

# The Climate-Policy Context for the C Ranch



**Duke Environment**  
at the Nicholas School



**Bill Chameides**  
Nicholas Professor of the Environment  
Dean

November 12, 2010

**Harnessing  
Farms and  
Forests  
in the  
Low-Carbon  
Economy**

**How to  
Create,  
Measure,  
and Verify  
Greenhouse  
Gas Offsets**

THE NICHOLAS INSTITUTE FOR  
ENVIRONMENTAL POLICY SOLUTIONS

ZACH WILLEY AND BILL CHAMEIDES,  
EDITORS

[www.nicholasinstitute.org](http://www.nicholasinstitute.org)

# What I will talk about ...

- Climate Change Background
- Potential Role of Land-Based Offsets
- Prospects for a C Market
- But First ...



***Positive proof of global warming.***



**18th  
Century**

**1900**

**1950**

**1970**

**1980**

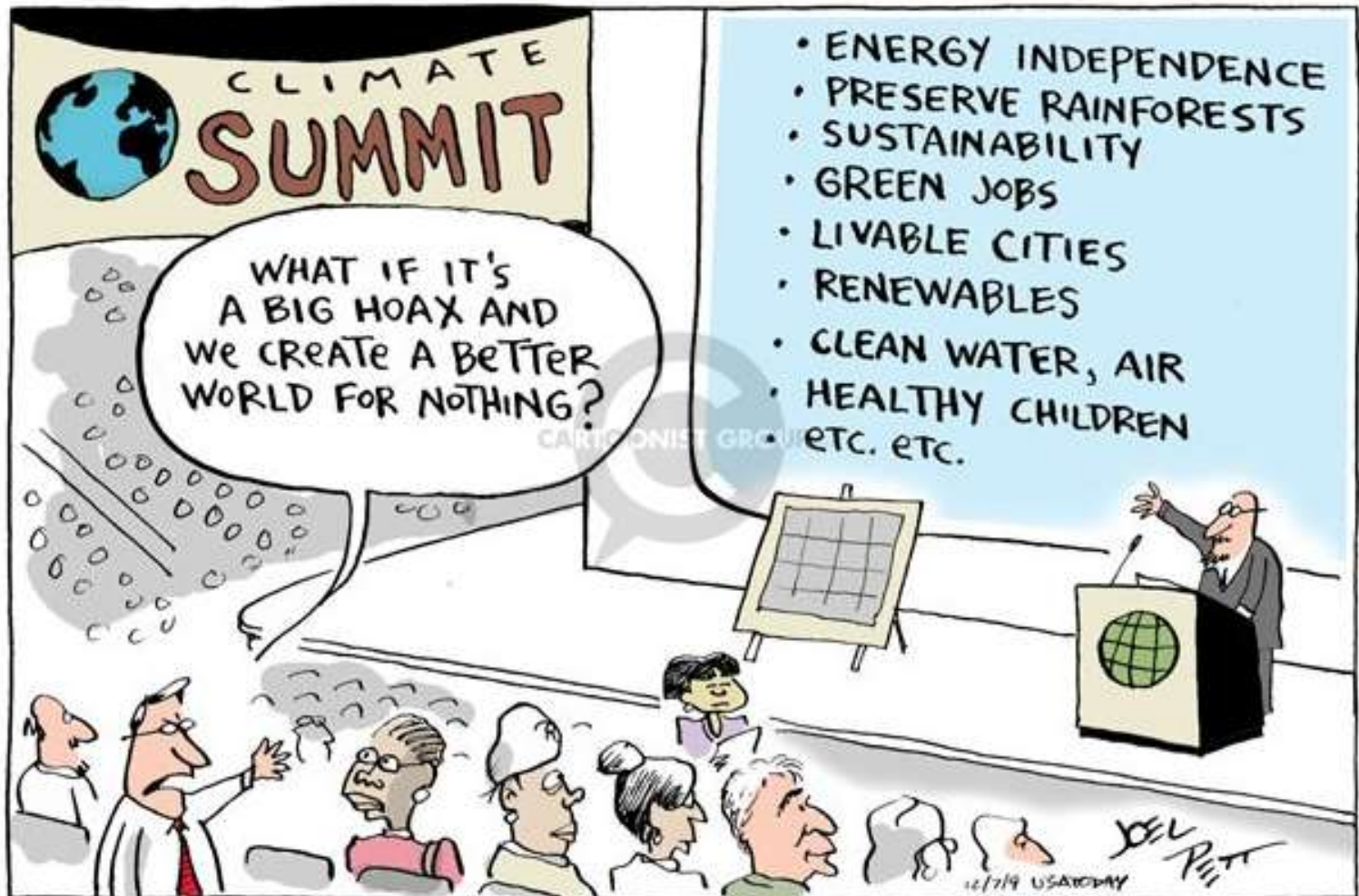
**1990**

**2006**

<http://go.funpic.hu>



**Duke Environment**  
at the Nicholas School



© Joel Pett.

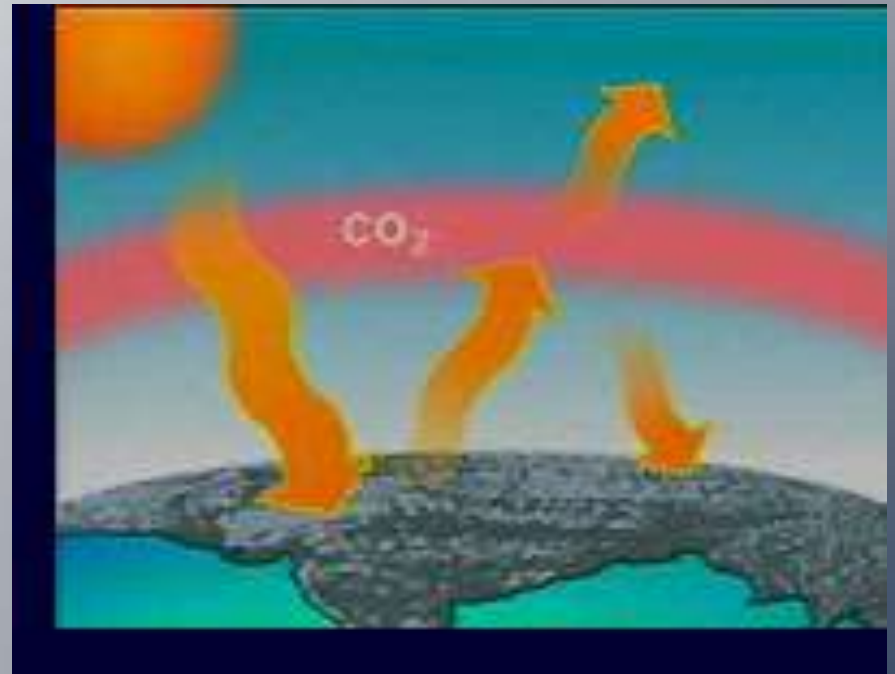


# Climate Change

## *Some basics*

## The greenhouse gases (GHGs)

- **Carbon Dioxide (CO<sub>2</sub>)**
  - Fossil fuels, deforestation
- Methane (CH<sub>4</sub>)
  - Cows, rice, landfills, wetlands, coal mining
- Nitrous oxide (N<sub>2</sub>O)
  - Nitrogen fertilizers
- HFCs
  - Refrigerants, solvents



# The GHGs

## Some Basics

- Carbon Dioxide (CO<sub>2</sub>)
  - Fossil fuels: 25 billion tons CO<sub>2</sub>/yr
    - 43% coal
    - 43% petroleum
    - 15% natural gas
  - Deforestation: 7 billion tons CO<sub>2</sub>/yr



# CO<sub>2</sub> Emissions (tons/yr)

- Average American car: 7
- Average American family: 24
- United States: 7 billion
- World: 30 billion

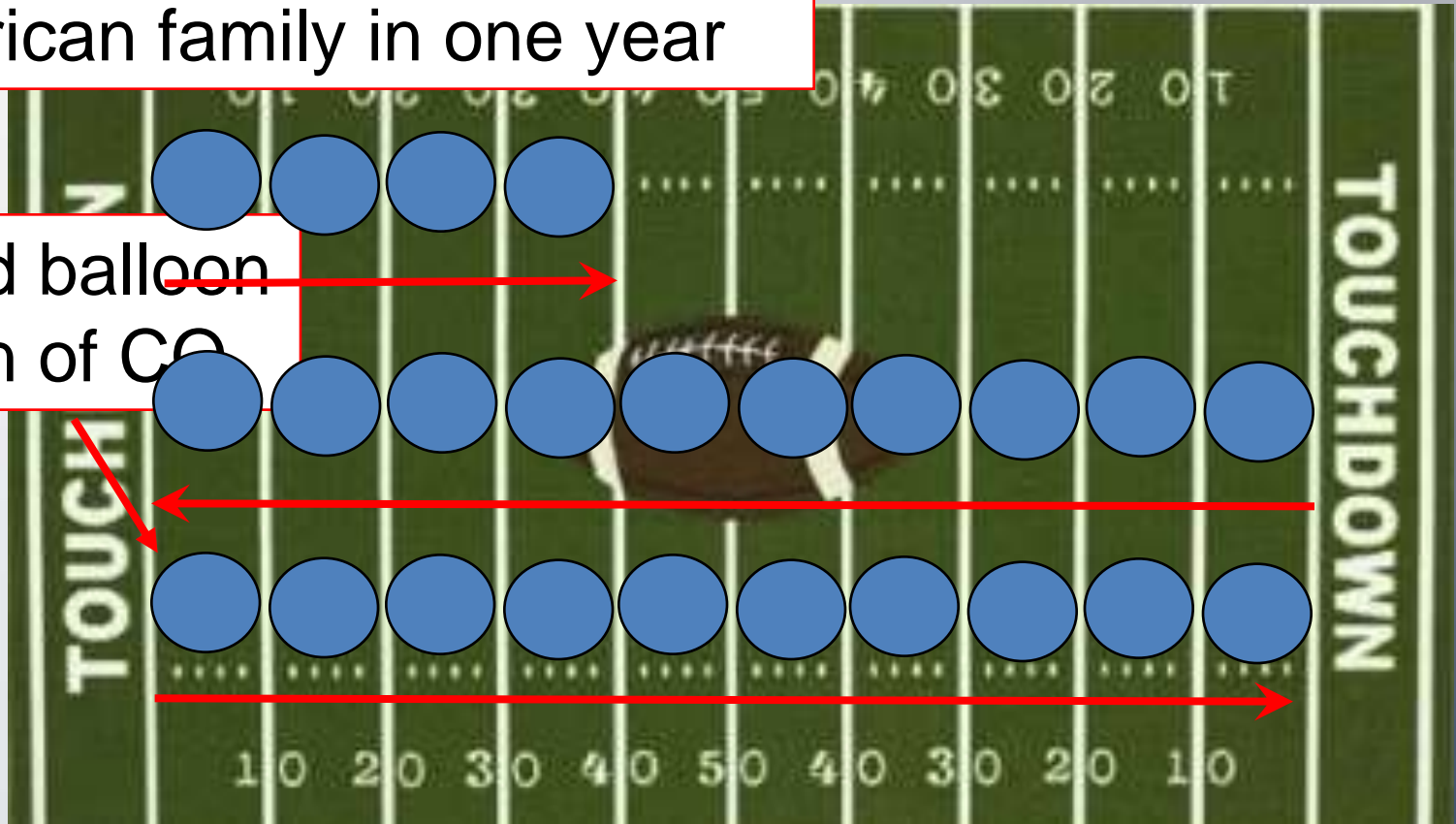
**But what is a ton of CO<sub>2</sub>?  
How can a gas have a weight?**



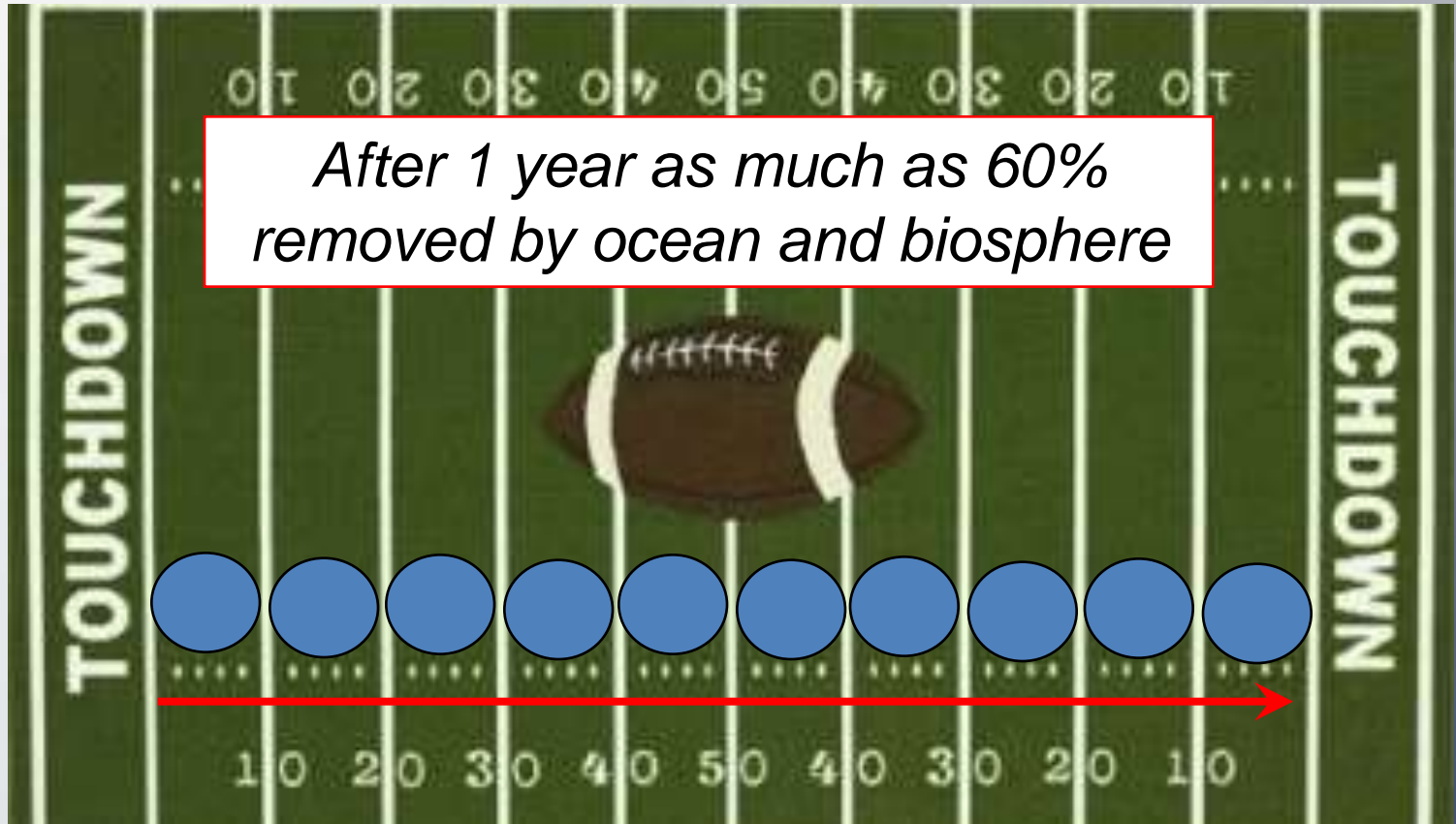
# CO<sub>2</sub> on the “Gridiron.”

American family in one year

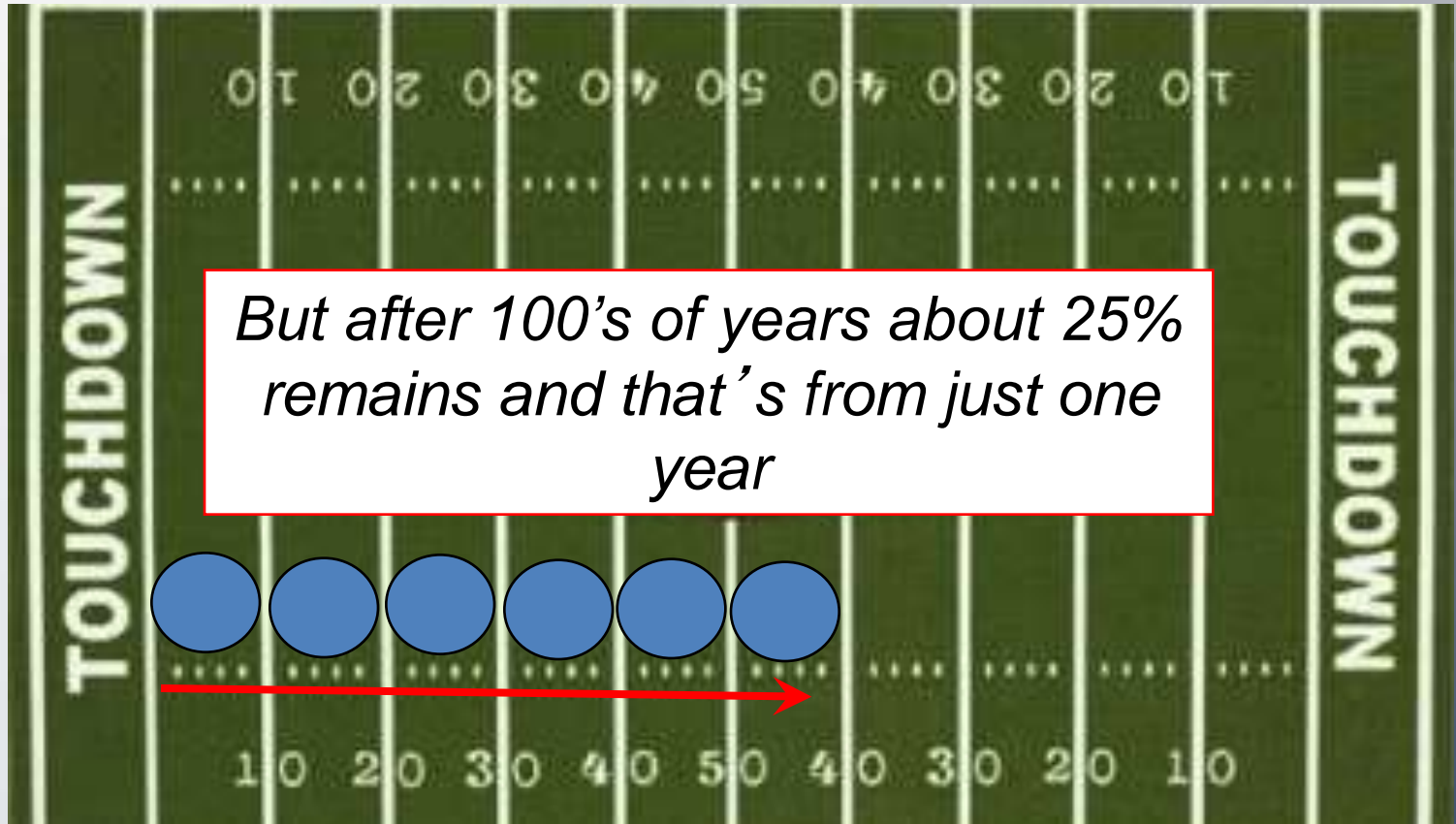
10 yard balloon  
= 1 ton of CO<sub>2</sub>



# CO<sub>2</sub> on the “Gridiron.”



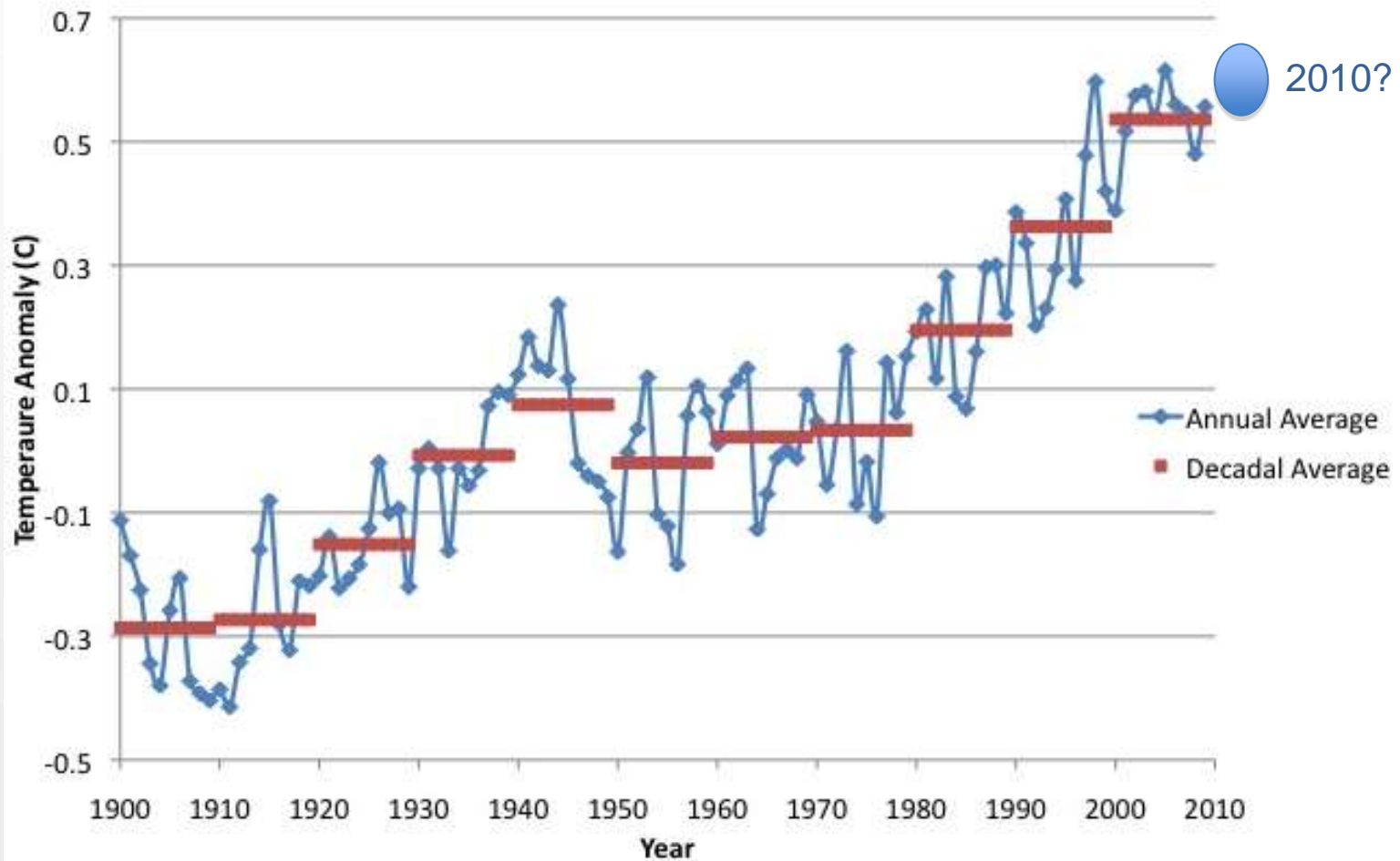
# CO<sub>2</sub> on the “Gridiron.”



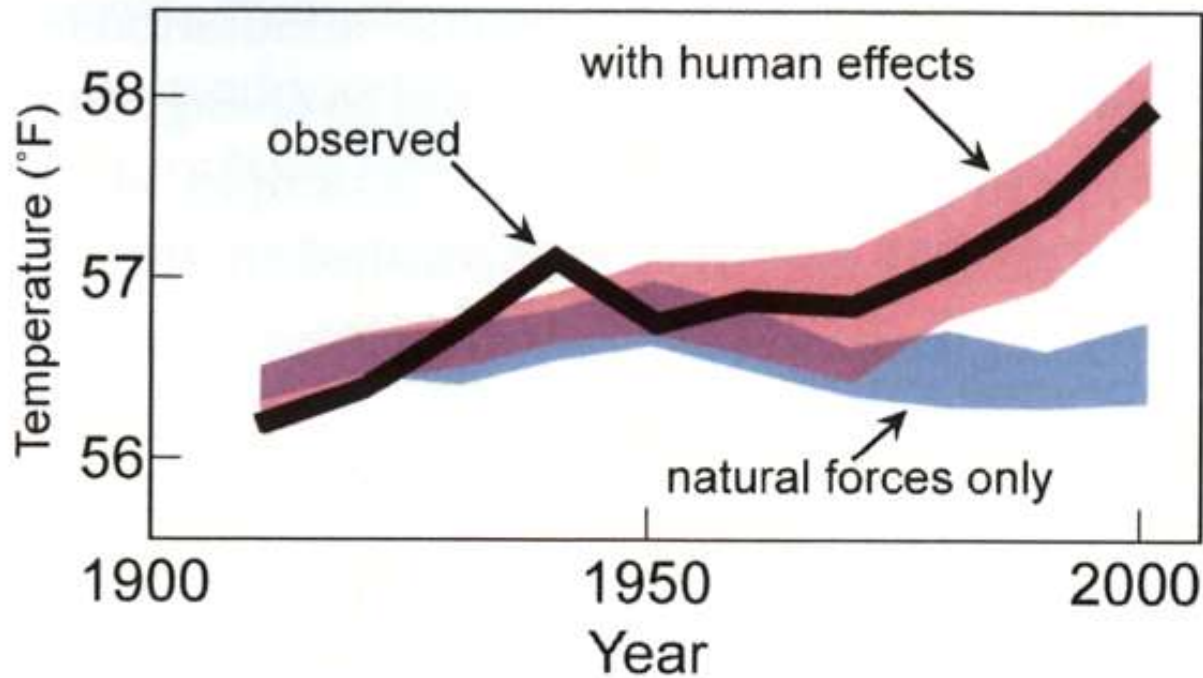
# The scientific foundation for action

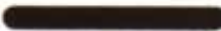
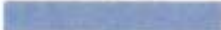

1. CO<sub>2</sub> warms the atmosphere
2. CO<sub>2</sub> is increasing due to human activities
3. “Globe” is warming
4. Warming is largely due to increasing CO<sub>2</sub>
5. Inaction will likely bring dangerous consequences





## Separating Human and Natural Influences on Climate



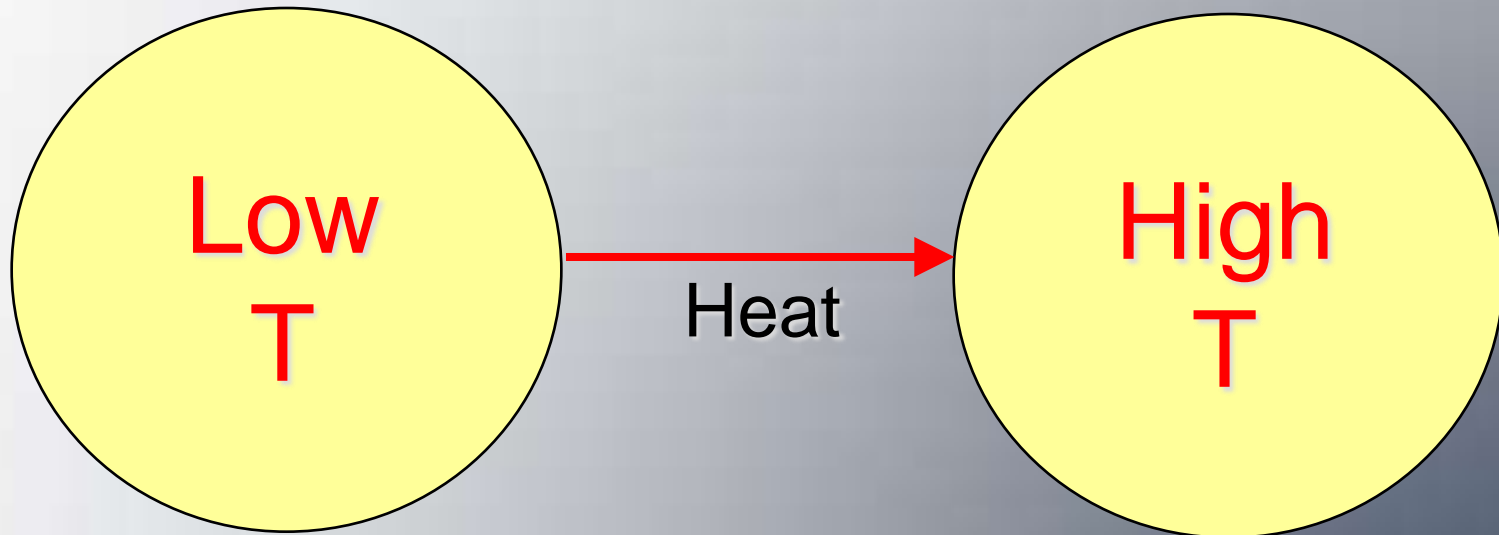
-  Observations
-  Models using only natural forces
-  Models using both natural and human forces

Hegerl et al.<sup>49</sup>

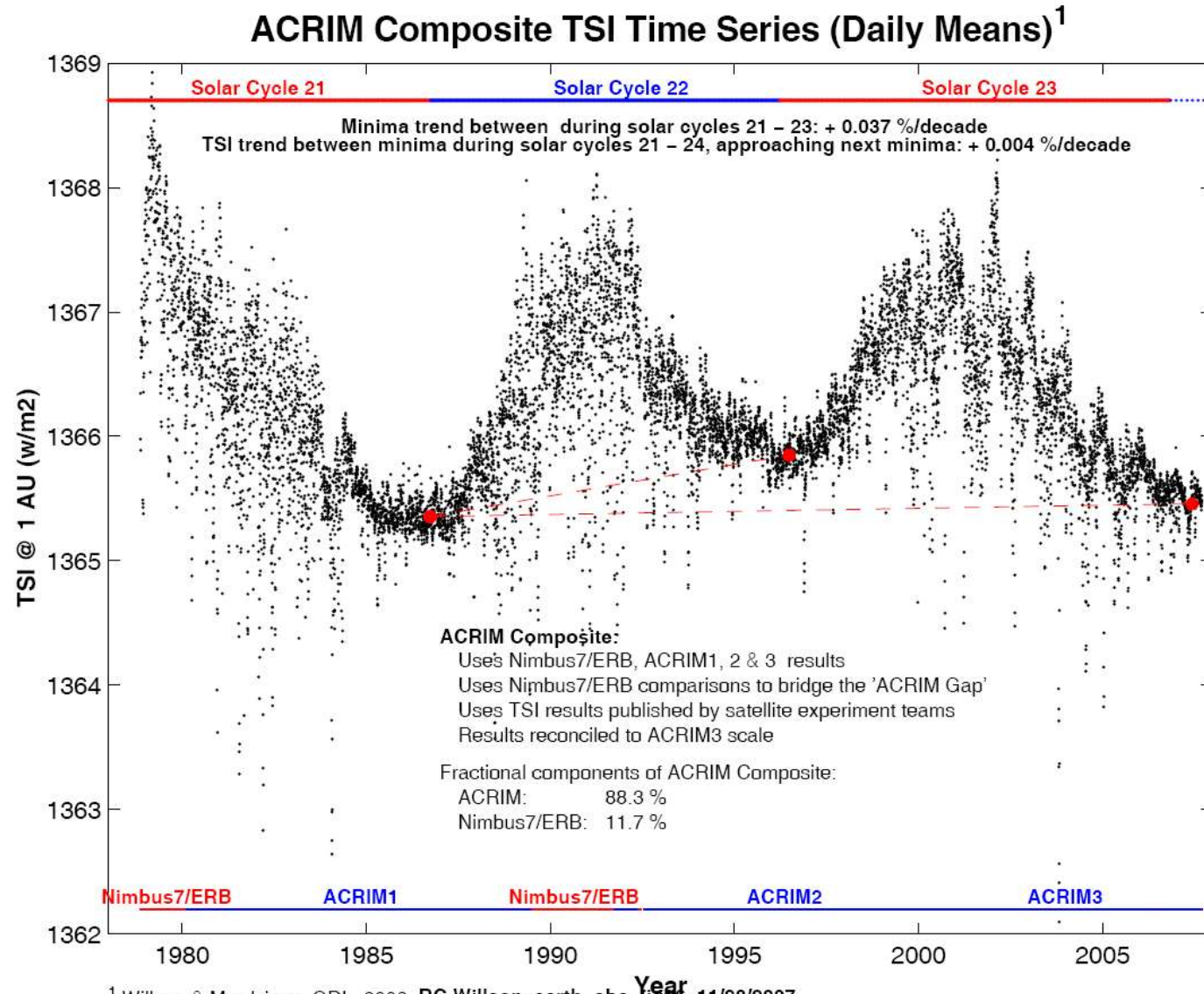
How do we know warming is due to human activities?

Any explanation of warming must have a physical basis:

Global warming requires a source of heat



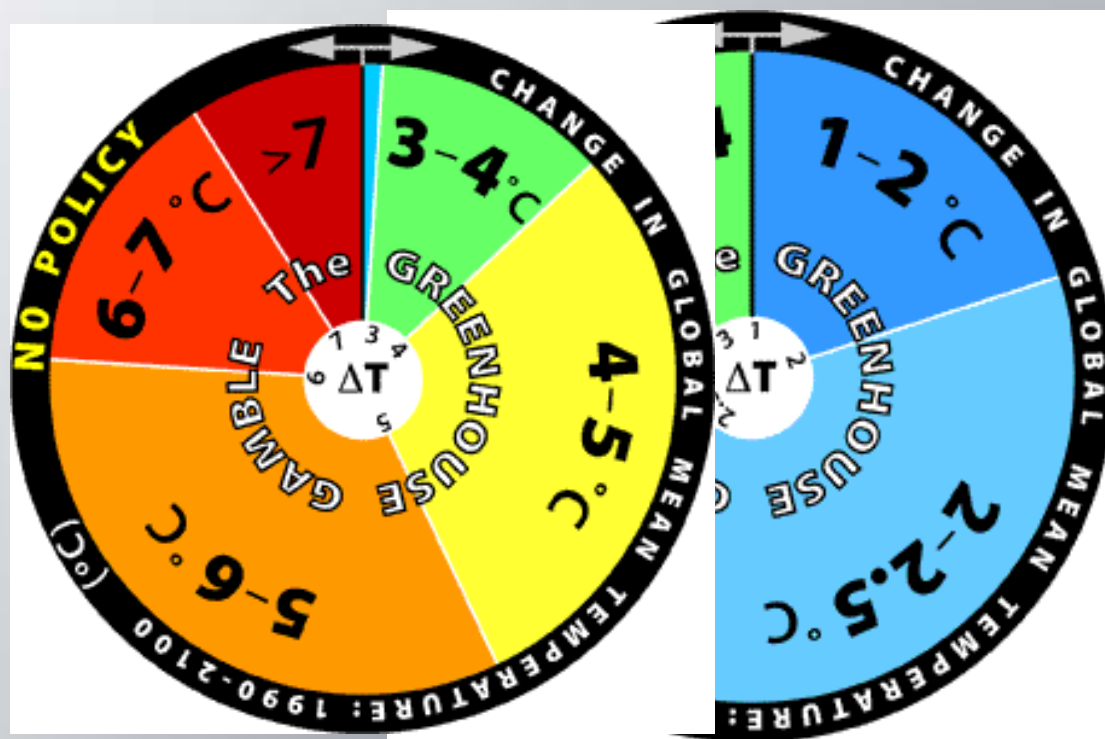
# Solar Output: No Significant change in 20+ years...



<sup>1</sup> Willson & Mordvinov, GRL, 2003 RC Willson, earth\_obs\_fig26 11/28/2007

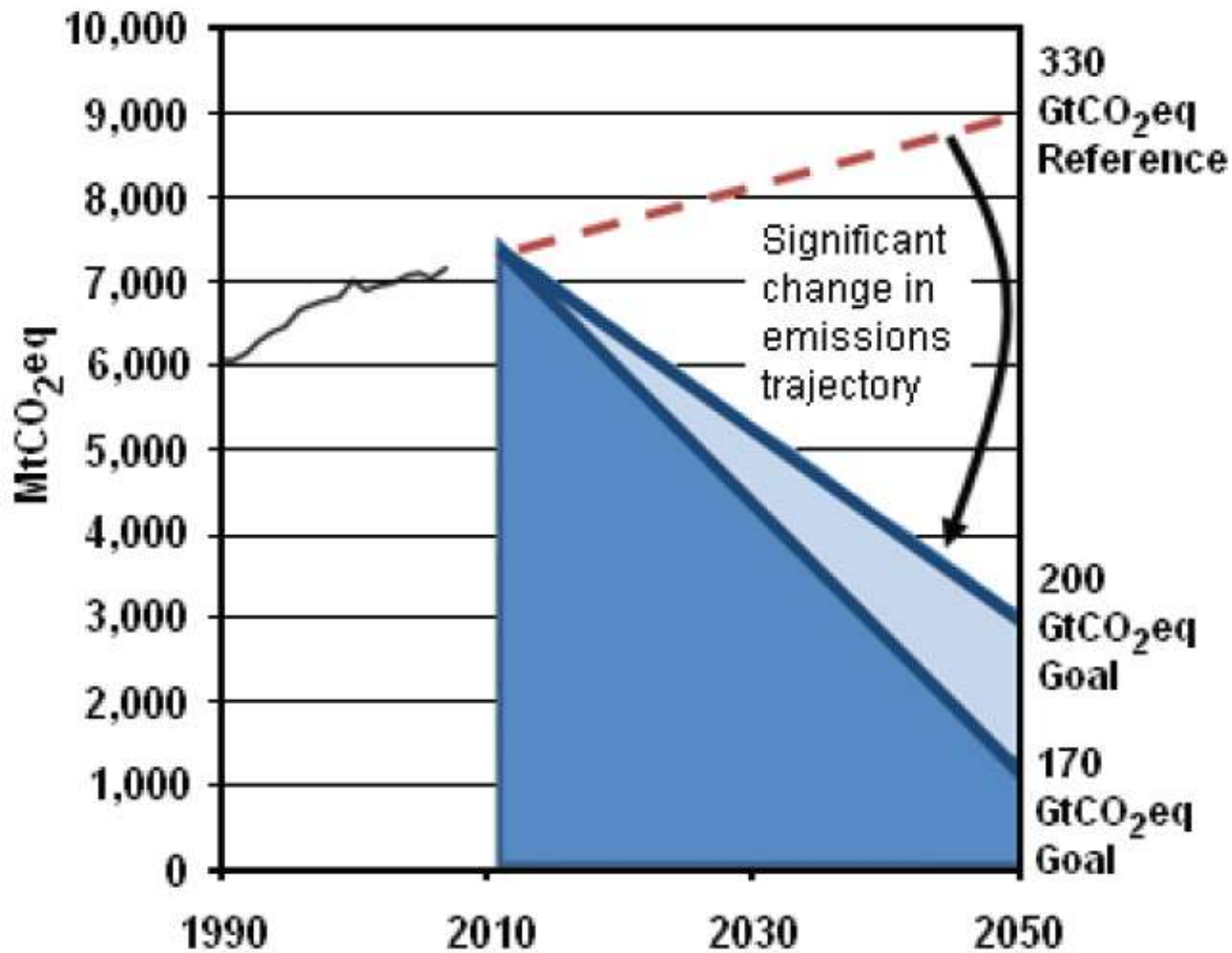
# What does the future hold?

The Greenhouse Gamble:



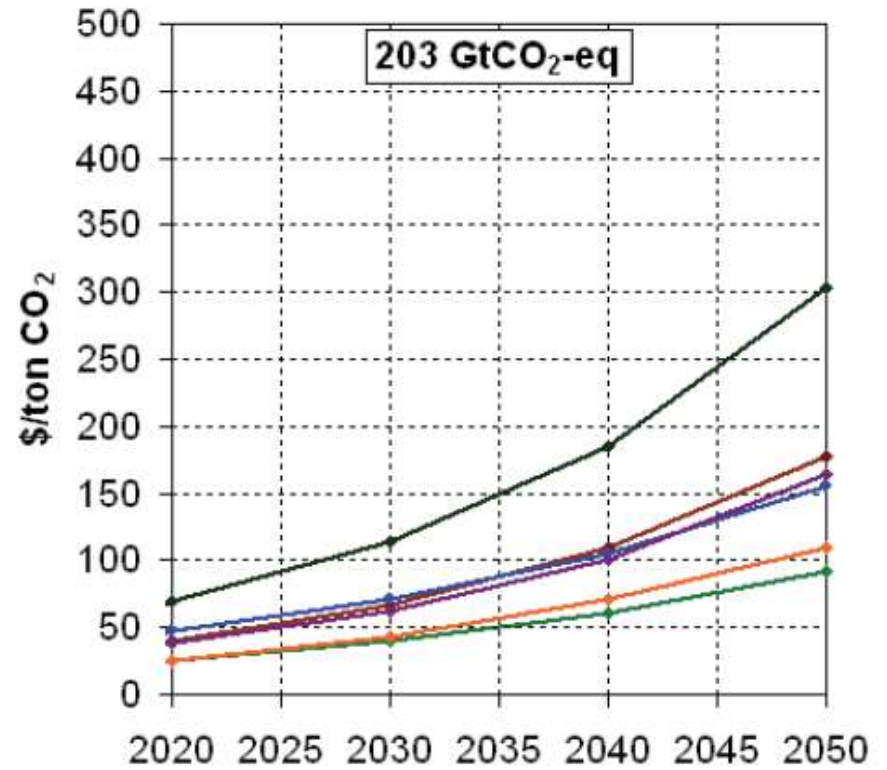
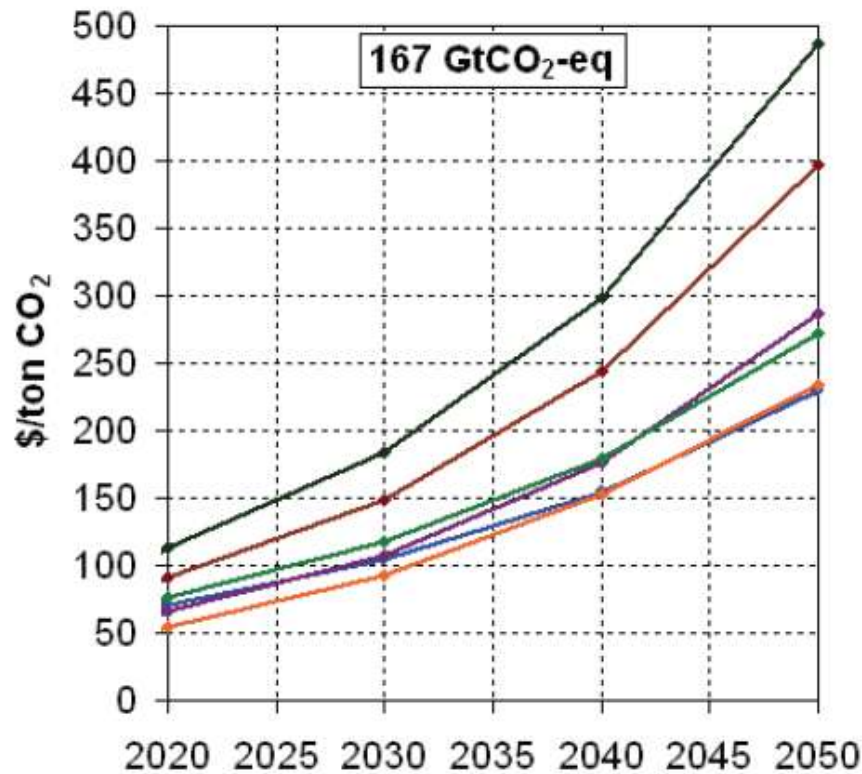
<http://globalchange.mit.edu/resources/gamble/policy.html>





Need to find emission cuts totaling about 6,000 – 8,000 MtCO<sub>2</sub>/yr

1,000 Mt = 1 billion tons



—◆— ADAGE   
 —◆— MRN-NEEM   
 —◆— EPPA   
 —◆— IGEM   
 —◆— MERGE (opt)   
 —◆— MiniCAM (base)

**Figure 2.12** Carbon prices across EMF22 scenarios for 167 and 203 GtCO<sub>2</sub>-eq goals. In all scenarios, carbon prices increase over time, and prices are higher for the more stringent (167 GtCO<sub>2</sub>-eq) emissions budget. Source: Fawcett et al., 2009.



# What Role Can Offsets from Land-Management Play?



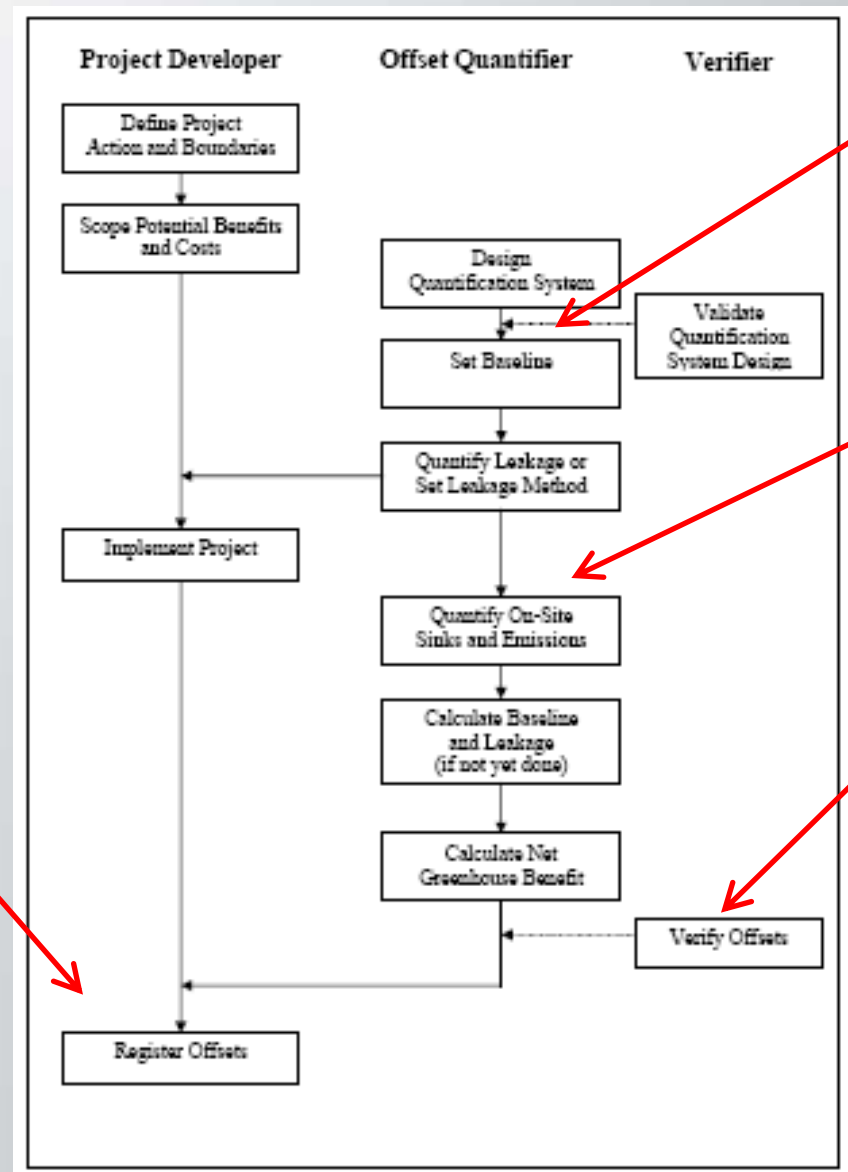
# What Role Can Offsets from Land-Management Play?



[www.Cheatneutral.com](http://www.Cheatneutral.com)

Helping you because you can't help yourself

# Process for creating credible offsets



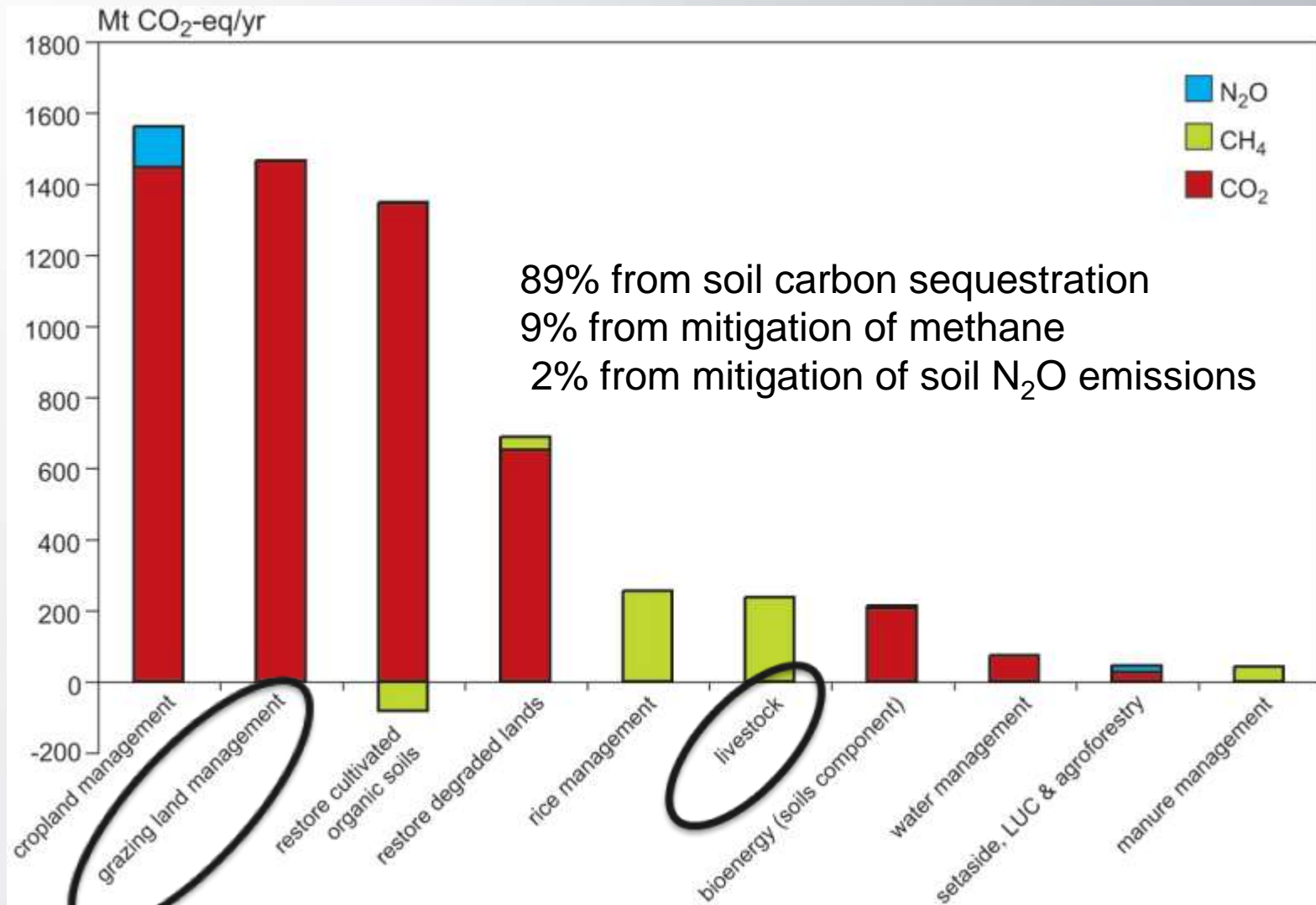
Set baseline

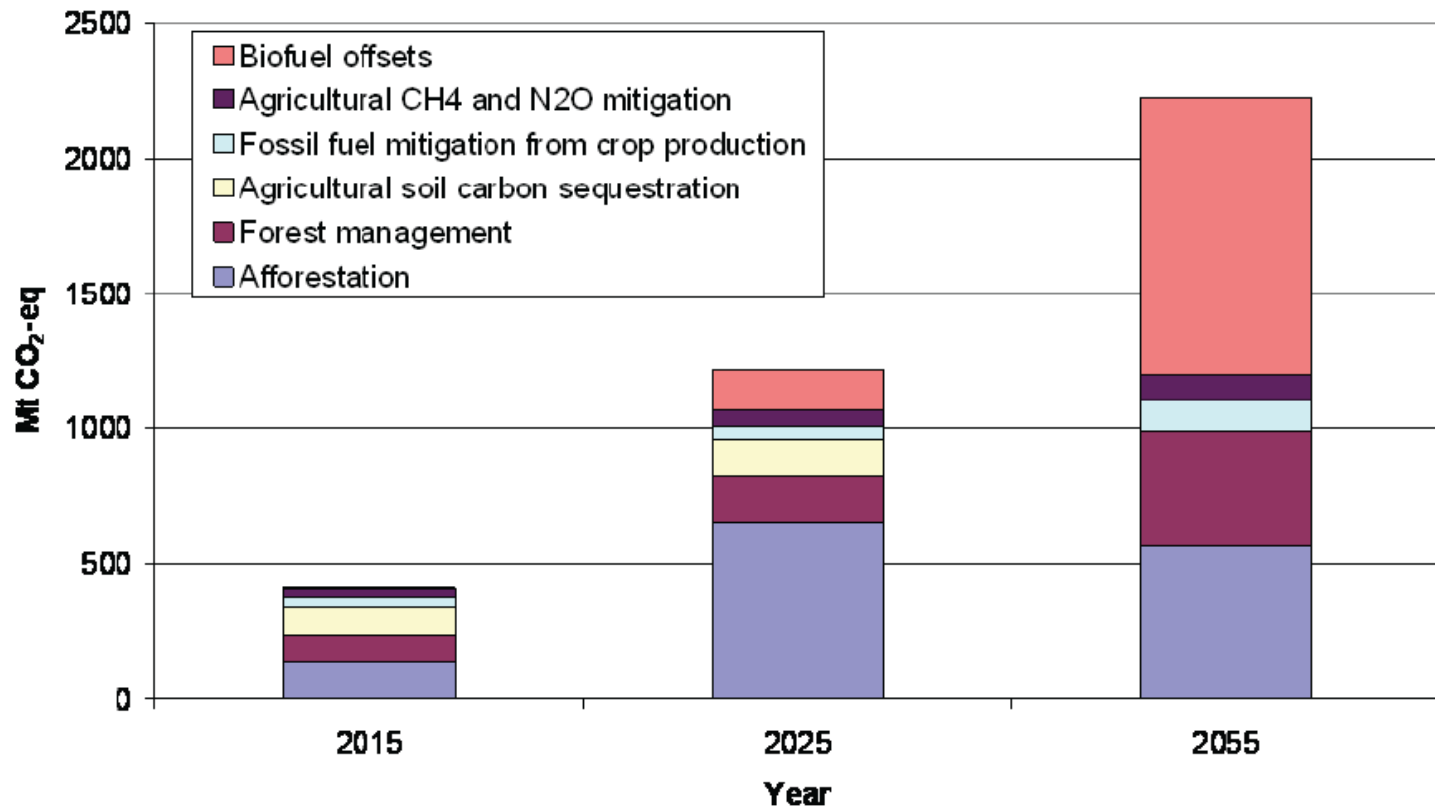
Measure change

Register offset

Independently verify

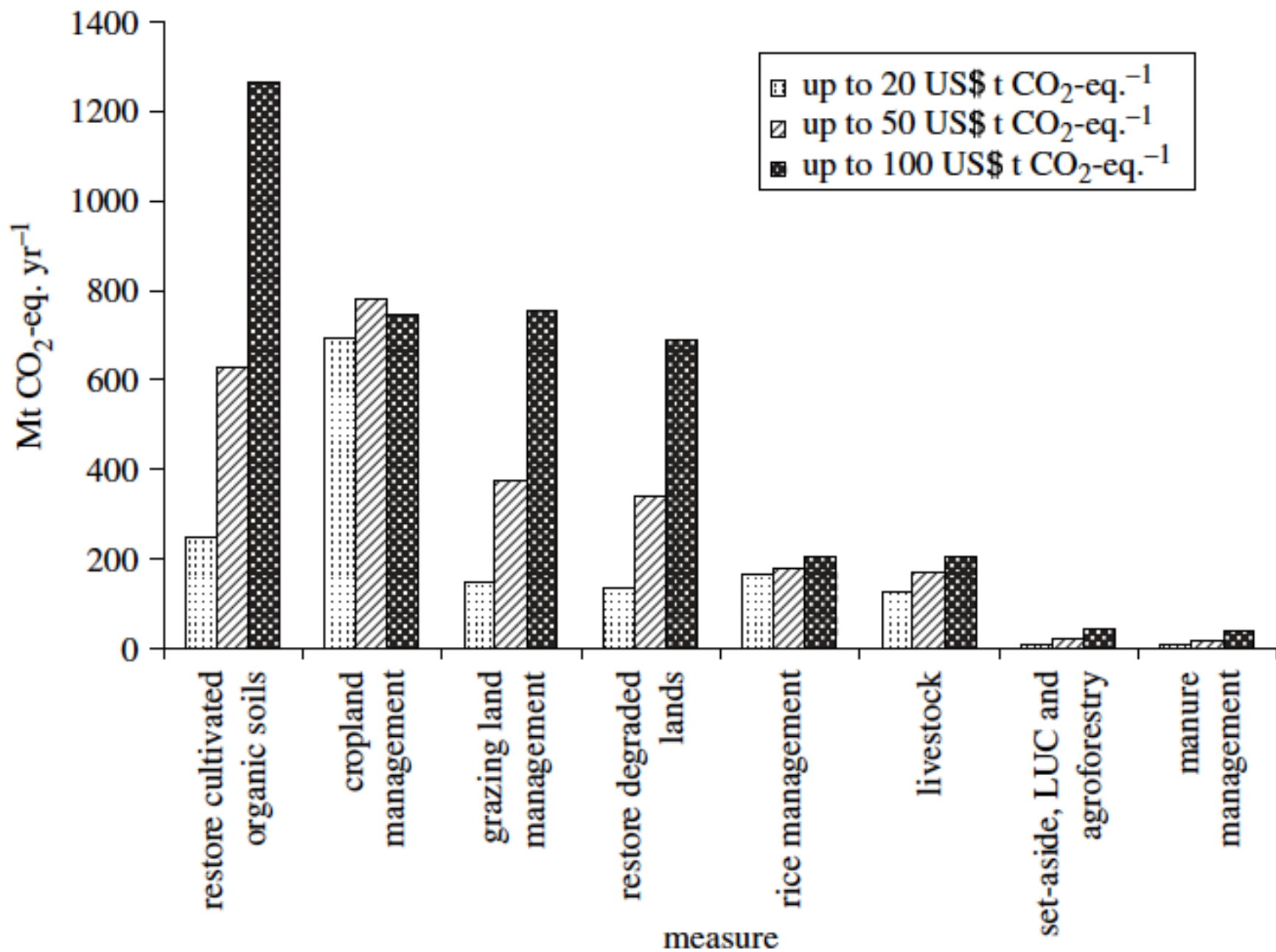
# Global Mitigation Potential from Agriculture in 2030





**Figure 3.2** Mitigation potential in the U.S. agriculture and forestry sectors. Assumes a price of \$20 per ton CO<sub>2</sub>-eq in 2010, increasing at \$1.30/yr. (The negative value in 2055 indicates less sequestration relative to the baseline value). Note that both the absolute and relative magnitude of different sequestration options varies over time. Source: U.S. EPA.





# The Climate Science Meltdown of 2009/10

**WALL STREET JOURNAL ON  
CLIMATEGATE:**

***“HAS CLIMATE CHANGE DATA  
BEEN RIGGED SINCE THE  
BEGINNING?”***

**NOVEMBER 27, 2009**

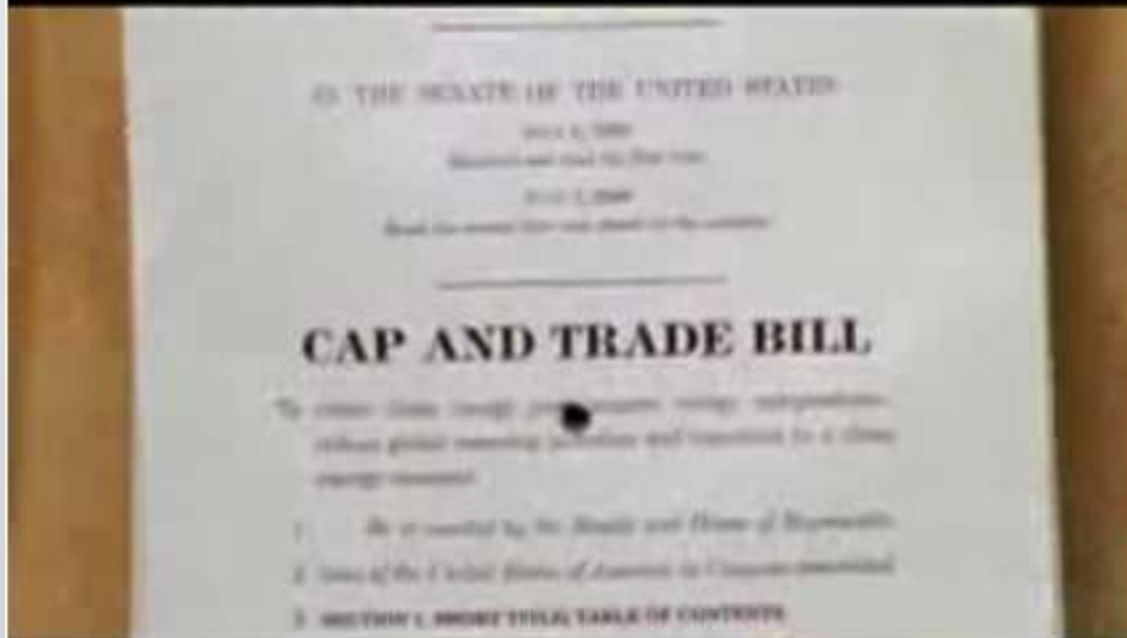
- Climategate
- IPCC
- Copenhagen Climate Meeting
- Blizzard 2010
- 111<sup>th</sup> Congress
- Election 2010



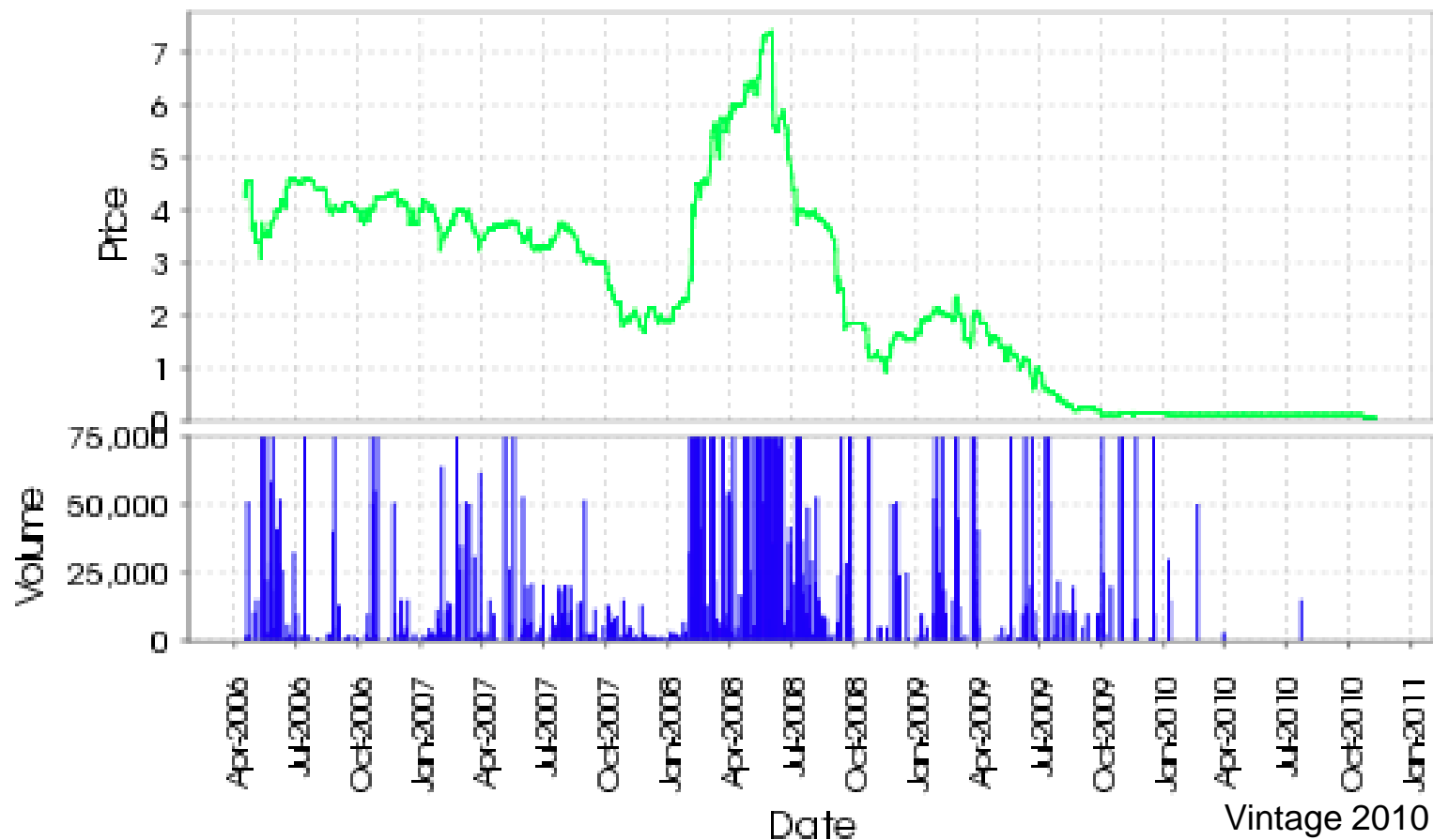
## Dead Aim - Joe Manchin for West Virginia TV Ad



## Dead Aim - Joe Manchin for West Virginia TV Ad



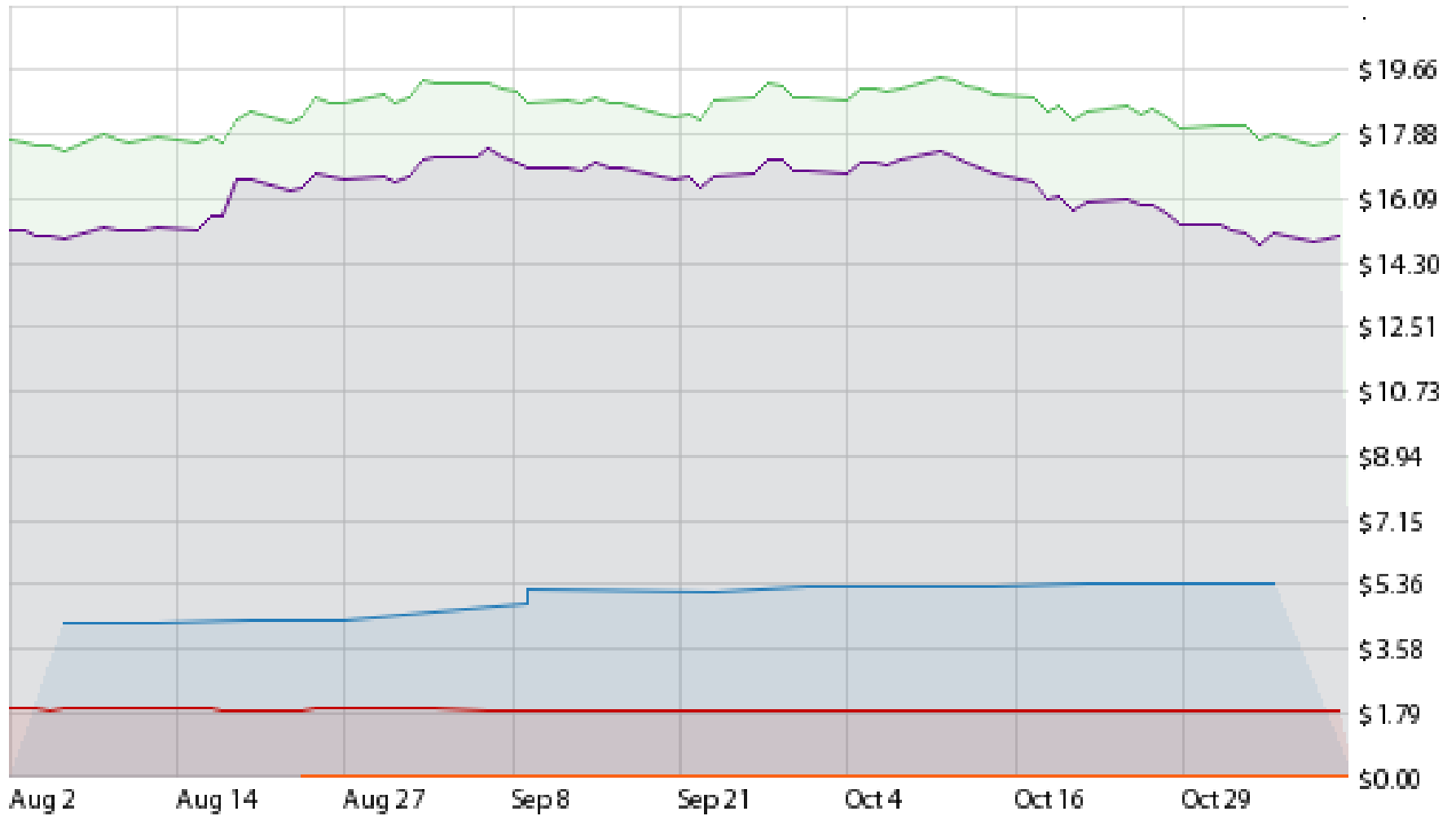
## CCX Carbon Financial Instrument (CFI) Contracts Daily Report



Price and volume reported in metric tons CO<sub>2</sub>

# MarketWatch Three Month Carbon Mid-Price (USD)

— CER — NSW — RGGI — EUA — CCX





# Carbon Trading Grinds to a Halt in U.S.

Published November 08, 2010 | FoxNews.com

The air has been taken out of the carbon trading market.

The only national carbon trading market in the U.S. will close its doors next month, due to stalled legislation in Congress and Republican gains in the midterm elections — a major setback in efforts to regulate so-called greenhouse gases, which environmentalists argue contribute to global warming.

## Chicago Climate Exchange will keep doors open with carbon offset trading

The pioneering environmental market last month announced it will cease trading of new emission allowances at the end of the year but continue trading carbon offsets generated by projects that consume greenhouse gases, such as planting trees.

## Alternatives

--- Ecosystem Marketplace ---

--- *Carbon, water, biodiversity* ---

- Voluntary Markets
- Regional/State-Based Markets: CARB, RGGI
- USDA Office of Environmental Markets
- Biofuels/Biomass

# We have a Failure to Communicate ---Culture War Clouding Our Perceptions?---

