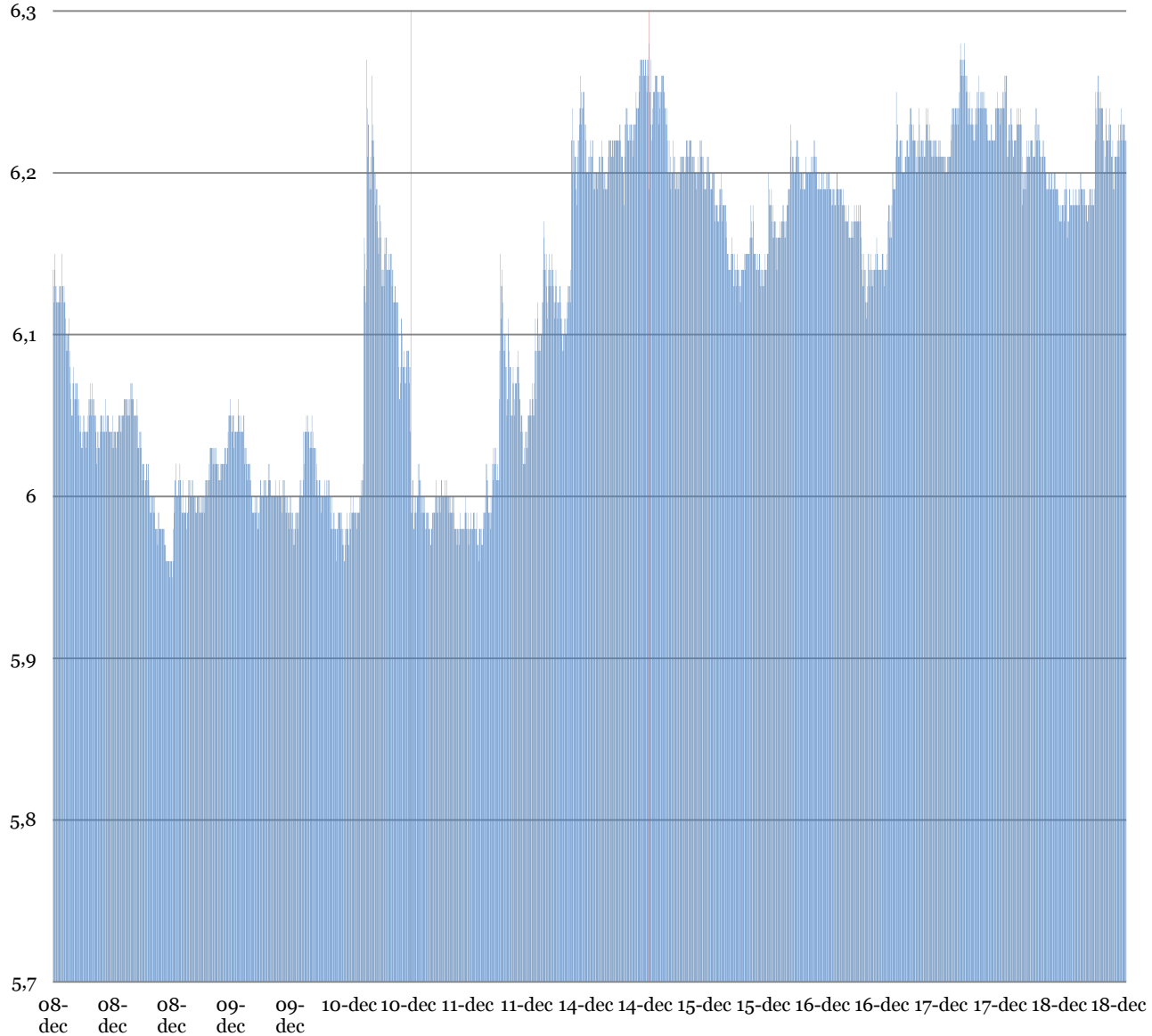
- Un Grand succès pour la diplomatie française
- $<2^{\circ}\text{C}$ -----même 1,5
- Pas de Prix Carbone
- Les plans sont-ils suffisamment contraignants?
- Les actions Charbon/Petrolières n'ont pas bougé

Stowe Global Coal Index vs Benchmarks
(31/12/2014-18/12/2015)

Carbon prices did fall before the COP



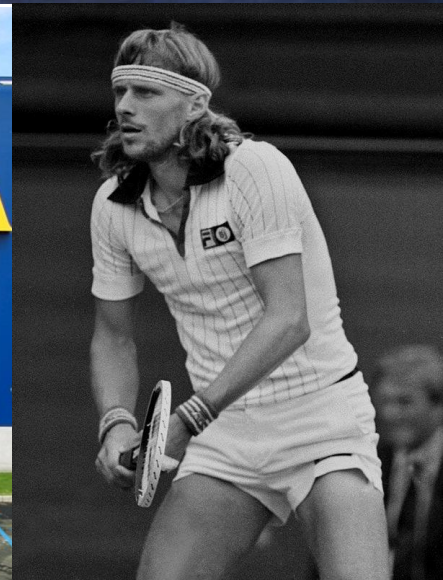
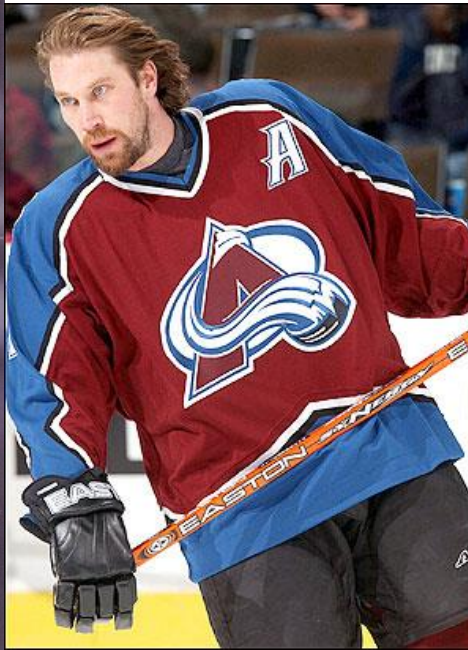
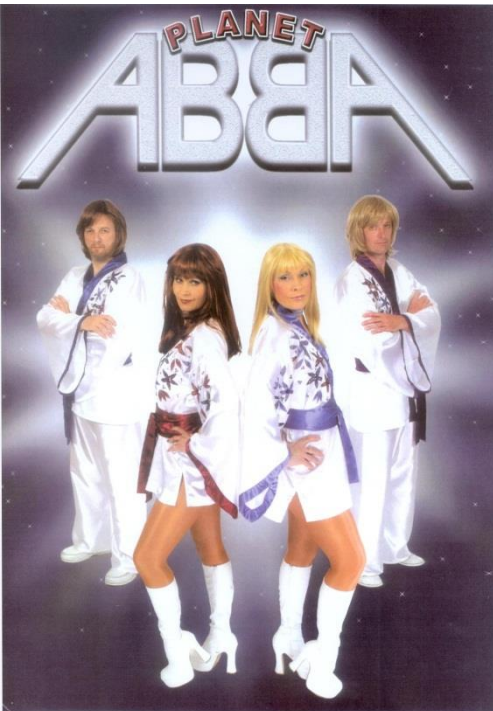
But not during the COP. : Coal China



National interest in C-tax

- Carbon taxes in Sweden
- Harmonized carbon taxes

CO2 tax Sweden 125 \$/Ton



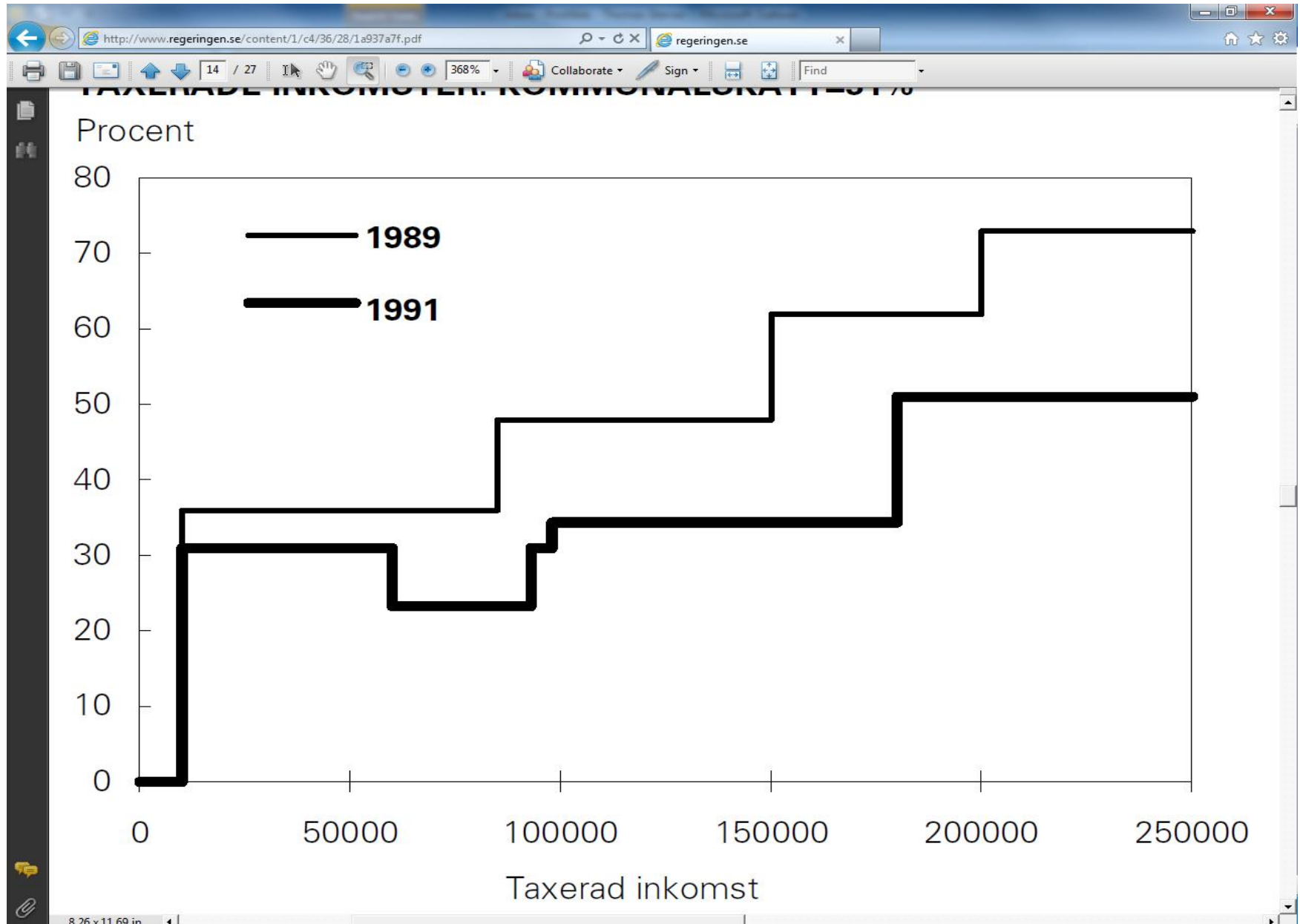
125 \$/ton and life goes on...



576x432 81kb JPEG



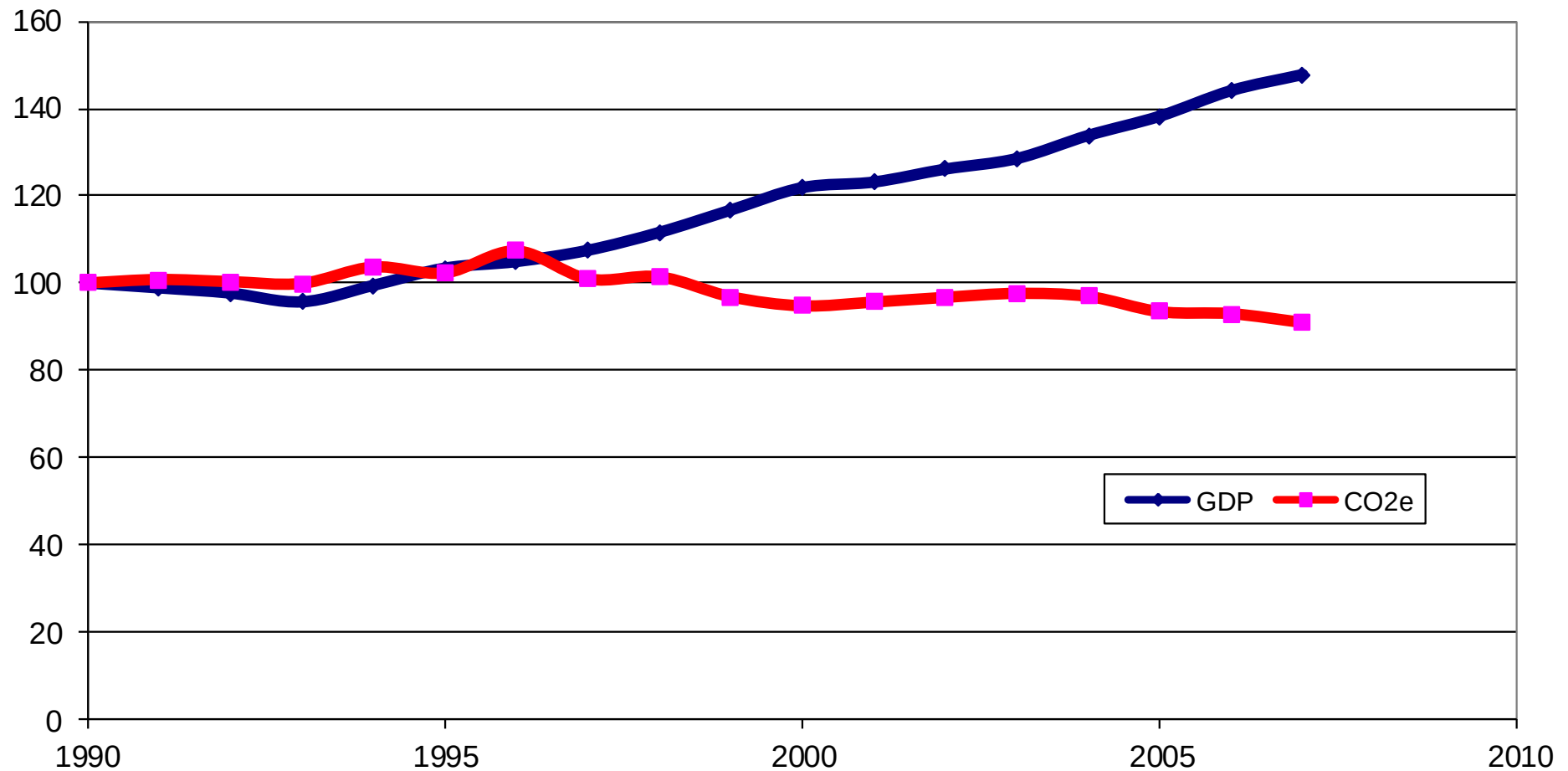
Context: Reduce Marginal taxes



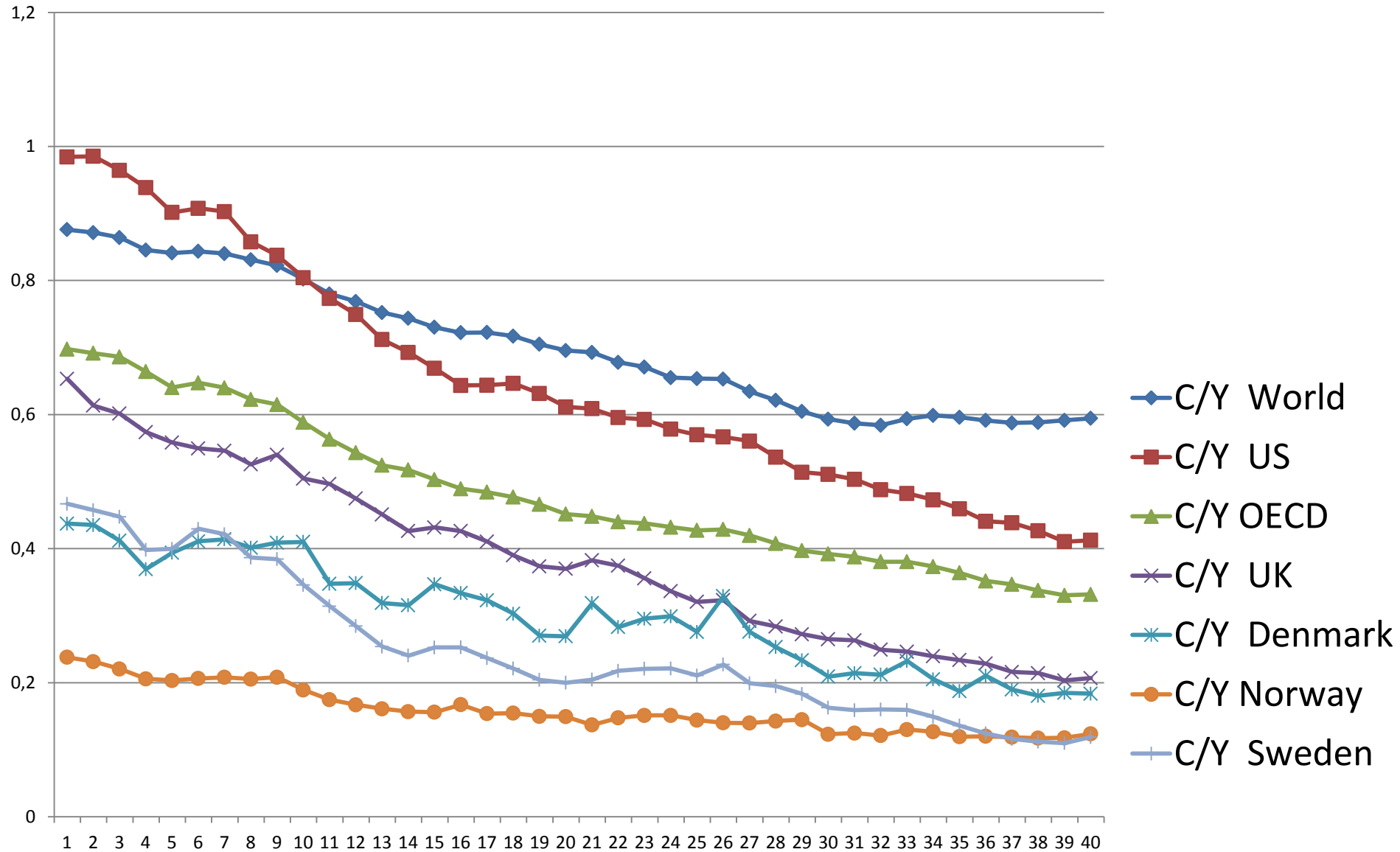
Parlament also:

- Abolished wealth tax, inheritance tax,
- Modified property tax
- Broadened tax base for VAT etc
- includes Services, **energy**, télévis., heat etc
- Reduced profit taxes for companies
- Total 10 billion € (30% environnemental)

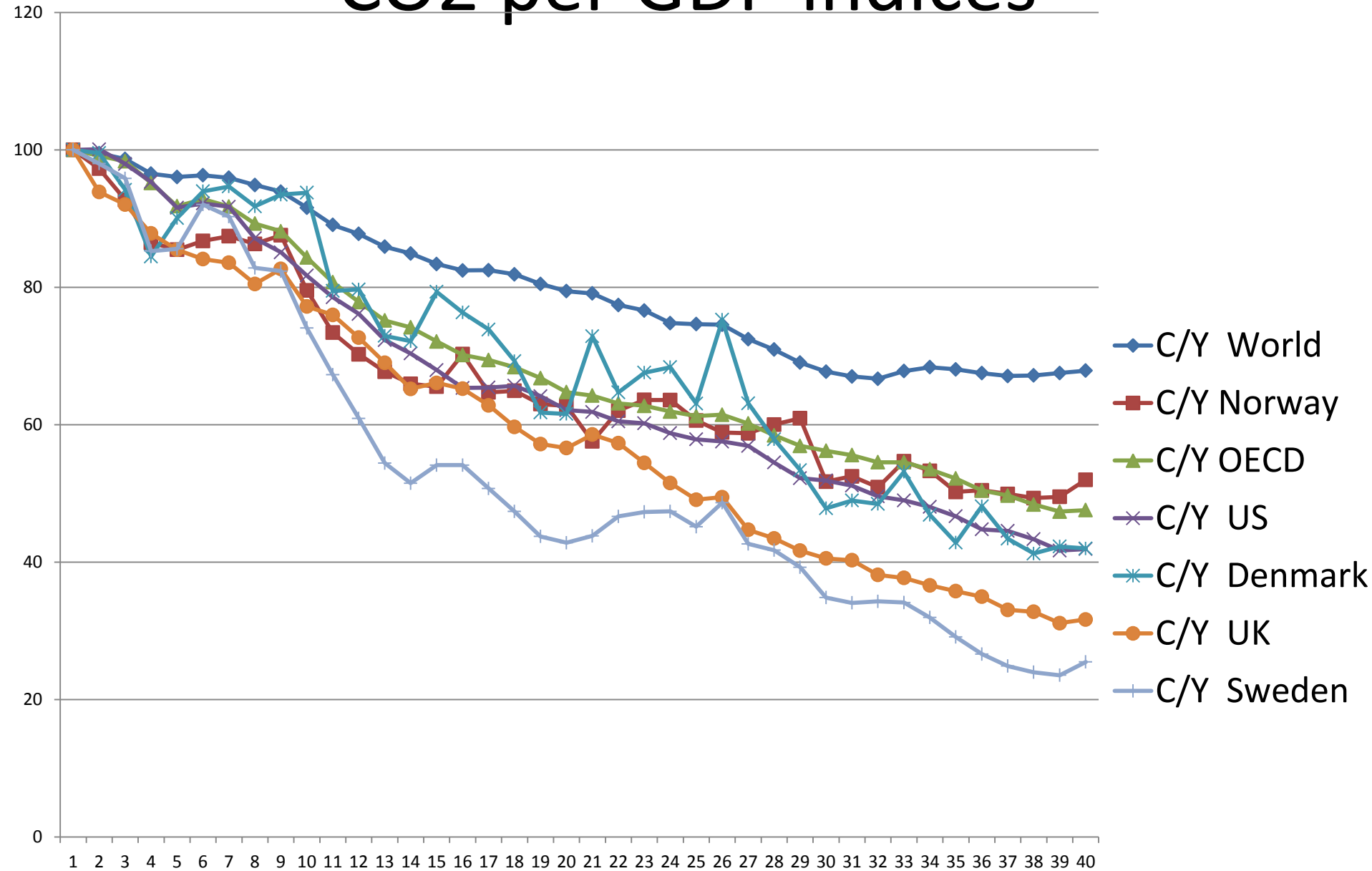
CO₂ -9% & GDP + 48% 1990 - 2007



Tons CO₂ / \$ GDP

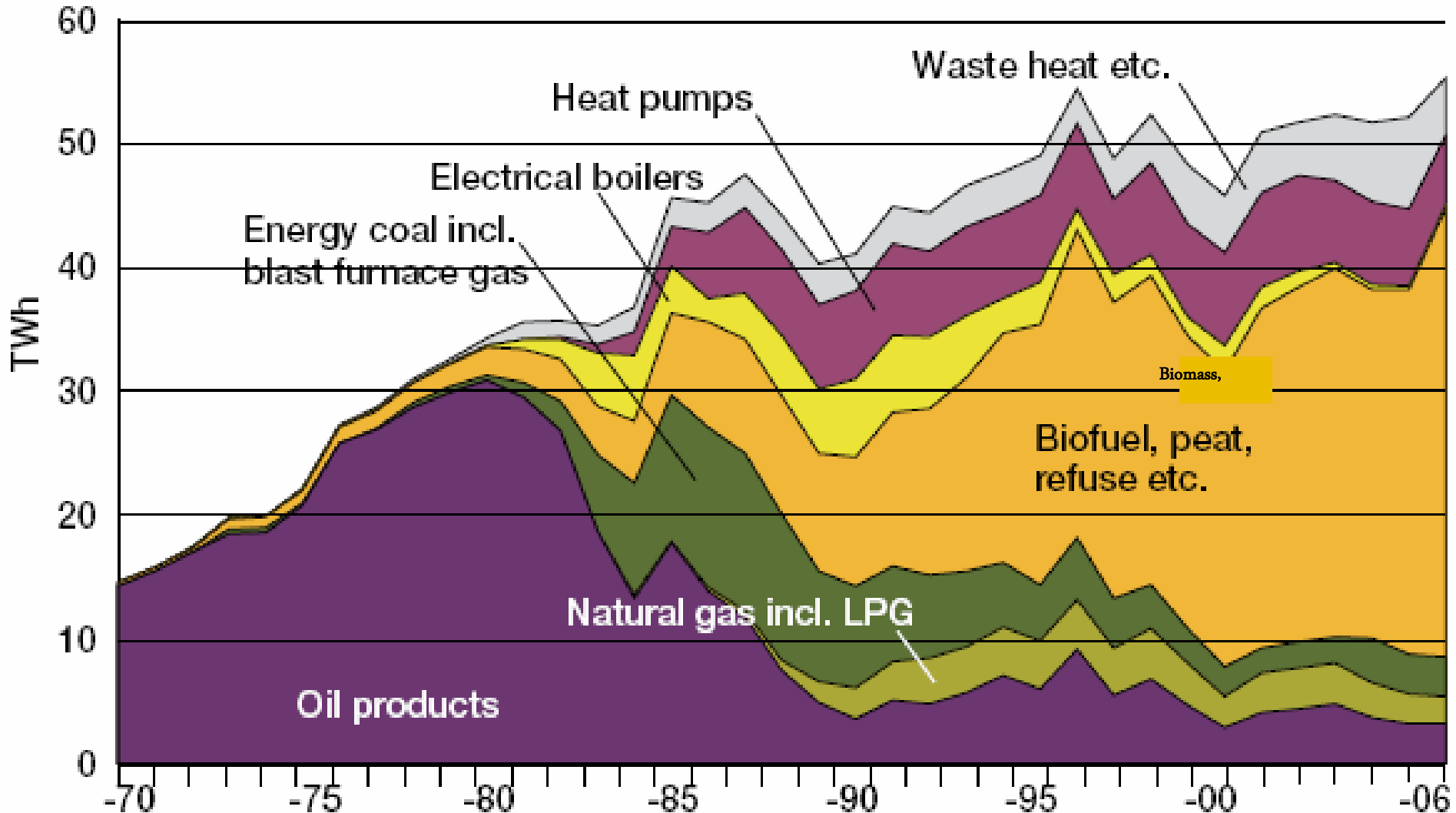


CO2 per GDP indices

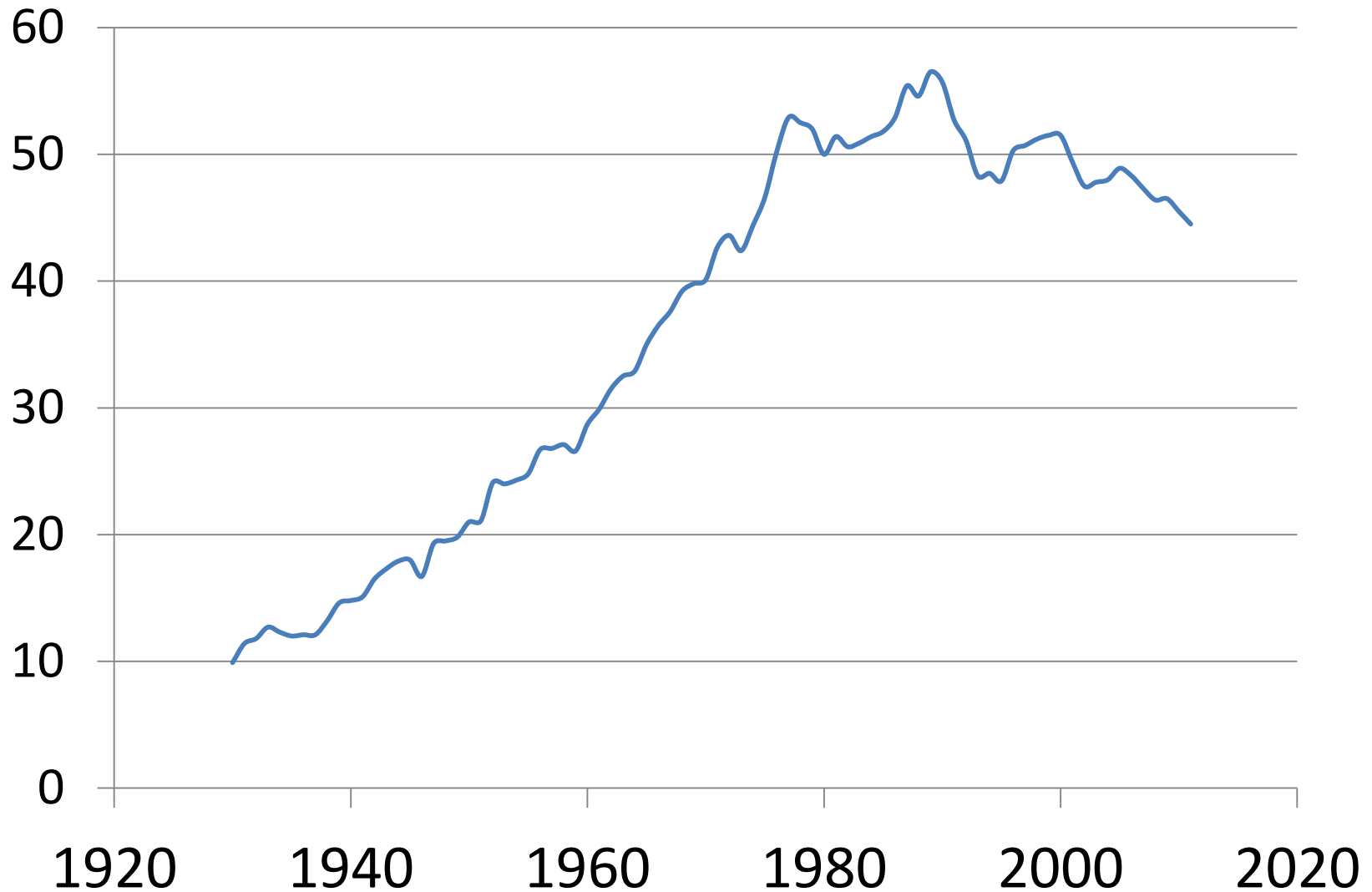


District heating 1970-2006

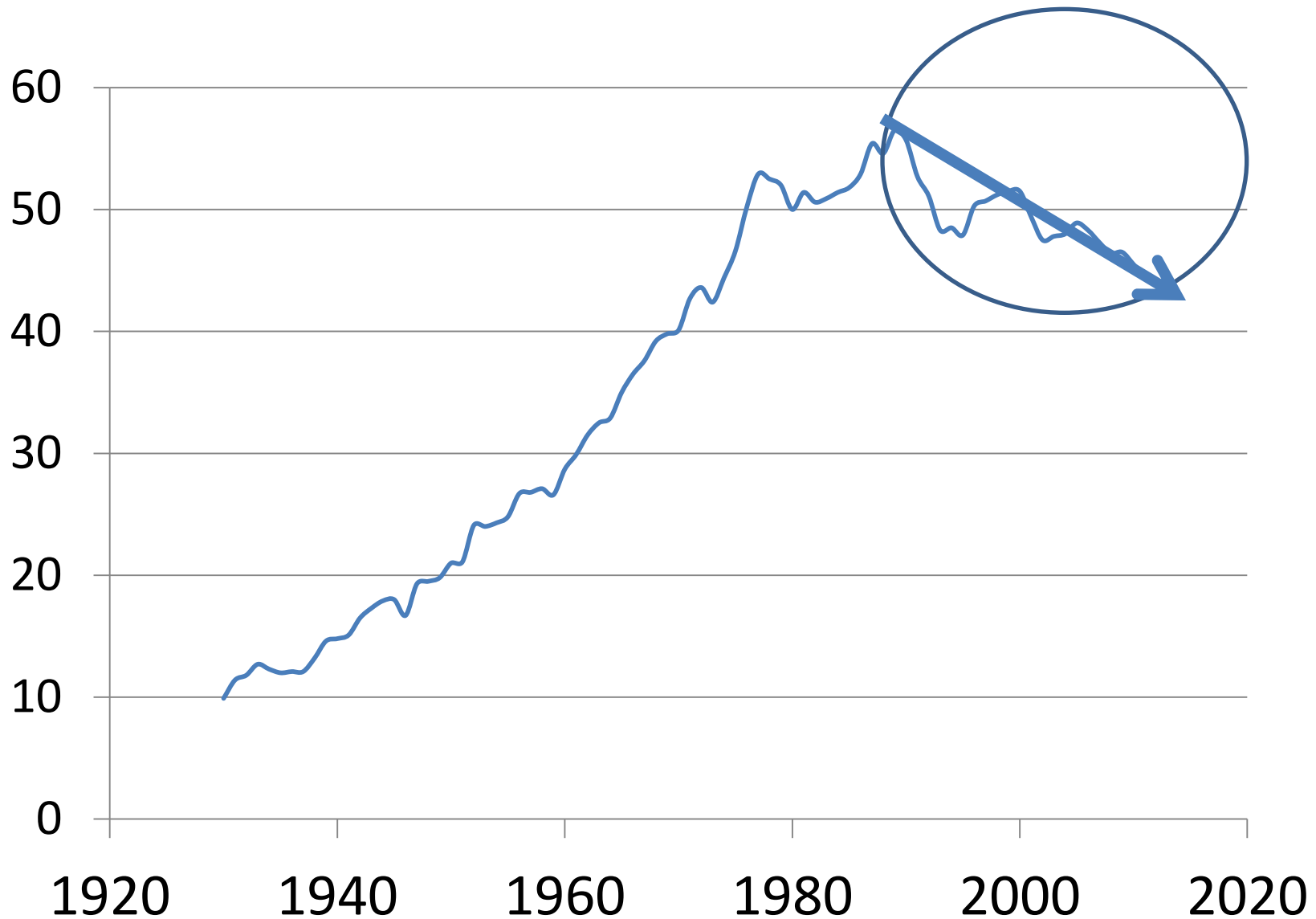
2007 54 TWh (+ 32 % > 1990) & Bio 24 → 70 %
50 % of total heat. 76 % of flats.



% Taxes in Sweden 1990→

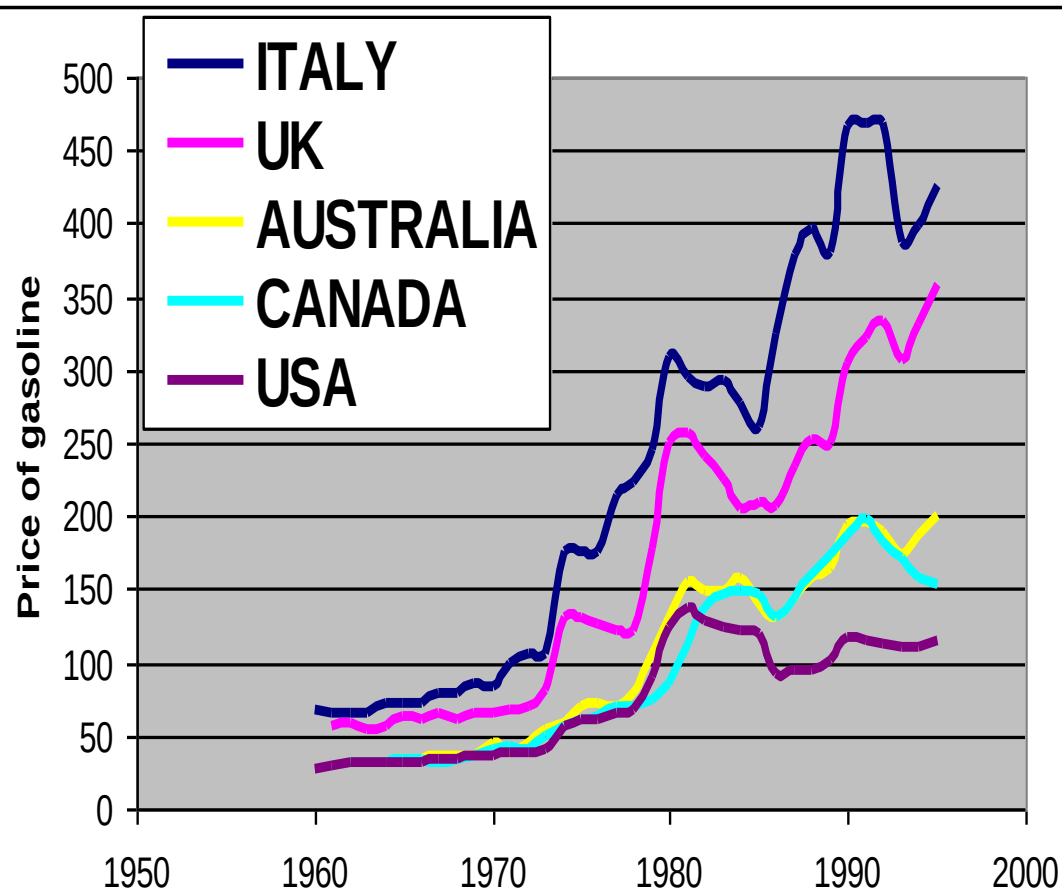


Taxes in Sweden did NOT go up in total

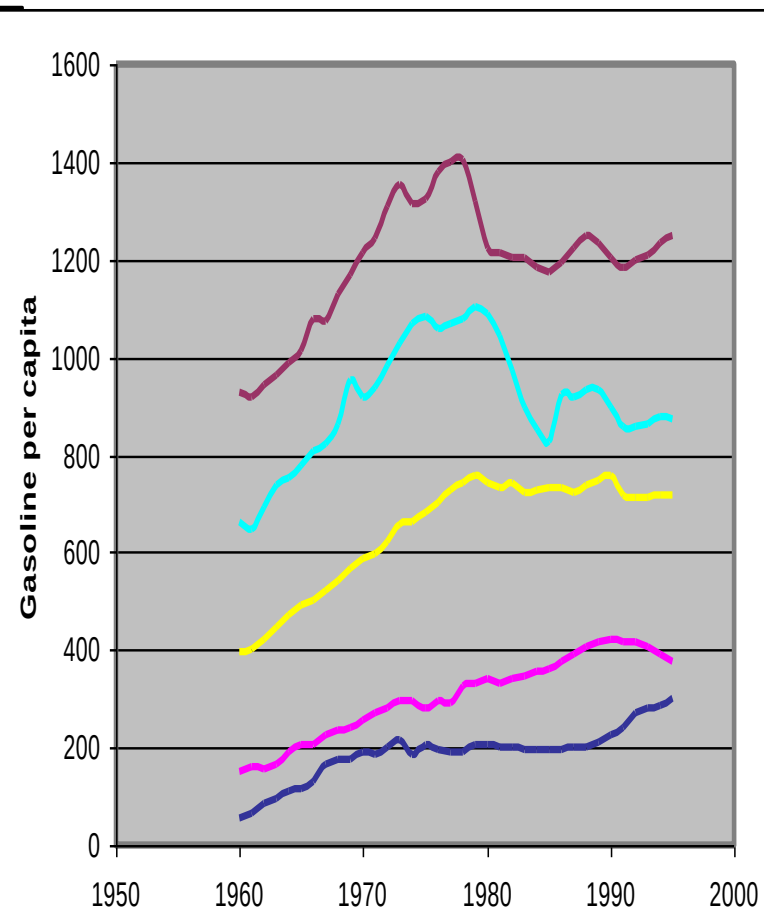


Petrol – *sectoral* carbon taxes

prices



Consumption/cap



EU (+Japan etc) gas taxes

- Effective total tax several hundred \$/ton
- Only instrument to have an atmospheric effect
- **SIGNIFICANT** harmonization in EU last 30 yrs
- Once Introduced – popular with Fi Min
- Even Oil countries like UK and Norway!

Easier to negotiate coordinated taxes?

- Quantity negotiations mired by fairness concern
- Tirole emphasizes efficiency properties of uniform price
- Nordhaus: Carbon Clubs
- Marty Weitzman, information content and degree of conflict concerning a tax T rather than a vector of abatement A_i for each country.

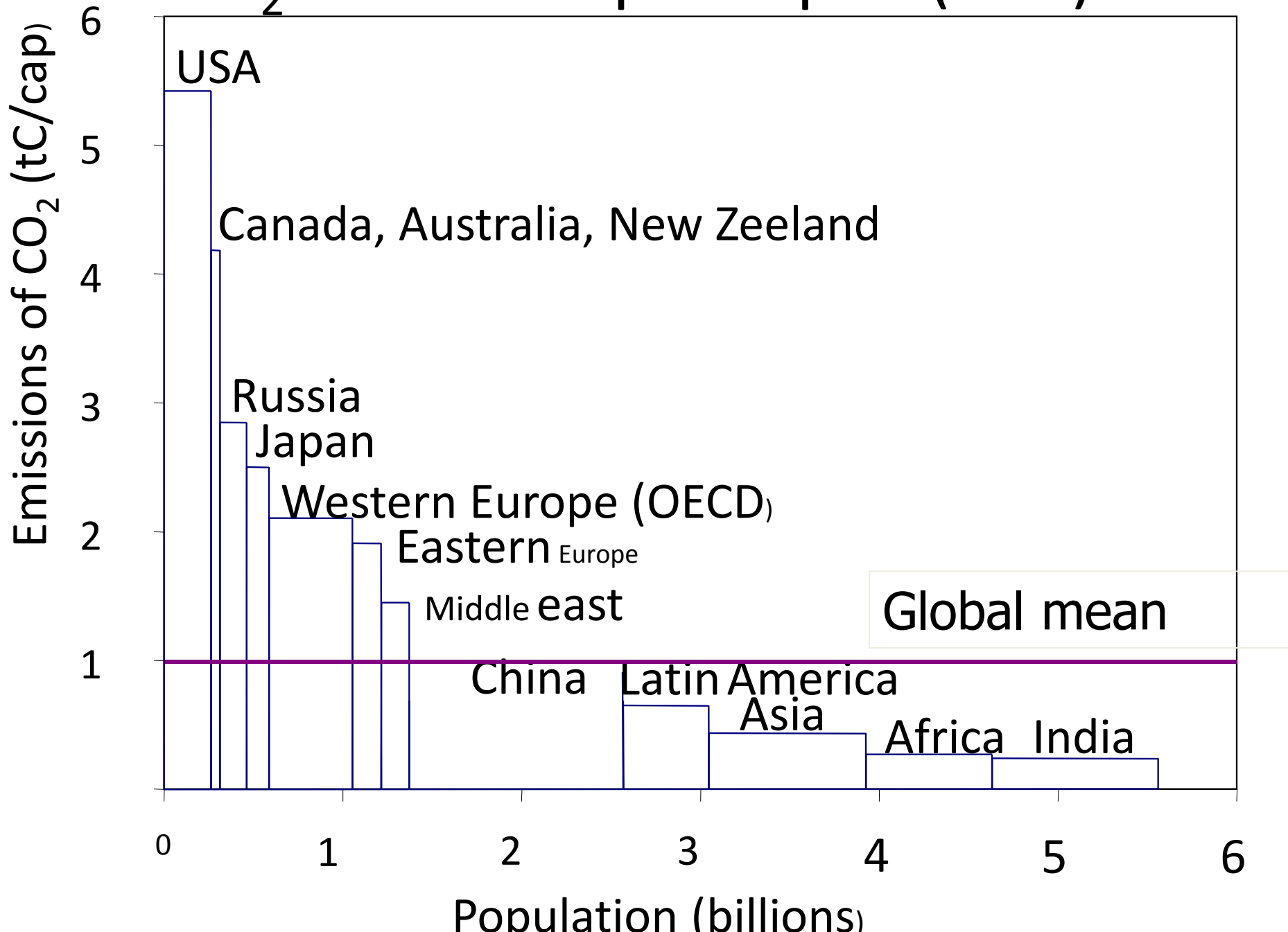
Is this national interest for ALL?

- Quantity negotiations mired by fairness concern
- Poor countries want per capita
- Fast growing countries nervous about cap
- Efficient countries want benchmarking
- Gas-guzzling countries want Grandfathering

Is this national interest for ALL?

- Quantity negotiations mired by fairness concern
 - Poor countries want per capita
 - Fast growing countries nervous about cap
 - Efficient countries want benchmarking
 - Gas-guzzling countries want Grandfathering
-
- For every Price Scheme there is an equivalent Q
 - What is physical analog of tax agreement ?

CO₂ emissions per capita (as C)



What is Fair?

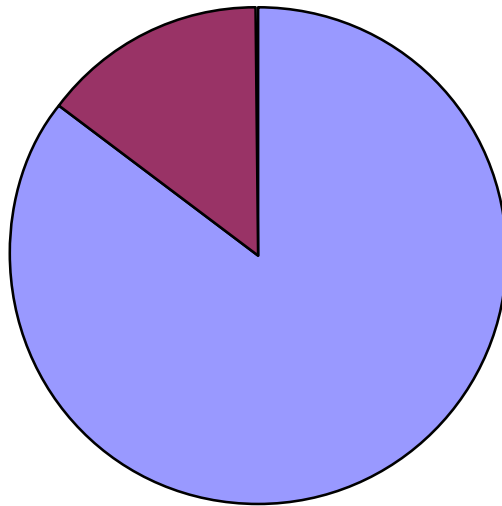
1. Equal emissions per capita
2. Equal access to stock (accumulated e) percapita
3. Equal ability to pay ~proportionality to income?
4. Equal reductions, Grandfathering
5. Equal effort : total or at the margin
6. Equal net benefit (more vulnerable do more)
7. Willingness to act

Differentes charges des allocations

	Current	GF	Equal	Par habitant
USA	1700	850	500	150
INDIA	300	150	500	850
Total	2000	1000	1000	1000

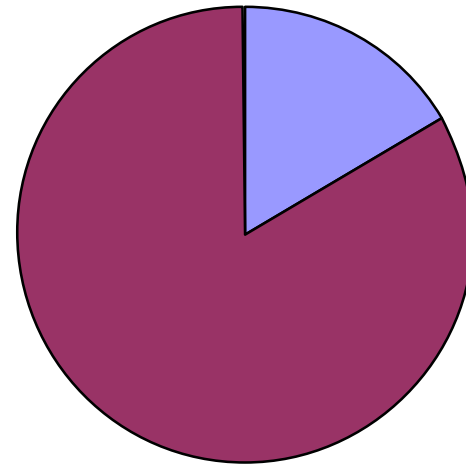
The allocation between US and India

GF



USA
INDIA

Per Capita



USA
INDIA

- Population in country i N_i
- Income per cap y_i
- Income $Y_i = y_i N_i$
- Carbon price P global and $P T_i$ nationally
- Carbon use $E_i = Y_i^a (P T_i)^b \Psi_i = (y_i N_i)^a (P T_i)^b \Psi_i$
-
- Carbon use ($a=1$; $T_i=T$) $E_i = Y_i (P T)^b \Psi_i$
- Global Carbon Use $E = Y (P T)^b$
- **Country share** E_i/E

Model of Carbon Emissions E

- $E_i = (y_i N_i) (PT_i)^b \Psi_i$

1. **Per capita** allocation $\sigma_{in} = N_i/N$

2. Proportion to **income** $\sigma_{iy} = Y_i/Y = \sigma_{in} * (y_i/y)$

3. **Grandfathering** share us $\sigma_{ig} = E_{i,t-1}/E_{t-1}$

$$= (y_i N_i) (PT_i)^b \Psi_i / Y (PT)^b = \sigma_{in} * (y_i/y) * (T_i/T)^b \Psi_i$$

This is prop to Y with extra benefit for those **who had low taxes** historically and **high Ψ**

What does a Harmonised tax imply?

$$\sigma_{ip} = Y_i(PT)^b \Psi_i / Y(\mathbf{PT})^b = \sigma_{iy} \Psi_i$$

SAME AS INCOME SHARE CORRECTED FOR Ψ

Same GF but countries cannot benefit from low tax

Reasonable?

Attractive? For India: Better than GF but not as good as per capita! Compensation needed?

Actually not too far from INDC either!

The right to emit **valuable**
50 Gtons CO₂ à 50 \$/t = **2500 B\$/yr**

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

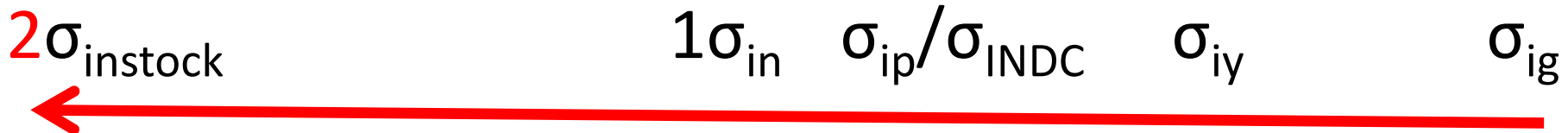
Elinor Ostrom



	Grand father	Per capita	INDC
INDIA	6%	18%	9%
USA	15%	4%	7%

What is Fair?

1. Equal emissions per capita σ_{in}
2. Equal access to stock (accumulated e) percapita
3. Equal ability to pay ~proportional to income? σ_{iy}
4. Equal reductions, Grandfathering σ_{ig}
5. Equal effort : total or at the **margin** σ_{ip}
6. Equal net benefit (more vulnerable do more)
7. Willingness to act σ_{INDC}



Conclusion

- Either make INDCs → NDCs and then tighten very significantly
- Or
- Introduce carbon taxation
- Or trust our luck and build green technology lobby.