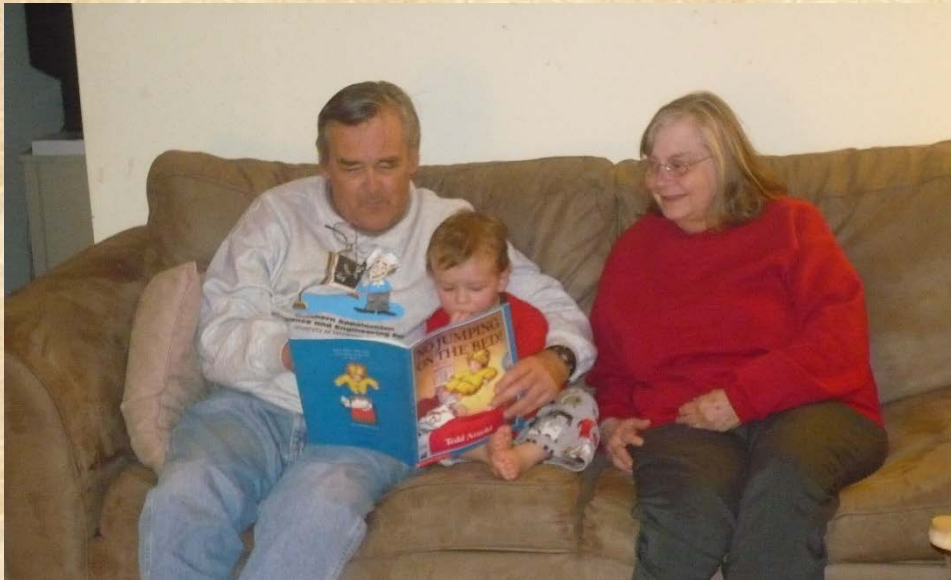


# A half-Century Record of State-by-State Changes in Fossil- Fuel Carbon Emissions and Corresponding Isotope Ratios in the United States

T. J. Blasing

Independent Scholar



Presented at the **NOAA, GMD, ESRL Annual Conference, May 20, 2013**



**GUIDE TO  
VOLUNTARY SEPARATION  
INCENTIVE PAYMENTS**





"I GUESS RETIREMENT IS O.K.,  
BUT WHAT I MISS MOST IS GOOFING  
OFF ON COMPANY TIME."

**“I married you for better or for worse but not for lunch; find something to get yourself outta the house when you retire.”**

**- - - - Carolyn Blasing**

# Sponsors: WORK



# Sponsor: TRAVEL

T.J. and Carolyn Blasing  
Vacation Fund





U.S. DEPARTMENT OF  
**ENERGY**

**Energy Information  
Administration (EIA)**

**State by state energy related carbon dioxide  
emissions by fuel back to 1980**

[http://www.eia.gov/environment/emissions/state/state\\_emissions.cfm](http://www.eia.gov/environment/emissions/state/state_emissions.cfm)

**State by state energy related carbon dioxide  
emissions by fuel back to ~~1980~~ 1960**

Available from T.J. Blasing [t.j.blasing@outlook.com](mailto:t.j.blasing@outlook.com)

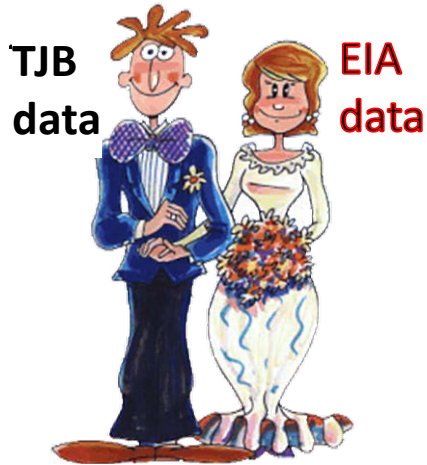
# Methods

## *Recalculate Emissions.*

Recalculate all emissions from SEDS data.\*

Calculate emissions through 2010 by same method.

## *Unite the 2 data sets.*



Calculate **EIA/TJ** for 1980-1984

Multiply TJ 1960's and 1970's by ratio  $\frac{TJ \times EIA}{TJ}$

Use the result for 1960s and 70s

USE EIA numbers for 1980 forward

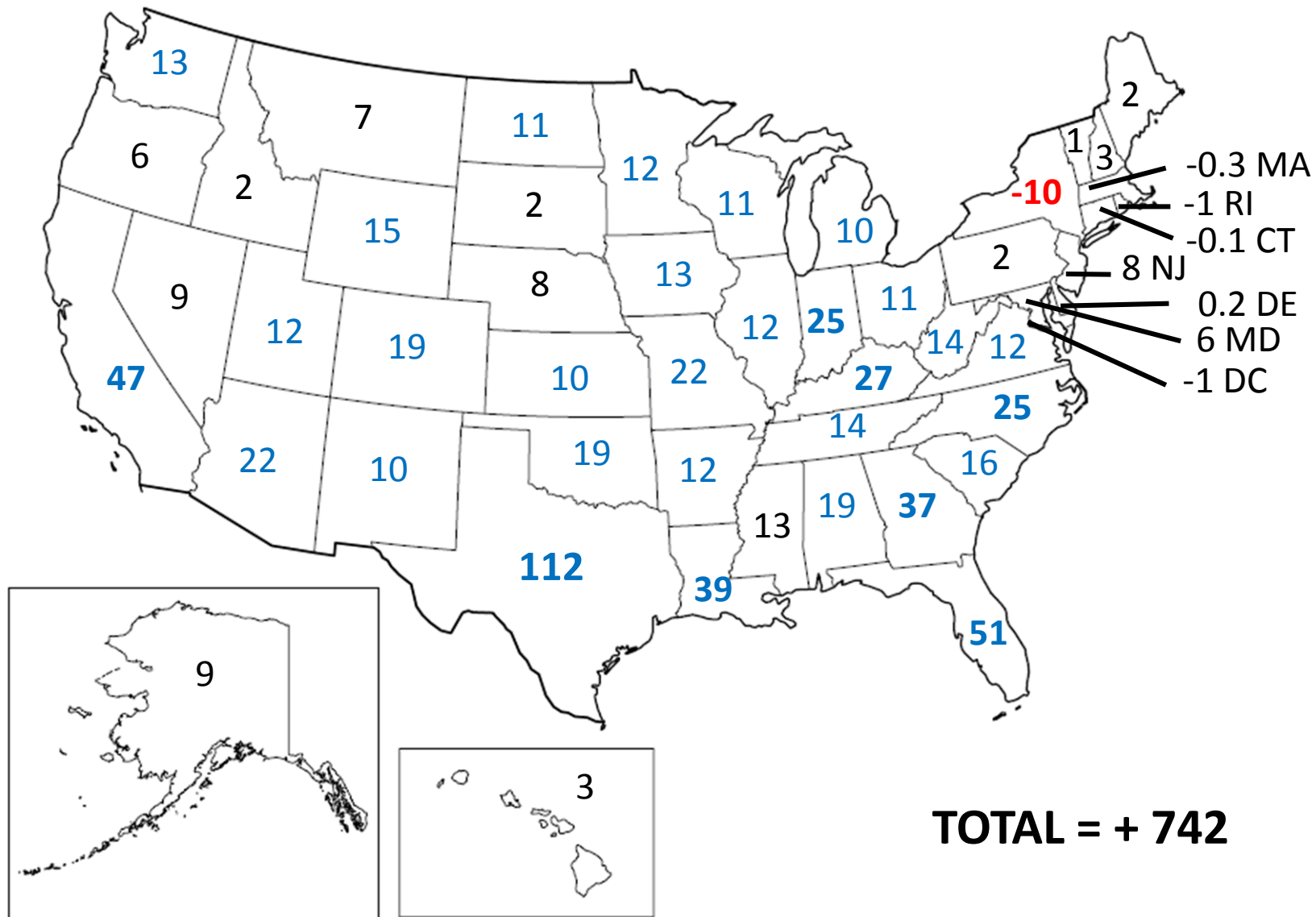
VOILA !! Continuous time series.

\* Things have changed:

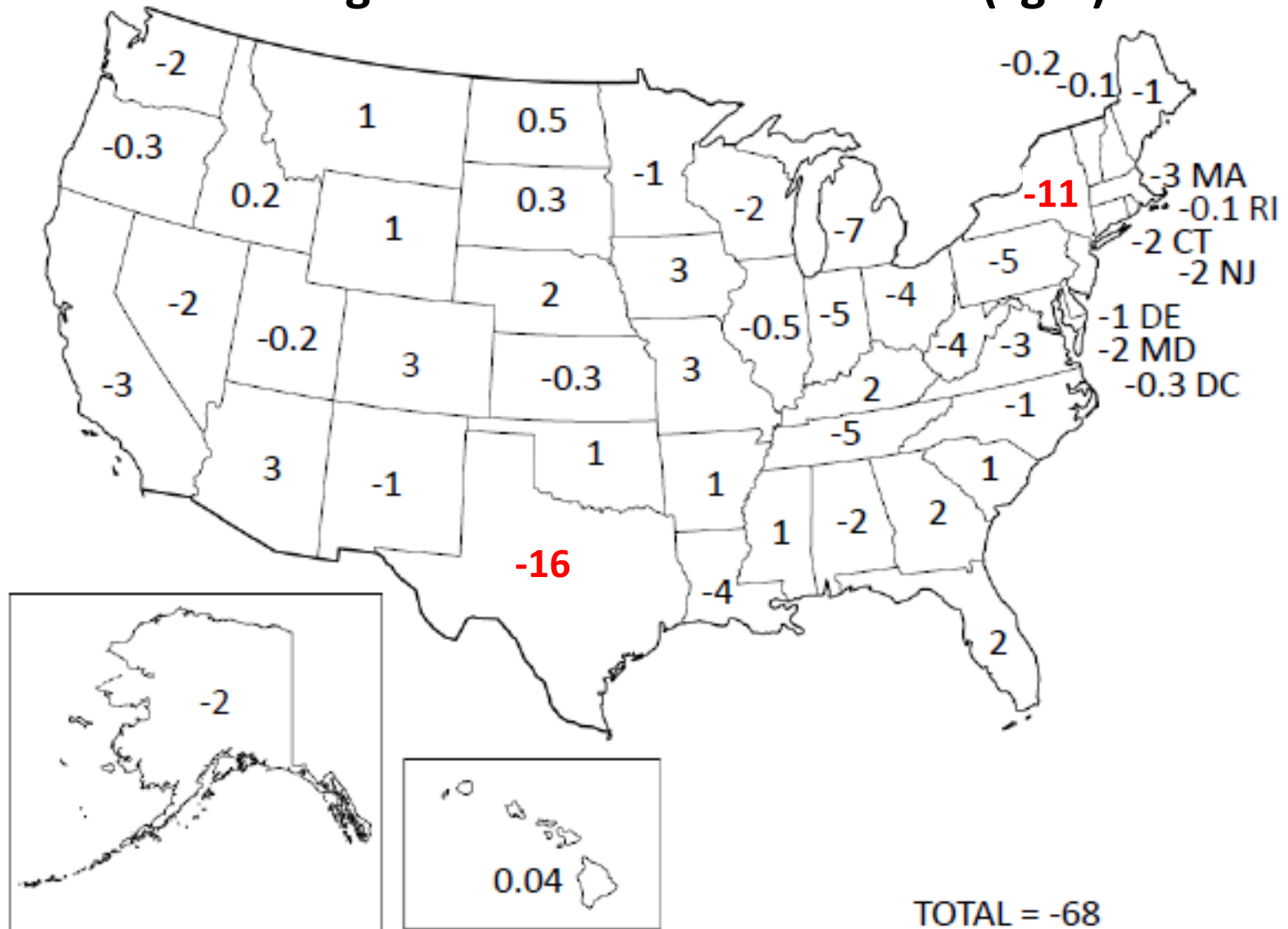
1. We now assume 100% Combustion.
2. Some heat and carbon coefficients have changed slightly.
3. Some fuel-use figures have been refined.
4. Other changes (See North Dakota)



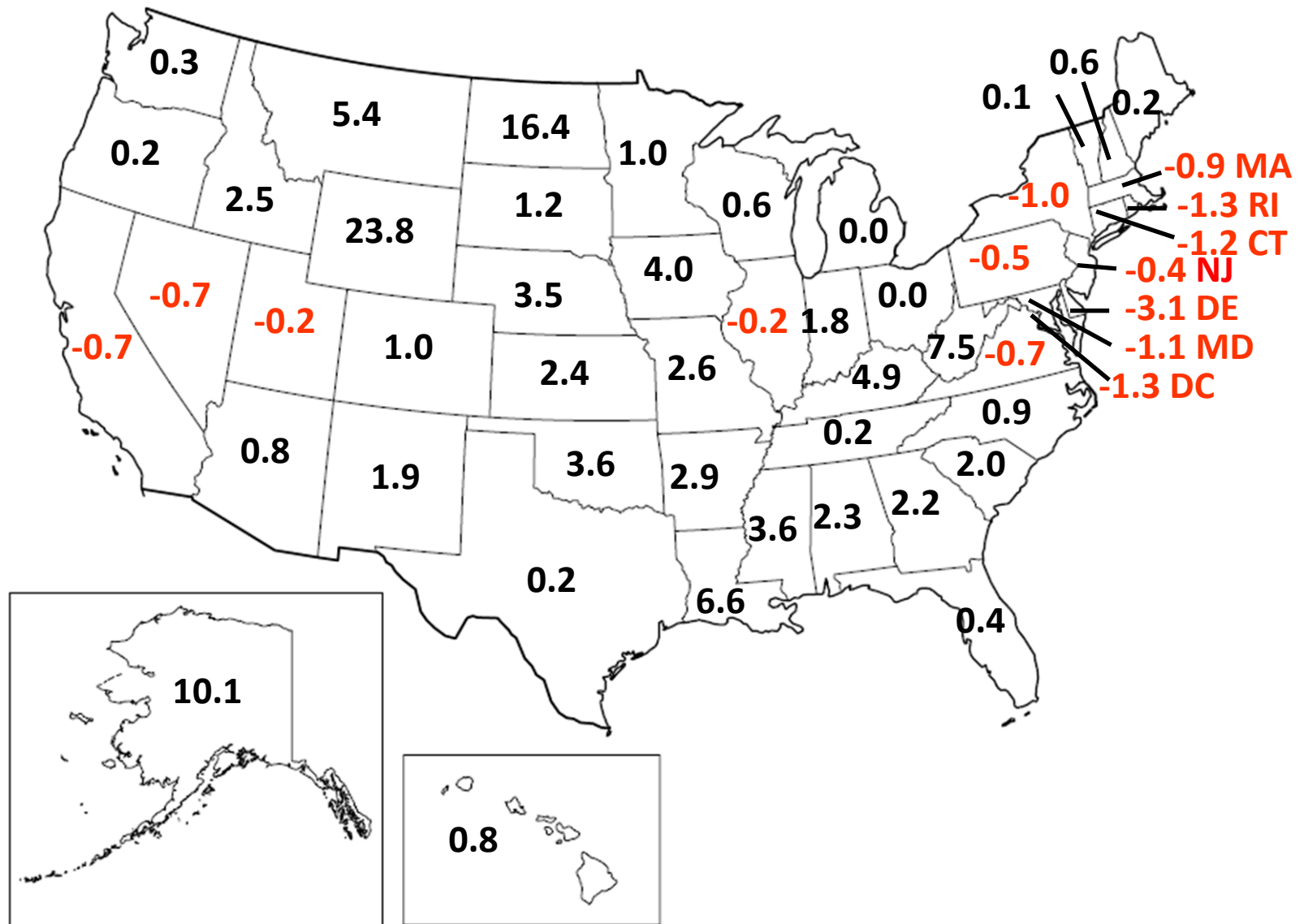
# Change in C Emissions 1960-2010 (Tg-C)



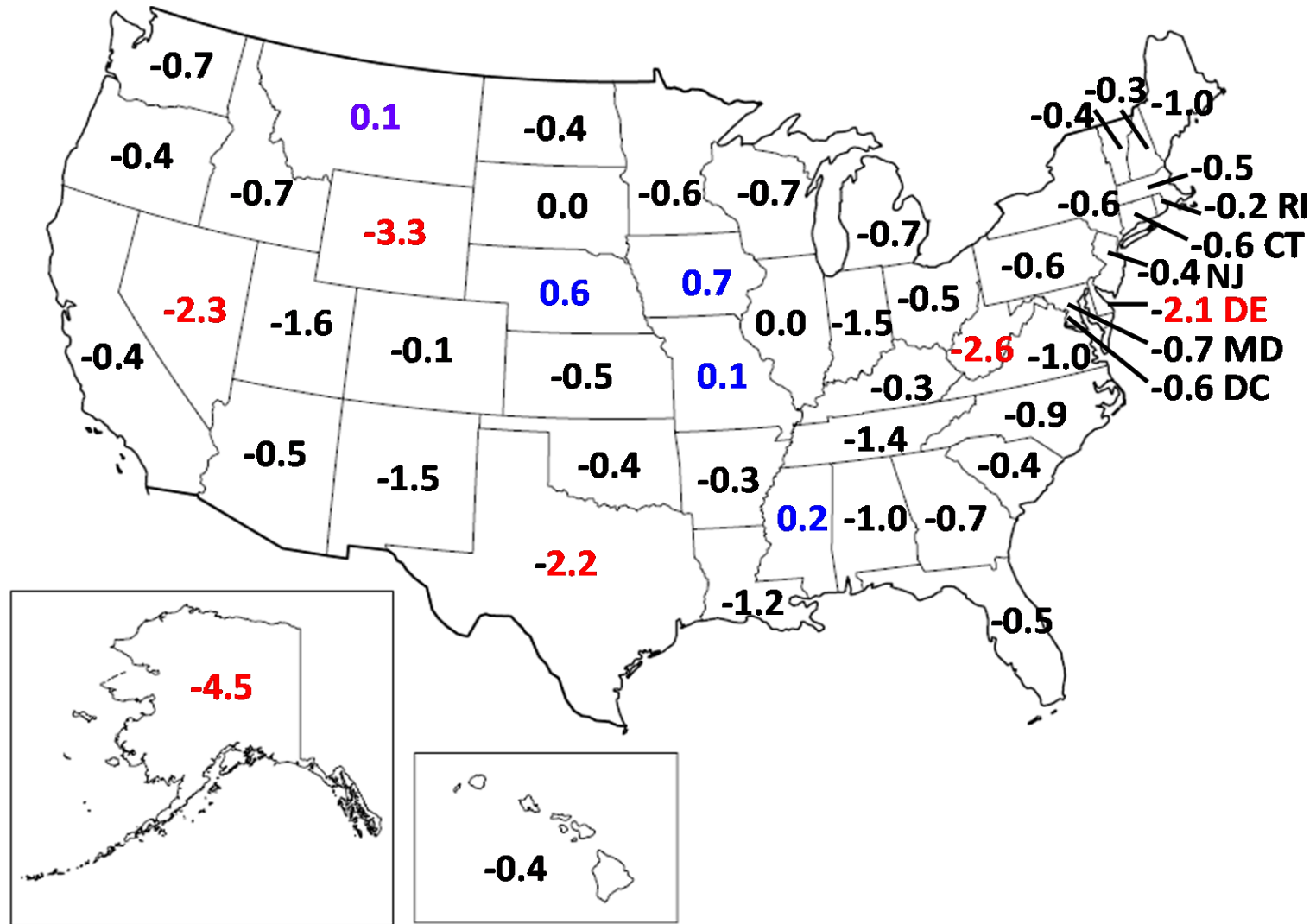
# Change in C Emissions 2000-2010 (Tg-C)



# Change in Per Capita Carbon Emissions (Mg/person-year) 1960-2010

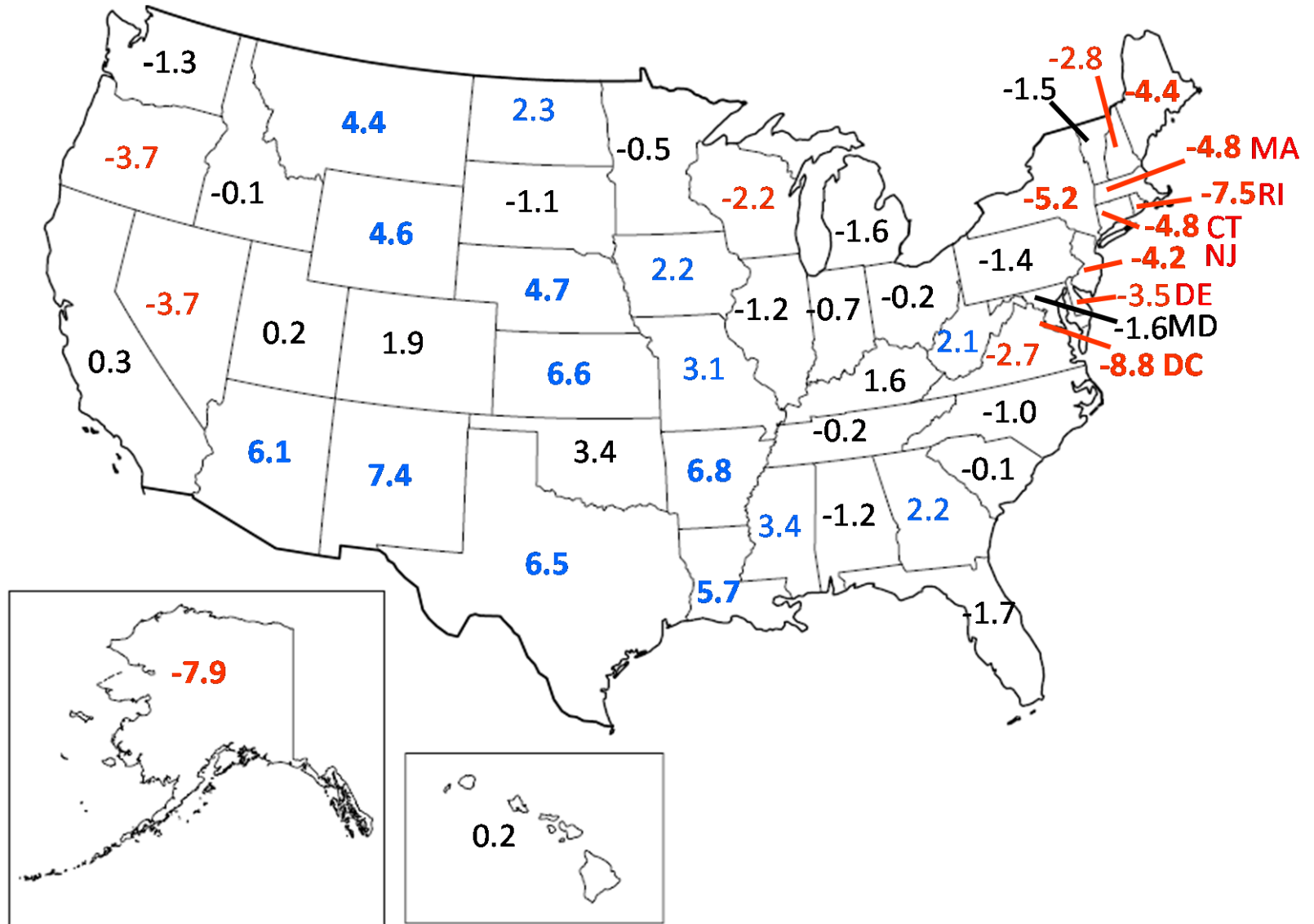


# Change in Per Capita Carbon Emissions (Mg/person-year) 2000-2010

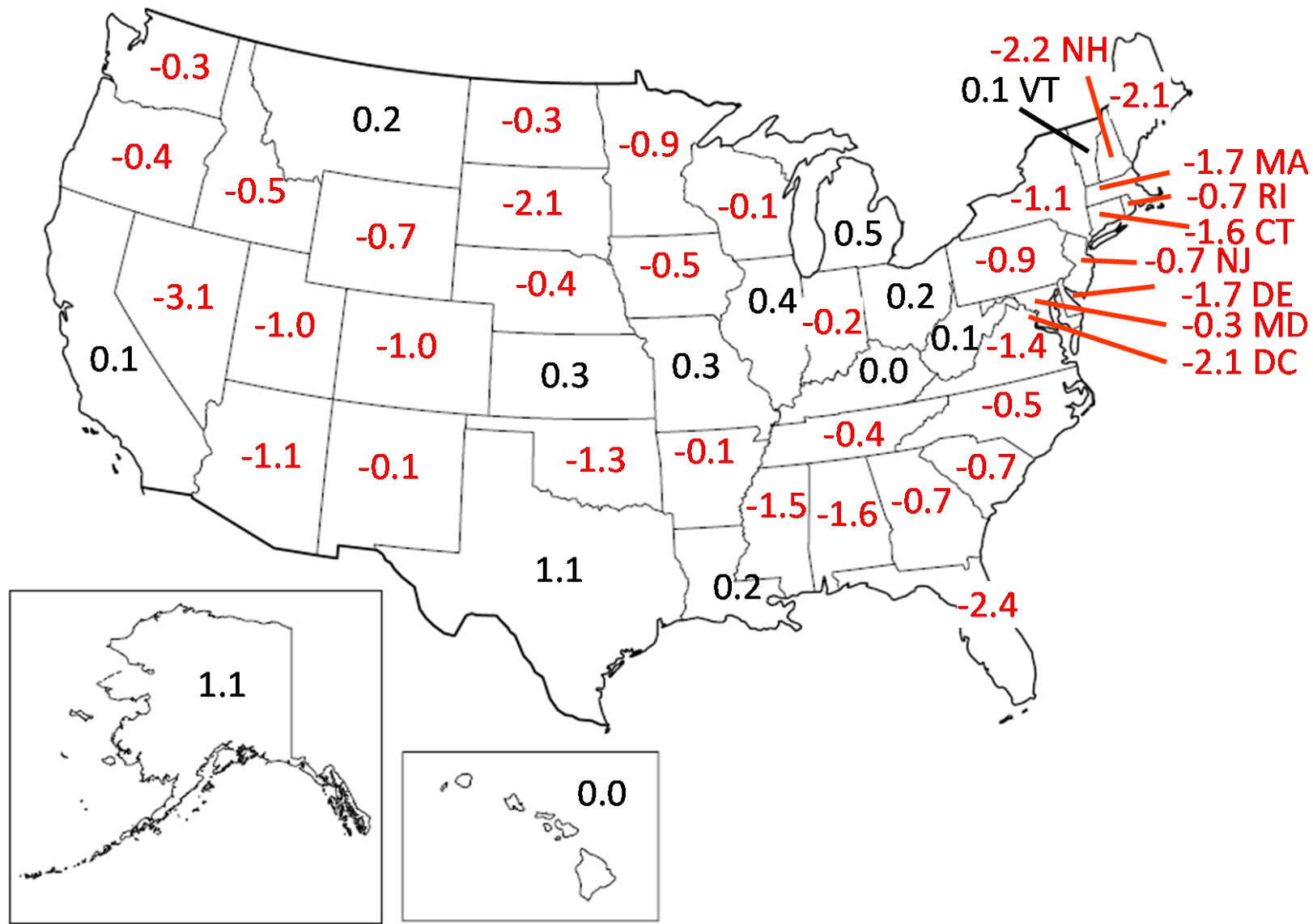


Negative in all states but 5 (SD was -0.03)

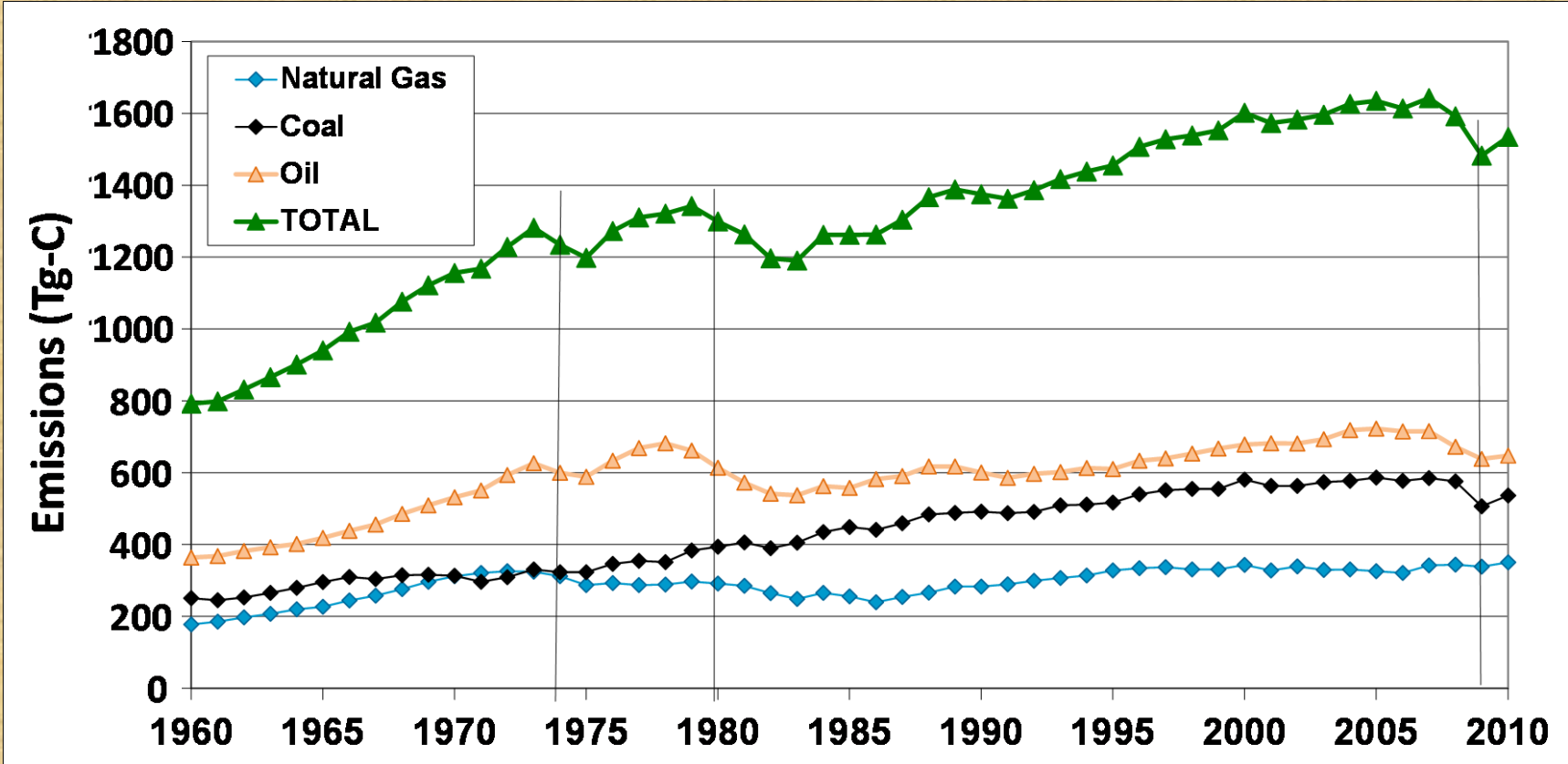
# Change in $\delta^{13}\text{C}$ (per mil) in Emitted Fossil-Fuel Carbon: 1960-2010



# Change in $\delta^{13}\text{C}$ (per mil) in Emitted Fossil-Fuel Carbon: 2000-2010

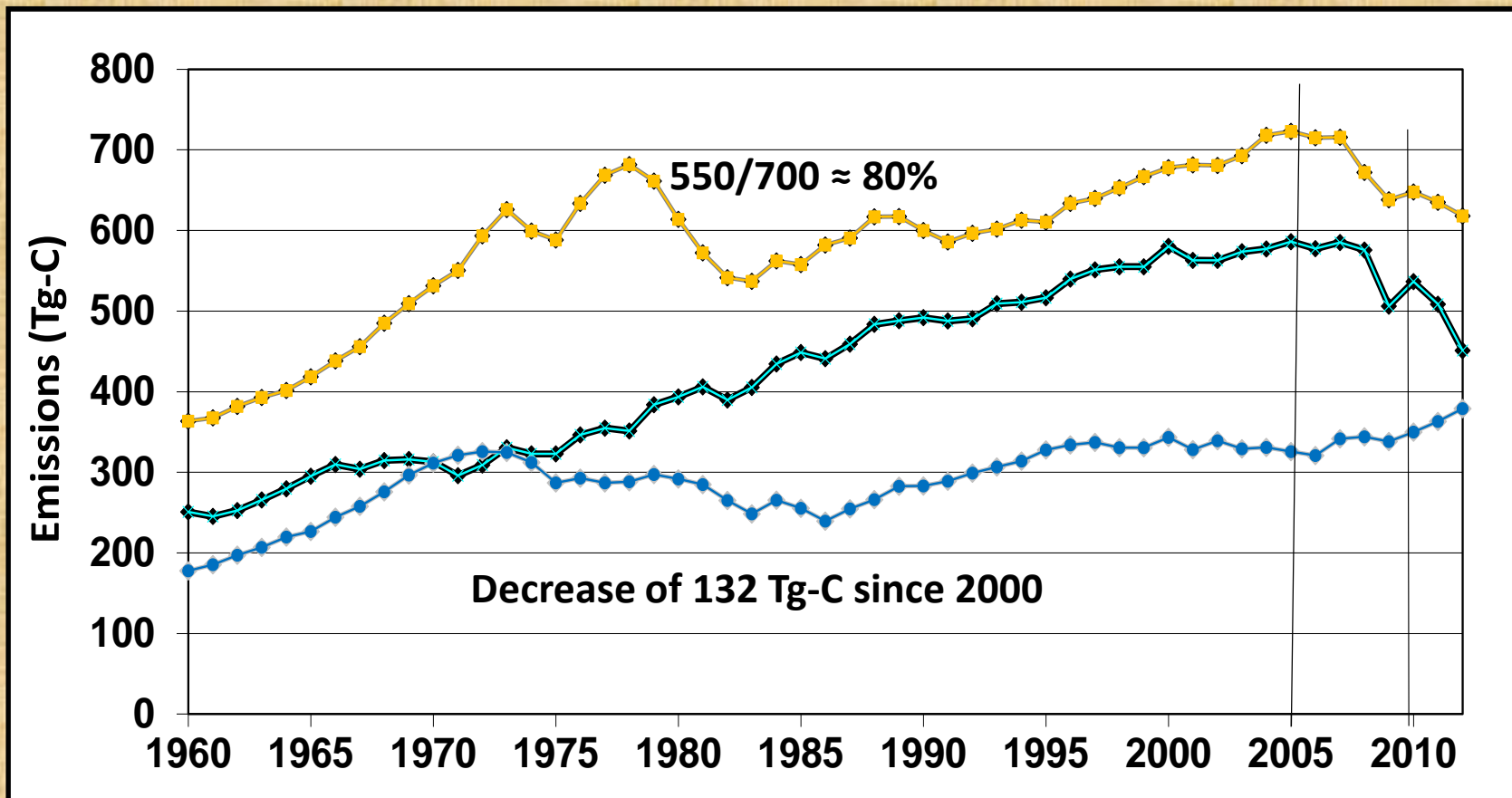


# Carbon Emissions from the 50 United States and the District of Columbia



# Carbon Emissions from the 50 United States and the District of Columbia

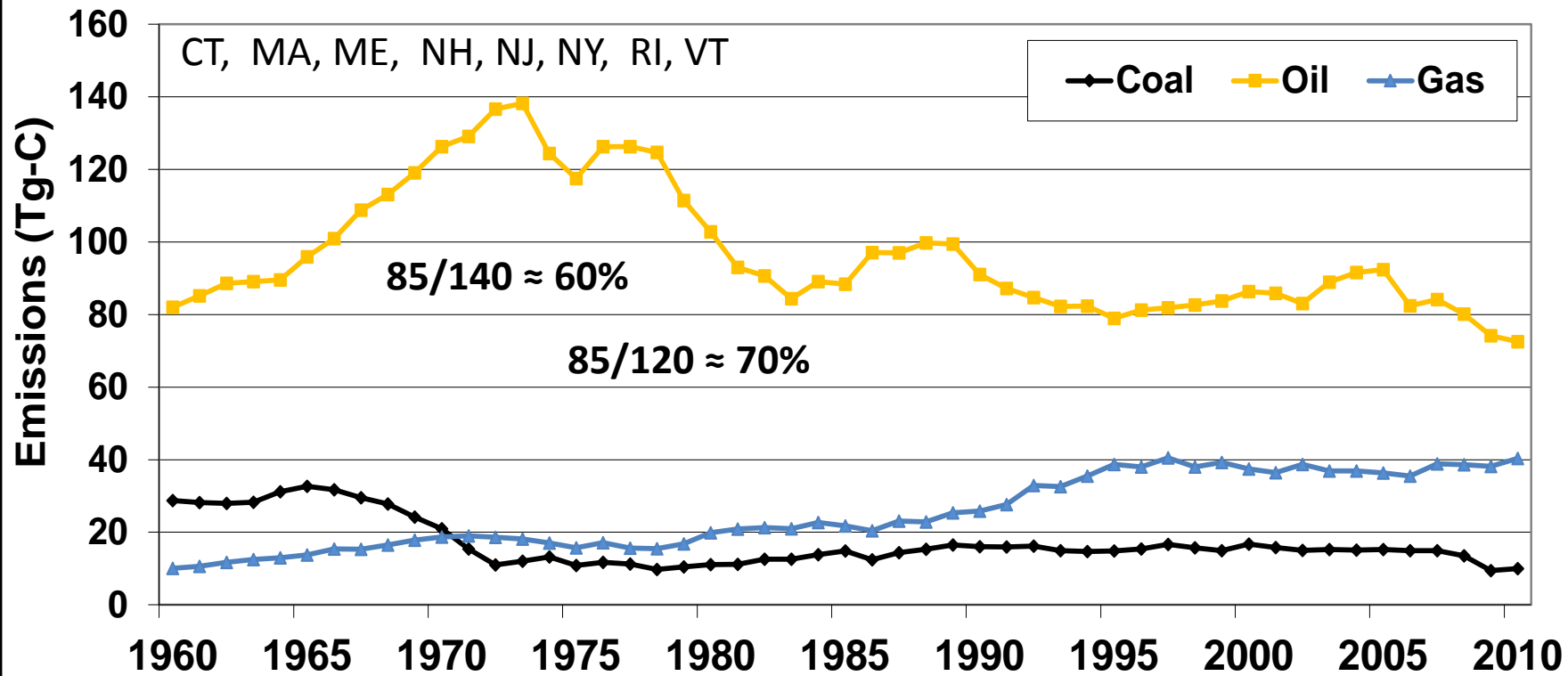
(through 2012)



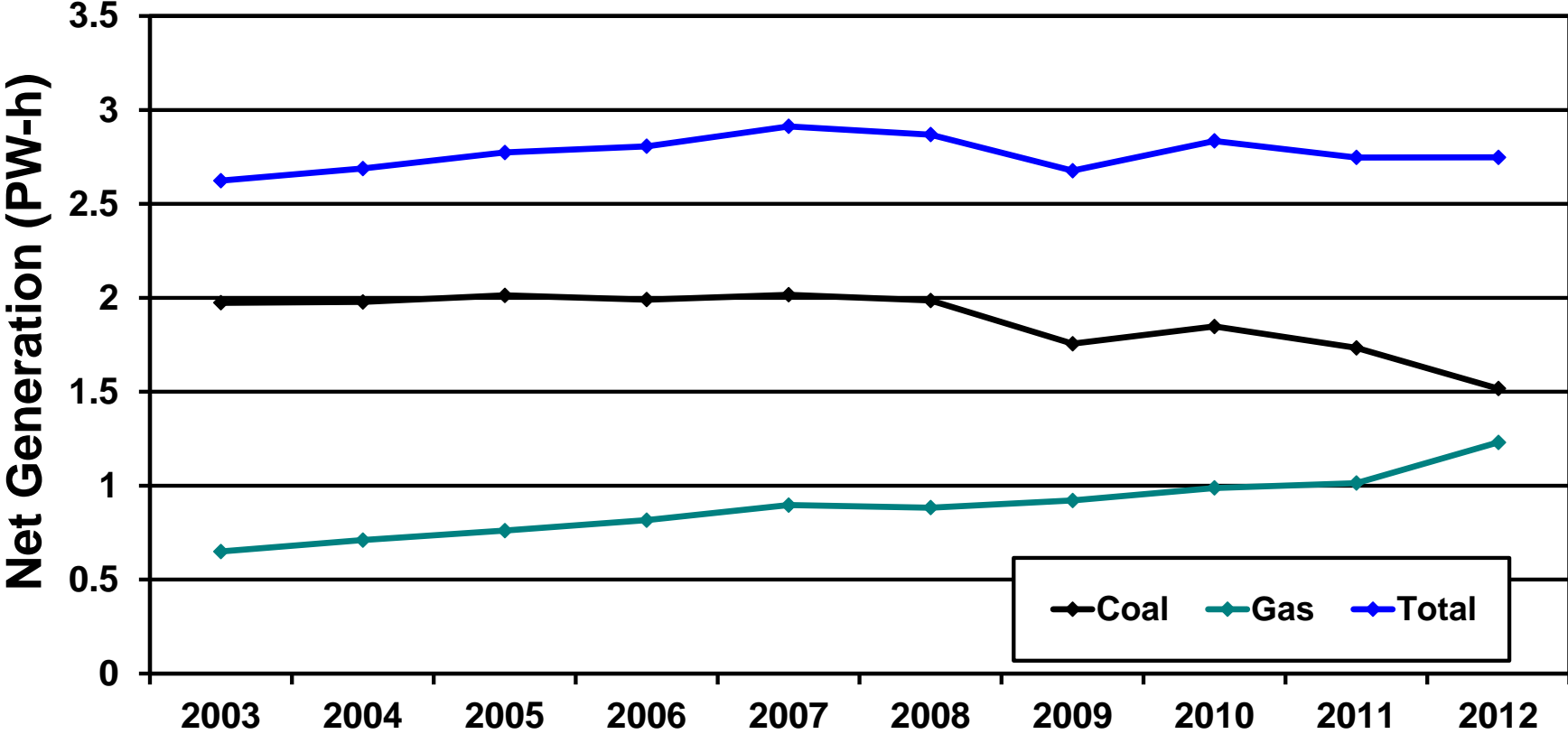
U.S. Energy Information Administration / Monthly Energy Review April 2014  
Table 12.1 Carbon Dioxide Emissions From Energy Consumption by Source



### 8 Northeastern States -- by fuel

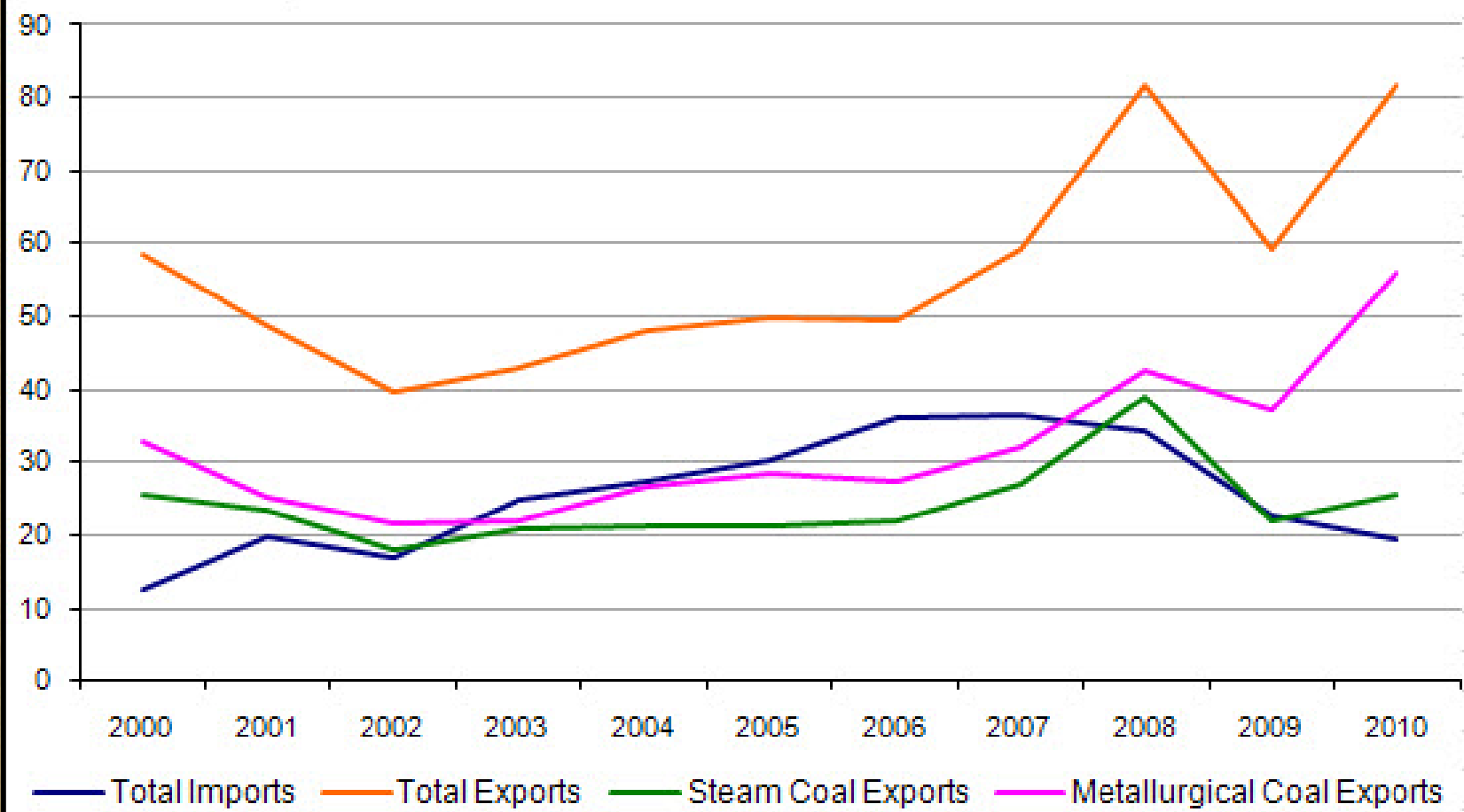


Net Generation from Coal and Natural Gas



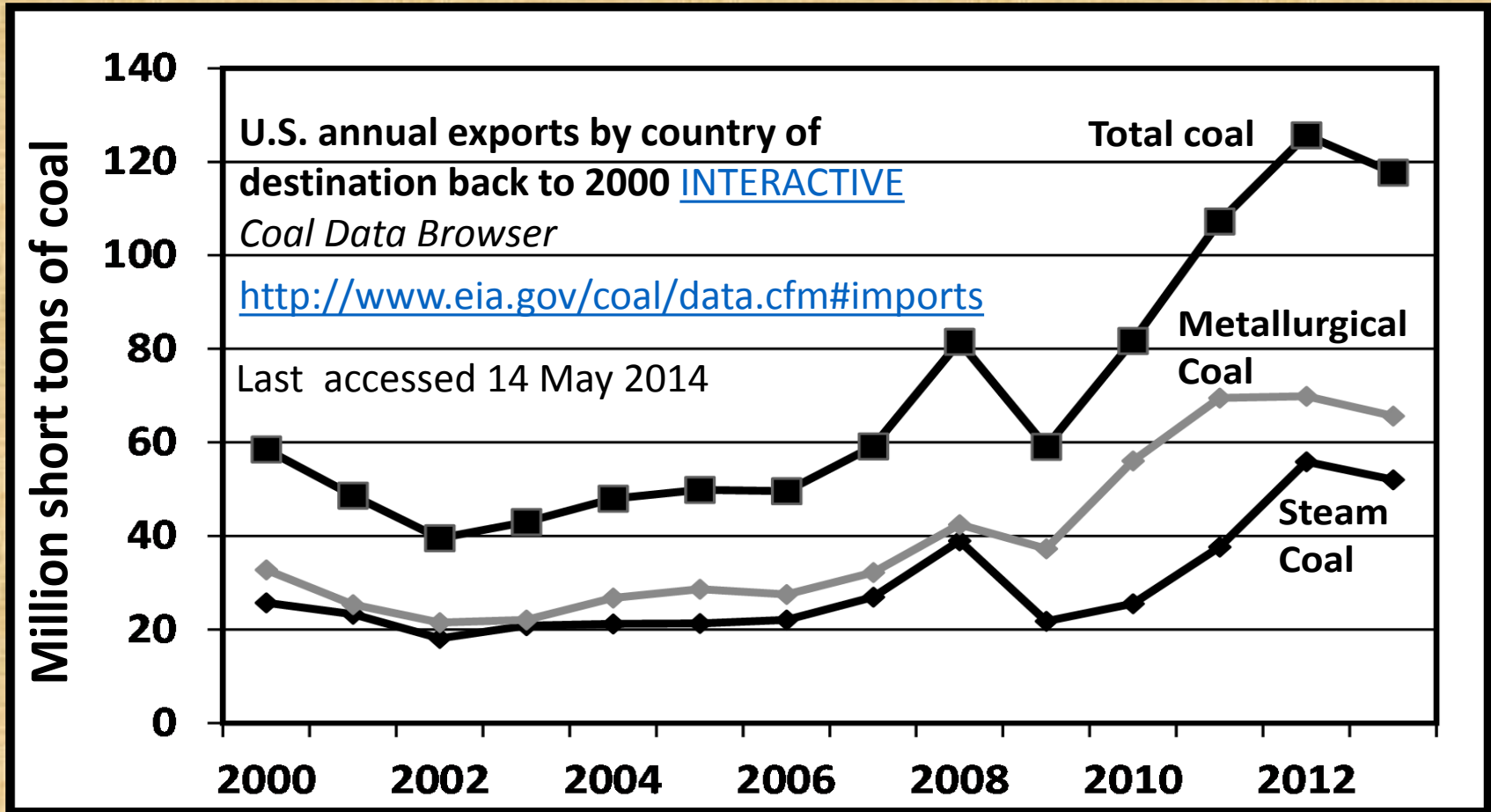
**Figure 8. U.S. coal export and imports, 2000-2010**

(million short tons)



Sources: U.S. Department of Commerce, Bureau of the Census, "Monthly Report EM 545" and "Monthly Report IM 145."

# U.S. Coal Exports



Increase in coal exports = 38.5 Tg-C; increase in natural gas exports = 19.4 Tg-C  
**Total increase in exported carbon = 57.9 Tg-C**  
Using MER heat coefficients and EPA carbon coefficients emissions.

$$I = P \cdot A \cdot T$$

## Kaya Identity and Related Concepts

**p** = population      **GDP** = gross domestic product  
**e** = energy      **c** = fossil carbon emitted  
**Fc** = airborne fraction  
**Δc** = change in atmospheric carbon

population

affluence  
term

energy  
intensity

carbonization  
factor

carbon  
emitted

$$p \cdot \frac{GDP}{p} \cdot \frac{e}{GDP} \cdot \frac{c}{e} = c$$

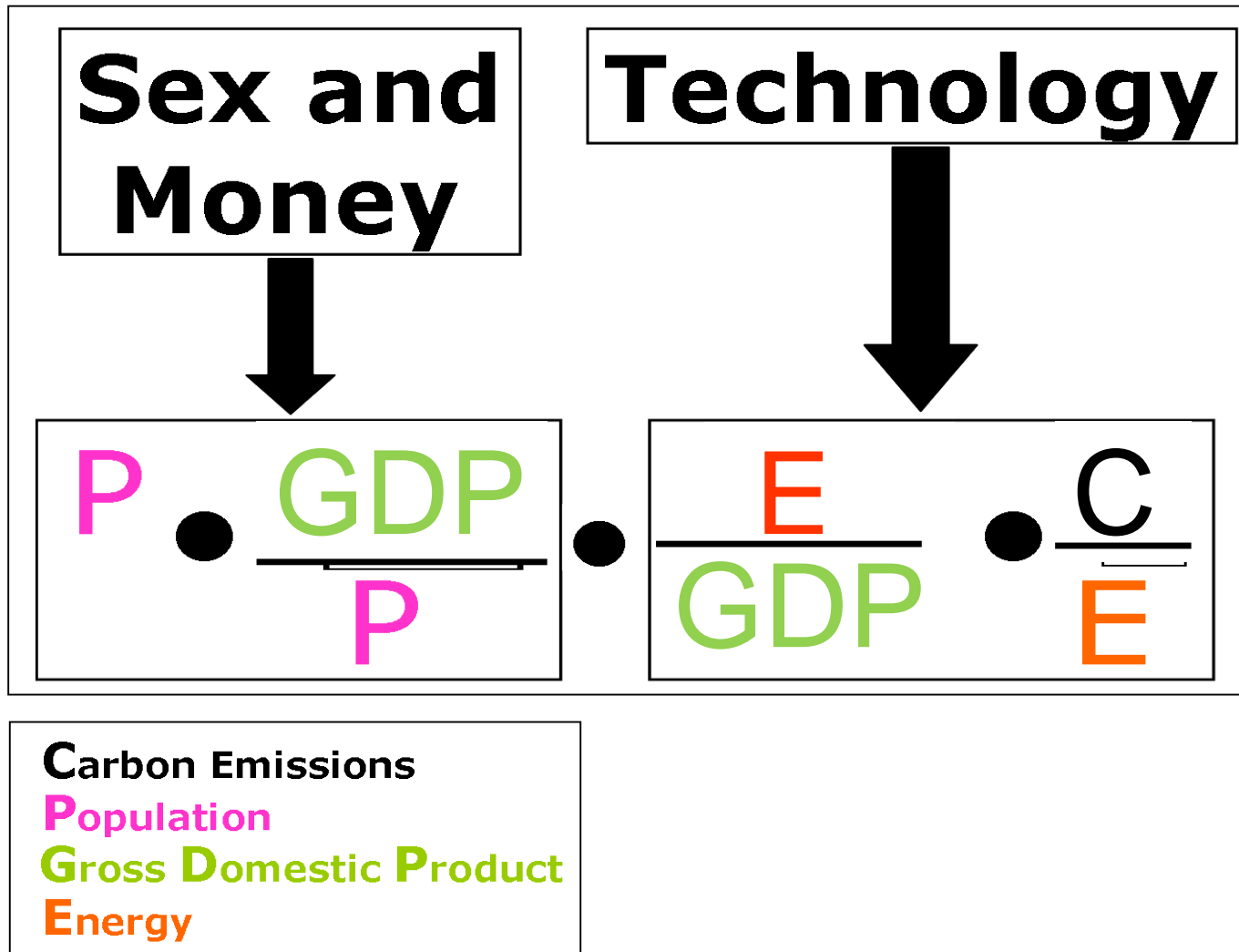
$$p \cdot \frac{GDP}{p} \cdot \frac{c}{GDP} \cdot Fc = \Delta c$$

carbon  
intensity

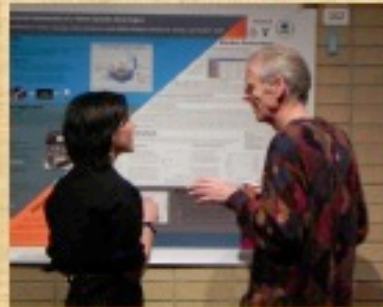
carbon-cycle  
dependent

rate of carbon  
accumulation

*No wonder we're losing !!!*



Thanks for the memories







## Carbon Emissions from Texas Oil

