

ADDENDUM TO THE GLOBAL CLIMATE CHANGE POLICY BOOK

The Global Climate Change Policy Book distributed with the President's February 14th speech on Clear Skies and Global Climate Change included several calculated statistics:

- **2002 emission intensity:** 183 metric tons of carbon equivalent emissions per million dollars GDP
- **2012 emissions intensity:** 158 metric tons of carbon equivalent emissions per million dollars GDP
- **2002-2012 decline in emission intensity based on current forecasts with existing policies and efforts:** 14%
- **Expected emission reductions in 2012 resulting from the President's commitment to reduce intensity by 18%:** more than 100 million metric tons carbon equivalent

This document and accompanying spreadsheet describes the data used to produce these numbers.

Three primary forecasts underlie these intensity and emission reduction estimates: real GDP, energy-related carbon dioxide emissions, and other carbon dioxide and greenhouse gas emissions. The sources of these forecasts are described below, followed by an explanation of the calculated intensities and emission reductions.

Real GDP forecasts (spreadsheet row 28) are based on the *Annual Energy Outlook 2002*, published by the Energy Information Administration in December 2001.¹ In turn, these are based on the DRI-WEFA July 2001 Trend Growth scenario.² Although these forecasts were made before September 11 and before the exact nature of last year's recession was clear, the forecast growth of 38% over 2002-2012 matches the recent forecasts published in the *2003 Budget of the United States Government*.³ Real GDP forecasts are converted from 1996 dollars to 2001 dollars (spreadsheet row 29) using the implicit GDP deflator, published in the National Income and Product Accounts.

Forecasts of energy-related carbon dioxide emissions (spreadsheet row 25) are also based on the *Annual Energy Outlook 2002*.⁴ These emissions are derived from the use of fossil fuels forecast by the National Energy Modeling System developed by the Energy Information Administration, incorporating the economic growth assumptions described above.

Forecasts of other carbon dioxide and greenhouse gas emissions (spreadsheet row 26) are based on two sources. The projections begin with 1999 inventories reported in *Emissions of Greenhouse Gases in the United States 1999*, published by the Energy Information Administration. Future emission levels are estimated using growth rates derived from reports published by the Environmental Protection Agency:

¹ Table A20.

² *Assumptions to the Annual Energy Outlook 2002*, page 13.

³ Table S-14.

⁴ Table A19.

*Addendum to the U.S. Methane Emissions 1990-2020: Inventories, Projections and Opportunities for Reductions,*⁵ *Climate Action Report 2001,*⁶ *U.S. High GWP Gas Emissions 1990-2010: Inventories, Projections, and Opportunities for Reductions.*⁷

There are two alternative forecasts provided on the accompanying spreadsheet. The first (spreadsheet row 39) is based on similar growth rates, but using inventories published in *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000*. The second (spreadsheet row 44) is based on inventories and projections in the *Climate Action Report 2001* and uses growth rates estimated to include existing policies and measures to reduce greenhouse gases.

Greenhouse gas intensity is computed as the ratio of total greenhouse gas emissions (spreadsheet rows 27, 40 and 45) to real GDP (spreadsheet row 29). This is multiplied by 1000 to convert to units of metric tons carbon equivalent (mtce) per million dollars of GDP.

The intensity decline is measured as one minus the ratio of 2012 greenhouse gas intensity to 2002 greenhouse gas intensity. For example, in the reference case intensity declines from 183 to 158 mtce/\$million. $14\% = 1 - 158/183$.

Emission reductions from business as usual are computed by first determining the emissions implied by the President's goal. Specifically, forecast GDP in 2012, multiplied by $(1 - 18\%)$, multiplied by intensity in 2002, and divided by 1000 (the latter converts from thousands to millions of tons). In the reference case, this works out to $14,459 \times 0.82 \times 183.3 / 1000 = 2173$ million metric tons of carbon. This is then subtracted from forecast emissions in 2012, 2279, to yield the reported estimate of 106 million tons of reductions.

Note that the exact intensity goal in 2012 will not be known until accurate inventory data for 2002 is available as a basis for the 18% decline. The exact emission goal will then depend on the eventual GDP level in 2012.

References:

Annual Energy Outlook 2002. <http://www.eia.doe.gov/oiaf/aeo/>

Emissions of Greenhouse Gases in the United States 1999. <http://www.eia.doe.gov/oiaf/1605/gg00rpt/>

Climate Action Report 2001. <http://www.epa.gov/globalwarming/publications/car/index.html>

Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000.
<http://www.epa.gov/globalwarming/publications/emissions/us2002/index.html>

Addendum to the U.S. Methane Emissions 1990-2020: Inventories, Projections and Opportunities for Reductions. http://www.epa.gov/ghginfo/pdfs/final_addendum2.pdf

U.S. High GWP Gas Emissions 1990-2010: Inventories, Projections, and Opportunities for Reductions.
<http://www.epa.gov/ghginfo/reports/index.htm>

⁵ Table 1.

⁶ Table 5-2.

⁷ Exhibit 1.4

Summary of Forecasts Used to Quantify President Bush's Intensity Goal

(yellow highlights values presented in the Global Climate Change Policy Book at <http://www.whitehouse.gov/news/releases/2002/02/climatechange.html>)

	Intensity Decline 2002-2012	2012 Emission Reductions under President's Goal Relative to Forecast (MMTCE)	
President's Goal	18%		
EIA Reference Case (basis of Administration analysis)	14%	106	
Published Government Forecasts	13%	123	
National Communication	15%	89	

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
EIA Reference Case														
Emissions (million metric tons carbon equivalent)														
Energy-Related Carbon Dioxide (1)	1517	1562	1561	1584	1631	1662	1694	1724	1756	1781	1807	1835	1865	1892
Other Carbon and GHGs (2)	322	325	329	333	337	341	346	351	356	361	367	373	380	387
Greenhouse Gas Total	1839	1887	1890	1917	1968	2003	2039	2075	2112	2142	2174	2208	2245	2279
US GDP (billion 1996 dollars) (3)	8857	9224	9319	9523	9826	10103	10418	10719	11046	11442	11867	12312	12777	13166
US GDP (billion 2001 dollars) (4)	9726	10130	10234	10458	10791	11095	11442	11771	12131	12565	13032	13521	14032	14459
GHG Intensity (metric tons of carbon equivalent per million dollars GDP)	189	186	185	183	182	181	178	176	174	170	167	163	160	158

Alternate Estimates of Non-energy Carbon and Other GHGs

Published Government Forecasts (5)	335	344	353	362	372	381	387	393	399	406	412	419	427
Greenhouse Gas Total	1897	1905	1937	1994	2034	2075	2112	2149	2180	2212	2246	2284	2319
GHG Intensity	187	186	185	185	183	181	179	177	174	170	166	163	160
Climate Action Report (with measures) (6)	342	346	350	354	358	363	366	369	372	375	379	384	390
Greenhouse Gas Total	1903	1907	1934	1985	2021	2056	2090	2125	2153	2182	2213	2249	2282
GHG Intensity	188	186	185	184	182	180	178	175	171	167	164	160	158

Notes:

- (1) http://www.eia.doe.gov/oiaf/aeo/aeotab_19.htm
- (2) EIA staff calculations using 1999 emission inventories from <http://www.eia.doe.gov/oiaf/1605/gg00rpt/tbles2.html> and <http://www.eia.doe.gov/oiaf/1605/gg00rpt/tbl4.html>, with growth rates derived from preliminary EPA estimates of other GHGs.
- (3) http://www.eia.doe.gov/oiaf/aeo/aeotab_20.htm
- (4) converted using implicit price index for GDP (2001:III) from National Income and Product Accounts, Table 7.1
- (5) See attached "Published Government Forecasts" table.
- (6) Table 5-2 excluding sinks. Values between 2001-2004, 2006-2009, and 2011-2012 interpolated using a constant growth trend

Published Government Forecasts of Non-Energy CO₂ and Other GHGs: 2000 to 2015

GHG and Sectors	All data in MMTCE (1)			
	2000	2005	2010	2015
METHANE Emissions (2)	167	176	178	177
NITROUS OXIDE Emissions (3)	116	122	127	132
HIGH-GWP GAS (HFCs, PFCs, SF₆) Emissions (4)	33	62	84	115
NON-ENERGY CO₂ (3)	36	38	40	42
ADJUSTMENTS (3)	-16	-16	-16	-16
TOTAL Non-Energy CO₂ and Other GHG Emissions	335	382	412	450

Data Sources:

- (1) 2000 data for methane, nitrous oxide, and high-gwp gases are from USEPA (2002). Draft Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2000. See <http://www.epa.gov/globalwarming/publications/emissions/us2002/index.html>
- (2) Methane projections are from USEPA (2001). Addendum to the U.S. Methane Emissions 1990-2020: Inventories, Projections, and Opportunities for Reductions. See Table 1, http://www.epa.gov/ghginfo/pdfs/final_addendum2.pdf
- (3) Nitrous Oxide projections as well as current and projected Non-energy CO₂ and Adjustments are from the Climate Action Report 2001, Chap 5, Table 5-2. See <http://www.epa.gov/globalwarming/publications/car/index.html>
- (4) High-GWP Emissions are from USEPA (2001). U.S. High GWP Gas Emissions 1990-2010: Inventories, Projections, and Opportunities for Reductions. (EPA 000-F-97-000). See Exhibit 1.4, <http://www.epa.gov/ghginfo/reports/index.htm>
2015 data calculated by using growth rate from 2005 to 2010.