

Executive Summary

Global climate change will very likely be the defining issue of the 21st Century. At its dawn, we face the knowledge that industrialization, and its historic reliance on the combustion of fossil fuels like coal, natural gas, and oil, has significantly increased the amount of carbon dioxide and other greenhouse gases in our atmosphere. We also are beginning to understand some of the implications of these greenhouse gas emissions for our planet: namely, warmer days and nights; more intense storms; more severe droughts; melting glaciers; and rising oceans. The impacts of these physical changes on the Earth's inhabitants are less well understood; however, scientists, politicians, and business leaders around the world have sounded the alarm with an ever-increasing sense of urgency, identifying a range of concerns, including compromised freshwater supplies; reduced agricultural production; significant risks to coastal communities and major population centers from rising sea levels and stronger hurricanes; and the increased likelihood of extinction for many species.

Here in Colorado we face the danger of reduced annual snow packs, affecting both water supply and tourism, and secondary impacts of warming, such as pine beetle infestations and changing agricultural economics.

Under the leadership of Mayor John Hickenlooper, Denver is poised to join the ranks of the world's leading cities in taking decisive steps to reduce local contributions to the greenhouse gas problem — and at the same time, to position Denver as a leader in establishing a diversified economy based on the combined use of traditional and alternative sources of energy. Although there will be up-front costs associated with some of these mitigation efforts, they will ultimately save many energy dollars and, more important, will pale in comparison to the likely costs of inaction resulting from global warming and its related impacts.

In 2005, Mayor Hickenlooper established Denver's initial greenhouse gas reduction goal: by 2012 Denver will reduce its emissions of greenhouse gases by 10 percent per capita relative to 1990 levels. Since that time, Mayor Hickenlooper's Greenprint Council — an advisory group of civic and business leaders, joined by managers of several City departments — has worked with scientists and policy makers to understand the issues and opportunities faced by the City as it grapples with this challenge.

Denver's Carbon Footprint

A greenhouse gas inventory of Denver reveals that the sources of our greenhouse gas emissions come from three main sectors: 1) Transportation, 2) Residential-Commercial-Industrial Energy Use, and 3) Use of Key Urban Materials. The greenhouse gases produced from these activities are related in large part to the source of power generation — in the case of transportation, petroleum, and in the case of buildings and commercial/industrial activities, electricity generated from coal- and natural gas-powered plants along with natural gas used for the heating of buildings. Key materials (such as concrete, water, and food) require energy of various types to manufacture items without which city life would not be possible.

Denver has a rich history as a center of energy development. In our challenge to reduce emissions and their related environmental, health, and economic costs, we have an opportunity to lead the country—indeed, the world—in developing new technologies to improve traditional energy sources, improve energy efficiency, and create new energy sources.

Denver's Goals

The Denver region has experienced significant population growth over the past decade, and emissions have increased in almost direct proportion to that growth, although the **per capita greenhouse gas emissions have remained nearly constant at about 25 metric tons of carbon dioxide equivalents (mtCO₂e) per person per year from 1990 to 2005.*** Our original goal of a 10 percent per capita reduction in greenhouse gases from 1990 levels by the year 2012 appears to be attainable, and corresponds to reducing Denver's annual total community-wide greenhouse gas emissions by 1.8 million metric tons of CO₂ equivalents from the business-as-usual projections. However, reaching this goal also means that absolute, or total, emissions will have increased significantly since 1990 due to population growth (see Figure ES-1). Indeed, based on population projections, **a 10 percent per capita reduction by 2012 will still result in a 16 percent increase in Denver's total contribution of greenhouse gases to our global atmosphere over 1990 levels**, with annual emissions of 13.7 million metric tons in 2012 compared with 11.8 million metric tons in 1990. To begin to stabilize and then reduce our greenhouse gas emissions, we must commit to more ambitious goals over the long term. Based on an understanding of what is at stake for the City and the region in the context of global warming, and the time-sensitivity of reducing our emissions, **we recommend that the City adopt an absolute reduction target of 25 percent — to get the entire Denver community below 1990 levels — by 2020.** This corresponds to mitigating 4.4 million metric tons of CO₂ equivalents annually by 2020 from the business-as-usual projections.

**The average individual uses ~15 mtCO₂e per year.*

How much is a “metric ton of CO₂ e”?

One ton of carbon dioxide gas would fill a 30-foot diameter balloon. In one year, the average individual in the U.S. produces enough CO₂ to fill about 15 of these balloons, enough to stretch from goal line to goal line of a football field one and one-half times! Another way to imagine the carbon in the greenhouse gas emissions of the average individual is to imagine producing an 8-foot-square block of coal for every man, woman, and child in the city.

The Mayor's Greenprint Council recommends that in addition to the 2012 goal, Denver adopt a Year 2020 goal as described below.

2012 Goal: Reduce Denver's **per capita** greenhouse gas emissions by 10 percent below 1990 levels, thereby reducing community-wide emissions by 1.8 million metric tons of CO₂e annually, by 2012. This is equivalent to eliminating a small [250 megawatt (MW)] coal-fired power plant, or taking about 260,000 cars off the road.

2020 Goal: Decrease **total** community-wide emissions to below 1990 levels, which equals a community-wide reduction of 4.4 million metric tons of CO₂e annually. This is equivalent to eliminating 2 small coal-fired power plants [550 MW], or taking about 600,000 cars off the road.

Note: Throughout this report, when discussing “coal-fired power plants,” we are referring to conventional plants using pulverized coal as the fuel source.

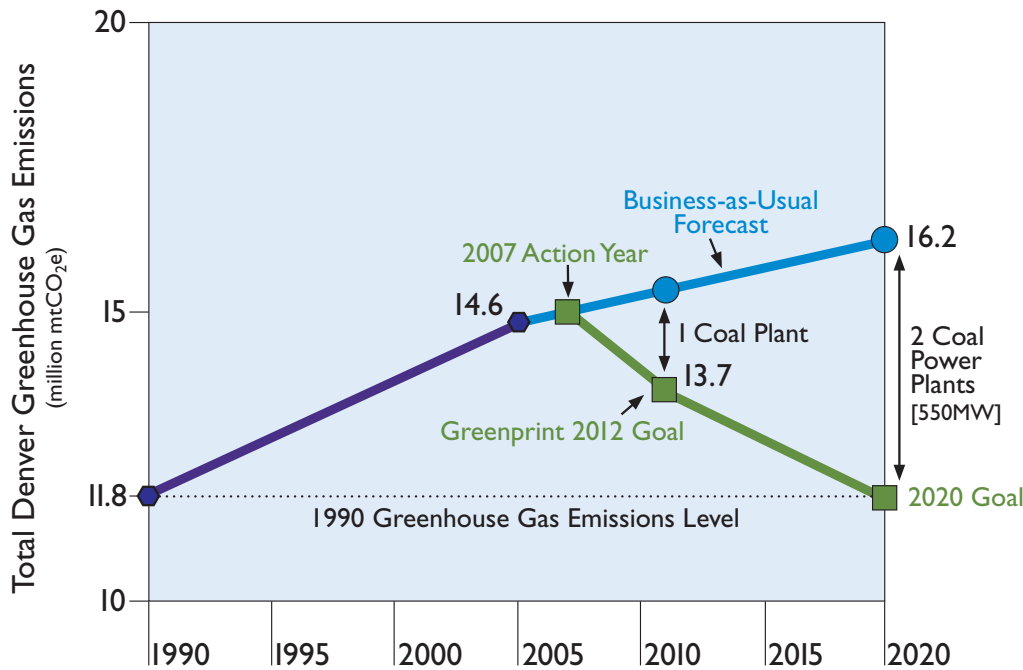


Figure ES-1

Denver's community-wide greenhouse gas projections with and without recommended actions.

Emissions are shown in million metric tons of CO₂ equivalents (CO₂e). (The business-as-usual scenario incorporates population growth with assumed steady per capita emissions of 25 mtCO₂e plus small increasing trends seen in buildings' electricity use. The 2012 goal will eliminate 1.8 million mtCO₂e annually, equivalent to eliminating the need for 1 coal-fired power plant. The 2020 goal will mitigate 4.4 million mtCO₂e annually, equivalent to removing 2 coal-fired power plants.)

If we can begin to reduce our electricity consumption and make our transportation system more efficient, we can avoid building new coal-fired power plants and reduce our crude oil consumption, thus preventing a significant increase in our greenhouse gas emissions, along with other air pollutants.

Recommended Climate Action Strategies

After more than seven months of study, the Greenprint Council has developed a series of recommendations designed to help Denver meet its short-term climate goals. These recommendations are in the form of specific actions that can be taken by individuals, businesses, and the City and County of Denver, in service of a larger, overarching objective: **to avoid the construction of new coal-fired power plants intended to serve Denver's growing population and energy demands.**

These priority strategies have been evaluated in terms of cost-effectiveness, impact, and their potential to engage the public, and they are distributed across the sectors most responsible for greenhouse gas emissions. Detailed summaries of each are found in Section 3 of this report.

If adopted, the following ten recommendations are projected to achieve our 2012 goal, resulting in total annual emissions reductions of 1.8 million metric tons of CO₂ equivalents.*

1. Corporate and Residential Climate Challenges (28 percent toward 2012 goal) — Develop major business and residential outreach campaigns supporting the adoption of best practices related to energy conservation, purchase of renewable energy, support for multi-modal transportation, and waste reduction in the commercial and residential sectors.

2. Incentivize Energy Conservation (25 – 40 percent toward 2012 goal) — Introduce a proposal to apply a tiered rate structure to electrical and natural gas usage. Similar to water use rate charges, such electrical and natural gas tiered rates would impose a premium charge for excessive electrical and natural gas usage. Voter approval should be sought for this measure. Funds generated would be used to support energy conservation and greenhouse gas reduction programs, especially for lower-income neighborhoods.

** Note: the ten recommendations are expected to contribute to greenhouse gas mitigation if all other factors remain the same. For example, if the use of air conditioners increases significantly beyond current trends, the energy savings from the actions listed below may be substantially offset by such increases in electricity use.*

3. Voluntary Travel Offset Program (20 percent toward 2012 goal) — Provide the opportunity to pay a small voluntary fee, at the time of air travel or motor vehicle registration, to offset the carbon emissions related to travel. Funds would be used for carbon-absorbing or carbon-reducing activities. Explore potential partnership with the Governor's Energy Office to develop local offset investment opportunities.

4. City Leading by Example (9 percent toward 2012 goal) — In addition to the 5-year goals for City practice improvements outlined in the 2006 Greenprint Denver Action Agenda, aggressively pursue opportunities for energy efficiency and renewable energy at Denver International Airport, work to develop “carbon neutral” City buildings through application of energy efficiency savings to the purchase of Windsorce, and make additional City fleet improvements.

5. Enhance Recycling Programs (2 percent toward 2012 goal) — Support new and expanded recycling initiatives throughout Denver, including multi-family, commercial, and green waste recycling, as part of the development of a comprehensive Solid Waste Master Plan. The goal is to double the present recycling rate, which contributes to both energy and greenhouse gas savings.

6. Energy Efficiency Standards for New Buildings and Remodels (4 percent toward 2012 goal; long-term {2020} impact up to 12 percent) — Adopt a set of mandatory building standards for commercial buildings and building codes for new homes and some remodels that incorporate energy efficiency standards and renewable energy requirements.

7. Increase Energy Efficiency in Existing Homes (1–4 percent toward 2012 goal; more than 10 percent toward long-term {2020} goal) — Promote basic energy efficiency measures at residential properties as a way to improve the energy efficiency of older housing stock. Incentives to plant shade trees and install in-home energy display systems would enhance the effectiveness of this program.

8. Community-wide High-performing Green Concrete Policy (3 percent toward 2012 goal) — Require, through City policies, the use of “green” concrete, containing a low to moderate percentage of fly ash, in all public and private construction projects. Pilot projects are recommended using both fly ash and recycled aggregates, in public and private projects to evaluate the feasibility of large-scale implementation.

9. Compact Growth Boundary with Incentives for Density in Urban Areas (2 percent towards 2012 goal; greater than 10 percent by 2020) — Support maintenance of the existing DRCOG growth boundary and support additional population growth around transit in the metro area to promote denser, more pedestrian-, bicycle-, and transit-friendly neighborhoods that will reduce the demand for motorized personal transport.

10. City Support for Alternative Transportation Strategies (~2 percent toward 2012 goal) — Develop various City policies that promote the transition over time to the use of alternative transportation sources (such as bicycles, telecommuting, walking, van/car pools, and mass transit). These strategies may also include the promotion of alternatively fueled and high-fuel economy vehicles, including parking subsidies, car-share programs, and access fee discounts for hybrid taxis at DIA.

Taken together, these City-based actions described above are projected to result in the mitigation of 1.8 million metric tons of climate-changing greenhouse gases annually by 2012, decreasing Denver's per capita greenhouse gas footprint by more than 10 percent relative to 1990 levels.

By employing all of these measures, along with the will of the citizens of Denver, we can reach our goal: **to eliminate the need for the equivalent of one coal-fired power plant by 2012 and set us on a course toward eliminating a second one by 2020.**

