

Washoe County, Nevada

Greenhouse Gas Inventory Report

March 2010

*Yann Ling-Barnes, P.E.
Air Quality Management Division
Washoe County Health District*

Resolution from the County Commissioners

**RESOLUTION
LOCAL GOVERNMENTS FOR SUSTAINABILITY**

WHEREAS, Washoe County recognizes that reducing greenhouse gas emissions is a reflection of our success in a building resilient, sustainable community; and

WHEREAS, Washoe County recognizes local government actions taken to reduce greenhouse gas emissions, increase energy efficiency, and provide alternative energy resources has multiple local benefits including a decrease in air pollution, improvement of our quality of life, job creation, economic prosperity, and reduce costs for the local government, its businesses, and its residents; and

WHEREAS, International Council on Local Environmental Initiatives--Local Governments for Sustainability (ICLEI) empowers local governments to set and achieve their climate goals and make tangible progress in building a sustainable community through an international renown inventory, planning, monitoring, and reporting process; and

WHEREAS, The National Association of Counties supports and refers to the tools that for ICLEI provides in the Cities and Counties Climate Protection Program; and

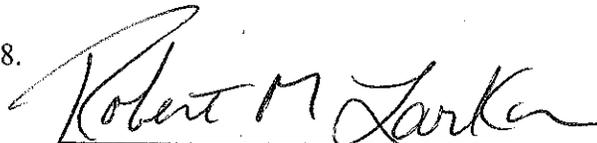
WHEREAS, Washoe County has been invited to join ICLEI and become a partner in the Cities and Counties Climate Protection Program and Washoe County has demonstrated commitment by developing the Washoe County Green Team; now therefore be it

RESOLVED, That Washoe County, Nevada will join ICLEI as a full member and pledges to take a leadership role in promoting public awareness about the causes and impacts of climate change; and be it further

RESOLVED, That Washoe County will undertake ICLEI's five milestones to reduce both greenhouse gas and air pollution emissions throughout the community, and specifically:

- Conduct a greenhouse gas emissions inventory and forecast to determine the source and quantity of greenhouse gas emissions in the jurisdiction;
- Establish a greenhouse gas emissions reduction target;
- Develop an action plan with both existing and future actions which when implemented will meet the local greenhouse gas reduction target;
- Implement the action plan; and,
- Monitor and report progress.

ADOPTED, this 28th day of October, 2008.



**Robert M. Larkin, Chairman
Washoe County Commission**

ATTEST:



**Amy Harvey
Washoe County Clerk**

Acknowledgements

Washoe County would like to thank the following individuals and/or agencies for providing information to help establish Washoe County's 2008 baseline greenhouse gas inventory:

Althoff, Judy – Associate Planner, Regional Transportation Commission
Bernardy, John – Site Operations Supervisor, Ormat Nevada, Inc. – Brady/Desert Peak 2 Facilities
Deetken, Bruce, CEM, CBCP – Energy Manager, Washoe County School District
Etchart, Peter, P.E., LEED AP – Deputy Public Works Director/City Engineer, City of Sparks
Flaten, Davis – Manager, Engineering, Southwest Gas Corporation
Gallian, Dan – Regional Transportation Commission of Washoe County
Geddes, Jason, Ph.D. – Environmental Services Administrator, City of Reno
Giesinger, Chad, AICP – Senior Planner, Community Services Program, Department of Community Development, Washoe County
Gilletti, Cheryl – Account Manager, Waste Management
Gonzales, Dave – Equipment Services Superintendent, Department of Public Works, Washoe County
Greene, Michael – Chief, Sierra Fire Protection District, Washoe County
Hall, Ramona – Tax Examiner II, Motor Carrier Division, Nevada Department of Motor Vehicle
Howard, Joe – Interim Utility Operations Manager, Department of Water Resources, Washoe County
Jones, Karen – Administrative Assistant, Sierra Fire Protection District, Washoe County
Kelly, Steven C. – Captain, Detention Bureau Commander, Sheriff's Department, Washoe County
Korman, Ron – Maintenance Superintendent, City of Sparks
Korson, Cathie – HR Analyst, Department of Human Resources, Washoe County
Mathews, Chris – E-Government Public Information Officer, County Manager's Office, Washoe County
Mohn, Pat – Staff Engineer II, Minor Source Permits Division, Bureau of Air Pollution Control, Nevada Division of Environmental Protection
Morehouse, Don – Planner, Community Services Program, Department of Community Development, Washoe County
Murray, Jon – Firefighter, Sierra Fire Protection District, Washoe County
Neuweiler, Karen – Senior Analyst, Load Research, NV Energy
Perry, Carol – Trip Reduction Specialist, Regional Transportation Commission of Washoe County
Plaggemeyer, Ted – Dean, School of Sciences, Truckee Meadows Community College
Reeder, Robert – CitiCenter Transit Center, Regional Transportation Commission of Washoe County
Richards, Lora – Resource Planner, Truckee Meadows Water Authority
Rueffer, Jeanne – Planning Manager, Department of Water Resources, Washoe County
Sagebiel, John C., Ph.D., LEED AP – Environmental Affairs Manager, Environmental Health and Safety, University of Nevada, Reno
Solaro, Dave, P.E., Architect – Capital Projects Division Manager, Department of Public Works, Washoe County
Soyars, Darrell – Program Manager, Environmental, Health & Safety, NV Energy

Tone, Sarah – Community Outreach Coordinator, County Manager’s Office, Community Relations Division, Washoe County

Trinidad, Susi – Public Transportation, Regional Transportation Commission of Washoe County

Turner, Mike – Director, Facilities Management Division, Department of Public Works, Washoe County

Ullah, Tobarak, P.E. – Professional Engineer, Emissions Auditing Division, Bureau of Air Pollution Control, Nevada Division of Environmental Protection

Wallace, Scottie – Manager, Washoe County Main Library, Washoe County

Welty, Todd – Environmental Program Manager, Reno-Tahoe Airport Authority

Whipple, Lee – Office Support Specialist, Facilities Management Division, Department of Public Works, Washoe County

Young, Scott – Principal Policy & Special Projects Analyst, Legislative Council Bureau, State of Nevada

Washoe County would also like to thank Anna Frankel, Xico Manarolla, and Justus Stewart of ICLEI, USA, California and Pacific Northwest Regional Offices, for their guidance and direction while compiling this baseline inventory and report.

Washoe County of Nevada Climate Action Plan

Table of Contents

Executive Summary

I. Introduction

- A. Introduction to Climate Change Science
- B. Effects & Impacts of Climate Change
- C. Action Being Taken on Climate Change
- D. ICLEI and the Cities for Climate Protection Campaign

II. Emissions Inventory

- A. Reasoning, Methodology & Model
 - 1. Software
 - 2. Inventory Sources and Creation Process
- B. Inventory Results
 - 1. Community Scale Emissions Inventory
 - a. Energy/Stationary Source Emissions
 - b. Transportation Emissions
 - c. Solid Waste Emissions
 - 2. Municipal Operations Emissions Inventory
 - a. Energy/Stationary Source Emissions
 - b. Transportation Emissions
 - c. Solid Waste Emissions

III. Forecast for Greenhouse Gas Emissions

IV. Conclusion

Appendix A – CACP2009 Community Greenhouse Gas Emissions in 2008 Detailed Report - by Sector, Data Sources Assumptions and Notes for the Community Inventory

Appendix B – CACP2009 Government Greenhouse Gas Emissions in 2008 Detailed Report - by Sector, Data Sources Assumptions and Notes for the Municipal Inventory

Appendix C – CACP2009 Community Greenhouse Gas Emissions in 2018 Detailed Report- by Sector, Data Sources Assumptions and Notes for the Community Inventory

Executive Summary

The scientific consensus has concluded that human-induced climate change is a reality, and represents one of the most pressing environmental problems facing this generation and those to come.

The time to act is now. In the 20th Century the planet has experienced warming temperatures that are unparalleled in the geologic record. The past decade has been the warmest in recorded history, and the world's pre-eminent climate scientists have overwhelming evidence that human activity is the cause. Scientific studies by the University of Washington's Climate Impacts Group show that allowing this warming trend to continue at present rates could result in decreased agricultural output, increased catastrophic weather events such as forest fires, drought and floods, and the displacement of entire populations due to rising sea levels.

Washoe County has chosen to do its part. Washoe County recognizes that in order to have an impact on this global phenomenon, each community must take responsibility for its local actions. The actions that Washoe County has engaged in over the course of the past 2 years include:

- Made a proclamation on Earth Day, 2008, to initiate a Green Team to encourage, inspire and support Washoe County's efforts to build a sustainable community.
- Performed a Washoe County's facilities energy assessment to determine ways to make the buildings more energy efficient thereby reducing energy cost and greenhouse gas (GHG).
- In order to implement these resolutions, Washoe County joined more than 600 U.S. local governments and 1,100 local governments worldwide in ICLEI's Cities for Climate Protection[®] (CCP) Campaign in October, 2008. In partnering with ICLEI, Washoe County has committed to ICLEI's Five Milestone Process to fight global warming:

Milestone 1: Conduct a baseline emissions inventory and forecast;

Milestone 2: Adopt an emissions reduction target;

Milestone 3: Develop a Climate Action Plan for reducing emissions;

Milestone 4: Implement policies and measures;

Milestone 5: Monitor and verify results.

The emissions inventory summarized in this report represents the completion of Milestone 1, the first step in this process. This inventory, along with goals set by the County Commissioners, will be used to develop a local action plan to enable the Washoe County to reduce GHG emissions in a strategic and systematic manner.

Inventory Results

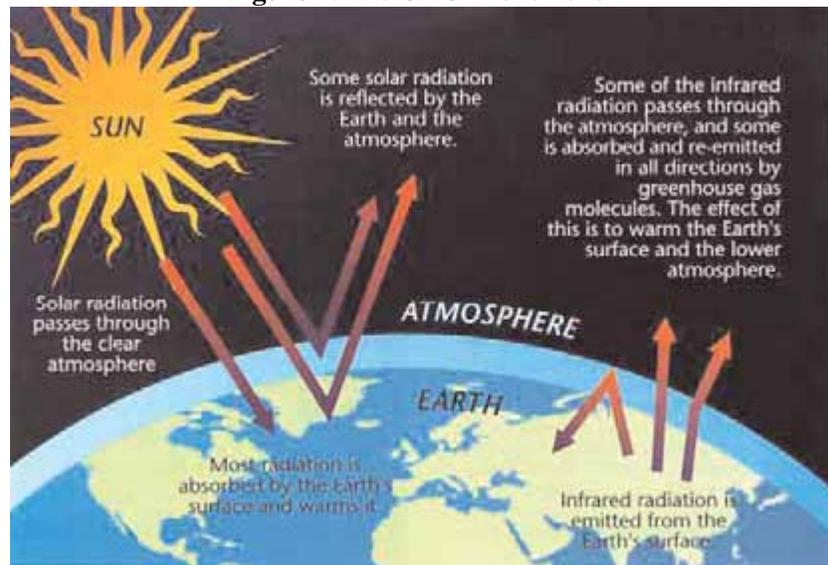
In 2008, the baseline year of Washoe County's GHG emissions inventory, the community of Washoe County emitted 6,093,401 tonnes (metric tons) of equivalent carbon dioxide (eCO₂) into the atmosphere. The transportation sector is the major eCO₂ emitter, contributing 43% of the total emission. The Commercial/Industrial sector is the second largest emitter, contributing 26% of the total emission, followed by the residential sector, which contributed 19%. The remaining 12% is made up of waste generated in the community.

I. Introduction

A. Introduction to Climate Change Science

The Earth's atmosphere is naturally composed of a number of gases that act like the glass panes of a greenhouse, retaining heat to keep the temperature of the Earth stable and hospitable for life at an average temperature of 60°F. Carbon dioxide (CO₂) is the most prolific of these gases. Other contributing gases include methane (CH₄), nitrous oxide (NO₂), ozone (O₃), and halocarbons. Without the natural warming effect of these gases the Earth's surface temperature would be too cold to support life (Figure 1).

Figure 1: The GHG Phenomenon



Source: US Environmental Protection Agency

While the existence of GHG in the atmosphere is necessary for life on Earth, human beings are changing the proportions of these gases in the atmosphere, most significantly by adding CO₂ from the burning of fossil fuels. Atmospheric CO₂ concentrations have increased from between 270-280 parts per million (ppm) in pre-industrial times to more than 380 ppm today.¹ If current emissions levels continue, the atmospheric CO₂ concentration is projected to reach 730-1020 ppm by 2100. The current atmospheric concentration of carbon dioxide exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice core measurements.

¹ United Nations Intergovernmental Panel on Climate Change - IPCC (2007) "Climate Change 2007: The Physical Science Basis. Summary for Policy Makers" <http://www.ipcc.ch/SPM2feb07.pdf>

What is the IPCC?

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) to establish a scientific consensus on the issue of global warming. The IPCC does not conduct research, but provides a process for climate experts from the world's leading universities and government institutions to synthesize the most recent scientific findings every five to seven years. The IPCC has issued comprehensive assessments for political leaders in 1990, 1996, 2001 and 2007.

The Fourth Assessment Report (AR4) was released in February of 2007 and represents the most comprehensive synthesis of climate change science to date. Experts from more than 130 countries have contributed to this assessment over a six year period. More than 450 lead authors have received input from more than 800 contributing authors, and an additional 2,500 experts peer-reviewed the draft documents.

Source: About the IPCC - <http://www.ipcc.ch/about/faq.htm>

Over this same geologic time period, methane concentrations have increased from 715 parts per billion (ppb) to more than 1774 ppb, and nitrous oxide, (N₂O) concentrations have increased by 270 ppb to 319 ppb.² In addition to these naturally occurring gasses, humans have introduced synthetic gasses with heat-trapping capacity into the atmosphere, such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Though relatively low in concentration, these gasses are of particular concern because they have a heat trapping capacity between 1,500 and 22,000 times stronger than CO₂.³

Elevated concentrations of GHG in the atmosphere have had a destabilizing effect on the global climate, fueling the phenomenon commonly referred to as global warming. **The 2007 United Nations Intergovernmental Panel on Climate Change (IPCC) report states that “warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures.”**⁴ The IPCC is referring to the 1.3°F increase in surface temperature over the last century.⁵ These increases in global temperature have accelerated recently, with 11 of the 12 warmest years on record occurring between 1995 and 2006.⁶

The climate and the atmosphere will not necessarily react in a linear fashion to increased GHG. That is to say that you cannot simply predict that for each ton of carbon dioxide emitted the Earth will warm a certain amount. The Earth's climate has a number of feedback loops and tipping points that scientists fear will accelerate global warming beyond the rate at which it is currently occurring. For example, as CO₂ emissions have increased in recent human history, the oceans and terrestrial ecosystems have been absorbing a significant portion of these gases. With continued warming, scientists anticipate a decrease in the ability of oceans and terrestrial ecosystems to absorb GHG, causing anthropogenic CO₂ emissions to have a more substantial impact on global climate.⁷ Another example of a compounding effect can be found in the polar ice caps. Ice is highly reflective and acts like a giant mirror, reflecting the sun's rays back into space. As the planet warms and some of this ice melts, a darker land or ocean surface is revealed. This darker surface will tend to absorb more heat, accelerating the speed at which the planet warms with each tonne of GHG emitted.

² United Nations Intergovernmental Panel on Climate Change - IPCC (2007). “Climate Change 2007: The Physical Science Basis. Summary for Policy Makers,” <http://www.ipcc.ch/SPM2feb07.pdf>

³ United Nations Intergovernmental Panel on Climate Change - IPCC (2001). “Third Assessment Report. Climate Change 2001: The Scientific Basis,” <http://www.ipcc.ch/pub/wg1TARtechsum.pdf>

⁴ United Nations Intergovernmental Panel on Climate Change - IPCC (2007). “Climate Change 2007: The Physical Science Basis. Summary for Policy Makers,” <http://www.ipcc.ch/SPM2feb07.pdf>

⁵ Ibid

⁶ Ibid

⁷ United Nations Intergovernmental Panel on Climate Change - IPCC (2007). “Climate Change 2007: The Physical Science Basis. Summary for Policy Makers,” <http://www.ipcc.ch/SPM2feb07.pdf>

Findings and Projections from the 2007 IPCC Report:

- “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”
- “Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values.”
- “The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land-use change, while those of methane and nitrous oxide are primarily due to agriculture.”
- “The observed widespread warming of the atmosphere and ocean, together with ice mass loss, support the conclusion that it is *extremely unlikely* that global climate change of the past fifty years can be explained without external forcing [including anthropogenic sources], and *very likely* that it is not due to known natural causes alone.”

Source: IPCC WGI Fourth Assessment Report Summary for Policy Makers

B. Effects & Impacts of Climate Change

Global Impacts

Changes in temperature and climate will have a dramatic impact on plants and animals that are adapted to present climactic conditions. Surface temperatures are on course to increase by between 3.2 and 7.2°F by the year 2100, with temperatures in the Arctic expected to increase by twice the global average.⁸ In addition to causing average temperature increases, rising levels of GHG have a secondary destabilizing effect on a number of different microclimates, conditions, and systems.

The increase in the temperature of the oceans is projected to accelerate the water cycle, thereby increasing the severity and rate of both storms and drought which, along with decreased snow pack, could disrupt ecosystems, agricultural systems and water supplies.⁹

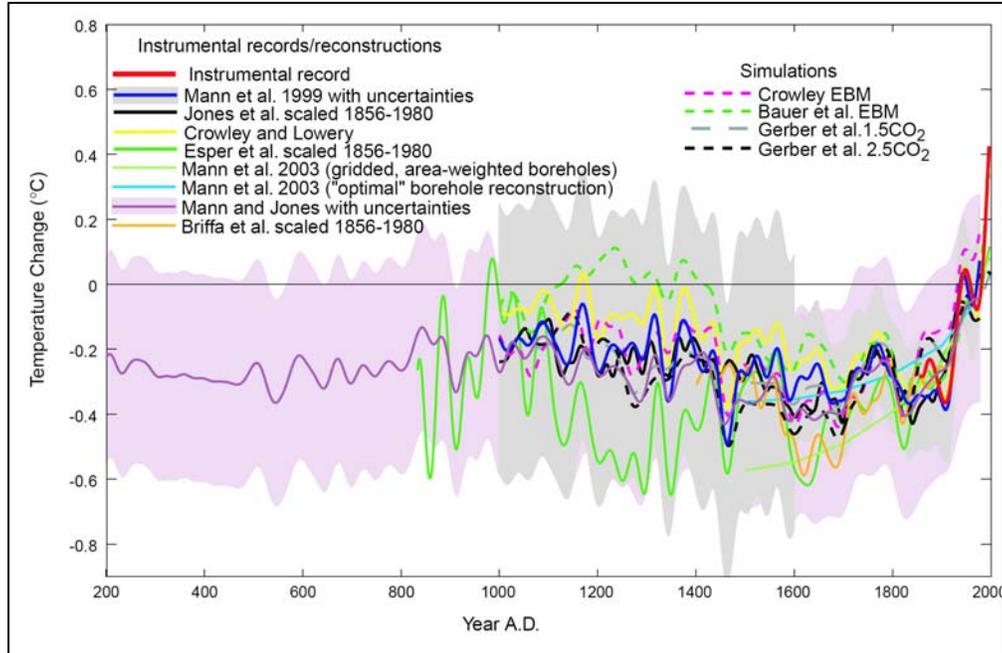
As Figure 2a below indicates, following almost 2000 years of steady or slightly declining temperature, there has been a rapid increase in global surface temperature over the past century, which is inconsistent with the geologic record. Figure 2b shows that increasing global temperatures have already led to the widespread melting of snow and ice around the world. Melting snow and ice in Greenland and Antarctica have, in turn, contributed to a rise in sea level.¹⁰ Rising sea levels could lead to significant environmental and ecosystem disturbances, as well as major population displacement and economic upheaval.

⁸ Ibid

⁹ Ibid

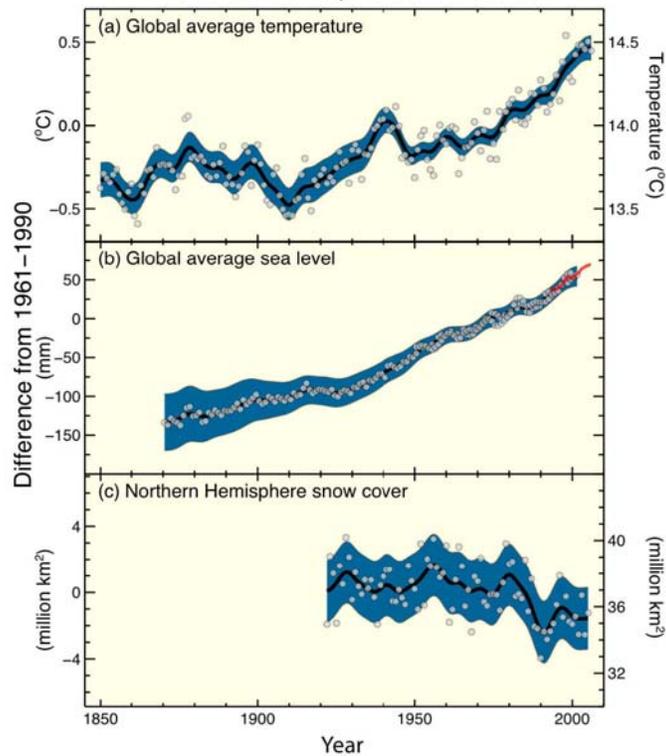
¹⁰ Ibid

Figure 2a: Global Temperature Reconstructions for the Past 2000 Years



Source: Mann et. al. 2003 “On Past Temperatures and Anomalous Late 20th Century Warmth” EOS, TRANSACTIONS AMERICAN GEOPHYSICAL UNION, VOL. 84, NO. 44, PAGE 473

Figure 2b: Changes in Global Temperature, Sea Level, and Snow Cover Over the Past Century



Source: IPCC “Climate Change 2007: The Physical Science Basis. Summary for Policy Makers”

In addition to increased temperatures, other secondary impacts of climate change have already been observed. These impacts include:¹¹

- The extent of Arctic sea ice has shrunk by 2.7% per decade since 1978;
- Significantly increased precipitation levels in eastern parts of North and South America, northern Europe and northern and central Asia between 1900 and 2005;
- More intense and longer droughts have occurred over wider areas since the 1970s, particularly in the tropics and subtropics;
- The frequency of heavy precipitation events has increased over most land areas;
- Frost has become less frequent, while heat waves have become more frequent over the past 50 years;
- An increase in the intensity of hurricanes in the North Atlantic since 1970; and
- A decrease in ocean salinity at mid- to high-latitudes and an increase in the tropics, suggesting changes in precipitation and evaporation.

Secondary impacts are more difficult to predict, as they are caused by multiple that vary by region. It is also important to understand that while the average global temperature has risen and will continue to rise, the net result in individual locations will vary widely.

Local Impacts

Climate change is a global problem influenced by an array of interrelated factors that have concrete consequences for the Intermountain West. A 2010 report by the Lincoln Institute of Land Policy, “Planning for Climate Change in the West,” found that climate change will significantly challenge the region’s natural and economic systems.¹² (All subsequent mention of climate impacts in the Intermountain West, aside from the studies directly cited, reference this study.)

Natural disasters: Local climate trends will reflect continued increases in both average air and water temperatures. Due to a hotter, drier climate, the Intermountain West will likely see an increase in extreme weather events. Climate models show that an increased amount of rain and snow will come in the form of severe storms exceeding current flood control systems, with more frequent and intense flood events, even while overall precipitation may decrease. Additionally, earlier snowmelt may cause changes in river and stream flows. Increased seasonal flooding could incur considerable costs as these phenomena pose risks to property, infrastructure and even human life.

For centuries, wildfire in the arid western states had been a natural and beneficial phenomenon for many ecosystems, to help clear out thick underbrush, create disturbance for new growth, and facilitate reproduction of some species. As development encroached into the forested area, aggressive fire suppression management has been exercised to protect the general public. As a result, large fuel loads have built up in many forest ecosystems, and have been further exacerbated by the spread of non-native, invasive grass species prone to frequent fire. Fire seasons have also been extended due to warmer, earlier springs leading to increased drying periods for vegetation. All these factors contribute to a dramatic increase in large-scale fire in the recent decades.

Impact on water: Water quality and quantity are also at risk to be depleted as a result of changing temperatures. With warmer average temperatures, more winter precipitation will fall in the form of rain

¹¹ United Nations Intergovernmental Panel on Climate Change - IPCC (2007). “Climate Change 2007: The Physical Science Basis. Summary for Policy Makers,” <http://www.ipcc.ch/SPM2feb07.pdf>

¹² Rebecca Carter and Susan Culp, “Planning for Climate Change in the West.” Policy Focus Report, Lincoln Institute of Land Policy.

https://www.lincolninst.edu/pubs/dl/1744_966_Planning%20for%20Climate%20Change%20in%20the%20West.pdf

instead of snow, shortening the winter snowfall season and accelerating the rate at which the snow pack melts in the spring.

These snow melt patterns increase the threat for spring flooding and decrease the storage of the natural water tower in the Sierra Nevada mountain range, meaning less water will be available for agricultural irrigation and the general needs of a growing population, especially during the summer months.

Impact on plants and animals: The local native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes. Increased temperatures also provide a foothold for invasive weed and insect species, as well as other non-native threats.

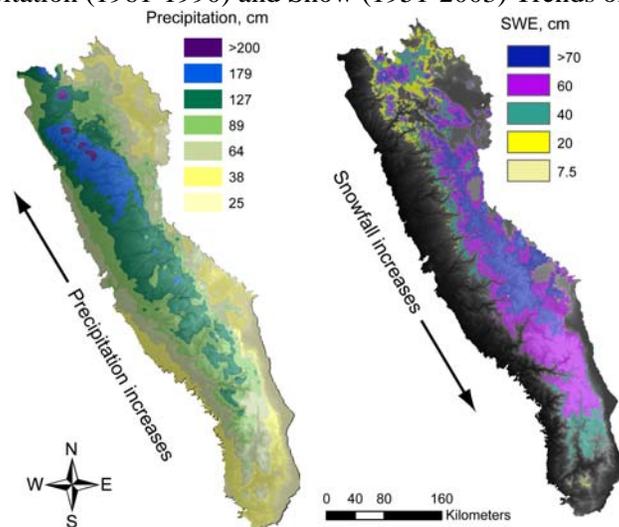
The change in hydrology caused by warmer and drier climate in turn causes stress to the riparian ecosystems and other wildlife habitats, which depend on the region's rare and precious waterways.

Additionally, these trends alter the natural cycle of flowering and pollination, as well as the temperature conditions necessary for a thriving locally adapted agriculture. Perennial crops in particular will be challenged.

Public health impact: Warming temperatures and increased precipitation can accelerate the breeding of mosquitoes, thus engendering diseases for which mosquitoes are vectors, such as the West Nile virus. Increased temperatures also pose a risk to human health because it increases ozone levels and air pollution toxicity, which are tied to increased rates of asthma and other pulmonary diseases. Furthermore, the anticipated increase in hotter days poses heat-stroke risks particular for the elderly, young, those already sick, and people who work outdoors.

Regional evidence: The impacts of climate change are already here, and are expected to continue to escalate if the levels of heat trapping pollution continue to increase. Figure 3a shows annual average precipitation (1961 – 1990) and snow water equivalent (SWE) (1951 – 2003) in the Sierra Nevada. Figure 3b shows the April 1st snow course data (1950 – 1997) of the Intermountain West. Figure 3c shows the April 1st snow course data from 1950 to 1997 for the Sierra Nevada, which includes the elevation shading.

Figure 3a: Precipitation (1961-1990) and Snow (1951-2003) Trends of the Sierra Nevada

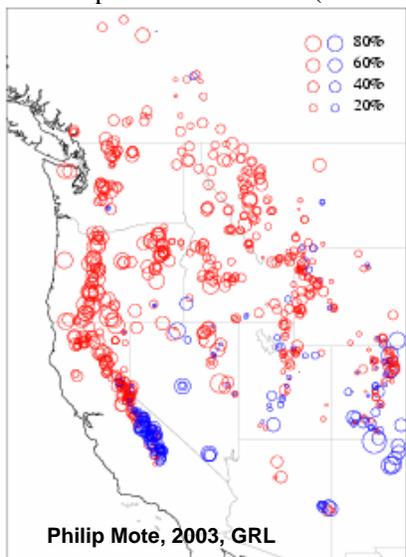


Source: Bales, et al.: Mountain Hydrology of the Western US, 2006¹³

Annual average precipitation and snow water equivalent gradients related to latitude and elevation in the Sierra Nevada, interpolated by the method of Fassnacht et al. [2003]

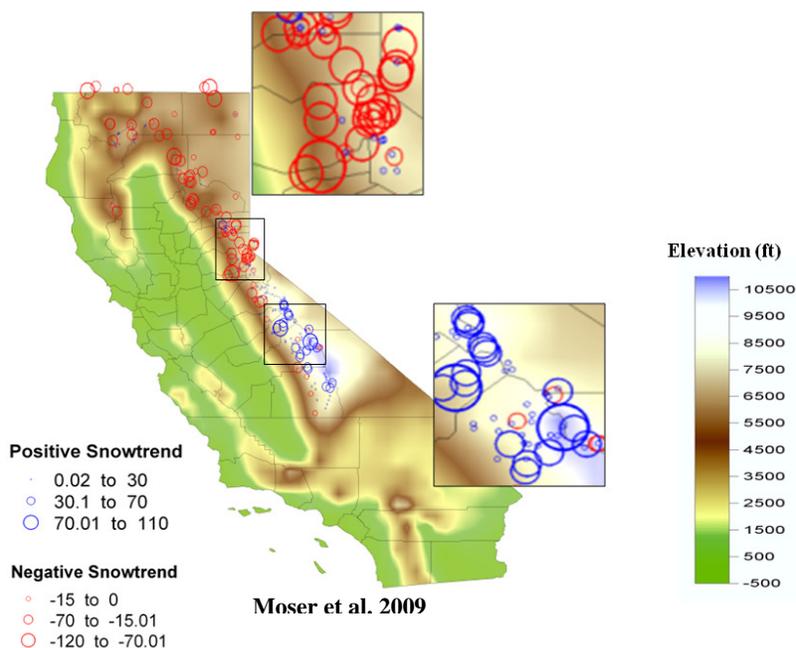
¹³ Bales, et al, "Mountain Hydrology of the western United States," Water Resources Research, Vol. 42, W08432, doi:10.1029/2005WR004387, 2006, <http://tenaya.ucsd.edu/~dettunge/balesetal06.pdf>

Figure 3b: Apr 1 Snow Course (1950-1997)



Source: Dettinger, et al, USGS and Scripps Institution of Oceanography, 2004¹⁴

Figure 3c: April 1 Snow Trends 1950-1997



Source: USDA Forest Service, 2009¹⁵

These figures show widespread increases in average annual precipitation for the period 1961 to 1990 and decreases in April 1 SWE (an important indicator for forecasting summer water supplies) for the period 1950 to 1997. The size of the circles in Figures 3b & 3c corresponds to the magnitude of the change, with the red circles indicating negative trends and blue circles positive trends.

¹⁴ Dettinger, et al, USGS and Scripps Institution of Oceanography, “Earlier Springs in the Western U.S.: Observations and Projections.” http://www.climatechange.ca.gov/events/2004_conference/presentations/2004-06-09_DETTINGER.PDF

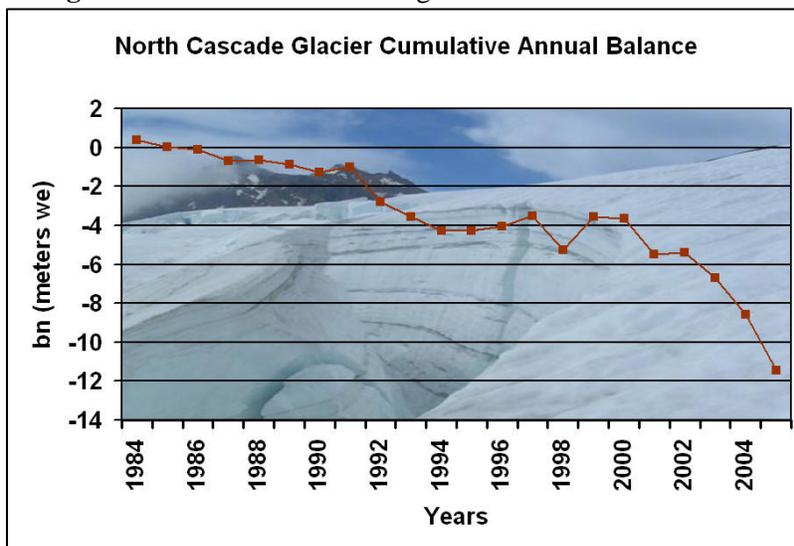
¹⁵ Toni Lyn Morelli, Pacific Southwest Research Station, USDA Forest Service, “Evaluating Climate Change in the Eastern Sierra Nevada.” http://www.fs.fed.us/psw/cirmount/policy/bishop2009/BISHOP2009_review.pdf

Some of the largest precipitation decreases and temperature increases (up to 5.4°F) are projected for winter in the Sierra Nevada, particularly the latter half of the cold season. As an exception, cold season rainfall is expected to increase in higher elevation of the Sierra Nevada. Snowpack in the high Sierra Nevada is projected to decrease by over 40% in fall and nearly 70% in winter, reducing winter snowmelt by 54% from the late 1900s (Kim et al. 2009).¹⁶

In addition, Lake Tahoe is warming at almost twice the rate of the world’s oceans, similar to warming reported in other big lakes around the world, including the U.S. Great Lakes (Coats et al. 2006, Mazur & Milanes 2009). From 1969 to 2002, Lake Tahoe’s water temperature increased about 0.88°F, driven by warmer air temperatures (nighttime air temperatures increased 3.6°F from 1914-2002; Moser et al. 2009).¹⁷

Due to a lack of more localized information, figure 4a below indicates the rate that glaciers in the North Cascades, located in the Pacific Northwest, are shrinking. The loss of glacier volume since 1984 represents 20 to 40 percent of entire glacier volume. Figure 4b illustrates how this change has been so dramatic and rapid, it can be seen with the naked eye.

Figure 4a: Rate of recession of glaciers in the North Cascades



Source: North Cascades Glacier Climate Project¹⁸

¹⁶ Ibid

¹⁷ Ibid

¹⁸ North Cascades Glacier Climate Project. 2006. <http://www.nichols.edu/departments/Glacier/>

Figure 4b: Eyewitness North Cascades Glacier Recession

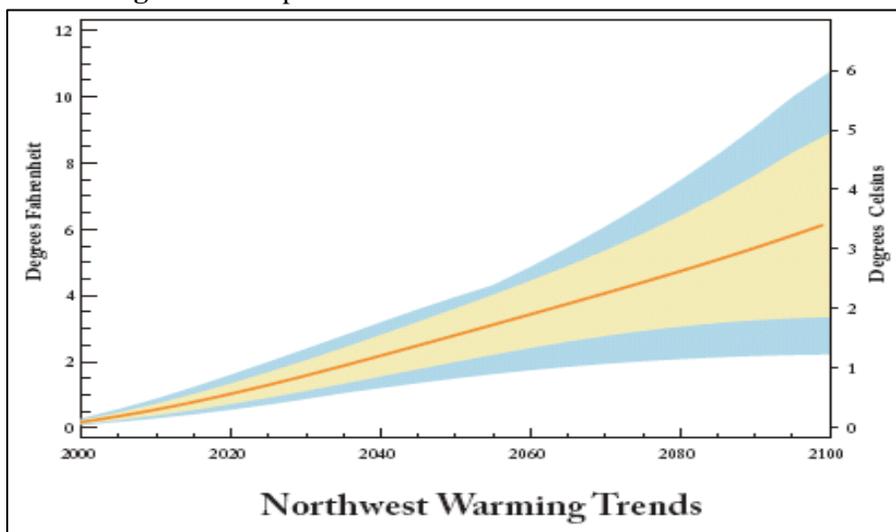


Source: North Cascades Glacier Climate Project¹⁹

Scientists have calculated a number of predicted increases in average temperature in the Northwest under ten different climate change study scenarios. Figure 5 below illustrates these predictions. Each scenario makes different assumptions about the levels of heat trapping pollution that humans will emit over the next one hundred years. The orange line indicates the average temperature from all of the scenarios. The yellow area indicates the temperature range that two-thirds of the scenarios fall within. The blue area indicates the full range of variability of all of the scenarios.

It is important to note that there is very little variability in short-term predictions of the average global temperature over the next twenty to thirty years. This is due to the significant lag time inherent in the climate system: the impact of gases already in the atmosphere will determine the impacts felt in the near term. Moreover, despite the proliferation of energy saving technologies, existing power plants and vehicles will continue to be used in the short term. The short- and medium-term implications of climate change are therefore largely unalterable. However, longer-term outcomes, meaning those relating to outcomes that will be felt between 2040 and 2100, will be shaped by the actions taken today.

Figure 5: Temperature under increased emissions scenarios



Source: University of Washington Climate Impacts Group. 2005. "Uncertain Future"

¹⁹North Cascades Glacier Climate Project. 2006. <http://www.nichols.edu/departments/Glacier/>

C. Action Being Taken on Climate Change

National and State Action

State Actions: Many states have begun to consider the affects of climate change. As of July 2007, 35 states have completed or are currently working on comprehensive Climate Action Plans.²⁰ The most common state laws call for studies of the impacts of climate change and require inventories of the states' GHG emissions and the creation of commissions to study the possible implications of GHG trading systems. However, seventeen of these states have passed legislation setting GHG targets.²¹

In addition to these individual state actions, there are two regional coalitions coordinating an interstate agreement to mitigate climate change in North America. The Western Regional Climate Action Initiative was announced in February 2007, by the governors of Arizona, California, New Mexico, Oregon and Washington. Since that time, Utah, British Columbia, and Manitoba have joined the Initiative. Under the Initiative, the participating states have agreed to cut GHG emissions levels to 15% below 2005 levels by 2020 by establishing and implementing a market-based system by August 2008.²² The Regional Greenhouse Gas Initiative (RGGI) of the Northeastern and Mid-Atlantic states has also set reduction targets for GHG pollution emitted from the generation of electricity, and is trying to establish a market-based regional cap-and-trade program they hope to put into effect by 2009.²³

The State of Nevada

Over the past several years, the Nevada State Legislature has passed a number of bills that will have an impact on the reduction of GHG emissions.

AB 237 (2003) revised the definitions of “alternative fuel” and “dedicated alternative fuel motor vehicle” by removing petroleum diesel from the alternative fuel list and adding biodiesel. It also took steps to move the program from fuel based to emission based by requiring the State Environmental Commission to adopt regulations relating to dedicated alternative fuel motor vehicles.

AB 296 (2003) provides that, for the purposes of complying with the Portfolio Standard, 1 kilowatt-hour of energy generated by solar photovoltaic (PV) energy systems is equivalent to 2.4 kilowatt hours of energy. In addition, the measure establishes that energy generated from tires is only considered renewable energy if generated using a reverse polymerization process. If this process is used, 1 kilowatt-hour of energy generated is equivalent to 0.7 kilowatt-hours of energy.

AB 398 (2003) establishes an alternative procedure pursuant to which certain performance contracts for the installation or purchase of cost-savings energy measures in buildings occupied by state and local governmental entities are bid. The bill authorizes local governments to enter into performance contracts with “qualified service companies” for the purpose of saving energy and other resources and repeals existing provisions regarding energy efficiency retrofits. The measure notes that performance contract terms shall not exceed 15 years.

AB 429 (2003) defines a “qualified Energy recovery process” to mean a system with a nameplate capacity of not more than 15 megawatts that converts heat lost from exhaust stacks or pipes, or reduction in high pressure water and gas lines, and uses the energy to generate electricity. The measure also establishes a program to promote net metering systems through the Nevada State Office of Energy. The program may distribute money in the form of grants, incentives, or rebates to aid in the cost to install or improve net metering systems. In addition, the measure defines “net metering system” as having a generating capacity

²⁰Pew Center on Global Climate Change: http://www.pewclimate.org/what_s_being_done/in_the_states/action_plan_map.cfm

²¹ Pew Center on Global Climate Change: http://www.pewclimate.org/what_s_being_done/in_the_states/emissionstargets_map.cfm

²² Washington Department of Ecology <http://www.ecy.wa.gov/climatechange/CATdocs/06052007CATsummary.pdf>

²³ Regional Greenhouse Gas Inventory - <http://www.rggi.org/agreement.htm>

of not more than 30 kilowatts. The bill also includes the term “waterpower” in the definition of “renewable energy.” Further, the measure adds a qualified energy recovery process to the renewable energy portfolio standard. The definition of “renewable energy system” is amended to include both solar and solar thermal energy systems that reduce the consumption of electricity, natural gas, or propane.

AB 431 (2003) provides that the Public Utilities Commission of Nevada must adopt regulations to establish a system of renewable energy credits. In addition, the bill creates the solar energy systems demonstration program to provide incentives for the installation of certain solar energy systems. The Renewable Energy Task Force is responsible for reviewing and nominating applicants for participation in the demonstration program.

AB 220 (2005) expands the types of “finished diesel fuel” that can qualify as an “alternative fuel,” provides technical corrections regarding the proper names of certain specifications, and clarifies that alternative fuels must comply only with any applicable regulations adopted by the federal Environmental Protection Agency pursuant to the standards established in the federal Clean Air Act Amendments of 1990.

AB 236 (2005) is designed to encourage the development of small-scale renewable energy systems. The bill requires a utility to offer net metering systems to its customers until the cumulative capacity of all such net metering systems is equal to one percent of the utility’s peak capacity. A customer may install a net metering system that has generative capacity of up to 150 kilowatts. Also, the measure establishes formulas for calculating the net cost of electricity based on net metering system capacity. Additionally, to make it easier for small generators to install their own systems, the measure provides that the permitting requirements for electric generating plants and associated facilities will not apply to certain types of renewable energy used as a primary source to generate electricity. Finally, the bill requires a local government to permit a person to use solar or wind energy systems, to the extent the local climate allows for the use of such systems.

AB 3 (as AB 385) (2005) provides incentives for energy efficiency and energy-efficient or “green” buildings. Qualifying buildings can be granted a partial abatement from property taxes up to 50% for up to 10 years, and the materials used to construct or remodel such a building are exempt from certain sales and use taxes.

Additionally, the Director of the Office of Energy is directed to:

- Adopt guidelines for green building standards for all new building projects of occupied public buildings;
- Establish a process for adopting the Leadership in Energy and Environmental Design (LEED) green building rating system, or its equivalent;
- Prepare a state energy reduction plan to reduce grid-based energy purchases for state-owned buildings;
- Adopt regulations that include the International Energy Conservation Code; and
- Prepare a report reviewing model commercial standards for appliances by July 2006.

To ensure that personnel are qualified to install renewable systems, the Division of Industrial Relations must adopt licensing procedures in occupations involving photovoltaic or solar energy system projects.

SB 437(2007) enacted the Solar Energy Systems Incentive Program, the Renewable Energy School Pilot Program and the Wind and Waterpower Energy Systems Demonstration Programs; established a program for evaluating the energy consumption of residential property; revised legislative findings concerning energy conservation and energy requirements; revised provisions governing the universal energy charge and the Fund for Energy Assistance and Conservation; required certain electric utilities to make quarterly rate adjustments; required the creation of various methods and programs to remove financial disincentives

that may discourage energy conservation by various public utilities that purchase natural gas for resale; revised various provisions governing utility resource planning and the portfolio standard for providers of electric service; required certain residential properties for sale to be evaluated based on energy consumption and required that certain evaluations be provided to purchasers of those properties; and revised various provisions governing partial abatements of certain taxes by the Commission on Economic Development.

AB 1 (2007) relates to the renewable portfolio standard. This measure makes a geothermal energy system an energy efficiency measure if it provides heated water to customers. This provision recognizes and rewards “pioneers” who installed geothermal heating systems before there were any incentives and encourages installation of new ones. It also makes adjustments to the renewable portfolio standard as it applies to a provider of new electric resources.

It:

- Allows a provider to earn credits for an energy efficiency measure or a solar energy system paid for, in whole or in part, by a customer;
- Relieves a provider from having to install at least half of any energy efficiency measures at residential service locations; and
- Relieves providers from having the terms of their renewable energy or energy efficiency contracts approved by the PUCN.

AB 178 (2007), enhances the Legislature’s energy efficiency and renewable energy efforts. Between January 1, 2012, and December 1, 2015, no general purpose light bulb may be sold in Nevada unless it produces at least 25 lumens per watt. Regulations establishing the new, higher lumens per watt standard will be effective after January 1, 2016. When fully implemented, and after all the old bulbs have burned out and been replaced with new efficient ones, it is estimated the bill will lead to significant savings:

- 1,200 gigawatt-hours of electricity saved annually, equivalent to the electricity use of 100,000 typical households in Nevada;
- \$1.3 billion in net economic benefits for consumers over the lifetime of more efficient lamps installed through 2020;
- An annual reduction in carbon dioxide emissions of 850,000 tons—the equivalent of removing 160,000 passenger cars from the road; and
- 300 MWs of peak power avoided—the equivalent of 40 percent of one of the new coal-fired power plants planned in White Pine County.

AB 178 also increases the net metering limit from the current 150 kilowatts to 1 MW, allowing much larger renewable energy systems to be installed. Finally, AB 178 establishes the Wind Energy Systems Demonstration Program Act for qualified schools, other public properties, private residences, small businesses, and agricultural properties, identical to the program in SB 437. The bill also authorizes Clark County to establish a pilot program for collecting recyclable material with potential for conversion into renewable energy or fuel.

AB 621 (2007) requires the State Office of Energy to adopt a Green Building Rating System in order to determine eligibility for tax abatements. The system must:

- Be based on the Leadership in Energy and Environmental Design (LEED) system;
- Include LEED standards that have been in place for at least two years;
- Not include LEED standards for homes; and
- Require a building or other structure to obtain a certain amount of energy conservation points at the LEED silver, gold, and platinum levels.

A partial abatement of real property taxes must be granted for a building that meets the LEED silver, gold, or platinum standards. Rebates are correspondingly 25, 30, and 35 percent, for a period not to exceed ten years, and do not apply to the portion of the taxes attributable to public education. A project is not eligible for the abatement if it receives money from the State or a local government for construction of the building or land acquisition. The partial abatement terminates if the structure ceases to meet the LEED standards. This bill also consolidates various existing statutes related to energy conservation, and addresses the applicability of existing statutes to projects already underway. Qualifying projects are granted a real property tax abatement of 35 percent for ten years.

AB 163 (2009) encourages purchase and use of cleaner operating, more fuel-efficient vehicles by providing that Nevada's Department of Transportation may adopt regulations to allow certified low emission and energy-efficient vehicles to operate in lanes designated for preferential use or exclusive use of high-occupancy vehicles. Additionally, local governments may adopt regulations allowing low emission and energy-efficient vehicles, including golf carts, to travel in designated lanes on planned community streets.

AB 186 (2009) changes the definition of a public utility to exclude renewable energy systems dedicated to one customer. This allows for third party ownership of renewable energy systems. This will allow the local government agencies to partner with third parties, who are eligible for the federal tax credits, to install renewable energy systems.

AB 192 (2009) changes the provisions of NRS 332 dealing with local purchasing as it applies to performance contracting. The requirements for selecting a performance contractor and reporting on energy and financial savings have been clarified.

AB 387 (2009) provides for planning of transmission to renewable energy zones that are to be identified. It also increases the Portfolio Standard to 25% by 2025 and increases the solar set aside from 5% to 6% starting in 2016. This will serve to increase the amount of renewable energy in the energy mix and identify areas for renewable energy development.

AB 441 (2009) recognizes the value of alternative forms of transportation using electricity instead of fossil fuels by excluding electric bicycles from vehicle licensing, registration, and driver's license requirements. Electric bicycles will now be allowed on any trail or pedestrian walkway intended for use by bicycles and constructed using federal funding. Additionally, Nevada's Department of Transportation must include electric bicycles in the development and administration of plans relating to the establishment, construction, and maintenance of bicycle lanes and routes.

AB 522 (2009) changes the criteria for providing abatements to renewable energy companies by requiring the company (1) to locate in Nevada for at least 10 years, (2) acquire a local business license, (3) hire at least 75 full time employees of which at least 30% must be Nevada residents, (4) make a capital investment of at least \$10,000,000, (5) pay an average hourly wage at least 110% of the average statewide wage, (6) average hourly wage of construction workers must be at least 150% of average statewide wage, and (7) construction employees must be offered health insurance. If the above criteria are met, the state will abate property taxes for a term of 20 years equal to 55% on real and personal property and a term of 3 years on sales taxes above 2.6%. In the case of geothermal energy, the board of county commissioners must approve. AB 522 is a companion bill to SB 358 and provides for funding of the Renewable Energy & Energy Efficiency Authority and the Nevada Energy Commissioner.

ASSEMBLY JOINT RESOLUTION NO. 10 (2009) Approximately 87 percent of Nevada is controlled by the federal government primarily through the Bureau of Land Management. Many potentially productive solar, wind, geothermal, and biomass sites in Nevada are located on federal land. The resolution urges Congress to enact legislation requiring the Secretary of the Interior to consider the recommendations of appropriate State agencies to identify and then convey ownership of land managed or

controlled by the Bureau of Land Management to the State of Nevada for development of renewable energy projects.

SB 9 (2009) authorizes taxicab companies to use hybrid electric vehicles for 24 months longer than a nonhybrid vehicle thus encouraging cab companies to include such vehicles in their fleets.

SB 73 (2009) requires local governing bodies to adopt and enforce the energy conservation standards approved by the State Energy Office or a higher or more stringent standard. There is also a requirement to review systems for electric resistance heating and approve exceptions or approve those systems hydronic radiant heating, ground source heat pumps, or water source heat pumps.

SB 114 (2009) prohibits homeowners' associations from imposing a restriction that reduces the efficiency or performance of a solar photovoltaic system by more than 10 percent or that prohibits the use of black solar glazing on a solar energy system.

SB 152 (2009) creates the Green Jobs Initiative through the Department of Employment, Training and Rehabilitation, the Housing Division and the Nevada System of Higher Education (NSHE). It further requires State Public Works Board, NSHE, and local school districts to determine specific projects to weatherize and public facilities to retrofit, including renewable energy systems. Additionally, SB 152 calls for the prioritization and selection of such projects. The measure specifies various criteria for prioritizing and selecting these projects, including (1) the length of time necessary to commence the project, (2) the number of workers, (3) the effectiveness of the project in reducing energy consumption, (4) its overall cost, (5) whether the project will be powered by renewable energy sources, et al.

SB 165 (2009) addresses the issue of tracking CO₂ emissions and accurately forecasting future carbon regulation impacts. It is incumbent on the Public Utilities Commission to require utilities to forecast future fuel prices as accurately as possible so that various alternative methods of meeting electric load demand can be fairly compared. This cannot be done without taking into account the financial impact of carbon regulation. It requires a utility to include in its triennial integrated resource plan a comparison of a diverse set of scenarios of the best combination of sources of supply to meet the demand on the utility's system. The plan must include at least one low carbon emission scenario.

SB 188 (2009) helps build a market for solar thermal systems to reduce the demand for natural gas in homes, businesses, and other buildings through the installation of at least 3,000 solar thermal systems in Nevada by 2019. The bill requires the Public Utilities Commission to establish a demonstration program for private residential, public, school, small business, and other property, establishing requirements for participation, specifications for design, energy output, installation program milestones, and a rebate program.

SB 332 (2009), a companion bill to S.J.R. 9, finds the State's environment, particularly metropolitan air quality, can be improved through use of alternative fuels and clean vehicles. Public entities can lead by example through use of cleaner-burning alternative fuels and acquisition of clean vehicles. The bill revises provisions governing use of alternative fuels by most public fleet vehicles and requires the State Environmental Commission to adopt regulations concerning standards and requirements for motor vehicles that use alternative fuels.

SB 358 (2009) creates the Renewable Energy and Energy Efficiency Authority and the Nevada Energy Commissioner. Most of the duties of the State Energy Office and Renewable Energy & Energy Conservation Task Force are transferred to the Authority. The Nevada Energy Commissioner will create a State & Local Government Panel on Renewable Energy & Energy Efficiency and a New Energy Industry Task Force to advise the Commissioner. The State & Local Government panel will have representatives appointed by the League of Cities and NACO and will advise the Authority on issues relating to the viability and progress of energy efficiency and renewable energy retrofit projects in public buildings. The

bill also changes the size, scope and procedures involved in the Solar, Wind and Water incentive programs. It also increases the Portfolio Standard to 25% by 2025 and increases the solar set aside from 5% to 6% starting in 2016. The bill further expands the list of improvement projects that the local government may finance to include energy efficiency improvement and renewable energy projects.

Lastly, it requires the governing body of each local government to develop a plan to retrofit public facilities by July 27, 2009. The plan must include a list of specific projects prioritized using the following criteria (1) the length of time necessary to commence the project, (2) the number of workers estimated to be employed on the project, (3) the effectiveness of the project in reducing energy consumption, (4) the estimated cost of the project, (5) whether the project is able to be powered by or otherwise use sources of renewable energy, (6) Whether the project has qualified for participation in one or more of the following programs: (I) The Solar Energy Systems Incentive Program; (II) The Renewable Energy School Pilot Program; (III) The Wind Energy Systems Demonstration Program; or (IV) The Waterpower Energy Systems Demonstration. The plan must also include a list of potential funding sources for use in implementing the projects, including, without limitation, money available through the Energy Efficiency and Conservation Block Grant Program (EECBG). The governing body of each local government shall submit the plan developed to the Nevada Energy Commissioner and to any other entity designated for that purpose by the Legislature.

SB 395 (2009) requires State Purchasing to establish standards for energy efficient appliances and equipment. It also requires the State Public Works Board to establish standards for green building and life cycle cost analysis. Further, it requires that auto dealers disclose carbon dioxide emissions data for all new vehicles beginning with the 2012 model year.

SENATE JOINT RESOLUTION NO. 9 (2009) urges Congress to allow state government fleets to use more hybrid vehicles to comply with the federal Energy Policy Act. Currently, hybrids are only allowed to satisfy state fleet requirements under limited circumstances.

SENATE CONCURRENT RESOLUTION NO. 19 (2009) directs the Legislative Commission to appoint a committee to study energy issues in Nevada. The study must include a review of statutes and regulations concerning all aspects of energy, including production, transmission, and programs for energy efficiency, plus electric vehicles, alternative fuels, and other related issues. The review includes an analysis of the effectiveness and implementation of existing energy or energy efficiency programs, and any new programs enacted by the 2009 Legislature. Finally, the study must investigate existing and emerging green technologies, including efforts to attract and expand green industries and jobs to Nevada. The results of the study and any recommendations for legislation are to be submitted for consideration to the 2011 Legislative Session.

Local Action

A great deal of work is also being done at the local level to address climate change.

U.S Mayor's Climate Protection Agreement

A national effort called the U.S Mayor's Climate Protection Agreement (MCPA) was established by Seattle Mayor Greg Nickels to promote local adherence to the goals of the Kyoto Protocol – an international agreement addressing global warming pollution and ratified by 164 countries. On February 16, 2005, the Agreement was launched and now includes over 640 signatures from mayors representing over 72 million Americans in all 50 states, Washington, D.C., and Puerto Rico. Signing the agreement makes a pledge that a city will reduce its GHG emissions consistent with the Kyoto Protocol, which declares reductions of 7 percent below 1990 levels by the year 2012. For more information about the MCPA, visit: <http://www.seattle.gov/mayor/climate/>

Locally in Washoe County, the City of Reno signed the agreement on August 11, 2006 and the City of Sparks signed the agreement in 2004.

ICLEI—Local Governments for Sustainability

Additionally, ICLEI—Local Governments for Sustainability has been a leader on both the international and national level for almost fifteen years, representing over 1,100 local governments around the world. ICLEI was launched in the United States in 1993 and has grown to over 600 cities and counties providing national leadership on climate protection and sustainable development. Today in Washington, ICLEI is working with 20 cities and counties on local climate policies – and forging a strong network between these governments.

D. ICLEI and the Cities for Climate Protection Campaign

ICLEI's mission is to improve the global environment through local action. The Cities for Climate Protection® (CCP) Campaign is ICLEI's flagship campaign designed to educate and empower local governments worldwide to take action on climate change. ICLEI provides resources, tools, and technical assistance to help local governments measure and reduce GHG emissions in their communities and their internal municipal operations.

ICLEI's CCP Campaign was launched in 1993 when municipal leaders, invited by ICLEI, met at the United Nations in New York and adopted a declaration that called for the establishment of a worldwide movement of local governments to reduce GHG emissions, improve air quality, and enhance urban sustainability. The CCP Campaign achieves these results by linking climate change mitigation with actions that improve local air quality, reduce local government operating costs, and improve quality of life by addressing other local concerns. The CCP Campaign seeks to achieve significant reductions in U.S. GHG emissions by assisting local governments in taking action to reduce emissions and realize multiple benefits for their communities.

ICLEI uses the performance-oriented framework and methodology of the CCP Campaign's Five Milestones to assist U.S. local governments in developing and implementing harmonized local approaches for reducing global warming and air pollution emissions, with the additional benefit of improving community livability. The milestone process consists of:

- Milestone 1: Conduct a baseline emissions inventory and forecast
- Milestone 2: Adopt an emissions reduction target
- Milestone 3: Develop a Climate Action Plan for reducing emissions
- Milestone 4: Implement policies and measures
- Milestone 5: Monitor and verify results

On October 28, 2008, Washoe County adopted a resolution to take action for climate protection and officially joined the 600 communities participating in ICLEI's CCP Campaign.

II. Emissions Inventory

A. Reasoning, Methodology & Model

ICLEI's Cities for Climate Protection methodology allows local governments to systematically estimate and track GHG emissions from energy and waste related activities at the community-wide scale and those resulting directly from municipal operations. The municipal operations inventory is a subset of the community-scale inventory.

Once completed, these inventories provide the basis for creating an emissions forecast and reduction target, and enable the quantification of emissions reductions associated with implemented and proposed measures.

1. CACP Software and Inventory Method

To facilitate local government efforts to identify and reduce GHG emissions, ICLEI developed the Clean Air and Climate Protection (CACP) Software package with Torrie Smith Associates.

The CACP software has been and continues to be used by over 600 U.S. cities and counties to reduce their GHG emissions. However, it is worth noting that, although the software provides Washoe County with a sophisticated and useful tool, calculating emissions with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation, rather than an exact value.

This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Emissions are aggregated and reported in terms of equivalent carbon dioxide units, or eCO₂. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different GHG in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one tonne of methane emissions to 21 Metric tons of eCO₂.

The emissions coefficients and methodology employed by the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) and the U.S. Voluntary GHG Reporting Guidelines (EIA form 1605).

The inventory is composed of two **categories**, which are analyzed independently: **municipal government emissions** and **community-wide emissions**. The inventory of the community emissions explores all sources within the Washoe County limits. The municipal operations inventory includes only those sources that are under the operational control or financial purview of Washoe County municipal organization.

Washoe County has chosen to develop community and municipal operations inventories based on the 2008 calendar year (baseline year). The community-wide inventory is the total, and the municipal government category is a specific subset of that total.

These two categories are explored independently for several reasons. The community-wide inventory explores sectors (residential, commercial, etc.), while a much finer resolution is possible in the municipal operations portion of the inventory (energy use by facility, etc.). Additionally, when attention is turned to the question of where emissions reductions are possible, there will be a different set of options for city-owned facilities than for private sector emissions. For example, the city might opt to implement a

procurement policy requiring that certain vehicles in the city fleet be replaced by hybrid vehicles, whereas in the private sector an education program about hybrids or an incentive program would be appropriate. Each of these categories is further broken down by sources and sectors. **Sources** are the fuel or energy that is the basis of the emissions. In this inventory, the main sources considered are electricity, natural gas, diesel, gasoline, and waste. **Sectors** are the portion of the community or government operations to which the emissions are attributable. In the **community inventory** the **sectors** considered are residential, commercial, industrial, transportation, and waste. In **municipal operations** the **sectors** considered are buildings, vehicle fleet, employee commute, lights, water/sewer and waste.

It should be noted that when calculating Washoe County's community emissions inventory, all energy consumed in Washoe County was included. This means that, even though the electricity used by residents is produced elsewhere, this energy and its associated emissions appear in the inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full ownership of the impacts associated with its energy consumption, regardless of whether the generation occurs within the geographical limits of the community.

For the same reasons, when calculating Washoe County's community emissions inventory, all waste generated in Washoe County was included, though it is landfilled outside the county. Even though the waste is deposited elsewhere, this energy and its associated emissions appear in the inventory.

2. Inventory Sources and Creation Process

The creation of an emissions inventory required the collection of information from a variety of sectors and sources. For the community inventory, the main sources of data were NV Energy, which provides the community with both electricity and natural gas, Southwest Gas Corp., natural gas provider for the southeastern outlying areas of Washoe County, the Regional Transportation Commission, which is the metropolitan planning organization (MPO) that provides the total vehicle miles traveled, and Waste Management, a private waste hauling and disposal company for waste generated. For the municipal inventory, the primary data sources were Washoe County's Public Works Department for the utilities data, Washoe County Fleet Manager for vehicle fleet records, Waste Management for municipal waste generated, and an in-house survey for the employee commuting.

The waste sector of both the municipal and community inventories deserves additional explanation. The CACP2009 Software is designed to be used in communities with a variety of waste disposal methods including open dumps and incineration. The calculations are based on the EPA's Waste Reduction Model (WARM). WARM was developed to assist solid waste managers in determining the GHG impacts of their waste management practices. WARM compares GHG and energy impacts of landfilling, recycling, incineration, composting, and source reduction.

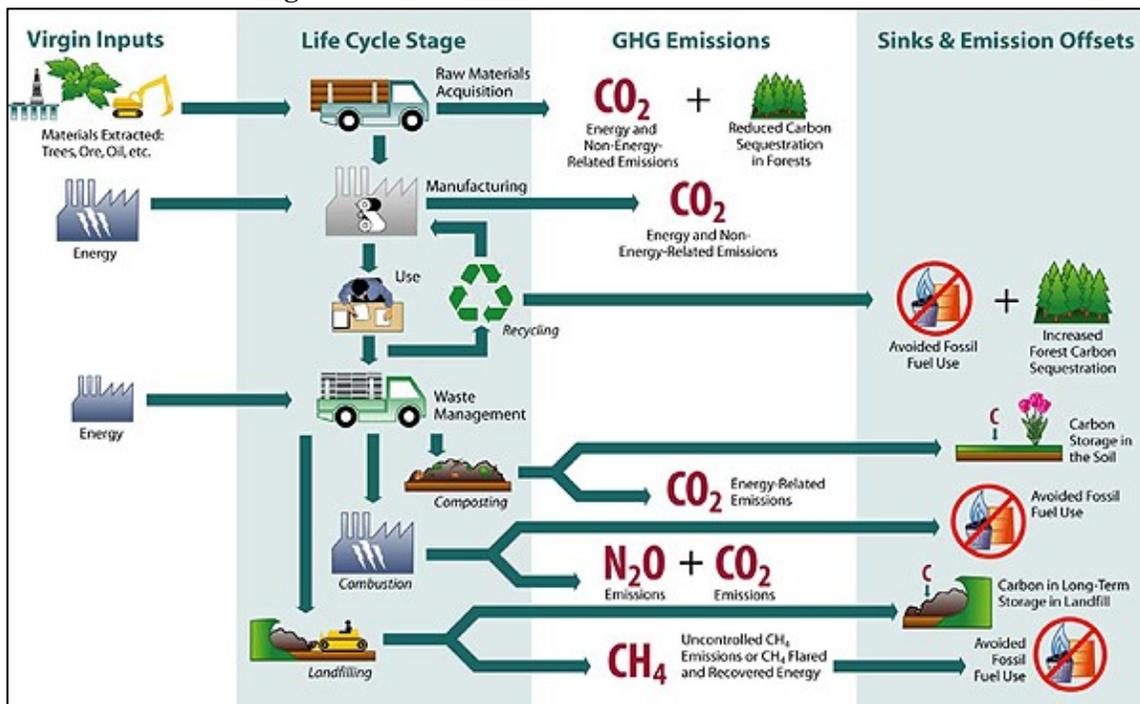
Washoe County's waste inventory is consistent with this national standard set by EPA. When organic matter like food scraps and yard waste decompose deep in a landfill where there is very little oxygen, it can create methane (CH₄), which traps more than twenty times as much heat as CO₂. In some cases, waste disposal can be a significant part of a community's climate pollution profile. In the case of Washoe County, all of our waste is sent to the Lockwood Landfill. The EPA estimates that 60 to 80 % of methane is recovered at the landfills to which Washoe County sends its waste. Recent studies have begun to question the U.S. EPA's estimates for the amount of methane that is actually captured by methane recovery systems at landfills. Many hypothesize that the efficiency with which methane recovery systems capture methane is currently overestimated, and that much more of the potent GHG is actually escaping from landfills into the atmosphere. In the absence of exact data, the Inter-governmental Panel on Climate Change recommends using the conservative end of that range to estimate the percentage of methane recovery at landfills. ICLEI chose to follow the recommendation and used a 75 % methane recovery factor if methane recovery occurs at a landfill. At the Lockwood Landfill, methane recovery process that involved burning or flaring of capture methane began in 2009. Since the process of flaring began in 2009,

a methane recovery factor of zero is used for the 2008 base year GHG inventory, but a 75% methane recovery factor will be used for future inventory calculation.

Unlike the WARM model, ICLEI’s waste reporting protocol does not take into account carbon sequestered in a landfill as an offset to emissions. WHERE LANDFILL METHANE IS CAPTURED: Methane is released as part of the decomposition of organic matter. However, most of the methane at the Lockwood Landfill converts to CO₂, and these emissions, summed with the small volume of methane that leaks out of the landfill, are still relatively small compared with other sectors. Of course, this does not mean that the reduction of solid waste generated in our community should not be a priority. Among other benefits, reducing the amount of waste created can preserve natural resources and decrease emissions that result from the transportation of waste. In addition, manufacturing paper and other goods from recycled sources is less energy intensive than harvesting and processing new inputs.²⁴

It is also important to note that while the waste-reduction effect of recycling is not reflected in this “end use” or “downstream” analysis, recycling does save a substantial amount of energy by reducing the need for virgin inputs and has a net benefit for the climate. Figure 6 shows GHG sources and sinks in the waste sector.

Figure 6: GHG Sources and Sinks in the Waste Sector



Source: U.S. EPA²⁵

²⁴ U.S. Environmental Protection Agency. (2006). “Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks. <http://epa.gov/climatechange/wywd/waste/SWMGHGreport.html>

²⁵ U.S. Environmental Protection Agency (2006). “Global Warming - Waste.” U.S. EPA... Online. <http://yosemite.epa.gov/oar/globalwarming.nsf/content/actionswastebasicinfogenerallifecycle.html>.

B. Inventory Results

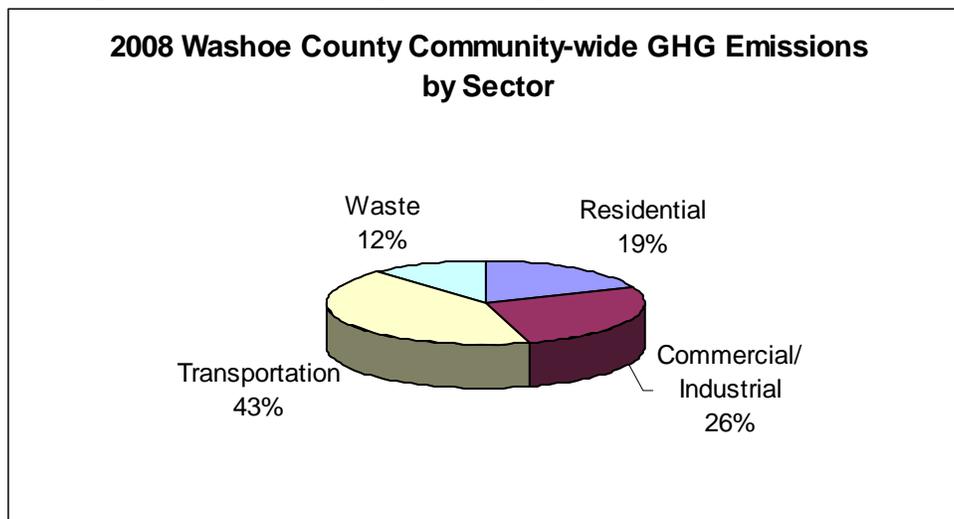
1. Community Emissions Inventory

In the base year 2008, the community of Washoe County emitted approximately 6,093,401 metric tons of eCO₂ from the residential, commercial, industrial, transportation and waste sectors. Burning fossil fuels in vehicles and for energy use in buildings and facilities is a major contributor to Washoe County's GHG emissions. Fuel consumption in the transportation sector is the single biggest source of emissions, contributing 43 % of total emissions. Table 1 and Figure 7 below show the breakdown of municipal emissions by source type. The residential and commercial/industrial sectors represent emissions that resulted primarily from electricity and natural gas. Minor emission contributors included liquefied petroleum gas (LPG), Fuel Oil #1, 2, and 4, and kerosene. They are used in both private and public sector buildings and facilities. The transportation sector includes emissions from private, commercial and fleet vehicles driven within the County's geographical boundaries as well as the emissions from transit vehicles and the county-owned fleet. It also includes emissions from locomotives and air travel by Washoe County residents.

Table 1: Washoe County Community Emissions Summary

Sector	Equiv CO ₂ Emitted (metric tons)	% of Total	Energy Consumed (million Btu)
Residential	1,155,619	19	15,488,902
Commercial/ Industrial	1,612,383	26	17,682,806
Transportation	2,605,371	43	35,240,483
Waste	720,028	12	0
TOTAL	6,093,401	100	68,412,191

Figure 7: Washoe County Community GHG Emissions - Year 2008



Source: CACP2009 Model output

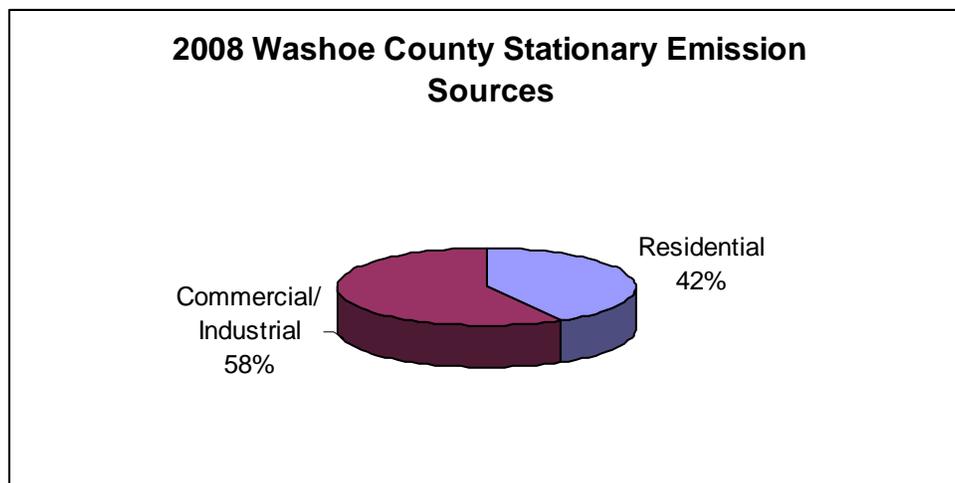
Energy/Stationary Source Emissions

In 2008, Washoe County's total stationary energy consumption was about 4,252,330,723 kWh of electricity and 170,043,557 therms of natural gas. Minor stationary source fuel usage also included 8,473,546 gallons of LPG, 2,488,543 gallons of Fuel Oil #1, 2, and 4, and 3,946,664 gallons of Kerosene. Stationary energy use by all sectors (residential, commercial and industrial activities) accounts for 45% of total GHG emissions in Washoe County. These emissions are a result of the combustion of fossil fuel. Washoe County's stationary energy use resulted in a total of approximately 2,768,002 metric tons of eCO₂ emissions in 2008.

Washoe County receives its electricity from NV Energy and its natural gas primarily from NV Energy, and secondarily from Southwest Gas Corporation. The other fuels, used for heating or backup generators, such as LPG, Fuel Oil #1, 2, 4, and kerosene are supplied by various local distributors.

Figure 8 shows the breakdown of GHG emissions by sector (residential and commercial/industrial) for electricity, natural gas, LPG, Fuel Oil #1, 2, 4, and kerosene. Of the total 2,768,002 metric tons of eCO₂ emitted from stationary energy use, 42 % was from residential buildings and 58 % from commercial/industrial buildings.

Figure 8: Washoe County Community GHG Emissions Breakdown (Residential and Commercial/Industrial) – Year 2008



Source: CACP2009 Model output

Residential

In 2008, Washoe County had 418,751 residents, which made up about 165,689 households, and consumed 1,389,642,189 kWh of electricity, or about 8,387 kWh per household. At the same time, the residents consumed 99,309,151 therms of natural gas, or about 599 therms per household. This consumption, together with the other fuels used, resulted in a release of 1,155,619 metric tons of eCO₂. Major residential energy uses include heating and cooling, refrigeration, lighting, and water heating.

Commercial/Industrial

In 2008, Washoe County's commercial/industrial sector buildings consumed 2,862,688,534 kWh of electricity and 70,734,406 therms of natural gas. This consumption, together with the other fuels used, resulted in 1,612,383 metric tons of eCO₂ emission.

Transportation Emissions

The transportation sector is responsible for about 43 % of Washoe County’s GHG emissions. Motor vehicles driven within the county’s geographical boundaries on both local and state roads, as well as emissions from locomotives and air travel by Washoe County residents contributed approximately 2,605,371 metric tons of eCO₂ emission in 2008.

Solid Waste Emissions

In 2008, Washoe County sent approximately 889,251 tons of solid waste to landfills resulting in 720,028 metric tons of eCO₂ emissions. Washoe County has recycling measures in place to reduce the amount of waste sent to landfills.

Washoe County does not have a landfill located within its geo-political boundary. The waste generated within the county was sent to the Lockwood Landfill, located in the adjacent, Storey County, about 1 mile east and south of the county boundary. Therefore, the eCO₂ emission from waste generated by Washoe County is noted as a Scope 3 emission in the CACP2009 software.

Emissions from waste result from organic materials decomposing in the anaerobic environment of a landfill, which produces methane, a GHG 21 times more potent than carbon dioxide. Waste Management did not characterize the types of materials generated by Washoe County that was sent to landfills in 2008. Therefore, the US default breakdown percentage from the LGO Protocol, Table 9.3, “Default US Waste Characterization (1960-present)” was used instead. Materials that do not release GHGs as they decompose are included in the “All Other Waste” category.

2. Municipal Operations Emissions Inventory

ICLEI’s emissions analysis software and methodology enable a jurisdiction to inventory the emissions that result from municipal operations. As was noted earlier, the municipal inventory is a subset of the community inventory.

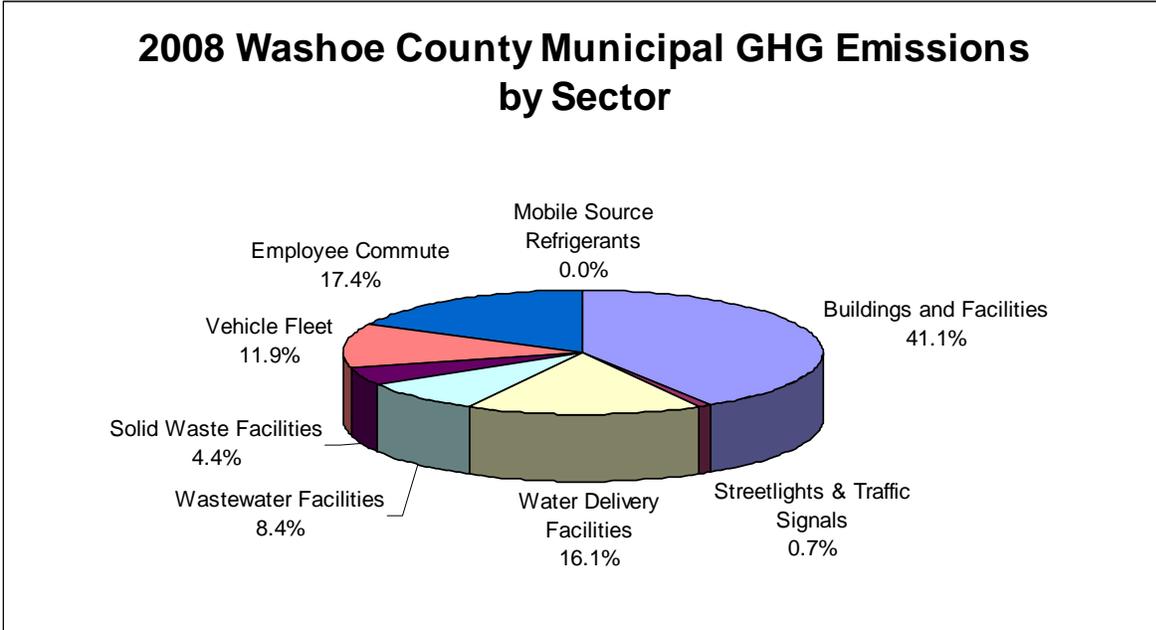
In the base year of 2008, Washoe County’s municipal operations generated 47,399 Metric tons of eCO₂. Table 2 and Figure 9 show the breakdown of municipal operations emissions by source type.

Table 2: Washoe County Municipal Emissions Summary

Sector	Equiv CO₂ Emitted (Metric tons)	% of Total	Energy Consumed (million Btu)
Buildings and Facilities	19,468	41.1	222,707
Streetlights & Traffic Signals	349	0.7	2,896
Water Delivery Facilities	7,633	16.1	83,069
Wastewater Facilities	3,990	8.4	25,203
Solid Waste Facilities	2,069	4.4	0
Vehicle Fleet	5,627	11.9	145,318
Employee Commute	8,257	17.4	114,756
Mobile Source Refrigerants	6	0.0	0
TOTAL	47,399	100	593,950

Source: CACP2009 Model Output

Figure 9: Washoe County Municipal GHG Emissions – Year 2008



Source: CACP2009 Model output

Municipal emissions in Washoe County constitute less than one percent of Washoe County’s total emissions. Local government emissions typically fall between 1 to 5 percent of overall community emissions. Table 3 shows a summary of Washoe County’s community and municipal inventory. Appendix B shows the results of the CACP2009 analysis. As a minor contributor to total emissions, actions to reduce municipal energy use may have a limited impact on Washoe County’s overall community emissions levels. However, municipal action has symbolic value and demonstrates leadership that extends beyond the magnitude of emissions actually reduced.

Table 3: Washoe County Emissions Summary

Washoe County Emissions Summary		
	Community Analysis	Municipal Operations Analysis
Base Year	2008	2008
eCO ₂ Emissions in 2008 (metric tons)	6,093,401	47,399

Source CACP2009 Model Output

Energy/Stationary Source Emissions

In 2008, Washoe County municipal buildings, facilities, streetlights, and water distribution and waste treatment facilities consumed 55,947,260 kWh of electricity and 1,156,087 therms of natural gas, which resulted in a release of 31,440 metric tons of eCO₂ into the atmosphere.

Transportation Emissions

Washoe County’s vehicle fleet consumed 595,878 gallons of fuel and emitted about 5,627 metric tons of eCO₂ in 2008. The municipal fleet includes all vehicles owned and operated by Washoe County.

Solid Waste Emissions

Washoe County government operations sent an estimated 4,985 tons of waste to the landfill resulting in 2,069 metric tons of eCO₂ emission. The county's recycling programs saved approximately 1,008 tons of paper products and cardboard from going to the landfill.

As noted earlier, the waste generated within the county was sent to the Lockwood Landfill, located in the adjacent, Storey County, about 1 miles east and south of the county boundary. Therefore, the eCO₂ emission from waste generated by Washoe County's municipal operation is noted as a Scope 3 emission in the CACP2009 software.

III. Forecast for Greenhouse Gas Emissions

Based on the community and municipal operations emissions inventories developed for Washoe County for the base year 2008, our next step was to forecast future emissions generated in our community for the year 2018. The emissions forecast represents a business-as-usual prediction of how GHG emissions may change in our community over time.

The forecast projects the growth (or reduction) in GHG emissions that will occur in a given future year. Projections are based on the assumption that energy consumption will grow as population increases. For the community analysis, the forecast was conducted by applying population growth factors to Washoe County’s base year residential, commercial/industrial, and transportation data resulted in a forecast of 21.88 % growth in emissions based on a business-as-usual scenario. For the municipal government analysis, no growth was anticipated in the municipal government operations. Table 4 provides an emissions summary for Washoe County’s base year and forecast year.

Washoe County has chosen 2018 as its forecast year for a 10-year GHG emissions forecast, since 2008 was used as its baseline inventory year. The growth rate used for forecasting is based on the Washoe County Consensus Forecast, finalized in May, 2008.

Table 5: Washoe County Emissions Summary

Washoe County Emissions Summary		
	Community Analysis	Municipal Operations Analysis
Base Year	2008	2008
eCO ₂ Emissions in 2008 (metric tons)	6,093,401	47,399
Target Year	2018	2018
Indicators used to generate forecast	Washoe County 2008 Consensus Forecast growth rate of 21.9% from 2008 to 2018	No growth anticipated
Business-as-usual projection of eCO ₂ emissions in 2018 (metric tons)	7,482,432	47,399

Source CACP2009 Model Output

Conducting an emissions forecast is also essential for setting the reduction target, since the amount of GHG emissions Washoe County has pledged to reduce will be derived from projected emissions. Appendix C provides the results of the CACP analysis.

IV. Conclusion

Climate change is an issue of growing concern for communities across the United States and around the world. Washoe County has displayed great leadership and foresight in choosing to confront this issue now. By reducing the amount of GHGs emitted by its community, Washoe County joins hundreds of other American cities and counties in stemming the tide of global warming and the numerous threats associated with it, such as increased droughts and flooding, disrupted agricultural systems, and rising sea levels.

This baseline GHG emissions inventory report represents a profile of the GHGs that Washoe County emits in its base year, 2008, on a community-wide level and a municipal level. The report also approximates the GHGs that the County will emit in the year 2018.

This information will be used to help the County adopt an emissions reduction target and develop a climate action plan. The climate action plan consists of policies and measures that, when implemented, will serve the County to achieve its target. The inventory also serves to inform the County regarding the major sources of GHG emissions. For example, the community-wide inventory for the Washoe County reveals that the transportation sector is responsible for 43% of total emissions.

The inventory also reveals the fact that in Washoe County, like many cities and counties, the municipal government emissions represent a small percentage of community-wide emissions, in this case, less than one percent. That being said, by proactively reducing emissions generated by its own activities, the Washoe County government takes a visible leadership role in the effort to address climate change. This is important for inspiring local action in Washoe County as well as for inspiring action in other communities.

Appendix A
CACP2009 Community Greenhouse Gas Emissions in
2008
Detailed Report - by Sector, Data Sources
Assumptions and Notes for the Community Inventory

Community Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)
Washoe County, Nevada						
Residential						
<i>Residential Utilities Usage</i>						
Electricity	568,710	9,392	12,058	571,875	9.4	4,742,806
Fuel Oil (#1 2 4)	22,873	188	3,440	23,004	0.4	312,691
Kerosene	4,020	33	612	4,043	0.1	55,594
Natural Gas	526,934	993	49,655	528,285	8.7	9,930,915
Propane	194	2	34	195	0.0	3,077
Stationary LPG	28,032	266	4,882	28,217	0.5	443,819
Subtotal Residential Utilities U:	1,150,763	10,874	70,680	1,155,619	19.0	15,488,902

1) Electric usage data provided by Darrell Soyars, Program Manager, NV Energy, Environmental, Health and Safety, 6100 Neil Road, Reno, Nevada 89520, O:775.834.4744, C:775.771.0882, dsoyars@nvenergy.com.

2) NG data provided by:

a) Karen Neuweiler, Senior Analyst ~ Load Research, NV Energy, P.O. Box 10100, Reno, Nevada 89520, Phone: 775-834-3942, Fax: 775.834.4484, KNeuweiler@nvenergy.com.

*NV Energy Residential NG Sold = 88,742,631 therms

b) Davis Flaten, Manager/Engineering, Southwest Gas Corp., 400 Eagle Station Ln, P.O. Box 1190, Carson City NV 89701, 775-887-2855, Davis.Flaten@swgas.com.

*SWG Residential NG sold = 10,566,520 therms.

Note: NV Energy provides NG to the cities of Reno & Sparks and some other outlying areas in Washoe County, while SWG provides NG exclusively to the outlying areas of Washoe County, primarily the southern part of the county.

3) Household # under the indicators tab is occupied dwelling units for 2008, data provided by Chad Giesinger, AICP, Senior Planner, Washoe County Community Development, Community Services Program, Direct Ph. (775)328-3626, GGiesinger@washoecounty.us.

4) Fuel Oil, Kerosene, Propane & Stationary LPG data obtained from fuel distributors. Propane #s here were the portable 5-gallon type used in BBQ and camper-trailer, etc.

Subtotal Residential	1,150,763	10,874	70,680	1,155,619	19.0	15,488,902
-----------------------------	------------------	---------------	---------------	------------------	-------------	-------------------

Commercial

Commercial Utilities Usage

Electricity	1,171,553	19,348	24,840	1,178,072	19.3	9,770,268
Fuel Oil (#1 2 4)	1,833	15	276	1,843	0.0	25,055
Kerosene	34,500	286	5,248	34,699	0.6	477,107
Natural Gas	375,317	707	35,367	376,279	6.2	7,073,441
Stationary LPG	19,681	187	3,428	19,811	0.3	311,600
Subtotal Commercial Utilities U	1,602,883	20,543	69,159	1,610,703	26.4	17,657,470

1) Electric usage data provided by Darrell Soyars, Program Manager, NV Energy, Environmental, Health and Safety, 6100 Neil Road, Reno, Nevada 89520, O:775.834.4744, C:775.771.0882, NEW EMAIL: dsoyars@nvenergy.com.

*Note: NV Energy does not differentiate between commercial and industrial usage, so both usage are listed in this field.

Community Greenhouse Gas Emissions in 2008 Detailed Report

CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)	Energy (MMBtu)
-----------------------------	--------------------------	-------------------------	---------------------------------------	-------------------

2) NG data provided by:

a) Karen Neuweiler, Senior Analyst ~ Load Research, NV Energy, P.O. Box 10100, Reno, Nevada 89520, Phone: 775-834-3942, Fax: 775.834.4484, KNeuweiler@nvenergy.com.

*NV Energy Residential NG Sold = 62,075,146 therms (includes, small, medium, & large commercial usage).

b) Davis Flaten, Manager/Engineering, Southwest Gas Corp., 400 Eagle Station Ln, P.O. Box 1190, Carson City NV 89701, 775-887-2855, Davis.Flaten@swgas.com.

*SWG Residential NG sold = 8,659,260 therms (includes small & large commercial usage).

Note: NV Energy provides NG to the cities of Reno & Sparks and some other outlying areas in Washoe County, while SWG provides NG exclusively to the outlying areas of Washoe County, primarily the southern part of the county.

3) Fuel Oil, Kerosene, & Stationary LPG data obtained from fuel distributors.

Subtotal Commercial	1,602,883	20,543	69,159	1,610,703	26.4	17,657,470
----------------------------	-----------	--------	--------	-----------	------	------------

Industrial

Industrial Stationary Fuel Usage

Fuel Oil (#1 2 4)	538	4	22	540	0.0	7,354
Kerosene	3	0	0	3	0.0	41
Stationary LPG	1,133	11	54	1,138	0.0	17,941
Subtotal Industrial Stationary F	1,674	15	76	1,680	0.0	25,336

Fuel Oil, Kerosene, & Stationary LPG data obtained from fuel distributors.

Subtotal Industrial	1,674	15	76	1,680	0.0	25,336
----------------------------	-------	----	----	-------	-----	--------

Transportation

WC - On-Road Veh

Diesel ULSD	498,528	1,485	1,573	499,021	8.2	6,815,143
Gasoline	1,982,393	130,156	109,625	2,025,044	33.2	27,968,303
OFF ROAD Gasoline	3,491	87	198	3,522	0.1	49,225
Subtotal WC - On-Road Veh	2,484,412	131,728	111,396	2,527,587	41.5	34,832,671

WC VMT Data provided by Judy Althoff, Associate Planner, RTC, (775) 335-1915, Jalthoff@rtcwashoe.com.

Note: The VMT vehicle fleet mix was determined by EPA's MOBILE6.2 modeling tool. The % breakdown of fuel by VMT & vehicle type for gasoline & ULSD in the Transport Assistant is adjusted to reflect this fleet mix. The total came out to 99.5% because the other 0.5% was made up of motorcycles. Since there is no VMT input for motorcycles, assumed motorcycles get 50 mpg & converted the motorcycle VMT from MOBILE6.2 model output to gallons & entered under the offroad gasoline section.

WC Train Emissions

OFF ROAD Diesel	29,045	0	0	29,045	0.5	396,832
OFF ROAD Diesel ULSD	804	0	0	804	0.0	10,980
Subtotal WC Train Emissions	29,849	0	0	29,849	0.5	407,812

Community Greenhouse Gas Emissions in 2008

Detailed Report

CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)	Energy (MMBtu)
-----------------------------	--------------------------	-------------------------	---------------------------------------	-------------------

1) Freight train data from Lanny Schmid, Director, Environmental Affairs, Union Pacific RR, W (402) 544-2262, Cell (402) 306-7986, laschmid@up.com.

Note: UPRR consumed ~2,776,330 gals of diesel for line haul & 85,259 gals for switch yard.

2) Amtrak passenger train data from Jeffrey D. White, Amtrak Senior Environmental Coordinator, 530 Water Street, Oakland, CA 94607, W (510) 873-6151, Cell (510) 295-7549, WhiteJef@amtrak.com.

Note: Used regular diesel for UPRR's trains and ULSD for Amtrak's passenger trains.

Subtotal Transportation	2,514,261	131,728	111,396	2,557,436	42.0	35,240,483
-------------------------	-----------	---------	---------	-----------	------	------------

Waste

Scope 3 - Community Generated Waste

Disposal Method - Managed Landfill

Paper Products	0	0	21,521,031	451,942	7.4	
Food Waste	0	0	7,625,196	160,129	2.6	
Plant Debris	0	0	2,002,389	42,050	0.7	
Wood or Textiles	0	0	3,138,419	65,907	1.1	
Subtotal Scope 3 - Community	0	0	34,287,035	720,028	11.8	

Waste data provided by Cherolyn Gilletti, Waste Management, Account Manager, CGillett@wm.com, Phone 775-326-2336, Cell 775-771-5464, Fax 775-329-4662.

*Note: (1) This is the waste generated in Washoe County, but the waste is shipped to Lockwood Landfill, located in Storey County, outside of Washoe County. WM has no waste share values, so used default values from LGO Protocol, Sep. 2008 ed., Table 9.3, "Default US Waste Characterization, (1960-Present)," column heading "2003-present". (2) Lockwood Landfill became a Title V facility in 2009?. They started running the flare as their methane recovery process some time in 2009. This is one of 3 processes available to them - flare, boiler process heater, or collect for sale. The Title V Permit writer from NDEP, Tobarak Ullah, said that they picked the flare method as a test, and will notify NDEP when they are running it officially.

Subtotal Waste	0	0	34,287,035	720,028	11.8	
----------------	---	---	------------	---------	------	--

Other

Air Travel by Washoe County residents

Carbon Dioxide	47,935	0	0	47,935	0.8	
Subtotal Air Travel by Washoe	47,935	0	0	47,935	0.8	

Note: 1) Air travel includes local residents flying in & out of Reno-Tahoe International Airport (RTIA), Reno-Stead Airport, and Spanish Springs Airport. The CO₂ emissions data is generated from LTOs input to the EDMS 5.1.2 software, using only the aircraft emissions portion (i.e., no GSE, roadway emissions, etc.).

2) 40% of the air travel for RTIA originated in Washoe County. Since RTIA is the only major airport within the area, the local passengers include residents from other counties such as Carson City, Lyon, Storey, Douglas, and Lander. So assumed that out of that 40%, 30% of the total air travel is made by Washoe County residents and apportioned the CO₂ emissions accordingly.

RTIA & Reno-Stead Airports LTOs and RTIA passenger data source: Todd Welty, Environmental Program Manager, Reno-Tahoe Airport Authority, (775) 328-6467, twelty@renoairport.com.

3) WC residents accounted for 65% of Reno-Stead Airport and 78% of Spanish Springs local general aviation traffic.

Source: Sky Vector <http://skyvector.com/airport/RTS/Reno-Stead-Airport> & <http://skyvector.com/airport/N86/Spanish-Springs-Airport>

Community Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂		Energy (MMBtu)
				(tonnes)	(%)	
Subtotal Other	47,935	0	0	47,935	0.8	
Subtotal Washoe County, Nevad	5,317,516	163,161	34,538,346	6,093,401	100.0	68,412,191
Total	5,317,516	163,161	34,538,346	6,093,401	100.0	68,412,191

Appendix B
CACP2009 Government Greenhouse Gas Emissions in
2008
Detailed Report - by Sector, Data Sources
Assumptions and Notes for the Municipal Inventory

Government Greenhouse Gas Emissions in 2008

Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
Washoe County, Nevada							
Buildings and Facilities							
<i>350 S. Center St. - Electric</i>							
Electricity	534	9	11	537	1.1	4,457	164,075
Subtotal 350 S. Center St. - El	534	9	11	537	1.1	4,457	164,075
<u>Unless otherwise noted, all info in the Buildings & Facilities tab are provided by:</u>							
- Utilities: Mike Turner, Facilities Management Division Director (now retired), 775-328-2171. Subsequent data provided by Dave Solaro, Architect, Capital Projects Division Manager, Washoe County Public Works, (775) 328-3624, DSolaro@washoecounty.us.							
- Employee count: Cathie Korson, HR Analyst, Washoe County Human Resources, (775) 328-2092 Office, (775) 328-6119 Fax, ckorson@washoecounty.us.							
- Floor Area & depts housed in various buildings: Mike Turner & Dave Solaro.							
<i>350 S. Center St. - NG</i>							
Natural Gas	336	1	32	337	0.7	6,336	69,488
Subtotal 350 S. Center St. - NG	336	1	32	337	0.7	6,336	69,488
<i>9th St Complex - Electric</i>							
Electricity	1,411	23	30	1,419	3.0	11,769	433,290
Subtotal 9th St Complex - Elec	1,411	23	30	1,419	3.0	11,769	433,290
<i>9th St Complex - NG</i>							
Natural Gas	444	1	42	446	0.9	8,376	91,859
Subtotal 9th St Complex - NG	444	1	42	446	0.9	8,376	91,859
<i>Animal Shelter - Electric</i>							
Electricity	503	8	11	506	1.1	4,197	154,500
Subtotal Animal Shelter - Elect	503	8	11	506	1.1	4,197	154,500
<i>Animal Shelter - NG</i>							
Natural Gas	373	1	35	374	0.8	7,034	77,133
Subtotal Animal Shelter - NG	373	1	35	374	0.8	7,034	77,133
<i>Jan Evans Juvenile Fac - Electric</i>							
Electricity	610	10	13	613	1.3	5,086	187,243
Subtotal Jan Evans Juvenile F.	610	10	13	613	1.3	5,086	187,243
<i>Jan Evans Juvenile Fac - NG</i>							
Natural Gas	600	1	57	602	1.3	11,307	124,001
Subtotal Jan Evans Juvenile F.	600	1	57	602	1.3	11,307	124,001

Government Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
<i>Main Library - Electric</i>							
Electricity	296	5	6	298	0.6	2,469	90,904
Subtotal Main Library - Electric	296	5	6	298	0.6	2,469	90,904
<i>Main Library - NG</i>							
Natural Gas	145	0	14	146	0.3	2,739	30,036
Subtotal Main Library - NG	145	0	14	146	0.3	2,739	30,036
2008 Library hours provided by Scottie Wallace, Downtown Main Library Manager, (775) 327-8270. *Note: The library hours, including staff hours prior to and post library official hours for the public, is estimated to be M-F: 8:15am-5:15pm, and S-S: 9:00am-3:15pm. This amounts to a total of 57.5 hours per week.							
<i>Mills B Lane Bldg - Electric</i>							
Electricity	1,008	17	21	1,014	2.1	8,408	309,556
Subtotal Mills B Lane Bldg - EI	1,008	17	21	1,014	2.1	8,408	309,556
<i>Mills B Lane Bldg - NG</i>							
Natural Gas	256	0	24	257	0.5	4,834	53,007
Subtotal Mills B Lane Bldg - NG	256	0	24	257	0.5	4,834	53,007
Since some courts are housed in this bldg, and they have night sessions, assumed that they are operational 50 hours/week.							
<i>Other Fac - Electric</i>							
Electricity	5,519	91	117	5,549	11.7	46,023	1,694,402
Subtotal Other Fac - Electric	5,519	91	117	5,549	11.7	46,023	1,694,402
<i>Other Fac - NG, LPG, Fuel Oil</i>							
Fuel Oil (#1 2 4)	7	0	1	7	0.0	100	2,575
Natural Gas	2,080	4	196	2,086	4.4	39,209	429,987
Propane	148	1	26	149	0.3	2,354	75,839
Subtotal Other Fac - NG, LPG,	2,236	5	223	2,243	4.7	41,663	508,401
<i>Sheriff's Facility - Electric</i>							
Electricity	2,482	41	53	2,496	5.3	20,698	762,031
Subtotal Sheriff's Facility - Elec	2,482	41	53	2,496	5.3	20,698	762,031

Data provided by Captain Steven C. Kelly, Detention Bureau Commander, 911 Parr Blvd., Reno, Nv. 89512, Phone: 328-2962, Pager: 861-3111, E-mail: SKelly@washoecounty.us

*Note: Sheriff's Fac. has 790 employees as of July, 2008. It also has a max. capacity of 1465 & a functional capacity 1322 for inmates. Used the functional capacity & the total employees for a total of 2112 occupants.

Government Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes)	(%)	Energy (MMBtu)	Cost (\$)
<i>Sheriff's Facility - NG</i>							
Natural Gas	1,836	3	173	1,841	3.9	34,608	379,528
Subtotal Sheriff's Facility - NG	1,836	3	173	1,841	3.9	34,608	379,528
<i>Water Resources - Electric</i>							
Electricity	185	3	4	186	0.4	1,541	53,227
Subtotal Water Resources - El	185	3	4	186	0.4	1,541	53,227
Water Resources Data provided by Jeanne Rueffer (since left), subsequently by Joe Howard, Interim Utility Operations Manager of the Dept of Water Resources. 775-954-4623; Cell 775-750-3992, jhoward@washoecounty.us.							
<i>Water Resources - NG</i>							
Natural Gas	62	0	6	62	0.1	1,163	13,919
Subtotal Water Resources - Nt	62	0	6	62	0.1	1,163	13,919
<i>WC Fac - Refrigerants</i>							
Carbon Dioxide	377	0	0	377	0.8	0	0
HFC-134a 236cb 43-10me	0	0	0	88	0.2	0	0
R-404A Blend	0	0	0	35	0.1	0	0
R-408A Blend	0	0	0	42	0.1	0	0
Subtotal WC Fac - Refrigerant	377	0	0	544	1.1	0	0
Subtotal Buildings and Faciliti	19,215	220	871	19,468	41.1	222,707	5,196,599
Streetlights & Traffic Signals							
<i>Street Flashers - Electric</i>							
Electricity	3	0	0	3	0.0	29	4,904
Subtotal Street Flashers - Elec	3	0	0	3	0.0	29	4,904
All Streetlights & Traffic Signals data provided by Mike Turner (now retired) & Lee Whipple, Facility Management Division, 775-328-2171.							
<i>Street Lights - Electric</i>							
Electricity	235	4	5	237	0.5	1,962	171,870
Subtotal Street Lights - Electric	235	4	5	237	0.5	1,962	171,870
<i>Traffic Lights - Electric</i>							
Electricity	109	2	2	109	0.2	905	41,202
Subtotal Traffic Lights - Electric	109	2	2	109	0.2	905	41,202

Government Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
Subtotal Streetlights & Traffic :	347	6	7	349	0.7	2,896	217,976

Water Delivery Facilities

Longley Ln WTF - Electric

Electricity	3,777	62	80	3,798	8.0	31,495	1,240,530
Subtotal Longley Ln WTF - Ele	3,777	62	80	3,798	8.0	31,495	1,240,530

Data provided by Joe Howard, Interim Utility Operations Manager of the Dept of Water Resources. 775-954-4623; Cell 775-750-3992
jhoward@washoeconomy.us.

TMWA - Electric

Electricity	3,432	57	73	3,451	7.3	28,620	0
Subtotal TMWA - Electric	3,432	57	73	3,451	7.3	28,620	0

All TMWA data provided by Lora R. Richards, Resource Planner, Truckee Meadows Water Authority, (1355 Capital Blvd), P.O. Box 30013, Reno, NV 89520-3013, 775/834-8060 voice, 775/834-8280 fax, <http://www.tmh2o.com>

*Note: TMWA was formed by a joint-powers agreement, it is its own government entity overseen by elected officials from Reno, Sparks, and Washoe County.

TMWA provides ~14% of water to Washoe County customers, so attributed 14% of the total utility usage accordingly.

TMWA - Gen. Hydro Electric

Green Electricity	0	0	0	0	0.0	19,256	378,000
Subtotal TMWA - Gen. Hydro l	0	0	0	0	0.0	19,256	378,000

Per Lora Richards, in 2008, TMWA generated ~\$2.7 million in hydroelectric power (~40.3 million kilowatt hours), mitigating nearly half of the energy used to divert, treat, and distribute municipal water to ~93,000 service connections throughout Reno, Sparks, and Washoe County.

Note: since WC has about 14% jurisdiction in the joint agreement, claimed 14% of the hydro electricity generated.

TMWA - NG

Natural Gas	48	0	5	48	0.1	907	0
Subtotal TMWA - NG	48	0	5	48	0.1	907	0

WC Muni. Wells Pumping - Electric

Electricity	335	6	7	337	0.7	2,792	108,103
Subtotal WC Muni. Wells Pum	335	6	7	337	0.7	2,792	108,103

Data provided by Joe Howard, Interim Utility Operations Manager of the Dept of Water Resources. 775-954-4623; Cell 775-750-3992
jhoward@washoeconomy.us.

Government Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
Subtotal Water Delivery Facilit	7,591	125	164	7,633	16.1	83,069	1,726,633
Wastewater Facilities							
<i>Cold Springs WWTF</i>							
Nitrous Oxide	0	123	0	38	0.1	0	0
Subtotal Cold Springs WWTF	0	123	0	38	0.1	0	0
All Wastewater Facilities data provided by Joe Howard, Interim Utility Operations Manager of the Dept of Water Resources. 775-954-4623; Cell 775-750-3992, jhoward@washoecounty.us.							
<i>Cold Springs WWTF - Electric</i>							
Electricity	338	6	7	340	0.7	2,823	99,977
Subtotal Cold Springs WWTF	338	6	7	340	0.7	2,823	99,977
<i>Lemmon Valley WWTF</i>							
Methane	0	0	32,811	689	1.5	0	0
Subtotal Lemmon Valley WWTF	0	0	32,811	689	1.5	0	0
<i>Lemmon Valley WWTF - Electric</i>							
Electricity	116	2	2	116	0.2	966	32,077
Subtotal Lemmon Valley WWTF	116	2	2	116	0.2	966	32,077
<i>Reclaimed Water - Electric</i>							
Electricity	478	8	10	481	1.0	3,988	352,880
Subtotal Reclaimed Water - El	478	8	10	481	1.0	3,988	352,880
<i>S. Truckee Meadows WRF</i>							
Natural Gas	0	0	0	0	0.0	3	515
Nitrous Oxide	0	721	0	224	0.5	0	0
Subtotal S. Truckee Meadows	0	721	0	224	0.5	3	515
<i>S. Truckee Meadows WRF - Electric</i>							
Electricity	407	7	9	409	0.9	3,393	315,188
Subtotal S. Truckee Meadows	407	7	9	409	0.9	3,393	315,188
<i>Various Sewage Lift Stations - Electric</i>							
Electricity	1,682	28	36	1,692	3.6	14,030	57,572
Subtotal Various Sewage Lift S	1,682	28	36	1,692	3.6	14,030	57,572
Subtotal Wastewater Facilities	3,022	894	32,875	3,990	8.4	25,203	858,209

Government Greenhouse Gas Emissions in 2008

Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
Solid Waste Facilities							
<i>WC Fac Generated Waste</i>							
Carbon Dioxide	2,069	0	0	2,069	4.4	0	0
Subtotal WC Fac Generated W	2,069	0	0	2,069	4.4	0	0
Data provided by Cherolyn Gilletti, Waste Management, Account Manager, CGillett@wm.com, Phone 775-326-2336, Cell 775-771-5464, Fax 775-329-4662.							
*Note: (1) The waste is generated in Washoe County but disposed in Lockwood Landfill, located in Storey County. (2) Since Gov't Analysis module has no waste stream tab, the data provided by WM was entered into the Community Analysis Module's Waste tab, given the waste share %, a CO ₂ e in tonnes was calculated. This number is then entered into the Community Analysis module so as not to double count, per ICLEI's direction. (3) WM has no waste share values, so used default values from LGO Protocol, Sep. 2008 ed., Table 9.3, "Default US Waste Characterization, (1960-Present)," column heading "2003-present" -->[26.2% Paper products, 16.4% Food waste, 7.6% Plant debris, 13.5% Wood or textiles, and 36.3% all other waste].							
Subtotal Solid Waste Facilities	2,069	0	0	2,069	4.4	0	0
Vehicle Fleet							
<i>Gen Fac BioD Fleet - B5 - CH4/N2O Only</i>							
Biodiesel (B100)	0	1	1	0	0.0	5,441	7,752
Subtotal Gen Fac BioD Fleet -	0	1	1	0	0.0	5,441	7,752
All Fleet data, unless otherwise noted, provided by Dave Gonzales - Equipment Services Superintendent, (775) 328-2121, dgonzales@washoecounty.us.							
*Note: Washoe County uses B5 (5% biodiesel) in its fleet. The CO ₂ coefficient for biodiesel is 0.00946 metric tonnes/U.S. gal. Biodiesel portion of the CO ₂ emissions is considered biogenic and not part of the ICLEI reporting requirement protocol. But it is included here for complete emission inventory purpose. Light Trucks MY 1996 to 2004 also include veh data from 2005-2008. All Diesel used are ULSD. Gas veh for Passenger Cars & Light Duty Veh MY 2005 also include veh data from 2006-2008.							
<i>Gen Fac BioD Fleet - B5 - CO2 Only</i>							
Biodiesel (B100)	23	0	0	23	0.0	220	7,752
Subtotal Gen Fac BioD Fleet -	23	0	0	23	0.0	220	7,752
<i>Gen Fac BioD Fleet - Dsl - CH4/N2O Only</i>							
Diesel ULSD	0	1	1	0	0.0	5,441	147,288
Subtotal Gen Fac BioD Fleet -	0	1	1	0	0.0	5,441	147,288
<i>Gen Fac BioD Fleet - Dsl - CO2 Only</i>							
Diesel ULSD	463	1	1	464	1.0	6,334	147,288
Subtotal Gen Fac BioD Fleet -	463	1	1	464	1.0	6,334	147,288
<i>Gen Fac Conv Fleet - CH4/N2O Only</i>							
Compressed Natural Gas	0	0	0	0	0.0	0	2,244
Diesel ULSD	0	0	0	0	0.0	700	341,636

Government Greenhouse Gas Emissions in 2008

Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
Gasoline	0	5	6	2	0.0	2,956	84,496
LPG	0	0	0	0	0.0	3	253
Subtotal Gen Fac Conv Fleet -	0	5	6	2	0.0	3,659	428,629
<i>Gen Fac Conv Fleet - CO2 Only</i>							
Compressed Natural Gas	0	0	0	0	0.0	0	2,244
Diesel ULSD	1,080	3	3	1,081	2.3	14,761	341,636
Gasoline	224	0	0	224	0.5	3,161	84,496
LPG	1	0	0	1	0.0	11	253
OFF ROAD Diesel ULSD	774	0	0	774	1.6	10,568	233,666
OFF ROAD Gasoline	8	0	1	8	0.0	107	2,983
Subtotal Gen Fac Conv Fleet -	2,086	3	4	2,087	4.4	28,608	665,278
<i>Gen Fac RFG Fleet - E5.7 - CH4/N2O Only</i>							
Ethanol (E100)	0	191	157	63	0.1	15,566	34,880
Subtotal Gen Fac RFG Fleet -	0	191	157	63	0.1	15,566	34,880
<p>Washoe County uses Reformulated Gasoline (RFG) that contains 5.7% of ethanol with unleaded gasoline. So assumed it is volume % and attributed 94.3% of unleaded gasoline for calculation purpose. The CO₂ coefficient for ethanol is 0.00556 metric tonnes/U.S. gal. CO₂ emission from the ethanol portion is considered biogenic and not part of the ICLEI reporting requirement protocol. But it is included here for complete emission inventory purpose.</p>							
<i>Gen Fac RFG Fleet - E5.7 - CO2 Only</i>							
Ethanol (E100)	59	0	0	59	0.1	888	34,880
Gasoline	27	0	0	27	0.1	375	6,836
Subtotal Gen Fac RFG Fleet -	85	0	0	85	0.2	1,263	41,716
<i>Gen Fac RFG Fleet - Gas - CH4/N2O Only</i>							
Gasoline	0	53	51	17	0.0	24,630	579,497
Subtotal Gen Fac RFG Fleet -	0	53	51	17	0.0	24,630	579,497
<i>Gen Fac RFG Fleet - Gas - CO2 Only</i>							
Gasoline	1,535	0	0	1,535	3.2	21,657	579,497
Subtotal Gen Fac RFG Fleet -	1,535	0	0	1,535	3.2	21,657	579,497
<i>Law Enf. BioD Fleet - B5 - CH4/N2O Only</i>							
Biodiesel (B100)	0	0	0	0	0.0	610	1,163
Subtotal Law Enf. BioD Fleet -	0	0	0	0	0.0	610	1,163

Government Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
<i>Law Enf. BioD Fleet - B5 - CO2 Only</i>							
Biodiesel (B100)	3	0	0	3	0.0	33	1,163
Subtotal Law Enf. BioD Fleet -	3	0	0	3	0.0	33	1,163
<i>Law Enf. BioD Fleet - Dsl - CH4/N2O Only</i>							
Diesel ULSD	0	0	0	0	0.0	610	22,090
Subtotal Law Enf. BioD Fleet -	0	0	0	0	0.0	610	22,090
<i>Law Enf. BioD Fleet - Dsl - CO2 Only</i>							
Diesel ULSD	70	0	0	70	0.1	954	22,090
Subtotal Law Enf. BioD Fleet -	70	0	0	70	0.1	954	22,090
<i>Law Enf. Conv Fleet - CH4/N2O Only</i>							
Gasoline	0	15	23	5	0.0	11,843	365,232
Subtotal Law Enf. Conv Fleet -	0	15	23	5	0.0	11,843	365,232
<i>Law Enf. Conv Fleet - CO2 Only</i>							
Gasoline	1,002	0	0	1,002	2.1	14,144	365,296
OFF ROAD Gasoline	19	0	1	19	0.0	265	7,500
Subtotal Law Enf. Conv Fleet -	1,021	0	1	1,021	2.2	14,408	372,796
<p>WC's motorcycle enforcement vehicle fuel usage is accounted for under the "off road gasoline" fuel type, under "Recreational Including Motorcycles" since there is no other place to enter info for this vehicle class and the coefficients used for onroad & off road is the same for motorcycles - per Anna Frankel of ICLEI. Since off road gasoline tab is in quantity of fuel used only, all motorcycle fuel quantity is accounted for under this tab.</p>							
<i>Law Enf. RFG Fleet - E5.7 - CH4/N2O Only</i>							
Ethanol (E100)	0	3	2	1	0.0	226	757
Subtotal Law Enf. RFG Fleet -	0	3	2	1	0.0	226	757
<i>Law Enf. RFG Fleet - E5.7 - CO2 Only</i>							
Ethanol (E100)	1	0	0	1	0.0	20	757
Subtotal Law Enf. RFG Fleet -	1	0	0	1	0.0	20	757
<i>Law Enf. RFG Fleet - Gas - CH4/N2O Only</i>							
Gasoline	0	1	1	0	0.0	382	757
Subtotal Law Enf. RFG Fleet -	0	1	1	0	0.0	382	757
<i>Law Enf. RFG Fleet - Gas - CO2 Only</i>							
Gasoline	2	0	0	2	0.0	29	757
Subtotal Law Enf. RFG Fleet -	2	0	0	2	0.0	29	757

Government Greenhouse Gas Emissions in 2008

Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
<i>Sierra Fire Prot. Distr Fleet</i>							
Diesel ULSD	157	0	0	157	0.3	2,151	57,496
Gasoline	80	5	4	82	0.2	1,131	30,574
OFF ROAD Diesel ULSD	8	0	0	8	0.0	103	2,732
Subtotal Sierra Fire Prot. Distr	245	6	5	247	0.5	3,386	90,802

Data provided by Karen L Jones, Administrative Secretary - RR/EPR, Sierra Fire Protection District, (775) 849-1108 x2, KJones@washoecounty.us, & Jon H Murray, Firefighter, (775) 849-1108, JHMurray@washoecounty.us.

Note: fuel consumption info is based on transaction data, which is not well defined between vehicle class. So based on the # of gas & diesel vehicles owned by SFPD, assumed that all gas veh. with >30 gal/transaction are heavy duty veh., and all diesel veh. with >20 gal/transaction are heavy duty vehicles. This may seem arbitrary, but since 79% of the diesel veh are heavy duty vehicles, it seems like a reasonable assumption.

For future reporting, better record keeping and data needs to be obtained from SFPD to depict a more accurate vehicle fleet emission.

Subtotal Vehicle Fleet	5,535	281	252	5,627	11.9	145,318	3,517,941
-------------------------------	--------------	------------	------------	--------------	-------------	----------------	------------------

Employee Commute

BioD - B5

Biodiesel (B100)	0	0	0	0	0.0	727	0
Subtotal BioD - B5	0	0	0	0	0.0	727	0

Data collected from the employee commute survey, with the survey set up by Sarah Tone, Community Outreach Coordinator, Washoe County Manager's Office, Community Relations Division, (775) 328-2721, STone@washoecounty.us and Chris Mathews, E-Government Information Officer, County Manager's Office, (775) 328-3719, CMathews@washoecounty.us.

Note: 212 respondents out of ~3000 employees took the survey. The VMT for each vehicle group is averaged from the survey taken, then projected to the total County employee level.

BioD - Diesel

Diesel ULSD	54	0	0	54	0.1	736	0
Subtotal BioD - Diesel	54	0	0	54	0.1	736	0

Non Bio Fuel

Diesel ULSD	132	0	0	132	0.3	1,805	0
Gasoline	7,868	513	445	8,037	17.0	111,011	0
OFF ROAD Gasoline	34	1	2	34	0.1	478	0
Subtotal Non Bio Fuel	8,034	514	447	8,203	17.3	113,293	0

Since motorcycles & scooters are not included in the on-road gasoline vehicle list, the VMT projected from the employee commute survey is converted to gallons by assuming that MC/scooters have a 50-mpg fuel efficiency. The calculated amount in gallons is then entered under the off-road gasoline type to account for this mode of transportation. This procedure is directed by ICLEI.

Government Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)		Energy (MMBtu)	Cost (\$)
Subtotal Employee Commute	8,088	515	448	8,257	17.4	114,756	0
Refrigerants All Sectors							
<i>Fleet Refrigerants</i>							
HFC-134a 236cb 43-10me	0	0	0	6	0.0		
Subtotal Fleet Refrigerants	0	0	0	6	0.0		
<p>Fleet refrigerant data from Dave Gonzales - Equipment Services Superintendent (775) 328-2121, dgonzales@washoecounty.us. 157 oz. of R134 was recharged for the WC vehicle fleet in 2008; however, not all was lost to fugitive emission. But since no detailed info was available regarding fleets added or retired, this is used as a conservative estimate for now. Future year data will require a more detailed record keeping to get a more representative quantity of refrigerants lost due to fugitive emission.</p>							
Subtotal Refrigerants All Sectc	0	0	0	6	0.0		
Subtotal Washoe County, Nevad	45,868	2,041	34,618	47,399	100.0	593,950	11,517,358
Total	45,868	2,041	34,618	47,399	100.0	593,950	11,517,358

Appendix C
CACP2009 Community Greenhouse Gas Emissions in
2018
Detailed Report - by Sector, Data Sources
Assumptions and Notes for the Community Inventory

Community Greenhouse Gas Emissions in 2018 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)	Energy (MMBtu)
Washoe County, Nevada					
Residential					
<i>Residential Utilities Usage</i>					
Electricity	706,245	11,742	14,873	710,198 9.5	5,890,055
Fuel Oil (#1 2 4)	28,406	233	4,272	28,568 0.4	388,328
Kerosene	4,992	41	759	5,021 0.1	69,042
Natural Gas	654,396	1,233	61,666	656,073 8.8	12,333,129
Propane	241	2	42	243 0.0	3,821
Stationary LPG	34,812	331	6,063	35,042 0.5	551,175
Subtotal Residential Utilities U:	1,429,093	13,583	87,675	1,435,145 19.2	19,235,551

Note: 2018 emissions projection is population-based, using the population increase from 2008 to 2018, from the Washoe County Consensus Forecast, 2008 - 2030, finalized in May, 2008. Based on the Consensus Forecast, the average annual population growth from 2008 to 2018 is 2.19%. This percentage is used for all emissions sources for 2018 forecast.

1) 2008 base year electric usage data provided by Darrell Soyars, Program Manager, NV Energy, Environmental, Health and Safety, 6100 Neil Road, Reno, Nevada 89520, O:775.834.4744, C:775.771.0882, dsoyars@nvenergy.com.

2) 2008 base year NG data provided by:

a) Karen Neuweiler, Senior Analyst ~ Load Research, NV Energy, P.O. Box 10100, Reno, Nevada 89520, Phone: 775-834-3942, Fax: 775.834.4484, KNeuweiler@nvenergy.com.
*NV Energy Residential NG Sold = 88,742,631 therms

b) Davis Flaten, Manager/Engineering, Southwest Gas Corp., 400 Eagle Station Ln, P.O. Box 1190, Carson City NV 89701, 775-887-2855, Davis.Flaten@swgas.com.
*SWG Residential NG sold = 10,566,520 therms.

Note: NV Energy provides NG to the cities of Reno & Sparks and some other outlying areas in Washoe County, while SWG provides NG exclusively to the outlying areas of Washoe County, primarily the southern part of the county.

3) 2008 base year household # under the indicators tab is occupied dwelling units, data provided by Chad Giesinger, AICP, Senior Planner, Washoe County Community Development, Community Services Program, Direct Ph. (775)328-3626, GGiesinger@washoecounty.us.

4) 2008 base year fuel oil, kerosene, propane & stationary LPG data obtained from fuel distributors. Propane #s here were the portable 5-gallon type used in BBQ and camper-trailer, etc.

Subtotal Residential	1,429,093	13,583	87,675	1,435,145	19.2	19,235,551
-----------------------------	------------------	---------------	---------------	------------------	-------------	-------------------

Commercial

Commercial Utilities Usage

Electricity	1,454,878	24,189	30,639	1,463,020 19.6	12,133,622
Fuel Oil (#1 2 4)	2,276	19	342	2,289 0.0	31,116
Kerosene	42,845	356	6,518	43,092 0.6	592,515
Natural Gas	466,103	878	43,922	467,298 6.2	8,784,453
Stationary LPG	24,441	232	4,257	24,603 0.3	386,973
Subtotal Commercial Utilities L	1,990,543	25,674	85,678	2,000,302 26.7	21,928,679

Community Greenhouse Gas Emissions in 2018 Detailed Report

CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)	Energy (MMBtu)
-----------------------------	--------------------------	-------------------------	---------------------------------------	-------------------

Note: 2018 emissions projection is population-based, using the population increase from 2008 to 2018, from the Washoe County Consensus Forecast, 2008 - 2030, finalized in May, 2008. Based on the Consensus Forecast, the average annual population growth from 2008 to 2018 is 2.19%. This percentage is used for all emissions sources for 2018 forecast.

1) 2008 base year electric usage data provided by Darrell Soyars, Program Manager, NV Energy, Environmental, Health and Safety, 6100 Neil Road, Reno, Nevada 89520, O:775.834.4744, C:775.771.0882, NEW EMAIL: dsoyars@nvenergy.com.

*Note: NV Energy does not differentiate between commercial and industrial usage, so both usage are listed in this field.

2) 2008 base year NG data provided by:

a) Karen Neuweiler, Senior Analyst ~ Load Research, NV Energy, P.O. Box 10100, Reno, Nevada 89520, Phone: 775-834-3942, Fax: 775.834.4484, KNeuweiler@nvenergy.com.
*NV Energy Residential NG Sold = 62,075,146 therms (includes, small, medium, & large commercial usage).

b) Davis Flaten, Manager/Engineering, Southwest Gas Corp., 400 Eagle Station Ln, P.O. Box 1190, Carson City NV 89701, 775-887-2855, Davis.Flaten@swgas.com.
*SWG Residential NG sold = 8,659,260 therms (includes small & large commercial usage).

Note: NV Energy provides NG to the cities of Reno & Sparks and some other outlying areas in Washoe County, while SWG provides NG exclusively to the outlying areas of Washoe County, primarily the southern part of the county.

3) 2008 base year fuel oil, kerosene, & stationary LPG data obtained from fuel distributors.

Subtotal Commercial	1,990,543	25,674	85,678	2,000,302	26.7	21,928,679
---------------------	-----------	--------	--------	-----------	------	------------

Industrial

Industrial Stationary Fuel Usage

Fuel Oil (#1 2 4)	668	5	27	670	0.0	9,133
Kerosene	4	0	0	4	0.0	51
Stationary LPG	1,407	13	67	1,413	0.0	22,280
Subtotal Industrial Stationary F	2,079	19	94	2,087	0.0	31,464

Note: 2018 emissions projection is population-based, using the population increase from 2008 to 2018, from the Washoe County Consensus Forecast, 2008 - 2030, finalized in May, 2008. Based on the Consensus Forecast, the average annual population growth from 2008 to 2018 is 2.19%. This percentage is used for all emissions sources for 2018 forecast.

2008 base year fuel oil, kerosene, & stationary LPG data obtained from fuel distributors.

Subtotal Industrial	2,079	19	94	2,087	0.0	31,464
---------------------	-------	----	----	-------	-----	--------

Transportation

WC - On-Road Veh

Diesel ULSD	619,118	1,844	1,953	619,730	8.3	8,463,675
Gasoline	2,376,634	161,640	136,143	2,429,602	32.5	33,530,396
OFF ROAD Gasoline	4,335	0	0	4,335	0.1	61,132
Subtotal WC - On-Road Veh	3,000,088	163,484	138,096	3,053,668	40.8	42,055,203

Community Greenhouse Gas Emissions in 2018 Detailed Report

CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)	Energy (MMBtu)
-----------------------------	--------------------------	-------------------------	---------------------------------------	-------------------

Note: 2018 emissions projection is population-based, using the population increase from 2008 to 2018, from the Washoe County Consensus Forecast, 2008 - 2030, finalized in May, 2008. Based on the Consensus Forecast, the average annual population growth from 2008 to 2018 is 2.19%. This percentage is used for all emissions sources for 2018 forecast.

2008 base year WC VMT Data provided by Judy Althoff, Associate Planner, RTC, (775) 335-1915, Jalthoff@rtcwashoe.com.

Note: The VMT vehicle fleet mix was determined by EPA's MOBILE6.2 modeling tool. The % breakdown of fuel by VMT & vehicle type for gasoline & ULSD in the Transport Assistant is adjusted to reflect this fleet mix. The total came out to 99.5% because the other 0.5% was made up of motorcycles. Since there is no VMT input for motorcycles, assumed motorcycles get 50 mpg & converted the motorcycle VMT from MOBILE6.2 model output to gallons & entered under the offroad gasoline section.

WC Train Emissions

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)	Energy (MMBtu)
OFF ROAD Diesel	36,071	0	0	36,071 0.5	492,823
OFF ROAD Diesel ULSD	998	0	0	998 0.0	13,636
Subtotal WC Train Emissions	37,069	0	0	37,069 0.5	506,459

Note: 2018 emissions projection is population-based, using the population increase from 2008 to 2018, from the Washoe County Consensus Forecast, 2008 - 2030, finalized in May, 2008. Based on the Consensus Forecast, the average annual population growth from 2008 to 2018 is 2.19%. This percentage is used for all emissions sources for 2018 forecast.

1) 2008 base year Freight train data from Lanny Schmid, Director, Environmental Affairs, Union Pacific RR, W (402) 544-2262, Cell (402) 306-7986, laschmid@up.com.

Note: UPRR consumed ~2,776,330 gals of diesel for line haul & 85,259 gals for switch yard.

2) 2008 base year Amtrak passenger train data from Jeffrey D. White, Amtrak Senior Environmental Coordinator, 530 Water Street, Oakland, CA 94607, W (510) 873-6151, Cell (510) 295-7549, WhiteJef@amtrak.com.

Note: Used regular diesel for UPRR's trains and ULSD for Amtrak's passenger trains.

Subtotal Transportation	3,037,157	163,484	138,096	3,090,737 41.3	42,561,662
--------------------------------	-----------	---------	---------	----------------	------------

Waste

Scope 3 - Community Generated Waste	Disposal Method - Managed Landfill				
Paper Products	0	0	26,726,806	561,263 7.5	
Food Waste	0	0	9,469,674	198,863 2.7	
Plant Debris	0	0	2,486,752	52,222 0.7	
Wood or Textiles	0	0	3,897,579	81,849 1.1	
Subtotal Scope 3 - Community	0	0	42,580,810	894,197 12.0	

Note: 2018 emissions projection is population-based, using the population increase from 2008 to 2018, from the Washoe County Consensus Forecast, 2008 - 2030, finalized in May, 2008. Based on the Consensus Forecast, the average annual population growth from 2008 to 2018 is 2.19%. This percentage is used for all emissions sources for 2018 forecast.

2008 base year waste data provided by Cherolyn Gilletti, Waste Management, Account Manager, CGilletti@wm.com, Phone 775-326-2336, Cell 775-771-5464, Fax 775-329-4662.

*Note: (1) This is the waste generated in Washoe County, but the waste is shipped to Lockwood Landfill, located in Storey County, outside

Community Greenhouse Gas Emissions in 2018 Detailed Report

	CO ₂ (tonnes)	N ₂ O (kg)	CH ₄ (kg)	Equiv CO ₂ (tonnes) (%)	Energy (MMBtu)
--	-----------------------------	--------------------------	-------------------------	---------------------------------------	-------------------

of Washoe County. WM has no waste share values, so used default values from LGO Protocol, Sep. 2008 ed., Table 9.3, "Default US Waste Characterization, (1960-Present)," column heading "2003-present". (2) Lockwood Landfill became a Title V facility in 2009?. They started running the flare as their methane recovery process some time in 2009. This is one of 3 processes available to them - flare, boiler process heater, or collect for sale. The Title V Permit writer from NDEP, Tobarak Ullah, said that they picked the flare method as a test, and will notify NDEP when they are running it officially.

Subtotal Waste	0	0	42,580,810	894,197	12.0
-----------------------	---	---	------------	---------	------

Other

Air Travel by Washoe County residents

Carbon Dioxide	59,530	0	0	59,530	0.8
Subtotal Air Travel by Washoe	59,530	0	0	59,530	0.8

Note: 2018 emissions projection is population-based, using the population increase from 2008 to 2018, from the Washoe County Consensus Forecast, 2008 - 2030, finalized in May, 2008. Based on the Consensus Forecast, the average annual population growth from 2008 to 2018 is 2.19%. This percentage is used for all emissions sources for 2018 forecast.

1) Air travel includes local residents flying in & out of Reno-Tahoe International Airport (RTIA), Reno-Stead Airport, and Spanish Springs Airport. The CO₂ emissions data is generated from LTOs input to the EDMS 5.1.2 software, using only the aircraft emissions portion (i.e., no GSE, roadway emissions, etc.).

2) For 2008 base year, 40% of the air travel for RTIA originated in Washoe County. Since RTIA is the only major airport within the area, the local passengers include residents from other counties such as Carson City, Lyon, Storey, Douglas, and Lander. So assumed that out of that 40%, 30% of the total air travel is made by Washoe County residents and apportioned the CO₂ emissions accordingly. RTIA & Reno-Stead Airports LTOs and RTIA passenger data source: Todd Welty, Environmental Program Manager, Reno-Tahoe Airport Authority, (775) 328-6467, twelty@renoairport.com.

3) 2008 base year WC residents accounted for 65% of Reno-Stead Airport and 78% of Spanish Springs local general aviation traffic. Source: Sky Vector <http://skyvector.com/airport/RTS/Reno-Stead-Airport> & <http://skyvector.com/airport/N86/Spanish-Springs-Airport>

Subtotal Other	59,530	0	0	59,530	0.8
Subtotal Washoe County, Nevad	6,518,402	202,759	42,892,354	7,481,997	100.0
Total	6,518,402	202,759	42,892,354	7,481,997	100.0