

U.S. Initiatives to Reduce Transportation-Related Greenhouse Gas Emissions

Gregg G. Fleming

17 December 2013





Overview

- ❑ President's Climate Action Plan

- ❑ Putting transportation in context

- ❑ Key initiatives to reducing transportation-related greenhouse gas emissions
 - Corporate Average Fuel Economy (CAFE)
 - Aviation CO₂



Overview of Major Initiatives of Obama's Administration

- ❑ Strong support for clean energy in stimulus bill and annual budgets (2009-2013): (1) \$21.5B in energy infrastructure; and (2) \$27.2B in energy efficiency and renewable energy research.
- ❑ In 2009, the administration pledged to limit greenhouse gas emissions and bring them below 2005 levels by 2020.
- ❑ Strong focus in 2013 state of the union speech where he urged congress to pursue “bi-partisan, market based solution to climate change”.

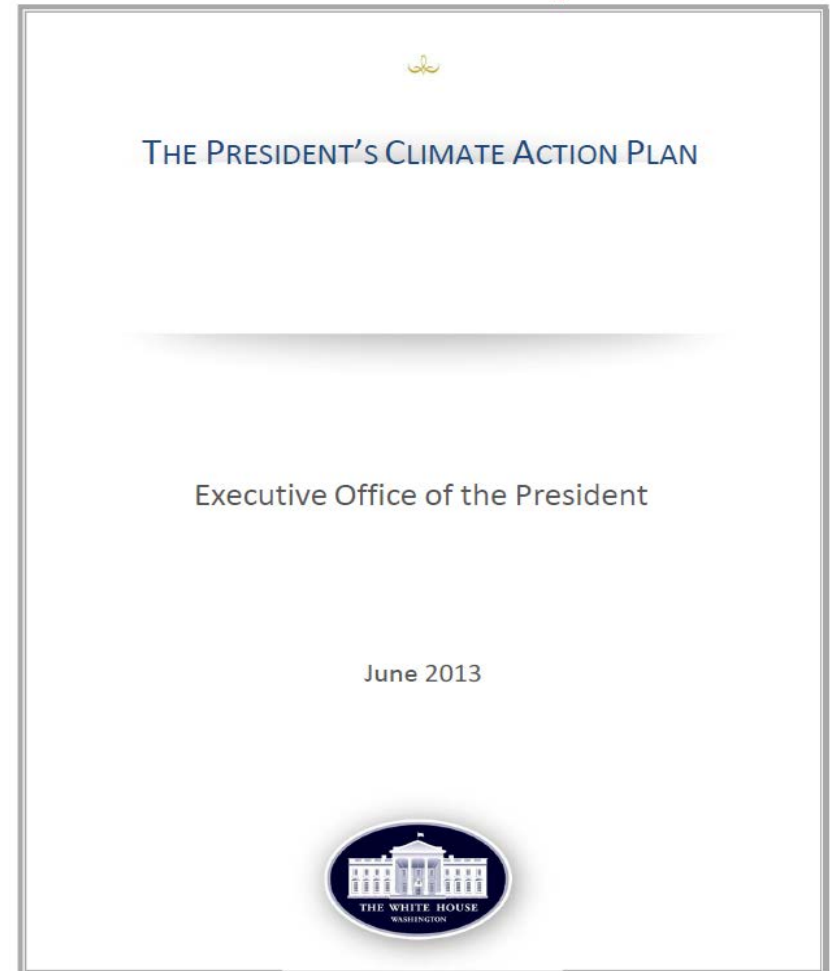
What is the President's Climate Action Plan?



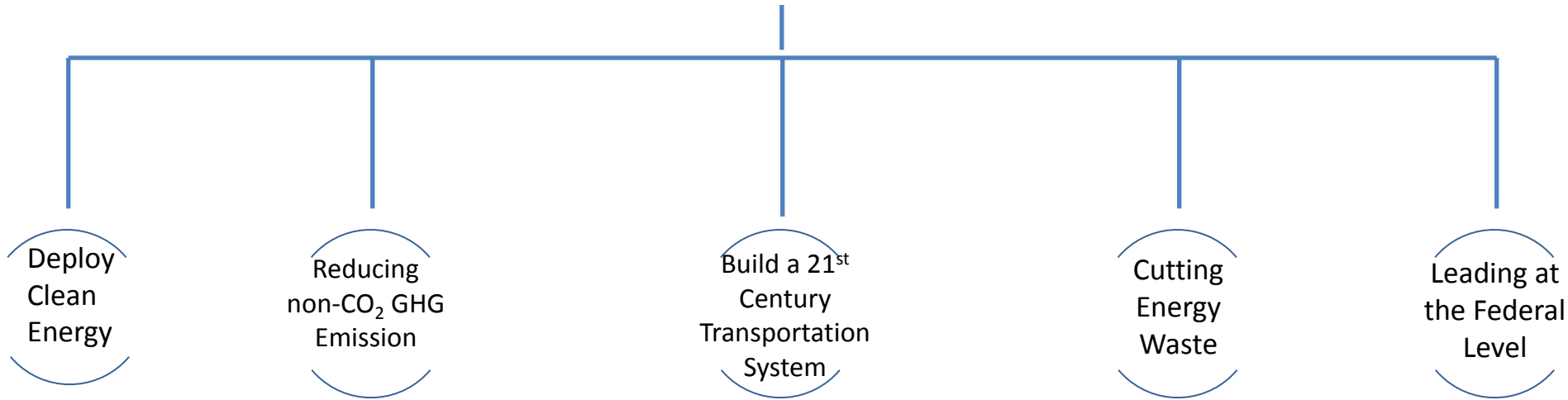
Climate Action Plan Breakdown

- ❑ Cut Carbon Pollution (mitigation)
- ❑ Prepare the U.S. for the impact of climate change (adaptation and resiliency)
- ❑ Lead international efforts to address global climate change

<http://www.whitehouse.gov/sites/default/files/image/president27climateactionplan.pdf>



Cut Carbon Pollution



SAY YES

TO CUTTING CARBON POLLUTION

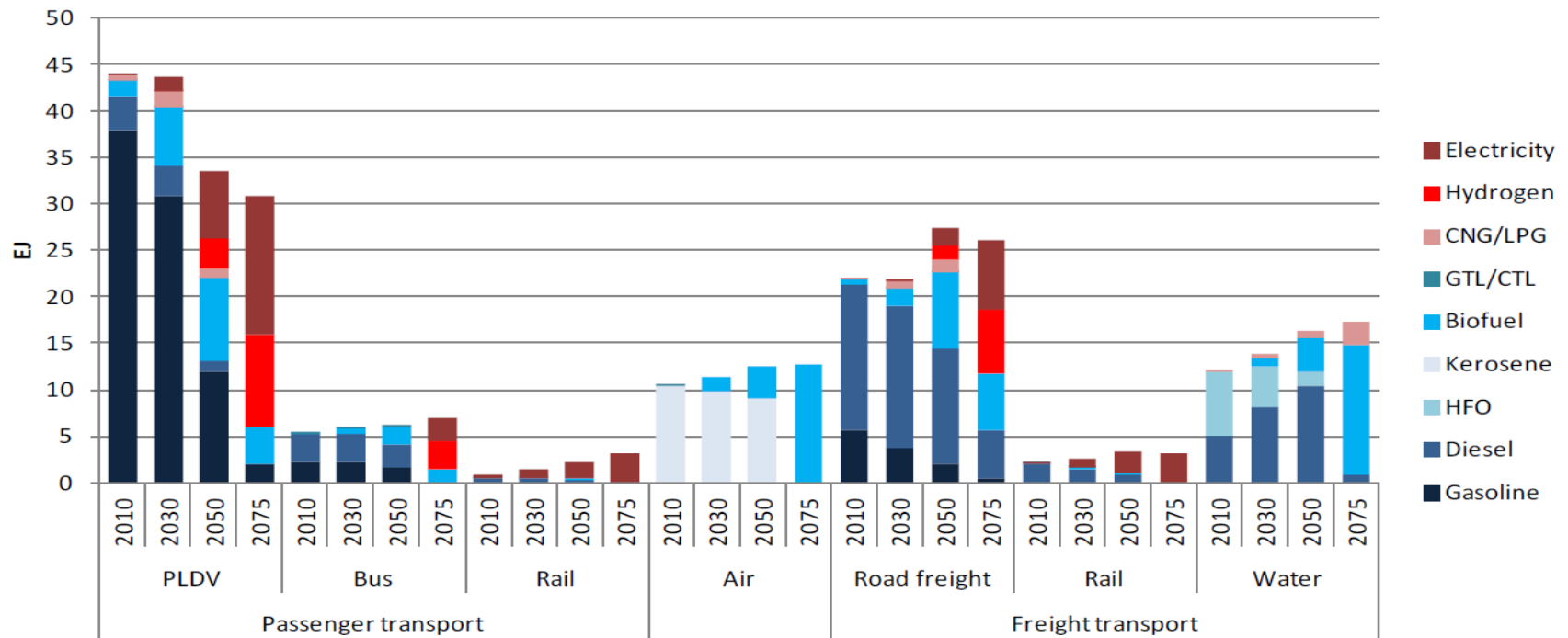
Cut Carbon Pollution – 21st Century Transportation

Increase Fuel Economy Standards

- Current passenger vehicle standards toughest in U.S. history (54.5 MPG by 2025; \$8,000 in fuel costs over the life of the vehicle).
- In 2011, heavy duty vehicle standards finalized for Model Years 2014-18 (270 mmt saved); currently working on post-2018 standards.

Transportation Technologies

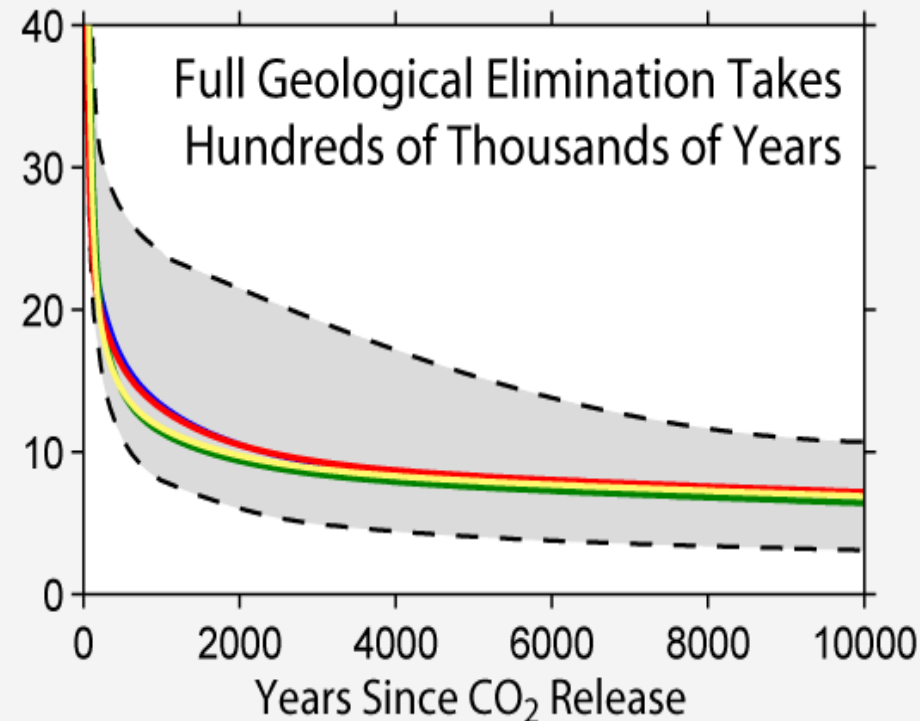
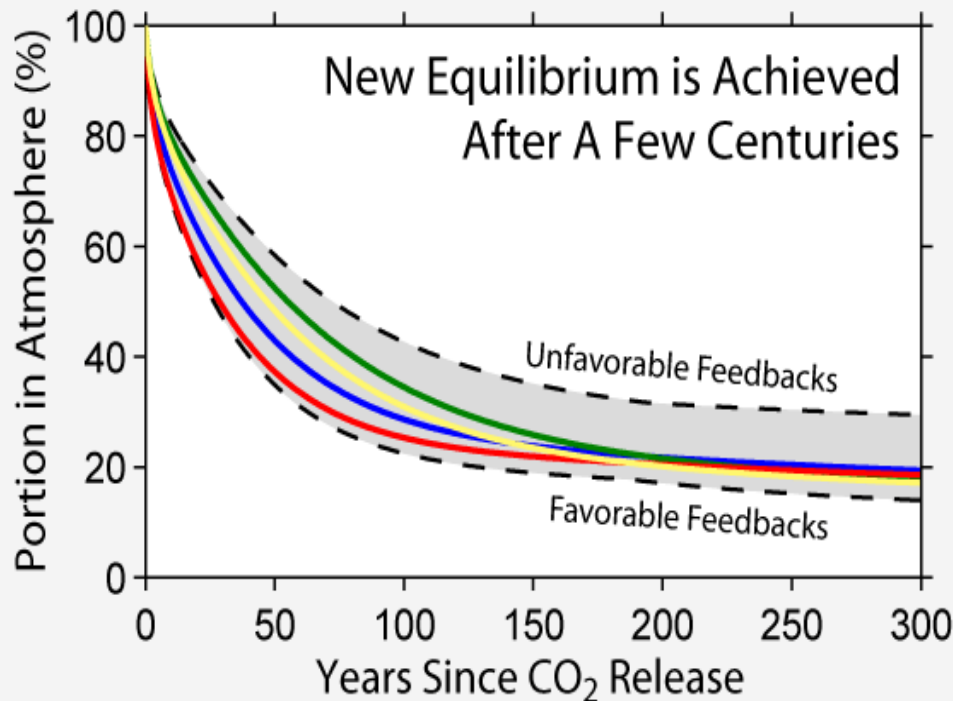
- Support for the Renewable Fuels Standard and biofuel research.
- Promote DOE's eGallon for electric cars.
- Commitment to work with local communities to improve transportation option, lower costs, and protect the environment.



Climate Response to CO₂ Emissions

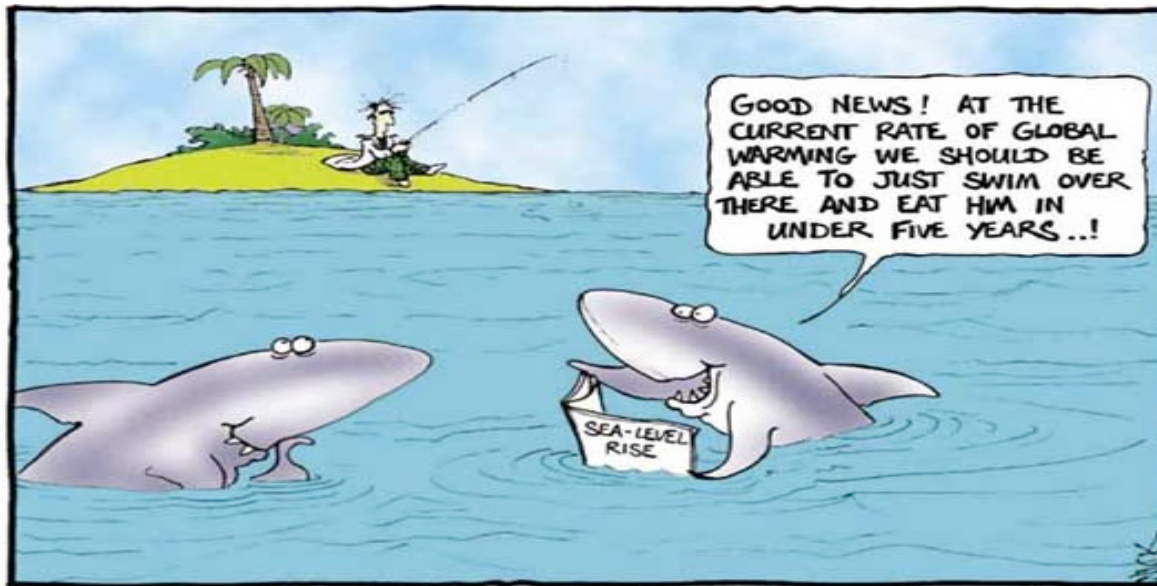
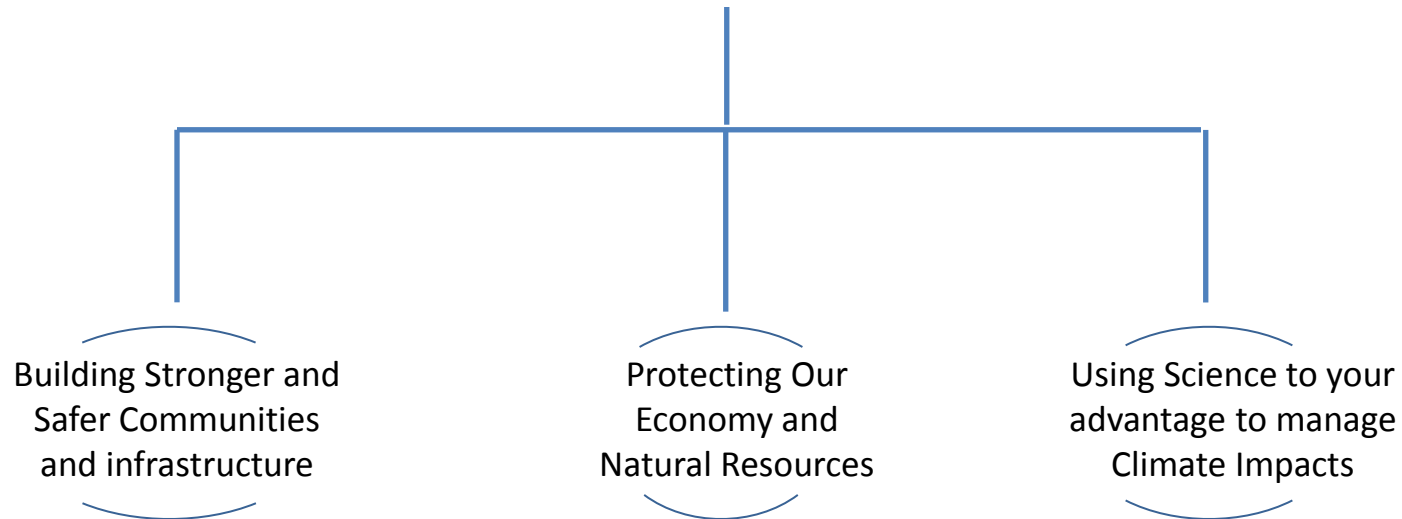
- ❑ CO₂ is chemically inert in the atmosphere and has a warming effect.
- ❑ Typical residence time for CO₂ is much higher than other greenhouse gases.

CO₂ Residence Time



Source: Hausfather et al, 2010

Preparing for the impact of Climate Change



Source: www.fearbeneath.com assessed on Oct 2, 2013



Lead International Efforts

- Working with other countries to ‘Take action to address Climate Change’.
- Leading efforts to address climate change through international negotiations .

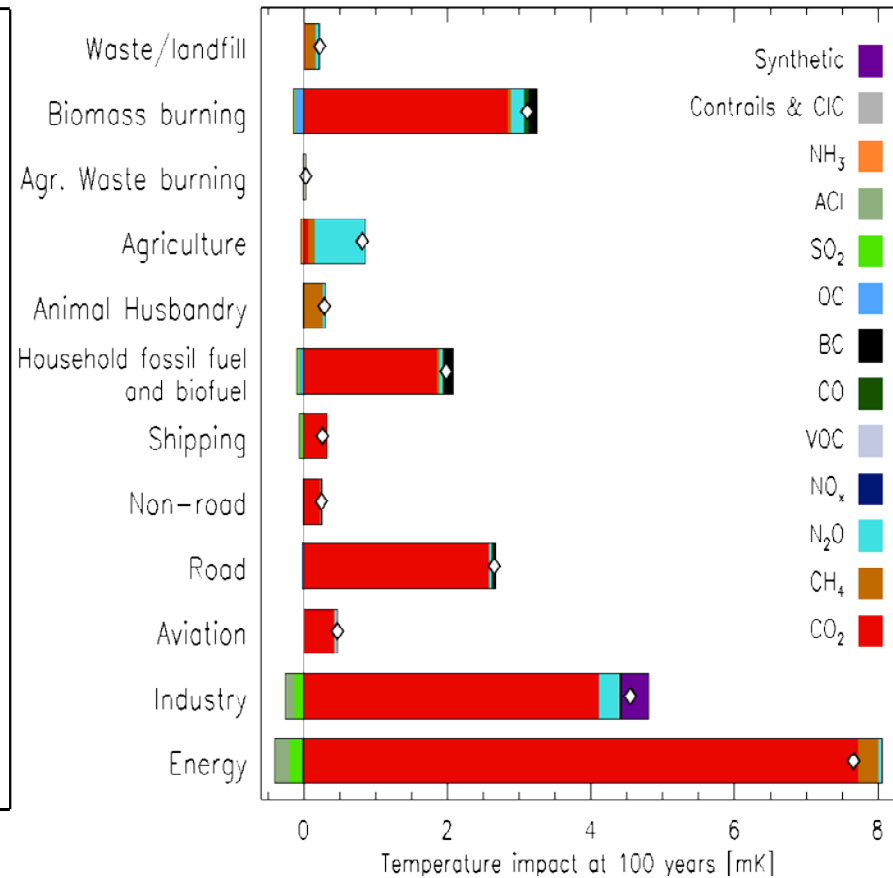
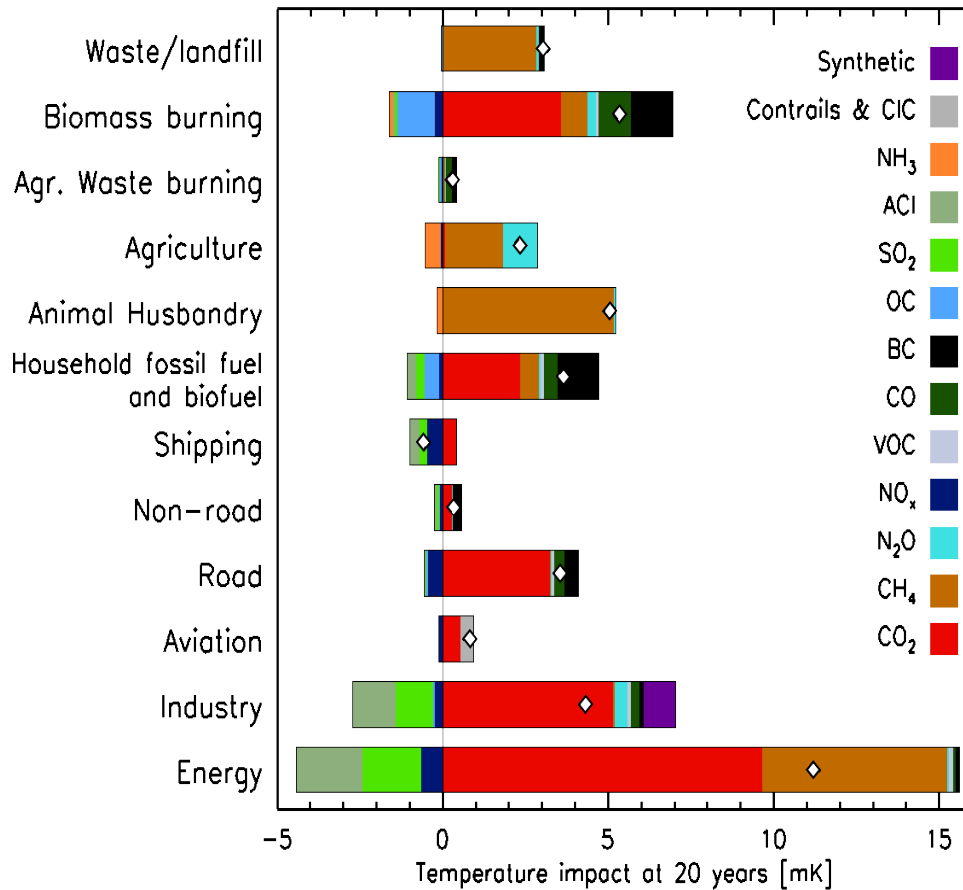
Quad BTU	Quadrillion BTU			% Growth	% Total Growth
	2010	2025	2040		
Africa	4	6	9	125%	12%
Asia Pacific	25	40	51	104%	62%
Europe	19	19	19	0%	0%
Latin America	7	10	13	86%	14%
Middle East	6	9	11	83%	12%
North America	32	33	31	-3%	-2%
Russia/Caspian	4	5	5	25%	2%
Total	97	122	139	43%	100%

Source: ExxonMobil 2012 Outlook

Putting Transportation in Context



Metrics and Impacts by Energy Sector

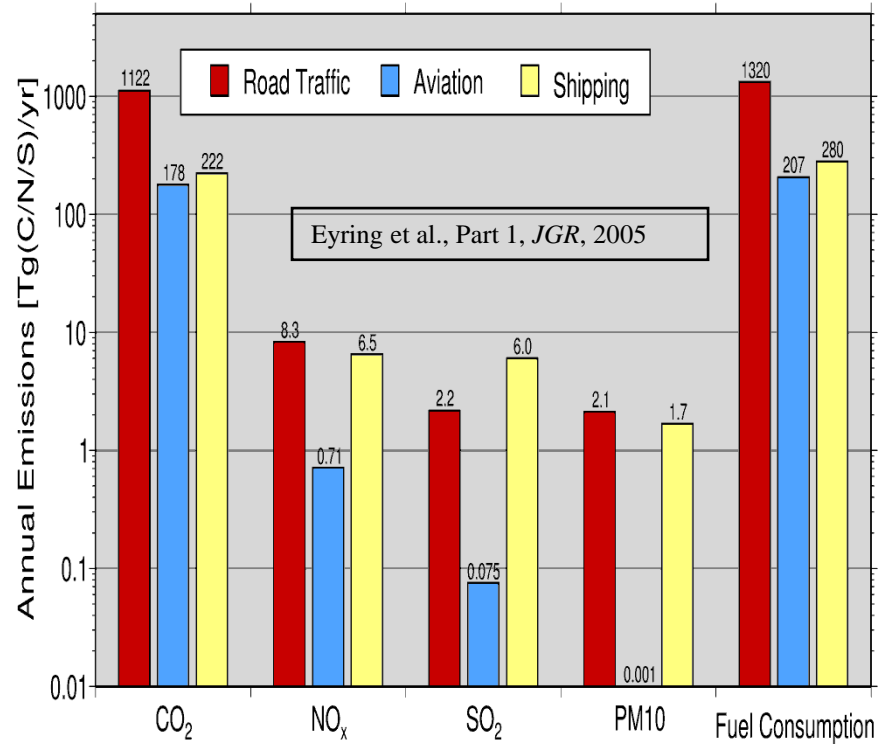


Source: IPCC WGI Fifth Assessment Report

The Transportation Landscape



Global CO₂ emission per transport (%), IPCC (2004)



Key initiatives to reducing transportation-related greenhouse gas emissions

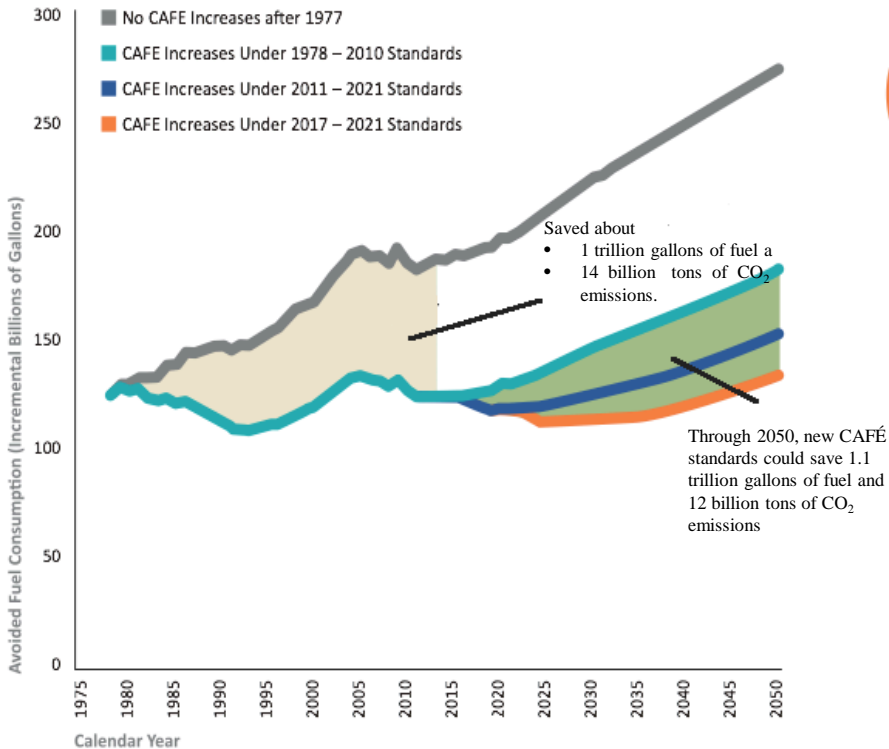
- Technology
- Operations
- Alternative Fuels
- Market-Based Measures



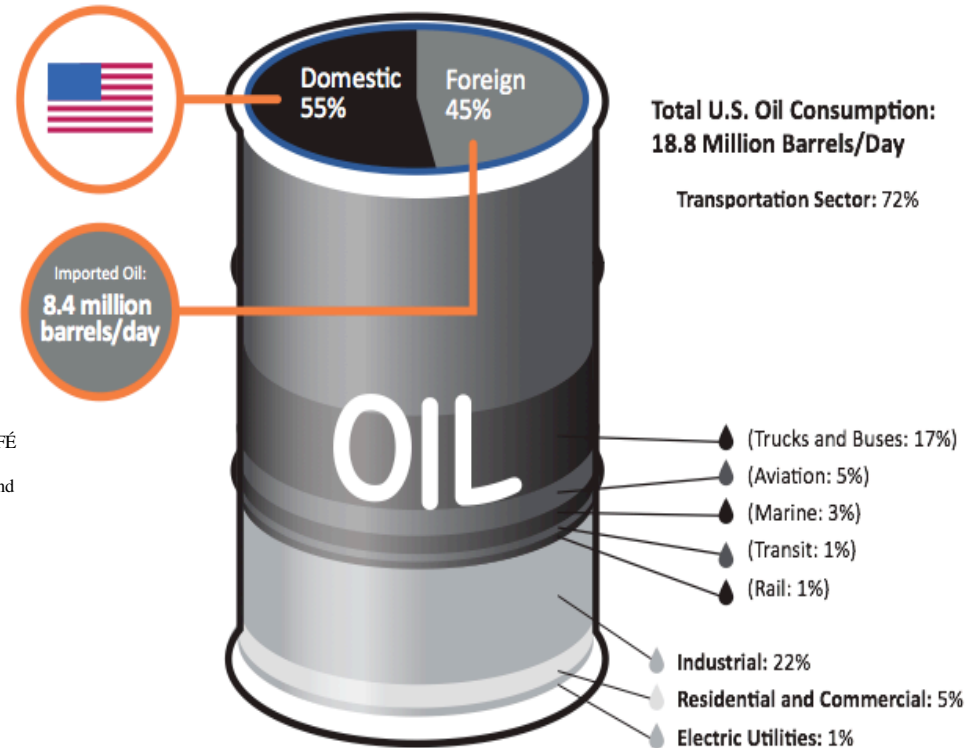
Image: Leigh, P. Lancaster University, 2002

Corporate Average Fuel Economy (CAFE) Standards

Reducing Fuel Consumption



Reducing US Transportation's Oil Sector consumption



Key Facts:

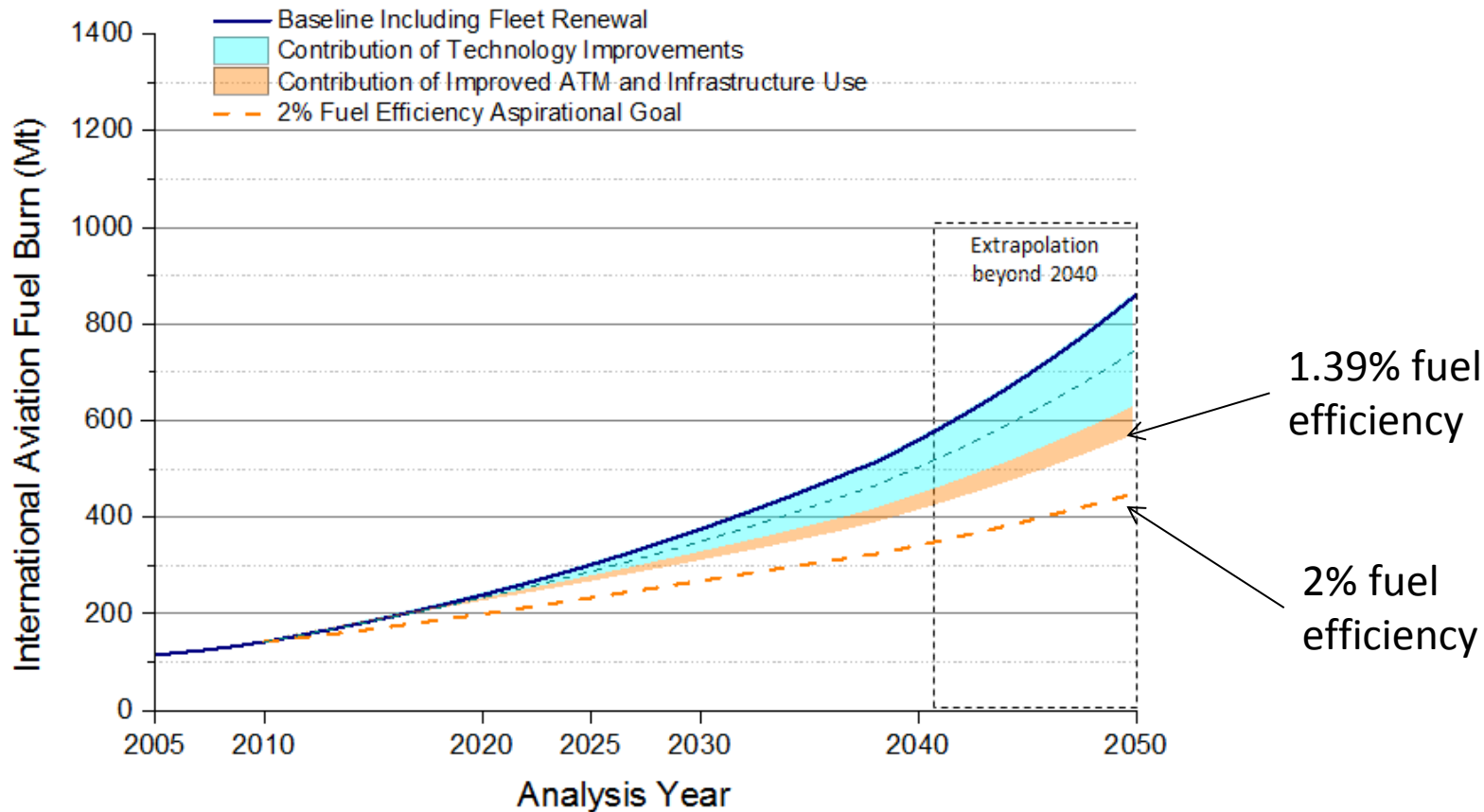
- CAFE standards have saved an estimated 14 billion tons of CO₂ emissions since the 1970s.
- By 2021, consumers may save between \$660 and \$860 billion at the pump over the life of the paradigm.

Aviation CO₂

- ❑ Aviation contributes about 2% of globally produced CO₂ and accounts for 13% of fossil fuels consumed by transport (IPCC, 2007).
- ❑ Around 2 Billion passengers are transported by air.
- ❑ International traffic represents about 60% of the total scheduled passenger traffic and about 83% of freight air traffic.
- ❑ Total scheduled passenger traffic worldwide is forecast to increase at an average annual rate of 4.6 percent for the period 2005- 2025.
- ❑ ICAO recently agreed to a CO₂ metric for aircraft.



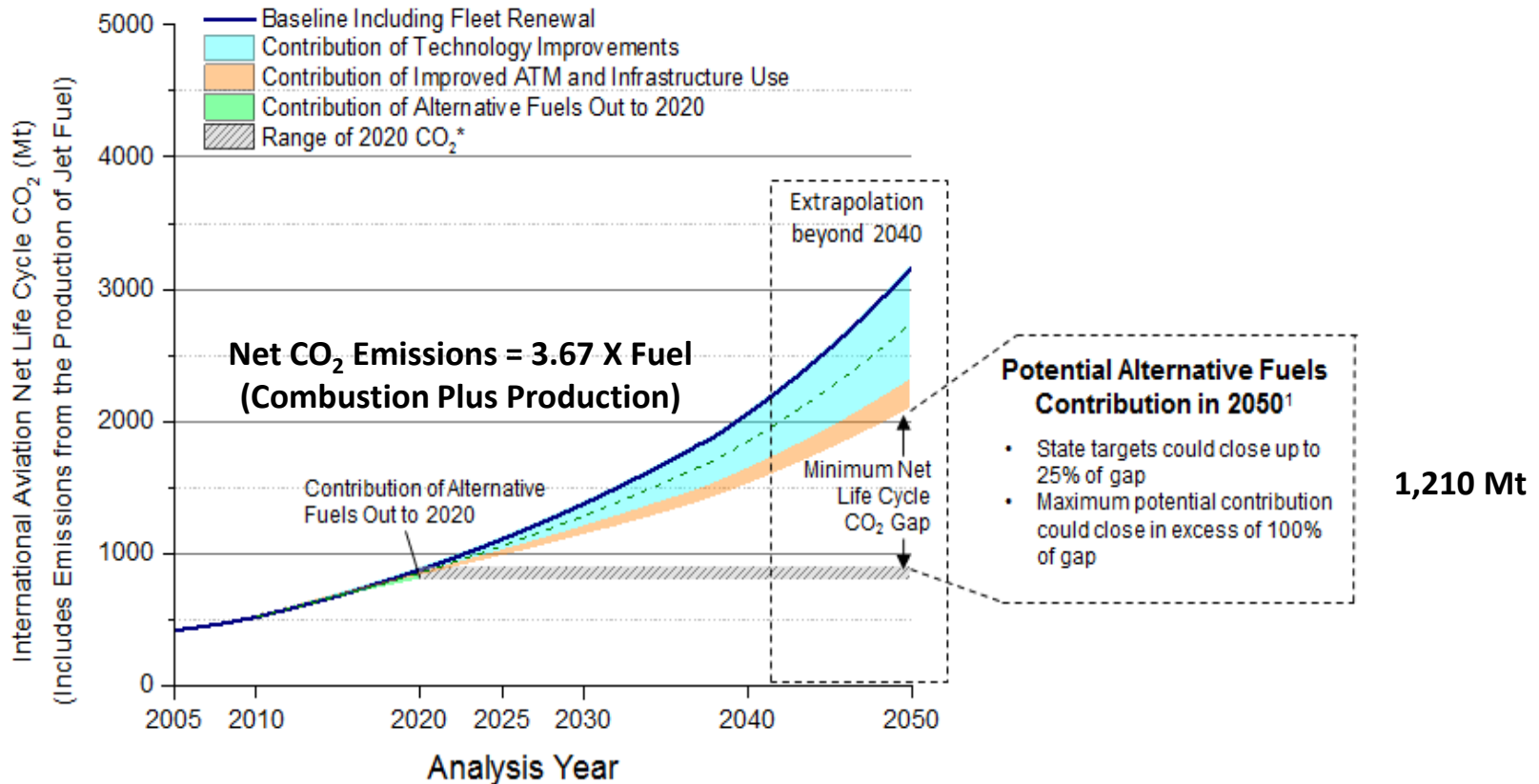
Fuel Burn Trends from International Aviation, 2005 to 2050



*Dashed line in technology contribution sliver represents the "Low Aircraft Technology Scenario."

Note: Results were modelled for 2005, 2006, 2010, 2020, 2025, 2030, and 2040 then extrapolated to 2050.

Net Life Cycle CO₂ Emissions Trends from International Aviation, 2005 to 2050



*Actual carbon neutral line is within this range

Dashed line in technology contribution sliver represents the "Low Aircraft Technology Scenario."

¹If all alternative fuels in 2050 were zero net carbon

Note: Results were modelled for 2005, 2006, 2010, 2020, 2025, 2030, and 2040 then extrapolated to 2050.

Market Based Measures (MBMs) in Aviation

- ❑ MBMs have the potential to incentivize low cost reductions.

- ❑ The 38th ICAO Assembly concluded on October 4th, 2013:
 - Agreed on a roadmap and requested Council make a recommendation for a global MBM scheme.
 - Applicable for international aviation.
 - For decision by the 39th ICAO Assembly.
 - Key technical work: (1) monitoring, reporting and verification; (2) acceptable types of carbon credits; and (3) allocation/definition of “international”.
 - Could lead to closing the CO₂ gap and provide a blueprint for other sectors.

Summary

- ❑ The climate action plan provides a three-prong roadmap to help address climate change.
- ❑ Transportation is a major contributor to GHG emissions and climate change.
- ❑ There are a number of key transportation-related initiatives to address GHG emissions and climate change.



Questions

“ The best scientists and explorers have the attributes of kids! They ask question and have a sense of wonder. They have curiosity. 'Who, what, where, why, when, and how!' They never stop asking questions, just like a five year old”

- Sylvia Earle