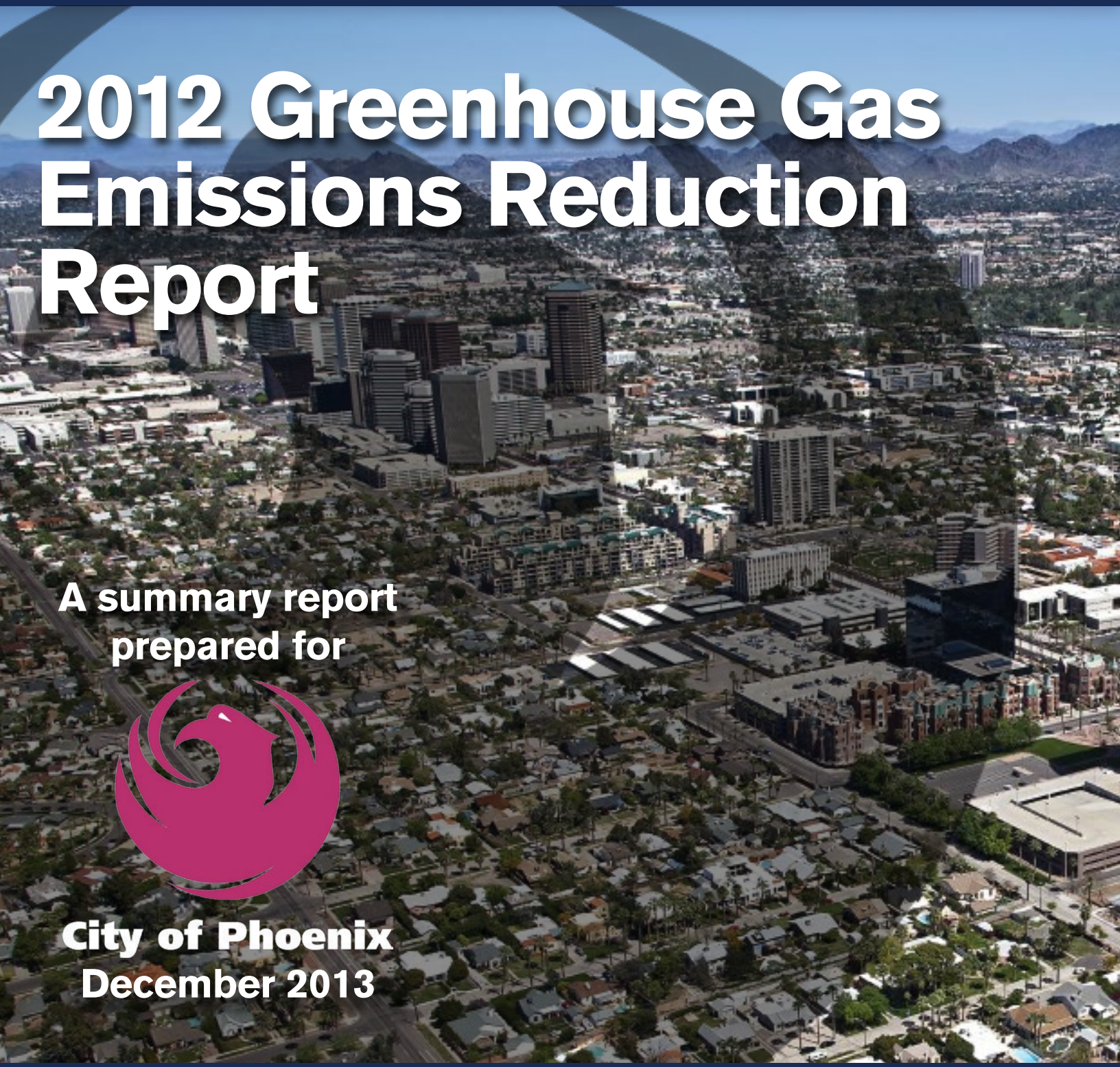
Rob and Melani Walton Sustainability Solutions Initiatives

# 2012 Greenhouse Gas Emissions Reduction Report



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Sustainability Solutions Services

# Acknowledgements

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Finally, we would like to thank the city of Phoenix employees, residents and business members who are on the ground supporting the city's efforts and who are working toward reducing their own GHG emissions. It may seem like we have a long way to go, but as this report proves—we can make a difference.

**"Employees still use gasoline as the primary fuel for commuting, averaging about 93,910,834 total vehicle miles. However, alternative fuels and modes of transportation (i.e., bus and light rail) now account for 6% or 6,026,437 total vehicle miles.**

**Emissions from the use of gasoline equal 35,176 MT $CO_2e$ while the total emissions from electric, CNG, LPG, E85, Bus and Light Rail commuting equal only 695 MT $CO_2e$."**

Excerpt from the city of Phoenix 2012 Greenhouse gas Emissions Inventory for Goverrnent Operations

# Foreword

We live in a world that is increasingly interconnected and dependent. The actions we take today have a lasting impact on the quality of life and economic strength of future generations.

Controlling greenhouse gas emissions is essential to maintaining a safe, secure, and resilient environment that all Phoenicians can thrive in and enjoy. The negative impacts of greenhouse gases diminish air quality, hurting youth and seniors with respiratory illnesses; contribute to increased night-time summer temperatures that stymie tourism and increase electricity bills; and reduce our ability to attract and retain high performing companies and jobs.

I want to ensure that all current and future Phoenicians have the opportunity to enjoy the amazing place that we call home.

In 2008, the city of Phoenix sought to reduce its greenhouse gas footprint 5% by the year 2015. I am very pleased to say that we have not only met that goal, but we have exceeded it.

I am proud of the work of our City staff and residents to make Phoenix more sustainable.

But we can't stop here. We must make an even greater impact…not just for ourselves. Our future – the future of our children and grandchildren – depend on the conscious actions that we take today. This report details work to reduce emissions associated with city operations. Now we have to expand our vision and involve all of the community and region. Together, we can implement measures that reduce our greenhouse gas impact and create the sustainable Phoenix we all desire.

Greg Stanton
Mayor

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# Background

## Introduction

In 2008, Phoenix City Council adopted a goal to:

*Reduce GHG emissions from city operations to 5% below the 2005 levels by 2015*

In 2012, three years ahead of schedule, the city achieved its goal. As Phoenix continues to pursue excellence, it must maintain a comprehensive view of where it has been, where it is now, and where it can go.

To accomplish this, the city has partnered with ASU's Sustainability Solutions Services to assess its current standing by:

- Conducting a greenhouse gas (GHG) emissions inventory update
- Evaluating the progress made towards the 2009 Climate Action Plan (CAP); and
- Recommending next steps for reducing emissions

The inventory compared 2005 and 2012 city emissions, those created by city operations, as a means of evaluating the effectiveness of the city's CAP and GHG emissions reduction efforts to date.

It revealed the largest contributors and identified areas where city efforts can make the largest impact.

Results and analysis of the 2012 inventory also provide a framework for the city's emission reduction efforts going forward to protect and improve the quality of life for residents.

The future of Phoenix depends on today's actions and commitments like never before. Water, food, energy, infrastructure, flows of goods and services, health, and safety are all vulnerable to external stressors.

In order for Phoenix to be resilient in these areas, it must be able to withstand stress and recover from crises caused by climate change and rapid urbanization, such as urban heat island and an increasing demand for resources.

**2012 Overall Findings**
7.2% decrease - *2.2% beyond Phoenix's 2015 Goal*

**City Action Highlights**
Advanced methane capture systems at city landfills
Biodiesel and ethanol alternative fuel programs
Energy efficient streetlight, traffic signal, water and wastewater upgrades
Energy efficiency measures in over 45 city buildings
City solar power projects

# Background

## Milestones

Due to their regional boundaries and shared resources, cities have a natural potential to be sustainable. Over the years, Phoenix has become increasingly involved in finding sustainable solutions that make the city more resilient.

### Valley of the Sun Clean Cities Coalition
- When? 1997
- What? Advocates for and participates in clean domestic energy practices

### Environmental Preferable Purchasing (EPP)
- When? 2005
- What? Directs city standards, policies, education, and promotion for purchasing sustainable products and services

### Tree & Shade Master Plan
- When? 2010
- What? Directs programs, policies, and infrastructure that achieve an average 25% tree canopy coverage by 2030

### Energize Phoenix
- When? 2010
- What? Creates a 10 square mile model of urban efficiency along the light rail by facilitating residential and commercial energy saving behaviors and building upgrades

### Reinvent Phoenix
- When? 2012
- What? Creates sustainability plans for five districts, which act as pilot projects for innovative policies, infrastructure, and programs

# Measuring Emissions

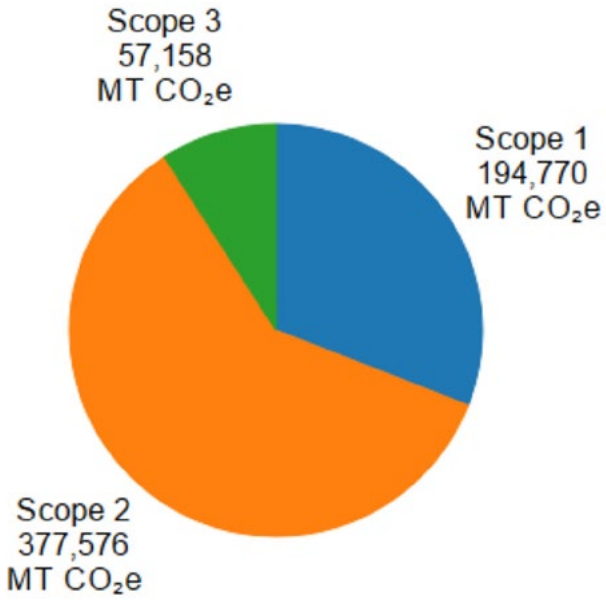
## What's The Source?

*The city of Phoenix 2012 GHG Emissions Inventory for Government Operations* identified sources of greenhouse gases (GHG) emissions in city operations by both scope and sector.

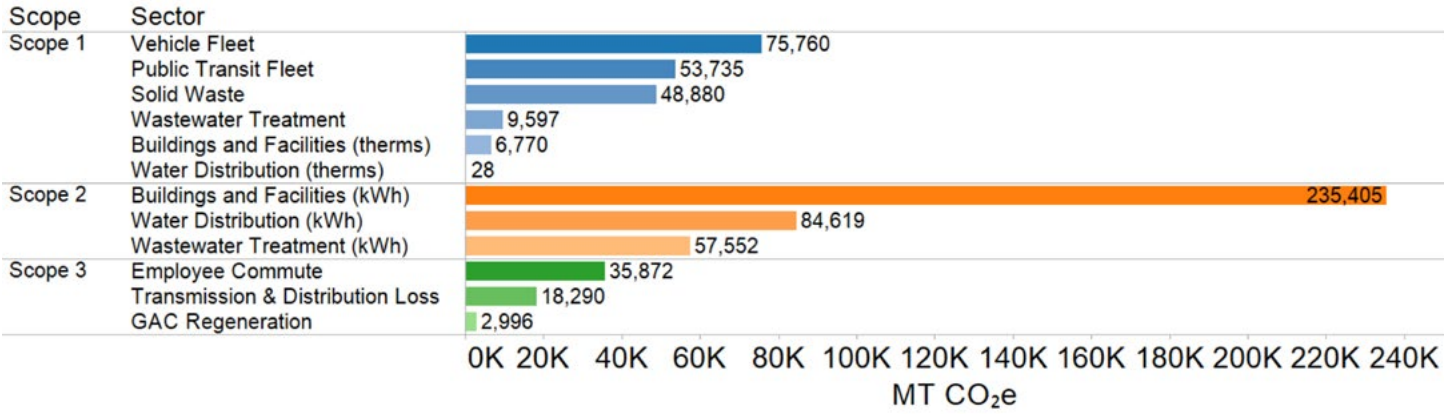
Scope 1 emissions are those generated directly by city operations.

Scope 2 and 3 emissions are indirect sources of emissions from activities related to city operations but not owned or controlled by Phoenix.

The sectors—buildings and facilities, city vehicle fleet, wastewater treatment, solid waste, employee commuting, granulated activated carbon (GAC) hauling, and regeneration for water treatment—make the findings more relevant to Phoenix's policy making and project management.




**Total GHG emissions related to city of Phoenix operations in 2012 was 629,504 MT $CO_2e$ emissions.**




[GHG emissions are measured as metric tons of carbon dioxide equivalent or MT $CO_2e$. This is consistent with the established international standard for comparison of the global warming potential of different GHG relative to $CO_2e$.]

# Measuring Emissions

## How Did We Do?

In 2005, a baseline GHG emissions inventory was conducted. The 2012 inventory update enabled the city to evaluate its progress in lowering emissions from its operations. Between 2005 and 2012, emissions decreased by 7.2%, from 678,150 to 629,504 metric tons $CO_2e$. This can, in part, be attributed to the 2009 Climate Action Plan (CAP), which outlined 10 actions the city could take to lower emissions.

CAP actions fell into three broad categories, based on major emissions sources in the 2005 inventory: Energy Efficiency, Transportation, and Solid Waste. The table below outlines the actions and current status.

[Note: due to corrections in methodology, the 2005 total increased from 618,682 metric tons $CO_2e$ to 678,150 metric tons $CO_2e$.]

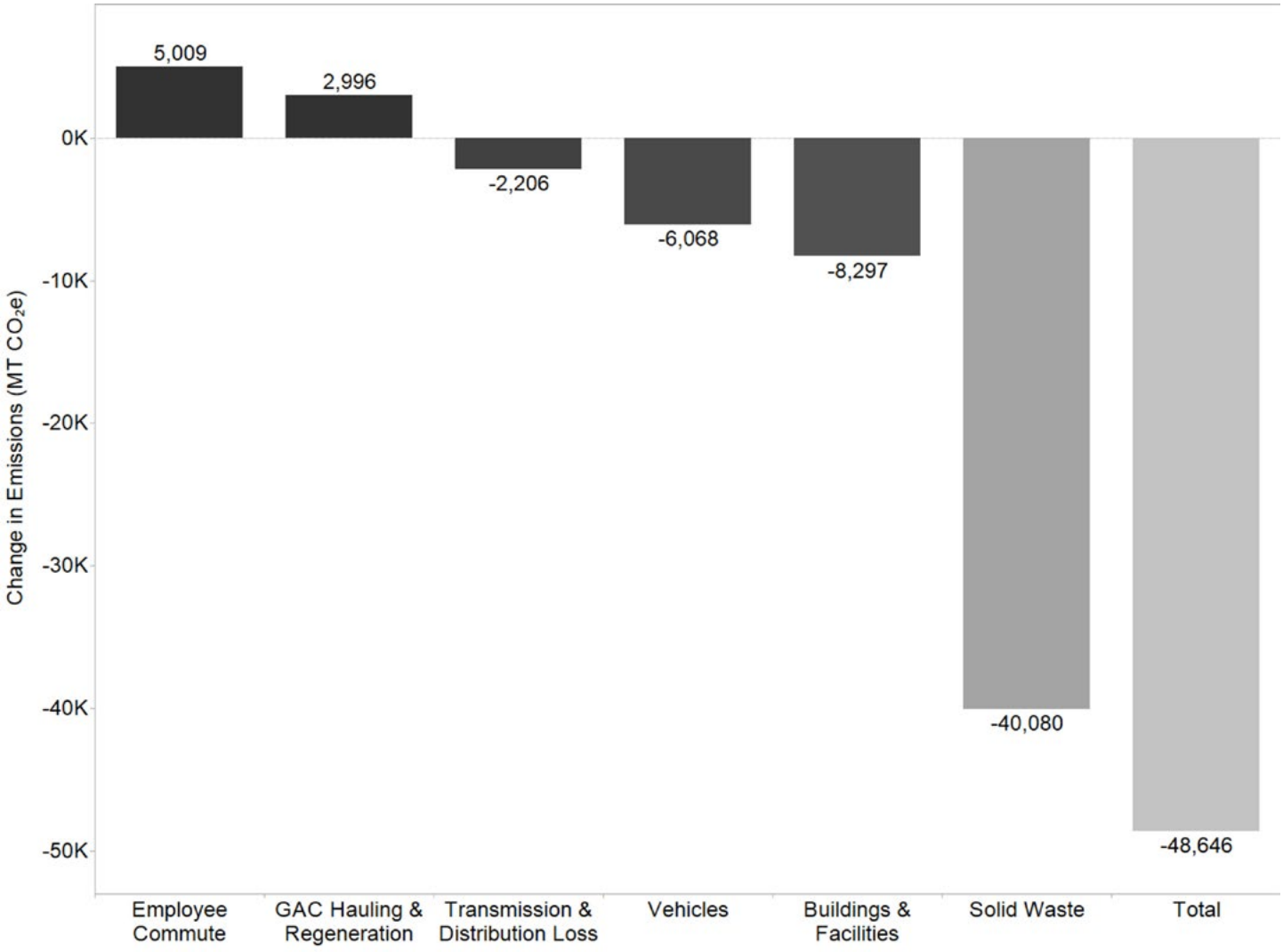
| 2009 Action | 2012 Status |
|---|---|
| **Energy Efficiency** | |
| Wastewater treatment gas to clean energy | Ongoing: Phoenix is planning a project to convert biogas being emitted from wastewater treatment to fuel and/or electricity to offset the need for purchased electricity. |
| 15% renewable energy by 2025 | Ongoing: The city currently generates ~3% of its energy from renewable sources. Additional projects, including solar and biogas conversion, are in the planning stages. |
| Energy efficient traffic signals | Ongoing: 100% of new and 74% of existing traffic signals now use LED bulbs. By 2015, all existing traffic signals will be converted to LEDs. |
| Energy efficient building upgrades | Ongoing: 45 facilities have been upgraded. The city's Energy Capital Improvement budget includes funds for additional upgrades to meet its commitment of a 20% building energy use reduction from 2009 levels by 2020. |
| Energy efficient new buildings | Ongoing: All new city buildings must meet minimum U.S. Green Building Council (USGBC) Leadership in Energy & Environmental Design (LEED) Standards. |
| **Transportation** | |
| Alternative Fleet Fuel - Biodiesel and Ethanol (E85) | Ongoing: All fleet vehicles are being converted to biodiesel. Public Works and Aviation departments have a total of 5 E85 tanks dedicated to the city fleet. |
| Phoenix Sky Train: Stage I | Complete: Sky Train construction has been completed from the 44th Street/Washington Light Rail stop to Terminal 4. Free 24-hour service began in April 2013, reducing Aviation Compressed Natural Gas vehicle use by 32%. |
| Phoenix Sky Train: Stages Ia and II | Ongoing: Construction is continuing with Stage Ia connecting Terminal 4 and 3 expected to be completed in early 2015. Stage II (start date to be determined) will connect the airport and car rental center. |
| Expand employee rideshare program | Ongoing: Reported emissions increased due to changes in survey sampling. The city is looking at options for engaging more employees in ride reduction programs and alternative transportation options. |
| **Solid Waste** | |
| Enhanced landfill methane collection | Complete: An enhanced collection system was installed in the city's newest and only operational landfill, SR-85. The Skunk Creek landfill was taken off line and its collection efficiency was enhanced using newer technology with its final cap. |
| Expand mulching and recycling programs | Ongoing: The city diverted over 12,000 more tons of green waste than in 2009. |

# Measuring Emissions

## Significant Reductions

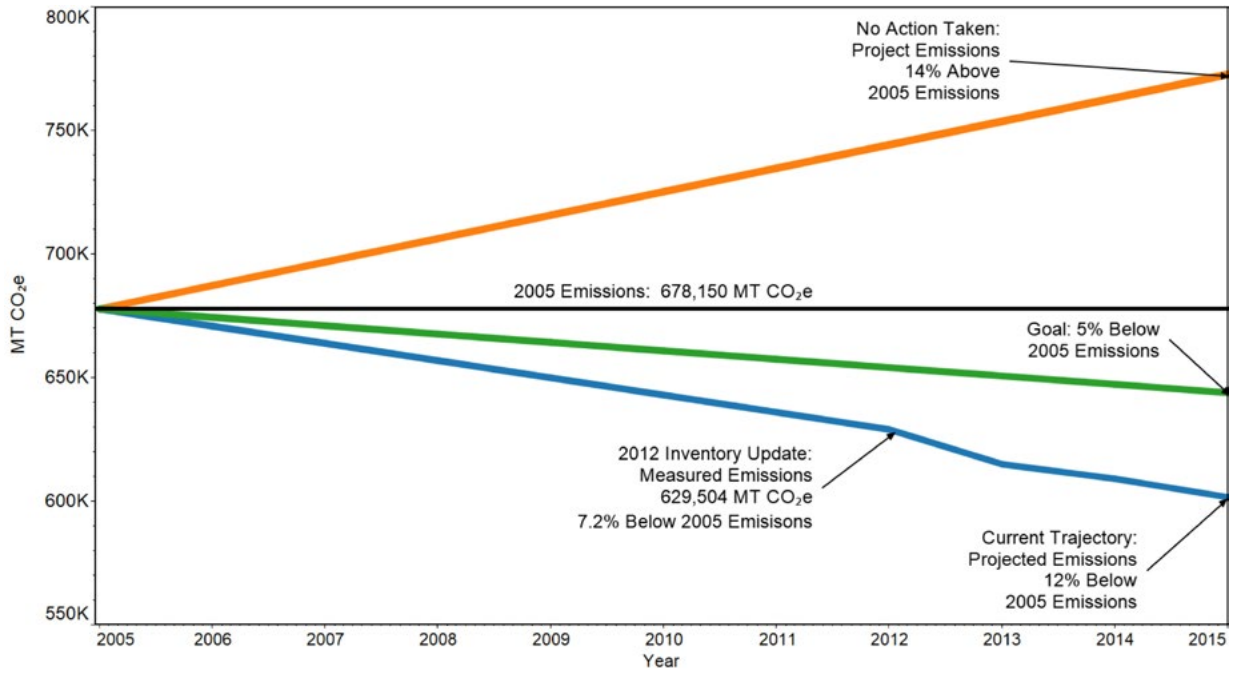
Significant progress has been made for each of the ten actions. However, the 2012 inventory revealed the three largest reductions:

1. The largest reduction in emissions came from enhanced methane ($CH_4$) collection at city landfills, which prevented 40,080 MT $CO_2e$ from entering the atmosphere.
2. The second largest reduction came from city buildings and facilities emissions, which fell by 8,297 MT $CO_2e$. Reductions resulted from solar energy generation, improved building efficiency standards and upgrades, as well as a cleaner, more efficient regional electricity mix.
3. New biofuel policies led to a decrease of 6,068 MT $CO_2e$ in city vehicle emissions.



# Measuring Emissions

## Where Are We Headed?




Although Phoenix has met and surpassed its original goal, the city is planning to implement several projects that will further reduce GHG emissions. This will allow the city to offset future GHG emissions due to anticipated population growth as well as maintain the highest quality of life in the city and the region.

These projects are estimated to prevent an additional 27,939 MT $CO_2e$ from entering the earth's atmosphere by 2015. This is equivalent to taking 5,281 vehicles off the road annually or eliminating electricity use in 4,182 homes for one year.

As Phoenix continues to grow, it also has an opportunity to work with neighboring cities and make a global impact. The challenge is formidable and cannot be met overnight. Infrastructure will have to change, technologies developed, and policies enacted, but Phoenix embraces the challenge and invites other municipalities in the Valley to join it.

### UPCOMING PROJECTS

**Better Building Challenge**
Reduce 20% of city building energy consumption by 2020

**Alternative Fuel Program Expansion**
Convert 85 city solid waste trucks to CNG and all contracted solid waste haulers from diesel to biodiesel

**Streetlight and Traffic Light Retrofitting**
Convert 2,489 streetlights and all traffic lights to LED lighting

**Phoenix's Sky Train to Sky Harbor Airport**
Complete Stage Ia connecting Terminals 4 and 3 by early 2015

**Solar Projects**
Add 1.2 MW of new solar projects to the 24 existing projects

# Actions

The city's momentum can be built upon by continuing to take bold actions to identify the sources of emissions in Phoenix, evaluate the effectiveness of climate action programs, and prepare vulnerable city resources and populations for continued growth and climate change impacts.

The authors of this report propose five measures, which can be used by the city government and the community to lower emissions and create a resilient metropolitan region.

## 1. Annual GHG Emissions Inventory Update

To accurately evaluate the effectiveness of city climate action technologies, programs and policies and effectively influence the drivers of change in emissions, the inventory should be updated on an annual basis.

## 2. City GHG Emissions Dashboard

Transparency and accountability are critical in ensuring that emissions reduction efforts remain active. A city of Phoenix online GHG dashboard would present the results of emissions inventories in an easily accessible way for city staff, other municipalities and the public.

## 3. Regional GHG Emissions Inventory

Greenhouse gases are not contained by city boundaries. The actions of each city and town in the Phoenix Metro area affect neighboring towns, cities, and tribal communities. A comprehensive view of regional emissions is critical in order to target major GHG emissions contributors that impact Phoenix's efforts. A Regional GHG Emissions Inventory would ensure that the city's efforts are effective; encourage collaboration across the Valley; and identify additional opportunities for reducing emissions in residential, commercial, and industrial areas.

## 4. Vulnerability Assessment

Climate changes pose a greater threat to certain populations and resources within Phoenix. A Risk & Vulnerability Assessment would identify those populations and resources at the greatest risk. It would also enable the city to develop and analyze a variety of climate change scenarios to inform resilient development strategies (e.g. infrastructure, transportation).

## 5. New Climate Reduction Targets

The city of Phoenix has had great success in its GHG emissions reduction projects and programs and has, in fact, surpassed its 2015 reductions goal. Therefore, setting New Climate Reduction Targets could help ensure that the city continues its success in climate leadership.