U.S. Climate Change Policy and Progress toward our 2020 Target

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December 8, 2014
COP20 Lima
Multilateral Assessment

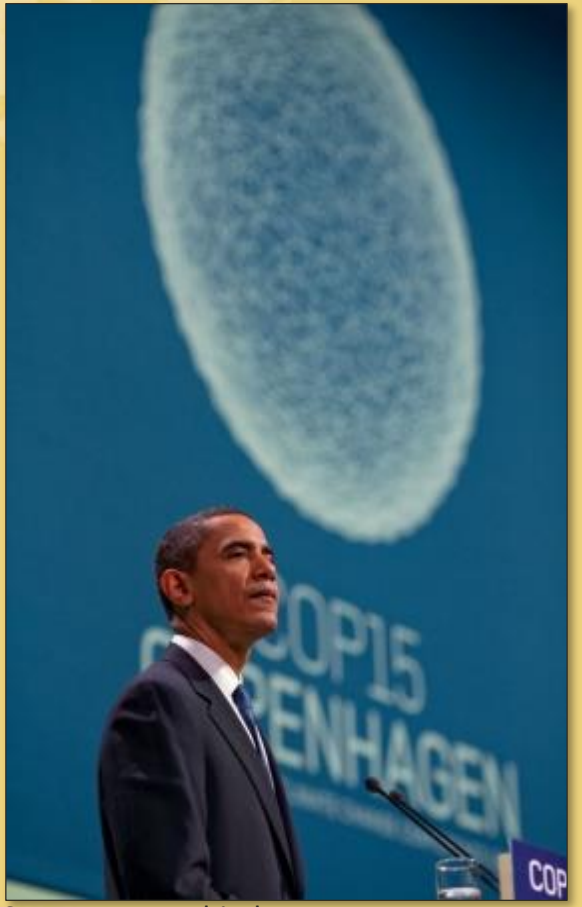
2014CAR
UNITED STATES CLIMATE ACTION REPORT 2014

Overview

In 2009, the United States made a commitment to reduce U.S. GHG emissions in the range of 17% below 2005 levels by 2020

At that time, we expected emissions to rise by roughly 5% by 2020

With strong policy actions across sectors, we are on track to hit our target



Source: www.whitehouse.gov

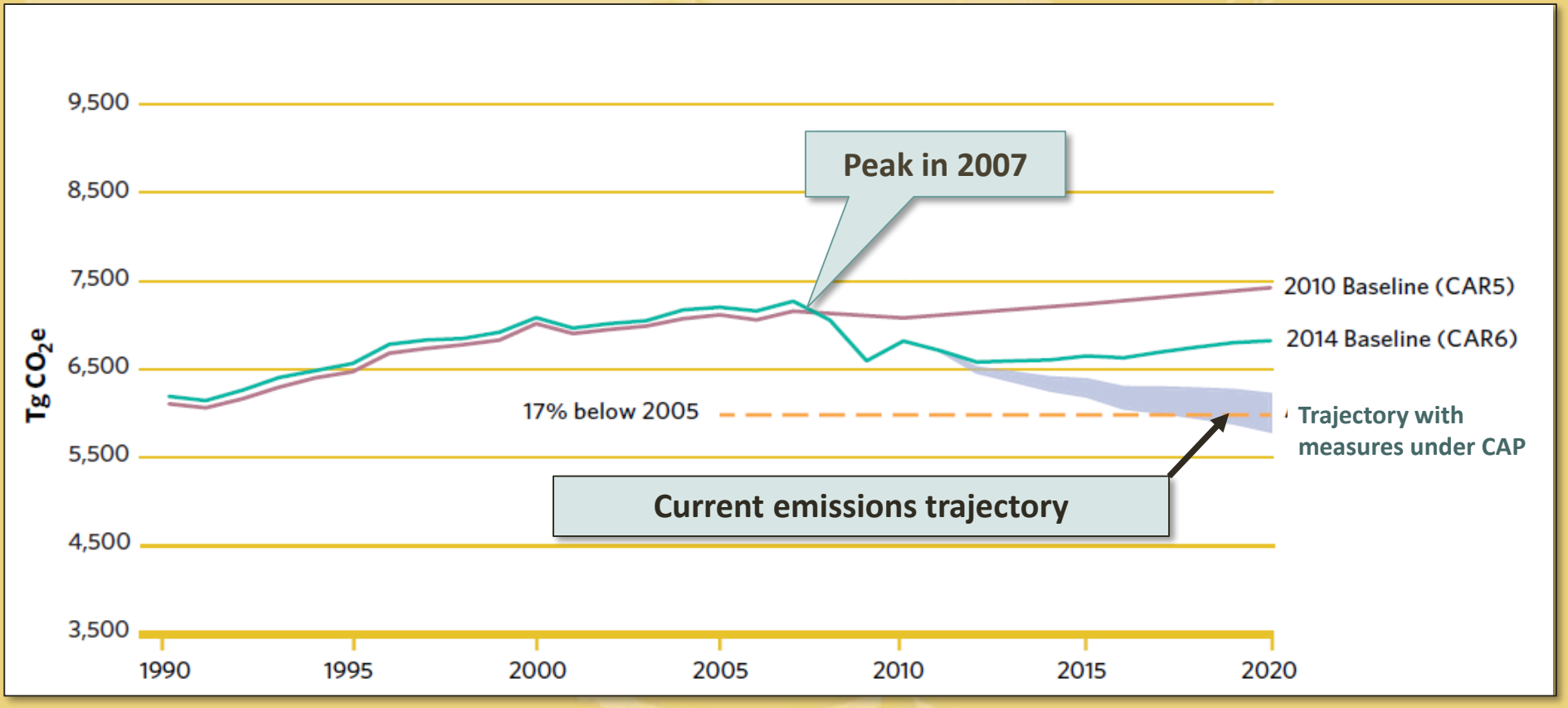
Key Parameters for our 2020 Target

Table 1 **Key Parameters of the U.S. Economy-wide Emission Reduction Targets**

Parameters	Targets
Base Year	2005
Target Year	2020
Emission Reduction Target	In the range of 17 percent below 2005 levels.
Gases Covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, and NF_3.
Global Warming Potential	100-year values from the IPCC Fourth Assessment Report (IPCC 2007).
Sectors Covered	All IPCC sources and sectors, as measured by the full annual inventory (i.e., energy, transport, industrial processes, agriculture, LULUCF, and waste).
Land Use, Land-Use Change, and Forests (LULUCF)	Emissions and removals from the LULUCF sector will be accounted using a net-net approach and a 2005 base year, including a production approach to account for harvested wood products. The United States is considering approaches for identifying the impact of natural disturbances on emissions and removals.
Other	To be in conformity with U.S. law.

Note: CH_4 = methane; CO_2 = carbon dioxide; HFCs = hydrofluorocarbons; IPCC = Intergovernmental Panel on Climate Change; N_2O = nitrous oxide; NF_3 = nitrogen trifluoride; PFCs = perfluorocarbons; SF_6 = sulfur hexafluoride.

We are On Track to hit our 2020 Goal



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Source: US Biennial Report 2013; "CAR5"/"CAR6" are US Climate Action Report projections

AGENDA

- Institutional Arrangements
- Progress to Date
- Additional Actions in Progress
- Biennial Report
- Q&A

1. Institutional Arrangements

Federal Governance Structure

Legislative	Executive	Judicial
Makes Laws	**Implements Laws**	**Evaluates Laws**
Senate 100 Senators 2 per state	**President** Vice President	**Supreme Court**
House of Representatives 435 total allocated in proportion to population	**Cabinet Secretaries +** **Departments & Agencies** State Defense Energy EPA Others	**Other Federal Courts**

Executive Branch

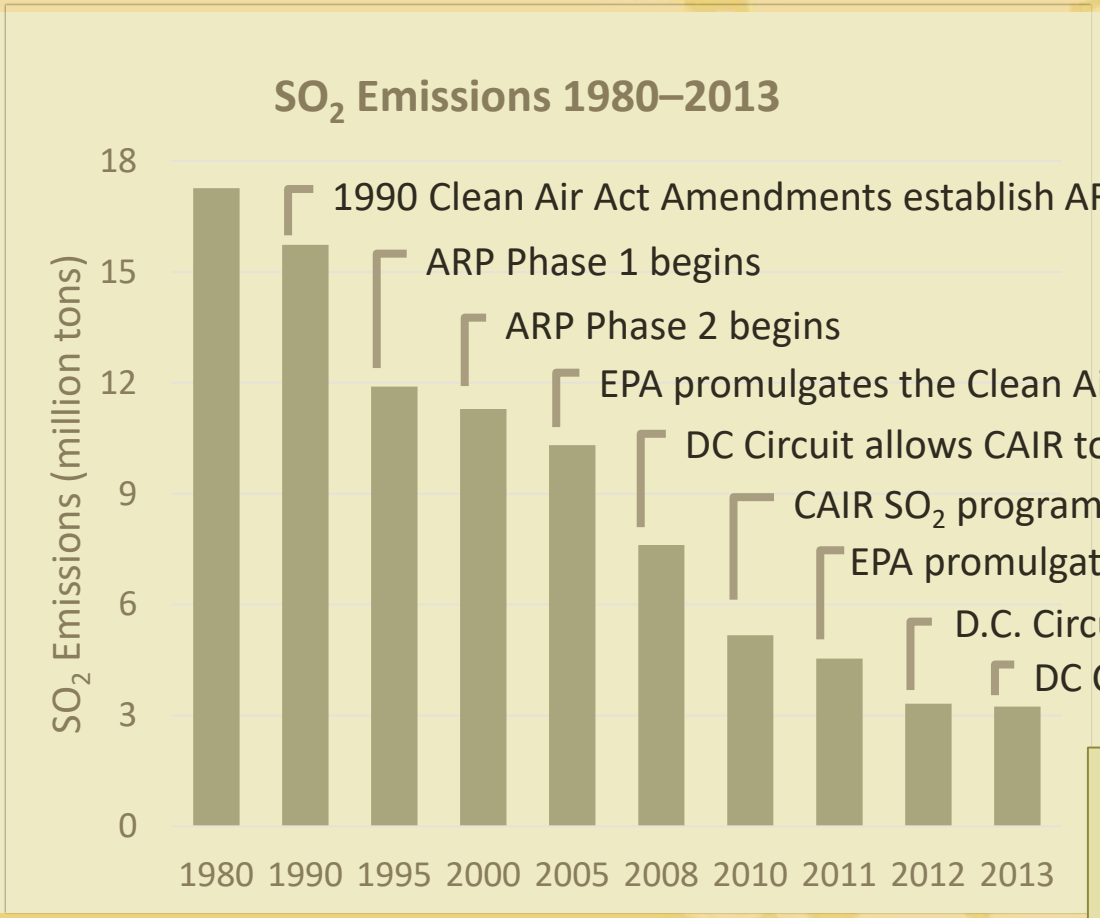
Key Departments & Agencies	Examples of Rulemaking & Policy
Environmental Protection Agency	Clean Power Plan, HFCs, methane
Department of Energy	Efficiency Standards, Clean Energy R&D
State Department	UNFCCC
Department of Agriculture	Forest Management
Department of Transportation	Vehicle Fuel Efficiency Standards
Department of Interior	Leasing for Renewable Energy
Housing and Urban Development	Climate Resilience and Preparedness
Department of Defense	Renewables, Biofuels and Efficiency

Legislative Authority for Executive Actions

- Obama Administration actions taken under existing authorities granted by Congress to the Executive Branch

- These laws require action, e.g.
  - Passed in 1970 and amended in 1977 and 1990, the Clean Air Act requires EPA to regulate harmful pollutants
  - Energy Policy & Conservation Act of 1975 and subsequent laws (e.g. 2005, 2007) require DOE to issue appliance efficiency standards

Example of Durability: SO2 Reduction Policies



EPA policies have driven down pollution successfully across many administrations

Note: For CAIR units not in the ARP, the 2009 annual SO_2 emissions were applied retroactively for each pre-CAIR year following the year in which the unit began operating. * On April 29, 2014, the U.S. Supreme Court reversed the D.C. Circuit Court opinion and on June 26, EPA filed a motion to lift the stay of CSAPR and begin implementation on January 1, 2015.
Source: EPA, 2014

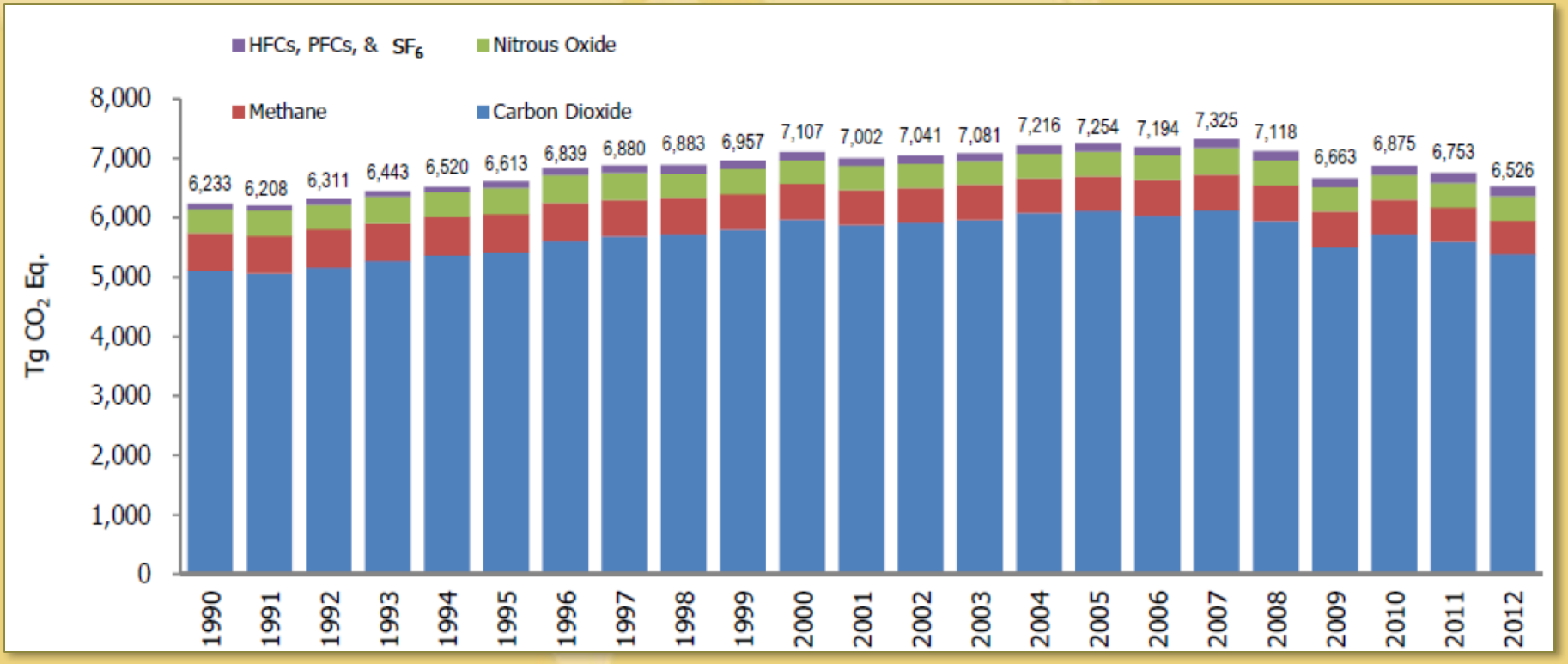
Examples of Regional, State, & Local Action

- 20 states with carbon emissions targets or limits
  - 9 states in Regional Greenhouse Gas Initiative (RGGI)
  - California's Global Warming Solutions Act (AB 32)
- 38 states with renewable energy standards or goals
  - 29 states have binding renewable portfolio standards (RPS)
  - 9 states have non-binding goals
- 27 states with energy efficiency standards or goals
  - 23 states have binding energy efficiency resource standards
  - 4 states have non-binding/RPS eligible goals
- Cities are also leading
  - 16 Climate Action Champions recognized last week
  - Over 1,055 cities from all 50 states have signed the U.S. Mayors Climate Protection Agreement

Note: The state count is inclusive of mandatory portfolio and resource standards only.

2. Progress to Date In Meeting 2020 Target

Breakdown of Gross Greenhouse Gas Emissions by Gas through 2012



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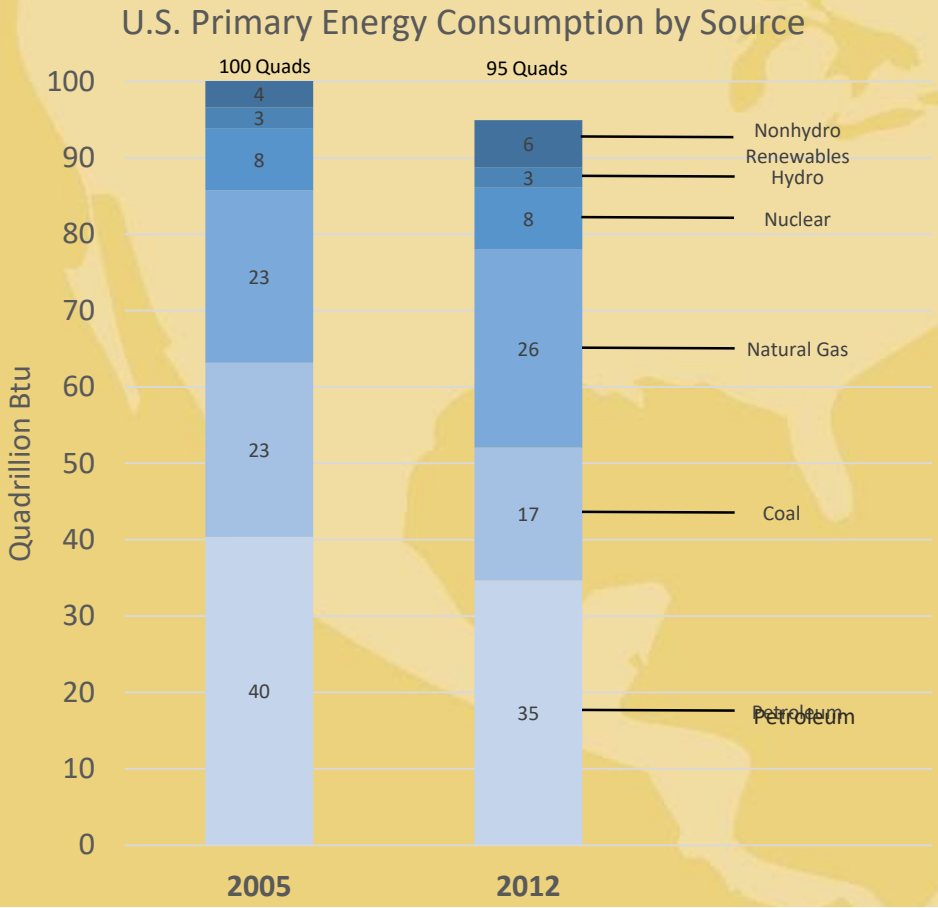
Source: 2014 Greenhouse Gas Emissions Inventory

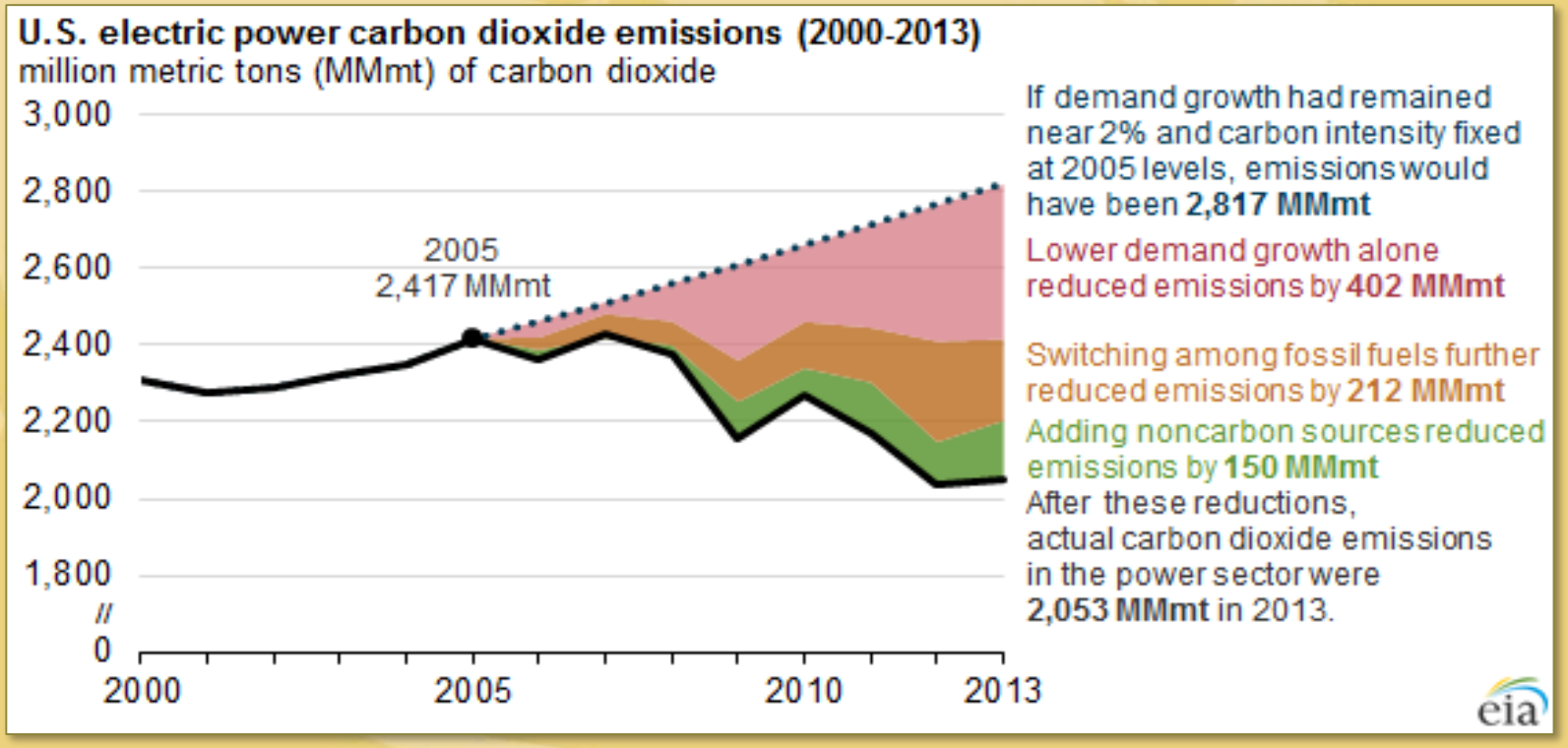
U.S. Energy Sector has Become Cleaner and More Efficient



- Since 2005, fuel economy standards, appliance efficiency standards, building codes, private sector innovation, and state and local action have driven down energy consumption by 5%, even as real GDP increased by 9%
- From 2009 to 2012, electricity generation from wind and solar power more than doubled
- Shift from coal to natural gas, largely in the power sector

Source: EIA data

Changes to Power Sector were a Major Factor Driving Emissions Lower



- Steep declines in power sector emission since 2007
- Federal, state and local policies for renewable energy and energy efficiency are key drivers

Source: EIA

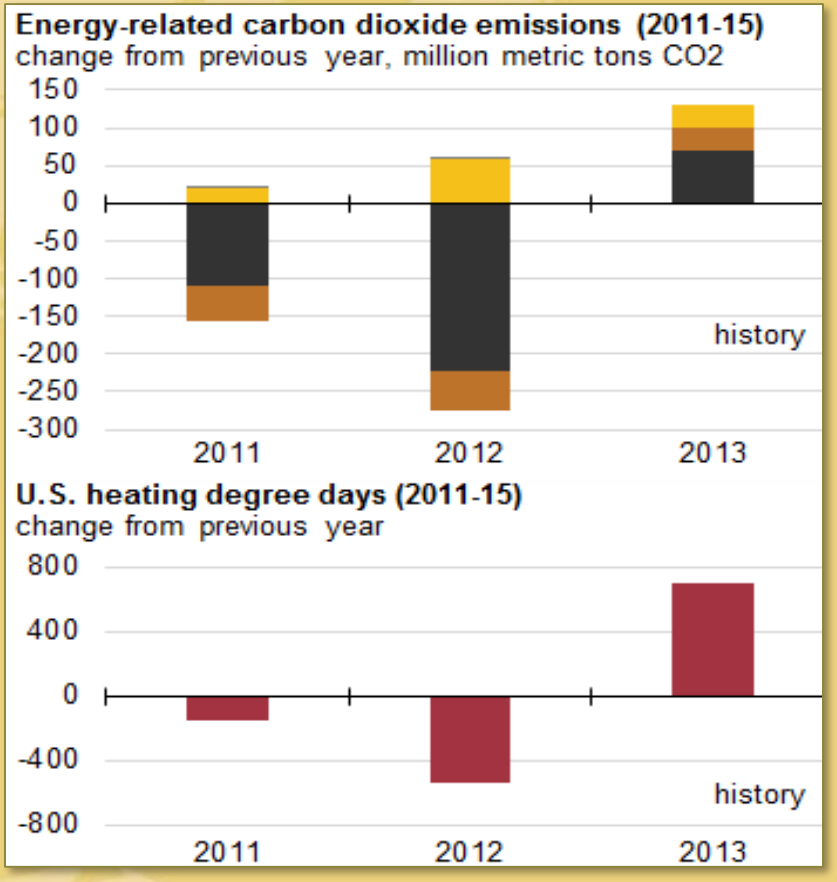
Energy Efficiency Policies also Driving Down Emissions

- **Major fuel economy standards for cars and light trucks**
  - New standards will doubles the efficiency of cars and trucks by 2025, reducing over 6,000 Mt of CO2 over life of program
  - First-ever national fuel economy and greenhouse gas emission standards for commercial trucks, vans, and buses for model years 2014-2018

- **Comprehensive buildings sector efficiency measures**
  - Many appliance standards for consumer products were finalized in the President's first term, yielding steadily growing emissions reductions over time
  - Through Better Buildings Challenge over 2 billion square feet of commercial and industrial buildings on track to be at least 20 percent more energy efficient by 2020
  - Completed energy efficiency upgrades in more than 100 million homes, saving many families more than $400 on their heating and cooling bills in their first year alone

Weather and Other Factors Cause Short-term Fluctuations, but Long-term Trend is Clear

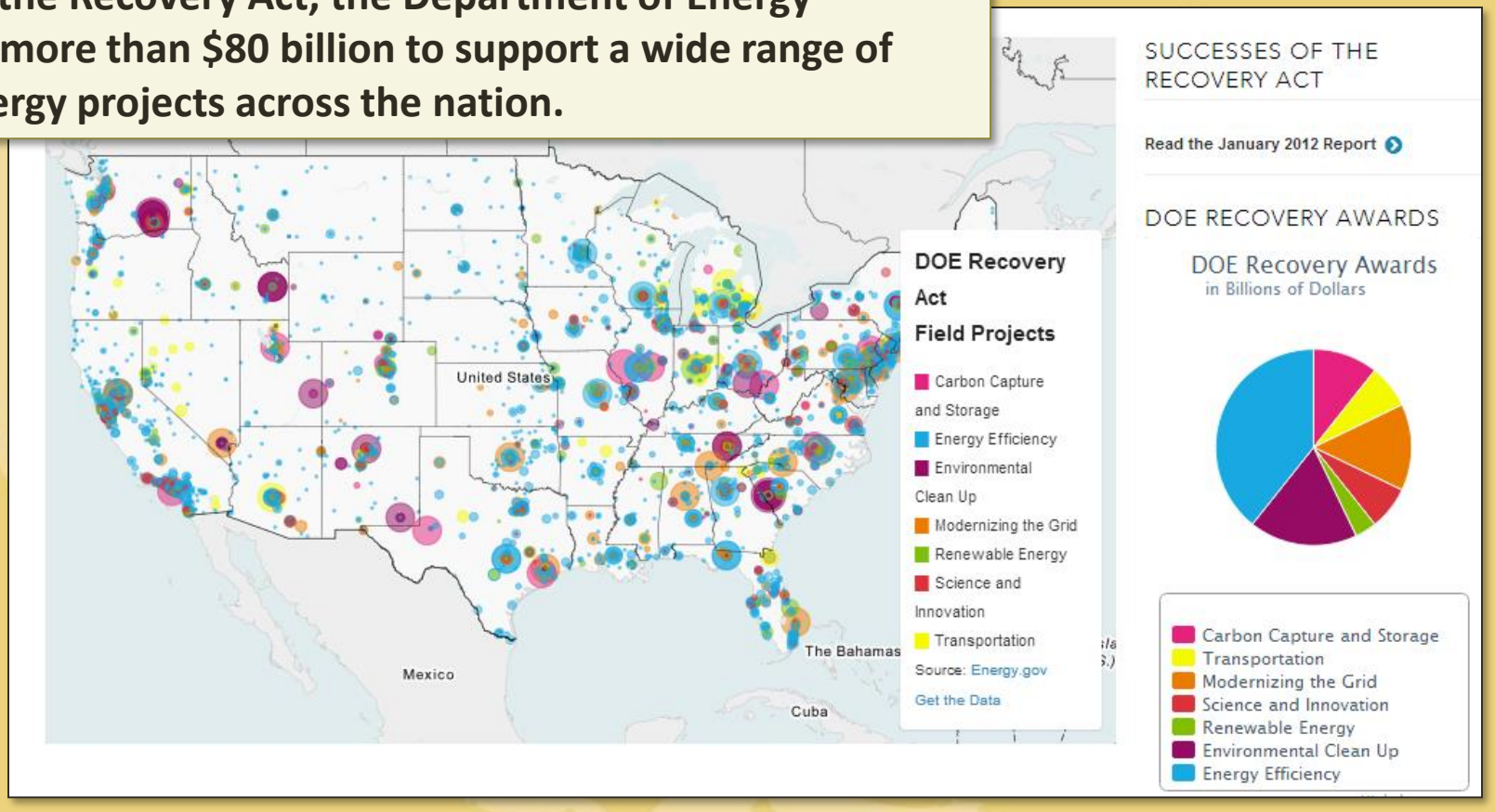
- Short-term variations in weather cause minor year-to-year emissions variations
  - US energy CO2 emissions increased slightly in 2013 and 2014 due to exceptionally cold winter
  - Assuming typical weather, EIA projects emissions from the energy sector will decline again in 2015
- Over long-term, policies will continue to drive sustained emissions reductions



Source: EIA

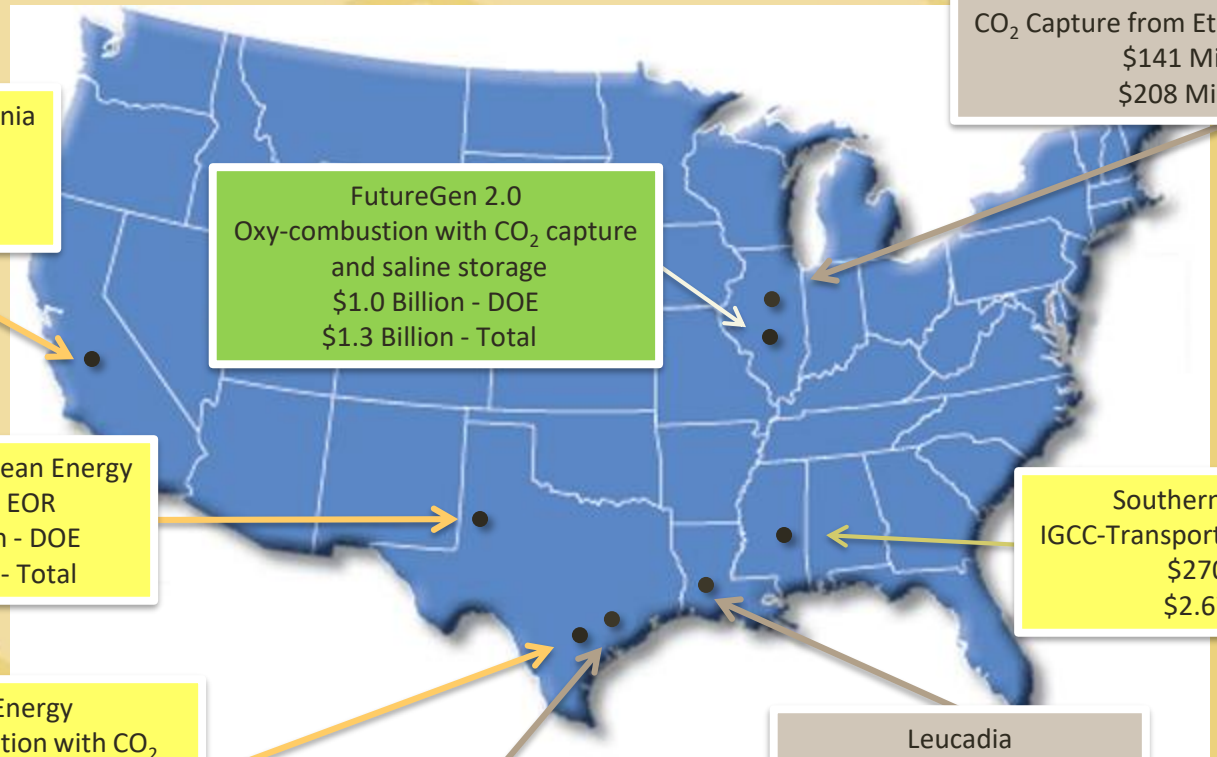
Major Investments in Clean Energy Research, Development and Demonstration

Through the Recovery Act, the Department of Energy invested more than $80 billion to support a wide range of clean energy projects across the nation.



Source: energy.gov/maps/doe-recovery-act-field-projects

Department of Energy CCUS Demonstration Projects



Archer Daniels Midland
CO_2 Capture from Ethanol w/ saline storage
$141 Million - DOE
$208 Million - Total

Hydrogen Energy California
IGCC with EOR
$408 Million - DOE
$4.0 Billion - Total

FutureGen 2.0
Oxy-combustion with CO_2 capture and saline storage
$1.0 Billion - DOE
$1.3 Billion - Total

Summit Texas Clean Energy
IGCC with EOR
$450 Million - DOE
$1.7 Billion - Total

Southern Company Services
IGCC-Transport Gasifier w/CO2 pipeline
$270 Million - DOE
$2.67 Billion - Total

NRG Energy
Post Combustion with CO_2 Capture with EOR
$167 Million – DOE
$339 Million - Total

Air Products
CO_2 Capture from Steam Methane Reformers with EOR
$284 Million - DOE
$431 Million - Total

Leucadia
CO_2 Capture from Methanol with EOR
$261 Million - DOE
$436 Million - Total

FutureGen
CCPI
ICCS (Area I)

Innovation Investments are Driving Down Costs and Delivering Results

- **Sunshot:** Less than four years into the President's decade-long SunShot Initiative, the solar industry is already more than 68% of the way to achieving SunShot's cost target of $0.06 per kilowatt-hour for utility-scale PV; approximately 20 GW of solar across the US, a 16-fold increase since 2008

- **EV Batteries:** Reduced modeled, high volume cost of EV battery production from $1000/kWh in 2008 to $325/kWh in 2013, with a goal of $125/kWh by 2022

- **Biofuels:** Reduced modeled mature cost of cellulosic ethanol from over $13 per gallon to about $2 per gallon; industry now deploying larger-scale demonstration- and commercial-scale plants starting with three cellulosic ethanol refineries in 2014

- **Wind:** With support from EERE R&D funding and deployment support, U.S. wind power capacity has more than tripled since 2008, and PPAs signed in 2013 show wind energy available at competitive rates as low as 2.5 cents/kWh

3. Actions In Progress

Climate Action Plan (CAP)

The President's Climate Action Plan (2013) consists of executive actions across three key pillars, grounded in existing legal authorities:

1. Reduce U.S. GHG Emissions
2. Prepare for the Impacts of Climate Change
3. Lead in International Efforts to Combat Global Climate Change

Cutting Greenhouse Gas Emissions Through Clean Energy

- **Develop carbon pollution standards for new and existing power plants**
  - Delivered Proposed Standards for new power plants in Sep 2013
  - Delivered Proposed Standards for existing power plants in June 2014
  - Final rules and state plans by June 2016
- **Double electricity generation from solar and wind in the U.S. again by 2020**
  - Builds on previous doubling from 2009 to 2012
  - New 20 percent by 2020 renewables procurement target for the Federal government
- **On-going research, development and deployment**

Cutting Greenhouse Gas Emissions through Efficiency

- **Appliance efficiency standards to reduce carbon pollution by at least 3 billion metric tons cumulatively by 2030**
  - The US Department of Energy (DOE) completed 7 final appliance standards already in 2014 whose total cumulative emissions reductions are estimated to be 248 MMtCO2 through 2030
  - DOE is also on track to complete 3 additional final appliance standards in 2014 which will collectively yield major additional carbon pollution reduction

- **Develop new, post-2018 fuel economy standards for heavy-duty vehicles**
  - Under this first-ever national program, average fuel efficiency for cars and trucks will nearly double, reaching an average performance equivalent of about 54.5 miles per gallon by 2025

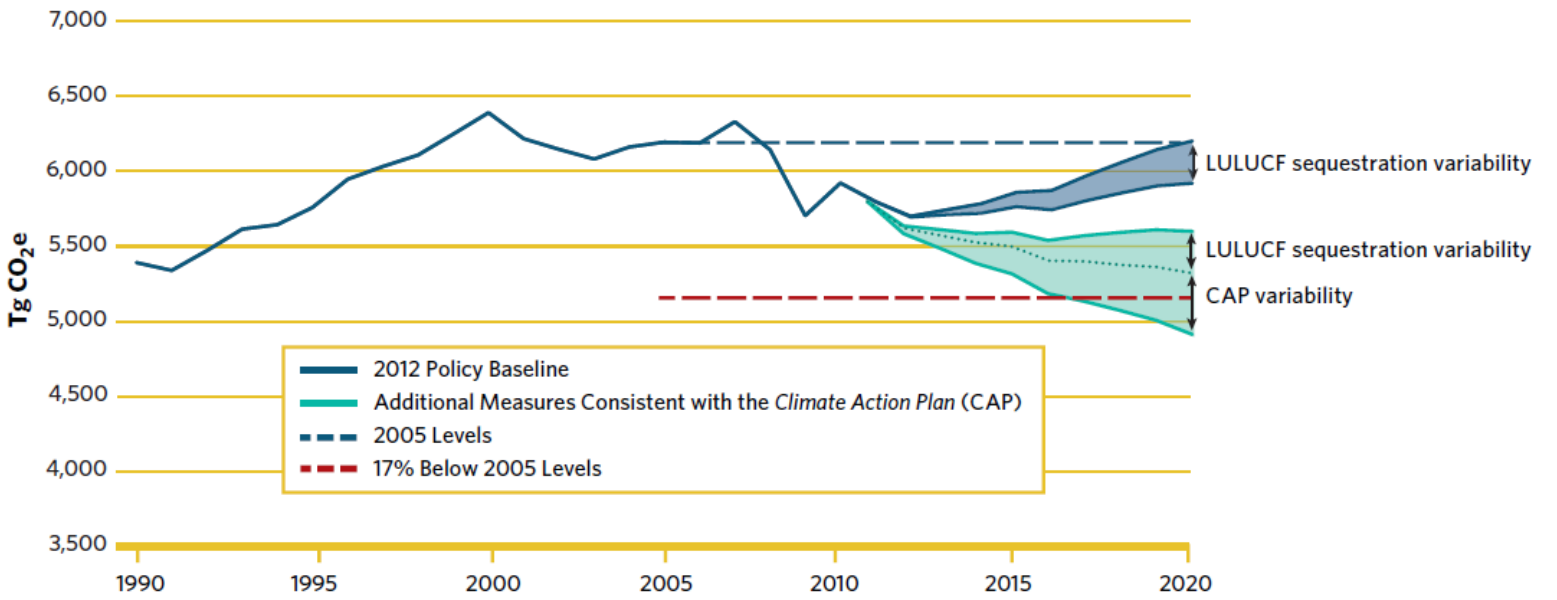
Cutting Greenhouse Gas Emissions beyond the Energy Sector

- **Domestic actions to reduce short-lived climate pollutants**
  - On September 16, 2014, White House announced new executive actions and private sector commitments to reduce cumulative global consumption of HFCs by the equivalent of 700 million metric tons of CO2e through 2025, or 1.5% of the world's 2010 GHG emissions
  - In 2014 the Environmental Protection Agency proposed two new rules under the Significant New Alternatives Policy (SNAP) program that will reduce 31-42 million metric tons of CO2e

- **New approaches to protect and restore forests, grasslands and wetlands to bolster our carbon sinks**
  - October 2014 release of Priority Agenda to manage and enhance lands sector carbon sinks

4. Biennial Report to the UNFCCC

U.S. Net GHG Emissions Projections



Notes: Figure 4 shows the range of projected emissions for both (1) the 2012 Policy Baseline scenario (in blue), which assumes that no additional measures are implemented after 2012; and (2) a scenario (in green) that incorporates post-2012 implementation of Additional Measures Consistent with the *Climate Action Plan*. The range (in blue) for the 2012 Policy Baseline scenario reflects variability in projected net sequestration rates from land use, land-use change, and forestry (LULUCF), much of which will be determined by factors that cannot be directly influenced by policies and measures. The range (in green) for the Additional Measures Consistent with the *Climate Action Plan* scenario reflects both LULUCF sequestration variability, as well as uncertainty regarding projected emission reductions from measures that will be implemented consistent with the *Climate Action Plan.* The dotted line delineates the share of projected variability that is attributable to LULUCF and the *Climate Action Plan,* respectively. Specifically, the portion labeled "CAP variability" illustrates the range of emission outcomes that can be directly influenced by implementation of the *Climate Action Plan,* assuming best-case LULUCF sequestration outcomes. The LULUCF sequestration variability ranges are identical in both scenarios.

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Source: 2014 Climate Action Report

LAND SECTOR TRACKING "OPTIMISTIC" PATHWAY

- **Uncertainty Reported in 2014 Biennial Report**
  - Our January 2014 Biennial Report communicated significant uncertainty in projections of 2020 sinks with two possible pathways: "Optimistic" and "Pessimistic"

- **Subsequent effort to reduce uncertainties and bolster our carbon sinks**
  - Substantial effort to reduce uncertainties in the land sector projections through:
    - Improvement data and accounting methods for forests and agriculture
    - Improved understanding of the drivers of carbon sinks projections
  - New efforts to protect and bolster our carbon sinks
    - Policies and programs to reduce degradation and enhance carbon uptake
    - Reforestation of public lands; conservation on private lands; conservation of high organic agricultural soils

- **We now expect to track more closely to the BR "Optimistic Sink" projection**
  - Paired with our comprehensive emissions reductions under the Climate Action Plan, this gives us confidence we will achieve our overall target of -17%

2020 Ranges of Potential Emission Reductions Relative to Emissions in the 2012 Policy Baseline Scenario (Tg CO2e)

Pollutant	Potential Reductions
Energy Sector CO_2	485–800
HFCs	100–135
Methane	25–90
Total	**610–1,025**

Note: HFC values listed for potential abatement in 2020 were calculated using GWP values from the IPCC Fourth Assessment Report (IPCC 2007).

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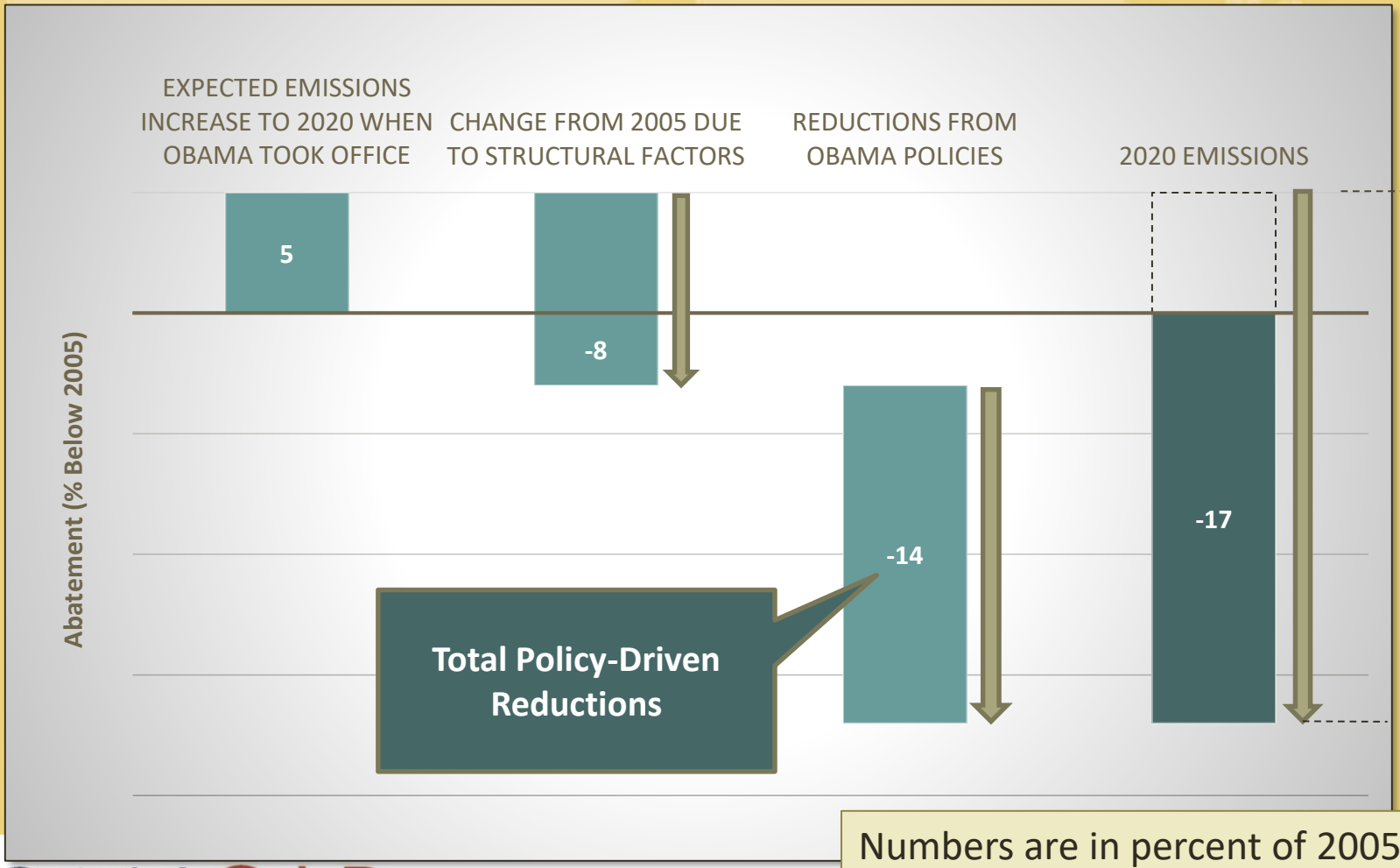
Source: 2014 Climate Action Report

Drivers of Emissions Reduction



Numbers are in percent of 2005 emissions

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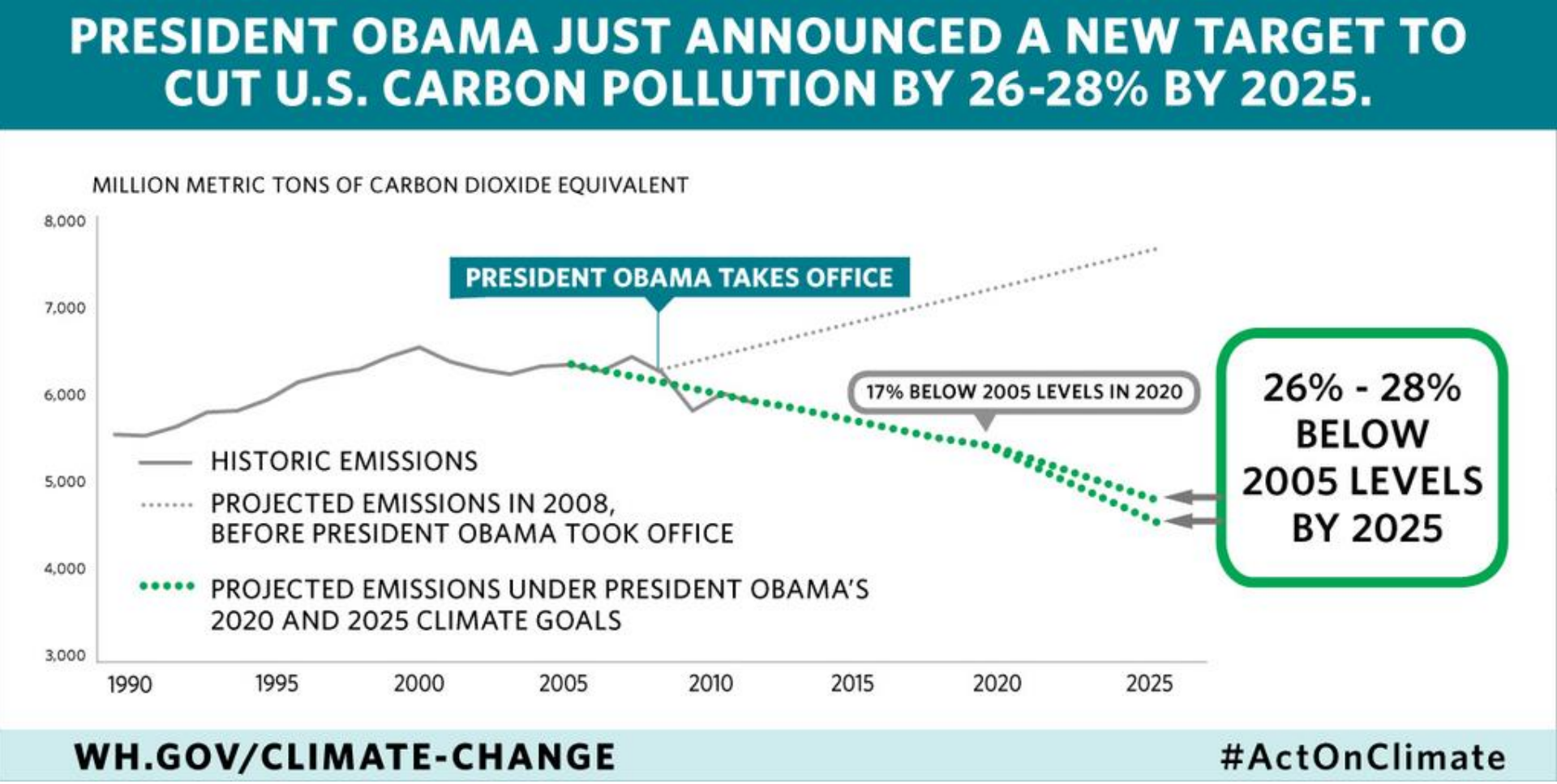
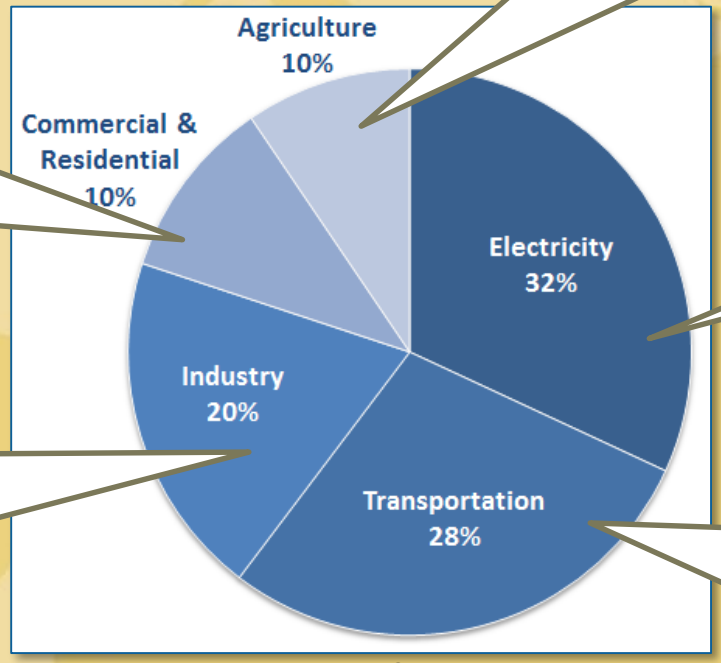


- Robust action brings us in range of 26-28% below 2005 levels by 2025
- Doubling of decarbonization pace
- Consistent with reductions of >80% by 2050

Policies Address All Sectors and Gases

- Interagency Methane Strategy
- Agricultural programs

- Appliance & Equipment standards
- Building codes
- Green Mortgages
- Other measures



Sector Breakdown of 2012 Emissions

- Clean Power Plan
- Building codes
- Appliance & equipment standards
- Other measures

- HFCs including SNAP
- Oil & Gas Methane
- Efficiency standards and programs
- Other measures

- Fuel economy standards
- Biofuels
- Reduced VMT
- Other measures

- The U.S. is driving substantial reductions in all sectors and gases through existing and new policies.
- Enhanced policies to bolster sinks through reforestation and conservation will further contribute to reaching our 2025 goal

SUMMARY

Because of aggressive policy actions, we are on track to reach our goal of reductions in the range of 17 percent below 2005 levels by 2020

The impact of those policies will continue to grow, and we will continue to implement new policies to drive down emissions even further after 2020

Source: www.whitehouse.gov

5. QUESTIONS

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