



# Chapter 4: Set an Emission Reduction Goal

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*The debate is over. The science is in. The time to act is now. Global warming is a serious issue facing the world. We can protect our environment and leave California a better place without harming our economy.*

*-California Governor Arnold Schwarzenegger<sup>1</sup>*

*Every city that undertakes a climate protection program will need to set a target for reducing its greenhouse gas (GHG) emissions. The targets cities set should be tied to the various scientific studies that calculate the amount of reductions necessary by various dates in the future. They should be as aggressive as possible while still being achievable. Some communities are ready to move rapidly to protect the climate; others will wish to move more*

*slowly. The goal each city adopts will depend on how quickly it is ready to move.*

## Examples of Emission Targets

Cities typically follow one of several approaches:

**Adopting the goals set by the Kyoto Protocol:**  
**This is not an ambitious goal, but more than 300 cities have joined the U.S. Mayors Climate Protection Agreement in committing to meet or beat them. The Kyoto Protocol goals set for the U.S. are to reduce emissions of greenhouse gases 7% below 1990 levels by 2012.<sup>2</sup>**

**Various cities and other jurisdictions have set their own goals, which may be more or less ambitious.**

- The New York State Energy Plan set a goal of 5% below

<sup>1</sup> Schwarzenegger made this comment as he set the nation's most aggressive goal for greenhouse gas reductions a state goal of 80% reductions of carbon emissions by 2050 compared to 1990 levels.

<sup>2</sup> For information on the U.S. Mayors Climate Protection Agreement see: [www.seattle.gov/mayor/climate/](http://www.seattle.gov/mayor/climate/), 30 October 2006. See Kyoto Protocol to the United Nations Framework Convention on Climate Change at [unfccc.int/resource/docs/convkp/kpeng.html](http://unfccc.int/resource/docs/convkp/kpeng.html). The Protocol calls for reductions in "aggregate anthropogenic carbon dioxide equivalent emissions of greenhouse gases". For simplicity these will be referred to in this manual as GHG or carbon reductions. Neither are technically accurate, but they are common parlance.

1990 levels by 2010 and 10% below 1990 levels by 2020.<sup>3</sup>

### Some cities are adopting more ambitious goals and longer-range goals.

- The city of Portland and Multnomah County, Oregon, chose a level of 10% reductions below 1990 levels by 2010.<sup>4</sup>
- Cambridge, Massachusetts, chose 20% below 1990 levels by 2010.<sup>5</sup>
- Ottawa, Ontario, Canada picked 20% below 1990 levels, splitting the dates of attainment to 2007 for corporate business activities and 2012 for community emissions.<sup>6</sup>

### Some governments and companies have adopted goals ranging from cutting emissions in half to eliminating them entirely to achieve carbon “neutrality.” Examples from the public and private sectors include:

- Seattle City Light, a municipal utility, set a target of zero net emissions that was achieved in 2005 through a purchase of 300,000 tons of GHG offsets<sup>7</sup>
- Fort Carson Mountain Post,

U.S. Army set a goal of 100% renewable energy by 2027.

- DuPont set corporate goals of 65% reduction over 1990 levels by 2010, and has already met that target for its global operations, with a savings to date of \$3 billion.
- Interface Inc.’s “Mission Zero” commitment to “eliminate any negative impact our company may have on the environment by 2020” includes a goal that all fuels and electricity will be from renewable sources.<sup>8</sup>

### An increasing number of cities are joining Chicago Climate Exchange:

- Over 200 members, including six cities and King County, Washington (as of September 2006) have committed to the legally binding requirements of the Chicago Climate Exchange (CCX). Cities that join CCX get a comprehensive carbon calculator, as well as externally verified, third party audits of their performance. CCX requires its city members to reduce emissions from municipal operations a total of 6% by 2010 from a baseline of the average

emissions of 1998-2001.

Annual requirements from the baseline from 2006 to 2009 are: 2007: 4.25%; 2008: 4.5%; 2009: 5%.<sup>9</sup>

## Establishing a Time Frame

Based on the best estimates by climate scientists at the time (1996) the Kyoto Protocol set the base date of 1990 as the level of carbon emissions to reduce below. Many cities have followed this lead. However, many jurisdictions will find that they were not keeping records of their carbon emissions at that time. Depending on the results of the baseline inventory process (see Chapter 3), and the community’s level of comfort with the accuracy of the baseline data of 1990 emission levels, there may be reasons to set a different point in time from which to measure carbon reductions.

Some jurisdictions have chosen goals that will reduce emissions from what they are at the time of goal setting:

<sup>3</sup> New York State Energy Research and Development Authority, “Facing Energy Challenges in the 21st Century—A Three Year Strategic Outlook 2006-2009,” 2006. Available at [www.nyserda.org/Energy\\_Information/energy\\_state\\_plan.asp#dsep](http://www.nyserda.org/Energy_Information/energy_state_plan.asp#dsep), 15 October 2006

<sup>4</sup> City of Portland and Multnomah County, “Local Action Plan on Global Warming,” 2001, available at [www.portlandonline.com/shared/cfm/image.cfm?id=25050](http://www.portlandonline.com/shared/cfm/image.cfm?id=25050), 30 October 2006

<sup>5</sup> “City of Cambridge Climate Protection Plan—Local Actions to Reduce Greenhouse Gas Emissions,” available at [www.cambridgema.gov/~CDD/et/env/clim\\_plan/clim\\_plan\\_full.pdf](http://www.cambridgema.gov/~CDD/et/env/clim_plan/clim_plan_full.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/CambridgeMA\\_clim\\_plan\\_full.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/CambridgeMA_clim_plan_full.pdf), 30 October 2006. The plan includes specific improvement goals for electrical use efficiency (12.5%), reduced natural gas and fuel oil use (10%), reduced electrical generation emissions (40%), green power purchases (20%), average auto fuel economy (40 MPG), reduction of vehicle miles travelled (10%), and recycling rate (60%).

<sup>6</sup> City of Ottawa, Air Quality and Climate Change Management Plan website: [ottawa.ca/city\\_services/planningzoning/2020/air/](http://ottawa.ca/city_services/planningzoning/2020/air/), 8 October 2006

<sup>7</sup> Seattle City Light news release 11/9/2005 at [www.seattle.gov/news/detail.asp?id=5656&dept=40](http://www.seattle.gov/news/detail.asp?id=5656&dept=40), 8 October 2006

<sup>8</sup> Interface’s website: [www.interfacesustainability.com/renew.html](http://www.interfacesustainability.com/renew.html), 8 October 2006 Interface is also a member of the Chicago Climate Exchange.

<sup>9</sup> Chicago Climate Exchange, website Program Summary, at [www.chicagoclimatex.com/about/program.html](http://www.chicagoclimatex.com/about/program.html). See also [www.usmayors.org/uscm/wash\\_update/energyenviros Summit06/ChicagoClimateExchange.ppt](http://www.usmayors.org/uscm/wash_update/energyenviros Summit06/ChicagoClimateExchange.ppt), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/CCX\\_USMayorsConf\\_may06.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/CCX_USMayorsConf_may06.pdf), 8 October 2006

**Salt Lake City, Utah Mayor's Executive Order requires city operations to achieve a 21% reduction from 2001 to 2006.**<sup>10</sup>

**Burlington, Vermont, pledged in 2000 to achieve a 10% reduction of 2000 emissions by 2010.**

**Sweden plans a 50% reduction from "present levels" (2005) by 2050.**

Rather than establish 1990 or other historic baselines, cities such as Los Angeles and Berkeley, California established emission reduction goals compared to the emission levels expected from a "business as usual" projection of future emissions.

**Los Angeles aims to reduce 30% of electricity purchases for city operations by 2010**<sup>11</sup>

**Berkeley aims to achieve 15% reductions below emissions that have been projected for 2010.**<sup>12</sup>

## Set Aggressive Goals

Emission reduction pledges, such as those represented by the

Kyoto Protocol and embodied in the Mayors' Climate Protection Agreement are a good start. However, increasingly clear scientific evidence of the speed and severity of global warming is eliciting calls from scientists and business and political leaders throughout the world for stronger actions than those called for by the Kyoto Protocol.

In 2000, the British Royal Commission on Environmental Pollution concluded that the U.K. needed to reduce carbon emissions by 60% by 2050. It stated that such a target would be needed to "prevent excessive climate change" by keeping levels of CO<sub>2</sub> in the atmosphere below 550 parts per million (ppm).<sup>13</sup> The U.K. government formally adopted this goal. The Commission recommended a short-term goal of 20% carbon reduction by 2010. The government initially set this target, but recently scaled back to 15-18% reduction by 2010, as it struggles with the initial reluctance to change, and the difficulties of getting such a program underway.

Lacking a coherent national mechanism to limit carbon emissions, U.S. emissions increased 20% from 1990 to 2003,<sup>14</sup> despite the economy becoming about 20% less carbon

intensive.<sup>15</sup> The U.S. Energy Information Administration predicts a 75% growth in global emissions from 2003 to 2030.<sup>16</sup> Observers around the world fear that unless the U.S. undertakes more aggressive reduction plans there will be little hope of controlling greenhouse warming.

In October 2006 a report commissioned by British Prime Minister Blair was released. Its author, the former Chief Economist of the World Bank, Sir Nicolas Stern, stated that the planet faces catastrophe unless urgent measures are taken to reduce greenhouse gas emissions.<sup>17</sup> The Report stated that the world has the means to avert catastrophe from global warming although it will involve the huge expense of 1% of global GDP (£0.3trn). This may seem like an untenable amount of money to spend, but the report warned that if it is not done, global warming could cost the world's economies up to 20% of their gross domestic product (GDP). The report called for "a rapid increase in research and development of low carbon technologies".<sup>18</sup>

The report warned that 200 million people are at risk of being driven from their homes by flood or drought by 2050. Four million square kilometres of

<sup>10</sup> Mayor Rocky Anderson, "Salt Lake City Green – Climate Change and Sustainability," 2005.

<sup>11</sup> City of Los Angeles Climate Action Plan – Energy C.A.P., 2001, available at [www.energy.ca.gov/global\\_climate\\_change/01-GGE-01\\_registry\\_guidance/documents/2001-12-14\\_workshop/2001-12-14\\_PRESENTATIONS/12-14\\_Climate\\_Action\\_Plan.ppt](http://www.energy.ca.gov/global_climate_change/01-GGE-01_registry_guidance/documents/2001-12-14_workshop/2001-12-14_PRESENTATIONS/12-14_Climate_Action_Plan.ppt), 30 October 2006

<sup>12</sup> City of Berkeley Resource Conservation and Global Warming Abatement Plan, January 1998, available at [www.baaqmd.gov/pln/GlobalWarming/BerkeleyClimateActionPlan.pdf#search=%22City%20of%20Berkeley%20Resource%20Conservation%20and%20Global%20Warming%20Abatement%20Plan%22](http://www.baaqmd.gov/pln/GlobalWarming/BerkeleyClimateActionPlan.pdf#search=%22City%20of%20Berkeley%20Resource%20Conservation%20and%20Global%20Warming%20Abatement%20Plan%22), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/BerkeleyClimateActionPlan1998.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/BerkeleyClimateActionPlan1998.pdf), 18 October 2006

<sup>13</sup> "The Royal Commission on Environmental Pollution's 22<sup>nd</sup> Report: Energy—The Changing Climate," available at [www.rcep.org.uk/newenergy.htm](http://www.rcep.org.uk/newenergy.htm), 8 October 2006

<sup>14</sup> United Nations Framework Convention on Climate Change, "National Greenhouse Gas Inventory Data for the Period 1990-2003 and status of reporting", 2005.

<sup>15</sup> U.S. Energy Information Administration, "2006 International Energy Outlook," Chapter 7, p. 4. Carbon intensity in 1990 was 701 Mt per million 2000 U.S. dollars of GDP and had declined to 562 by 2003, The OECD average in 2003 was 473. Available at

land, home to one-twentieth of the world's population, is threatened by floods from melting glaciers. It observed that 35,000 Europeans died in the 2003 heatwave, an event likely to become 'commonplace'.

To prevent these and worse disasters, the report found, it would be necessary to spend £200bn, or 1% of global GDP every year. Failure to take such action to limit climate change, the report warned, would force the world's economies to spend up to 20% of their GDP each year to deal with the floods, storms, fires, droughts and other catastrophes. The technology does exist to confront the challenge, the report stated, the financing public and private does exist, so it doesn't have to be a catastrophe, but it's a challenging message. In fact, the report finds reducing climate change could become one of the world's biggest growth industries, generating around £250bn of business globally by 2050.

The Stern Report reckons that such aggressive action would enable "carbon dioxide levels to "stabilize" at 550ppm. This accords with scientists' predictions that a 70-80% reduction of climate changing emissions from all sources will be needed to "stabilize" concentrations of GHGs in the atmosphere by the middle of the 21<sup>st</sup> century at approximately double pre-industrial levels of

CO<sub>2</sub> in the atmosphere.

Some scientists, however, fear that even these levels would be too high. They point out that the word "stabilise," is misleading, however. Given the time lags in global climate, it will take at least another 50 years for the climate to stabilize at any particular level. There is intense debate between scientists about how high concentrations can rise before life as we know it cannot survive.

The level in the atmosphere of carbon dioxide, the principal greenhouse gas, stood at 280 parts per million by volume (ppm) before the Industrial Revolution, in about 1780. The level of CO<sub>2</sub> in the atmosphere today stands at 382 ppm.

Without an unthinkable dislocation in present energy practices, concentrations of GHGs will inevitably reach 400 ppm in 10 years. Scientists believe that this is the upper limit that can be safely maintained. At a level of 450 ppm, the world would see a 4-5 F degree increase in temperature, an interference with the climate system that essentially all climate scientists consider dangerous.

The Stern report warned:

**6C is a "plausible" estimate of how much world temperatures could rise by the end of the century if greenhouse gas emissions are unchecked**

**40% of the world's species would face extinction if temperatures rose by 2C**

**4 billion people will suffer from water shortage if temperatures rise by 2C**

**35 per cent drop in crop yields across Africa and the Middle East is expected if temperatures rise by 3C**

**200 million more people could be exposed to hunger if world temperatures rise by 2C (550 million more people could be at risk of hunger if world temperatures rise by 3C).**

Global warming reinforces itself, and is now occurring much faster than had been predicted. Key factors include:

**Loss of ice reflection. As ice near the poles melts, incoming sunlight will reach either oceans or land rather than being reflected back into space by white ice sheets or caps. Greater absorption of solar energy by land and water will raise temperatures and higher land or ocean surface temperatures will further speed the melting of remaining ice.**

**Thawing of permafrost in northern latitudes. If Arctic permafrost continues to thaw, there is the potential for large releases of carbon in the form of carbon dioxide and/or**

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[www.eia.doe.gov/oiaf/ieo/pdf/emissions.pdf](http://www.eia.doe.gov/oiaf/ieo/pdf/emissions.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/emissions.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/emissions.pdf), 8 October 2006.

<sup>16</sup> Ibid.

<sup>17</sup> Brown, Colin and Cornwell, Rupert "The day that changed the climate" The Independent, 31 Oct 2006, [news.independent.co.uk/environment/article1943294.ece](http://news.independent.co.uk/environment/article1943294.ece), 30 October 2006.

<sup>18</sup> Brown, Colin and Cornwell, Rupert "The day that changed the climate" The Independent, 31 Oct 2006, [news.independent.co.uk/environment/article1943294.ece](http://news.independent.co.uk/environment/article1943294.ece), 30 October 2006.



methane. For example, the Siberian permafrost (400,000 sq. miles) alone is estimated to have the potential to release methane equivalent to decades of human activity if it thaws.<sup>19</sup> Methane is a more potent GHG than CO<sub>2</sub>

Warmer soil, especially at high latitudes, speeds up dead plant material decomposition, releasing more carbon as either CO<sub>2</sub> or CH<sub>4</sub>.

Most climate scientists thus agree that the goal should be to peak at the lowest level of emissions possible and then drop from there until the world reaches levels well below pre-industrial concentrations.<sup>20</sup>

#### Examples of Aggressive Goals:

Such European Union (EU) countries as France, Germany, the Netherlands and Sweden have set long-term goals ranging from 50% to 80% reductions. Germany targeted all GHGs. Sweden set targets based on per capita emissions. The EU Environment Council

has recommended that developed countries set goals of 15-30% by 2020 and 60 to 80% by 2050 below 1990 levels.<sup>21</sup> In 2004, the Network of European Environment and Sustainable Development Advisory Councils (EEAC) advocated political commitments to goals of a 30% GHG reduction by 2020 and 70% by 2050.<sup>22</sup>

In 2006, the 1,300 members of the Climate Alliance of European Cities with Indigenous Rainforest Peoples resolved to reduce CO<sub>2</sub> emissions 10% every five years, reaching emission levels 50% below 1990 by 2030. The resolution aims for a climate stabilization goal of 2.5 metric tons of carbon dioxide equivalent emissions per person, approximately 25% of current emissions levels in the UK and Belgium.<sup>23</sup>

In 2005, California Governor Schwarzenegger set a California target of 80% reduction of GHGs from 1990 levels by 2050, with an interim target to reduce emissions by 2020 to 1990 levels.<sup>24</sup> In

September 2006, the Global Warming Solution Act, known as AB 32 passed was passed by the Legislature and signed into law by the Governor. The 2020 target was adopted as a statewide “limit” for greenhouse gas emissions. The law sets a mandatory cap on carbon emissions and establishes a trading regime by which companies failing to meet the goal may face fines unless they purchase other entities excess reductions.<sup>25</sup>

On December 20, 2005, seven states announced an agreement to implement the Regional Greenhouse Gas Initiative, as outlined in a Memorandum of Understanding (MOU) signed by the Governors of the participating states. The states that agreed to sign the MOU are Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. The MOU outlines the program in detail, including the framework for a Model Rule. Participating states would set requirements beginning in 2009 for its GHG emitters. Emitters would be

<sup>19</sup> Janet Wilson, “Global Warming Threat Is Seen in Siberian Thaw,” Los Angeles Times, 16 June 2006, sourced at [www.commondreams.org/cgi-bin/print.cgi?file=/headlines06/0616-05.htm](http://www.commondreams.org/cgi-bin/print.cgi?file=/headlines06/0616-05.htm), 18 October 2006. According to scientific study published in *Science* magazine, the Siberian permafrost, about 80 feet deep, could contain 500 billion tons of carbon.

<sup>20</sup> Compiled from various studies, including the conclusion by the UK Royal Commission for Environmental Protection in 2000 that a 60% reduction from 1990 levels is needed, and a 2003 conclusion by scientist Graeme Pearman that 70% from “current emissions levels” is required (see [www.ens-newswire.com/ens/aug2003/2003-08-07-01.asp](http://www.ens-newswire.com/ens/aug2003/2003-08-07-01.asp), 18 October 2006).

<sup>21</sup> See Dr. Karsten Sach, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, “Climate Policy – the Short- and Long-term,” 2006, archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Sach.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Sach.pdf). See also Sweden Ministry of Sustainable Development, “National Climate Policy in Global Cooperation—Fact Sheet”, [www.swedenabroad.com/SelectImage/51404/climatepolicysweden.pdf](http://www.swedenabroad.com/SelectImage/51404/climatepolicysweden.pdf), 8 October 2006.

<sup>22</sup> EEAC, “70/30 – Towards European Targets for Greenhouse Gas Reductions”, December 2004, available at [www.eeac-net.org](http://www.eeac-net.org), 8 October 2006.

<sup>23</sup> Environment News Service, “European Cities Pledge to Slash Greenhouse Emissions,” 9 May 2006.

<sup>24</sup> Executive Order S-3-05, California Governor Arnold Schwarzenegger. For implementation details see the March 2006 report of the California Environmental Protection Agency’s Climate Action Team, available at [www.climatechange.ca.gov/climate\\_action\\_team/reports/2006-04-03\\_FINAL\\_CAT\\_REPORT.PDF#search=%22california%20governor%20office%20schwarzenegger%2080%25%20goal%20climate%20carbon%22](http://www.climatechange.ca.gov/climate_action_team/reports/2006-04-03_FINAL_CAT_REPORT.PDF#search=%22california%20governor%20office%20schwarzenegger%2080%25%20goal%20climate%20carbon%22), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/2006-04-03\\_FINAL\\_CAT\\_REPORT.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/2006-04-03_FINAL_CAT_REPORT.pdf), 8 October 2006.

<sup>25</sup> California Assembly Bill 32; this approach is nearly identical to the EU’s implementation of the Kyoto Protocol. The bill directs the California EPA to establish enforcement regulations by 2011 that will establish legal limits for 2012 based on the maximum GHG reductions that are “technologically feasible and cost-effective.”

**required to reduce emissions by 2012 or face fines**<sup>26</sup>

**The American Institute of Architects and the U.S. Conference of Mayors have endorsed a minimum 50% reduction in fossil fuel consumption in building construction and operation by 2010, with further reductions of 10% annually for five years. Their long-term goal is carbon neutrality for all new and renovated buildings by 2035.**<sup>27</sup>

## Recommended Process

The following process lays out a 15-step approach that cities may follow to undertake an initial goal-setting process.

1. Establish the timeframe for which to set goals.  
The timeframe should give a community enough time to implement a reasonable program, but should include periodic benchmarks so that the climate protection effort is not just passed on to a future administration. It is worth building in the ability to revisit the goals, in case the science or local circumstances dictate strengthening or altering the goals as time goes by.
2. Set the most aggressive goal

that the political climate will allow. U.S. communities, being among the world's largest emitters of GHGs, should set the strongest goals possible unless compelling evidence demonstrates that they would face severe economic and/or human health consequences.<sup>28</sup> In the wake of the Stern report, British Ministers were drawing up a Climate Change Bill, which would enshrine in law the long-term target of reducing carbon emissions by 60% by 2050.

3. Determine whether there is sufficient political will to simply set a goal or whether greater community support must be obtained before such a goal can be established. ICLEI suggests that mayors pass a resolution setting the goal to ensure longevity of the climate protection program.
4. Establish the implementation plan that the city will follow to ensure adherence with the stated goal. Many communities form citizen task forces to help determine appropriate actions for their communities.
5. In the event that the Mayor cannot simply declare a goal by Executive Order, outline the strategy needed to produce the necessary

support.

6. Determine whether it will be necessary to establish legal findings to support inclusion of adopted goals into decision-making procedures of the city, including land use regulations, which require legally defensible findings.
7. Determine the best way to obtain the information necessary to enable officials to set a goal. At a minimum, it will be necessary to calculate the city's emissions at present, set the baseline date against which the target will be measured, and establish the ability to calculate emissions going forward.

Some cities hire consultants to obtain the necessary data.<sup>29</sup> Denver used local university students supervised by a professor.<sup>30</sup> Some cities have an environmental department with sufficient staff to undertake the analysis.

The use of local and non-local scientific and technological expertise brings up a strategic choice. Local experts and examples of sustainable behavior can be much more powerful motivators for local businesses than consultants or examples from afar. On the other hand, non-local experts can legitimize sustainability

<sup>26</sup> Regional Greenhouse Gas Initiative, [www.rggi.org](http://www.rggi.org), 8 October 2006.

<sup>27</sup> AIA newsletter 22 May 2006 at [www.aia.org/angle\\_nwsltr\\_20060522](http://www.aia.org/angle_nwsltr_20060522), 18 October 2006.

<sup>28</sup> This suggestion is akin to the "precautionary principle" that is advocated for governance of human-derived chemical compounds. Communities can investigate the pros and cons and established protocols of this concept through the UK Interdepartmental Liaison Group on Risk Assessment website at [www.hse.gov.uk/aboutus/meetings/ilgra/pppa.htm](http://www.hse.gov.uk/aboutus/meetings/ilgra/pppa.htm), 18 October 2006. Also see the Institute of Science and Society's Report "The Precautionary Principle is Science Based," 2003, at [www.i-sis.org.uk/sapp.php](http://www.i-sis.org.uk/sapp.php), 18 October 2006.

<sup>29</sup> It is not the intention of this manual to advertise, but an example is Boulder, CO. They hired the consulting firm, Econergy, [www.econergy.com](http://www.econergy.com), 8 October 2006.

<sup>30</sup> Denver Greenprint Report, 7.12.06, available at [www.greenprintdenver.org](http://www.greenprintdenver.org), 8 October 2006.

and/or climate change efforts as being on the global cutting edge.

Consider whether to partner with other cities in the region or state to obtain information that might apply to more than one community in order to reduce costs.

Examine the climate change goals of other communities (particularly those in the region and/or state) and determine the implications of such goal choices (i.e. are there synergies to be achieved through goal consistency on a regional or state basis).

8. Consider the creation of a Citizen Advisory Commission. If a citizen advisory commission for either climate change or general sustainability has not yet been established, determine whether this would enhance climate protection efforts. Be sure to create a Commission with sufficient diversity and resources to be credible and balanced in its development of climate strategies. Ensure sufficient business community involvement to give the commission's work a strong economic development component. A citizen commission can also be useful in developing a local action plan.

Leading examples include:

**Boulder County Sustainability Task Force, Boulder County, Colorado**<sup>31</sup>

**Denver Greenprint Council**<sup>32</sup>

**Aspen Global Warming Alliance, Aspen Colorado**<sup>33</sup>

**Portland/ Multnomah County Sustainable Development Commission, Portland Oregon**<sup>34</sup>  
**Alliance for Climate Action, Burlington Vermont**<sup>35</sup>

**Green Ribbon Commission on Climate Protection, Seattle Washington**<sup>36</sup>

9. Consider whether the climate goals should be integrated with existing plans and progress indicators. Most of the actions a community will take to address climate change will make local companies more profitable. Similarly, a good climate protection program can increase the effectiveness of city and other local government operations. Often, however, existing policies, plans and regulations form barriers that will impede cost-effective climate change actions by municipal and community members. The analysis should examine opportunities to help the local economy and improve quality of life through climate change revisions. This process should conduct a review of land use and development policies and other goals of the city's comprehensive plans. Leading examples include:

**Aspen Climate Impact Assessment, Aspen Colorado**<sup>37</sup>

**Economic and Technology Advancement Advisory Committee, State of California (to assist with regulatory development)**<sup>38</sup>

10. Consider whether to undertake a local/regional climate change risk analysis. It may be useful to conduct a science-based analysis of the likely local physical effects that are expected to result from climate change. Such an analysis will bring climate concerns home and build greater stakeholder support. Stakeholder education efforts can then include what can be forecast about climate change risks to your ecology and economy. This analysis will also help citizens, businesses and governments plan for what is coming.<sup>39</sup> Leading examples include:

**University of Washington Climate Impacts Report (for Pacific Northwest)**<sup>40</sup>

**City of Santa Monica Solar Potential Study (1997) and Community Energy Independence Initiative (2006), Santa Monica California**<sup>41</sup>

**The European project AMICA has developed a methodology for cities to use in development of a climate-change sensitive regional development strategy.**<sup>42</sup>

<sup>31</sup> Boulder County Board of County Commissioners, Resolution 2005-137, "Adopting a Sustainable Energy Path for Boulder County," available at: [www.co.boulder.co.us/bocc/images/Energy\\_Res\\_2005-137.pdf](http://www.co.boulder.co.us/bocc/images/Energy_Res_2005-137.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Boulder\\_Energy\\_Res\\_2005-137.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Boulder_Energy_Res_2005-137.pdf), 8 October 2006.

**Climate Alliance of European Cities, which offers a model set of progress indicators towards climate stabilization.**<sup>43</sup>

11. Scan Carbon Trading Opportunities.  
The economics of achieving GHG reduction goals have changed with the advent of the Chicago Climate Exchange (CCX). Such major metropolitan areas as Chicago, Portland, Berkeley, Oakland, Boulder and others have determined that the procedures that CCX uses to establish the city's baseline, the third-party verification that CCX provides, and the potential for greater returns from selling reductions in GHGs made it worthwhile to make the legally binding commitment to reduce their emissions by becoming CCX members. It is worth conducting a scan of the trading opportunities that CCX offers and how they may affect the economics of reaching your climate change goals.
12. Bring the results of the assessments together as quickly as possible, preferably within six months,

in order to keep momentum up.  
The findings will inform adoption of goals, and will support work to develop a Climate Action Plan (Chapter 5). If there is a desire to move more quickly, develop a local action plan at the same time as the goal-setting process. It should be possible to develop both strong short- and long-term goals and a Climate Action Plan in under a year.

13. Align community regulations and resources to maximize GHG reductions to the extent technologically feasible and cost-effective (as per California's Global Warming Solutions Act of 2006).

14. Establish enforceable short- and long-term total emissions goals that estimate the implementation of maximum feasible and cost-effective reductions.

**Define "cost-effective" as any investment with up to a ten-year payback (as per the energy efficiency strategy of the U.S. Department of Defense).**

**Include a per-capita goal that psychologically reinforces the duty of every citizen to adjust their own life choices to play their part – such as the Swedish goal described below.**

15. Revise the goals at least every five years.

If the process outlined above seems too ambitious at first, consider starting with the simpler steps, and then undertake the more complicated steps as you develop expertise and political will.

## Factors to Consider in Choosing a Goal

In addition to the variables described above, there are other factors to consider in setting a target for climate protection. These include:

**Which basis of measurement to use:**

- Total GHG emissions vs. per capita GHG emissions vs. carbon/GHG intensity
- Gross emissions vs. net (aggregate) emissions
- Carbon only vs. all GHGs

<sup>32</sup> Denver Greenprint website, [www.greenprintdenver.org](http://www.greenprintdenver.org), 8 October 2006.

<sup>33</sup> City of Aspen Canary Initiative, [www.aspenglobalwarming.com](http://www.aspenglobalwarming.com), 8 October 2006.

<sup>34</sup> Portland/Multnomah County Sustainable Development Commission, [www.portlandonline.com/osd/index.cfm?c=41485](http://www.portlandonline.com/osd/index.cfm?c=41485), 8 October 2006.

<sup>35</sup> Burlington Electric, Alliance for Climate Action, [www.burlingtonelectric.com/SpecialTopics/climate.htm](http://www.burlingtonelectric.com/SpecialTopics/climate.htm), 8 October 2006.

<sup>36</sup> Seattle Climate Action Plan homepage, [www.cityofseattle.net/climate/](http://www.cityofseattle.net/climate/), 8 October 2006.

<sup>37</sup> Aspen Canary Initiative, Western Colorado Climate Data, [aspenglobalwarming.com/westerncoloradodata.cfm](http://aspenglobalwarming.com/westerncoloradodata.cfm), 8 October 2006.

<sup>38</sup> This Committee is to be set up under California's Global Warming Solutions Act of 2006—see Part 7, section 38591.

<sup>39</sup> EPA State Climate Change Impacts information sheets, [yosemite.epa.gov/OAR%5Cglobalwarming.nsf/content/ImpactsStateImpacts.html](http://yosemite.epa.gov/OAR%5Cglobalwarming.nsf/content/ImpactsStateImpacts.html), 30 October 2006.

<sup>40</sup> "Uncertain Future: Climate Change and its Effect on Puget Sound," at: [www.cses.washington.edu/cig/outreach/files/psat1005.shtm](http://www.cses.washington.edu/cig/outreach/files/psat1005.shtm), 8 October 2006.

<sup>41</sup> Community Energy Independence Initiative proceedings and information about the Solar Potential Study are available at: [santamonica.org/cityclerk/council/agendas/2006/20060912/s2006091201-G.htm](http://santamonica.org/cityclerk/council/agendas/2006/20060912/s2006091201-G.htm), 8 October 2006.

<sup>42</sup> Amica Integrate Climate Policy Approach, [www.amica-climate.net](http://www.amica-climate.net), 8 October 2006.

<sup>43</sup> Climate Alliance Municipal Fields of Action, [www.klimabuendnis.org/english/municipal/frameset.htm](http://www.klimabuendnis.org/english/municipal/frameset.htm), 8 October 2006.



## Outcome-based goals:

- Climate stabilization (long-term)
- Economic development

## Measurement

Three fundamental choices exist regarding how to measure greenhouse or climate change goals:

1. primary measurement strategies;
2. gross or net measurement; and
3. carbon only versus all GHGs.

## Primary Measurement Strategies

All climate change goals will interact with population growth, economic development and emissions rates. A simple formula is:

$(\text{Population}) \times (\text{Per capita GDP}) \times (\text{GHG intensity}^*) = \text{total GHG emissions.}^{44}$

\* GHG intensity is defined as GHG emissions per dollar of GDP generated in a given time period

Total emissions caps set the total amount of GHGs that can be emitted; the most meaningful measure is actual GHGs being put into the atmosphere. A goal or limit of total emissions can be achieved by reducing any or all

of the three variables in the equation above. As described above, most cities and nations have adopted goals like the Kyoto Protocol that would limit total emissions. Total emissions goals are stronger than goals based on limits to carbon intensity or per capita limits.

Examples of total emissions limitation goals include:

**California's "Global Warming Solutions Act 2006" sets a statewide "limit" of no more than the 1990 level of emissions in 2020. The Act mandates development of regulations and programs that will promote the maximum implementation of "technologically feasible and cost-effective reductions."**<sup>45</sup>

**Kyoto Protocol implementation by the EU has set limits for the industrial sector, for each country as well as sector-by-sector. This approach means that limits are set for all major GHG producers. The limits are calibrated to achieve the EU's commitment of 8% total reductions from 1990 levels by 2008-12.**

Total emission reduction goals can be stated on a per capita basis. Sweden translated its overall emissions goal of 50% reduction from 2005 to 2050 into a per capita goal of achieving 4.5 million tons of CO<sub>2</sub> emitted per person. Its emissions at the time were 8 million tons per capita.<sup>46</sup>

To achieve its total emissions reduction goals, Sweden's population will have to remain constant.

The U.S. government (as per policy statement by President Bush in 2002, not enacted into law) is aiming for an 18% reduction in carbon intensity from 2002-2012. According to the U.S. Department of Energy, the U.S. economy has been steadily reducing its carbon intensity for the past two decades through energy efficiency, and through the steady transition of the U.S. economy from energy-intensive heavy manufacturing and light manufacturing to services during the past three decades.<sup>47</sup>

Per capita goals or intensity goals leave room for total GHG emissions to increase if the population or per capita GDP increase faster than the reduction of emissions per capita or GHG intensity.<sup>48</sup>

A decrease in intensity does not necessarily mean a decrease in actual GHG emissions. As a measure of progress, carbon intensity must be used with caution. The Energy Information Administration (EIA) chart below illustrates that while U.S. carbon intensity is decreasing, actual GHG emissions are projected by EIA to rise significantly by 2030.

<sup>44</sup> John E. Blodgett and Larry Parker, US Congressional Research Service (CRS), "Greenhouse Gases and Economic Development: An Empirical Approach to Defining Goals," published by the CRS, Library of Congress, 4 February 2005.

<sup>45</sup> State of California Assembly Bill 32, "Global Warming Solutions Act 2006."

<sup>46</sup> Sweden Ministry of Sustainable Development, "National Climate Policy in Global Cooperation," Fact Sheet, May 2006, [www.sweden.gov.se/content/1/c6/06/47/24/ccbef4cd.pdf](http://www.sweden.gov.se/content/1/c6/06/47/24/ccbef4cd.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Sweden\\_natClimatePolicy.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Sweden_natClimatePolicy.pdf), 8 October 2006.

## Total Energy Related Carbon Dioxide Emissions, 1980-2030 (million metric tons)

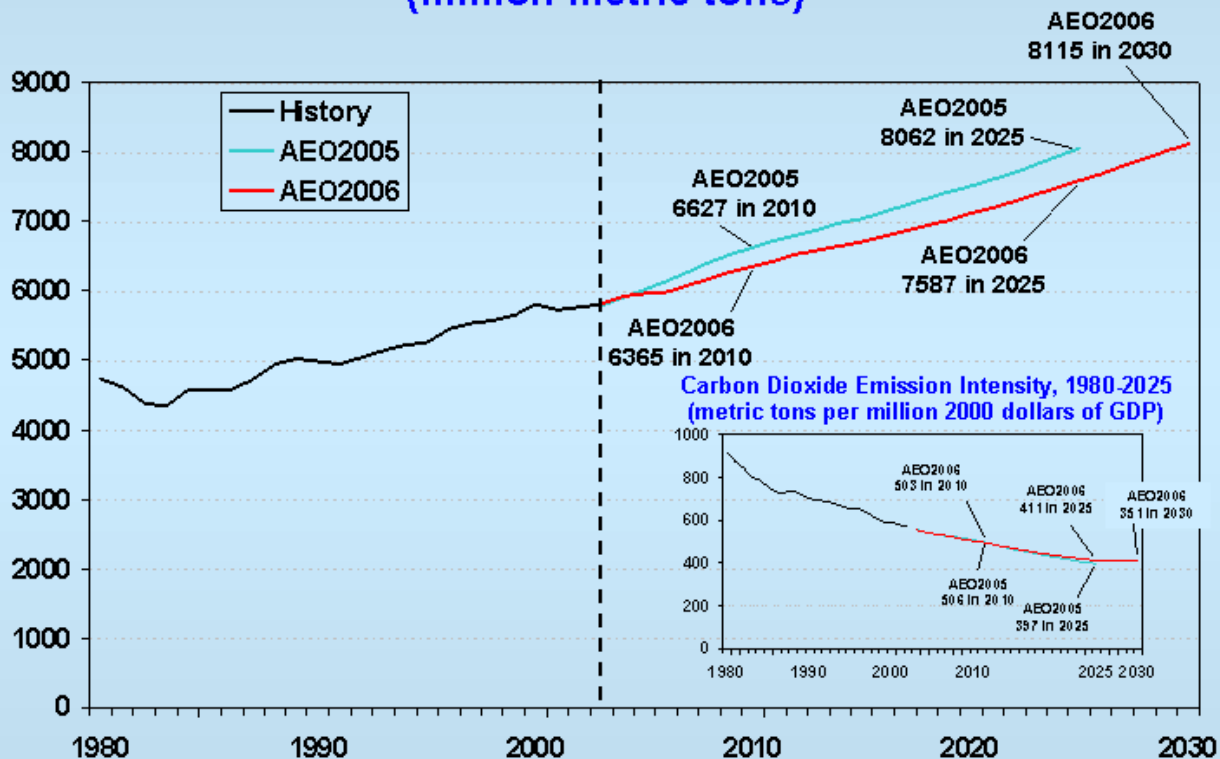


Figure: Energy Information Administration

### Gross Emissions vs. Net or Aggregate Emissions

Though U.S. cities have generally chosen to set gross emissions goals (i.e. without subtracting for carbon absorption), the international reporting system established by the Intergovernmental Panel on Climate Change for the Kyoto Protocol recognizes an “aggregate” emissions reporting basis in which gross emissions are offset by credits for potential emissions absorption, for

example, from tree planting. The U.S. Mayors Climate Protection Agreement and the Kyoto Protocol, upon which it is based, are aggregate emissions commitments.<sup>49</sup>

### Carbon Only vs. All GHGs

The Kyoto Protocol recognizes and regulates six GHGs: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulfur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). The

U.S. Mayors Climate Protection Agreement represents a goal for “global warming pollutants,” meaning the six Kyoto GHGs. The reporting requirements of the Chicago Climate Exchange also include all GHGs converted to CO<sub>2</sub> equivalents. These and most GHG reporting and goals call for the reduction of all GHGs; however, they convert measurements of the other gases to metric tons of carbon dioxide equivalents (MtCO<sub>2</sub>e) in which the other five GHG emissions are

<sup>47</sup> The U.S. Department of Labor projects that 18.7 million of 18.9 million net new jobs from 2004 to 2014 will be in service-related industries, whereas employment in “goods-producing” industries is expected to decline. US Department of Labor, Bureau of Labor Statistics, “Tomorrow’s Jobs,” available at [www.bls.gov/oco/oco2003.htm](http://www.bls.gov/oco/oco2003.htm), 20 December 2005.

<sup>48</sup> For more on the pros and cons of carbon intensity goals, see William Pizer, “The Case for Intensity Targets,” 2005, available from Resources for the Future, [www.rff.org](http://www.rff.org), 18 October 2006. Pizer believes that intensity goals can be useful for easing carbon goals into the economy without political opposition based on limiting economic growth – a useful short-term strategy.

<sup>49</sup> See Kyoto Protocol to the United Nations Framework Convention on Climate Change, available at [unfccc.int/resource/docs/convkp/kpeng.html](http://unfccc.int/resource/docs/convkp/kpeng.html), 8 October 2006.

converted to the equivalent amounts of CO<sub>2</sub>. This is a good practice. Capturing all GHGs is important because all the other GHGs have more warming potential of CO<sub>2</sub>. Thus, even smaller releases of these gases can have dangerous impacts on the climate. Doing this, however, requires more sophisticated measures of sources of emissions than just tracking fossil energy use.

### Outcome-based Goals

Local and regional governments have increasingly been held accountable to specific outcomes, particularly with regard to environmental and health regulations. Stakeholder efforts since the early 1990s to create “progress,” “sustainability” or other quality of life indicators are based on the concept of identifying specific outcomes that the community wishes to achieve, and implementing management systems to ensure these outcomes. Climate change outcomes are no different. Good goals, policies and activities should be tied to consensus outcomes that are measurable and that contribute towards all of the positive outcomes the community desires. Climate stabilization and economic development are two primary goals that should drive your climate protection program.

### Climate Stabilization: The Wedge Strategy

Allowing emissions of GHGs to rise is risking the ability of the Earth to support life as we have known it. GHG levels now present in the atmosphere are unprecedented in human history and are increasing every day.<sup>50</sup> Given that our GHG emissions to date already have created climate instability, stabilizing emissions at approximately double the preindustrial level of GHGs in the atmosphere is likely to mean accepting a very different climate than we experience today, one about 4 to 5 degrees F warmer than in the year 2000. As stated in the science primer at the beginning of this chapter, that will result in enormous dislocations around the globe.

Even so, stabilization at some relatively safe level is widely agreed by scientists to be preferable to allowing a continued rise in atmospheric levels of GHGs that would mean temperature increases more than twice this great and the much greater instability this would bring.

Achieving stabilization may require setting far more aggressive goals than cities have done to date. It is better to start somewhere, even if it is an inadequate goal, than to set no goals at all. However, city leaders should prepare themselves and their citizens for the likelihood that far tougher standards will be necessary.

The Carbon Mitigation Initiative at Princeton University approaches the climate change challenge as a choice between two scenarios. A business-as-usual (or do-nothing) scenario of continuing the historic growth of GHG emissions since 1976 to 2056, would lead to a tripling of atmospheric carbon from pre-industrial levels, with 14 billion tons of carbon added annually. The second strategy would hold annual carbon emissions at seven billion tons until 2056, then cut emissions in half for the following century to avoid doubling atmospheric carbon from pre-industrial levels.

The Princeton Carbon Mitigation Initiative<sup>51</sup> outlines 16 basic strategies (below) to achieve the stabilization strategy. Each of the strategies would result in the reduction of about a billion tons of carbon a year. To hold emissions at 7 billion tons annually the world would need to implement seven of the measures below. Reducing emissions further could be achieved by implementing more measures:<sup>52</sup>

End-user efficiency and conservation

1. Increase fuel economy of two billion autos from 30 to 60 MPG
2. Cut average use of two billion autos (at 30 miles per gallon (MPG)) from 10,000 miles/year to 5,000.
3. Cut electricity use in buildings 25%

<sup>50</sup> A useful metaphor for this situation is a comparison to the hormones in our bodies – how would we react to a situation in which one of our key hormones had risen 35% more than normal levels and was growing further from normal every year. Even if medical science was not certain of the eventual outcome, any sane doctor would urge immediate changes to return the levels to normal.

<sup>51</sup> Robert H. Socolow and Stephen W. Pacala, “A Plan to Keep Carbon in Check,” *Scientific American* magazine, September 2006.

<sup>52</sup> The Princeton Initiative is useful because it describes an example of how to set a plan, but its calculations are based on GHG reduction goals that are less ambitious than what will likely be needed. [www.princeton.edu/~cmi](http://www.princeton.edu/~cmi), 30 October 2006.

Fuel switching (“power generation” and “alternative energy sources”)

4. Drive two billion autos (at 60 MPG) on ethanol instead of gasoline
5. Improve power generation efficiency at 1,600 large (1,000 MW) coal-fired electric powerplants from 40 to 60%
6. Replace 1,400 large coal-fired plants with gas-fired plants
7. Increase wind-generated electricity 80-fold to make hydrogen for autos
8. Increase solar-generated electricity 700-fold to displace coal-fired power plants
9. Increase wind-generated electricity 40-fold to displace coal-fired power plants
10. Double nuclear power plant output to displace coal-fired power plants (or increase nuclear power plant output by a factor of five to displace all coal plants—achieving more than double the effect)

Carbon capture and storage

11. Expand conservation tillage to 100% of cropland
12. Stop all deforestation
13. Curtail emissions of methane (primarily from agricultural sources)
14. Install Carbon Capture & Storage systems at all coal-to-syngas plants (that make enough syngas to replace 1/3 of today’s oil production)
15. Install Carbon Capture & Storage systems at coal-fired

power plants that make hydrogen for 1.5 billion vehicles

16. Install Carbon Capture & Storage systems at 800 large coal-fired power plants

Authors Socolow and Pacala<sup>53</sup> note that setting a price for carbon emissions between \$100 and \$200 per ton—enough to make it cheaper for owners of coal plants to sequester carbon rather than vent it—is required to “jump-start” the needed transition. The current price (as of January, 2007) on both the Chicago Climate Exchange and the European Exchange is running between \$4 and \$5. They also note that holding global population to eight billion rather than the projected nine billion would also be the equivalent of reducing emissions by one billion tons over forecasts, and would thus count as one of the seven strategies required.

Goals must also consider local and global issues of carbon equity (or environmental justice). These sorts of issues have been central to international climate change negotiations:

**Do nations that are now more carbon / GHG intensive (like the U.S.) need to adopt more aggressive goals in order to make room for carbon-based economic development of less developed nations, at least in the short-term?**<sup>54</sup>

**Do carbon-intensive personal lifestyles (motor sports, and long distance air travel) need to be more aggressively regulated in order to allow some growth of carbon-usage by the community’s underprivileged?**

These are thorny issues that frequently derail efforts to reach international agreement on carbon / GHG reductions. It is unlikely that individual cities will be able to resolve them, but awareness of them is important.

### Economic Development

Since the 1970s, advocates for environmental health have demonstrated that well-designed environmental protection measures increase economic competitiveness.<sup>55</sup> Yet the climate change debates in the U.S. have featured unfortunate and acrimonious claims that economic competitiveness and growth would be unacceptably diminished by climate change efforts. The discussion in Chapter 2 of this manual shows that there is actually a strong business case for aggressively reducing emissions of GHGs. Based on reading the report on which Chapter 2 of this manual is based, the Chamber of Commerce of Boulder, Colorado switched from opposing a proposed municipal carbon tax to supporting it.

<sup>53</sup> Ibid.

<sup>54</sup> As noted by the World Bank, “Assume, for the sake of fairness, that every person on earth has an equal right to the atmosphere as a resource. In that case carbon dioxide emission quotas for countries would be determined by population size. Low-income countries would not yet have reached their quotas and would have the right to continue emitting carbon dioxide. But middle and high income countries would already have exceeded their quota.” Tatyana P. Soubbotina, World Bank, *Beyond Economic Growth – Meeting the Challenges of Global Development*, 2000, Chapter 14.

<sup>55</sup> See Florida, Richard L., *The Rise of the Creative Class: And How It’s Transforming Work, Leisure, Community and Everyday Life*, showing that regions that protect their environment economically outperform those that do not. Basic Books, 2004.



A city's discussions must examine all sides of the issue: the economic consequences of runaway climate change as well as the potential costs or benefits of responsibly addressing it. As the Stern Report in the UK found, the costs of doing nothing may far exceed any costs of action. The California Global Warming Solutions Act leads with a warning for other U.S. states and regions:

Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, skiing, recreational and commercial fishing and forestry.<sup>56</sup>

Predictions that climate change strategies would diminish economic health are largely based on the unexamined expectation that the only way to elicit reductions of energy use would be to require higher energy costs for businesses and consumers. However, as described by economic analysts at the non-profit research center, Redefining Progress:

...credible economic models estimate that controlling U.S. emissions of greenhouse gases would result in less than

a 0.5% one-time loss of Gross Domestic Product (GDP). Public policies with significant impacts are usually phased in over time. Assuming a ten-year transition period, this approach would amount to reduced growth of GDP and real income of less than one tenth of 1% per year. Pessimistic studies estimate that real GDP per employee will grow from \$54,000 in 1995 to \$61,000 in 2010 under Kyoto Protocol commitments.<sup>57</sup>

Similar projections supported the U.K. government's commitment to a 60% reduction goal by 2050.<sup>58</sup>

Nearly all climate change investments by the private sector (and public sector organizations through management of their own operations) actually achieve strong rates of return—far beyond the cost of money (the bottom-line of investment returns). These rates of return are amplified if fossil fuel energy prices increase faster than the rate of inflation. Unless a government is prepared to make the case that fossil fuel energy will decrease in real dollar costs (a very difficult case to make in a time of diminishing U.S. production and global reserves, increasing global demand and

increasing availability of cost-effective substitutes), community policies that support reduced fossil fuel dependence will enhance your community's economic competitiveness.<sup>59</sup>

Climate protection programs also confer economic development benefits. These include quality of life improvements and reduction of indirect costs (such as costs of traffic congestion) as well as increased job creation.

The U.S. Mayors Climate Protection Agreement states:

...many cities throughout the nation, both large and small, are reducing global warming pollutants through programs that provide economic and quality of life benefits such as reduced energy bills, green space preservation, air quality improvements, reduced traffic congestion, improved transportation choices, and economic development and job creation through energy conservation and new energy technologies...<sup>60</sup>

The economic development case was important to the Seattle Green Ribbon Commission's 2006 findings and recommendations:

One of the primary obstacles to responsible climate policy is the perception that reducing fossil fuel use will be economically costly. We

<sup>56</sup> State of California Assembly Bill 32, "Global Warming Solutions Act 2006," 38501 sections (a) and (b).

<sup>57</sup> Gary Wolff and Gautam Sethi, Redefining Progress, "What's Fair: Workers, Investors and Climate Change," 2000. Available at: [www.rprogress.org/newpubs/2000/wf\\_work\\_invest.pdf](http://www.rprogress.org/newpubs/2000/wf_work_invest.pdf), 19 October 2006.

<sup>58</sup> "The Royal Commission on Environmental Pollution's 22<sup>nd</sup> Report: Energy—The Changing Climate," available at [www.rcep.org.uk/newenergy.htm](http://www.rcep.org.uk/newenergy.htm), 8 October 2006.

<sup>59</sup> See J. Andrew Hoerner, Redefining Progress, "A Golden Opportunity: Strengthening California's Economy Through Climate Policy," 2006, [www.rprogress.org/newpubs/2006/goldenopp0106.pdf](http://www.rprogress.org/newpubs/2006/goldenopp0106.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/RedefiningProgress\\_goldenopp.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/RedefiningProgress_goldenopp.pdf), 19 October 2006.

<sup>60</sup> Seattle's Letter Calling Mayors to Action, [www.seattle.gov/mayor/climate/PDF/USCM\\_6-page\\_Climate\\_Mailing\\_ALL.pdf](http://www.seattle.gov/mayor/climate/PDF/USCM_6-page_Climate_Mailing_ALL.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/USCM\\_6-page\\_Climate\\_Mailing\\_ALL.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/USCM_6-page_Climate_Mailing_ALL.pdf), 19 October 2006.

believe the opposite is true. The road to a more climate-friendly community is paved with economic opportunities ranging from cost-savings for families to new business development for companies. For example, the state's new "clean car" standards are projected to save drivers \$2,500-\$3,000 in fuel costs over the life of the vehicle, while reducing global warming pollution by 25-30% per vehicle. Similarly, investing in more energy efficient homes and businesses creates local jobs. And, here in Seattle, new jobs already are being created by climate-friendly businesses engaged in sustainable building design and biodiesel production.<sup>61</sup>

**Boulder, Colorado Climate Action Plan<sup>62</sup>;**

**New York State Energy Strategy 2006<sup>63</sup>;**

**Economic development goals are included in the sustainability indicators of Santa Monica, California<sup>64</sup>;**

**and the recommended indicators of the Pikes Peak Sustainability Indicators Project, Colorado.<sup>65</sup>**

Other examples of governments including economic development goals in their climate change efforts are:

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<sup>61</sup> Seattle Green Ribbon Commission, "Seattle, a Climate of Change: Meeting the Kyoto Challenge," 2006, available at [www.seattle.gov/climate/PDF/SeattleClimateReport.pdf](http://www.seattle.gov/climate/PDF/SeattleClimateReport.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/SeattleClimateReport.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/SeattleClimateReport.pdf) 18 October 2006.

<sup>62</sup> See Boulder Climate Action portal, [www.ci.boulder.co.us/index.php?option=com\\_content&task=view&id=1058&Itemid=396](http://www.ci.boulder.co.us/index.php?option=com_content&task=view&id=1058&Itemid=396), 30 October 2006.

<sup>63</sup> New York State Energy Research and Development Authority, "Facing Energy Challenges in the 21<sup>st</sup> Century: A Three-year Strategic Outlook 2006-2009," 2006. It notes that "Assessing how and when we use energy, while ensuring that our energy use is efficient and effective, will play an important role in our economic well-being." Available at: [www.nyserda.org/publications/strategicplan.pdf](http://www.nyserda.org/publications/strategicplan.pdf), also archived at [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/NYSERDA\\_jun06.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/NYSERDA_jun06.pdf), 30 October 2006.

<sup>64</sup> City of Santa Monica, "Santa Monica Sustainable City Plan," 2006, available at [santa-monica.org/epd/scp/pdf/SCP\\_2006\\_Adopted\\_Plan.pdf](http://santa-monica.org/epd/scp/pdf/SCP_2006_Adopted_Plan.pdf), Also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/SCP\\_2006\\_Adopted\\_Plan.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/SCP_2006_Adopted_Plan.pdf), 30 October 2006.

<sup>65</sup> The Pikes Peak Sustainability Indicators Project is a collaboration of local governments and Fort Carson Mountain Post. Summary report available from Pikes Peak Area Council of Governments website: [www.ppacg.org/Envir/PPSIPProject.pdf#search=%22PPSIP%22](http://www.ppacg.org/Envir/PPSIPProject.pdf#search=%22PPSIP%22), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/PikesPeakSustainabilityIndicatorProject.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/PikesPeakSustainabilityIndicatorProject.pdf), 30 October 2006.

## Additional Resources

### Why Science Compels Strong Action, Physical basics: how and why GHGs affect climate

- World Resources Institute<sup>66</sup>
- Intergovernmental Panel on Climate Change, a project of the United Nations Environment Programme and the WMO, especially “Climate Change 2001: The Scientific Basis”.<sup>67</sup>
- Tim Flannery, *The Weathermakers*, Atlantic Monthly Press, 2006.
- Al Gore, *An Inconvenient Truth*, <http://www.climatecrisis.net>

### Science’s predictions of global physical effects

- “The Scientific Consensus on Climate Change,” Essays Beyond the Ivory Tower, 2004.<sup>68</sup>
- The Climate Group’s “About Climate Change” Case studies of companies and governments<sup>69</sup>
- ClimateArk’s Climate Change and Global Warming Portal and its Climate Change Overview.<sup>70</sup>

- Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change”, US Global Change Research Program, Cambridge University Press 2000.<sup>71</sup>

### Science’s predictions of local physical effects

- “Climate Change Impacts on the United States – the Potential Consequences of Climate Variability and Change,” prepared by US Global Change Research Program, 2000.<sup>72</sup>

### Goal-setting Considerations

- Technology and Innovation Opportunities: US Government National Climate Change Technology Initiative.<sup>73</sup>
- Daniel R. Abbasi, “Americans and Climate Change: Closing the Gap Between Science and Action – A Synthesis of Insights and Recommendations from the 2005 Yale F&ES Conference on Climate Change,” 2006.<sup>74</sup>

### Evangelical Climate Initiative Call to Action, United States, 2006.<sup>75</sup>

**Pew Climate Center, especially corporate commitments made through the Business Environmental Leadership Council program.**<sup>76</sup>

**The Carbon Disclosure Project supports progress towards corporate reporting of climate change impacts.**<sup>77</sup>

**DriveNeutral, a project of the Presidio School of Management, provides a system for people to offset the climate impacts of their driving.**<sup>78</sup>

**The European Climate Forum includes recent information developed by the EU.**<sup>79</sup>

**ICLEI Cities for Climate Protection Campaign**<sup>80</sup>

**City of Seattle, Green Ribbon Commission – Resources for Local Governments web page**<sup>81</sup>

**The Heat is On, Economist Article, Sept 7, 2006. The many issues surrounding climate change are explained clearly and succinctly in this article with a focus on**

<sup>66</sup> World Resource Institute, Climate, Energy & Transport, [www.wri.org/climate/](http://www.wri.org/climate/), 15 October 2006.

<sup>67</sup> Intergovernmental Panel on Climate Change, [www.ipcc.ch](http://www.ipcc.ch), 8 October 2006.

<sup>68</sup> Author: Naomi Oreskes. Available through Aspen Canary Initiative website: [aspenglobalwarming.com/pdf/Science\\_Consensus\\_Essay.pdf](http://aspenglobalwarming.com/pdf/Science_Consensus_Essay.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Science\\_Consensus\\_Essay.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Science_Consensus_Essay.pdf), 8 October 2006.

<sup>69</sup> The Climate Group Case Studies, [www.theclimategroup.org/index.php?pid=430](http://www.theclimategroup.org/index.php?pid=430), 8 October 2006

The Climate Group’s report “Low Carbon Leader: Canada Dec. 2005” at [www.theclimategroup.org/assets/TCG\\_LCL\\_Canada\\_01.pdf](http://www.theclimategroup.org/assets/TCG_LCL_Canada_01.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/TCG\\_LCL\\_Canada\\_2005.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/TCG_LCL_Canada_2005.pdf), 8 October 2006.

<sup>70</sup> Climate Ark, [www.climateark.org/overview](http://www.climateark.org/overview), 8 October 2006.

<sup>71</sup> “Climate Change Impacts of the United States: The Potential Consequences of Climate Variability and Change” [www.gcrio.org/NationalAssessment/index.htm](http://www.gcrio.org/NationalAssessment/index.htm), 8 October 2006.

<sup>72</sup> Available through Aspen Canary Initiative website: [aspenglobalwarming.com/pdf/natl\\_assess\\_key\\_findings.pdf](http://aspenglobalwarming.com/pdf/natl_assess_key_findings.pdf), also archived at, [www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Natl\\_assess\\_key\\_findings.pdf](http://www.natcapsolutions.org/ClimateManual/Cities/Chapter4/Natl_assess_key_findings.pdf), 8 October 2006.

<sup>73</sup> The National Climate Change Technology Initiative, [www.climatechange.gov/about/nctti.htm](http://www.climatechange.gov/about/nctti.htm), 8 October 2006.

<sup>74</sup> Available at [environment.yale.edu/climate/americans\\_and\\_climate\\_change.pdf](http://environment.yale.edu/climate/americans_and_climate_change.pdf), 8 October 2006.

<sup>75</sup> Evangelical Climate Initiative, [www.christiansandclimate.org](http://www.christiansandclimate.org), 8 October 2006.

<sup>76</sup> Pew Center on Global Climate Change, [www.pewclimate.org/](http://www.pewclimate.org/), 8 October 2006.

economics and politics.

[http://www.economist.com/opinion/displaystory.cfm?story\\_id=7884738](http://www.economist.com/opinion/displaystory.cfm?story_id=7884738)

### **The Stern Report**

The report applies the science of global warming to an analysis of the future of the world's economy. His conclusion is that, left unchecked, global warming will generate an unprecedented economic catastrophe.

[http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/stern\\_review\\_report.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm)

Amica, a collaborative in EU trying to establish a regional development methodology with climate change considered

<http://www.amica-climate.net/home1.html>

Too Hot Not To Handle. HBO cautionary documentary offers a guide to the effects of global warming in the United States.

<http://www.hbo.com/docs/programs/toohot/>



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<sup>77</sup> Carbon Disclosure Project, [www.cdproject.net](http://www.cdproject.net). Also see summary of 2006 report at GreenBiz.com: [www.greenbiz.com/news/news\\_third.cfm?NewsID=34028](http://www.greenbiz.com/news/news_third.cfm?NewsID=34028), 8 October 2006.

<sup>78</sup> Drive Neutral, [www.driveneutral.org](http://www.driveneutral.org), 8 October 2006.

<sup>79</sup> European Climate Forum, [www.european-climate-forum.net/](http://www.european-climate-forum.net/), 8 October 2006.

<sup>80</sup> ICLEI, [www.iclei.org/index.php?id=1118](http://www.iclei.org/index.php?id=1118), 8 October 2006.

<sup>81</sup> Resources for Local Governments on Seattle website, [www.seattle.gov/climate/govResources.htm](http://www.seattle.gov/climate/govResources.htm), 8 October 2006.