



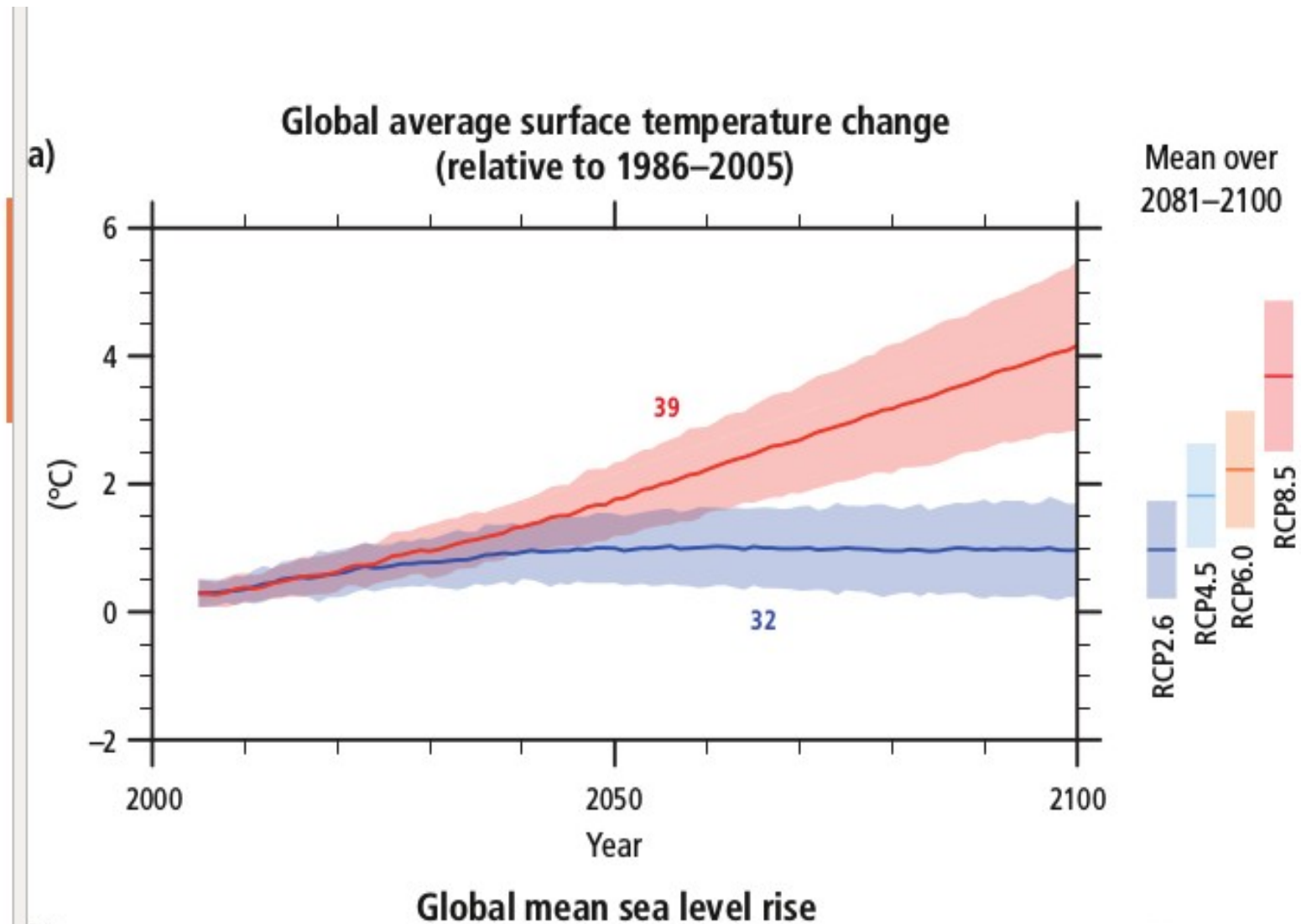
The Energy Innovation and Carbon Dividend Act of 2019

Dr. James A. (Jim) Martin

AIAA ASAT Conference
November 9, 2019

Is the increase in carbon
in the atmosphere due
to human activity?

Models Show Effects



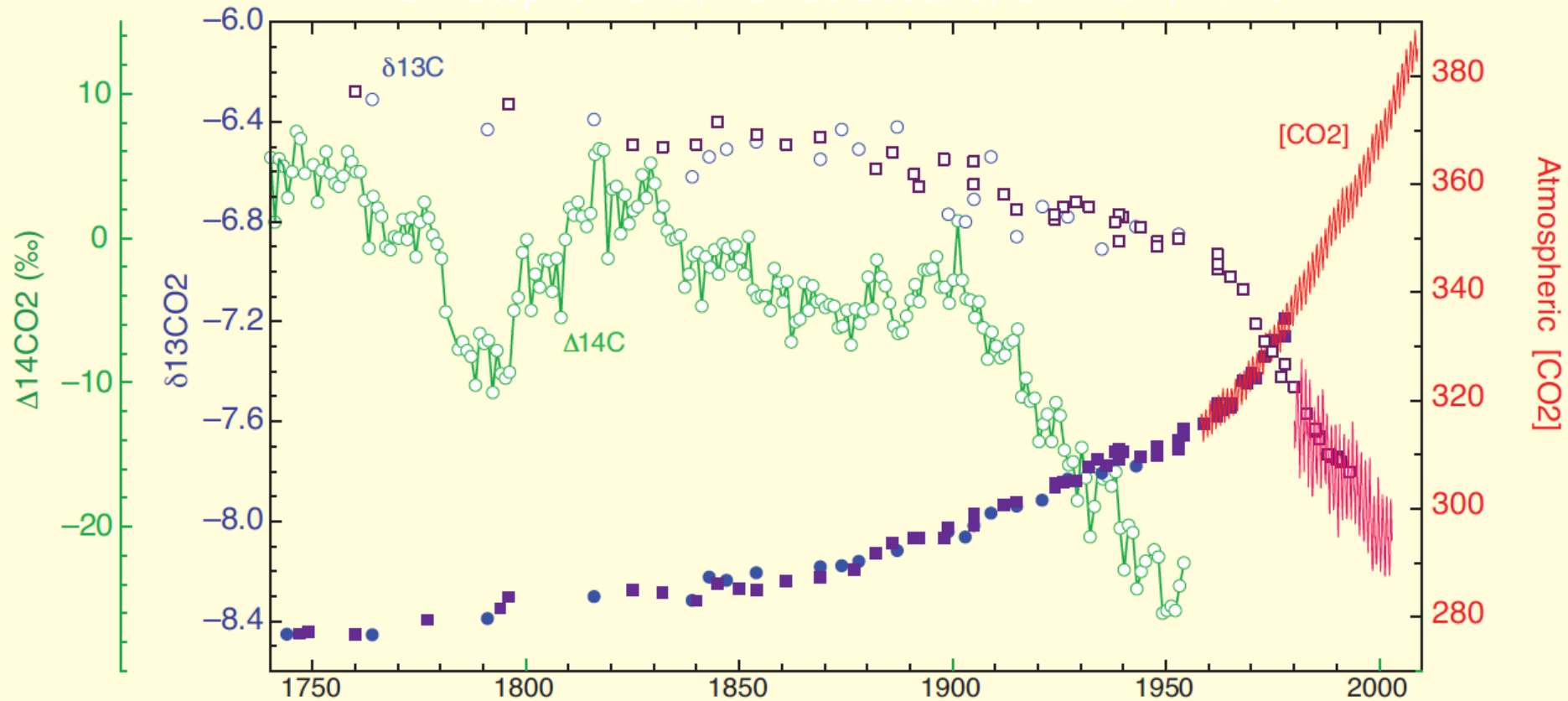
Carbon 14: “Smoking Gun”*

*Dr. Stephen Chu, Reines Lecture, Univ. CA, Irvine

- Carbon is mostly Carbon 12
- Carbon 14 is radioactive; half-life 5700 years
- Useful for carbon dating organic objects
- Created from space radiation + nitrogen 14
- Migrates down through atmosphere
- Taken up in organic items with carbon 12
- Fossil fuel: all carbon 14 decayed away
- Burning fossil fuel increases atmospheric carbon 12 without increasing carbon 14; carbon 14 fraction down

Atmospheric CO₂ and the Suess Effect on ¹³C and Δ¹⁴C

*Dr. Stephen Chu, Reines Lecture, Univ. CA, Irvine



¹⁴C (produced in the upper atmosphere by cosmic rays) mixes with the bio-sphere. The decay lifetime is ~5,700 years. Organic matter sequestered > 100,000 years has no ¹⁴C.

Jetstream

Reference:

What is a Jet Stream?

By Kim Ann Zimmermann, Live Science Contributor | March 11, 2013 07:22pm ET

f 186

87

g+ 25

87

76

MORE ▾



The jet stream, in purple, separates cold air over the Rocky Mountains from warm air over the Midwest in this forecast map for the weekend of March 8, 2013.

Credit: AccuWeather.com

Previous Successes

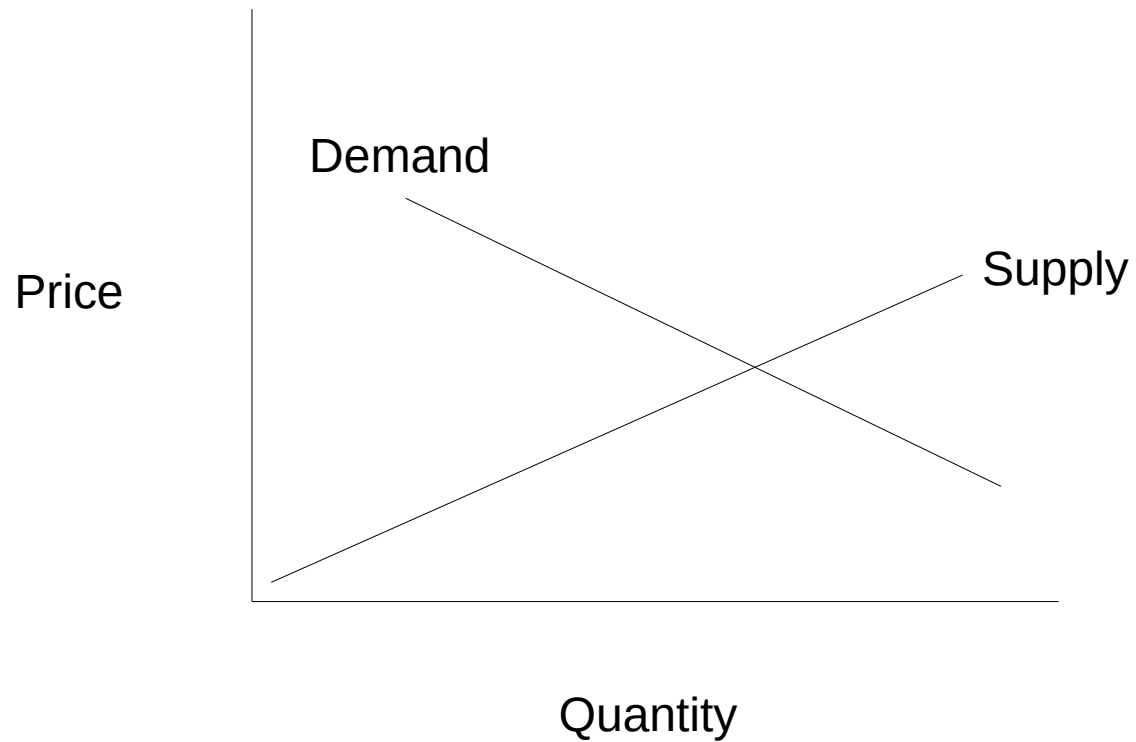
- Sewage
 - Pay for disposal
- Trash
 - Pay for disposal
- Bald eagles
 - Banned DDT
- Acid rain
 - Wash sulfur from coal; sell sulfur at a profit
- Ozone hole
 - Changed from CFC's for air conditioners
- Los Angeles basin (and other places) smog
 - Unleaded gasoline, vapor guards on pumps, car pollution control, etc.

Altruism

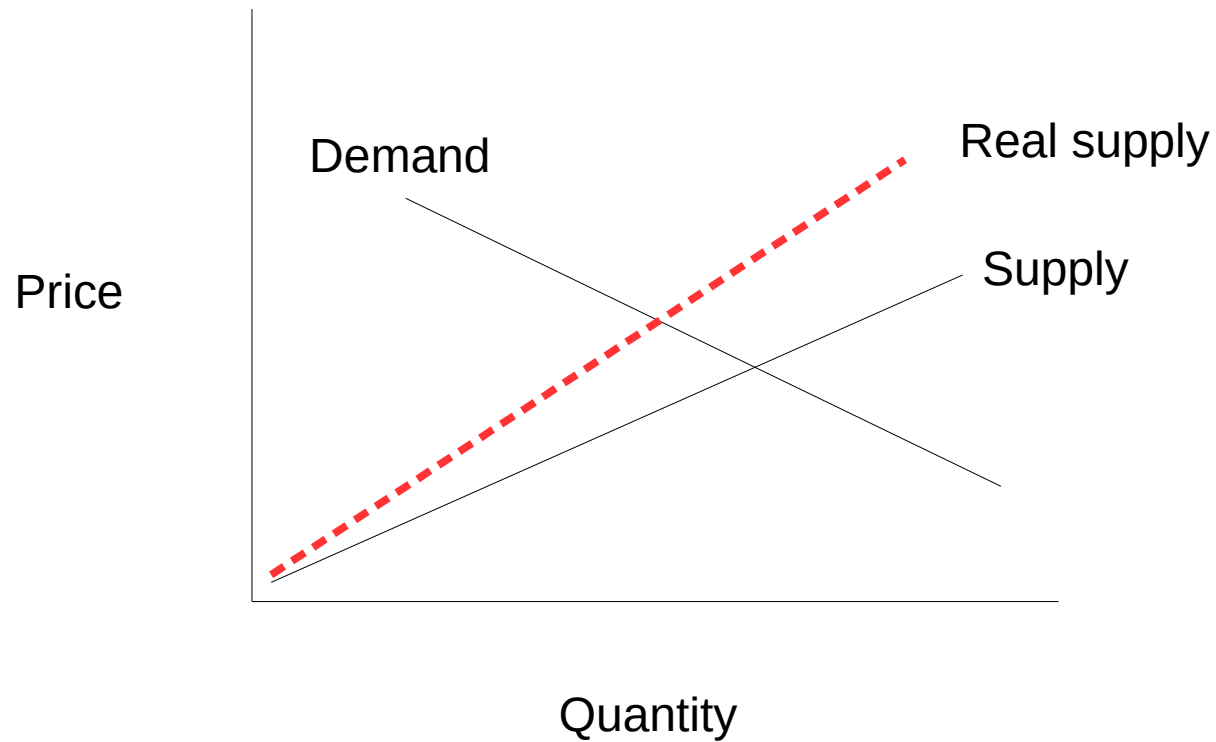
- Useful
- Not a solution

Economics

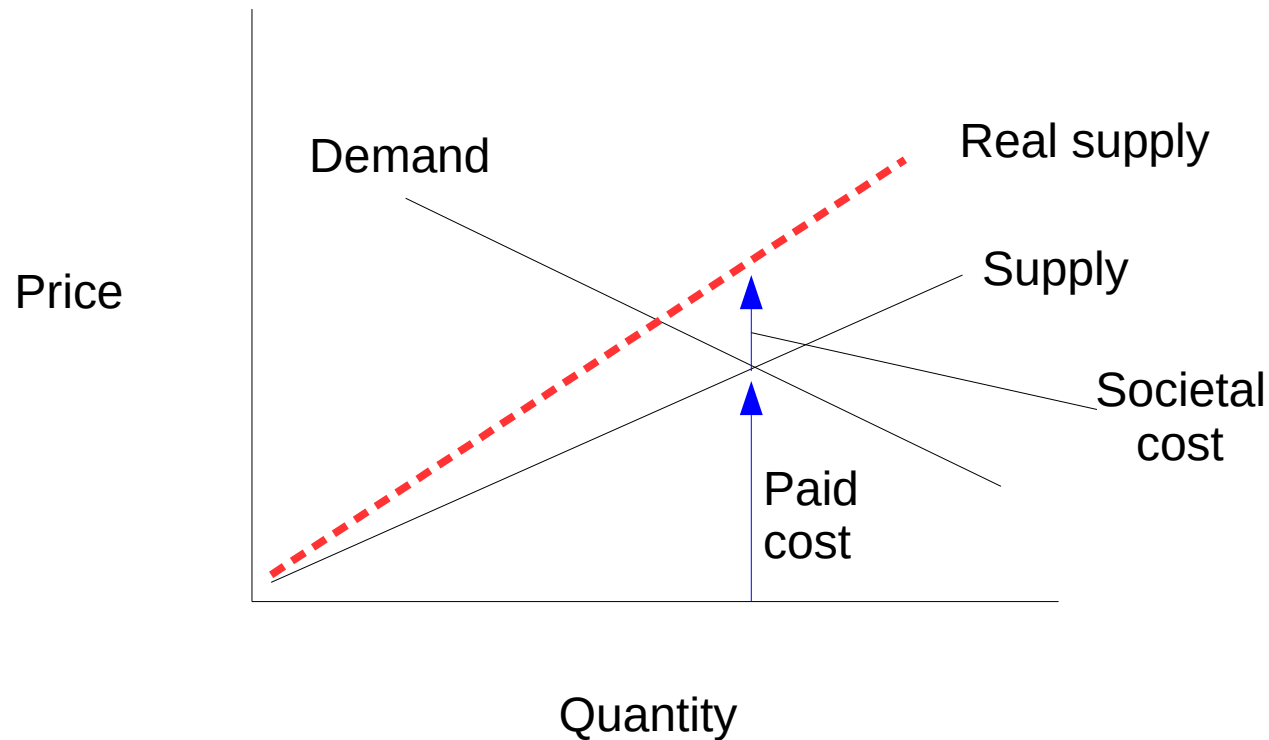
Supply and Demand



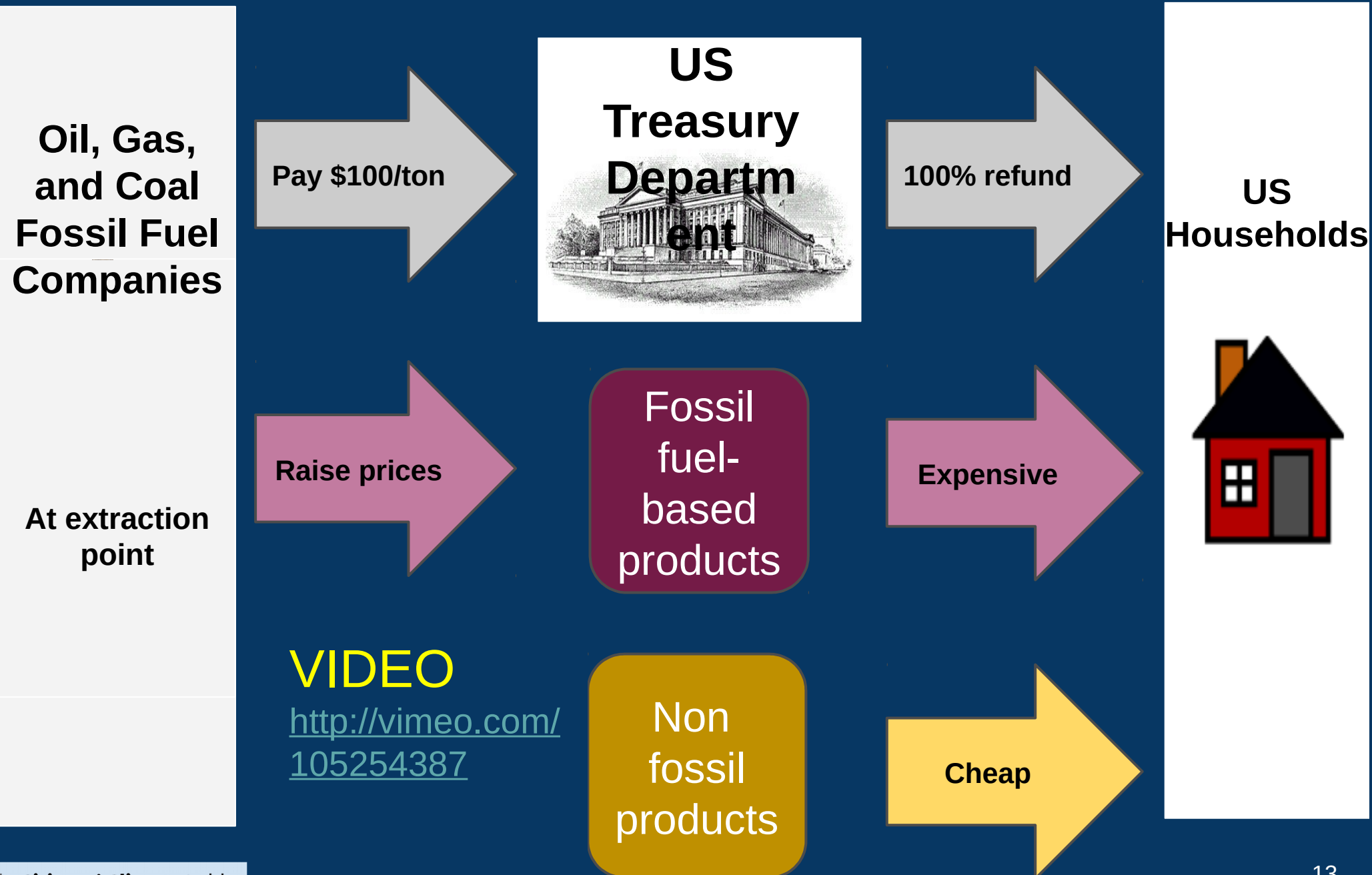
Real Supply and Demand



Real Supply and Demand



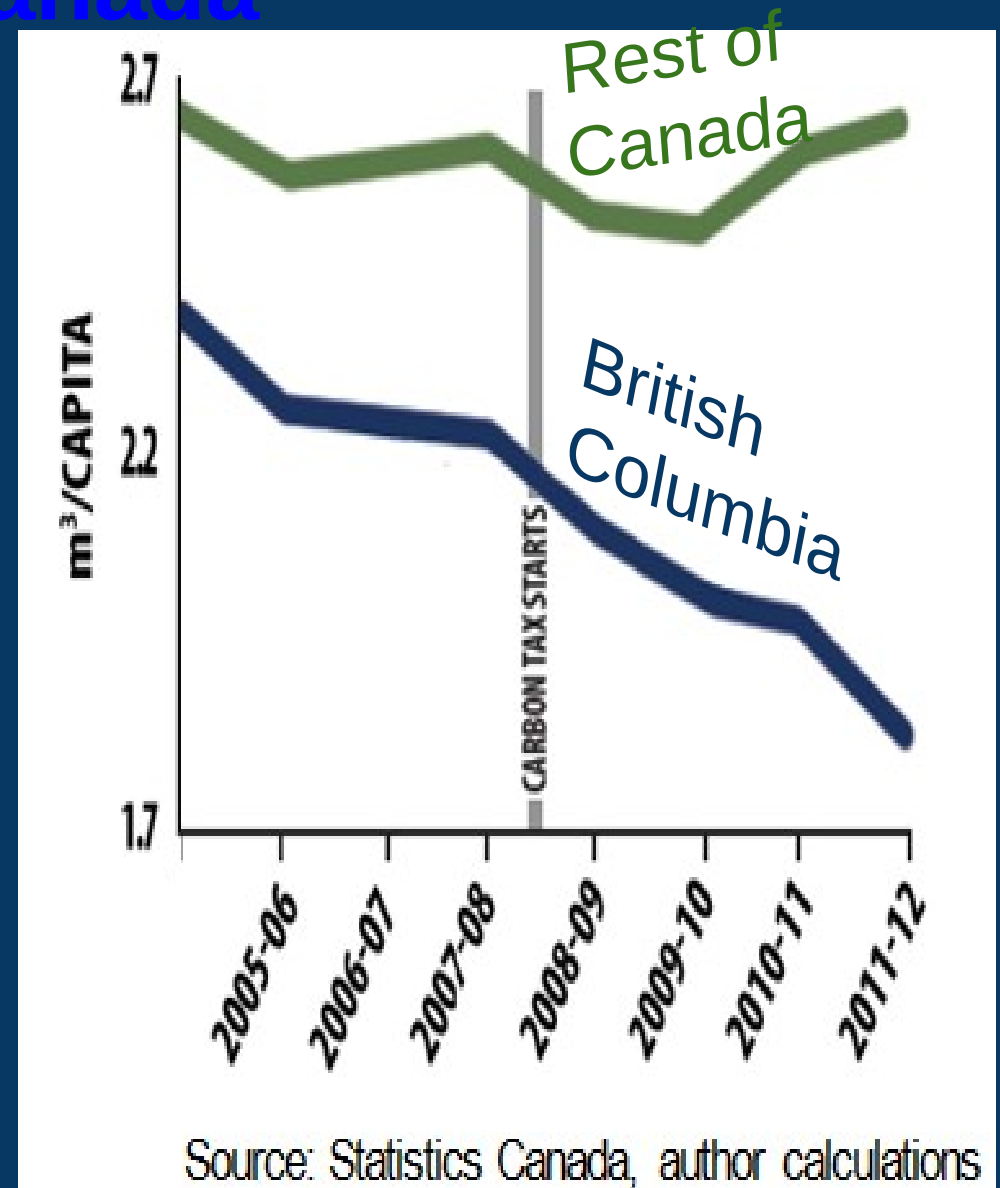
The Best Solution - Carbon Fee & Dividend



Carbon Fee and Dividend

Proven Success in Canada

- Started in 2008
- \$30/ton
- Fuel use down
- GDP up
- Jobs up
- Popular



Sales of petroleum fuels subject to
BC carbon tax

REMI: Report Summary

Employment

- **2 million more jobs**

Climate

- **Reduces carbon dioxide**

Fiscal

- **Increases household incomes**

Humanitarian

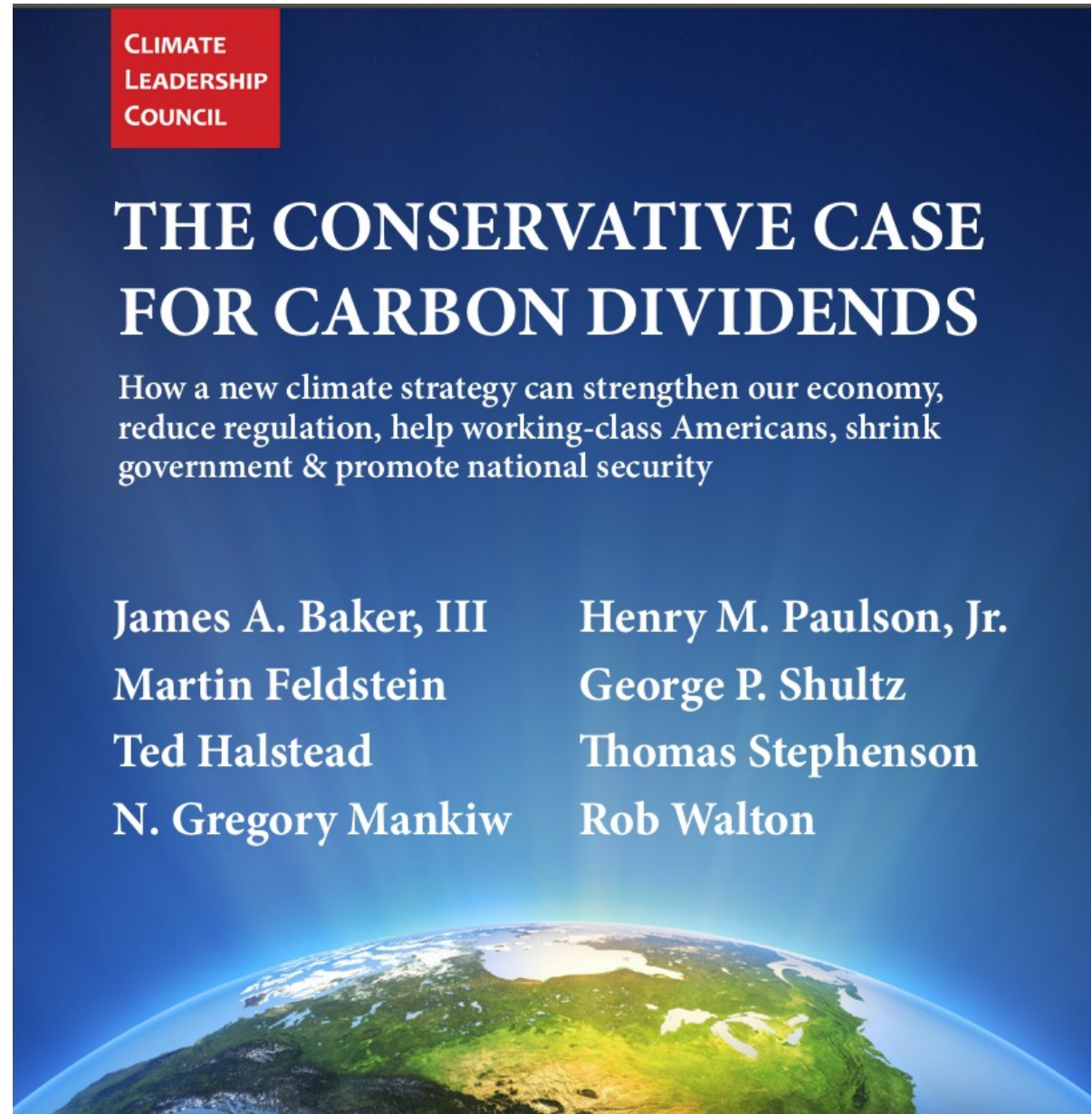
- **Saves Lives**

Economic

- **\$1.3 trillion more GDP**

Politics Progress (2)

- Climate Leadership Council
- Plan similar to Citizen's Climate Lobby



Conservation

- Potential to reduce carbon pollution from conservation may exceed effects from renewable fuels
 - Home and building insulation; passive solar design
 - Water-based heat pumps (heat and air conditioning)
 - Lighter, smaller vehicles
 - Reduction of stop-and-go traffic; demand toll rates
 - Electric grid and local generation effects

Innovation

- Impossible to predict
- Economic incentive WILL drive innovations