

## **Climate Change Facts and Comments**

### Political statements:

'Speaking to hundreds of international leaders gathered here for the United Nations World Environment Day, Gov. Arnold Schwarzenegger announced a plan to reduce California's contribution to gases that many scientists believe cause global warming.... "I say the debate is over," Mr. Schwarzenegger told about 500 guests, including mayors from more than 70 cities from around the world invited to hear the announcement at City Hall. "We know the science. We see the threat, and we know the time for action is now." Carolynn Marshall, "Schwarzenegger Issues Plan to Reduce Greenhouse Gases, New York Times, June 2, 2005.

132 mayors, Republican and Democrat, representing 29 million citizens in 35 states, endorse Kyoto rules. Seattle's mayor, Greg Nickels, the organizer of the coalition, expressed concern that climate change could reduce snowpack in the Cascades, thereby lowering the City's drinking water and hydroelectric supply. C. Ray Nagin, New Orleans' mayor joined the coalition because a projected rise in sea levels "threatens the very existence of New Orleans". The mayor of Alexandria, Virginia is concerned about increased flooding, while mayors in flooding fear hurricanes. Jerry Ryan, the Republican mayor of Bellevue, Nebraska signed on because of concerns about droughts on his farming community. Eli Sanders, New York Times, May 14, 2005, p. A8.

"I'm concerned about climate change. I'm going to do something about it". Senator John McCain, 2004.

Climate change is a greater threat to the world than terrorism, argues Sir David King, chief science adviser to Prime Minister Tony Blair: "Delaying action for a decade, or even just years, is not a serious option." "Global Warming", cover story, Business Week, August 16, 2004.

"In all sectors, water, health, food, energy, insurance, governments and human settlements, the risk exists that impacts of climate change will overstress existing institutional structures and engineered systems designed for a more stable world." Klaus Toepfer, executive director of the United Nations Environmental Program and former German Minister for the Environment, March 2001.

Byrd & Domenici joined Bingaman & Specter in sponsoring the attached Sense of the Senate Resolution on Climate Change. It passed on a voice vote on 6/22/05 after a 54-43 vote against tabling the Resolution. The Resolution expresses the sense of the Senate that before the end of the 1st Session of the 109th Congress, Congress should enact a comprehensive and effective national program establishing mandatory limits on greenhouse gases.

### Religious statements:

"Many of us share a deep conviction that global climate change presents an unprecedented threat to the integrity of life on Earth and a challenge to universal values that bind us as human beings." From a May 2004 letter entitled, "Earth's Climate Embraces Us All: A Plea from Religion and Science for Action on Global Climate Change", organized by the National Religious Partnership for the Environment, and signed by the following religious leaders (in addition to numerous scientific authorities):

Reverend Richard Cizik  
Vice President for Governmental Affairs  
National Association of Evangelicals

His Grace Bishop Dimitrios  
Ecumenical Officer  
Greek Orthodox Archdiocese of America

Reverend Dr. Robert Edgar  
General Secretary  
National Council of Churches USA

United States Catholic Conference of Bishops

The Most Reverend Frank T. Griswold  
Presiding Bishop and Primate  
The Episcopal Church, USA

Dr. Richard Mouw  
President, Fuller Theological Seminary  
Professor of Christian Philosophy

Reverend Mark S. Hanson  
Presiding Bishop  
Evangelical Lutheran Church in America

Most Reverend John H. Ricard, S.S.J.  
Bishop of Pensacola-Tallahassee  
Chairman, International Policy Committee  
United States Catholic Conference of Bishops

Bishop Thomas L. Hoyt Jr.  
Christian Methodist Episcopal Church Bishop  
President, National Council of Churches USA

Rabbi Ismar Schorsch,  
Chancellor  
Jewish Theological Seminary of America

Reverend Dr. Clifton Kirkpatrick  
Stated Clerk  
Presbyterian Church (USA)

Bishop Melvin Talbert  
Interim General Secretary and Ecumenical Officer  
Council of Bishops  
United Methodist Church

Theodore Cardinal McCarrick  
Archbishop of Washington, DC  
Chairman, Domestic Policy Committee

Rabbi Eric H. Yoffie  
President  
Union for Reformed Judaism

Military and security comments:

“Climate change 'should be elevated beyond a scientific debate to a US national security concern', say the authors, Peter Schwartz, CIA consultant and former head of planning at Royal Dutch/Shell Group, and Doug Randall of the California-based Global Business Network. An imminent scenario of catastrophic climate change is 'plausible and would challenge United States national security in ways that should be considered immediately', they conclude.” “The report was commissioned by influential Pentagon defense adviser Andrew Marshall”. Mark Townsend and Paul Harris, “Now the Pentagon tells Bush: climate change will destroy us”, in *The Observer*, February 22, 2004.

“We must take steps to control the emissions from the burning of coal, oil, and natural gas that are affecting the global climate.” From a March 30, 2005 letter to President Bush from 31 national security leaders, including Admiral William T. Crowe, Jr., former Chairman Joint Chiefs of Staff; John H. Dalton, former Secretary of the Navy; Frank J. Gaffney, Jr., President & CEO, The Center for Security Policy and columnist for the Washington Times; C. Boyden Gray, Partner, Wilmer Cutler Pickering Hale & Dorr, and former White House Counsel to President George H.W. Bush; Gary Hart, Co-Chair, U.S. Commission on National Security for the 21st Century, former U.S. Senator from Colorado; Robert McFarlane, Chairman & CEO, Energy & Communications Solutions, and former National Security Advisor to President Ronald Reagan; Vice Admiral Dennis McGinn, former Deputy Chief of Naval Operations, USN (Ret.); John Podesta, former White House Chief of Staff for President Bill Clinton; Vice Admiral Richard Truly, former astronaut, former NASA administrator, former Director of the National Renewable Energy Laboratory; Admiral James D. Watkins, Chairman of the Commission on Ocean Policy; Timothy Wirth, President of the United Nations Foundation, and former U.S. Senator from Colorado; R. James Woolsey, former Director of Central Intelligence.

#### Corporate statements:

“We feel there is sufficient scientific evidence that global climate is affected by man-made carbon dioxide emissions from the burning of fossil fuels. We are also believers in sustainable development, which is the simultaneous achievement of economic, social, and environmental goals.” -Brent Dorsey, Director of Corporate Environmental Programs for Entergy, in a press release for a talk given on carbon sequestration.

“It is incumbent upon every business and every individual to take action to take action to limit greenhouse gas emissions”. J.Wayne Leonard, CEO of Entergy, Environmental Defense, The Heat is On: A white Paper on Climate Action, 2004, p.21.

“We are going to live in a carbon-constrained world”. Dale E. Heydlauff, senior vice president for governmental and environmental affairs at AEP, the nation’s largest power supplier and largest emitter of carbon dioxide. Wall Street Journal, February 11, 2003.

According to Xcel Energy [the nation’s fourth largest electricity and gas utility] CEO and Chairman Wayne Brunetti, we have the technology to significantly reduce emissions: "Give us a date, tell us how much we need to cut, give us the flexibility to meet the goals, and we'll get it done." “Global Warming”, cover story, Business Week, August 16, 2004.

"There's no time to wait because tomorrow is now. We are living in a carbon-constrained world where the amount of CO2 must be reduced." General Electric CEO Jeffrey Immelt announcing GE's pledge to develop new energy saving technologies and reduce the company's own emissions of heat-trapping greenhouse gases. (reported by Environmental Defense, 5/18/05)

“Alcoa, one of the world’s largest aluminum companies, has pledged to slash its greenhouse emissions by 25% from 1990 levels by 2010. ‘Rather than further debate the science, we have decided that the risk of significant climate change is an issue of vital importance requiring action.’” Randy Overby, president of Alcoa’s energy business. Environmental Defense, The Heat is On: A white Paper on Climate Action, 2004, p.21.

"Is climate change one of the most important issues facing the insurance industry today? Quite simply, yes." "Despite the fact that the industry is financially healthy, and has some 160 billion in surplus, in two events you could take 70 billion, or maybe 80 billion of that surplus away and you'd cripple the industry. It wouldn't be able to take on new risks. It wouldn't have the capacity to underwrite the business of the future. We'd have massive, massive availability problems." Eugene Lecompte, President of the US National Committee on Property Insurance, December 1993.

"As in 2002 and 2003, the overall balance of natural catastrophes is again clearly dominated by weather-related disasters, many of them exceptional and extreme." "We need to stop this dangerous experiment humankind is conducting on the Earth's atmosphere. Thomas Loster, Munich Re climate expert,

December 2004.

“Swiss Re [the world’s second largest reinsurer] warned in a recent report that natural disasters induced by global warming could cost the world’s financial centers as much as \$150 billion per year within the next decade (more than double the present rate).” Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.23.

“Global warming is a perfect storm in the making”. Leon Panetta, former director of the New York Stock Exchange, Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.23.

80% of CEOs said that climate change was a potential risk, but only 40% were doing something about it. That's not good to hear for insurers." Christopher Walker, a Swiss Re greenhouse-gas expert. “Global Warming”, cover story, *Business Week*, August 16, 2004.

“Global warming is a key environmental issue and a bottom line issue for the \$3 billion ski industry and its employees. Without action soon, ski regions could see less snow, reduced snow pack, and shorter, more erratic seasons. Seventy-one [ski] resorts from 21 states are urging members of the 109th Congress to support bi-partisan legislation by Republican Senator John McCain (R-AZ) and Democrat Joe Lieberman (D-CT) (S. 342) to control global warming pollution for the first time.” Geraldine Link, NSAA Director of Public Policy, National Ski Areas Association, Press release, February 23, 2005.

#### Scientific statements:

“Greenhouse gases are accumulating in the Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise. National Research Council, 2001, *Climate Change Science: An Analysis of Some Key Questions*. National Academy Press, 29 pp.

“Because human activities are contributing to climate change, we have a collective responsibility to develop and undertake carefully considered response actions.” American Meteorological Society, *Climate Change Research: Issues for the Atmospheric and Related Sciences*, Executive Summary Adopted by AMS Council on 9 February 2003, *Bull. Amer. Met. Soc.*, v. 84, pp.508—515.

“The scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action. It is vital that all nations identify cost-effective steps that they can take now, to contribute to substantial and long-term reduction in net global greenhouse gas emissions.” G8 Joint Academies Statement on Climate Change, June 5, 2005, signed by Academia Brasileira de Ciências (Brazil), Royal Society of Canada (Canada), Chinese Academy of Sciences (China), Académie des Sciences (France), Deutsche Akademie der Naturforscher Leopoldina (Germany), Accademia Nazionale dei Lincei (Italy), Indian National Science Academy (India), Science Council of Japan (Japan), Russian Academy of Sciences (Russia), United Kingdom Royal Society (Great Britain), National Academy of Sciences (United States of America).

The National Academy of Sciences' Ad Hoc Study Group on Carbon Dioxide and Climate, the "Charney panel, concluded in 1980 that if "carbon dioxide continues to increase, the study group finds no reason to doubt that climate change will result and no reason to believe that these changes will be negligible", adding, "we may not be given a warning until the CO2 loading is such that an appreciable climate change is inevitable". Elizabeth Kolbert, *New Yorker*, 4/25/05, p. 58

The U.N.-sponsored Intergovernmental Panel on Climate Change (IPCC) cited in 2001 “new and strong evidence that most of the observed warming of the last 50 years is attributable to human activities”. Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.7.

“At the request of President Bush, the U.S. National Academy of Sciences convened a panel in spring 2001 to assess the IPCC findings. Its verdict: ‘the IPCC’s conclusion that most of the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations

accurately reflects the current thinking of the scientific community on this issue". Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.7.

In 2003, the American Geophysical Union issued the statement, "Natural influences cannot explain the rapid increase in global near-surface temperatures". Elizabeth Kolbert, *New Yorker*, 4/25/05, p. 58

"The drafting of such reports and statements involves many opportunities for comment, criticism, and revision, and it is not likely that they would diverge greatly from the opinions of the societies' members. Nevertheless, they might downplay legitimate dissenting opinions. That hypothesis [of overlooked dissent against a consensus that climate change is occurring and affected by human activities] was tested by analyzing 928 abstracts, published in refereed scientific journals between 1993 and 2003, and listed in the ISI database with the keywords "[global] climate change". The 928 papers were divided into six categories: explicit endorsement of the consensus position, evaluation of impacts, mitigation proposals, methods, paleoclimate analysis, and rejection of the consensus position. Of all the papers, 75% fell into the first three categories, either explicitly or implicitly accepting the consensus view; 25% dealt with methods or paleoclimate, taking no position on current anthropogenic climate change. Remarkably, none of the papers disagreed with the consensus position." Naomi Oreskes, *BEYOND THE IVORY TOWER: The Scientific Consensus on Climate Change*, *Science*, Vol 306, Issue 5702, 1686 , 3 December 2004.

"The authors of the overview document of the ACIA [Arctic Climate Impact Assessment] identified the following ten key findings:

1. The Arctic climate is now warming rapidly and much larger changes are projected.
2. Arctic warming and its consequences have worldwide implications.
3. Arctic vegetation zones are projected to shift, bringing wide-ranging impacts.
4. Animal species' diversity, ranges, and distribution will change.
5. Many coastal communities and facilities face increasing exposure to storms.
6. Reduced sea ice is very likely to increase marine transport and access to resources.
7. Thawing ground will disrupt transportation, buildings, and other infrastructure.
8. Indigenous communities are facing major economic and cultural impacts.
9. Elevated ultraviolet radiation levels will affect people, plants, and animals.
10. Multiple influences interact to cause impacts to people and ecosystems."

Arctic Climate Impact Assessment Policy Document, Issued by the Fourth Arctic Council Ministerial Meeting, Reykjavík, Iceland, 24 November 2004. The research was conducted by "300 leading Arctic researchers, indigenous representatives and other experts from fifteen nations" (p.3); commissioned by the "Arctic Council ... a high-level, intergovernmental forum comprised of eight Member States (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States) and six Permanent Participants (Arctic Athabaskan Council, Aleut International Association, Gwich'in Council International, Inuit Circumpolar Conference, Russian Association of Indigenous Peoples of the North and the Saami Council) representing Arctic indigenous communities.

"There is no dispute that the temperature will rise. It will," says Donald Kennedy, editor-in-chief of *Science*. "Global Warming", cover story, *Business Week*, August 16, 2004.

'A July 2000 Texas A&M study found that human activity is responsible for 75 percent of observed warming since 1900, with the remaining 25 percent caused by natural factors such as fluctuations in solar intensity.' *New York Times*, July 14, 2000, "Study Faults Humans for Large Share of Global Warming"

In 1999, a computer-based study by the University of Maryland and NASA's Goddard Space Flight Center found that there is less than a 0.1 percent chance that observed melting of arctic sea ice over the last 46 years is the result of normal climatic variations. *Washington Post*, December 3, 1999, "Study: Arctic Sea Ice Is Rapidly Dwindling; Global Warming Called Likely Cause"

In 1999, a computer-based study by the University of Maryland and NASA's Goddard Space Flight Center found that there is less than a 0.1 percent chance that observed melting of arctic sea ice over the last 46 years is the result of normal climatic variations." *Washington Post*, December 3, 1999, "Study:

Arctic Sea Ice Is Rapidly Dwindling; Global Warming Called Likely Cause".

'Carbon dioxide and methane levels are both well outside the range of natural variation, according to a 1999 study of ice core records dating back 420,000 years by the National Center for Scientific Research in Grenoble, France. Carbon dioxide levels are more than 20 percent higher than during historical peaks (warm periods), and twice as high as during ice ages; methane levels are double their historical peak levels, and about five times higher than during ice ages.' Associated Press, June 10, 1999 "Scientists: Ice core sample attests to warming climate"

[Jay Zwally, NASA scientist working on a satellite project called ICESat]: "to put it nicely, we are heading into deep doo-doo". Elizabeth Kolbert, *New Yorker*, 4/25/05, p.69.

[Konrad Steffen, professor of geology at the University of Colorado]: "climate change is a real thing...the time is already five past midnight". Elizabeth Kolbert, *New Yorker*, 4/25/05, p.69.

"There is a real potential for sudden and perhaps catastrophic change," says Eileen Claussen, president of the Pew Center on Global Climate Change: "The fact that we are uncertain may actually be a reason to act sooner rather than later." "Global Warming", cover story, *Business Week*, August 16, 2004.

"What's worrisome are the unknown unknowns," says Daniel P. Schrag, director of the Laboratory for Geochemical Oceanography at Harvard University. "We are performing an experiment that hasn't been done in millions of years, and no one knows exactly what's going to happen." "Global Warming", cover story, *Business Week*, August 16, 2004.

"We're in the middle of a large uncontrolled experiment on the only planet we have". Donald Kennedy, Editor in Chief, *Science*. The Conference Board, Executive Action, No. 107, August 2004.

"We are altering the climate, says Stephen Schneider of the National Center for Atmospheric Research, at a rate ten to sixty times the natural rate of change." Bill McKibben, *The End of Nature*, Random House, New York, 1989, p.99.

#### Factors: transportation

"The United States transportation system produces almost one-third of the nation's greenhouse gas (GHG) emissions, which constitute about 25% of world net GHG production. Transportation is the fastest-growing sector for CO<sub>2</sub> emissions in the US. Transportation sector CO<sub>2</sub> emissions are growing 45% faster than total US CO<sub>2</sub> emissions. Transportation will become the largest end-use sector source of CO<sub>2</sub> emissions, exceeding industrial, within a few years." US Environmental Protection Agency, 2002. US Climate Action Report, 2002. Washington, DC.

#### Greenhouse gases:

"Antarctic ice cores also show that carbon-dioxide levels today are significantly higher than they have been at any other point in the last four hundred twenty thousand years". Elizabeth Kolbert, *New Yorker*, 4/25/05, p. 65

"In 1894, the Swedish chemist Svante Arrhenius became convinced that humans were altering the earth's energy balance"... "Arrhenius himself predicted that it would take three thousand years of coal burning to double the CO<sub>2</sub> in the air, a prediction, it is now known, that was off by roughly twenty-eight centuries." Elizabeth Kolbert, *New Yorker*, 4/25/05, p. 66

"Since pre-industrial times, the concentration of CO<sub>2</sub> in the earth's atmosphere has risen by roughly a third, from 280 parts per million to 378 p.p.m. During the same period, concentrations of methane, an even more powerful (but more short-lived) greenhouse gas, have more than doubled, from .78 p.p.m. To 1.76 p.p.m." Elizabeth Kolbert, *New Yorker*, 5/2/05, p.68

"If steps are not taken to reduce emissions, carbon-dioxide levels will probably reach 500 parts per

million – nearly double pre-industrial levels – sometime around the middle of the century”. Elizabeth Kolbert, *New Yorker*, 5/2/05, p.69.

“Nearly three times as much carbon was released in 2004 as in 1960”. Worldwatch Institute, *Vital Signs* 2005, p. 40.

The United States, with 5 percent of the world’s population, accounts for nearly a quarter of total global carbon emissions. Lila Buckley, “Carbon Emissions Reach Record High”, *Eco-Economy Indicators* (Washington, D.C., Earth Policy Institute, 2004).

“Between 1990 and 2003, U.S. energy-related emissions rose 16 percent.” “U.S. Greenhouse Gas Emission Continue to Grow”, *Environmental News Service*, 15 December 2004.

“A Jeep Grand Cherokee emits more than 20,000 pounds of global warming pollutants annually, roughly three times its body weight.” *Environmental Defense*, *The Heat is On: A white Paper on Climate Action*, 2004, p.21.

### Warming history:

“Since the early 1900s, average global temperature has risen 0.6 degrees Celsius, but the rate of change since 1976 has been triple that for the century as a whole”. “World Meteorologists Rank 2004 Fourth Warmest Year on Record”, *Environmental News Service*, 16 December 2004.

“The ten warmest years on record have all occurred since 1990.” Goddard Institute for Space Studies, NASA, “Global Land-Ocean Temperature Index”, January-December 2005, at [www.giss.nasa.gov/data/update/gistemp/GLB.Ts+dSST.txt](http://www.giss.nasa.gov/data/update/gistemp/GLB.Ts+dSST.txt), note 4.

### Warming projections:

“For doubled CO<sub>2</sub>, equilibrium runs of the GISS [Goddard Institute for Space Studies] model predict that average global temperatures will rise by 4.9 degrees Fahrenheit. ... GISS' s forecast is on the low end of the most recent projections; the Hadley Centre model, which is run by the British Met Office, predicts that for doubled CO<sub>2</sub> the eventual temperature rise will be 6.3 degrees Fahrenheit, while Japan's National Institute for Environmental Studies predicts 7.7 degrees.” Elizabeth Kolbert, *New Yorker*, 5/2/05, p.69.

“The latest Intergovernmental Panel on Climate Change projections for 21<sup>st</sup> century average global temperature increase is 2.5-10.4 degrees Fahrenheit, based upon multiple climate models and multiple assumptions regarding future greenhouse gas emissions. [http://www.pewclimate.org/global-warming-basics/faq\\_s/glance\\_faq\\_science.cfm](http://www.pewclimate.org/global-warming-basics/faq_s/glance_faq_science.cfm)”

“Temperature increases in the United States are projected to be approximately 30% higher than the global average. [http://www.pewclimate.org/global-warming-basics/faq\\_s/glance\\_faq\\_science.cfm](http://www.pewclimate.org/global-warming-basics/faq_s/glance_faq_science.cfm)”

### Warming and permafrost:

“the temperature of the permafrost [around Fairbanks, AK] has risen to the point where, in many places, it is now less than one degree below freezing”. Elizabeth Kolbert, *New Yorker*, 4/25/05, p. 60

“If the [Alaskan] permafrost thaws it will be doing so for the first time in more than a hundred and twenty thousand years”. Elizabeth Kolbert, *New Yorker*, 4/25/05, p. 60

“In most parts of Alaska, the permafrost has warmed by three degrees since the early nineteen-eighties. In some parts of the state, it has warmed by nearly six degrees.” Elizabeth Kolbert, *New Yorker*, 4/25/05, p. 61

“As the permafrost in the area has warmed, methane releases have increased, in some spots by up to

sixty per cent.... No one knows exactly how much carbon is stored in the world's permafrost, but estimates run as high as four hundred and fifty billion metric tons." Elizabeth Kolbert, New Yorker, 4/25/05, p. 61

### Warming and glaciers:

Relocation of the Alaskan Inuit island village of Shismaref (pop. 591), no longer protected by sea ice, and now hammered by sea storms, will cost \$180 million to relocate. Elizabeth Kolbert, New Yorker, 4/25/05, p. 58.

"Nearly every major glacier in the world is shrinking; those in Glacier National Park are retreating so quickly it has been estimated that they will vanish entirely by 2030." Elizabeth Kolbert, New Yorker, 4/25/05, p. 58

"Over the period 1850 to 1979 glaciers in the Blackfoot-Jackson Glacier Basin of Glacier National Park decreased in area by about 65%". Environmental Defense, The Heat is On: A white Paper on Climate Action, 2004, p.8.

"Since 1850, the number of glaciers [in Glacier National Park] has dropped from 150 to less than 40. The park's remaining glaciers could disappear completely in 30 years." Worldwatch Institute, Vital Signs 2005, p. 89.

[Oddur Sigurdsson, head of the Icelandic Glaciological Society]: "climate models predicted that by the end of the next century Iceland will be virtually ice-free.. It is believed that there have been glaciers on Iceland for the last few million years".

[Robert Corell, an American oceanographer and former assistant director of the National Science Foundation]: the Arctic climate is warming rapidly now, with an emphasis on now. Particularly alarming, were the most recent data from Greenland, which showed ice sheet melting much faster "than we thought possible even a decade ago". Elizabeth Kolbert, New Yorker, 4/25/05, p.71

"Margins [of the Greenland ice sheet] are now melting by as much as 10 meters per year, 20 times faster than in 2001. Speed of flow of the largest outlet glacier has doubled since 1997, to 12.6 kilometers per year." Worldwatch Institute, Vital Signs 2005, p. 89.

"Glaciers [in the Alps] lost roughly one third of their area and one half their mass between 1850 and 1980. Since 1980, a further 20-30 percent of the remaining ice has melted. Three quarters of Swiss Alpine glaciers are projected to disappear by 2050". Worldwatch Institute, Vital Signs 2005, p. 89.

### Warming and sea ice:

"In 1979, the satellite data show perennial sea ice covered 1.7 billion acres [in the Arctic], or an area nearly the size of the continental United States". ... "By now, though, the perennial sea ice has shrunk by roughly two hundred fifty million acres, an area the size of New York, Georgia, and Texas combined." Elizabeth Kolbert, New Yorker, 4/25/05, p. 62

"The loss of sea ice since the late nineteen-seventies was equal to the size of Texas and Arizona combined". Elizabeth Kolbert, New Yorker, 4/25/05, p.71.

"Some climate models – worldwide, there are about fifteen major ones in operation – predict that the perennial sea-ice cover n the Arctic will disappear entirely by the year 2080." ... "In summer the Arctic Ocean would be completely ice-free". Elizabeth Kolbert, New Yorker, 4/25/05, p. 65

"The Greenland ice sheet holds enough water to raise sea levels worldwide by twenty-three feet. Scientists at NASA have calculated that throughout the nineteen-nineties the ice sheet, despite some thickening at the center, was shrinking by twelve cubic miles per year." Elizabeth Kolbert, New Yorker, 4/25/05, p.68.

“According to NASA’s latest calculations, [Arctic sea ice] is retreating at a rate of 9% per decade. Global warming is thought to have caused a significant portion of the shrinkage.” Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.8.

“If greenhouse-gas emissions are not controlled the total disintegration of the Greenland ice sheet could be set in motion in a matter of decades... once begun it would become self-reinforcing.” Elizabeth Kolbert, *New Yorker*, 4/25/05, p.68.

“The breakup of the Larsen B ice shelf in the Antarctic Peninsula in 2002 was a watershed event. The disintegration of the Rhode Island-sized ice shelf was most alarming to experts because of the extraordinary swiftness of the collapse. It was the largest single event in a series of retreats by ice shelves in the peninsula over the past three decades.” Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.10.

### Warming and Sea Level Rise:

“Sea level rose 4-8 inches globally during the 20<sup>th</sup> century, ten times the average rate over the last 3000 years”. Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.9.

Global sea level is rising about three times faster over the past 100 years compared with the previous 3,000 years. Union of Concerned Scientists

“Over the last century, global sea levels have risen by about half a foot. The most recent report of the U.N.’s Intergovernmental Panel on Climate Change, issued in 2001, predicts that they will rise anywhere from four inches to three feet by the year 2100. This prediction includes almost no contribution from [the melting of] Greenland or Antarctica; it is based mostly on the physics of water, which, as it warms up, expands.” Elizabeth Kolbert, *New Yorker*, 4/25/05, p.68.

“Average global sea levels have risen 20-25 centimeters since 1901, due mainly to thermal expansion.” Janet Sawin, *WorldWatch*, March/April 2005, p. 15.

“Louisiana is losing wetlands at a rate of two acres per hour, partly due to a rise in sea level. Wetlands provide habitat for fish and wildlife and are critical to the state’s \$2.2 billion seafood industry. A one foot or greater rise in sea level could eliminate 20 to 40% of U.S. wetlands.” Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.9.

Sea level from Brownsville to Port Arthur has risen steadily, increasing eight inches over the past 100 years due to a combination of globally rising seas and substantial local sinking of the land (subsidence). By 2100, ocean levels around Texas could be 17 inches higher than today, based on a continued average subsidence rate of 2 inches per century and a mid-range sea-level rise scenario. Even a relatively small vertical rise in sea level (a few inches to 1 foot) can move the shoreline inland by substantial distance (several tens of feet) along low-lying, flat coastal areas. R. Twilley et al, *Confronting Climate Change in the Gulf Coast Region*, 2001, cited in Union of Concerned Scientists, 2005, [http://www.ucsusa.org/gulf/gcstatetex\\_cli.html](http://www.ucsusa.org/gulf/gcstatetex_cli.html)

### Civilization’s Vulnerabilities:

“Since our species evolved, average temperatures have never been much more than two or three degrees higher than they are right now”. Elizabeth Kolbert, *New Yorker*, 5/2/05, p.69.

“The list of cultures whose demise has been linked to climate change has continued to grow. They include the Classic Mayan civilization, which collapsed at the height of its development, around 800 A.D.; the Tiwanaku civilization, which thrived near Lake Titicaca, in the Andes, for more than a millenium, then disintegrated around 1100 A.D.; and the Old Kingdom of Egypt, which collapsed around the same time as the Akkadian empire”. Elizabeth Kolbert, *New Yorker*, 5/2/05, p.66

[David Rind, climate scientist at the Goddard Institute for Space Studies]: “We may say that we're more technologically able than earlier societies. But one thing about climate change is it's potentially geopolitically destabilizing. And we're not only more technologically able; we're more technologically able destructively as well. Elizabeth Kolbert, New Yorker, 5/2/05, p.70

[Peter deMenocal, paleoclimatologist at the Lamont-Doherty Earth Observatory]: “The thing that they [ancient civilizations which failed in the face of past climate change] couldn't prepare for, because in their case they didn't know about it and because in our case the political systems can't listen to it. And that is that the climate system has much greater things in store for us than we think”. Elizabeth Kolbert, New Yorker, 5/2/05, p.72

Other instances of civilizations failing due to climate changes: “the Indus Valley, where, some four thousand years ago, the Harappan civilization suffered a decline after a change in monsoon patterns; the Andes, where fourteen hundred years ago, the Moche abandoned their cities in a period of diminished rainfall, and even the United States, where the arrival of English colonists on Roanoke Island, in 1587, coincided with a severe regional drought (By the time English ships returned to resupply the colonists, three years later, no one was left)”. Elizabeth Kolbert, Elizabeth Kolbert, New Yorker, 5/2/05, p.73

### Health Effects:

“A recent study by the Hadley Centre for Climate Prediction and Research, published in Nature,..found that burning of fossil fuels, which has increased atmospheric greenhouse gas levels, has more than doubled the risk of record-breaking hot summers in Europe, such as the 2003 heat wave that killed as many as 35,000 people and devastated much of Europe's agricultural sector.” Janet Sawin, WorldWatch, March/April 2005, p. 15.

“Europe was scorched by heat waves in the summer of 2003, the hottest in at least 500 years.” Environmental Defense, The Heat is On: A white Paper on Climate Action, 2004, p.8.

“The World Health Organization estimates that global climate change already accounts for more than 160,000 deaths annually.” Janet Sawin, WorldWatch, March/April 2005, p. 15.

Vector-borne diseases that the IPCC considers very likely or highly likely to be affected by climate change include malaria, schistosomiasis, onchocerciasis (river blindness), dengue, and yellow fever. Warmer temperature speed up the lifecycle of the parasite and increase infectiousness. Over-winter freezing kills mosquito and other vector insect larvae. Recently, 13 cases of dengue fever were reported in McAllen, Texas. IPCC;  
[http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsPatz\\_Health.html](http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsPatz_Health.html)

### Water Effects:

“Rising global temperatures have been a key factor in increasing drought worldwide”. U.S. National Center for Atmospheric Research study cited by J.R. Pegg, “Global Warming Linked to Increasing Drought,” Environmental News Service, 11 January 2005.

“The GISS model for doubled CO2 .. showed most of the continental United States to be suffering under severe drought conditions.” Elizabeth Kolbert, New Yorker, 5/2/05, p.70

“A University of Texas study on the impact of climate change on the statewide water budget showed that a 4 degree F increase in temperature and 5 percent decrease in precipitation (the study's forecast for climate change in Texas in the next 50 years) resulted in a 35 percent reduction in water flow to the coast and less water available for recharging groundwater aquifers and reservoirs. When climate change was superimposed on drought conditions, this reduction was even more severe; flows to the coast were 85 percent below normal. Indeed, it was significantly more severe than that seen for the most intense drought of the last 50 to 100 years, that of the 1950s, where flows to the coast were reduced by about 60 percent.” Janine Bloomfield, Environmental Defense and U.S. Climate Action Network, “What's New about Global Warming?: Impacts on Texas”, 1996.

### Fishery Effects:

“The IPCC reports a study which showed that the brown shrimp catch in the US Gulf Coast could fall 25 percent with a 10 inch rise in sea level.” Janine Bloomfield, Environmental Defense and U.S. Climate Action Network, “What’s New about Global Warming?: Impacts on Texas”, 1996.

### Energy Effects:

“It is estimated that generating capacity will have to be increased by 20 to 30 percent due to additional energy demands from air conditioning, thereby resulting in a significant increase in the unit cost of electricity”. Janine Bloomfield, Environmental Defense and U.S. Climate Action Network, “What’s New about Global Warming?: Impacts on Texas”, 1996.

### Agriculture Effects:

“The current [1996] drought in Texas ... provides a useful analog of potential future episodes which could become more common [with climate change]. Texas A&M University found that the state will lose at least \$2.4 billion from reduced crop and livestock yields this year, rising to \$6.5 billion when reduced farm equipment sales, retail purchases and other indirect costs are considered.” Janine Bloomfield, Environmental Defense and U.S. Climate Action Network, “What’s New about Global Warming?: Impacts on Texas”, 1996.

“Simulations of future crop yields show significant reductions in dryland wheat in Texas under climate change scenarios. A northward shift in the producing capacity of wheat, corn, and soybeans is predicated as well as significant loss of crop acreage within the state.” Janine Bloomfield, Environmental Defense and U.S. Climate Action Network, “What’s New about Global Warming?: Impacts on Texas”, 1996.

### Wildlife Effects:

“Polar bears in Hudson Bay are having fewer cubs. A recent study by the Canadian Wildlife Service found that early sea-ice breakup correlates with a decline in health of adult females. Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.9.

“A study by an international research team, published in *Nature*, warned that unabated warming could drive 15 to 37% of 1103 living species the team studied toward extinction by 2050. Environmental Defense, *The Heat is On: A white Paper on Climate Action*, 2004, p.9.

In 1991, “ornithologists in Great Britain announced that more than 74,000 nesting records showed that many birds in the United Kingdom were laying their eggs an average of nine days sooner than in 1971”. Scott Wiedensaul, “Living on the Wind: Across the Hemisphere with Migratory Birds”, 1999, p. 367.

“In Germany, ornithologists found that short-distance migrants in the fall were passing through the study area up to ten days later than they had in the 1970s.” Scott Wiedensaul, “Living on the Wind: Across the Hemisphere with Migratory Birds”, 1999, p. 367.

“In North America, a University of Michigan researcher found that spring migrants were arriving in the northern Great Lakes states up to three full weeks earlier than they had in 1960”. Scott Wiedensaul, “Living on the Wind: Across the Hemisphere with Migratory Birds”, 1999, p. 367.

### Vegetation Effects:

“In 1997, scientists from Boston University analyzing satellite data announced that they had documented a 12 percent increase in spring and summer plant growth across the Far North, and a lengthening of the growing season by an average of eight days in the spring and four days in the fall. That substantial change had occurred, the team said, over just ten years, from 1981 to 1991.” Scott

Wiedensaul, "Living on the Wind: Across the Hemisphere with Migratory Birds", 1999, p. 367.

"Globally, plants now bloom an average of 5.2 days earlier each decade, according to Terry Root of Stanford University." Janet Sawin, WorldWatch, March/April 2005, p. 15.

### Miscellaneous Ecological Effects:

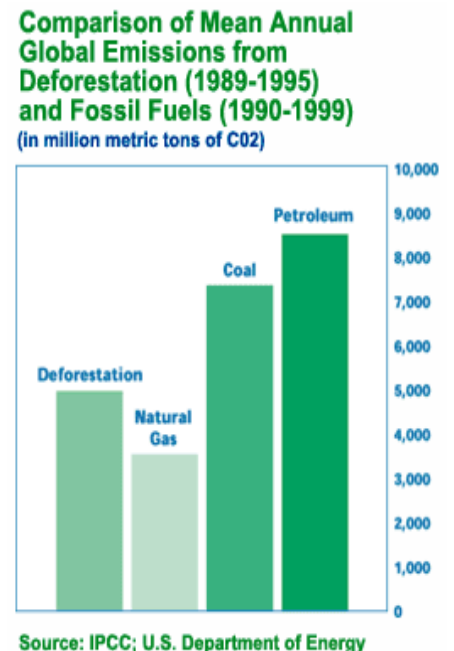
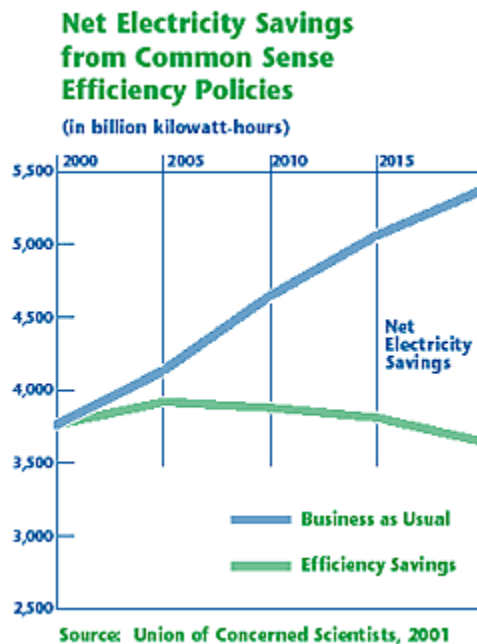
The oceans are becoming more acidic; the difference between day and nighttime temperatures is diminishing; animals are shifting their ranges poleward; and plants are blooming days, and in some cases, weeks, earlier than they used. Elizabeth Kolbert, New Yorker, 4/25/05, p. 58

John Keogak, an Inuit who hunts some 500 miles north of the Arctic Circle "and his fellow hunters had started to notice that the climate was changing in the mid-eighties. A few years ago, for the first time, people began to see robins, a bird for which the Inuit in his region have no word." Elizabeth Kolbert, New Yorker, 4/25/05, p.68.

### Public Solutions

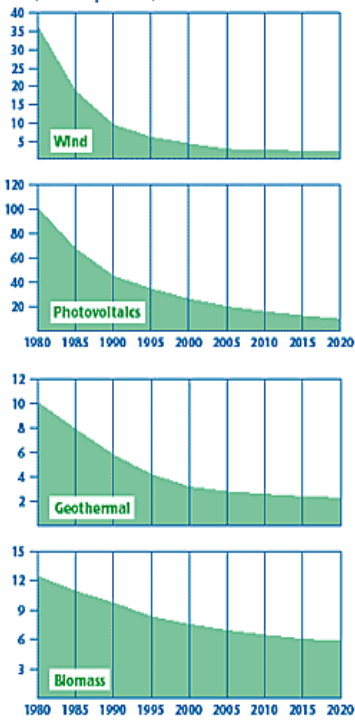
Better transmissions and engines, more aerodynamic designs, and stronger yet lighter material for chassis and bodies can cost-effectively increase the average fuel economy of today's automotive fleet from 24 mpg to 40 mpg over 10 years. This would be equivalent to taking 44 million cars off the road—and it would save individual drivers thousands of dollars in fuel costs over the life of a vehicle. Because transportation accounts for nearly 30 percent of U.S. annual CO2 emissions, raising fuel economy is one of the most important things we can do to slow climate change. Union of Concerned Scientists, [www.ucsusa.org](http://www.ucsusa.org), 2005.

A study by the Union of Concerned Scientists found that we could reduce power plant CO2 emissions by 60 percent compared with government forecasts for 2020. Consumers would save a total of \$440 billion—reaching \$350 annually per family by 2020. A national standard requiring 20 percent of our electricity to be generated from renewable energy sources by 2020 is an attainable goal. We are already using clean, safe, renewable sources such as solar, wind, geothermal, and biomass (fuel from plant matter) to produce clean energy. Costs for these technologies have dropped dramatically since they were first introduced decades ago. Union of Concerned Scientists, [www.ucsusa.org](http://www.ucsusa.org), 2005.



**Renewables Success Story:  
Price declines with R&D  
and growth**

(in cents per kWh)



Source: U.S. Department of Energy, 2003

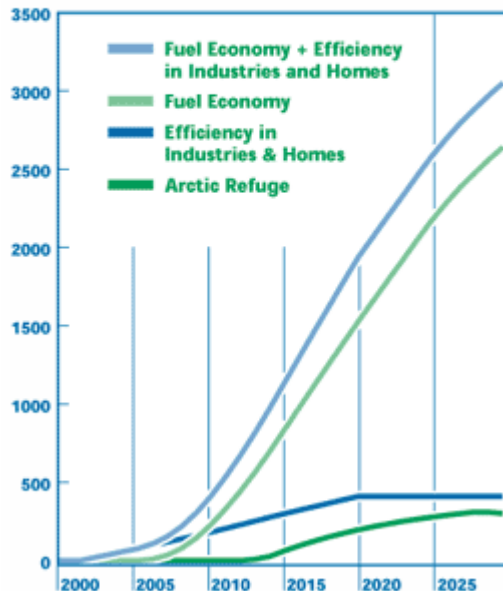
Increase energy use efficiency: New or updated standards are now in place for many major appliances, including clothes washers, dishwashers, water heaters, furnaces, and boilers. In 2006, new standards for air conditioners take effect that will increase efficiency 23 percent compared with the current standard. By 2020, these efficiency gains alone will reduce the need for up to 150 new medium-sized (300 megawatt) power plants. Efficiency standards for commercial equipment such as refrigerators, heaters, furnaces, and public lighting also have significant room for improvement. Many states and utilities have energy efficiency programs. They typically save consumers more than \$2 in lower energy bills for every \$1 invested in efficiency. A federal matching fund created by a \$1 per household surcharge on monthly electric bills could provide more than \$7 billion per year in funding for state energy efficiency and renewable energy programs. Union of Concerned Scientists, [www.ucsusa.org](http://www.ucsusa.org), 2005. We have a long way to go toward equaling the energy efficiency of our trading rivals: an article in the June 4, 2005 issue of the New York Times cited data from the Energy Information Administration indicated that the U.S. requires 10,575 BTUs per dollar of GDP, vs. 5998 for France, 5269 for Germany and 3876 for Japan.

Forests play a critical role in climate change: they store carbon, the base of CO<sub>2</sub>. When forests are burned, cleared, or otherwise degraded, their stored carbon is released into the atmosphere. Tropical deforestation now accounts for about 20 percent of all human-caused CO<sub>2</sub> emissions each year. forests of the Pacific Northwest and Southeast could double their storage of carbon if timber managers lengthened the time between harvests and allowed older trees to remain standing. We should also set up a system that allows private companies to get credit for reducing carbon when they acquire and permanently set aside natural forests for conservation. Union of Concerned Scientists, [www.ucsusa.org](http://www.ucsusa.org), 2005.

Support research in renewable energy and energy efficiency. Congress appropriated \$736 million for fossil fuel research and \$667 million for nuclear research in 2001, but only \$376 million for all renewable energy technologies combined. Climate change aspects aside, demand reduction is a much more promising source of energy than increases in domestic oil development. Union of Concerned Scientists, [www.ucsusa.org](http://www.ucsusa.org), 2005.

## Oil Savings from Fuel Economy Standards and Efficiency in Industries and Homes vs. Potential Arctic Refuge Supply

(in million barrels of oil)



Source: Union of Concerned Scientists, 2004

### Commercial solutions

Corporate greenhouse gas reduction pledges and accomplishments, per Pew Center on Global Climate Change, 6/28/05, shown at [www.pewclimate.org/companies\\_leading\\_the\\_way\\_belc/targets/index.cfm](http://www.pewclimate.org/companies_leading_the_way_belc/targets/index.cfm)



*Check marks identify achieved targets.*

#### **ABB**

Reduce GHG emissions by 1 percent each year from 1998 through 2005.  
Develop Environmental Product Declarations for every product produced.

#### **AEP**

Reduce CO<sub>2</sub> emissions by 1 percent in 2003, 2 percent in 2004, 3 percent in 2005, and 4 percent in 2006 below the average of 1998 to 2001 levels, using in-system reductions or carbon-equivalent offsets.

#### **Alcoa**

Reduce GHG emissions by 25 percent from 1990 levels by 2010, and by 50 percent from 1990 levels when their inert anode technology is fully commercialized.

#### **Baxter International**

Reduce energy use and associated GHG emissions by 30 percent per unit of product value from 1996 levels by 2005.

#### **BP**



Reduce GHG emissions by 10 percent from 1990 levels by 2010.  
Maintain net emissions at or below 2001 levels over the next decade.

#### **Cinergy**

Reduce greenhouse gas emissions to an average of five percent below their 2000 level during the period 2010 through 2012.

#### **Deutsche Telekom**

- ✓ Reduce energy use by 15 percent from 1995 levels by 2000.  
Reduce energy use by 3 percent from 2001 levels by 2004.

#### **DTE**

Reduce GHG emissions by 5 percent from 1999 levels by 2005.

#### **DuPont**

- ✓ Reduce GHG emissions by 65 percent from 1990 levels by 2010. (Actual reduction by 2002 is 67 percent.)  
Hold total energy use flat at 1990 levels through 2010. (Actual use in 2002 was 9 percent below 1990 levels while production has increased by almost 30 percent.)  
Source 10 percent of global energy use from renewable resources by 2010.

#### **Entergy**

Stabilize CO<sub>2</sub> emissions from U.S. generating facilities at 2000 levels through 2005.

#### **Hewlett-Packard**

Reduce PFC emissions by 10 percent from 1990 levels by 2005.

#### **Holcim**

Reduce CO<sub>2</sub> emissions by 12 percent per ton of product manufactured between 2000 – 2008.

#### **IBM**

Conserve annually 4 percent of the energy that would otherwise have been consumed;  
Reduce CO<sub>2</sub> emissions associated with IBM's fuel use and electricity consumption by an average annual 4 percent of what would otherwise have been emitted, over the period 1998-2004.  
Have 90 percent to 100 percent of the new product models introduced during each year meet Energy Star® criteria

- ✓ Reduce PFC emissions from semiconductor manufacturing worldwide by 40 percent from 1995 levels by 2002 (indexed to production); and  
Achieve an absolute 10 percent reduction in PFC emissions from IBM's semiconductor manufacturing processes by 2005, using 2000 as a base year.

#### **Intel**

Achieve an absolute 10 percent reduction in PFC emissions from 1995 levels by 2010.  
Reduce normalized energy consumption by 4 percent per year from 2002 to 2010, for a cumulative reduction of 28 percent by 2010 as compared to 2002.

#### **Interface Inc.**

Reduce non-renewable energy use per unit of production by 15 percent from 1996 levels by 2005.  
Increase renewable energy use to 10 percent of total energy use, by 2005.

#### **Novartis**

- ✓ Reduced CO<sub>2</sub> emissions by 3 percent absolute (based on 2000, i.e. 1 percent/year). (Achieved 2.8 percent in spite of production increase of 4.8 percent.)  
2 percent average energy efficiency improvement per year (using most suitable denominator for activity of business unit).  
Implement reduction projects representing 1 percent of past year's energy use and CO<sub>2</sub> emissions (each year between 2004 and 2006).

#### **Ontario Power Generation**

Stabilize CO<sub>2</sub> emissions at 1990 levels through 2000 and beyond.

#### **PG&E**

- ✓ Reduce annual sulfur hexafluoride (SF<sub>6</sub> – a greenhouse gas) emissions by 50 percent, compared with the 1998 baseline.  
Reduce SF<sub>6</sub> emissions by 60 percent by year-end 2007, compared with the 1998 baseline.
- ✓ Reduced overall energy use at 88 facilities by 24 percent compared with the 1998 baseline.

#### **Rio Tinto**

- ✓ Reduce on-site GHG emissions per unit of production by 4.8 percent from 1990 levels by 2001.  
Reduce on-site GHG emissions per unit of production by 4 percent from 2003 levels by 2008.

Group-wide energy efficiency target that seeks to reduce energy use per ton of product by 5 percent by 2008 from a 2003 base.

#### **Rohm and Hass**

- ✓ Reduce energy consumption by 5 percent per pound of product from mid-1999 levels by yearend 2001.
- ✓ Implemented a corporate wide energy metrics program in 2001 and achieved targeted year on year energy utilization reductions in 2002 and 2003.  
Reduce energy consumption by at least 1 percent per pound of product each year as compared to the year before.  
Establishing business-level energy management programs with individual targets.

#### **Royal Dutch/Shell**

- ✓ Reduce GHG emissions by 10 percent from 1990 levels by 2002.  
Meet 5-year (2002-2007) energy efficiency targets for global oil products and chemicals business units. For refining, this target is to improve its Refining Energy Index (REI) from 135 in 2002 to 128 by 2007 (or a 5 percent improvement in its REI). For chemicals, the target is to improve its Chemical Energy Index (CEI) from 100 in 2002 to 92 in 2007 (or an 8 percent improvement in its CEI).  
Actively manage GHG emissions such that by 2010 emissions are still 5% or more below 1990 levels, even while they grow their business.

#### **SC Johnson**

Achieve an absolute GHG reduction of 8 percent for all U.S. operations from 2000 levels by 2005 (or reduce GHG emissions intensity by 23 percent (per kilograms of product manufactured) from 2000-2005). Reduce GHG emissions from the top five factories worldwide by 5% per year from 2000 to 2005.

#### **Toyota**

Reduce CO<sub>2</sub> emissions by 5 percent from 1990 levels by 2005, and by 10 percent from 1990 levels by 2010. (Toyota Motor Corporation)

- ✓ Reduce energy consumption per unit of production by 15 percent from 2000 levels by 2005. (Toyota Motor Manufacturing North America).

#### **TransAlta Corporation**

- ✓ Return GHG emissions to 1990 levels by 2000.  
Achieve zero net GHG emissions from the company's Canadian operations by 2024.

#### **United Technologies Corporation**

- ✓ In 2003, successfully achieved goal of reducing energy consumption as a percent of sales by 25 percent from 1997 levels by 2007. (target reached in 2003 resulted in a 15 percent reduction in absolute GHG emissions since 1997).  
Achieve 40 percent reduction of energy and water use as a percentage of sales from 1997 levels by 2007.

#### **Whirlpool Corporation**

Decrease absolute total greenhouse gas emissions from global manufacturing, product use and end-of-life by 3% by 2008 based on a 1998 baseline.

#### **Wisconsin Energy Corporation**

Fuel 5 percent of energy mix from renewable resources by 2011.

#### Personal solutions (Union of Concerned Scientists, [www.ucsusa.org](http://www.ucsusa.org), 2005.)

When you buy your next car, look for the one with the best fuel economy in its class. Each gallon of gas you use releases 25 pounds of heat-trapping carbon dioxide (CO<sub>2</sub>) into the atmosphere.

Choose clean solar, hydroelectric, wind, geothermal or biomass power. In some states, you can switch to electricity companies that provide 50 to 100 percent renewable energy. (For more information go to [Green-e.org](http://Green-e.org).)

When it comes time to replace appliances, look for the Energy Star label on new appliances (refrigerators, freezers, furnaces, air conditioners, and water heaters use the most energy). Unplug an

extra refrigerator: it can reduce an average home's CO2 emissions by 10%. If each household in the United States replaced its existing appliances with the most efficient models available, we would save \$15 billion in energy costs and eliminate 175 million tons of heat-trapping gases.

Get a home energy audit. Simple measures, such as installing a programmable thermostat to replace your old dial unit or sealing and insulating heating and cooling ducts, can each reduce a typical family's carbon dioxide emissions by about 5 percent.

If every family in the United States replaced one regular light bulb with an energy-saving model, we could reduce global warming pollution by more than 90 billion pounds, the same as taking 7.5 million cars off the road.

Texas Economic Benefits

<b>Texas Clean Energy Market 2002-2020</b>			
\$billion	Current	2010	2020
Wind	0.3	0.8	3.1
Biomass	0.1	0.2	0.3
Energy Efficiency	3.9	5.3	8.5
<b>TOTAL</b>	<b>4.3</b>	<b>6.2</b>	<b>11.9</b>

Austin Clean Energy, Enriching Economy and Environment: Making Central Texas the Center for Clean Energy November 2002, Version 1.0, p.17.

<b>Wind Energy Market 2002-2020</b>			
\$billion	2002	2010	2020
World	4.2	18.2	112.7
US	1.0	4.4	27.1
Texas	0.3	0.8	3.1

Austin Clean Energy, Enriching Economy and Environment: Making Central Texas the Center for Clean Energy November 2002, Version 1.0, p.20.

<b>Biomass Energy Market 2002-2020</b>			
\$billion	2002	2010	2020
World	15.7	21.5	31.8
US	2.9	3.4	4.1
Texas	0.1	0.2	0.3

Austin Clean Energy, Enriching Economy and Environment: Making Central Texas the Center for Clean Energy November 2002, Version 1.0, p.25.

<b>Energy Efficiency Markets 2002-2020</b>			
\$billion	2002	2010	2020
World	114.2	156.9	256.1
US	37.6	51.3	81.2
Texas	3.9	5.3	8.5

Austin Clean Energy, Enriching Economy and Environment: Making Central Texas the Center for Clean Energy November 2002, Version 1.0, p.30.

**Job Creation from Renewable Energy in Texas**

Texas	Jobs created in 2010	Jobs created in 2020	Average jobs created per year 2002-2020	Total jobs created 2002-2020
Biomass	97	159	108	1,949
Wind	1,393	5,636	2,206	39,715
Efficiency	6,410	12,361	7,349	132,274
Total	7,900	18,156	9,663	173,938

Austin Clean Energy, Enriching Economy and Environment: Making Central Texas the Center for Clean Energy November 2002, Version 1.0, p.33.

More information

Alliance to Save Energy  
[www.ase.org](http://www.ase.org)

American Council for an Energy-Efficient Economy  
[www.aceee.org](http://www.aceee.org)

Center for Energy and Climate Solutions  
[www.cool-companies.org](http://www.cool-companies.org)

Climate and Energy Funders Working Group  
 Contact: Lynn Lohr - [llohr@cgbd.org](mailto:llohr@cgbd.org)

Climate Neutral Network  
[www.climateneutral.com](http://www.climateneutral.com)

The Climate Trust  
[www.climatetrust.org](http://www.climatetrust.org)

David Suzuki Foundation  
[www.davidsuzuki.org/Climate\\_Change/](http://www.davidsuzuki.org/Climate_Change/)

Energy Foundation  
[www.ef.org](http://www.ef.org)

Environmental Defense Fund, Undoit Campaign  
[www.undoit.org/what\\_is\\_gb.cfm](http://www.undoit.org/what_is_gb.cfm)

Environmental and Energy Study Institute  
[www.eesi.org](http://www.eesi.org)

Environmental Media Services  
[www.ems.org/climate/climate\\_information.html](http://www.ems.org/climate/climate_information.html)

Interfaith Climate Change Network  
[ProtectingCreation.org](http://ProtectingCreation.org)

Pew Center on Global Climate Change  
[www.pewclimate.org](http://www.pewclimate.org)

Public Citizen Texas  
[www.citizen.org](http://www.citizen.org)

Southeast Regional Climate Center  
<http://water.dnr.state.sc.us/climate/sercc/>

Southern Regional Climate Center  
[www.srcc.lsu.edu/](http://www.srcc.lsu.edu/)

Southeastern Regional Climate Assessment  
[www.ghcc.msfc.nasa.gov/regional/](http://www.ghcc.msfc.nasa.gov/regional/)

Sustainable Energy Coalition  
[www.sustainableenergy.org](http://www.sustainableenergy.org)

Union of Concerned Scientists  
[www.ucsusa.org](http://www.ucsusa.org)

US Global Change Research Program  
[www.usgcrp.gov](http://www.usgcrp.gov)

U.S. National Assessment  
Gulf Coast Regional Workshop Report  
[www.nacc.usgcrp.gov/regions/gulfcoast/](http://www.nacc.usgcrp.gov/regions/gulfcoast/)

World Resources Institute  
[climate.wri.org](http://climate.wri.org)