2019

SA Climate Ready: A Pathway for Climate Action & Adaptation

SA Climate Ready

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SA CLIMATE READY:
A PATHWAY FOR CLIMATE ACTION & ADAPTATION

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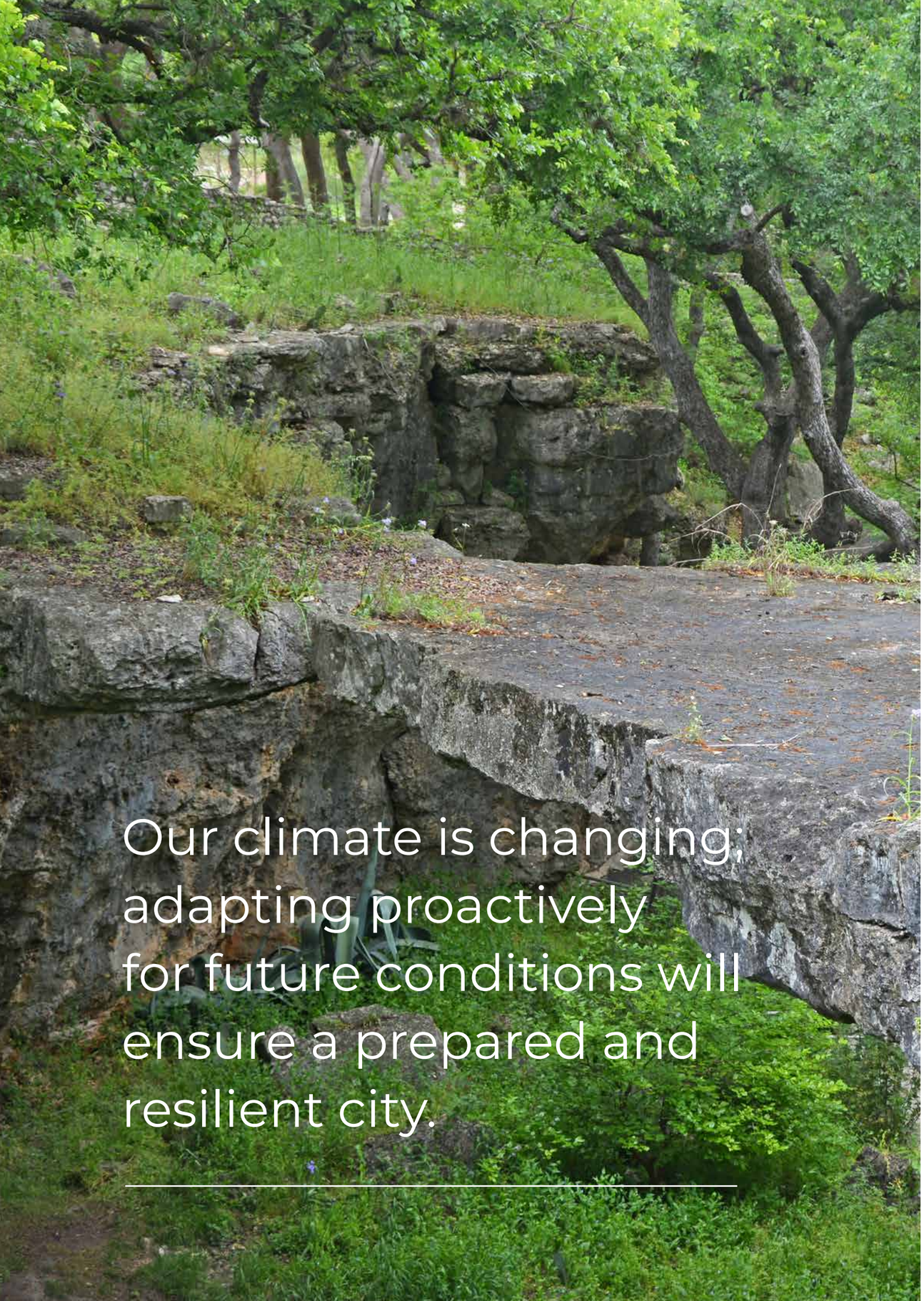
Draft for Public Discussion



CARBON NEUTRAL **BY 2050**

car·bon neu·tral
adjective
Having or resulting in no net addition of carbon dioxide to the atmosphere.

Par·is Cli·mate Agree·ment
noun
An international commitment to limit global temperature increase to well below 2 degrees Celsius (°3.6F)

A MESSAGE **FROM THE MAYOR**

San Antonio is one of the fasted growing cities in the nation. Every day, we are working to plan for and accommodate the estimated one million additional residents that will arrive in San Antonio by 2040. In much the same way, it's our collective responsibility to prepare for a future that is projected to have hotter temperatures, longer droughts and more intense rain events, as a result of our changing climate. That is why working with the City Council, one of my first acts as your Mayor was to sign the Paris Climate Agreement.

Throughout the SA Climate Ready process, people from across the community have helped craft a sustainable community approach by examining best practices and policies around how we build; how we power our homes, cars and businesses; how we travel; how we conserve water and green space; how we reduce air pollution; and, perhaps most importantly, how we take care of our most vulnerable neighbors. When it comes to climate action and adaptation, our borders do not stop at the city limits or county line. Working with stakeholders across jurisdictional lines will continue to be the way we achieve progress.

San Antonio is a warm, welcoming and culturally diverse community where we cherish tradition and heritage while nurturing forward-looking policies that keep our home healthy and vibrant. Protecting our community's quality of life, economy, military and historic treasures is a leading priority.

CLIMATE CHANGE
IMPACTS US DAILY.
LET'S GET
CLIMATE READY.

CONTENTS

Our City, Our Plan	07
Introduction	09
Grounding the Response: Climate Equity	13
The Challenge and Response	21
Mitigation	33
Adaptation	44
Implementation	54
Appendix I: Glossary	58
Appendix II: Methodology	62
Appendix III: Climate Equity Screening Mechanism	70
Appendix IV: Implementation	72
Appendix V: References	80
Acknowledgments	82

Implementation of SA Climate Ready translates to a more equitable future for all San Antonians

OUR CITY, OUR PLAN

IN 2019, San Antonio launches the city's first Climate Action & Adaptation Plan (CAAP) and enters its fourth century as an established municipality.[1] With thousands of years of rich history and culture, a diverse community has thrived around the river that initially sustained Native peoples over 10,000 years ago which they called "Yanaguana" (precious land), and now is the seventh most populous city in the United States and a powerhouse of economic growth in Texas. At a time of historic population growth and facing climate change, the most significant threat to our community and the world, our community has chosen to rise to the challenge to ensure the quality of life for all San Antonians for generations to come.

Throughout this history, our city has maintained a connection to our unique natural environment, and that deep connection has fueled action.

On June 22, 2017, San Antonio City Council passed a resolution in support of the Mayor's National Climate Action Agenda, a commitment by over 400 U.S. Mayors to uphold the goals of the Paris Climate Agrement. This came on top of the City Council's adoption of the SA Tomorrow Plans in August 2016; focused on neighborhoods, transportation, and sustainability serving as a roadmap for enhancing the City's quality of life and overall resilience while balancing the impact of our expected growth with existing economic, environmental, and social resources. The SA Climate Ready CAAP evolves from these actions, aligning the city's efforts with the Paris Climate Agreement and developing a roadmap to respond to the climate impacts that are in San Antonio over the next century.

San Antonians are already feeling the impacts of climate change: wildfires, powerful storms, and intense heat are becoming more common. Climate projections show that our future will be even hotter and drier — resulting in increased climate-related emergency room visits and even deaths, especially for our vulnerable populations who will be unable to escape the most severe impacts. By 2040, summer maximum temperatures in our city will be on average 4°F higher than they are today — and annually, we will experience 24 more days over 100°F and receive 3" less rain. By the end of the century the higher emissions scenarios project that we will see average summer maximum temperatures over 10°F higher than today with more than 90 additional days with maximum temperatures above 100°F.[2]

Without a plan to reduce our emissions and prepare our city for these impacts, our city — and our people — are at risk. Climate change threatens our health, our financial stability and economic competitiveness, our transportation

SA Climate Ready is San Antonio's plan to meet the present and future challenges of a changing climate, building on actions already enacted for a low-carbon future. Mitigation and adaptation strategies in this plan address the needs of all residents while supporting the systems that advance our city's resiliency.

systems, and our well-being. However, San Antonio is rising to the challenge of climate change by developing the CAAP. We are working together to ensure that San Antonio remains a vibrant, thriving city for generations to come. We are forging our own path to become climate ready.

The CAAP is the result of an intensive process to uphold this commitment. This process brought together voices from the community, involving a diverse coalition of eighty-nine community leaders as part of a Steering Committee and Technical Working Groups and soliciting significant input from the community at large.

With a goal of carbon neutrality by 2050, the City has already achieved:

- A 10% reduction in total Greenhouse Gas (GHG) emissions from 2014 to 2016, in spite of population and economic growth.
- Recognition in 2018 as 6th in the nation for installed solar capacity with 161 Megawatts of installed capacity.[3]
- Adoption of the most advanced International Energy Conservation Code (IECC) building code, setting the city apart as one of the most progressive jurisdictions in the nation, and ensuring the energy efficiency of our new buildings.

The vision of SA Climate Ready is one of health, vitality, and opportunity for all members of San Antonio's community. This is further intensified by identifying climate equity as fundamental to San Antonio's solution — calling forward the often unstated truth, that climate change has deeply disproportionate effects on vulnerable populations. The CAAP establishes a process for identifying and evaluating the impacts of climate change and climate change solutions on our city's most vulnerable. This process is described in deeper detail within the plan.

Achieving the mitigation and adaptation goals set in the CAAP will be no easy task — it will require action from every member of San Antonio's community. But global, national, and regional reports leave no room for error. The time for action is now. SA Climate Ready sets the trajectory for the next half-century, ensuring that we take responsibility for our impact today, harness the opportunities as our world transitions to a low-carbon economy, and build a more vibrant San Antonio for our children and grandchildren.

Signed by nearly every country, The Paris Agreement is an international commitment to limit global temperature increase to well below 2 degrees Celsius (3.6°F) and to aspire to limit global temperature increase to 1.5 degrees Celsius (2.7°F). San Antonio's City Council Resolution 2017-06-22-0031R commits San Antonio to adopt and support the goals of the Paris Agreement as part of the Mayors National Climate Action Agenda network.

INTRODUCTION

As one of the oldest cities in the United States, San Antonio has proudly taken on many names: Alamo City in reference to our most famous historical landmark, Military City USA[4] as home to one of the largest concentrations of military bases and active duty military in the U.S., and River City referencing the river that links our neighborhoods, enchanting both residents and visitors alike. Today, San Antonio is a global city with a dynamic economy and workforce, a deep cultural heritage, and diverse neighborhoods that are resilient and welcoming. It is one of the strongest fiscally managed cities in the country with a vibrant business climate; San Antonio is a city that nurtures entrepreneurship, encourages investment, and funds infrastructure. With two pan-american highways, IH-10 and IH-35, crossing through the heart of the city, San Antonio is not only an international thoroughfare, but an international destination. In 2015, the San Antonio Missions National Historical Park became the first UNESCO World Heritage site in Texas. Further, the City of San Antonio enjoys active and productive Sister City relationships with eleven cities worldwide.

San Antonio has expanded through the growth of jobs in the bioscience, IT/cybersecurity, finance/insurance, and advanced manufacturing/aerospace sectors.[5] Within our city, jobs have increased and educational opportunities for a prepared workforce continue to expand. Strong cultural traditions have allowed many neighborhoods from being drastically altered by socieconomic factors or generic influences, though change continues to knock incessantly at our doors. In recent years, the strong economy has spurred continual growth, ushering in both positive and negative impacts. With a fiscally sound credit rating, the City of San Antonio has been able to finance and deliver major infrastructure and service upgrades, but demand shows no sign of slowing.

San Antonio's preparation for the future is focused on the three pillars that define sustainability: economic, environmental, and social. Each pillar is dependent on the others and all must contribute to a thriving ecosystem. For San Antonio, growth has brought prosperity for some, but not for all; resulting in an ever

widening divide between our most prosperous and most vulnerable citizens. Growth has also impacted our natural resources including water and native species; increased air pollution and increased traffic congestion. The SA Climate Ready CAAP builds upon San Antonio's best-in-class achievements, showcasing San Antonio as a leader responding to our worldwide challenge, with aspirations to take on more.

Our climate is changing across the world; but what does this mean for our local community? It means hotter temperatures, less rainfall, more severe storms, and increased flooding. The same challenges we already struggle with will be magnified by our warming planet.

The economic impacts of climate change may be as substantial as the physical. For example, the high ozone concentrations that San Antonio is experiencing today, which are closely linked to GHG emissions, could result in 19 additional deaths in Bexar County, an impact of approximately $170 million to the community.[6] In addition, Moody's investor service has embedded climate risks as a key factor to considering a city's bond rating — this CAAP will help San Antonio to respond. Beyond the municipal impacts, businesses are starting to see both physical and economic impacts with some of the biggest investors labeling climate change as a critical impact.

To preserve our city, we must harness collaborative partnerships, technology, and creative thinking to innovate strategies that will ensure the quality of life of present and future residents, businesses, and partners.

SAN ANTONIO IS RESPONSIBLE FOR OUR SUSTAINABLE FUTURE

We have much to celebrate and much to protect within and around San Antonio. Every city is unique with responsibilities to their residents including, safety, access to services, and opportunities to improve one's life. Resilience, or the capacity for social, economic, and environmental systems to maintain their essential functions in response to unexpected impacts (i.e. hazardous events, trends, or disturbances) is a core requirement of the functionality of cities. Maintaining the resilience of San Antonio's systems will be further stressed by the dire effects of our changing world. More people, more heat, and less water. What will that mean for our future?

For San Antonio, that means supporting and regenerating the natural resources that sustain and feed us. That means empowering individuals to make choices that improve our collective well-being. And that means harnessing brain power and technological innovation to ensure a sustainable future for all future residents. We know that the systems on which we depend will be irreversibly damaged if we continue on our current path.

The longer we wait to take action, the likelihood of negative impacts increases, and the sooner we act, the sooner we can ensure that San Antonio can continue to prosper, The SA Climate Ready plan brings together voices and ideas from San Antonio to develop a pathway for our community. We invite you to read on and learn more about our plan to protect our community.

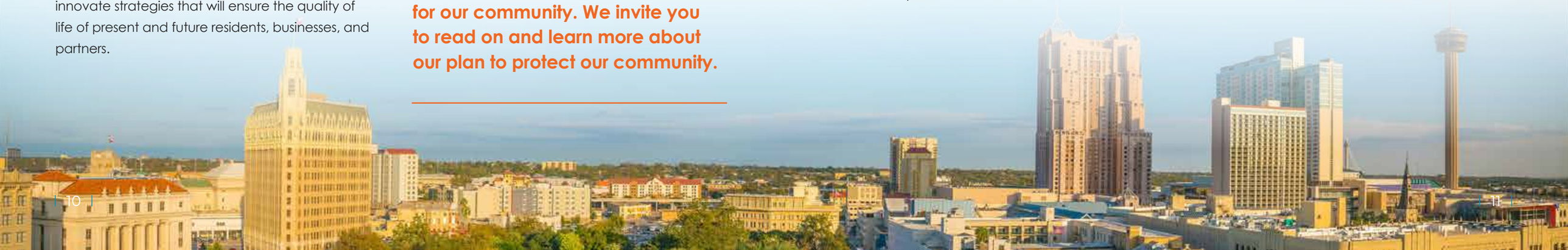
Climate change isn't just about nature, but presents an enormous challenge to preserving San Antonio's tangible and intangible heritage. The City of San Antonio is laying a foundation for a more resilient and sustainable future by integrated heritage values into this plan. Cultural heritage anchors social memory and sense of place, which inform community identity, strengthen social cohesion, and sustain inherent resilience.

SAN ANTONIO IS CONNECTED TO A GLOBAL EFFORT

Cities around the world are defining their own futures by taking action on climate change. Here in the U.S. over 400 Mayors representing 70 million Americans have committed to upholding the Paris Climate Agreement[7] — San Antonio is one of these cities. While we are only one spot on the map, the commitments laid out in SA Climate Ready mean San Antonio is joining the national and global list of cities who are not waiting for nations to live up to their commitments. Cities across the world are committing brain power and financial resources to determine their responsibility and ability to regenerate and improve natural systems so that humanity, and all life, may continue to thrive.

It is more imperative than ever that San Antonio analyze local climate trends in order to prepare for the future, aligning with other cities and responding to worldwide climate trends.

The challenge of a city climate commitments is determining the burden of responsibility — what should one city bear in comparison to all who share our planet — this challenge will be discussed in detail through the CAAP. While climate change is a global challenge, solutions must be localized. Scientific analysis is informing our focus here in San Antonio, for us warming of the global climate translates to a significant increase in days with maximum temperatures above 100°F, a decrease in cool nights (those that reach temperatures below 80°F), less annual rainfall, and more intense storms. Consider some of the key impacts of these climate changes: higher energy bills, reduced opportunity to work or play outside, more frequent water restrictions, impacts on supply chains, property damage and less productivity; these are just a few of the many effects that we will experience. The personal well-being of San Antonians and the economic development of the city is at stake.



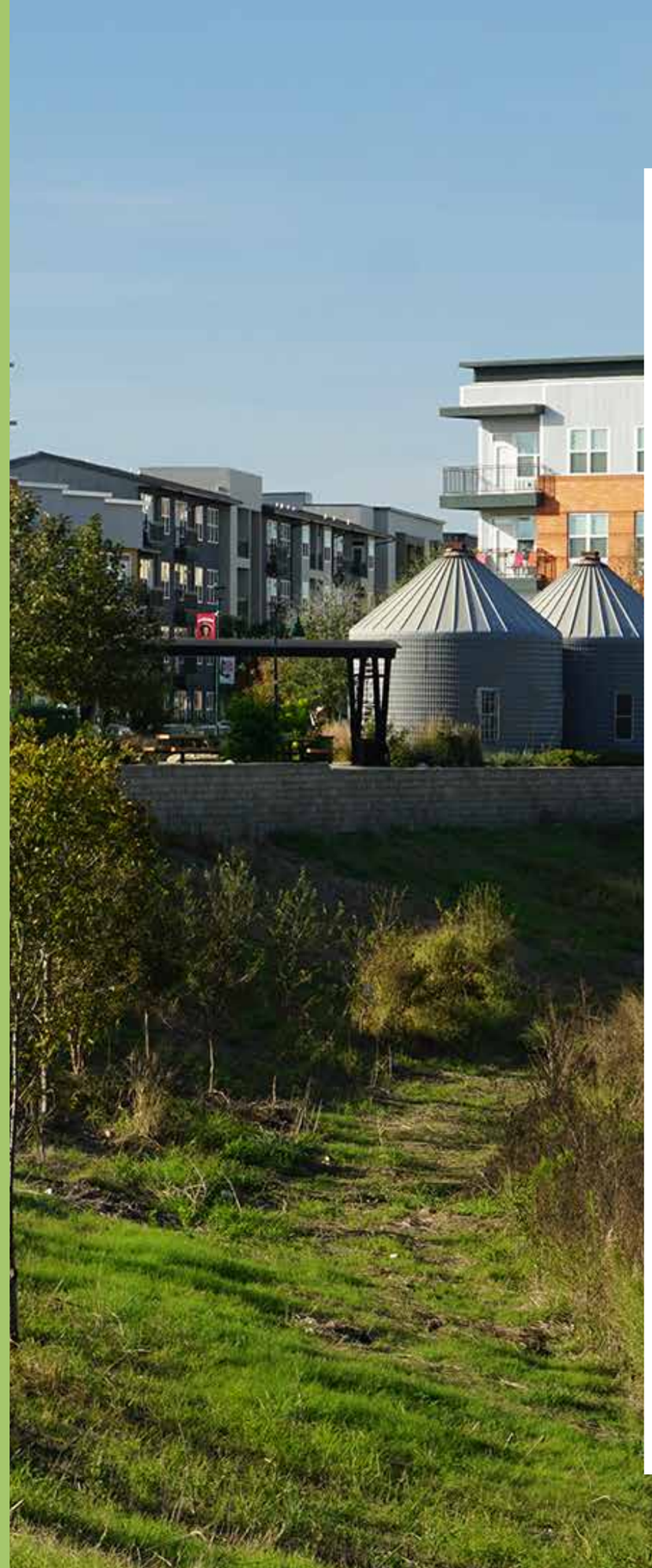
WHAT DOES CLIMATE EQUITY MEAN FOR **SAN ANTONIO?**

Equity means that our policy-making, service delivery, and distribution of resources account for the different histories, challenges, and needs of the people we serve. Equity differs from equality, which treats everyone the same despite disparate outcomes. (City of San Antonio, Equity Office, 2017)

Due to these different histories and challenges, in the City of San Antonio, not all community members are contributing equally to climate change, and not all community members have the same resources or capabilities to protect themselves from its negative effects. A climate equity framework prioritizes the communities burdened the most by climate change, those that contribute the least to climate change, and those that are socially vulnerable to climate change. Climate equity ensures that these communities play a central role in the just transformation of the systems that have established, and continue to perpetuate, the unequal burden of climate impacts. This means that intentional policies and projects to mitigate or adapt to climate change must:

1. **Actively seek, include, and prioritize direction from these communities,**
2. **Prioritize benefit to these communities**
3. **Reduce existing burdens and bar additional burdens to these communities**

Developed by the Climate Equity Technical Working Group. The definition will be updated as continued climate equity discussions occur through plan implementation.



GROUNDING THE RESPONSE: CLIMATE EQUITY

Climate change affects everyone, but not all people are impacted equally. Across the world and right here in San Antonio, people who are already socially vulnerable (communities of color and low-income communities, in particular) are less able to adapt to climate impacts and to prioritize climate action. That is why equity is at the heart of our CAAP: we aim to ensure San Antonio's most vulnerable communities are meaningfully engaged in climate planning and implementation, and policymakers have the tools needed to prioritize equitable outcomes in CAAP-related decision-making.

RECOGNIZING HISTORY TO SOLVE FOR THE FUTURE

An equitable approach to climate action requires an understanding of the historical legacies, structures, and policies that have resulted in and continue to perpetuate racial and economic inequities in San Antonio. Just as government plays a key role in addressing local climate action, so too does it bear some of the responsibility for driving systemic change to eliminate the inequities resulting in certain communities being disproportionately impacted by climate change.

In San Antonio, communities of color and low-income populations have experienced the greatest burdens due to inequities in housing, health, education, criminal justice, jobs, and other quality of life outcomes.

These inequities are the direct result of decades of discriminatory policies by local, state, and federal government agencies. Segregationist practices and policies, such as redlining and segregated public housing, isolated low-income communities of color from wealthier white communities, which set the foundation for San Antonio to become one of the most economically segregated cities in the country.[8, 9] Housing discrimination, neglected infrastructure, and a lack of investment in public amenities, particularly in low-income neighborhoods, are just a few examples of the structural and institutional forms of racism contributing to the inequities existing between racial groups in San Antonio.

Structural inequities also hinder a community's ability to adapt to a changing climate. Higher temperatures may force low-income families to choose between turning on the AC or paying for food, medicine, and other basic necessities. Homeless individuals may not have access to water or shelter needed to avoid heat-related health impacts. People with disabilities are disproportionately burdened during floods or wildfires because emergency response plans and infrastructure may not be designed with them in mind.

Extreme weather and climate events will exacerbate the current challenges facing vulnerable groups in San Antonio, making climate equity all the more critical in the development and implementation of the CAAP.

THE VISION: DEFINING CLIMATE EQUITY

SA Climate Ready is part of bigger shift towards normalizing and institutionalizing equity within our city government. The City's Office of Equity is working across departments to identify opportunities to increase equity in city services, programs, and policies. The CAAP's climate equity approach will guide the city's consideration of equity in its climate policies and programs to achieve more environmentally and economically just outcomes for San Antonians.

OPERATIONALIZING EQUITY IN THE CAAP: THE CLIMATE EQUITY SCREENING MECHANISM

One of the key tools developed as part of the CAAP is the Climate Equity Screening Mechanism. The Climate Equity Screening Mechanism was designed as a framework for the intentional consideration of equity issues in the implementation of CAAP strategies, i.e. policies, programs, and budget decisions. It is intended as a practical tool for applying an equity lens to all actions related to climate mitigation and adaptation.

The full Screening Mechanism (included as Appendix III), which will be continually refined and tested to ensure clear equity gains, is centered around five climate equity themes:

1. Access and Accessibility Increased access to jobs, housing, transportation, funding, education, healthy foods, and clean air for vulnerable populations.

2. Affordability Lower / more predictable costs related to basic living needs (e.g. housing, food, utilities, healthcare, transportation,etc.) for vulnerable populations.

3. Cultural Preservation Respecting and honoring cultural relevance and history.

4. Health Increased health (physical and mental) for vulnerable populations.

5. Safety and Security Mitigation of potential threats and increased access to critical lifelines when (or before) threats are experienced.

Each of these themes is associated with a list of diagnostic questions to assess the potential positive or negative impacts of a proposed strategy, action, or program. For example, under the theme of affordability a question that will be considered through the Equity Screening Mechanism is: "Could this reduce the number of families that are cost burdened by housing + transportation (defined as spending more than 33% of income on H+T)?" The purpose of the Climate Equity Screening mechanism is to ensure that the climate equity implications are considered in every decision made in the implementation of the CAAP both in terms of potential benefits and unintended consequences.

SAN ANTONIO'S COMMITMENT TO CLIMATE EQUITY

The City of San Antonio was committed to prioritizing climate equity in the development and in the implementation of climate action and adaptation strategies. Working with key community equity stakeholders and prior to implementation, each of the strategies outlined in the CAAP will be evaluated using the Climate Equity Screening Mechanism, which will allow the city to identify and mitigate potential equity impacts, reduce existing inequities and identify opportunities to improve the quality of life of vulnerable groups. Applying an equity lens to the implementation of the CAAP will ensure that the different experiences and perspectives of the San Antonians whose lives will be most impacted by climate change guide the city's decision-making around climate action and adaptation.

"Water should be free. I just want to stay cool."

— Homeless gentleman discussing access to water fountains and shelter during heatwaves
Bazan Branch Library (August 2018)

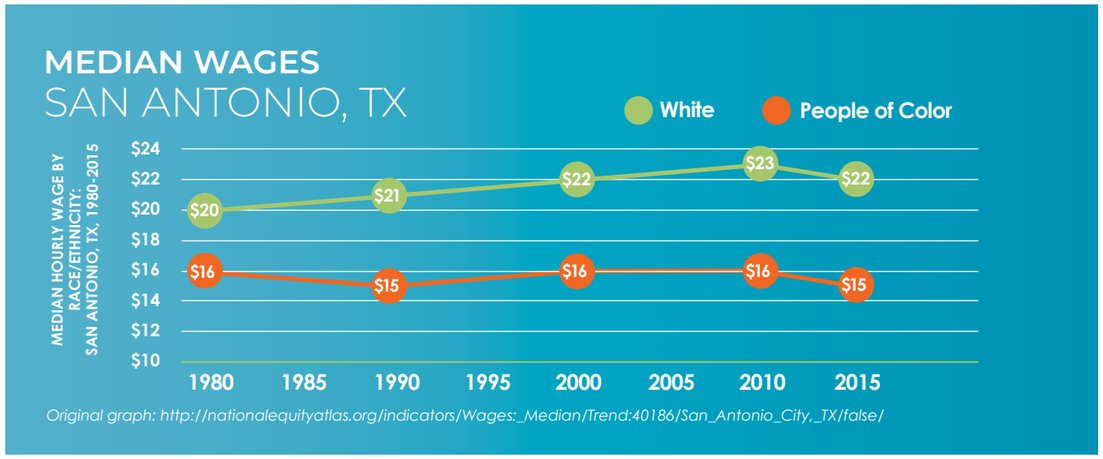
“No se si la casa esta segura para vivir pero pues que le hago?”

“I’m not sure if my home is [structurally] safe to live in but what can I do?”

— Community resident sharing concerns for her home and limited resources to repair.
Las Palmas Branch Library (September 2018)

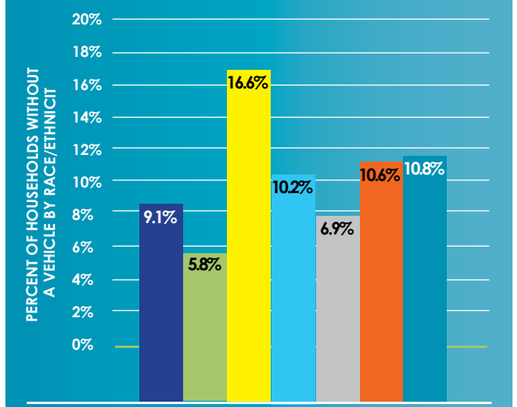
SAN ANTONIO:
EXAMPLES OF ECONOMIC INEQUITIES

The extent to which vulnerable populations face hardships resulting from historical inequities is not always top of mind. The following charts, from the National Equity Atlas,[10] serve as a reminder of the economic inequities experienced in San Antonio.



Median Wages Equitable wages would reflect differences in education, training, and experience but would not vary systematically by race. In 2015, San Antonio had a significant difference in median wages, with workers of color earning $7 less than the median hourly wage for White workers.

CAR ACCESS
SAN ANTONIO, TX

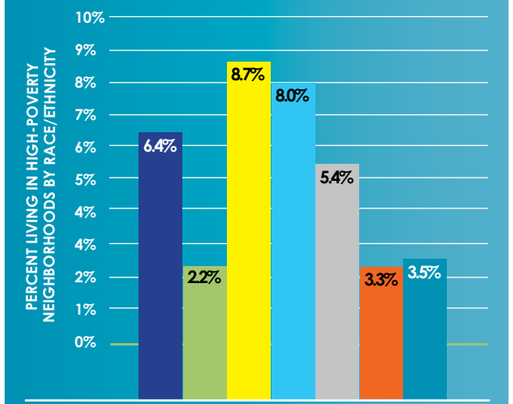


Original graph: http://nationalequityatlas.org/indicators/Car_access

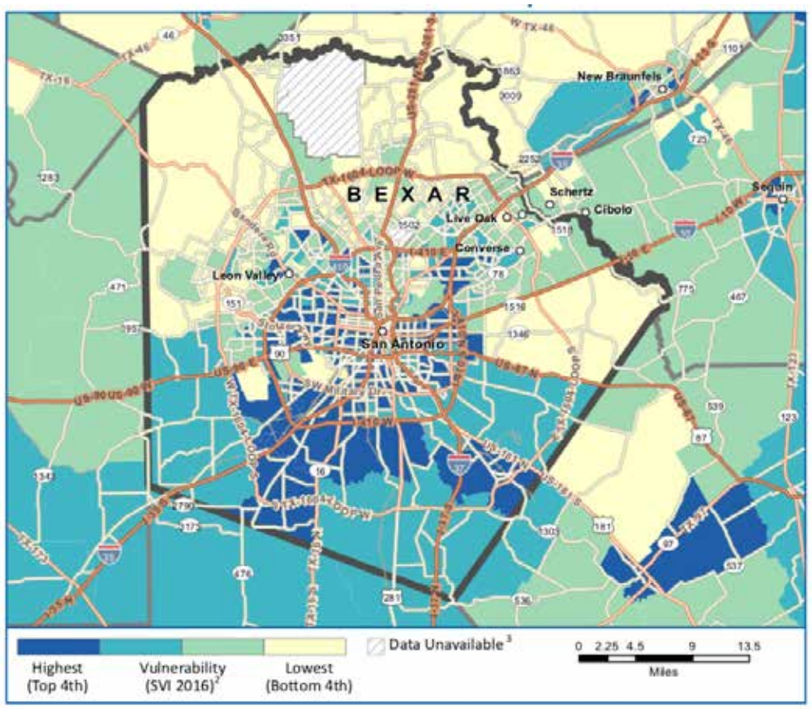
Car Access "Reliable and affordable transportation is critical for meeting daily needs and accessing educational and employment opportunities."[11] In 2015, fewer than 6% of White households did not have access to a car, while more than 10% of Latino households and more than 16% of Black households lacked access to a car.

Neighborhood Poverty "People who live in high-poverty neighborhoods have less access to jobs, services, high-quality education, parks, safe streets, and other essential ingredients of economic and social success that are the backbone of strong economies."[12] In 2015, San Antonio's White population had the lowest concentration of people living in high poverty neighborhoods, while both the Black and Latino populations had over 8% of their populations living in high poverty neighborhoods.

NEIGHBORHOOD POVERTY
SAN ANTONIO, TX



Original graph: http://nationalequityatlas.org/indicators/Neighborhood_poverty/2015:undefined/San_Antonio_City,_TX/false/Year(s):2015/



Original graph: https://svi.cdc.gov/Documents/CountyMaps/2016/Texas/Texas2016_Bexar.pdf

SOCIAL VULNERABILITY INDEX

The Centers for Disease Control and Prevention uses a tool known as the Social Vulnerability Index (SVI) to identify communities most likely to need support before, during, and after a disaster or extreme event. The SVI utilizes 15 indicators from U.S. Census data to determine social vulnerability at the census tract level. The indicators are categorized into the following themes:

Socioeconomic status:
Poverty, unemployment, income, and education levels.

Race/ethnicity/language:
People of color and limited English proficient speakers.

Household composition:
Elderly, children, disabled, and single-parent households.

Housing/transportation:
Mobile homes, large multifamily buildings, group quarters, crowded households, and households without a vehicle.

THE CHALLENGE AND RESPONSE

A city's response to climate change can be framed around two separate pathways for action: mitigation and adaptation. Mitigation activities address the underlying cause of climate change through the reduction and prevention of GHG emissions. By contrast, adaptation activities seek to increase a city's resilience, or limit the city's vulnerability to climate change impacts.

As part of a comprehensive response to climate change, San Antonio's CAAP identifies strategies for both mitigation and adaptation. In the following chapters you will find a detailed discussion of the strategies for both mitigation and adaptation as well as a preliminary prioritization of efforts to support planning and funding discussions.

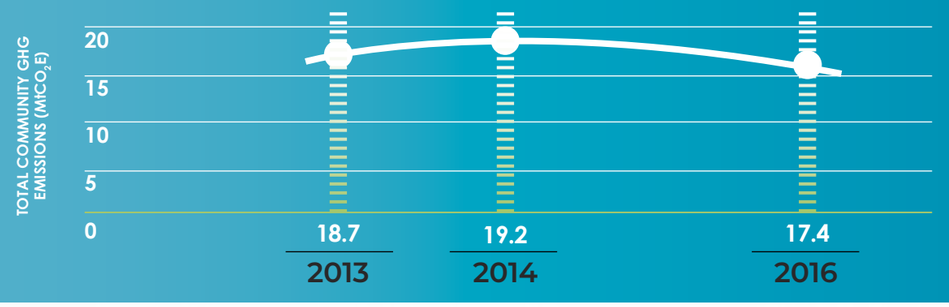
The remainder of this chapter presents the baseline for the mitigation and adaptation strategies identified in the CAAP. The baseline against which mitigation and adaptation strategies are evaluated varies in the context as well as the ability to numerically quantify the captured data. For mitigation, the baseline consists of a GHG inventory, which quantitatively evaluates the GHG emissions for which the city is responsible. In terms of adaptation, the baseline includes a description of current climate and projections for changes in future climate to which a city must respond with action.

COMMUNITY GHG INVENTORY

As part of the CAAP process, the city conducted a comprehensive GHG inventory for 2016 following the U.S. Community GHG Protocol developed by the World Resources Institute (WRI), C40 Cities Climate Leadership Group, and ICLEI - Local Governments for Sustainability (ICLEI).[13]

San Antonio's total community emissions in 2016 were 17.4 million metric tonnes of carbon dioxide equivalent ($MtCO_2e$).[14] Even though San Antonio is a growing city, with 6% population growth between 2014 and 2016, the 2016 emissions mark a 10% decrease in total GHG emissions in the same period. This decrease in total emissions was primarily driven by a reduction in the carbon intensity of the electricity supplied to the city by CPS Energy, meaning a greater proportion of this electricity is supplied by cleaner source.

HISTORIC SAN ANTONIO COMMUNITY
GHG EMISSIONS



HOW DOES SAN ANTONIO COMPARE?

Total community GHG emissions don't provide a great understanding of how one city's emissions compare to another — big cities will have larger total emissions than small cities and every city's emissions are impacted by underlying basics such as geography and their electricity source. To compare cities, GHG emissions data is normalized per capita. While it is interesting that San Antonio has relatively high emissions, when compared to other U.S. cities, it is important to note that every city and every inventory is slightly different. For example, a city like Cambridge, MA or Portland, OR requires significantly more energy for heating than San Antonio and the accounting methodologies used to capture the inventories are not exactly the same, meaning the comparison should be seen as illustrative only and not used to draw too strong of conclusions.

GHG EMISSIONS BY SECTOR

The two largest sources of GHG emissions in San Antonio are the stationary sector, i.e. energy use in buildings, and the transportation sector. Almost half (48%) of the GHG emissions captured in the 2016 GHG inventory result from energy use in buildings with an additional 38% resulting from transportation. The detailed greenhouse gas inventory can be found as a companion document to this CAAP.

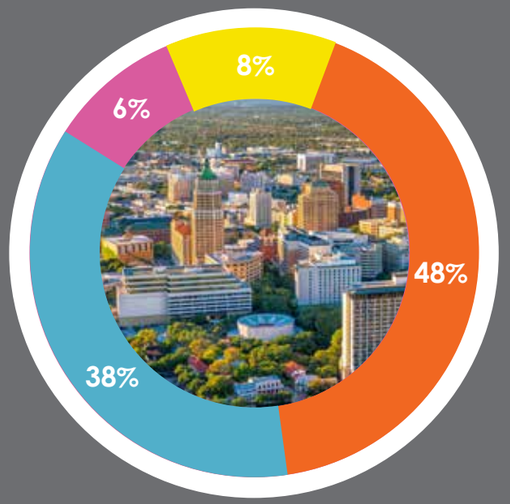
Stationary, i.e. Energy use in Buildings The stationary sector includes emissions related to energy use in commercial, residential, and industrial buildings as well as emissions related to energy production and use to supply energy to San Antonio. For San Antonio, emissions from electricity significantly outweigh emissions from natural gas within this sector — 87% of the emissions coming from buildings result from electricity usage.

Transportation The GHG emissions captured within the transportation sector include those resulting from the combustion of fuel and consumption of grid-supplied electricity for miles traveled within San Antonio's geographic boundary. Over 90% of San Antonio's total emissions within the transportation sector result from private vehicles, including passenger cars, light trucks, and heavy trucks.

Waste The waste sector accounts for emissions from: all solid waste generated within San Antonio, landfills (active or closed) located within city limits, and the treatment of water and wastewater. Emissions captured within the waste sector related to closed landfills are particularly challenging to reduce; the reduction of waste emissions primarily focuses on the generation and landfilling of new waste.

Industrial Processes (IPPU) GHG emissions captured within the IPPU sector are those resulting from industrial processes occurring within the geographic boundary of San Antonio. It is important to note that IPPU emissions within this inventory are only those resulting from large facilities, i.e. those that meet EPA reporting thresholds and emissions related to electricity and natural gas use in these same facilities are captured under the Stationary sector.

2016 SAN ANTONIO COMMUNITY GHG EMISSIONS



17.4 $MtCO_2$ total

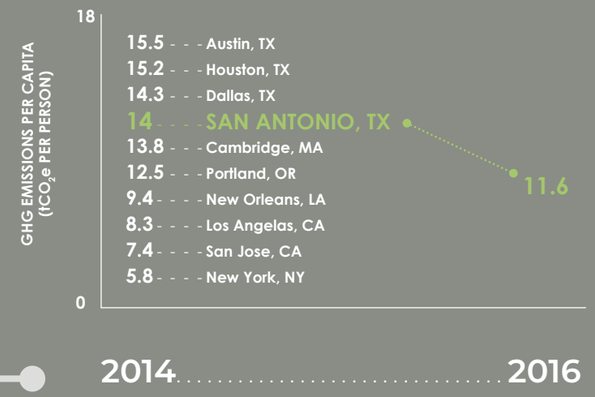
48% STATIONARY
- 27% Commercial and industrial buildings
- 18% Residential buildings
- 2% Industrial buildings
- 1% Energy industries within the city
- 0.2% Fugative emissions from oil and natural gas system

38% TRANSPORTATION
- 34% Private transportation, i.e. heavytrucks, light trucks, and passenger cars
- 3% Off-road transportation
- 0.4% Public transit
- <0.1% Waterborne navigation

8% INDUSTRIAL PROCESS AND PRODUCT USE (IPPU)
- 8% Industrial processes occurring within the city

6% WASTE
- 2% Solid waste generated in the city
- 2% Closed landfills within the city
- 2% Active landfills within the city
- 0.1% Wastewater generated and treated within the city

PER CAPITA GHG EMISSIONS U.S. CITIES



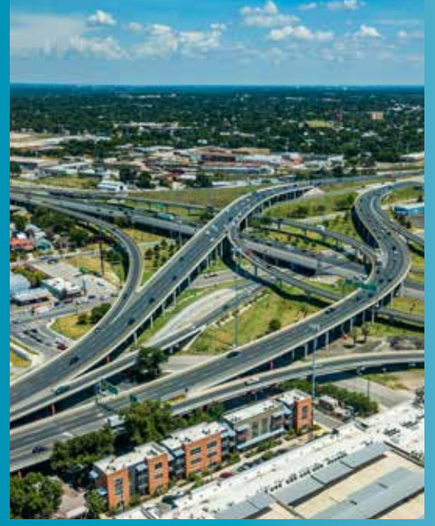
LET'S GET CLIMATE READY

THE IMPACT OF GLOBAL WARMING POTENTIAL

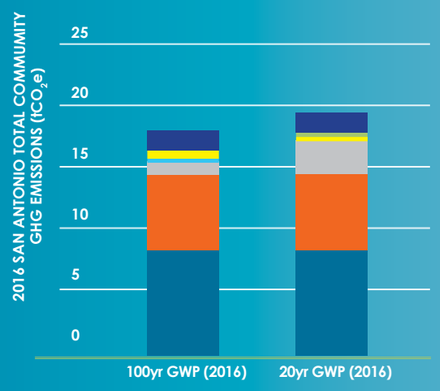
Standard GHG accounting methodologies generally track six key GHGs: CO_2, CH_4, N_2O, PFCs, HFCs, and SF_6. These GHGs differ in their ability to absorb energy and the amount of time they will remain in the atmosphere, so they are all converted to a common unit for comparison: carbon dioxide equivalent (CO2e) which is generally called the Global Warming Potential (GWP). The larger the GWP of a GHG, the higher its contribution to global warming.

The GWPs of GHGs are not set in stone, but continue to be updated as climate science evolves. The GWP values used in San Antonio's 2016 GHG inventory come from the IPCC 5th Assessment Report (published in 2014).[15] GWP values are generally considered over two timeframes: 20-yr and 100-yr. For long lived gasses like nitrous oxide, the GWP is virtually the same for both timeframes, but for short lived gases like methane, the 20-yr GWP is significantly higher than the 100-yr GWP because much of these gases have degraded by the time they reach 100-yr.

Results of San Antonio's GHG inventory are generally presented using the 100-yr GWP, which is standard practice for city GHG inventories. However, to provide additional information for decision makers, the inventory is presented here comparing the results of the two different time frames. When considering the GHG inventory using the 20-yr GWP, the total inventory increases by 19% from 17.4 $MtCO_2e$ to 19.6 $MtCO_2e$. Under both scenarios the stationary and transportation sectors remain the primary drivers of San Antonio's GHG emissions and vary only slightly between the two scenarios. Using the 20-yr GWP significantly increases the emissions from solid waste, driven by the high proportion of methane contributing to this emissions category.



2016 SAN ANTONIO
TOTAL COMMUNITY EMISSIONS
100-YEAR TO 20-YEAR GWP



GHG	100-YR GWP	20-YR GWP
Carbon Dioxide (CO_2)	1	1
Methane (CH_4)	28	84
Nitrous Oxide (N_2O)	265	264

MUNICIPAL GHG INVENTORY

In addition to the community GHG inventory the city evaluated the GHG emissions resulting from our own municipal government operations. Evaluating these GHG emissions separately allows us to understand the impact of our government's operations as well as opportunities for our city government to lead San Antonio's climate action. The municipal inventory includes emissions from electricity and natural gas usage in city-owned facilities, streetlights and traffic signals, city-owned vehicles, as well as city-owned and operated landfills; following the Local Government Operations Protocol (LGOP),[16,17] developed by ICLEI-Local Governments for Sustainability (ICLEI).

In total, the San Antonio city government emitted 461,547 tCO_2e in 2016, or 3% of the total city inventory. Similar to the trend in the community emissions, the 2016 municipal emissions mark a 19% decrease from 2014. The decrease in municipal emissions was driven by multiple factors including, the same reduction in carbon intensity of the electricity supplied by CPS Energy, a 6% reduction in municipal building energy usage from energy efficiency projects performed under the Office of Sustainability's Energy Efficiency Fund, as well as a reduction in the emissions from landfills.

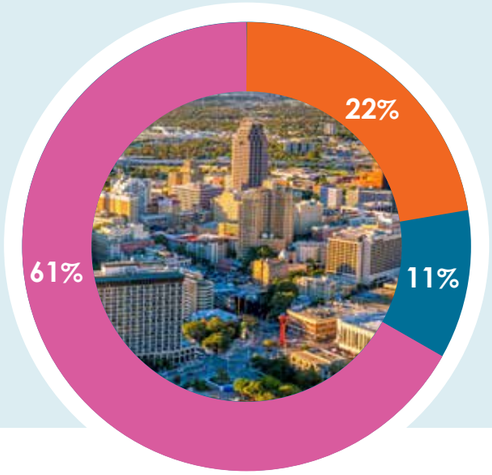
2016 SAN ANTONIO
MUNICIPAL GHG EMISSIONS

The largest source of GHG emissions resulting from San Antonio's municipal operations is from municipally-owned landfills (61%). This is followed by buildings and facilities (22%), city-owned vehicles (11%), and streetlights and traffic signals (6%). Emissions from the solid waste sector are primarily methane, which has a GWP 28 times greater than CO2, and the reason why the emissions from this sector look so large compared to the others.

City-Owndeed Landfills The landfill sector includes emissions (mostly methane) from both open and closed landfills operated by the city. Two of the four landfills in the city are closed, but emissions are still produced from the decay of waste from previous years. San Antonio already captures methane from landfills to convert to electricity and the emissions from closed landfills will decrease with time. There is limited additional potential to reduce these emissions today - the biggest opportunity sector is to limit the amount of new waste that enters open landfills.

Transportation The municipal transportation emissions are made up of city-owned vehicles (65%) and streetlights and traffic signals (35%). The emissions from streetlights and traffic signals decreased 22% between 2014 and 2016, primarily due to the installation of LED traffic signals, and the emissions from city-owned vehicles decreased 8% between 2014 and 2016.

Stationary, i.e. Energy use in Buildings Within the municipal buildings and facilities the majority of emissions are related to electricity supplied by CPS Energy (82%). Emissions from supplied chilled water, natural gas, and steam make up the remainder.



61% LANDFILLS
- 32% Closed Landfills: Nelson Gardens
- 29% Closed Landfills: Others

22% STATIONARY
- 18% Buildings & Facilities: Electricity
- 3% Buildings & Facilities: Chilled Water/Steam
- 1% Buildings & Facilities: Natural Gas

11% TRANSPORTATION
- 6% Streetlights and Traffic Signals
- 6% Vehicle Fleet: Diesel
- 5% Vehicle Fleet: Gasoline
- 0.5% Vehicle Fleet: Other

0.5 $MtCO_2e$ total

The emissions from streetlights and traffic signals decreased 22% between 2014 and 2016, primarily due to the installation of LED traffic signals, and the emissions from city-owned vehicles decreased 8% between 2014 and 2016.

CLIMATE PROJECTIONS:
SAN ANTONIO'S CHANGING CLIMATE

San Antonio has always been hot, but if you feel like it has been hotter in recent years, you are right. San Antonio's children are growing up in a much hotter city than their parents and grandparents. In the last seven years (2010-2017), we have had more days above 100°F than we did in any decade since record-keeping began in the 1890s.[18]

As part of the development of the CAAP, UTSA researchers completed a detailed climate analysis to understand how we can expect San Antonio's climate to change this century.[19] These climate projections show that our future will be hotter and drier, with severe impacts for San Antonians including more climate-related emergency room visits and even deaths. In addition, extreme heat is also connected to extreme precipitation — warmer air holds more water, so UTSA researchers predict extreme rainfall and flooding to increase over time.

- **By 2040 the average number of days with temperatures exceeding 100°F could quadruple to more than 30 days per year. By the end of the century we can expect to see 55-100 days with maximum temperatures above 100°F, as well as the appearance of days in excess of 110°F .**
- **We will soon start to see summer nights where temperatures never drop below 80°F, reaching a total of at least 10 of these nights by end of century.**
- **Summer maximum temperatures are expected to increase by more than 4°F by 2040 and by more than 6-10°F by end-of-century.**
- **By the end-of-century San Antonio should expect to receive 3" less rain per year, a decrease of 10 percent.**
- **The average number of days with more than 2" of rainfall is expected to increase from once in two years during the near-term period (2011-2040) to four times every five years by the end-of-century.**

In general, the increase in temperatures and shifts in expected precipitation are consistent with national and global trends. Carbon dioxide emissions resulting from human activities: deforestation, agriculture, and fossil fuel combustion are some of the main contributors to climate change. Current GHG emissions rates are exceeding the natural upates rates of the biosphere resulting in excessive amounts of heat-trapping gasses in the atmosphere. Our climate is expected to continue to change resulting in a more challenging environment for all San Antonians, especially our most vulnerable citizens.

did you know?

2 INCHES

The average number of days with more than 2" of rainfall is expected to increase from once in two years during the near-term period (2011-2040) to four times every five years by the end-of-century.

We will soon start to see **summer nights where temperatures never drop below 80°F,** reaching a total of at least 10 of these nights by end of century.

100°F

By 2040 the average number of days with temperatures **exceeding 100°F** could quadruple to more than **30 days** per year. And by the end of the century we can expect to see **55-100 days** with maximum temperatures above 100°F.

Summer maximum temperatures are expected to increase by more than 4°F by 2040 and by more than 6-10°F by end-of-century.

BY THE END-OF- CENTURY SAN ANTONIO SHOULD EXPECT TO RECEIVE **3" LESS RAIN PER YEAR, A DECREASE OF 10 PERCENT.**

WHAT DOES THIS MEAN FOR VULNERABLE POPULATIONS?

In the coming decades, we expect the projected changes in San Antonio's climate to negatively impact our residents, especially those living in heat-prone and flood-prone areas of the city and those who work outside. Communities that are highly vulnerable to climate change possess any of the following risk factors that make them disproportionately more likely to suffer under San Antonio's changing climate.

Increased vulnerability to heat-related illnesses, respiratory illnesses, or vector-borne diseases
A warming planet and associated GHG emissions contribute to an unhealthy living environment which can increase the rate of sickness in a community. The elderly, youth, and those lacking medical insurance or access to adequate healthcare are especially prone to these risks.

Reduced mobility
Extreme weather events like droughts and flooding affect all members of a population, but some groups are less prepared to react than others. Residents who lack access to walkable communities or adequate transit systems have significant difficulty responding to these climate change impacts.

Lack of financial capital
Switching to a sustainable, clean-energy lifestyle can come with an initial cost, especially when infrastructure upgrades, emergency response, or general health is concerned. Many individuals in our community have financial barriers such as bad credit or non-standard income, limiting their ability to take advantage of any opportunity with a high initial cost, even if it is cheaper over its lifetime, many will not be able to afford increased costs associated with housing, insurance, utilities or transportation.

Lack of representation in local government
Some voices are under-represented in city processes, including immigrants, refugees, indigenous populations, low-income individuals, and those for whom English is not their native language. These populations may not see solutions that work for them in city-led responses to climate change.

High exposure to GHG emission sources and environmental pollution
Neighborhoods located near congested highways, coal plants, or industrial refineries are frequently exposed to significant smog and airborne particulate matter. Exposure to these emission sources can result in poor respiratory health, declining property values, and deteriorated quality of life.

WHAT DOES THIS MEAN FOR BUSINESS?

When we think climate change, most of us picture rising sea levels, melting glaciers, and hotter temperatures – business is not usually the first thing that comes to mind. But, climate change also has substantial impacts on businesses, even those here in San Antonio. Because of their global supply chains and consumer networks, businesses will see impacts of climate change extending past what will be experienced in the local community. Businesses need to be prepared for the big climate change impacts, i.e. rising sea levels and changing weather patterns including the increasing likelihood of extreme weather will affect businesses, but they also need to consider less-discussed impacts such as pressure on water and food systems, political and security risks, human health risks, raw material shortages, restrictions on using fossil-fuel, and even changing demand in the products they produce. To ensure ongoing success, businesses must include potential climate change impacts in future planning efforts.

DISRUPTIONS

Weather Patterns

Climate change is disrupting weather patterns around the world. Storms are becoming more severe, causing greater losses for insurance companies and making shipping more dangerous. Businesses that rely on agricultural commodities are seeing production changes from established farming areas becoming less fertile and crop losses from insufficient rainfall.

Demand for Goods

Changing weather patterns and prices results in variations to consumer needs. For example, when temperatures rise in a specific location, demand for cold weather goods such as heating declines.

Working Conditions

Extreme weather impacts human health, which results in changes to working conditions. In extreme heat people are not be able to work as many hours outside, resulting in adapted working schedules or lack of ability to complete standard tasks.

Investment Trends

Large investors are already identifying a lack of environmental, social, and governance (ESG) management as a serious business risk. Large investment funds have already begun divesting from companies that rely too heavily on fossil fuels and companies that fail to take ESG issues into account.

Setting GHG emissions targets and actively moving towards renewable energy procurement and circularity allows business to protect themselves from the risk of investors and other shareholders ending their financial support.

Public Perception

A 2017 study by Unilever indicated that a third of consumers (33%) worldwide choose to by brands based on their social and environmental impact.[20] To retain consumers, many companies are investing in marketing campaigns to promote their green image and making visible changes like purchasing renewable energy.

OPPORTUNITIES

Increased Profitability, Reduced Costs, and Efficiency

Setting GHG emissions reductions targets often has an unexpected effect — reducing costs. This is because reducing GHG emissions requires businesses to make operations and productions more efficient. In addition, those companies that already have self-imposed targets are in a position to thrive when governments impose regulations.

Unleash Innovation

Setting GHG emissions targets allows businesses to discover creative solutions to the challenge of reducing emissions. The analysis required to set targets can drive business to create new and unique products and services and deliver better products to their customers.

Business Transformation, Lifecycle Thinking

Accurately assessing environmental impacts requires a systems approach. Thinking about a company's impact in a holistic way helps to understand the value chain, opening opportunities for collaboration and business transformation.

Preparing for Future Investments

Setting targets focuses a business and sets a path for the future.

Accurately understanding the climate impact of business operations creates a foundation for future investment opportunities, even if a technology or solution is not available today. For many businesses, understanding the trajectory allows them to take advantage of potential investments, such as renewable energy purchases at the time when they can be most financially valuable to the bottom line.

Improve The brand

their purchases to reflect their values. With a third of customers considering green and social impacts in their brand decisions, and that number continuing to grow, it is important for companies to cement their contribution to the low-emissions future.

Attracting and Retaining Employees

Millennials now constitute a larger portion of the U.S. workforce than any other generation, and climate change is their number one concern. In particular, younger generations want to work for a company that shares their values and taking action on climate change is a powerful way to communicate their values to workers, allowing the attraction and retention of the best talent.

How Businesses are Getting Involved

Businesses are making commitments and decisions around climate change at all levels – joining global compacts and developing local strategies. Here is a sampling of the ways that businesses are getting involved in climate action.

CDP: A global disclosure system (https://www.cdp.net/) used by businesses, investors, and cities to measure and understand environmental impact. Currently, over 7,000 companies, representing $3.3 trillion in assets report their climate change impacts through the CDP.

Science-Based Targets (SBTs): The SBT initiative (https://sciencebasedtargets.org/) has become the international standard for carbon mitigation targets, with over 500 companies committing, including 17% of Global Fortune 500 companies.

Task Force on Climate-Related Financial Disclosures (TCFD): TCFD (https://www.fsb-tcfd.org/) manages a climate-related financial risk disclosure methodology to be used by companies in providing information to investors, lenders, insurers, and other stakeholders. Today, the TCFD has more than 500 supporters and represents a combined market capitalization of over $7.9 trillion.

SA Climate Ready commits San Antonio to carbon neutrality by 2050

MITIGATION

On June 22, 2017, just weeks after President Trump announced his intention to withdraw the U.S. from the Paris Agreement, San Antonio City Council passed a resolution in support of the Mayor's National Climate Action Agenda, a commitment by over 400 U.S. Mayors to uphold the goals of the Paris Agreement. The SA Climate Ready CAAP brings this commitment to life, providing a roadmap for the necessary GHG emissions reductions to meet the goal of carbon neutrality by 2050.

Achieving the GHG emissions reductions to meet the Paris Agreement will not be easy, but it is possible. Reducing our GHG emissions will require participation by all San Antonians to revolutionize the buildings in which we live and work, the ways we travel, the goods we consume, the ways in which we classify trash, and the choices that we make. The City will support this revolution by reprioritizing our resources, enacting polices, and incentivizing change, as indicated in the CAAP.

The need for climate action has never been more urgent. After three steady years of decline, preliminary estimates indicate that U.S. GHG emissions rose by 3.4% in 2018. This marks the largest increase in eight years, even with a near-record number of coal plants retiring. The emissions growth is primarily linked to industrial emissions (increased by 5.7%) and transportation emissions including diesel for trucking and jet fuel for air travel (increased by 3%). SA Climate Ready is San Antonio's commitment to carbon mitigation in line with the Paris Agreement, charting a minimum 3% annual decrease in emissions through 2050.

WHAT IS THE RESULT OF A HALF DEGREE OF WARMING?

The difference between the world meeting the goal of limiting global temperature increase to 1.5°C compared to 2°C is considerable. The extra half-degree Celsius of warming would magnify the global impacts of climate change substantially, for example:

- **Double the number of people affected by water scarcity**
- **Increase by 10 times the number of ice-free summers in the Arctic Ocean**
- **Lose 30% more coral reefs (for a total loss of 99%)**
- **Add 10 million people to the number that will be affected by sea level change**

THE PARIS AGREEMENT AND THE CLIMATE SCIENCE

The Paris Agreement sets a goal of "holding the increase in global average temperature to well below 2°C (3.6°F) above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C (2.7°F),"[21] where pre-industrial is defined as the latter half of the nineteenth century. As of today, human activities have already warmed the planet about 1°C (1.8°F) above pre-industrial levels.[22] At the current GHG emissions rate, the world will reach the 1.5°C threshold between 2030 and 2052. To meet the Paris Agreement net emissions must be reduced 45% from their 2010 levels by 2030 and the world must reach carbon neutrality by 2050.

The window for climate action is rapidly closing, if we are to maintain a possibility of limiting global temperature increase to 1.5°C. The severity of the impacts of climate change are linked to the total concentration of GHG emissions in our atmosphere; what we emit each year adds to existing concentrations and results in a multiplying effect into the future. Dramatic GHG emission reductions in the next 3-5 years will increase the likelihood of meeting the Paris Agreement goals and limit the impacts experienced through the next century. Limited GHG emissions reductions will require a more substantial economic investment to meet the same goal.

HOW WILL SAN ANTONIO REDUCE GHG EMISSIONS?

1. Increase Carbon-Free Energy

Almost half of San Antonio's GHG emissions come from the sources that supply our buildings with energy. Reducing the carbon impact of our energy generation is one of the most impactful single actions we can take to slow climate change. San Antonio will focus on the development of carbon-free, grid-supplied energy and converting existing fossil fuel end uses to this new carbon-free opportunity.

2. Reduce Building Energy Consumption

Reducing the energy consumption of our buildings will reduce the need for energy generated by high-carbon sources. These strategies go hand-in-hand with increasing carbon-free energy by curbing San Antonio's growing appetite for energy and allowing for the conversion to carbon-free solutions.

3. Reduce Transportation Energy Consumption

More than one-third of San Antonio's GHG emissions come from our carbon-intensive transportation systems. As a car-centric city, San Antonio will need to utilize smart initiatives to reduce GHG emissions from our transportation systems, including promoting the use of greener vehicle technologies and reducing vehicle miles traveled through transforming and integrating existing transportation networks.

4. Increase Circularity

The waste that goes to the landfill today continues to release GHG emissions for decades as it breaks down. In recognition of these emissions, San Antonio has identified increasing the circular economy as a pillar of climate action. Together these strategies will work to remove items from the waste stream and divert all remaining waste to the least GHG-intensive waste streams.

5. Promote Biodiversity and Healthy Ecosystems

Healthy, properly functioning ecosystems can absorb emissions and stabilize the rate of change, resulting in less significant impacts. These strategies will promote healthy ecosystem responses and develop solutions that mimic those of natural systems.

6. Educate & Enable

Some of the most important significant behavior changes and limitations to future GHG emissions can be achieved through strategies that may not have significant short-term GHG emission reductions. These strategies will educate San Antonians and develop processes to enable the changes in behavior required to continue GHG emissions reductions into the future.

SAN ANTONIO'S PATH TO CARBON NEUTRALITY

NEAR-TERM PRIORITY ACTIONS

The CAAP includes a variety of GHG mitigation strategies to be implemented by the City over the next decades. A handful of near-term actions have been prioritized because of their ability to contribute significant GHG reductions in the next 3-5 years and set San Antonio on the path to meeting the long-term goal of carbon neutrality.

- Grid decarbonization
- Benchmarking and disclosure of commercial and multifamily buildings
- Adopting an Energy Policy Ordinance forcity-owned vehicles
- Expanding energy efficiency programs
- Transitioning to carbon-free vehicles, including municipal fleet
- Reducing vehicle miles traveled
- Reducing residential waste
- Diverting organics from landfills
- Adopting a municipal Environmentally Preferred Purchasing Policy

Business as Usual (BAU)
The BAU scenario illustrates San Antonio's potential future GHG emissions growth taking into account population growth, expected efficiency improvements for transportation and appliances, natural emission reductions from closed landfills, and emissions from electricity frozen at 2016 levels.

Carbon Neutrality
San Antonio's path to carbon neutrality will require the exploration of negative emissions solutions, such as carbon sequestration, as called out in the mitigation strategies. Detailed estimates for the potential of these solutions will develop as international best practices are tested.

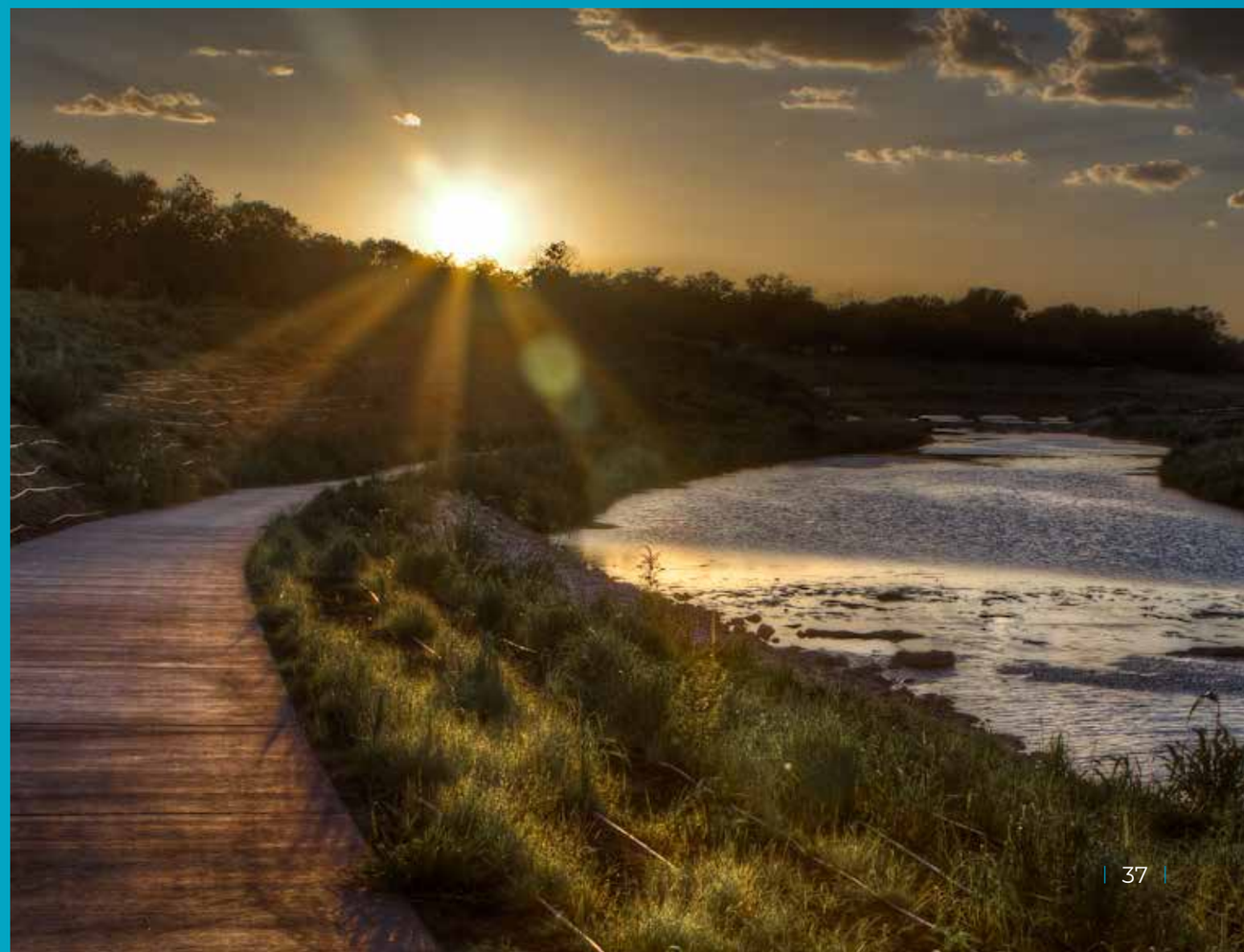
Carbon Neutral Target
San Antonio's carbon neutral target reflects a 88% reduction in emissions by 2050 as compared to a 2016 baseline, and reflects the total GHG reduction potential of the CAAP mitigation measures (outside of carbon sequestration).

Business as Usual
Minimum Path to Carbon Neutrality
IPCC-Referenced 1.5°C Global Pathway
Net Community Emissions

INTERIM GHG REDUCTION TARGETS

The pathway towards the goal of carbon neutrality is critically important. A straight-line approach or 3% annual reductions, may not be enough to limit global temperature increase to 1.5°C. As such, San Antonio sets the straight-line path to the target as the minimum acceptable reduction for the City and has built a potential reduction range that also reflects a more stringent reductions pathway, referencing the Intergovernmental Panel on Climate Change (IPCC) 1.5°C global pathway. The City will continue to refine the range of interim targets as the results of near-term reduction measures are quantified.

	2030	2040	2050
Minimum acceptable reduction (straight-line)	36%	62%	88%
High reduction potential (IPCC 1.5°F global pathway)	55%	79%	103%



COMMUNITY
MITIGATION STRATEGIES

LEGEND

Initiation Phase
- **NT** Near-term (Initiated by 2021)
- **LT** Long-term

Investments
- **C** City Investment
- **R** Resident Investment
- **B** Business Investment
- **$$$** Greater than $1 billion investment through 2030
- **$$** $100 million to $1 billion investment through 2030
- **$** Less than $100 million investment through 2030

Co-Benefits
- **AQ** Air quality
- **NC** Natural Capital/ Ecosystem Services
- **QJ** Quality Jobs
- **H** Health Outcomes
- **A** Affordability

		STRATEGIES	LEAD / PARTNER AGENCY	PHASE	GHG	C	R	B	AQ	NC	QJ	H	A
INCREASE CARBON-FREE ENERGY	1	DECARBONIZE THE GRID Work with CPS Energy to continue to reduce the emissions factor of supplied electricity to reach an emissions factor of 0.0 kg CO2e / kWh by 2050.	**CPS ENERGY** Office of Sustainability, Finance Department	NT	H		$$$		✓		✓	✓	✓
	2	SUPPORT AND INCENTIVIZE DISTRICT-SCALE CLEAN ENERGY PROJECTS Support and incentivize district-scale clean energy projects that harness renewable and waste energy at large-scales.	**CPS ENERGY** Office of Sustainability, Economic Development Department, Development Services Department	LT	L-M	$$	-	-	✓	✓	✓	✓	✓
	3	FUEL SWITCHING Promote and incentivize fuel switching from natural gas to electric for existing buildings, including industrial process applications.	**CPS ENERGY**	LT	L-M	$	$	$$	✓	✓	✓	✓	
REDUCE BUILDING CONSUMPTION	4	COMMERCIAL & MULTIFAMILY BENCHMARKING & DISCLOSURE ORDINANCE Implement a benchmarking and disclosure ordinance for large commercial, industrial, and multifamily buildings (above 50,000 sq. ft.).	**OFFICE OF SUSTAINABILITY** Development Services Department, CPS Energy	NT	L-M	$	-	$	✓		✓		✓
	5	COMMERCIAL AND RESIDENTIAL ENERGY AND WATER RATING SYSTEM To inform owners, builders, renters, and potential buyers, research and develop an energy and water rating system for all commercial and residential properties.	**OFFICE OF SUSTAINABILITY** SAWS, CPS Energy	LT	L	$	$$	$$	✓			✓	✓
	6	ZERO NET ENERGY BUILDING CODE Continue San Antonio's leadership in building codes by continually adopting the most recent update to the IECC code, with the goal of adopting a Zero Net Energy (ZNE) code for all new buildings and substantial rehabilitations by 2030.	**DEVELOPMENT SERVICE SDEPARTMENT** Office of Sustainability	LT	H	$	$$$	$	✓		✓		✓
	7	ENERGY EFFICIENCY PROGRAMS Continue to support and expand the energy efficiency and green building programs functioning within the City, such as the CPS Energy STEP program, with a goal of reducing city-wide annual building energy use 15% by 2030 and 40% by 2040.	**CPS ENERGY** Office of Historic Preservation	NT	M	$$	$	$$			✓	✓	✓
	8	REDUCE WATER CONSUMPTION Support all opportunities to further reduce San Antonio's water consumption both per capita and on a total consumption basis.	**SAWS**	LT	L	-	-	-	✓	✓			✓
REDUCE TRANSPORTATION CONSUMPTION	9	CARBON-FREE VEHICLES Transition to carbon-free transport by implementing strategies to accelerate the adoption of electric or other carbon-free personal vehicles, trucks, transit, and freight to reach 100% penetration by 2050.	**OFFICE OF SUSTAINABILITY** Building & Equipment Services, Office of Management & Budget, Purchasing, CPS Energy	NT	H	$	$$-$$$	$$	✓			✓	
	10	VEHICLE MILES TRAVELED (VMTS) Reduce vehicle miles traveled per person throughout the City, prioritizing the reduction of those traveled in single-occupancy vehicles by diversifying transportation choices.	**TRANSPORTATION & CAPITAL IMPROVEMENTS** Office of Sustainability, VIA	NT	H	$$-$$$	$	$	✓			✓	
	11	CONNECTIVITY / WALKABILITY Accelerate connectivity and walkability by prioritizing, the funding and construction of infrastructure for micro-mobility modes such as biking and other human-powered transportation with an emphasis on the protection of vulnerable road users.	**TRANSPORTATION & CAPITAL IMPROVEMENTS** Office of Sustainability	LT	L-M	$$-$$$	-	-	✓	✓		✓	✓
	12	SUSTAINABLE LAND PLANNING AND DEVELOPMENT Support the development and redevelopment of more compact, connected, and cost-effective communities.	**PLANNING** Transportation & Capital Improvements, Neighborhood & Housing Services, Office of Sustainability	LT	L-M	$-$$	-	-	✓	✓		✓	✓
	13	MOBILITY AS A SERVICE Utilize smart city and big data solutions to promote mobility as a service to reduce the GHG impact of transportation solutions.	**TRANSPORTATION & CAPITAL IMPROVEMENTS** Office of Innovation, VIA	LT	L	$$	-	-	✓		✓		✓

LEAD & PARTNER OFFICES
- **LEAD** Agency leading the initiative
- Partner Agency(ies) supporting the initiative.

GHG = GHG Reduction Potential (Total to 2030)
- **H** High Reduction Potential: More than 1,000,000 tCO_2e by 2030
- **M** Medium Reduction Potential: 100,000 – 1,000,000 tCO_2e by 2030
- **L** Low Reduction Potential: Less than 100,000 tCO_2e by 2030

COMMUNITY
MITIGATION STRATEGIES
CONTINUED

LEGEND

Initiation Phase
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		STRATEGIES	LEAD / PARTNER AGENCY	PHASE	GHG	C	R	B	AQ	NC	QJ	H	A
INCREASE CIRCULARITY	14	COMMERCIAL WASTE REDUCTION Reduce landfilled commercial waste 50% by 2035.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability	LT	L-M	-	-	$	✓	✓	✓	✓	✓
	15	RESIDENTIAL WASTE REDUCTION Reduce landfilled residential waste 25% by 2030 and 90% by 2050.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability	NT	L-M	-	$-$$	-	✓	✓	✓	✓	✓
	16	ORGANICS DIVERSION Accelerate the diversion of organics from landfills to the highest and best use opportunities and ensuring low-carbon composting solutions.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability	NT	M	$	$$	$-$$		✓	✓	✓	
	17	MATERIAL REUSE AND CIRCULARITY Support the development of a local circular economy to extend product lifespan through improved design and servicing, and relocating waste from the end of the supply chain to the beginning.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability, Office of Innovation, Economic Development Department	LT	L	$$	$	$-$$			✓		✓
	18	REDUCED-LANDFILL CONSTRUCTION Building on CoSA's Deconstruction Pilot Program, accelerate the acceptance of low-waste construction projects through education, incentives, and partnerships, with the goal of zero-landfill waste practices for all construction projects by 2035.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability	LT	L	-	$	$			✓		✓
PROMOTE BIODIVERSITY AND HEALTHY ECOSYSTEMS	19	CARBON SEQUESTRATION Develop and implement a plan for carbon sequestration that takes advantage of all available solutions including increasing plant material, restoring the soil landscape, enhancing wetlands, and implementing technological solutions that also support the regeneration of native species.	**OFFICE OF SUSTAINABILITY** ,San Antonio River Authority Green Spaces Alliance of South Texas, UTSA	LT	M	Not assessed for cost.			✓	✓		✓	
	20	URBAN HEAT ISLAND Analyze and quantify the urban heat island (UHI) in San Antonio and develop an implementable and impactful UHI mitigation and adaptation plan with a focus on vulnerable populations.	**OFFICE OF SUSTAINABILITY** Office of Emergency Management, SA Metropolitan Health District, Planning, Development Services Department, Neighborhood & Housing Services, Parks & Recreation	NT	M				✓	✓		✓	✓
	21	CLIMATE SENSITIVE DESIGN Integrate climate mitigation and adaptation into existing review and permitting processes and pilot an evaluation to account for the impacts of climate change including the GHG emissions from buildings and transportation.	**DEVELOPMENT SERVICES DEPARTMENT** Office of Sustainability, Office of Historic Preservation	NT	L-M	$-$$	$	$$		✓	✓	✓	
EDUCATE AND ENABLE	22	GHG EDUCATION AND TRAINING Work with partner organizations to develop and implement comprehensive sustainability and GHG education and workforce training programs.	**OFFICE OF SUSTAINABILITY**	LT	L	Not assessed for cost.			✓	✓	✓	✓	✓
	23	SA TOMORROW PLANS Fund, track, and achieve the goals of the SA Tomorrow Sustainability, Comprehensive, and Multi-Modal Transportation Plans, specifically the portions of those plans offering significant mitigation and adaptation opportunities.	**PLANNING, TRANSPORTATION & CAPITAL IMPROVEMENTS, OFFICE OF SUSTAINABILITY**	NT	M				✓	✓	✓	✓	✓
	24	BUSINESS INCENTIVES Incentivize businesses that operate within the City of San Antonio to set GHG reduction targets for their own operations that match or exceed the City targets.	**ECONOMIC DEVELOPMENT DEPARTMENT** Office of Sustainability, San Antonio Economic Development Foundation, Office of Historic Preservation	NT	M				✓	✓	✓	✓	
	25	ELECTRIC AND WATER RATE STRUCTURES Evaluate the potential to update electricity and water rate structures to support GHG reductions.	**CPS ENERGY, SAWS** Office of Sustainability, Finance Department	LT	L				✓			✓	✓
	26	GHG REDUCTION QUANTIFICATION Complete a comprehensive scope 3 or consumption-based assessment for San Antonio's community sector.	**OFFICE OF SUSTAINABILITY**	NT	-				✓	✓	✓	✓	
	27	DEVELOP AND IMPLEMENT A FRAMEWORK FOR REGIONAL COLLABORATION Work with Bexar County, suburban cities, and regional partner organizations to expand CAAP efforts through a Regional Climate Council.	**MAYOR'S OFFICE** Government & Public Affairs, Office of Sustainability	LT	-				✓	✓		✓	
	28	FINANCING ENERGY EFFICIENCY Explore financing mechanisms to accelerate adoption of energy efficiency, demand response, distributed renewable generation, and energy storage.	**OFFICE OF SUSTAINABILITY, CPS ENERGY**	LT	L						✓	✓	

LEAD & PARTNER OFFICES
- **LEAD** Agency leading the initiative
- Partner Agency(ies) supporting the initiative.

GHG = GHG Reduction Potential (Total to 2030)
- **H** High Reduction Potential: More than 1,000,000 tCO_2e by 2030
- **M** Medium Reduction Potential: 100,000 – 1,000,000 tCO_2e by 2030
- **L** Low Reduction Potential: Less than 100,000 tCO_2e by 2030

MUNICIPAL
MITIGATION STRATEGIES

San Antonio's municipal government will take the lead on GHG mitigation efforts within the City. While the municipal government operations only account for 3% of the city's total GHG emissions, the municipal mitigation strategies set a significant reduction goal that will allow the city to pilot approaches before institutionalizing the practices in the larger community. The City of San Antonio commits to a greener and more efficient government to benefit all San Antonians

LEGEND

Initiation Phase
- **NT** Near-term (Initiated by 2021)
- **LT** Long-term

Investments
- **$$** Greater than $500,000 investment through 2030
- **$** Less than $500,000 investment through 2030

Co-Benefits
- **AQ** Air quality
- **NC** Natural Capital/ Ecosystem Services
- **QJ** Quality Jobs
- **H** Health Outcomes
- **A** Affordability

		STRATEGIES	LEAD DEPARTMENTS	PHASE	GHG	CITY COST IMPACT	AQ	NC	QJ	H	A
REDUCE BUILDING CONSUMPTION	M1	BENCHMARKING AND PUBLIC DISCLOSURE OF BUILDING CONSUMPTION Benchmark and publicly disclose building energy and water use for municipal buildings.	Office of Sustainability, Building and Equipment Services	NT	L	$	✓			✓	
	M2	MUNICIPAL ENERGY POLICY To reduce energy consumption, adopt an Energy Policy Ordinance for city-owned buildings and facilities.	Office of Sustainability, Building and Equipment Services	NT	L	$	✓			✓	✓
	M3	ZERO NET ENERGY BUILDINGS Achieve ZNE for all municipal buildings by 2040.	Transportation & Capital Improvements, Office of Sustainability, Building and Equipment Services	LT	H	$$	✓		✓	✓	✓
REDUCE TRANSPORTATION CONSUMPTION	M4	COOL/GREEN ROOFS Install cool or green roofs on municipal government buildings, as appropriate.	Transportation & Capital Improvements, Building and Equipment Services	LT	L	$$	✓	✓	✓	✓	✓
	M5	STREETLIGHTS Convert all streetlights to LEDs with daylight sensors by 2021.	Finance Department, CPS Energy	NT	L	$$			✓		✓
	M6	CARBON-FREE FLEET VEHICLES Convert all fleet passenger vehicles and small trucks to carbon-free vehicles by 2025.	Office of Sustainability, Building and Equipment Services, Solid Waste Management Department, Transportation & Capital Improvement	NT	H	$$	✓			✓	
	M7	TRANSPORTATION DEMAND MANAGEMENT Reduce the GHG-impact of employee commuting.	SA Metro Health District, Transportation & Capital Improvements, Human Services	NT	L-H	$	✓		✓	✓	✓
INCREASE CIRCULARITY	M8	AIRPORT ACCREDITATION Consider pursuing and achieving Airport Carbon Accreditation.	Aviation	LT	H	$	✓			✓	
	M9	PRIORITIZATION IN DECISION-MAKING To encourage ongoing education and decision-making around GHG reduction, include a carbon impact analysis in city projects and budgeting processes.	City Manager, Mayor and City Council, Office of Management & Budget, Office of Sustainability	NT	L	$	✓	✓	✓	✓	✓
	M10	ENVIRONMENTALLY REEN PURCHASING Update the city's green purchasing policy to require the consideration of life cycle impacts when choosing products.	Finance Department	LT	L	$			✓	✓	
	M11	GREEN SPECIFICATIONS Reduce the GHG-impact of materials specified in public works and roadway projects.	Transportation & Capital Improvements, Finance Department	NT	L	$	✓		✓		
	M12	ZERO WASTE Achieve zero waste for all municipal government operations by 2030 with a focus on overall reduction, product reuse, and circularity.	Solid Waste Management Department, Office of Sustainability	LT	L	$$	✓	✓		✓	✓
EDUCATE & ENABLE	M13	GHG EDUCATION Develop and implement a comprehensive sustainability and GHG education program for municipal employees.	Office of Sustainability	NT	L	$	✓	✓	✓		

GHG = GHG Reduction Potential (Total to 2030)
- **H** High Reduction Potential: More than 10,000 tCO2e by 2030
- **M** Medium Reduction Potential: 100,000 – 1,000,000 tCO_2e by 2030
- **L** Low Reduction Potential: Less than 10,000 tCO2e by 2030

In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans. "Impacts are due to observed climate change, irrespective of its cause, indicating the sensitivity of natural and human systems to changing climate."[23]

ADAPTATION

Our climate is becoming more extreme from climate change. In this century San Antonio will experience an increase in warm nights (>80°F), an increase in hot days (>100°F), the introduction of very hot days (>110°F), a decrease in annual rainfall, and more concentrated rainfall during short periods. What this means for our people and our city is the increased likelihood of exacerbated exposure, especially for our vulnerable populations; a greater potential for severe infrastructure damage; and the increased likelihood of negative health outcomes from vector-borne diseases and ozone exposure. The updated Vulnerability and Risk Assessment completed as part of the CAAP identified twelve priority, climate-related risks to be addressed through the adaptation actions that are part of this plan.

HIGH RISKS

1. **Increased exposure and risk of injury of vulnerable groups (heatwaves)**
2. **Increased impacts from high ozone concentrations**
3. **Increased infrastructure damage (wildfires)**

MEDIUM RISKS

4. **Increased injury and mortality at low water crossings**
5. **Increased exposure and risk of injury of vulnerable groups (precipitation)**
6. **Increased infrastructure damage (precipitation)**
7. **Increase in vector-borne diseases**
8. **Increased need for waste and debris management**
9. **Reduction in local food security (production)**

EXPECTED IMPACTS FROM CLIMATE CHANGE
END OF CENTURY, SAN ANTONIO

As an inland city, San Antonio will not experience one of the most visible climate change impacts: sea level change, but that doesn't mean that we are immune to climate change. By the end of this century, we expect San Antonio to be hotter and drier than today. Lower global GHG emissions through this century will result in less significant climate changes, while higher global GHG emissions result in more significant impacts for San Antonio.

	Low Emissions Pathway	High Emissions Pathway
Summer Maximum Temperature	+6°F	+10°F
Hot Days (Maximum Temperature >100 °F)	+48 days	+94 days
Warm Nights (Minimum Temperature >80 °F)	+10 nights	+55 nights
Annual Precipitation	-3 inches	-4 inches

WHY ADAPT?

The impacts of our changing climate are already being felt across the globe, by natural and human systems. While the mitigation actions described previously are imperative to solving the underlying cause of climate change; adaptation actions recognize that change is occurring and function to avoid or mitigate the associated potential risks. Without adaptation actions to improve our resilience to these impacts, "climate change is expected to cause growing loses to American infrastructure and property and impede the rate of economic growth over this century."[24]

The vision for San Antonio's future is that of a resilient city, meaning a city that can maintain normal function in response to external stresses and disruptions, specifically those from climate change. Achieving resilience at this level, requires carefully and locally-inspired adaptation strategies that work for the population. For example, when our city gets hotter, residents who do not have access to air conditioning are likely to have more significant health impacts from the temperature changes than those who have air conditioning in their homes, cars, and workplaces.

Focusing on resilience and our response to already altered conditions in our region will strengthen San Antonio's ability to meet the needs of our residents and businesses. The adaptation strategies outlined in this chapter will allow San Antonio to achieve our goal of resilience, by focusing on the actions needed to mitigate the twelve climate-related priority risks identified in the Vulnerability and Risk Assessment.

THE COST OF DOING NOTHING

Climate change will result in costs for the City of San Antonio, whether we decide to pursue mitigation and adaptation actions, or not. Across the United States and the World, we have seen increasingly large and expensive climate change impacts, including wildfires in California, droughts through the Great Plains, and significant flooding here in Texas. When considering the cost of mitigation or adaptation actions, we must remember that the cost of these actions today will help to reduce the cost and severity of future impacts.

1. Increased Temperatures

San Antonio will experience increased temperatures through the next century, resulting in greater exposure, decreased health, and even an increased likelihood of death for certain individuals. The Fourth National Climate Assessment indicates that the death rate for elderly populations with chronic health conditions could increase by 2.8% to 4.0% per 1.8°F (or 1°C) increase in summer temperature.[25] For San Antonio, where our temperature is expected to increase by 6°F to 10°F by the end of the century, this could mean a 9% to 20% increase in the death rate for elderly populations with chronic health conditions. In the general population of the Southern Great Plains, defined as Nebraska, Oklahoma, and Texas, the projected temperature extremes under a high global GHG emissions scenario are expected to cause 1,300 additional deaths per year and a 6% loss in labor hours.[26]

2. Ozone and Human Health

Exposure to ground-ground level ozone poses significant threats to human health including, premature death, aggravated asthma, and respiratory hospital admissions. Under a high global GHG emissions scenario it is expected that premature deaths in the Southern Great Plains region will increase by 3.2% on average and cost about $40 million by 2050.[27]

For Bexar County, studies show that ozone levels above the current National Ambient Air Quality Standard (NAAQS), which is the County's current status, result in 19 additional deaths annually, with an associated cost of $170 million.[28] Beyond the human health, the current nonattainment ozone level in the San Antonio metropolitan area is estimated to cost $3 to $36 billion in expansion/relocation of companies, conformity costs, inspection and repair costs, etc.[29]

3. Increased Wildfires

Rising temperature and more sporadic precipitation is expected to increase the wildfire risk and duration of the fire season in the Southern Great Plains[30] region.

We have already experienced a significant wildfire event here in Texas – the Bastrop Fire of 2011, which caused the destruction of over 1,500 homes, killed thousands of cattle, resulted in several human fatalities, and caused community displacement.[31] Climate models show that these types of wildfire events could become more common in our region.

We don't often think of think of the wildfire threat as significant to San Antonio, but between 2007 and 2014, the City experienced 83 wildfire events – averaging to nine events at the cost of $27,778 per year. Two recent wildfires in 2011 and 2014 resulted in approximately $250,000 (2014 USD) in property damage. Within our metropolitan area, it is estimated that there are 15,649 homes in areas of high wildfire risk[34] and an additional 117,409 homes in areas of medium wildfire risk. In total, this represents an estimated $16.6B of property value in areas of considerable wildfire risk.

ADAPTATION STRATEGIES

LEGEND

RISK
This column is linked to the risks listed on page 45.

Benefits
= Yes
= No

LEAD & PARTNER AGENCIES
LEAD Agency leading the initiative
Partner Agencies supporting the initiative.

Initiation Phase
NT Near-term (initiated by 2021)
LT Long-term

		STRATEGIES, SUMMARY FOR PLAN DOCUMENT	RISK	CLIMATE HAZARD	MITIGATION BENEFIT	LEAD / PARTNER AGENCY	PHASE
INCREASE INFRASTRUCTURE RESILIENCE	1	UTILITY PREPAREDNESS FOR CLIMATE IMPACTS Ensure processes are in place to regularly assess the impacts of climate change on water and energy utilities.	1, 3, 5, 6, 11, 12	Various (all)	👍	**OFFICE OF SUSTAINABILITY**, CPS Energy, SAWS	NT
	2	RISK ASSESSMENT OF CRITICAL INFRASTRUCTURE Identify and undertake critical infrastructure (transportation, building, IT and telecoms, utilities sectors) risk assessment once updated flood plains are available (Atlas 14 to follow in Spring 2019) and incorporate additional future climate projections related to temperature and precipitation.	1, 3, 4, 5, 6, 11, 12	Various (all)	👎	**OFFICE OF SUSTAINABILITY**, Transportation & Capital Improvements, CPS Energy, SAWS, SARA, VIA, Neighborhood & Housing Services, Office of Emergency Management	NT
	3	HEAT RISK ASSESSMENT Undertake risk assessment for managing the impacts of extreme heat on public housing and City-subsidized residential buildings and identify opportunities to implement UHI reduction measures (as outlined in mitigation strategies) with a focus on vulnerable populations.	1, 2	Heatwaves	👍	**OFFICE OF SUSTAINABILITY**, Office of Emergency Management, SA Metropolitan Health District, Neighborhood & Housing Services, SAHA	NT
	4	FLOOD-PROOF ROADWAYS After Atlas 14 floodplain maps are produced, undertake a prioritized assessment of flood resilience options for all low-lying roadways.	4	Extreme Precipitation	👎	**TRANSPORTATION & CAPITAL IMPROVEMENTS**	NT
	5	PROTECT TRANSIT RIDERS Ensure public transportation routes, stops, and associated infrastructure provide shelter from extreme weather.	1, 5	Extreme Precipitation	👎	**VIA**, Transportation & Capital Improvements	NT
	6	BUILDING RETROFITS FOR VULNERABLE POPULATIONS Prioritize retrofit program assistance for vulnerable populations according to risk level and building type once updated floodplains are available (Atlas 14 to follow Spring 2019) and consider future extreme precipitation levels.	5	Extreme Precipitation	👍	**NEIGHBORHOOD & HOUSING SERVICES**, CPS Energy, Department of Human Services, Office of Historic Preservation	NT
	7	CLIMATE RISK IN DEVELOPMENT REVIEW PROCESS Develop and pilot questionnaire in the building development review process to assess how climate change could impact new development and major renovations and provide support to developers to design their buildings to be resilient to climate impacts (SA Tomorrow, GB12).	1, 3, 5, 6	Various (all)	👍	**DEVELOPMENT SERVICES DEPARTMENT**, Office of Sustainability, Office of Historic Preservation	NT
	8	FEMA COMMUNITY RATING SYSTEM Join FEMA's Community Rating System (CRS) program (SA Tomorrow, GB13).	6	Extreme Precipitation	👎	**TRANSPORTATION & CAPITAL IMPROVEMENTS**, Office of Emergency Management	NT
	9	HEALTHY BY DESIGN Develop a "Healthy by Design" program for all new affordable housing projects (SA Tomorrow, PH8) to incorporate resilient design principles.	6	Various (all)	👍	**NEIGHBORHOOD & HOUSING SERVICES**, San Antonio Metropolitan Health District, Office of Sustainability	NT
	10	FLOOD-PROOF CRITICAL INFRASTRUCTURE Identify and undertake prioritized retrofit programs for critical infrastructure (transportation, building, IT and telecoms, utilities sectors) to ensure resilience to flood impacts over the lifetime of the asset, once updated floodplains are available (Atlas 14 to follow Spring 2019) and also incorporating future climate projections.	4, 5, 6, 11, 12	Extreme Precipitation	👍	**OFFICE OF SUSTAINABILITY**, Transportation & Capital Improvements, CPS Energy, SAWS, SARA, VIA, Neighborhood & Housing Services	NT
	11	RESILIENCE IN BUILDING CODES AND PROGRAMS Assess opportunities to integrate resilience measures (e.g. water and temperature regulation, resilient landscaping measures within Low Impact Development, Build SA Green, Under 1 Roof programs) into building codes, existing building programs and checklists to reduce impacts from projected climate change over the lifetime of developments.	1, 3, 5, 6	Various (all)	👍	**DEVELOPMENT SERVICES DEPARTMENT**, Transportation & Capital Improvements, Office of Sustainability, Office of Historic Preservation	LT
	12	PRODUCE A CLIMATE HERITAGE STRATEGIC PLAN Develop guidelines for determining the appropriate treatments of cultural sties and objects around climate change adaptation including: building an inventory of resources, developing methods for building adaptive capacity, providing input on climate policies affecting tangible and intangible heritage resources, and joining the Climate Heritage Network.	3, 6	Various (all)	👎	**OFFICE OF HISTORIC PRESERVATION**, Office of Sustainability, Transportation and Capital Improvements	NT
STRENGTHEN PUBLIC HEALTH SYSTEMS	13	MONITOR AND TRACK PUBLIC HEALTH Track admissions and health cases related to weather events within the newly created SA Metro Health Informatics Unit.	1, 2, 3, 4, 5, 6, 7, 11, 12	Various (all)	👎	**SA METRO HEALTH DISTRICT**, Office of Emergency Management	NT
	14	INCORPORATE CLIMATE CHANGE INTO HEAT RESPONSE PLAN Assess and revise Heat Response Plan to account for future climate projections.	1, 2	Heatwaves	👎	**SA METROPOLITAN HEALTH DISTRICT**, Office of Emergency Management	NT
	15	PUBLIC DRINKING FOUNTAINS Assess need to install additional public water fountains in areas of high vulnerability as identified by the CDC Social Vulnerability Index.	1	Heatwaves	👎	Parks & Recreation CCDO, Transportation & Capital Improvements, SAWS	NT
	16	MOBILE HEALTH CLINICS Enhance mobile health clinics to underserved areas of the community (SA Tomorrow, PH1)."	7	Various (all)	👎	**SA METROPOLITAN HEALTH DISTRICT**	NT
	17	INTEGRATE CLIMATE RESILIENCE INTO PUBLIC HEALTH PRACTICES Actively participate in regional, national, and international public health peer groups and research networks (e.g. NACCHO Global Climate Change Workgroup) to continue identifying opportunities to integrate climate change considerations and best practices into local public health systems.	1, 2, 3, 4, 5, 6, 7, 11, 12	Various (all)	👎	**SA METROPOLITAN HEALTH DISTRICT**	NT

ADAPTATION STRATEGIES

LEGEND

RISK
This column is linked to the risks on listed on page 45.

Benefits
= Yes
= No

LEAD & PARTNER OFFICES
LEAD Agency leading the initiative
Partner Agency(ies) supporting the initiative.

Initiation Phase
NT Near-term (by 2021)
LT Long-term

		STRATEGIES, SUMMARY FOR PLAN DOCUMENT	RISK	CLIMATE HAZARD	MITIGATION BENEFIT	LEAD / PARTNER AGENCY	PHASE
ENHANCE EMERGENCY MANAGEMENT AND COMMUNITY PREPAREDNESS	18	EARLY WARNING SYSTEMS Assess and improve Early Warning System (EWS) communications to vulnerable groups around impacted routes and transportation modes.	4, 11	Extreme Precipitation	👍	**OFFICE OF EMERGENCY MANAGEMENT** Transportation & Capital Improvements, Government & Public Affairs, Office of Equity, VIA	NT
	19	FLOOD AWARENESS ON ROADWAYS Evaluate the effectiveness of increased barriers and signage (electronic and physical) ahead of affected routes and transportation modes with deviation instructions.	4, 11	Extreme Precipitation	👎	**TRANSPORTATION & CAPITAL IMPROVEMENTS**	NT
	20	COMMUNITY WILDFIRE PROTECTION PLAN Conduct a resource gap assessment and identify and pursue new partnership opportunities and funding sources to implement the priority recommendations included in the San Antonio Community Wildfire Protection Plan.	3	Wildfires	👎	**SAN ANTONIO FIRE DEPARTMENT**	NT
	21	DAMAGE COST ASSESSMENT PROTOCOLS Set up processes to systematically assess and document costs of extreme events across departments & partner agencies.	3, 6, 12	Various (all)	👎	**OFFICE OF EMERGENCY MANAGEMENT**, Office of Management & Budget, Department of Human Services	NT
	22	ASSESS EMERGENCY SHELTER POLICIES Evaluate shelter policies & resources in light of future climate impacts to include provision of indoor shelter during periods of elevated nighttime temperatures (>80°F); expand cooling center open times (weekends, warm nights) and consider additional locations and extreme precipitation. Assess opportunities to integrate back-up renewable and battery technology.	1, 5	Heatwaves; Extreme Precipitation	👎	**OFFICE OF EMERGENCY MANAGEMENT**, SA Metropolitan Health District, Human Services	NT
	23	EMERGENCY PLANNING FOR VULNERABLE GROUPS Review Emergency Planning procedures to ensure appropriate responses for vulnerable populations.	1, 5	Heatwaves; Extreme Precipitation	👎	**OFFICE OF EMERGENCY MANAGEMENT**, SA Metropolitan Health District	NT
	24	EMERGENCY PLANNING FOR CLIMATE-RELATED EVACUEES AND DISPLACED POPULATIONS Periodically review the City's ability to provide for the needs of coastal hurricane evacuees and other populations displaced by extreme weather and climate events.	12	Extreme Precipitation	👎	**OFFICE OF EMERGENCY MANAGEMENT**	NT
	25	COMPLETE REGULAR UPDATES TO VULNERABILITY AND RISK ASSESSMENT Regularly update the Vulnerability and Risk Assessment, especially when new data or evidence of climate impacts to San Antonio become available or if climate impacts become more severe. "	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Various (all)	👎	**OFFICE OF SUSTAINABILITY**	NT
	26	INCREASE CAPACITY ON ALTERNATE TRANSPORTATION ROUTES Utilize emerging technologies to improve flow and Increase transportation capacity on alternative routes (and modes, where relevant) to absorb uptake during flood events.	11	Extreme Precipitation	👎	**TRANSPORTATION & CAPITAL IMPROVEMENTS**	LT
	27	WILDFIRE MITIGATION Establish and maintain fire breaks, forest tracks, water supply points, and other blue infrastructure networks.	3	Wildfires	👍	**SAN ANTONIO FIRE DEPARTMENT**, Parks & Recreation	LT
	28	WILDFIRE SIMULATION AND SURVEILLANCE TOOLS Consider using fire simulator tools and review surveillance mechanisms (watch towers, cameras).	3	Wildfires	👍	**SAN ANTONIO FIRE DEPARTMENT**	LT
	29	ADDRESS NEIGHBORHOOD INGRESS/EGRESS ROUTES Increased road network to access fire and flood prone sites.	3	Wildfires; Extreme Precipitation	👎	**TRANSPORTATION & CAPITAL IMPROVEMENTS**, San Antonio Fire Departments	LT
	30	WASTE AND DEBRIS SURVEILLANCE AND RESPONSE Review waste surveillance and mitigation protocols in light of more frequent extreme weather events (frequency of surveillance, waste collection, problem site identification with partner agencies).	8	Various (Drought, Extreme Precipitation)	👎	**SOLID WASTE MANAGEMENT DEPARTMENT**, Code Enforcement, SARA	LT
PROMOTE, RESTORE, AND PROTECT GREEN INFRASTRUCTURE AND ECOSYSTEMS	31	CREATE AN INTEGRATED GREEN AND BLUE INFRASTRUCTURE PLAN Assess opportunities for creating connected networks to manage water and regulate temperature through ecosystem-based adaptation measures. This could include connecting existing park & open space networks and adjacent areas to provide cooling corridors, stormwater management benefits.	1, 3, 4, 5, 6, 10	Various (Extreme Precipitation, Heatwaves)	👍	**TRANSPORTATION & CAPITAL IMPROVEMENTS**, Parks & Recreation, SARA	LT
	32	TREE CANOPY PROGRAMS Incentivize, expand, and fund tree planting / replacement programs to promote more drought and wildfire resistant native species, prioritizing the most effective locations for the plantings.	1	Various (all)	👍	**PARKS & RECREATION**, Development Services Department	LT
	33	ACCELERATE PROTECTION OF SENSITIVE SPECIES Assess options for active conservation (nurseries, seed banks), habitat restoration and regeneration or relocation of near-endangered species.	10	Various (all)	👍	**PARKS & RECREATION**, SARA, Alamo Area Monarch Collaborative, Texas Parks & Wildlife	LT

ADAPTATION STRATEGIES
CONTINUED

LEGEND

RISK
This column is linked to the risks on listed on page 45.

Benefits
= Yes
= No

LEAD & PARTNER OFFICES
LEAD Agency leading the initiative
Partner Agency(ies) supporting the initiative.

Initiation Phase
NT Near-term (by 2021)
LT Long-term

		STRATEGIES, SUMMARY FOR PLAN DOCUMENT	RISK	CLIMATE HAZARD	MITIGATION BENEFIT	LEAD / PARTNER AGENCY	PHASE
PROTECT LOCAL FOOD SECURITY	34	LOCAL CROP DIVERSIFICATION Work with agriculture experts to identify and test more drought and pest resistant crop options for local food production in San Antonio and support wildlife that provides ecosystem services that enhance agriculture production.	9	Various (Drought, Heatwaves, Extreme Precipitation)	👍	**FOOD POLICY COUNCIL OF SAN ANTONIO**; Office of Sustainability, San Antonio Food Bank, the Nature Conservancy of Texas, Bat Conservation International	LT
	35	STATE OF THE FOOD SYSTEM Fund and hire a Food Policy Coordinator to develop a State of the Food System Report to understand extent food supply chain is resilient (SA Tomorrow, FS5, F6).	9	Various (all)	👎	**OFFICE OF SUSTAINABILITY**	LT
	36	PURSUE URBAN AGRICULTURE OPPORTUNITIES Assess pilot urban agriculture projects, such as Mission San Juan Capistrano, for potential duplication on other properties and incentivize and provide resources to facilitate urban agricultural uses on vacant or underutilized land, including City-owned and other public land (SA Tomorrow, FS8).	9	Various (all)	👍	**FOOD POLICY COUNCIL OF SAN ANTONIO**; Office of Sustainability: Parks & Recreation; San Antonio Food Bank, partner agencies	LT
	37	URBAN AGRICULTURE TRAINING PROGRAM Develop an urban agriculture training program to train new urban farmers in climate resilient agriculture and business practices (including low-carbon food production and processing) (SA Tomorrow, FS9).	9	Various (all)	👍	**FOOD POLICY COUNCIL OF SAN ANTONIO**, San Antonio Food Bank	LT
	38	CONTROLLED-ENVIRONMENT AGRICULTURE Consider opportunities for controlled-environment agriculture (hydroponics, aquaculture, etc.) to increase local production of food that is less energy and water intensive and protected from climate extremes.	9	Various (all)	👍	**FOOD POLICY COUNCIL OF SAN ANTONIO**, Office of Sustainability, San Antonio Food Bank	LT
	39	INCENTIVIZE LOCAL FOOD PRODUCTION Increase local food production through various incentive programs, e.g. through provision of rebates for the purchasing of equipment to enable precision farming /machine harvesting resilient to extreme weather conditions, rebates for residential chicken keeping, etc.	9	Various (all)	👍	**FOOD POLICY COUNCIL OF SAN ANTONIO**, Office of Sustainability	LT
	40	SUPPORT AND ENHANCE COMMUNITY GARDEN NETWORK Provide resources to ensure the viability of neighborhood-based gardens that contribute to local food production and beneficial pollinator habitat.	9, 10	Various (all)	👎	**FOOD POLICY COUNCIL OF SAN ANTONIO**, Office of Sustainability, Green Spaces Alliance of South Texas, Parks & Recreation, SAWS	LT
INCREASE RESILIENCEY AWARENESS AND OUTREACH	41	BUSINESS RESILIENCY ASSESSMENT Engage with the local business community to determine how to best undertake a vulnerability assessment (in a confidential, anonymous manner) to consider wide-ranging impacts of a changing climate to business continuity, economic growth, and unintended consequences.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Various (all)	👎	**OFFICE OF SUSTAINABILITY**, Economic Development Department	NT
	42	CLIMATE RESILIENCE EDUCATION AND OUTREACH Initiate a climate education campaign for businesses and property owners, including details about how to make built and natural infrastructure more resilient to existing and projected changes in climate (SA Tomorrow, GB11) for residents and businesses. Highlight successful projects through resiliency tours.	1, 3, 4, 5, 6, 10	Various (all)	👎	**OFFICE OF SUSTAINABILITY**, Office of Emergency Management, Economic Development Department, Development Services Department, Office of Historic Preservation, Transportation & Capital Improvements	LT
ENSURE EQUITY IN ADAPTION	43	EQUITY ASSESSMENT OF SUSTAINABILITY PROGRAMS Work with the Office of Equity to ensure existing and future sustainability programs and initiatives prioritize vulnerable populations and equitable outcomes.	1, 5	Various (all)	👎	**OFFICE OF EQUITY**, Office of Sustainability	NT
	44	PRIORITIZATION OF VULNERABLE RESIDENTS Work with partners to identify vulnerable individuals and groups, e.g. homebound individuals, disabled, elderly, etc. to prioritize adaptation actions.	1, 5	Various (all)	👍	**OFFICE OF EMERGENCY MANAGEMENT**, SA Metropolitan Health District, Department of Human Services, Office of Equity, SAHA	NT
	45	ANTI-DISPLACEMENT MEASURES Develop measures to prevent displacement to ensure vulnerable groups, small businesses, and existing residents can stay in their homes / districts and benefit from resilience measures.	1, 5	Various (all)	👍	**NEIGHBORHOOD & HOUSING SERVICES**, Office of Equity, Office of Historic Preservation, Department of Human Services	LT

Both climate action and adaptation demand the collective commitment of the entire community

IMPLEMENTATION

San Antonio's response to climate change is already underway; between 2014 and 2016, the city reduced GHG emissions by 10%, and adaptation actions outlined in the SA Tomorrow Sustainability Plan are being implemented. In early 2019, our city received a financial jump start through support from the Bloomberg American Cities Climate Challenge[35] which pledged $2.5 million of staff and technical resources to support climate action here in San Antonio.

Successful implementation of the CAAP will require participation from all members of San Antonio's community. To ensure the success of this collective action, the CAAP outlines expectations for implementation of plan action in terms of community engagement, reporting, governance, and processes for the management of priority actions. The Office of Sustainability will conduct and publish an annual review and assessment of our progress. The overall strategy, including prioritization of the proposed actions, will be reassessed every five years, starting in 2024, taking into account new science and local context, ensuring that San Antonio has the best opportunity to achieve our shared goals of climate action and adaptation.

Key performance indicators (KPIs)to be tracked on annual basis include: total and per capita GHG emissions, GHG reduction progress by sector, and progress towards priority actions (priority actions will be redefined in the reassessment). Community engagement and education, reporting, and governance are the essential and inter-related tools that will be deployed to maintain the pathway to target goals.

COMMUNITY ENGAGEMENT AND EDUCATION

To engage community members and decision makers on the progress of CAAP actions, the Office of Sustainability will integrate climate KPIs into the online sustainability dashboard (https://www.sasustainability.com/dashboard). Reporting CAAP metrics through the dashboard will ensure that decision-makers always have access to basic metrics around goal progress. Likewise, continued and robust outreach around climate education will ensure continued awareness and input throughout plan implementation.

REPORTING

The Office of Sustainability will:

- Provide annual updates on progress towards the CAAP KPIs as part of the publicly available sustainability report.
- Direct the completion of a full GHG inventory assessment every two years starting with 2018 data and a summary estimate for the interim years.[37]

GOVERNANCE

A CAAP Implementation Advisory Committee will be established to govern the overall implementation of the CAAP. This Advisory Committee will be charged with providing periodic input, through quarterly meetings, regarding the equitable implementation and update of SA Climate Ready goals and priorities. The advisory committee will focus their efforts on the implementation actions that have been identified as high-priority, short-term actions.

To ensure representation of a diversity of sectors and perspectives, the Advisory Committee will include stakeholders from a multitude of perspectives, who will be selected through a coordinated effort between the Office of Sustainability, the Mayor's Office, and City Council. In general, the Advisory Committee composition will include:

- Representatives of Lead Agencies, specifically from lead agencies responsible for short term priority actions.
- Key Stakeholders, including influential community members, neighborhood leaders, environmental representatives, climate justice representatives, and business and institutional partners.
- Priority Stakeholder Group Liaisons: An individual liaison from each of the Priority Stakeholder Groups to ensure consistency of actions.
- Climate Equity Sub-Committee members: The consideration of climate equity benefits and impacts in every aspect of plan implementation is considered a priority. As such, a portion of Advisory Committee members will be primarily responsible for the consideration of climate equity, including:
  - Bring diverse stakeholder opinions to the table, with a specific focus on vulnerable populations.
  - Piloting the Climate Equity screening mechanism, through review of every implementation action, to ensure proper application of the intent of the climate equity definition.
  - Ensuring climate equity considerations are brought forth in all actions and priorities reviewed through the Advisory Committee.

PRIORITY STAKEHOLDER GROUPS

Implementation of the CAAP will be supported by two Priority Stakeholder Groups, which will be responsible for mobilizing responses, sharing best practices, and magnifying efforts across San Antonio. These groups will include:

1. Civic Leadership for Climate: This will be a group of business, institutional, and civic leaders working to develop shared strategies for addressing climate change in coordination with the SA Climate Ready Plan. This group will be primarily driven outside the context of the municipal government, ensuring a separate platform for solution development and innovation.

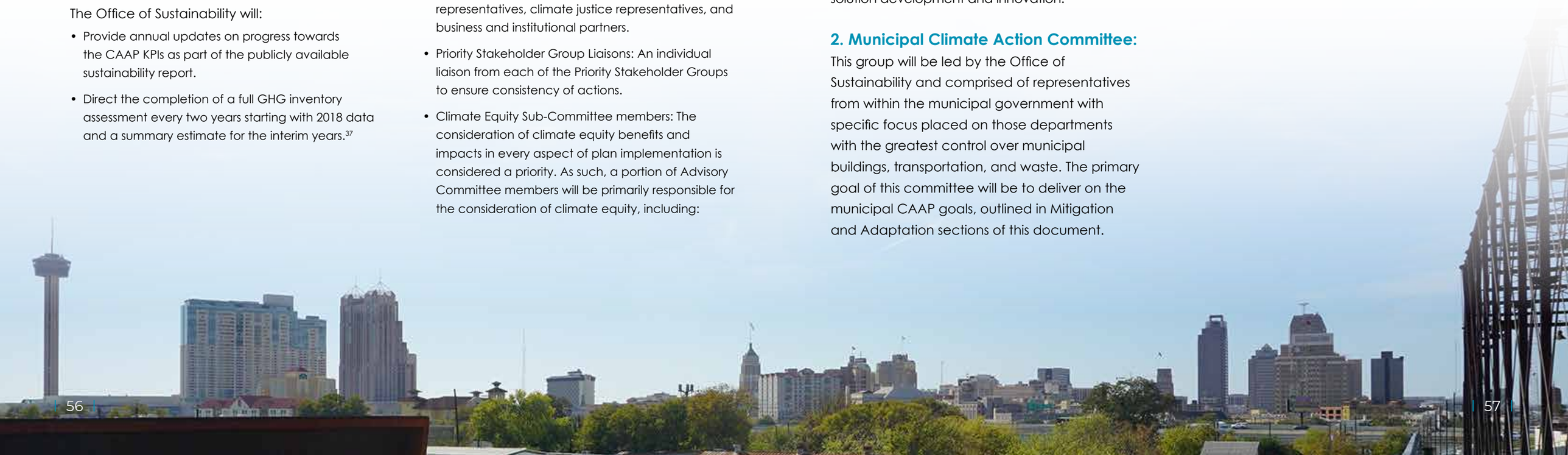
2. Municipal Climate Action Committee: This group will be led by the Office of Sustainability and comprised of representatives from within the municipal government with specific focus placed on those departments with the greatest control over municipal buildings, transportation, and waste. The primary goal of this committee will be to deliver on the municipal CAAP goals, outlined in Mitigation and Adaptation sections of this document.

ANNUAL PLANNING WITH KEY INSTITUTIONAL PARTNERS

To ensure that the goals of the CAAP remain central to the planning activities that will affect San Antonio's infrastructure, the city will initiate a formal, ongoing, planning process with its key institutional partners, including CPS Energy, VIA, SAWS, and SARA. In addition, the Office of Sustainability will develop a tool to integrate SA Climate Ready goals in city budgeting, capital improvement, and policy decisions and will make this tool available to institutional partners to evaluate the impacts of their own projects.

NATIONAL AND INTERNATIONAL CLIMATE ACTION

To ensure consistency with best practices and take advantage of scale, the city will participate in national and international organizations and activities related to climate action and adaptation. As part of this interaction, the city will actively monitor and pursue funding opportunities to advance mitigation measures, including state and federal grants and private partnerships.



GLOSSARY

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Big Data: Extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions.

Bio Diversity: The variety of plant and animal life in the world or in a particular habitat.

Carbon-Free Energy: Energy sources that do not depend on the combustion of fossil fuels or result in the emission of carbon dioxide. This includes renewables like solar, wind, geothermal, nuclear, and others.

Carbon Neutrality: Having achieved a state in which the net amount of carbon dioxide or other forms of carbon emitted into the atmosphere is reduced to zero because it is balanced by action to reduce or offset these emissions.

Carbon Sequestration: Refers to the removal of carbon from the atmosphere or the storage of carbon in biomass or in deep geological formations through natural or technological processes.

Circularity: A restorative model that decouples economic growth from natural resource use, and emphasizes longevity, reuse, and recycling.

Climate: The composite or generally prevailing weather conditions of a region averaged over a series of years. Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant atmospheric and meteorological quantities – such as temperature, precipitation, and wind - over a period of time. The classical period for averaging these is 30 years, as defined by the World Meteorological Organization. Climate in a wider sense is the state, including a statistical description, of the climate system.

Climate Change: Changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other features of the climate system.

Climate Equity: Equity means that our policy-making, service delivery, and distribution of resources account for the different histories, challenges, and needs of the people we serve. Equity differs from equality, which treats everyone the same despite disparate outcomes (City of San Antonio, Equity Office, 2017).

Due to these different histories and challenges, in the City of San Antonio, not all community members are contributing equally to climate change, and not all community members have the same resources or capabilities to protect themselves from its negative effects. A climate equity framework prioritizes the communities burdened the most by climate change, those that contribute the least to climate change, and those that are socially vulnerable to climate change. Climate equity ensures that these communities play a central role in the just transformation of the systems that have established, and continue to perpetuate, the unequal burden of climate impacts. This means that intentional policies and projects to mitigate or adapt to climate change must:

1. Actively seek, include, and prioritize direction from these communities,
2. Prioritize benefit to these communities, and
3. Reduce existing burdens and bar additional burdens to these communities.

Climate Projection: A climate projection is the simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative-forcing scenario used, which is in turn based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized.

Climate System: The climate system is the highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the lithosphere and the biosphere and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of external forcings such as volcanic eruptions, solar variations and anthropogenic forcings such as the changing composition of the atmosphere and land-use change.

Community Inventory: The San Antonio community inventory encompasses all emissions, considered under the scope of the inventory effort, generated by the City of San Antonio. This includes scope 1 and scope 2 emissions from buildings, energy industries, and transportation, as well as scope 1 and scope 3 emissions from waste.

Decarbonization: To reduce the amount of gaseous carbon compounds released in or present in the atmosphere.

Energy Industries: Emissions from energy production and energy use in energy industries, i.e. energy used for refining within San Antonio city boundaries.

Emissions Factor: A factor that converts activity data into GHG emissions data (e.g., kg CO_2e emitted per liter of fuel consumed, kg CO_2e emitted per kilometer traveled, etc.)

Emissions Scenarios: Quantitative illustrations of how the release of different amounts of climate altering gases and particles into the atmosphere from human and natural sources will produce different future climate conditions. Scenarios are developed using a wide range of assumptions about population growth, economic and technological development, and other factors.

Global Warming: The observed increase in average temperature near the Earth's surface and in the lowest layer of the atmosphere. In common usage, "global warming" often refers to the warming that has occurred as a result of increased emissions of greenhouse gases from human activities. Global warming is a type of climate change; it can also lead to other changes in climate conditions, such as changes in precipitation patterns.

Global Warming Potentials (GWPs): A universal unit of measure for GHGs, expressed by relating the global warming impact to one unit of carbon dioxide. Used to evaluate the relative impact of various GHGs.

GLOSSARY CONTINUED

Greenhouse Gas Emissions: Any gaseous compound in the atmosphere capable of absorbing infrared radiation, resulting in trapping and holding heat in the atmosphere.

Industrial Processes: Emissions related to industrial processes occurring within San Antonio. Note, only industrial process emissions from large facilities, i.e. those that meet EPA reporting thresholds, are included in San Antonio's GHG inventory.

Metric Tons CO2 Equivalent (tCO_2e): A measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential, by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

Greenhouse Gases (GHGs): Gases that absorb heat in the atmosphere near the Earth's surface, preventing it from escaping into space. As the atmospheric concentrations of these gases rise, the average temperature of the lower atmosphere gradually increases, a phenomenon known as the greenhouse effect. Greenhouse gases include, for example, carbon dioxide, water vapor, and methane.

Micro-Mobility: Personal transportation modes that can carry one or two passengers.

Mitigation: Measures to reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere.

Municipal Inventory: San Antonio's municipal inventory includes emission for sources under direct control of the San Antonio City Government, including: city-owned facilities, city-owned vehicles, and city-owned and operated waste emissions sources.

Ozone: A colorless gas consisting of three atoms of oxygen, readily reacting with many other substances. Ozone in the upper atmosphere protects the Earth from harmful levels of ultraviolet radiation from the Sun. In the lower atmosphere (ground-level or tropospheric ozone), ozone is an air pollutant with harmful effects on human health.

The Paris Climate Agreement (Paris Agreement): An agreement within the United Nations Framework Convention on Climate Change that brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects. The agreement's central aim is to strengthen the global response to the threat of climate change by keeping the increase in global average temperature this century to well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.

Risk: Threats to life, health and safety, the environment, economic well-being, and other things of value. Risks are often represented as probability (likelihood) of occurrence of hazardous events or trends multiplied by the impacts (consequence) if these events or trends occur.

Scope 1 Emissions: Direct GHG emissions generated from sources within the city boundary.

Scope 2 Emissions: GHG emissions occurring from the use of grid-supplied electricity, heat, and/or cooling within the city boundary.

Scope 3 Emissions: All other GHG emissions that occur outside of the city boundary as a result of the activities taking place within the city boundary.

Social Vulnerability Index (SVI): Social vulnerability refers to a community's capacity to prepare for and respond to external stresses on human health, stresses such as natural or human-caused disasters, or disease outbreaks. The Centers for Disease Control and Prevention's Social Vulnerability Index groups fifteen census-derived factors into four themes that summarize the extent to which an area is socially vulnerable to disaster. The factors include economic data as well as data regarding education, family characteristics, housing, language ability, ethnicity, and vehicle access.

Transportation Demand Management (TDM): Providing travelers with travel choices, such as work location, route, time of travel, and mode, to improve travel reliability.

Urban Heat Island: Occurs when a city experiences much warmer temperature than nearby rural areas due to the amount of heat-absorbing buildings and impervious surfaces.

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Vulnerable Populations: Groups that are disproportionately burdened by the impacts of climate change or face a greater number of risks associated with climate change and other stressors. This includes people of color, indigenous groups, low-income individuals and households, children, older adults, individuals with limited English proficiency, people with pre-existing or chronic medical conditions, pregnant women, people with disabilities, socially isolated individuals (e.g., homeless, homebound), and vulnerable occupational groups (e.g., outdoor workers).

Water Recycling Processes: This tool requires additional evaluation, refinement, and testing to ensure effectiveness.

Weather: The state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc. Weather refers to these conditions at a given point in time (e.g., today's high temperature), whereas climate refers to the "average" weather conditions for an area over a long period of time (e.g., the average high temperature for today's date).

Zero Net Energy (ZNE) Buildings: Buildings that combine energy efficiency and renewable energy generation to consume only as much energy as can be produced by dedicated renewable resources over a specified time period.

METHODOLOGY

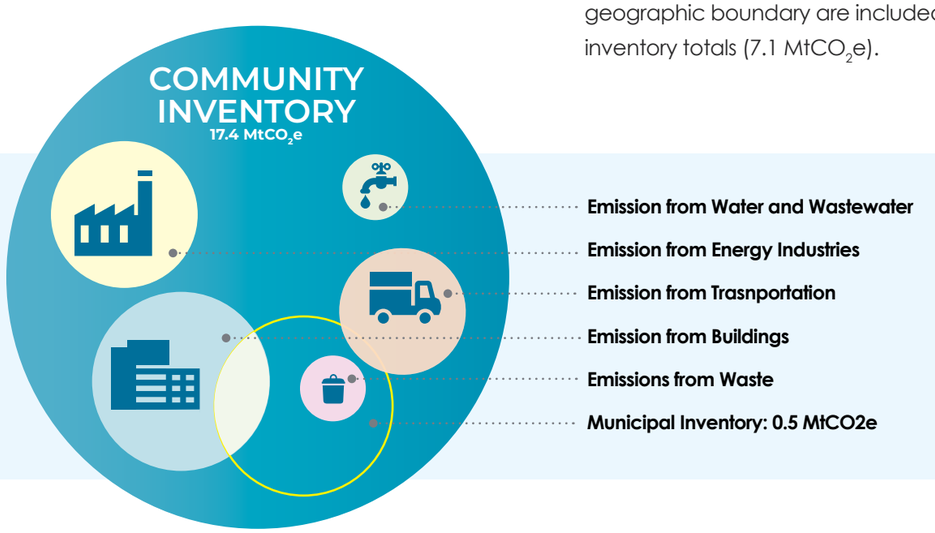
This appendix includes summaries of the various methodologies used in the development of the CAAP. In many cases, more detailed methodologies can be found in the companion reports, including the 2016 GHG Emissions Inventory, the Climate Projections for the City of San Antonio, and the Vulnerability and Risk Assessment.

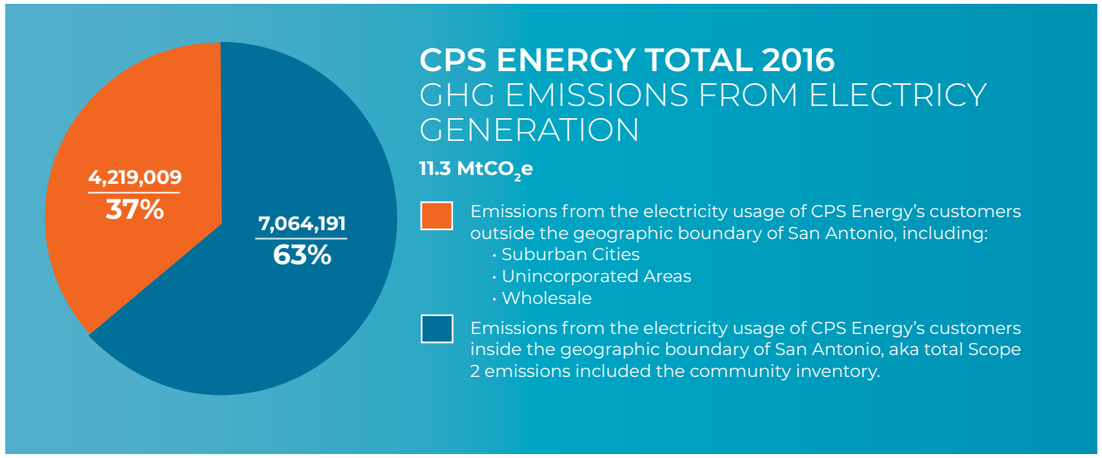
1. GHG Inventory

The 2016 San Antonio GHG Inventory includes inventories at two scales: the Community Inventory and the Municipal Inventory. These inventories are developed using separate, best-practice accounting protocols and have overlapping, yet distinct scopes and boundaries. The community inventory includes all emissions sources within San Antonio's geographic boundary, whereas the municipal inventory only includes the emissions from sources under direct control of the San Antonio City Government. The municipal inventory is a subset of the community inventory; all municipal emissions are included in the community inventory. The municipal inventory is not meant to be added to the community inventory total, as that would result in a double-counting of the municipal government emission sources.

GEOGRAPHIC BOUNDARY: Both the community and municipal inventories use the administrative boundary of the City of San Antonio as their geographic boundary. All emissions included in this inventory relate to actions inside this geographic boundary. This geographic boundary is particularly important in relation to the emissions from CPS Energy, a municipal utility serving the City of San Antonio and surrounding areas. CPS Energy is unique from other municipal inventories in that the utility is not under direct control of the city government.

In 2016, CPS Energy was responsible for total emissions of 11.3 $MtCO_2e$, from electricity generation. Per the Local Government Operations Protocol (LGOP),[38] which provides a methodology for accounting for emissions from municipal inventories, only the emissions from electricity generation related to Scope 2 emissions within the City of San Antonio's geographic boundary are included in the GHG inventory totals (7.1 $MtCO_2e$).





COMMUNITY GHG INVENTORY PROTOCOL:
The 2016 San Antonio Community GHG Inventory was assembled according to the Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC),[39] a reporting standard developed for cities by the World Resources Institute (WRI), C40 Cities Climate Leadership Group, and ICLEI-Local Governments for Sustainability (ICLEI). The GHP accounting protocol allows for selection between different reporting levels. Based on the data available, the community inventory generally follows the BASIC reporting level, exceeding the requirements of this level by including the largest industrial process emissions.[40]

The community inventory is an accounting of GHG emissions resulting from process and activities occurring within the geographic boundary of the City of San Antonio, which in 2016 comprised a population of just under 1.5 million. The community inventory includes emissions from electricity and natural gas usage in buildings; vehicular transportation within city boundaries; waste including solid waste and wastewater; energy production and energy use in energy industries; industrial processes. The community inventory data was collected using the City Inventory Reporting and Information System (CIRIS) tool,[41] developed by C40 Cities.

MUNICIPAL GHG INVENTORY PROTOCOL:
To understand the impact of city government operations, San Antonio completed a detailed inventory of GHG emissions resulting from city government operations. The 2016 San Antonio Municipal Greenhouse Gas Inventory follows the LGOP, developed by ICLEI-Local Governments for Sustainability (ICLEI). The municipal inventory includes emissions from electricity and natural gas usage in city-owned facilities, streetlights and traffic signals, city-owned vehicles, as well as city-owned and operated landfills. The municipal inventory is collected in a reporting tool that was developed for the City as part of the 2014 inventory, with updates to reflect new data and added sector emissions.

Municipal emissions are also included in the community inventory in the appropriate sectors. The municipal inventory is meant to be illustrative

METHODOLOGY CONTINUED

only and should not be added to the community inventory total, as that would result in a double-counting of the municipal government emissions sources. In 2016 San Antonio's municipal emissions represented 3% of the total community emissions.

GREENHOUSE GASES AND GLOBAL WARMING POTENTIALS: In accordance with the GPC protocol, the 2016 GHG Inventory accounts for the following GHGs:

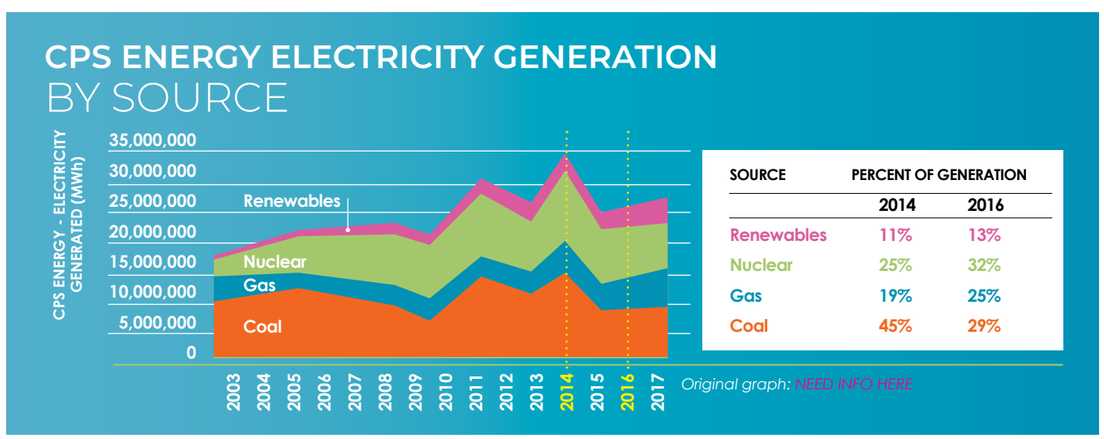
- Carbon Dioxide (CO2)
- Methane (CH4)
- Nitrous Oxide (N2O)

Because GHGs differ in their ability to absorb energy and their lifetime in the atmosphere, their impacts are converted to a common unit: carbon dioxide equivalent (CO2e); this conversion is conducted using the gas-specific global warming potential (GWP). The larger the GWP, the more a particular GHG warms the Earth over a particular timeline. The standard GWP values used in the 2016 San Antonio GHG inventory are the 100-yr GWPs from the IPCC 5th Assessment report.[42]

DATA COLLECTION: Developing a GHG inventory for a city requires the employment of a calculation-based methodology, because GHG emissions cannot be directly measured at their source. A calculation-based methodology converts GHG-inducing activities into emissions based on specific emission factors.

To complete the 2016 San Antonio GHG Inventory, the city obtained activity data from multiple agencies to determine number of vehicle miles traveled, volume of gas used, amount of waste generated, etc. Activity data is generated from detailed reporting, when possible, or modeling when primary data is not available. GHG emissions are calculated from activity data using emissions factors that are specific to San Antonio, when possible, or defined by standard protocols.

ELECTRICITY EMISSIONS FACTOR: The electricity emissions factor used in the 2016 San Antonio GHG inventory reflects the CO2 intensity of CPS Energy's fuel mix. In 2016, 13% of the electricity supplied by CPS Energy was from renewables, 32% from nuclear, 25% from natural gas and 29% from coal resulting in an emissions factor of 0.42 kg CO_2e / kWh.



The SA Climate Ready CAAP directly addresses GHG reductions for the portion of CPS Energy's emissions attributable to electricity use within the geographic boundary of the City of San Antonio. However, any reductions in the carbon intensity of CPS Energy's emissions will apply to the entirety of the CPS Energy service area as the same emission factor will be used to calculate all of CPS Energy's emissions, regardless of location.

ACKNOWLEDGEMENT OF UNCERTAINTY: A GHG inventory contains a level of uncertainty due to the natural presence of uncertain elements within the data collection process and the climate science involved in the GHG calculations. The results of the inventory should be interpreted with the acknowledgement of a degree of uncertainty. Though there is some uncertainty, the GHG inventory results can provide helpful information to the City of San Antonio to assist in the development of policy and community change.

2. Baseline Future GHG Emissions

Quantifying the impacts of GHG reduction strategies requires an understanding of the baseline, or what would happen without intervention, defined as the Business as Usual (BAU) scenario. For San Antonio, as the fastest growing city in the nation, this means a significant growth in GHG emissions.

For the purpose of evaluating the CAAP strategies, the BAU scenario:

- Includes expected population growth: which is expected to grow at 2.16% annually, adding 1 million residents to the city by 2040.
- Includes expected improvements in the efficiency of appliances and vehicles as projected by the EIA and DOE.
- Includes reductions in emissions from closed landfills, which will naturally decrease as waste decays. Note, new solid waste and wastewater emissions are expected to grow with population growth.
- Does not include the expected reductions in the carbon intensity of the energy supplied by CPS energy, which is expected to steadily decrease through 2040 as outlined in the Flexible Path.[43] The carbon reductions forecasted to be achieved by CPS Energy are quantified as part of the carbon mitigation strategies.

3. The Mitigation Goal: Paris-Compliance

On June 22, 2017 San Antonio's City Council set the underlying goal for the GHG mitigation goal of this plan, with the signing of City Council Resolution 2017-06-22-0031R, which committed San Antonio to adopt and support the goals of the Paris Agreement as part of the Mayors National Climate Action Agenda network. However, the Paris Agreement does not set a strict target for reductions, instead it sets an intention to limit global temperature increase to well below 2 degrees Celsius (3.6°F) and to aspire to limit global temperature increase to 1.5 degrees Celsius (2.7°F). Current best practice methodologies indicated that the world must reach carbon neutrality by 2050 to maintain the possibility of keeping global temperature degrees between the 1.5°C threshold. As such, San Antonio has adopted this goal for carbon neutrality.

Reaching carbon neutrality can follow many different pathways. The mitigation strategy

METHODOLOGY CONTINUED

outlined in the CAAP sets the linear trajectory between the 2016 GHG inventory and carbon neutral as the minimum required reduction, a minimum reduction of just over 3% annually. Best practice methodologies also point to a need for severe reductions as soon as possible, to maintain the possibility of meeting the 2050 carbon neutral goal worldwide. To respond to this need, San Antonio has prioritized the most impactful strategies for action first and developed an accelerated mitigation pathway that more closely tracks the recommended pathways for global 1.5°C compliance.

4. Prioritization: GHG Mitigation Potential & Required Investment

GHG mitigation strategies identified by the Technical Working Groups underwent a vetting and prioritization process which included identification of the required investment and GHG reduction potential. The reduction potential and investment was estimated for each strategy, as possible, using the Climate Action for Urban Sustainability (CURB) tool developed by The World Bank. The CURB tool relies on the input of local city data to analyze a series of the most common low-carbon actions.

GHG MITIGATION POTENTIA: For the estimation of**:** GHG reduction potential, many of San Antonio's strategies were included in the CURB tool, but some of San Antonio's strategies were not. For these strategies outside the tool, the consultant team relied on expert and stakeholder knowledge, as well as literature reviews of high-quality sources, including academic papers, industry re-.ports, and internationally-vetted estimation tools GHG reduction potential is forecasted to 2050 to support modeling of San Antonio's pathway to the carbon neutral goal, but the longer-term estimates should be considered highly variable. It is expected that the estimates will be periodically updated as technologies, economics, and proven mitigation strategy designs evolve.

San Antonio's GHG emissions can be split into four sectors: Stationary, Transportation, IPPU, and Waste. To evaluate the mitigation potential, a BAU scenario was developed for each sector, then the GHG mitigation potential of the associated strategies were estimated and applied to the relevant sectors.

REQUIRED INVESTMENT: Required investment was ,determined for three stakeholder groups: City i.e. the municipal government, residents, and businesses. Total investments required across ,all stakeholder groups were determined first then key stakeholders in the city and community provided input on the allocation of the .investment between the stakeholder groups

Investments are estimated through 2030 because the economic analysis will be used by the city to make near-term investment decisions and because the variability of the results gets significantly larger the further you project the estimate, given the potential for significant technological and economic changes. The potential economic impacts of co-benefits, which often result in savings, are not included in the calculation of the required investment — this number reflects the pure economic investment needed to reach the carbon neutrality goal.

SECTOR	BUSINESS AS USUAL (BAU)	MITIGATION MEASURES
STATIONARY, I.E. ENERGY USE IN BUILDINGS	The BAU scenario assumes that the overall emissions factor of the grid is frozen at 2016 levels. The BAU includes small emissions gains in Stationary energy use based on efficiency increases in building systems as projected by the EIA and DOE.	The potential GHG mitigation is a combination of the reduction in the emissions factor of the energy supplied by CPS Energy and efficiency gains in building energy use. The modeling of the energy emissions factor follows CPS Energy's Flex path through 2040 and then takes a straight-line approach to 0.0 kgCO2e / MWh by 2050. The building energy efficiency gains are represented by a percent change from 2016 emission levels. Residential energy usage intensity (EUI) is projected to decrease 45% from 2016 levels by 2050 and commercial EUI is projected to decrease 32% from 2016 levels by 2050. The steady decline in building energy use intensity (EUI) is a critical component to achieving the required GHG emissions reductions. The implementation of zero net energy (ZNE) building codes and the phase out of natural gas use is expected to drive the reduction in building EUI.
TRANSPORTATION	The BAU scenario assumes activity in the Transportation sector grows at the pace of population growth, while vehicle efficiency increases as projected by EIA and DOE.	The potential GHG mitigation is driven by the adoption of electric vehicles for personal transportation, reaching 100% penetration of electric vehicles by 2050. The modeling also takes into account the alternative transportation strategies outlined in the CAAP, i.e. decreased use of single occupancy private vehicles, increased use of alternative transportation, and an overall decline in passenger trips.
INDUSTRIAL PROCESSES (IPPU)	The BAU scenario assumes that industry process emissions experience zero growth past 2016.	The modeled GHG mitigation of the IPPU sector identifies a 50% reduction of Industrial Process emissions.
WASTE	The BAU scenario assumes that solid waste and wastewater emissions grow at the pace of population growth, while emissions related to closed landfills decreases in line with standard models, as waste naturally decays.	The modeled GHG reduction for the waste sector consists of the reduction of GHG emissions through the diversion and reduction of waste before it reaches a landfill. Key actions include: widespread composting, zero-waste construction, reducing commercial waste 50% by 2035, and enhancing a residential "pay-as-you-throw" program.

5. Co-Benefit Assessment

The implementation of climate change policies often results in multiple benefits to a community. The benefits that are above and beyond the direct benefit of a more stable climate are referred to as "co-benefits." Co-benefits can range from increased human health to safer and more secure supply chains for needed resources, such as food and energy. With input from the Technical Working Groups and Steering Committee the City of San Antonio selected five co-benefits categories to consider in the CAAP: air quality, natural capital/ ecosystem services, quality jobs, health outcomes, and affordability.

The mitigation strategies were all evaluated against these potential co-benefits to identify synergies and support prioritization.

Defining questions were developed in coordination with the Technical Working Groups to ensure consistency of interpretation. The evaluation of the potential benefit of each action used a qualitative approach based on expert knowledge and assessment of a high-quality literature review, where required. Benefit potential was determined to be either positive or neutral, where positive indicated a correlation between an action and benefit and neutral was defined as no perceived correlation.

METHODOLOGY CONTINUED

Air Quality (AQ)

- Could this improve air quality in San Antonio?
- Could this improve the likelihood of regaining air quality compliance, as defined by the EPA?

Natural Capital / Ecosystem Services (NC)

- Could this increase San Antonio's stocks of natural assets, i.e. geology, soil, air, water, and all living things?
- Could this reduce biodiversity loss and ecosystem degradation?

Quality Jobs (QJ)

- Could this result in the development of quality jobs within the City of San Antonio and Bexar County?
- Could this lead to sustained, long-term job impacts?
- Could this result in more children who grow-up in San Antonio
- Could this result in more children who grow-up in Antonio staying in San Antonio for economic opportunities?
- Could this increase the median household income?

Health Outcomes (H)

- Could this increase the life expectancy for residents of San Antonio?
- Could this reduce emergency room and healthcare visits?
- Could this reduce the likelihood of chronic health conditions such as asthma, obesity, and diabetes?
- Could this reduce impacts that result in low quality of life, i.e. traffic congestion and limited access to needed resources, such as food?
- Could this increase the mental health and quality of life of residents?

Affordability (A)

- Could this mean increased affordability of goods and services for San Antonio residents?
- Could this reduce household costs, i.e. household utility bills for San Antonio residents?
- Could this address affordability disparities?

6. Vulnerability/Risk Assessment

The CAAP Vulnerability and Risk Assessment characterizes the key climate-related vulnerabilities faced by the City of San Antonio and categorizes the highest priority vulnerabilities into low, medium, and high risks based on the both the likelihood and consequence of their impacts. Potential climate impacts are determined in accordance with the most recent climate projections for the City of San Antonio,[44] as well as data collected from multiple City departments, other local government agencies, and quasi-governmental partners. This assessment is an update to the city's previous vulnerability assessment completed in 2016.

SCOPE: The Vulnerability and Risk Assessment primarily focuses on the identification of climate-related impacts from a municipal government perspective, including vulnerabilities and risks to city operations, staff, assets, and infrastructure, as well as a scan of impacts to the wider community. It is important to note that the wider community impacts are assessed in terms of the potential vulnerabilities and risks to city government (e.g. more frequent extreme temperatures would significantly impact vulnerable populations, which would require additional resources, staff, and response capabilities from a municipal perspective).

FRAMEWORK: The Vulnerability and Risk Assessment follows a best-practice methodology outlined in the Guide and Workbook for Municipal Climate Adaptation published by ICLEI.[45] The framework lays out distinct methodologies to assess climate-related vulnerabilities and risks.

VULNERABILITY: Vulnerability describes the susceptibility of a particular service, asset, or community to be negatively impacted from climate change. Vulnerability is assessed on a scale of 1-5 and is determined by combining numerical ratings for sensitivity and adaptive capacity, where **sensitivity** refers to the potential effects a climate impact may have on the functionality of a service, asset, or community and **adaptive capacity** refers to the ability of a service, asset or community to adapt to those potential impacts.

RISK: Risk refers to the combination of hazard's likelihood and consequence, as summarized by the following function:

Risk = Likelihood x Consequence

Likelihood refers to whether the impact is reoccurring or a single event and can be described as:

Rare: Unlikely to occur in the next 25 years, or has a close-to-zero probability in any year.

Unlikely: Could occur once in 10-25 years, or has a low but greater than zero probability in any year.

Possible: Could occur once in 10 years, or has a probability <50% in any year.

Likely: Could occur once per year, or has a 50/50 chance in any year.

Almost certain: Could occur several times per year, or has a probability >50% in any year.

Consequence is defined as the magnitude of a particular impact and can be categorized as:

Negligible: Appearance of threat but no harm, minor disruption or stress, no damage.

Minor: Serious near-misses/minor injuries, isolated but noticeable examples of reversible decline/disruption.

Moderate: Small number of injuries, general decline in economic performance/services/environmental health, reversible with intense efforts.

Major: Isolated incidence of serious injuries/loss of life/regional stagnation/severe environmental damage continuing.

Catastrophic: Large number of injury/loss of life/ widespread failure/irrecoverable damage.

Based on the combined likelihood and consequence ratings, risks are then categorized into high, medium, and low levels of risk:

High: Requires actions and delegation to senior operational management.

Medium: Requires actions, review and reporting by relevant managers who are explicitly assigned to handling the risk.

Low: Remains under review with existing control measures unless it becomes more severe.

DATA COLLECTION: To complete the Vulnerability and Risk Assessment, the project team collected data from multiple sources using a variety of methods. Interviews were conducted with representatives from approximately 20 city departments and partner organizations. The team also compiled and analyzed data from over 100 external sources and authoritative reports. Feedback on vulnerabilities and risks was also solicited from CAAP Technical Working Groups.

CLIMATE EQUITY SCREENING MECHANISM

NOTE: This tool requires additional evaluation, refinement, and testing to ensure effectiveness.

STRATEGY/PROGRAM TO BE EVALUATED:

THEME 1: ACCESS AND ACCESSIBILITY

Desired Outcome: Results in increased access to jobs, housing, transportation, funding, education, healthy foods, and clean air for vulnerable populations.

SAMPLE SUPPLEMENTAL QUESTIONS	IMPACT Does it have the ability to positively/ negatively impact or have no impact on the desired outcome? Include explanation.	RECOMMENDATIONS
Could this expand access to healthy/clean transport systems, such as walking paths, bike routes, and public transit?		
Could this increase amenities and walkability in traditionally underserved geographies/neighborhoods?		
Could this reduce food insecurity in low-income areas by increasing access to healthy, local food sources?		
Could this increase access to information around climate, i.e. impacts, benefits, and programs?		
Could this increase access to quality parks/greenspaces in the most vulnerable communities?		
Could this increase opportunities for living wage jobs in the same zip code as people live?		
Will this offer workforce or support training programs?		
Other considerations?		
SUMMARY:		

THEME 2: AFFORDABILITY

Desired Outcome: Results in lower / more predictable costs related to basic living needs (housing, food, utilities, healthcare, transportation, etc.) for vulnerable populations.

SAMPLE SUPPLEMENTAL QUESTIONS	IMPACT Does it have the ability to positively/ negatively impact or have no impact on the desired outcome? Include explanation.	RECOMMENDATIONS
Could this reduce the number of families that are cost burdened by housing + transportation (defined as spending more than 33% of income on H+T)?		
Could this limit displacement of residents and small businesses when surrounding property values rise?		
Could this increase energy price stability?		
Could this reduce barriers to home ownership?		
Does this offer inclusive financing strategies that prioritize the most income burdened populations?		
Could this increase quality affordable (30-60% AMI) housing stock?		
Other considerations?		
SUMMARY:		

THEME 3: CULTURAL PRESERVATION

Desired Outcome: Respecting / honoring cultural relevance and history.

SAMPLE SUPPLEMENTAL QUESTIONS	IMPACT Does it have the ability to positively/ negatively impact or have no impact on the desired outcome? Include explanation.	RECOMMENDATIONS
Does this acknowledge/respect/honor the culture, historic assets, and traditions of communities of color?		
Does this negatively impact the existing cultural structure?		
Does this increase social cohesion (engagement and connection within/to the community)?		
Other considerations?		
SUMMARY:		

Theme 4: HEALTH

Desired Outcome: Results in increased health (physical and mental) for vulnerable populations.

SAMPLE SUPPLEMENTAL QUESTIONS	IMPACT Does it have the ability to positively/ negatively impact or have no impact on the desired outcome? Include explanation.	RECOMMENDATIONS
Could this reduce ground level ozone and improve air quality?		
Could this extend expected longevity for vulnerable populations and result in reduced disparity in expected longevity?		
Could this reduce asthma-related hospital visits?		
Could this reduce Urban Heat Island effects?		
Could this reduce standing water in areas of reduced drainage and resulting vector-borne diseases?		
Could this improve the walkability of communities and access to greenspaces?		
Could this reduce stress, anxiety, and depression, i.e. increase mental health?		
Other considerations?		
SUMMARY:		

THEME 5: SAFETY & SECURITY

Desired Outcome: Results in mitigation of potential threats to vulnerable populations and increased access to critical lifelines when (or before) threats are experienced.

SAMPLE SUPPLEMENTAL QUESTIONS	IMPACT Does it have the ability to positively/ negatively impact or have no impact on the desired outcome? Include explanation.	RECOMMENDATIONS
Could this result in improved flooding infrastructure, responses to flooding, and evacuation routes?		
Could this increase access to essential services such as hospitals, police, and fire?		
Could this improve notification and/or preparation for disasters?		
Could this reduce crime, focused on vulnerable zip codes?		
Could this increase safety and security in community?		
Could this reduce Urban Heat Island effects?		
Other considerations?		
SUMMARY:		

IMPLEMENTATION OF THE MITIGATION STRATEGIES

Much of the community input captured during the CAAP development process centered around detailed implementation opportunities, i.e. programs, incentives, and polices to deliver on the GHG mitigation goals. These detailed implementation actions were gathered from the community and subjected to a detailed vetting/ review process to ensure that the right implementation actions were part of this plan. The tables captured in this appendix present the final implementation actions from this process, outlining the necessary steps for San Antonio to deliver on the mitigation goals and strategies outlined in the CAAP.

IMPLEMENTATION COMMUNITY

		STRATEGIES	IMPLEMENTATION ACTIONS
Increase Carbon-Free Energy	1	Decarbonize the Grid	✔ Phase out generation from all fossil fuel sources, with an aggressive focus on eliminating coal sources. ✔ Increase the penetration of renewable resources to supply a minimum of 50% of San Antonio's energy by 2040 and 100% by 2050. ✔ Initiate an ongoing energy planning process between the City, CPS energy, key stakeholders, and the general public to ensure continued collaboration towards carbon reduction goals. ✔ Evaluate and implementing energy storage and load shifting technologies to support efforts to develop a more resilient grid to maximize the penetration of renewable generation.
	2	Support and Incentivize District-Scale Clean Energy Projects	✔ Work with CPS Energy to incentivize the adoption of district-scale installations, such as community solar, and district heating and cooling. ✔ Develop policies and mechanisms to overcome the political barriers of district-scale solutions.
	3	Fuel Switching	✔ Support the development of programs and incentives promoting electrification. ✔ Develop ongoing education on the benefits of electrification. "
Reduce Building Consumption	4	Commercial & Multifamily Benchmarking & Disclosure Ordinance	✔ Using a robust and diverse stakeholder process, develop a phased reporting system for managing the process of energy benchmarking and disclosure.
	5	Commercial and Residential Energy and Water Rating System	✔ Evaluate existing rating systems to determine the best fit system, or adjustments that are needed for San Antonio. ✔ Develop and pilot a process such that the results of this energy and water rating system are available prior to point-of-sale or point-of-lease.
	6	Zero Net Energy Building Code	✔ Improve the proper enforcement of codes through comprehensive education (technical requirements and benefits of energy efficiency) for code enforcement officials and users. ✔ With proper technical support, and through a diverse stakeholder process, develop a ZNE definition that will be incorporated into the UDC. ✔ Develop multiple pathways for ZNE compliance.
	7	Energy Efficiency Programs	✔ Identify and allocating funding towards CPS Energy's STEP program and other energy efficiency / green building programs working towards the goal of reduced energy consumption in buildings. ✔ Develop a plan to ensure that the funded energy efficiency programs will function to accelerate deep energy retrofits in existing and historic buildings; reduce energy use intensity in existing and historic buildings; support education of advanced building practices for new buildings; and implement demand shifting capabilities to support GHG reductions. ✔ Provide education and training related to energy efficiency retrofits for aging and historic homes.
	8	Reduce Water Consumption	✔ Continue to support programs through SAWS and other partners that focus on water conservation. ✔ Incentivize landscaping installations that promote water conservation including xeriscaping, the use of native plants, low impact development, etc.

LEGEND

= Near-term (implemented by 2021)

= Long-term

IMPLEMENTATION **COMMUNITY** CONTINUED

		STRATEGIES	IMPLEMENTATION ACTIONS
Reduce Transportation Consumption	9	Carbon-Free Vehicles	✔ Invest in new electric vehicle charging infrastructure throughout the city. ✔ Develop EV group purchase programs. ✔ Accelerate the adoption of carbon-free vehicular transportation in all sectors through education and incentives. ✔ Assess the barriers to electric vehicle ownership, with a priority focus on equity.
	10	Vehicle Miles Traveled (VMTs)	✔ Transition financial investments from prioritizing SOVs to those prioritizing carbon-free transit. ✔ Develop high-capacity rapid transit infrastructure to connect Regional Transit Centers, as identified in the SA Tomorrow Comprehensive Plan. ✔ Explore the development of vehicle-free zones within the Regional Transit Centers and specialized overlay districts focused on Transit-Oriented Development and affordable housing. ✔ Reducing parking spaces by revising parking regulations, unbundling parking costs from rent, and allowing parking space requirements to be met through alternative approaches demonstrated to reduce parking demand and GHG emissions (e.g. onsite car sharing, bicycle parking, providing transit passes). ✔ Incorporate the Housing and Transportation (H+T) Affordability Index into transportation and community planning. ✔ Support and incentivize Transportation Demand Management programs and policies, including supporting efforts developed by partner agencies and stakeholders in the community that will function to reduce VMTs, such as VIA's Vision 2040 Plan and AAMPO's Alamo Commutes program.
	11	Connectivity / Walkability	✔ Expand protected micro-mobility infrastructure by continuing the implementation of the Complete Streets Ordinance. ✔ Develop standards for connectivity and walkability in all neighborhoods. ✔ Pilot sprawl repair in existing developments. ✔ Design and construct a human-powered transportation network connecting key job, housing, service nodes, and greenspaces via on- and off-road trails and protected bike lanes.
	12	Sustainable Land Planning and Development	✔ Identify potential EcoDistrict pilot opportunities. ✔ Incentivize development that meets minimum metrics for density, connectivity, and affordability. ✔ Consider innovative solutions to housing and transportation that recognize the needs of the most vulnerable members of the San Antonio, focusing on communities that provide affordable housing with access to quality jobs. ✔ Strengthen and explore financial incentives to support building reuse.
	13	Mobility as a Service	✔ Develop solutions for City residents to compare the GHG-impacts of all transportation options. ✔ Evaluate the GHG-impacts of new transportation technologies, such as connected, autonomous vehicles and drones. ✔ Embrace technological applications that advance integrated reservation, routing and payment system for all modes of transportation, focusing on "first mile, last mile" modes.
Increase Circularity	14	Commercial Waste Reduction	✔ Incentivize and work with businesses to move away from single-use, disposable items. ✔ Work with businesses to accelerate recycling efforts, utilizing CoSA's ReWorks SA Commercial Recycling Program. ✔ Incentivize innovative zero waste solutions, for example: provide incentives for the establishment of a zero waste grocery store. ✔ Encourage waste certifications for all commercial facilities.
	15	Residential Waste Reduction	✔ Encourage the increased diversion of residential waste from landfills by enhancing the pay-as-you throw rate structure to provide a strong financial incentive to reduce landfilled waste, and investigate financial structures that account for the true cost of waste, including the GHG-impact. ✔ Fund significant ongoing education on what can be composted or recycled.
	16	Organics Diversion	✔ Encourage the highest and best use of diverted organics by developing streams for organics that are usable for human or animal consumption, or other economically-viable purposes. ✔ Support diversified solutions for low-carbon organics diversion, such as private-public partnerships and reliable processors that expand collection to all City residents and businesses. ✔ Incentivize a market for local compost and mulch for landscaping uses. ✔ Explore the potential for the use of organics in anaerobic digesters for energy production.
	17	Material Reuse and Circularity	✔ Establish a marketplace for local, existing/recycled products including manufacturing by-products. ✔ Incentivize local manufacturers who develop solutions to extend product life spans for local solutions. ✔ Develop a deconstruction policy to encourage reuse of building materias.
	18	Reduced-Landfill Construction	✔ Develop education programs around reduced-landfill waste practices. ✔ Offer incentives to encourage an increase in reduced-landfill construction practices. ✔ Encourage the development of markets for the reuse of construction waste. ✔ Partner with local industry organizations, such as the San Antonio General Contractors Association.

IMPLEMENTATION **COMMUNITY** CONTINUED

		STRATEGIES	IMPLEMENTATION ACTIONS
Promote Biodiversity and Healthy Ecosystems	19	Carbon Sequestration	✔ Develop a plan for carbon sequestration within the City boundaries, including a carbon sequestration baseline for the City ✔ Develop a tracking mechanism for progress around carbon sequestration.
	20	Urban Heat Island	✔ Increase San Antonio's tree canopy in line with Tree City USA, strategically considering vulnerable populations. ✔ Increase the installation of white or light surfaces for roofs and roadways, architectural canopies, and green roofs. ✔ Support the existing network and new development of urban farms and community, and pollinator gardens. ✔ Preserve open space and native ecosystems on publicly-owned land or in targeted priority areas.
	21	Climate Sensitive Design	✔ Pilot a process to identify the GHG emissions of building projects, as well as climate vulnerabilities into existing permitting processes. ✔ Incentivize development that meets the mitigation and adaptation strategies outlined in the CAAP. ✔ Continue to adopt the latest international code requirements and support updates to better respond to San Antonio's changing climate. ✔ Identify building code amendments that allow for the integration of climate action and adaptation strategies. ✔ Educate the local building design and construction community about climate responsive, passive solar design strategies. ✔ Support and incentivize the use of pervious cover, taking into consideration site constraints and the pervious coverage needs of priority growth areas, in the SA Tomorrow Regional Centers or other target areas, for the development of undeveloped land and infill or redevelopment projects.
Educate & Enable	22	GHG Education and Training	✔ Develop a comprehensive education platform that crosses socio-economic classes to serve all ages, races, and income to result in a San Antonio population that is well-informed about climate change and GHG-related topics and ensure a workforce that can support the City's evolving green economy. Topics include: - How will climate change affect San Antonio? - What can be composted or recycled? - How to reduce consumption and impact related to transportation and building energy use? - What are the actions you can take today? - What are the job training/skills that are needed to support the green economy transition?
	23	SA Tomorrow Plans	✔ Identify and implement a plan to provide proper funding for measures identified in the SA Tomorrow Plans. ✔ Review ongoing climate action against the SA Tomorrow Plans ito ensure alignment.
	24	Business Incentives	✔ Develop a platform for ongoing discussions between the City and businesses around climate issues and process towards mitigation and adaptation goals. ✔ Offer detailed education around developing GHG reduction targets. ✔ Develop a recognition program for businesses with proven GHG reductions. ✔ Recognize sustainability practices embraced by businesses within the Legacy Business Program, which celebrates San Antonio businesses in operation 20 years or more that contribute to the history, culture, and authentic identify of San Antonio.
	25	Electric and Water Rate Structures	✔ Enact time-of-use, tiered, and/or EV charging rates for all San Antonio energy users to encourage energy efficiency and reduce peak load. ✔ Identify and employ price signals to encourage energy and water conservation and ensure these resources are used when they are greener, i.e. when the grid is supplied by low-carbon sources.
	26	GHG Reduction Quantification	✔ Identify the methodology that the City will use to complete a comprehensive scope 3 assessment. ✔ Develop a quantification system for tracking scope 3 GHG emissions. ✔ Develop priority actions to reduce the carbon impact of scope 3 GHG emissions.
	27	Develop and Implement a Framework for Regional Collaboration	✔ Develop a Regional Climate Council. ✔ Work with Bexar County and other key partners to share best practices and work towards regional connectivity goals. ✔ Partner with City of Austin on the Implementation of Bloomberg American Cities Climate Challenge efforts.
	28	Financing Energy Efficiency	✔ Analyze possible mechanisms, including Property Assessed Clean Energy (PACE), Warehouse for Energy Efficiency Loans (WHEEL), privately financed on-bill repayment, green leases, and performance contracts. ✔ Work with regional and state partners to employ the most effective financing mechanisms.

IMPLEMENTATION MUNICIPAL

		STRATEGIES	IMPLEMENTATION ACTIONS
Reduce Building Consumption	M1	Benchmarking and Public Disclosure of Building Consumption	✔ Evaluate the potential to install sub-meters for any buildings where energy and water use cannot currently be disaggregated. ✔ Evaluate the potential to install energy energy use and trends for all municipal buildings.
	M2	Municipal Energy Policy	✔ Develop and implement an Energy Policy Ordinance to standardize requirements around energy operations and occupant behaviors such as temperature set points, HVAC run times, personal appliance restrictions, etc.
	M3	Zero Net Energy Buildings	✔ Set a standard for minimum Energy Use Intensity (EUI) for all buildings, based upon building type and function. ✔ Develop a ZNE Policy for municipal buildings that may include multiple options for compliance. ✔ Produce renewable power at municipal buildings and facilities. ✔ Purchase renewable power to cover remaining energy use.
	M4	Cool/Green Roofs	✔ When feasible, install green or cool roofs on new or existing buildings to reduce heat absorption, thereby reducing building energy consumption associated with heating and cooling.
Reduce Transportation Consumption	M5	Streetlights	✔ Complete the conversion of streetlights to energy efficient LEDs. ✔ Explore opportunities to incorporate smart city technology to assist with energy saving objectives, as well as other potential benefits, such as ev charging, temperature sensor, or air quality monitoring.
	M6	Carbon-Free Fleet Vehicles	✔ Update the municipal government vehicle procurement policy to ensure all new vehicle purchases support efficiency and carbon reduction objectives.
	M7	Transportation Demand Management	✔ Explore the potential of increasing the use of carbon-free vehicles for commuting through a government financing plan for leasing these vehicles. ✔ Encourage alternative scheduling, i.e. work from home one day-a-week, telecommuting, carpooling, or compressed work weeks. ✔ Incentivize the use of low-carbon transit solutions such as subsidizing bus passes and / or car or van-pooling opportunities.
	M8	Airport Accreditation	✔ Pursue Airport Carbon Accreditation for the San Antonio International Airport.
Increase Circularity	M9	Prioritization in Decision-Making	✔ Develop a process for city budgeting, project development, and other decision-making to assess GHG impacts and potential co-benefits.
	M10	Environmentally Preferable Purchasing	✔ Review the Environmentally Preferable Purchasing Policy to identify opportunities to capture existing contracts currently not meeting policy objectives. ✔ Develop criteria to encourage the selection of durable, long-lasting products, with low embodied energy with the goal of reducing emission resulting from municipal operations.
	M11	Green Specifications	✔ Determine the viability of utilizing low carbon, locally produced, and recycled-content materials in public works and roadway projects. Where cost-effective, require the use of products with reduced GHG emissions.
	M12	Zero Waste	✔ Require zero waste for municipal construction projects by 2030. ✔ Revise CoSA's Green Events Ordinance to require reduced-waste for all city sponsored events.
Educate & Enable	M13	GHG Education	✔ Develop an education program to increase awareness and bring about immediate GHG emission reductions within municipal government operations and create long-term change within the larger community, through education around: - Climate science - CoSA programs, focusing on "what you can do" - Community engagement opportunities

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DeeDee Belmares, Moms Clean Air Force
Belarmino Castellanos, Whataburger
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Steven Clouse, San Antonio Water System
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Adelita G. Cantu, UT Health San Antonio School of Nursing/ Alliance of Nurses for Healthy Environments
Isaac Garcia, Southwest Workers Union
Beth Keel, San Antonio Housing Authority
Elizabeth Montgomery, Palo Alto College
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Hector Morales, San Antonio Apartment Association
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Frankie Orona, Society of Native Nations
Diana Elisa Lopez Perez, Centro por la Justicia - Southwest Workers Union
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James Nichols, Joeris General Contractors/RECSA
Virginia Palacios, South-Central Partnership for Energy Efficiency as a Resource (SPEER)
Jason Pittman, Go Smart Solar
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