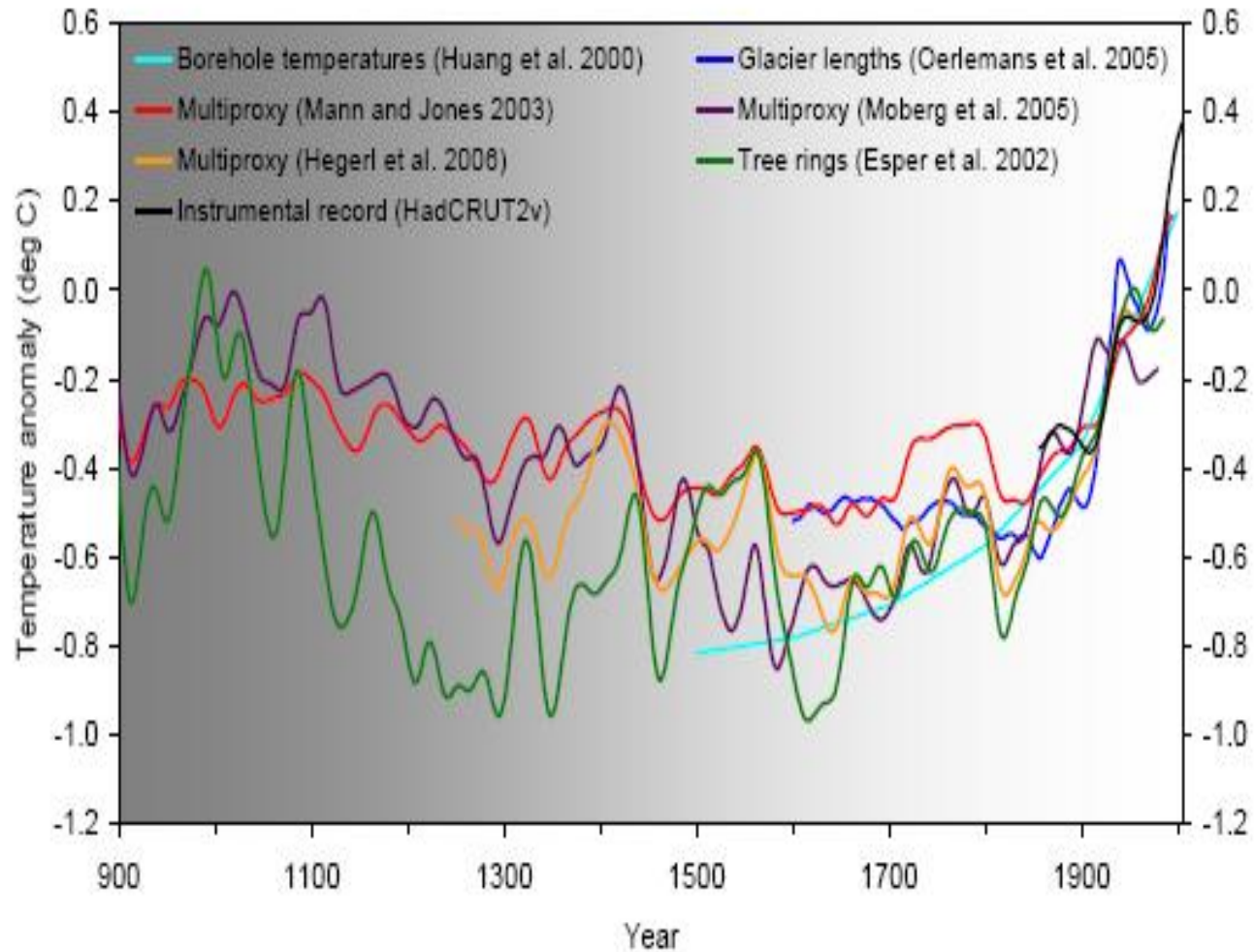


Policies for a reduced carbon world

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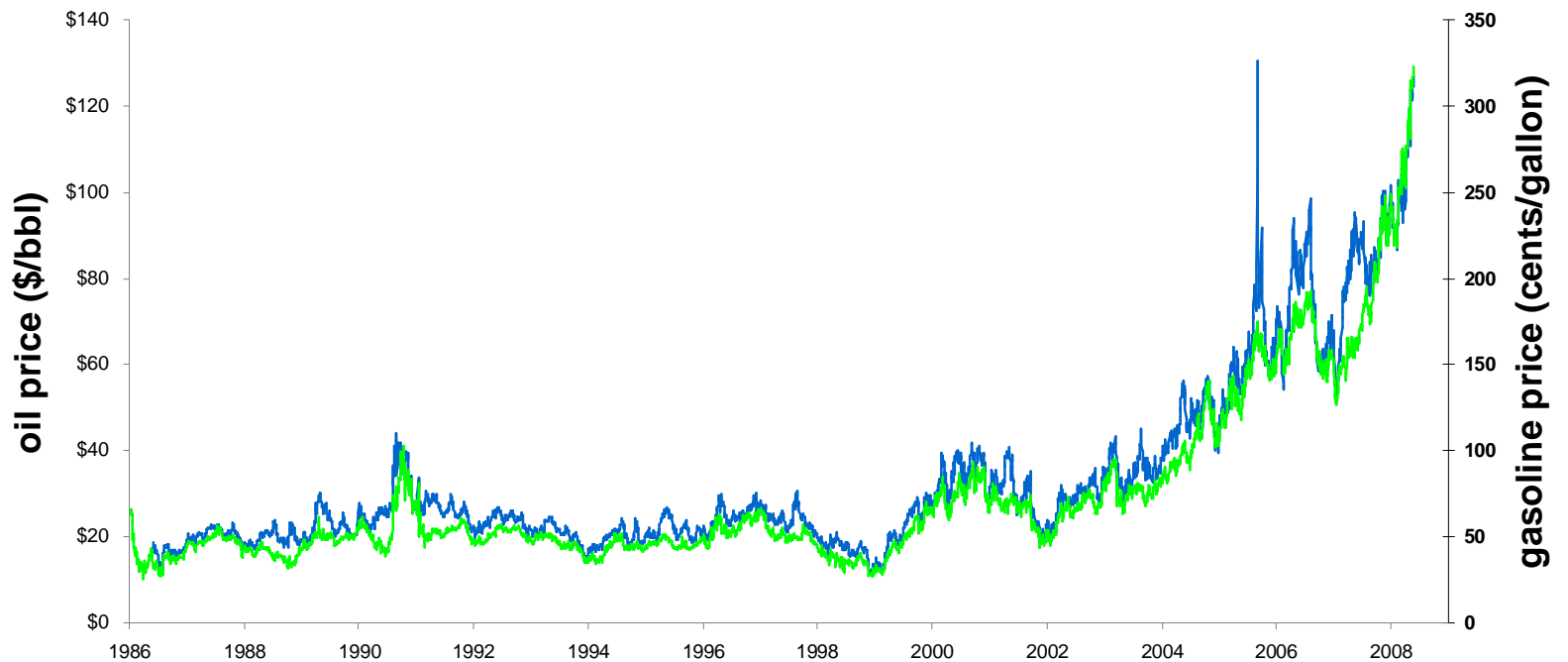
Northeast CERT
Sandstone, Minnesota
June 11, 2008

Temperature is up

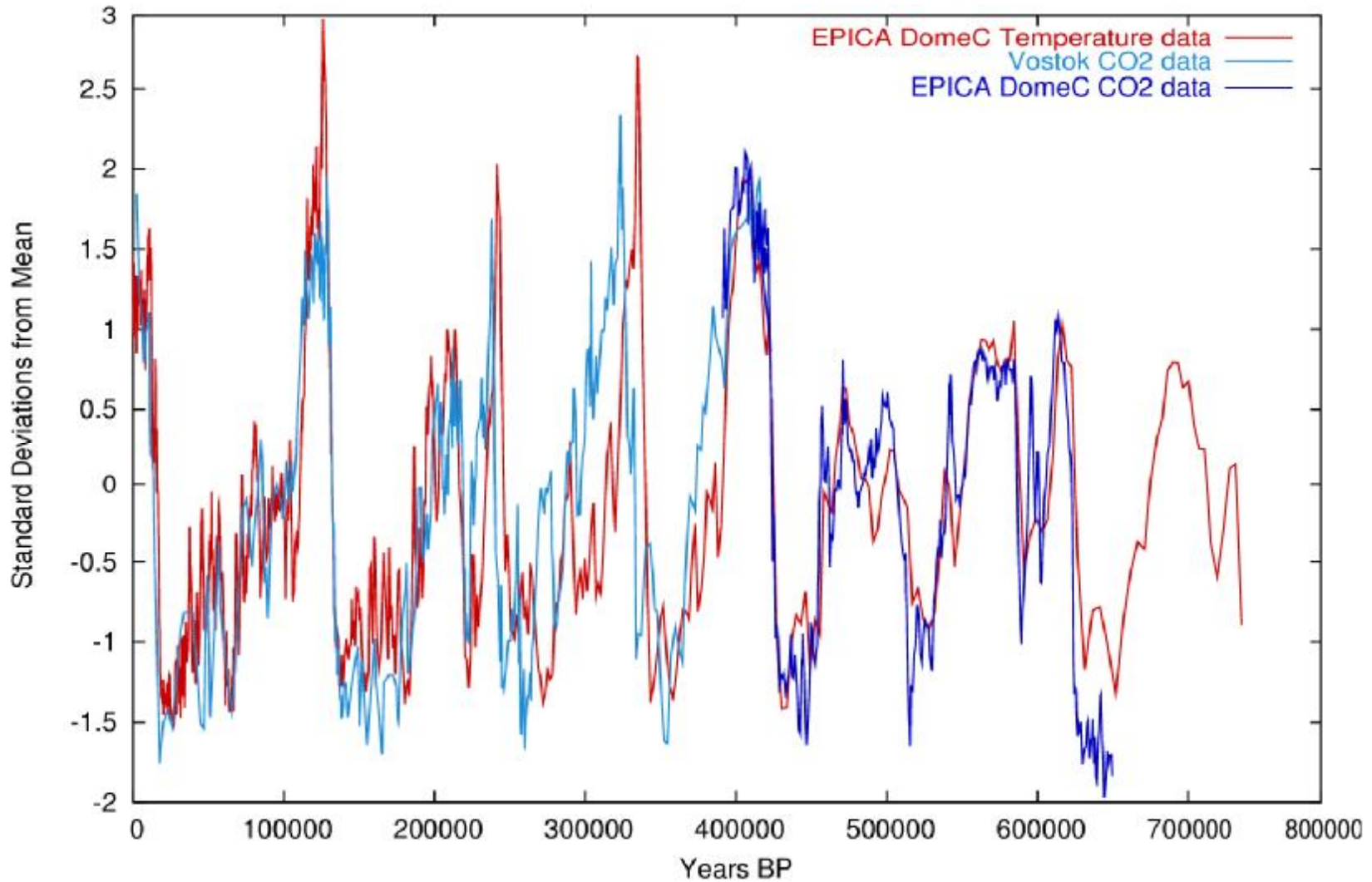


And so is oil

**Same-day petroleum prices:
Cushing OK WTI Crude (green)
New York Harbor Gasoline Regular Spot (blue)**



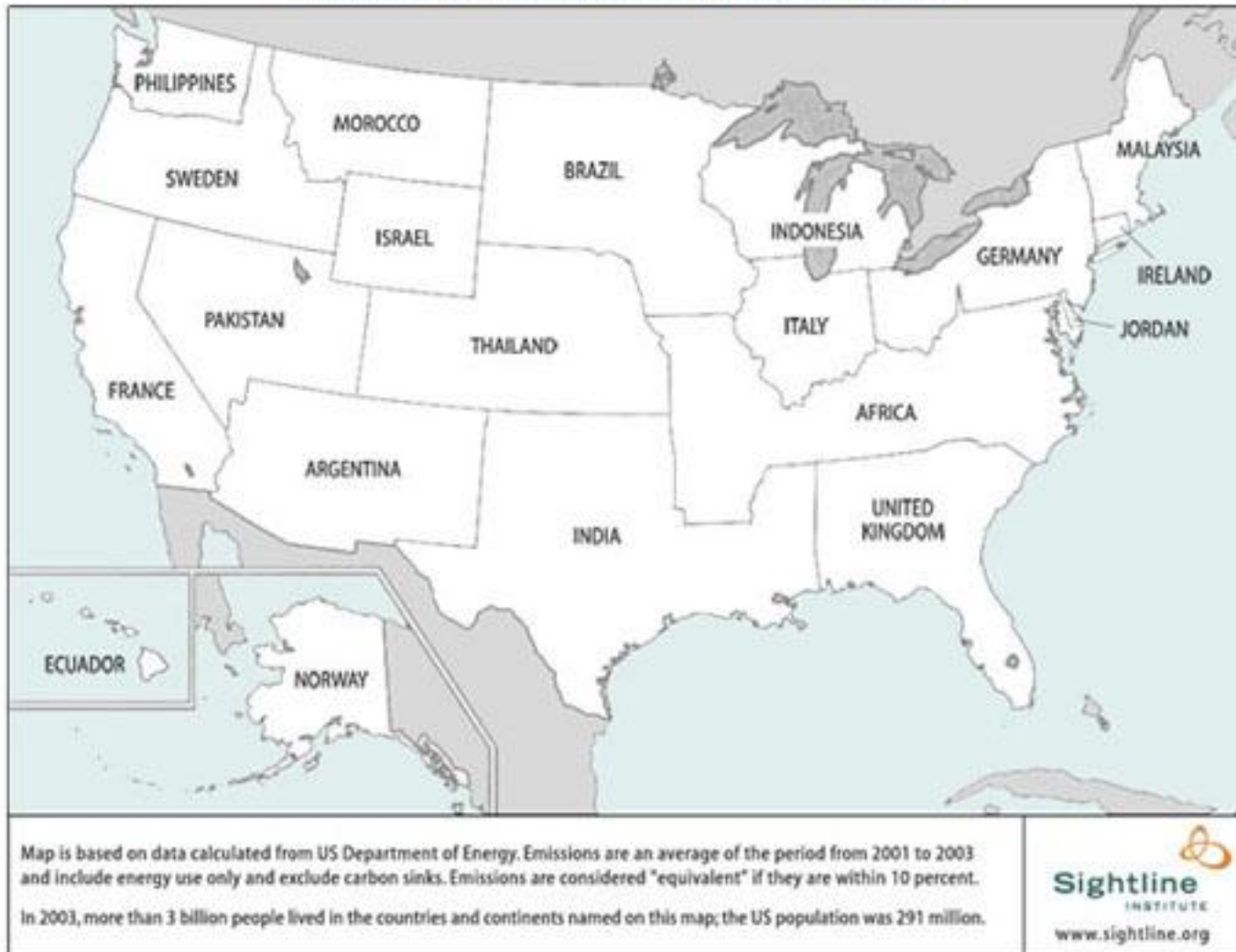
Temperature and CO2 move together



Source: Leland McInnes :
<http://en.wikipedia.org/wiki/Image:Co2-temperature-plot.png>

We're the Brazil of the Midwest

UNITED STATES OF CLIMATE CHANGE
Greenhouse gas emissions from energy, national equivalents



It's not a problem of keeping track

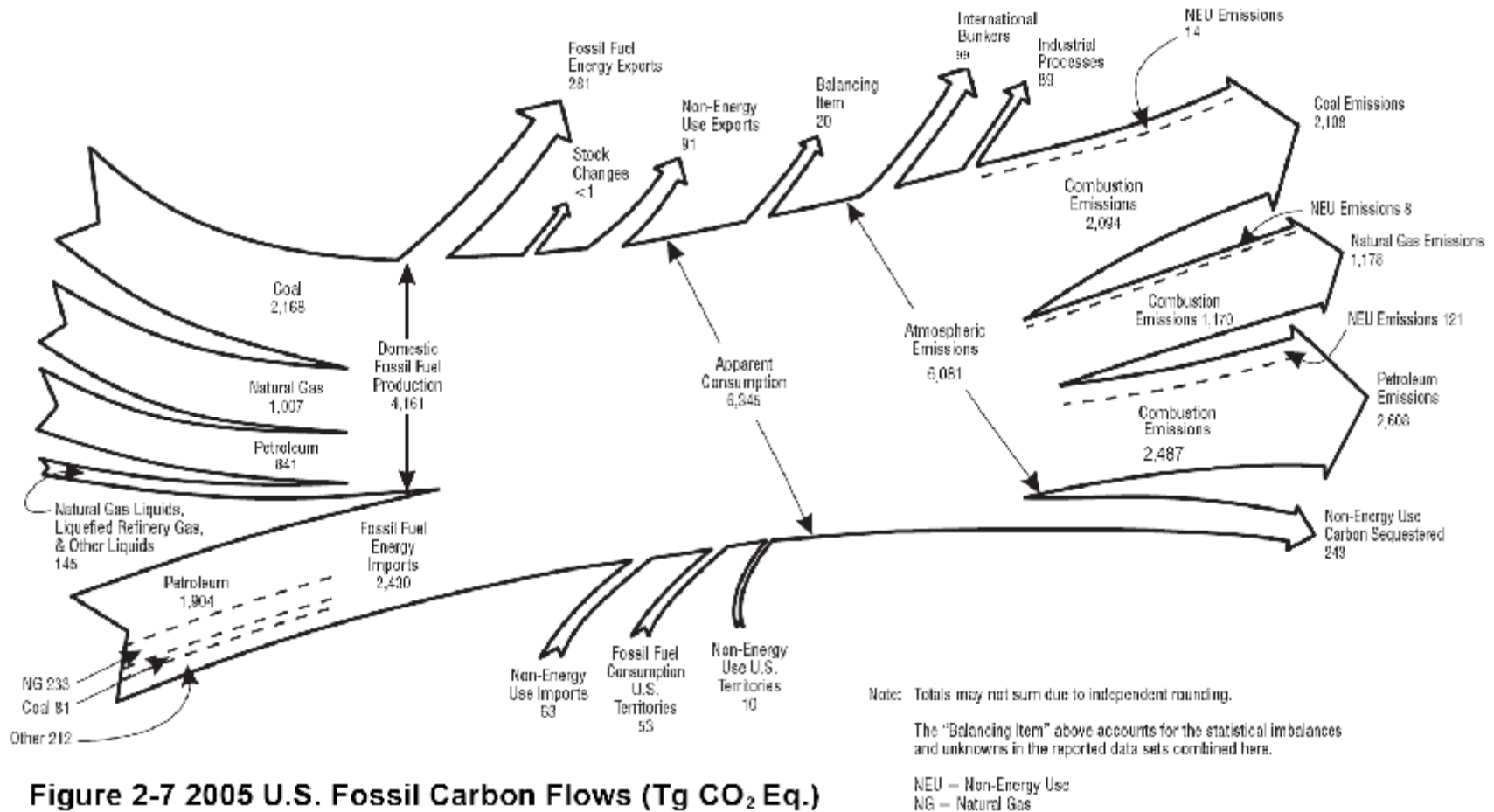
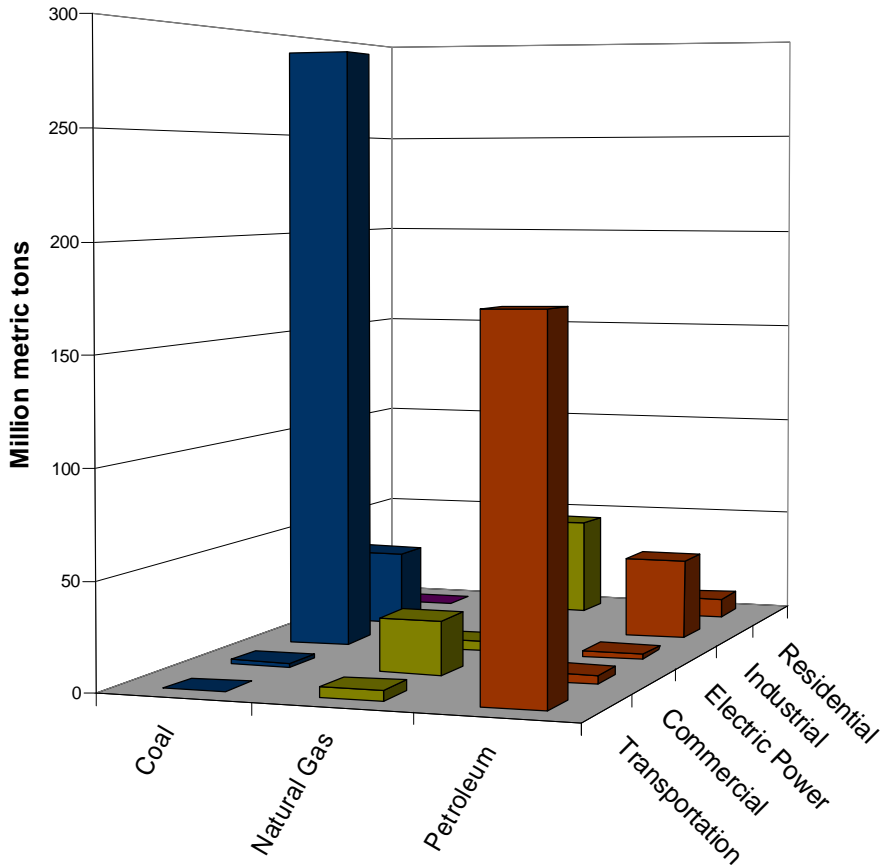


Figure 2-7 2005 U.S. Fossil Carbon Flows (Tg CO₂ Eq.)

We know where the CO2 is coming from.



Source: Jones et al., 2006

The policy choice

- Live with it
- Do something about it

Greenhouse gas reduction strategies

- *Ban* high-CO₂ technologies
- *Require* low-CO₂ technologies
- *Subsidize* new low-CO₂ technologies
- *Tax* CO₂ emissions
- *Reduce* demand

“Market-based” policies are Good for us

- Create economic incentives to meet environmental goals
- Provide flexibility for regulated entities to figure out best means of achieving the goal
- End up with lowest cost way to reach an environmental objective
- Requires a “commodity” to trade

Carbon credit is a “commodity”

- Piece of paper
- Score requires compromise
- Initial allocation, then market takes over
- Attach to:
 - Product
 - Fuel
 - activity
- Price is up to market

Carbon credits attached to activity

Practices	Afforestation	Agroforestry	Cover Crop	CRP	Wetland
	no harvesting	harvesting			
Carbon Value	1.09	0.48	1.01	0.41	1.23
CO₂ Value	4.00	1.76	3.71	1.50	4.51

Carbon credits require compromise

Study	Region	Yield Format	Potential carbon yield with afforestation (MT/acre/year)	
			no harvesting	decay after harvesting
Parks and Hardie (1995)	National	Average carbon flow	1.34~2.06	not specified
Stavins(1999)	Delta States	Carbon flow curve	1.85	---
Richards,et. al (1993)	Delta States	Carbon flow curve	2.64	---
Plantinga, et. al (1999)	Wisconsin	Carbon flow curve	1.22	1.07

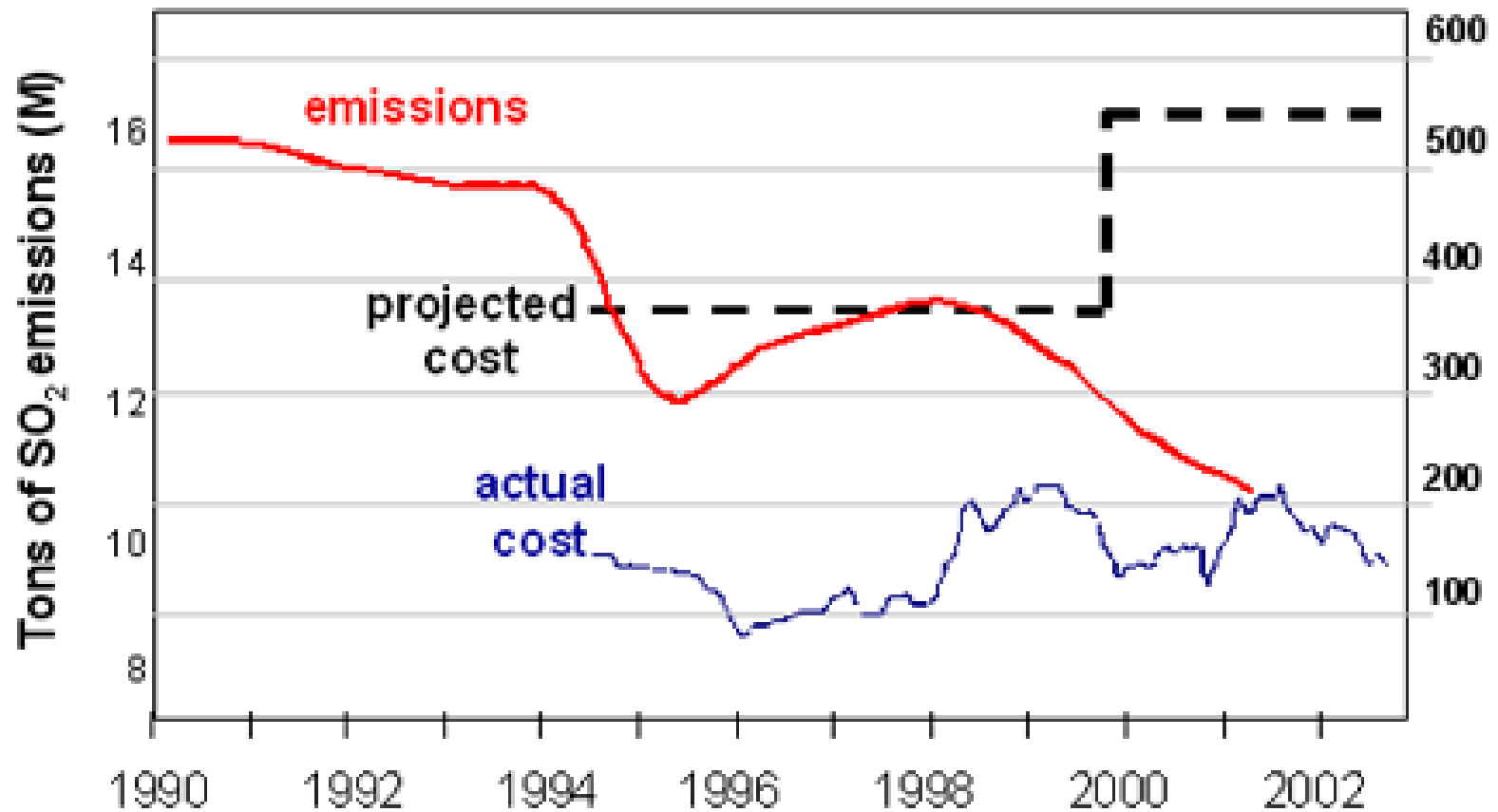
Cap and Trade is not new

- Promoted (by economists) since late 1960s (Dale 1968)
- Basic theory worked out (by economists) in early 1970s
- First large scale application (by politicians) in 1990 Clean Air Act Amendments

Cap and Trade is not uncommon

- Air pollution: Acid Rain Program
 - SO₂ emissions from electric utilities and large industrial sources
 - NOx emissions in eastern US
- Water pollution:
 - Minnesota River: MPCA point-non-point source trading program
 - Neuse River in NC and others
- Greenhouse gases
 - European Trading System
 - Chicago Climate Exchange

And it sometimes works!



Minnesota has aspirations

- It is the goal of the state to reduce statewide greenhouse gas emissions across all sectors producing those emissions to a level at least 15 percent below 2005 levels by 2015, to a level at least 30 percent below 2005 levels by 2025, and to a level at least 80 percent below 2005 levels by 2050.

Separable decisions in Cap and Trade

1. Cap: limit on the total amount of emissions. Allowances (permits) equal to the total amount of emissions are allocated to emissions sources.
2. Trade: emissions sources may trade allowances with other emission sources.

Cap: Environmental Goal

- Cap limits the total amount of allowable emissions
- Want stricter environmental standards – lower the cap
- Worried about costs of meeting the goal – raise the cap

Trade: Economic Efficiency

- Trade: reduces the cost of meeting the environmental objective
- Same overall level of emissions – but different distribution across sources
- A Cap without a Trade is feasible, but not efficient

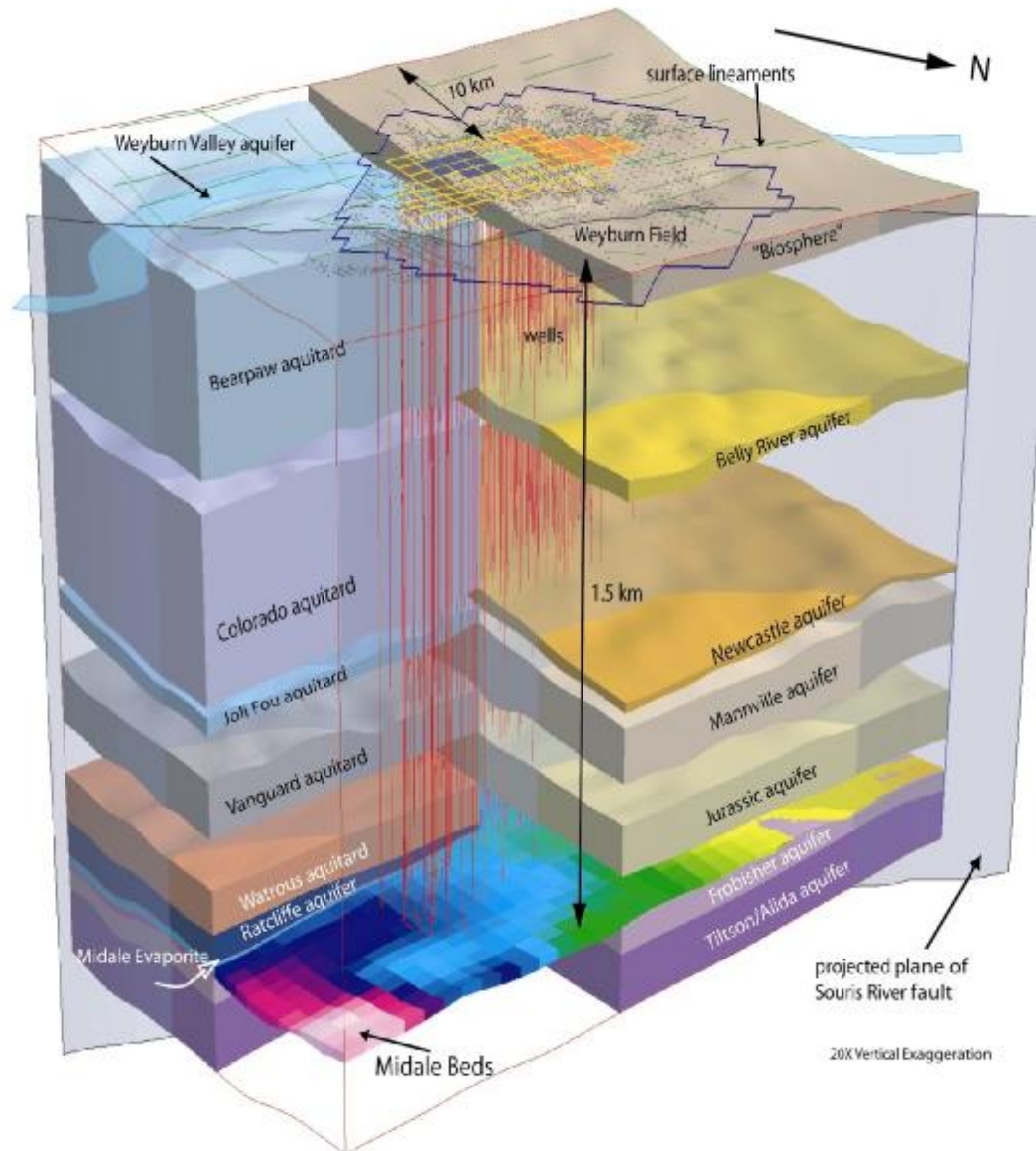
Initial allocation of credits (allowances)

- Two main approaches:
 - Auction
 - Free distribution
- No different than other government allocations (radio spectrum)
- What do we do with the proceeds?

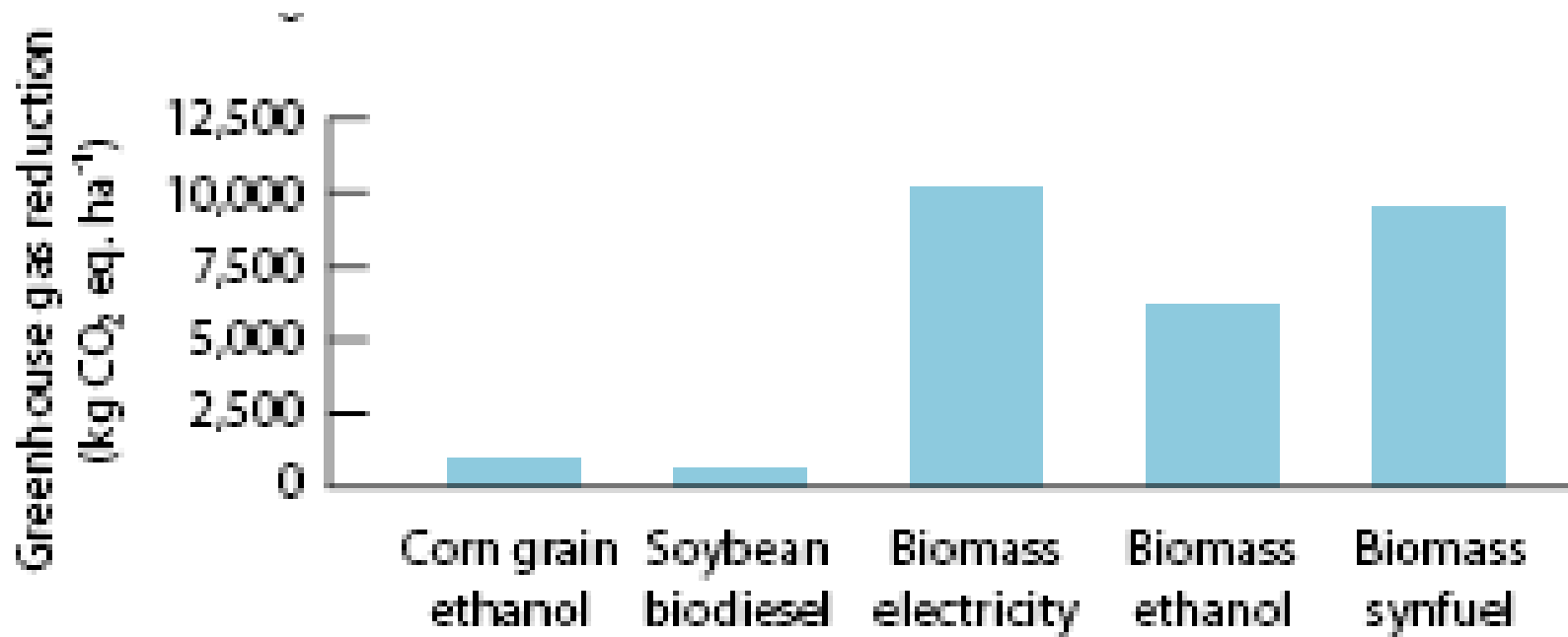
Where to offset carbon release?

- On land
- Underground

Should we just stick it into the ground?



Use biofuels to reduce carbon?



Instead, why not change land use?



**Grassland
/CRP**



**Wetland
Restoration**



**Afforestation:
Pine**

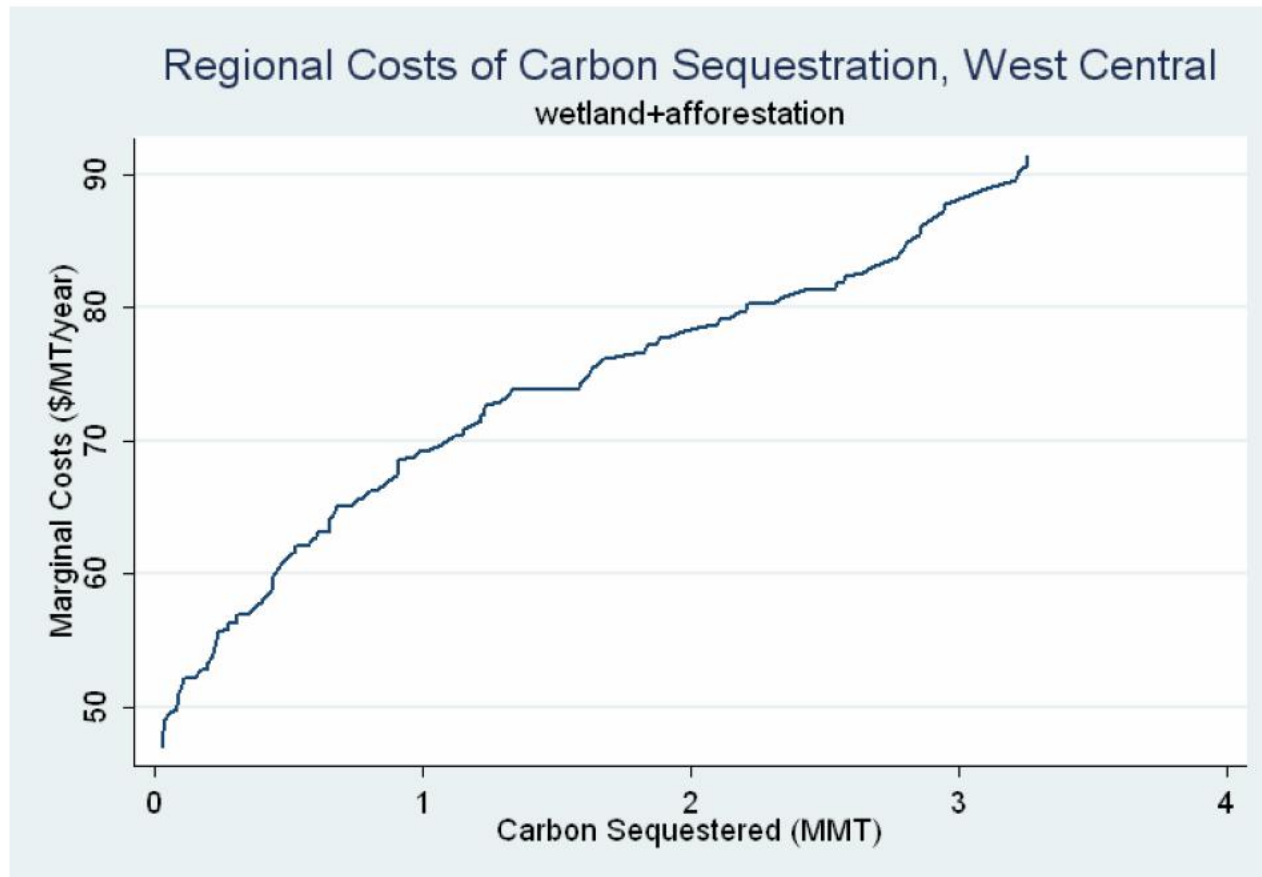


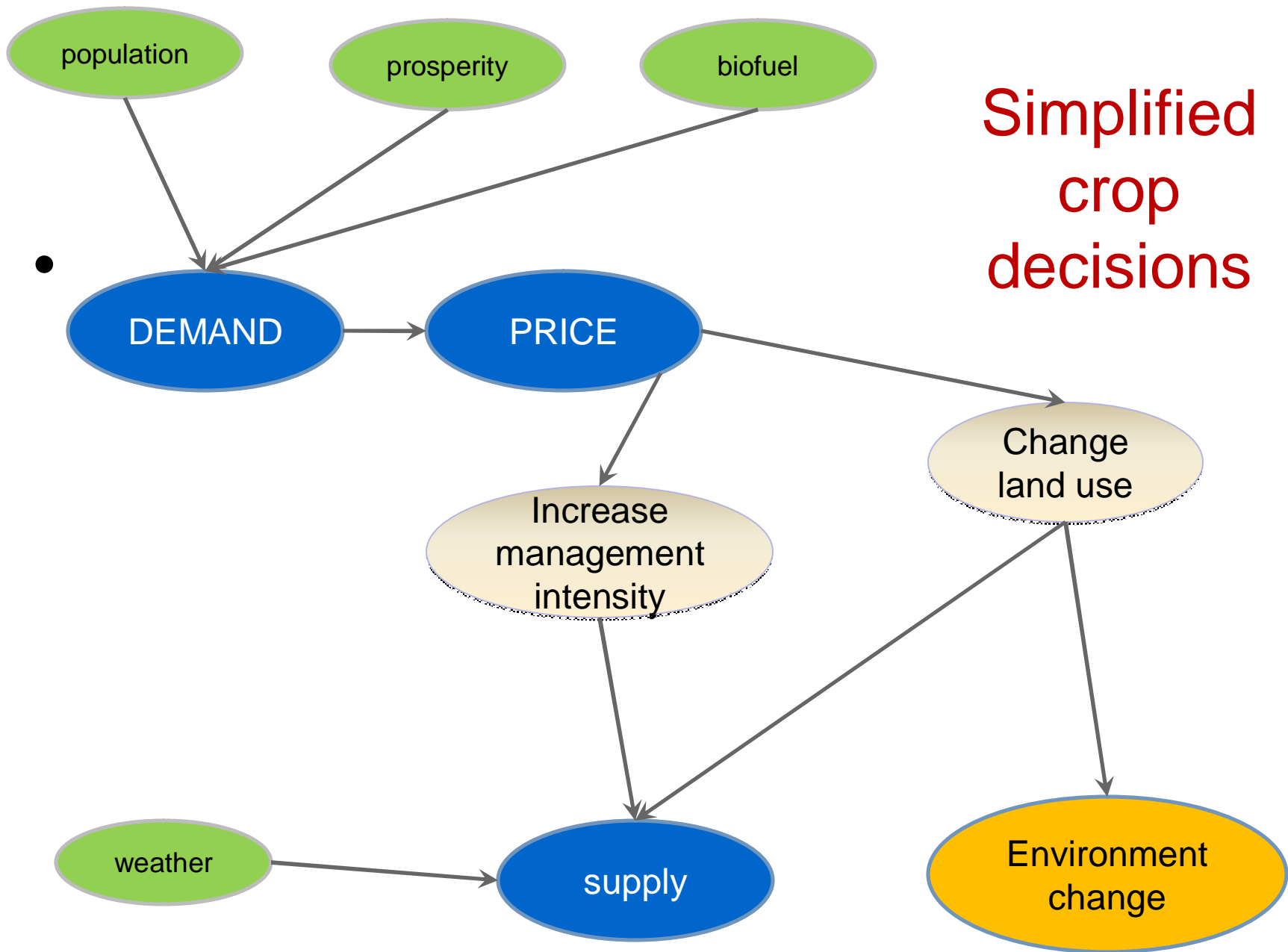
**Cover crop
Adoption**



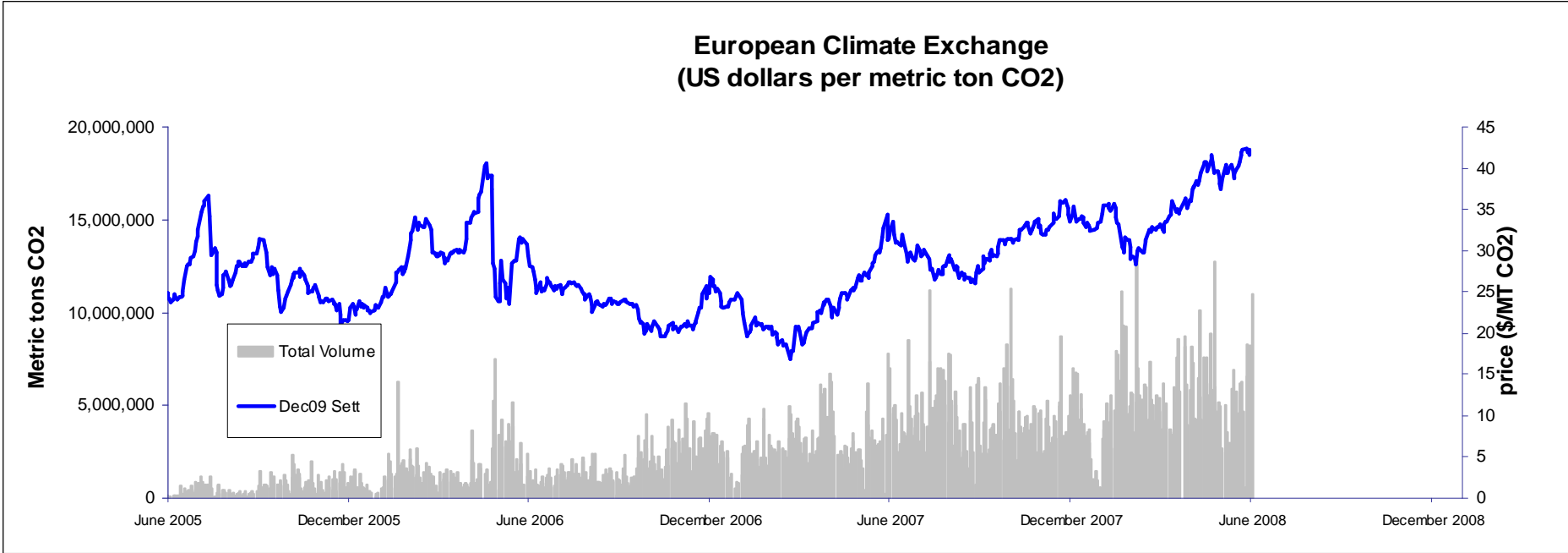
**Agroforestry:
Poplar**

How much will we have to pay?

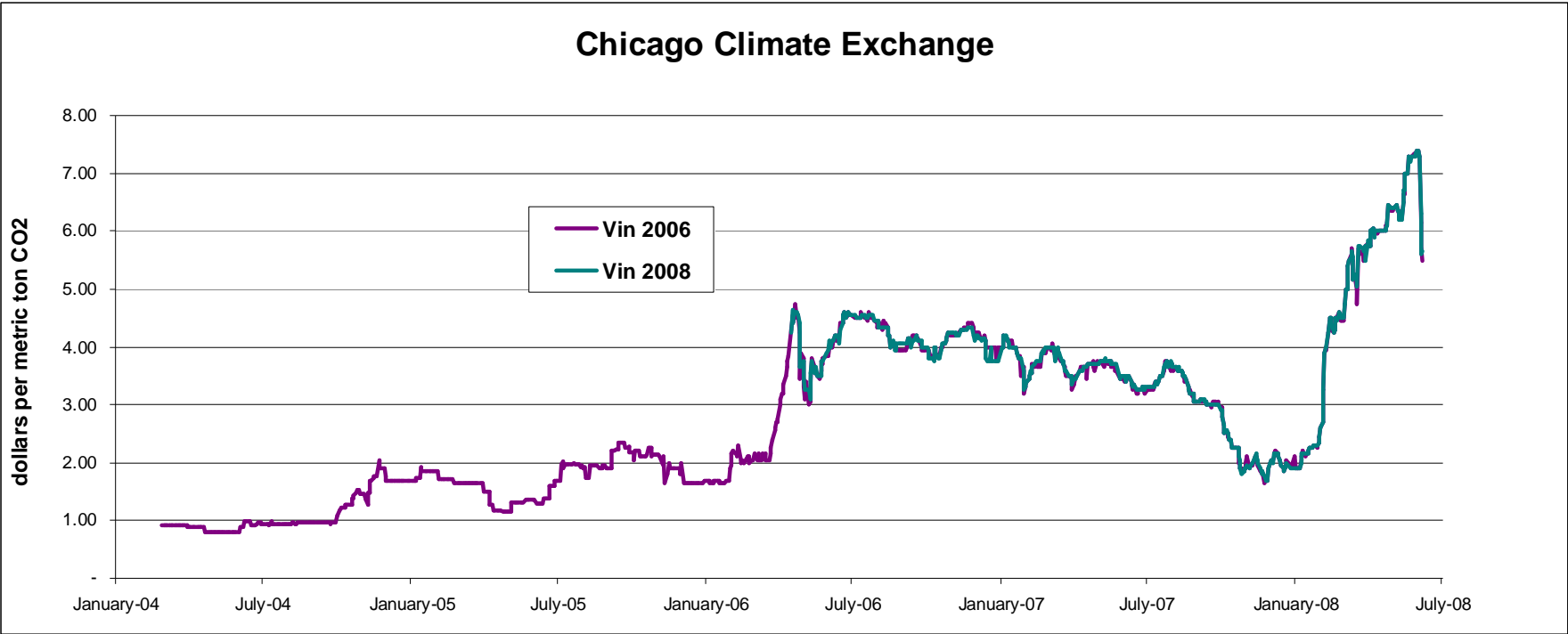




Is a fortune to be made on the Exchange?



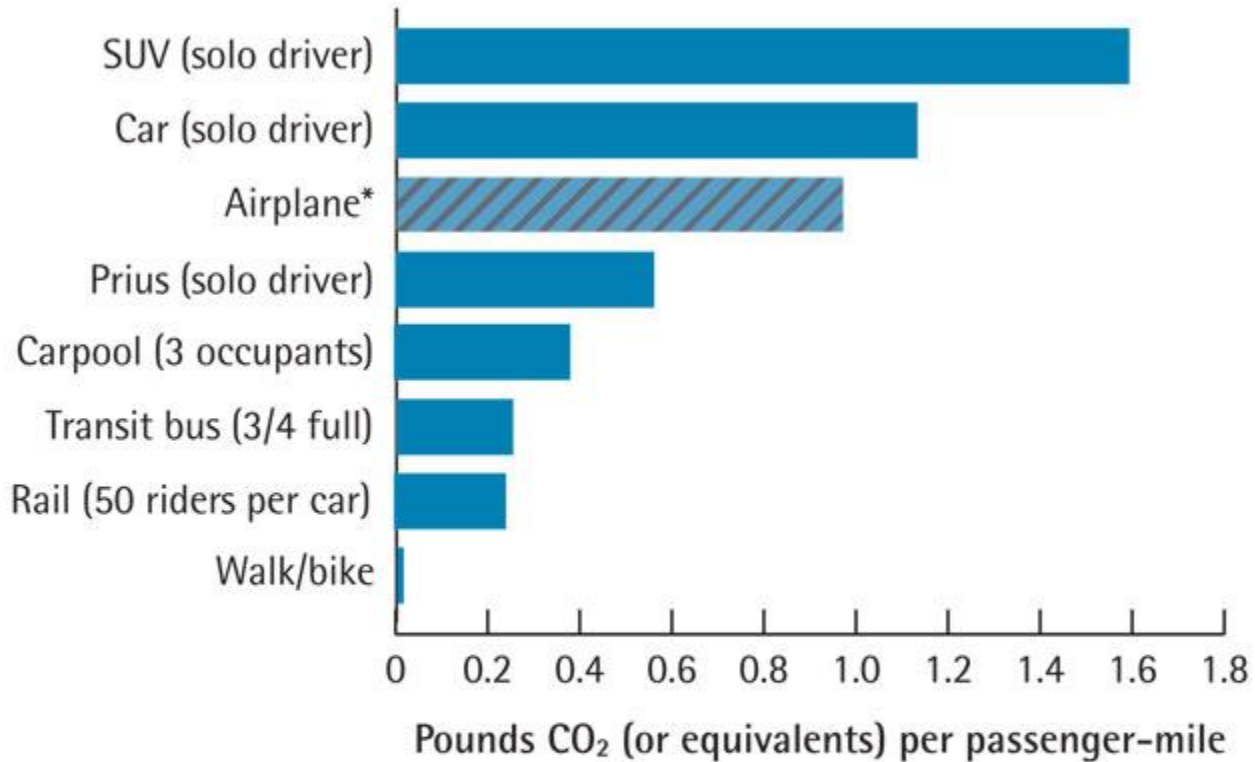
Is a fortune to be made on the Exchange?



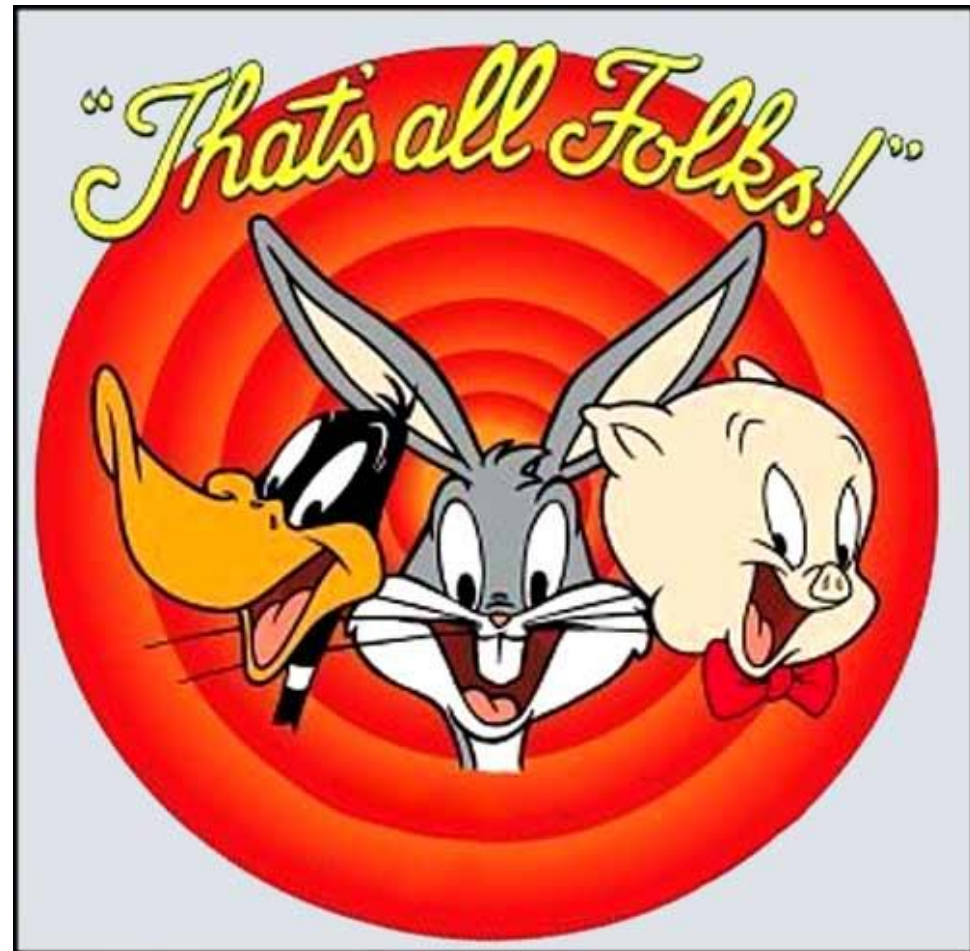
It's all about context

- Cap and Trade
- Low Carbon Fuel Standards
- Renewable Fuel Standards
- CAFE (mileage standards)
- Carbon tax
- Fuel tax
- FEEBates

A penny a mile...



**Aircraft emissions are the most variable. Use an online calculator, such as Atmosfair.com, to estimate the climate impacts of your flight.*



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