



# Energy and Climate Change

## National and Regional Perspective



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# What's being done about it?

- ❖ Existing laws and voluntary programs
- ❖ Congressional proposals
- ❖ Internationally





# Climate Change and Energy at EPA

## ❖ An EPA Priority

- Reducing greenhouse gases (GHG) is a top priority for Administrator Jackson

## ❖ Some key actions taken:

- Endangerment Finding
- Mandatory Reporting
- Renewable Fuels Standard
- Light-Duty Vehicle GHG Emissions Standards and CAFE Standards
- GHG permitting requirements for stationary sources
- Carbon Capture & Sequestration
- A variety of voluntary and other initiatives





# EPA's Endangerment Finding

- ❖ **Endangerment Finding:** Current and projected concentrations of the six key well-mixed GHGs in the atmosphere threaten the public health and welfare of current and future generations
- ❖ **Cause or Contribute Finding:** The combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare
- ❖ **Final Rule** published in Federal Register December 15, 2009



## Greenhouse Gases (GHGs)

- Carbon Dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous Oxide (N<sub>2</sub>O)
- Hydrofluorocarbons (HFC)
- Perfluorocarbons (PFC)
- Sulfur Hexafluoride (SF<sub>6</sub>)



## Key Findings

### ❖ Human Activity Has Increased GHGs in the Atmosphere

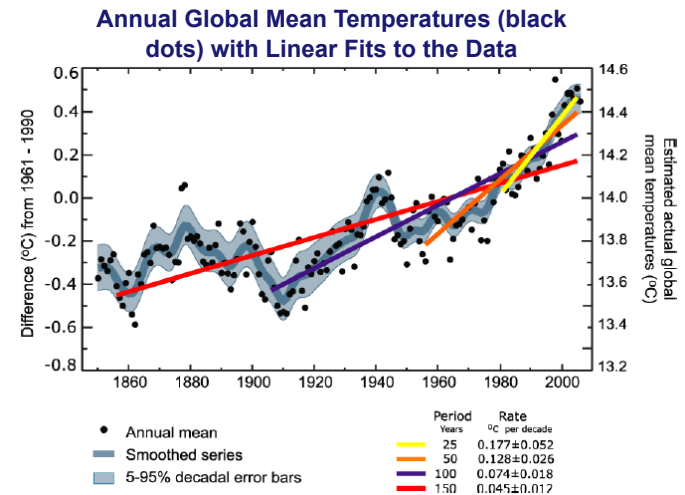
- GHGs now at record-high levels in the atmosphere compared to the recent and distant past
- These high atmospheric levels are the clear result of human activity
- Average global CO<sub>2</sub> concentrations have increased about 38% from pre-industrial levels to 2009, and almost all of this is due to human emissions
- CO<sub>2</sub> and methane concentrations are well above the natural range over at least the last 650,000 years
- Projected atmospheric concentrations of the six greenhouse gases show an increase under all scenarios by 2030 compared to 2000



# Key Findings

## ❖ The Climate is Warming

- Warming of the climate system is unequivocal, as evidenced by increases in:
  - Global average air and ocean temperatures
  - Widespread melting of snow and ice
  - Rising global average sea level
- Global surface temperatures have risen by 1.3 degrees Fahrenheit over the last 100 years
- Eight of the 10 warmest years on record have occurred since 2001





# Key Findings

## ❖ Human Greenhouse Gas Emissions are Causing Climate Change

- Most of the global warming of the last 50 years is very likely due to human-induced increases in greenhouse gas emissions.
- Multiple lines of evidence support this

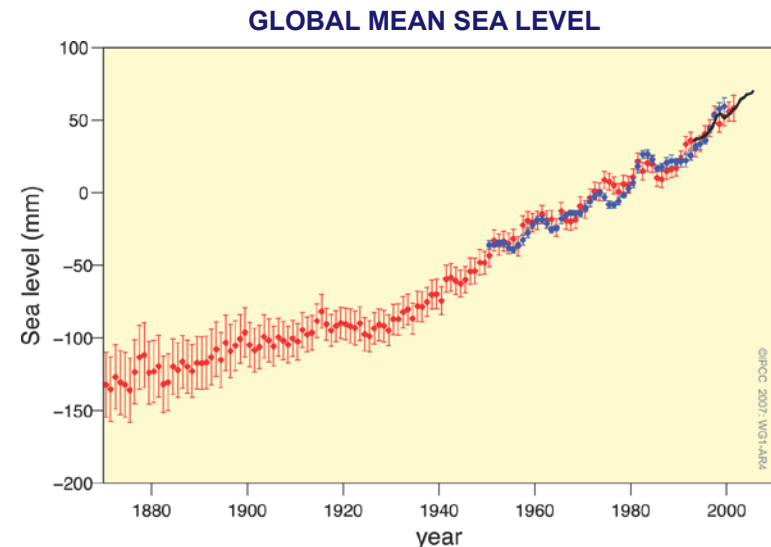
## ❖ Climate Change is Projected to Continue During This Century

- Future warming during the 21st century—even with low emissions growth—is very likely to be larger than warming during the 20th century.
- The Intergovernmental Panel on Climate Change projects a temperature rise of between 3 and 7 degrees Fahrenheit by the end of the 21st century (assuming a range of possible scenarios).



# Some Other Observed Changes

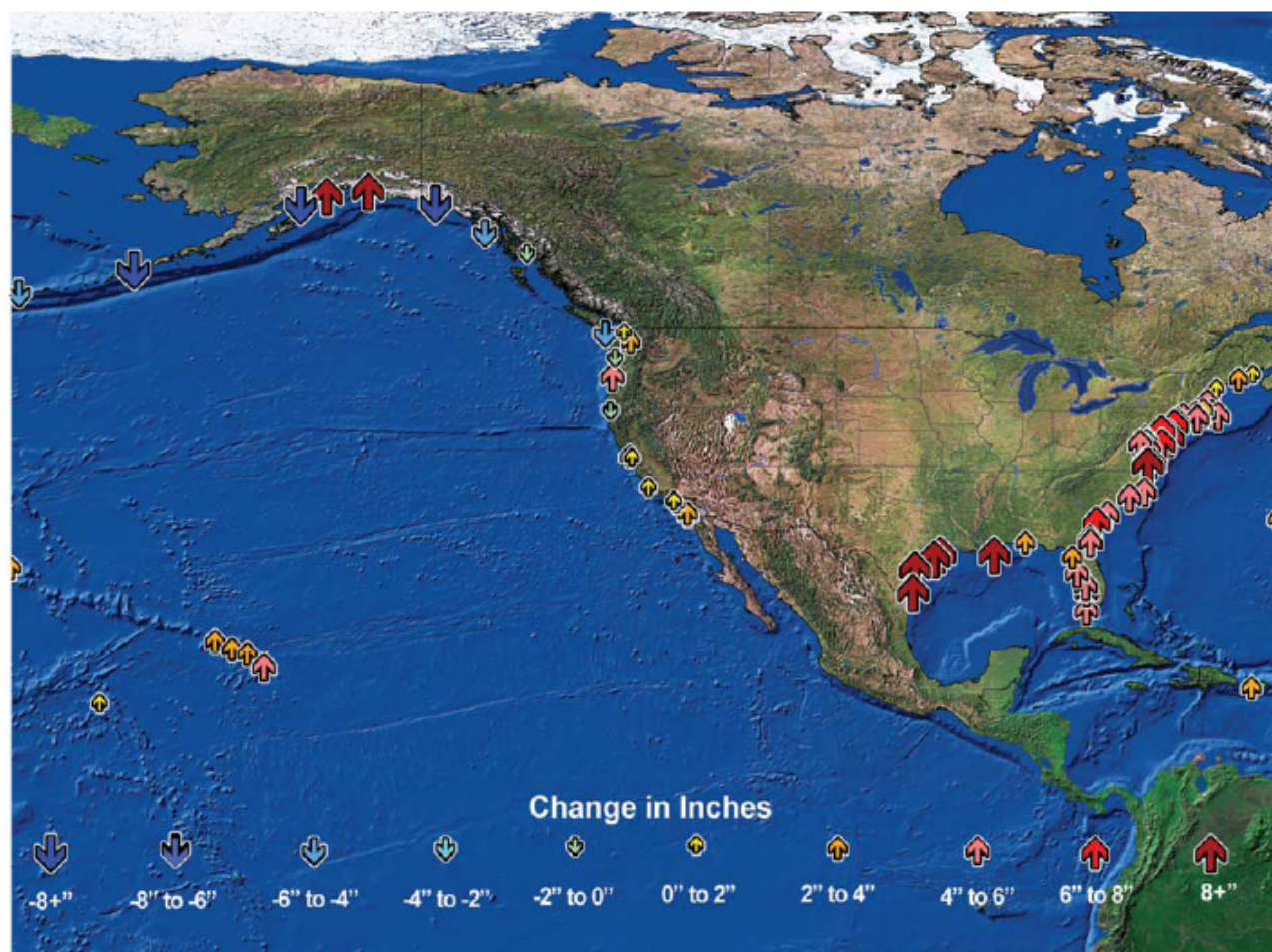
- ❖ Northern hemisphere snow cover decreasing
- ❖ Global ocean heat content increasing and ocean water becoming more acidic
- ❖ Global mean sea level increasing
- ❖ Arctic sea ice extent decreasing



Annual averages of the global mean sea level based on reconstructed sea level fields since 1870 (red), tide gauge measurements since 1950 (blue) and satellite altimetry since 1992 (black). Units are in mm relative to the average for 1961 to 1990. Error bars are 90% confidence intervals.



## Relative Sea Level Changes on United States Coastlines, 1958 to 2008



Source: Karl et al. (2009) Observed changes in relative sea level from 1958 to 2008 for locations on the United States coast



# GHG Reporting Rule

## Covered Source Types\*\*

- ❖ Electricity Generation
- ❖ Adipic Acid Production
- ❖ Aluminum Production
- ❖ Ammonia Manufacturing
- ❖ Cement Production
- ❖ HCFC-22 Production
- ❖ HFC-23 Destruction Processes
- ❖ Lime Manufacturing
- ❖ Nitric Acid Production
- ❖ Petrochemical Production
- ❖ Petroleum Refineries
- ❖ Phosphoric Acid Production
- ❖ Silicon Carbide Production
- ❖ Soda Ash Production
- ❖ Titanium Dioxide Production
- ❖ Municipal Solid Waste Landfills
- ❖ Manure Management Systems\*
- ❖ Stationary Combustion Units
- ❖ Misc. Uses of Carbonate
- ❖ Ferroalloy Production
- ❖ Glass Production
- ❖ Hydrogen Production
- ❖ Iron and Steel Production
- ❖ Lead Production
- ❖ Pulp and Paper Manufacturing
- ❖ Zinc Production
- ❖ Suppliers of Coal-based Liquid Fuels
- ❖ Suppliers of Petroleum Products
- ❖ Suppliers of Natural Gas and Natural Gas Liquids
- ❖ Suppliers of Industrial GHGs
- ❖ Suppliers of Carbon Dioxide (CO<sub>2</sub>)
- ❖ Manufacturers of engines outside of the light-duty sector

## Covered GHGs

- Carbon Dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous Oxide (N<sub>2</sub>O)
- Hydrofluorocarbons (HFC)
- Perfluorocarbons (PFC)
- Sulfur Hexafluoride (SF<sub>6</sub>)
- **Nitrogen Trifluoride (NF<sub>3</sub>)**
- **Hydrofluorinated Ethers (HFE)**

**Expressed in metric tons of carbon dioxide equivalent (mtCO<sub>2</sub>e)**

**First report for CY10**

**Final Rule Published in Federal Register on October 30, 2009**

\*EPA will not be implementing subpart JJ of the Mandatory GHG Reporting Rule using funds provided in its FY2010 appropriations due to a Congressional restriction prohibiting the expenditure of funds for this purpose.

\*\*Additional source categories have been proposed for inclusion (signed 3/22/10)



# Renewable Fuels Standard (RFS2)

- ❖ **Revision to current RFS (RFS1) as required by the Energy Independence and Security Act (EISA)**
- ❖ **Significant increase in renewable fuels to displace petroleum consumption (36 billion gallons by 2022)**
- ❖ **CO<sub>2</sub> Lifecycle analysis**
- ❖ **Final Rule Signed 2/3/2010**

Lifecycle GHG Thresholds Specified in EISA	
(percent reduction from 2005 baseline)	
Renewable fuel <sup>a</sup>	20%
Advanced biofuel	50%
Biomass-based diesel	50%
Cellulosic biofuel	60%

<sup>a</sup> The 20% criterion generally applies to renewable fuel from new facilities that commenced construction after December 19, 2007.



# Mobile Source GHG/CAFE Proposed Rule

- ❖ First national GHG emissions standards under the Clean Air Act
- ❖ Satisfies requirements under both Federal programs and the standards of California and other states
- ❖ Applies to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016
- ❖ Meet an estimated combined average emissions level of **250 g CO<sub>2</sub> per mile** in model year 2016, equivalent to **35.5 mpg** if the automotive industry were to meet this CO<sub>2</sub> level all through fuel economy improvements
- ❖ These standards will cut greenhouse gas emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016)
- ❖ Final rule signed April 1, 2010





# What about stationary sources of GHGs?

## ❖ Proposed “Tailoring Rule” (in Federal Register 10/27/09)

- Focus on large facilities emitting over 25,000 tons of CO<sub>2</sub>e/year
- PSD permits would require BACT for GHG emissions
- Title V and PSD permits would cover nearly 70 percent of the national GHG emissions that come from stationary sources

## ❖ February 22, 2010, Letter to Congress from Lisa Jackson clarifies expectations:

- First half of 2011, GHGs covered in CAA permit applications for sources with non-GHG permitting requirements
- Second half of 2011, phase in other large sources
- Between latter half of 2011 and 2013, the threshold for permitting will be substantially higher than 25K ton proposed limit in Tailoring Rule
- GHG permitting for smallest sources no sooner than 2016

## ❖ Final “Reconsideration of GHG Policy”

(signed 3/2

- PSD requirements triggered when control requirements of the CAFE rule “takes effect” (i.e., January 2011)
- No “grandfathering” of pending permit applications

<http://www.epa.gov/NSR/actions.html#sep09>  
<http://epa.gov/nsr/guidance.html>

