RESOLUTION R-1600

RESOLUTION OF THE BOARD OF DIRECTORS OF THE SAN ANTONIO RIVER AUTHORITY SUPPORTING THE CITY OF SAN ANTONIO'S CLIMATE ACTION AND ADAPTATION PLAN AS A FRAMEWORK FOR ANALYZING AND IMPLEMENTING FUTURE STRATEGIES TO ENHANCE COMMUNITY RESILIENCY

WHEREAS, in June, 2017, the City Council of the City of San Antonio passed resolution 2017-06-22-031R in support of the Paris Climate Agreement and Mayors' National Climate Action Agenda, joining the growing list of cities taking efforts to reduce greenhouse gas and adapt to changing climate impacts; and

WHEREAS, development of the Climate Action and Adaptation Plan (the "CAAP") involved a diverse coalition of leaders from business and industry, school districts, higher education institutions, neighborhood associations, the military, chambers of commerce, transit and housing authorities, public utilities, trade associations, and environmental non-profit groups and included input from the community at large, engaging thousands of residents at meetings and through surveys; and

WHEREAS, these leaders, including staff members from the San Antonio River Authority (SARA), served on a Steering Committee and Technical Working Groups that met regularly during 2018 to develop the CAAP; and

WHEREAS, in January 2019, a first draft of the CAAP was issued and SARA's Board of Directors issued a letter of support for the water resource elements of that draft. This first draft version of the CAAP received significant community feedback; and

WHEREAS, based on public input and requests for modifications, in August 2019, the City of San Antonio completed the development of its second and final version of the CAAP, which offers a roadmap to protect San Antonio from the effects of climate change, ensuring that it remains a vibrant, thriving city for generations to come; and

WHEREAS, the CAAP provides implementation strategies some of which support SARA's goals and objectives to proactively address sustainable development practices including flood control, water quality, green infrastructure, low impact development (LID), advancing the circular economy, triple bottom line, and educating and empowering the community; and

WHEREAS, it is recognized that the specific mitigation and adaptation strategies described in the CAAP were selected based on their ability to increase community resilience; however, it is acknowledged that the CAAP only serves as a framework, and as such, additional analysis and public discussion will be required to assess the cost and benefits, economic and job impacts, and technical feasibility for each of the strategies prior to implementation; and

WHEREAS, because climate action and adaptation benefits will best be achieved from the collective commitment of the entire community, the San Antonio River Authority Board of Directors desires to offer its support for the CAAP and is committed to assessing the agency's actions, projects, and programs to contribute to the overall resiliency of the community and participating in the future impact and technical analyses of implementation strategies.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE RIVER AUTHORITY THAT:

> That the San Antonio River Authority Board of Directors does hereby pledge support for the City of San Antonio CAAP in substantially the form attached to this Resolution as Attachment "A".

PASSED AND APPROVED this the 18th day of September, 2019.

DARRELL T. BROWNLOW, Ph.D, Chairman

ATTEST:

LOURDES GALVAN, Secretary

CERTIFICATE OF SECRETARY

SAN ANTONIO RIVER AUTHORITY	§
	§
SAN ANTONIO, BEXAR COUNTY, TEXAS	§

I hereby certify the above and foregoing to be a duplicate original of Resolution R-1600 of the Board of Directors of the SAN ANTONIO RIVER AUTHORITY as passed and approved by the members of said Board at a regular meeting of the Board of Directors of said AUTHORITY held on September 18, 2019, in San Antonio, Bexar County, Texas, at which a quorum was present, as shown by the Minutes of said meeting.

IN TESTIMONY WHEREOF, witness my hand and the official seal of the SAN ANTONIO RIVER AUTHORITY on this the 18th day of September, A.D., 2019, in San Antonio, Bexar County, Texas.

LOURDES GALVAN, Secretary

ATTACHMENT A

SA CLIMATE READY:
A PATHWAY FOR CLIMATE ACTION & ADAPTATION

AUGUST 2019

Draft for Public Discussion

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CITY OF SAN ANTONIO TEXAS

Our climate is changing; adapting proactively for future conditions will ensure a prepared, competitive, and resilient city.

A MESSAGE
FROM THE MAYOR

San Antonio is one of the fastest-growing cities in the nation. We are working to plan for and accommodate an estimated one million additional residents that will be living in our community by 2040. It is our collective responsibility to prepare for a future that is projected to have hotter temperatures, longer droughts and more intense rain events. That is why one of my first acts as Mayor in working with the City Council was to sign a resolution declaring San Antonio will adhere to the Paris Climate Agreement.

Throughout the SA Climate Ready process, people from across our community have helped craft a sustainable approach by examining best practices and policies concerning 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. With one planet to share, the work that is being done globally will benefit our way of life here in San Antonio. We must act now to join those efforts to perpetuate San Antonio's safety and prosperity.

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

Mayor Ron Nirenberg

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

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Implementation of SA Climate Ready means a more equitable, safe, affordable, and prosperous future for all San Antonians.

SA CLIMATE READY

IN 2019, as San Antonio entered its fourth century as an established municipality, the City launched the development of its first Climate Action & Adaptation Plan (CAAP).[1] With thousands of years of rich history and culture, the San Antonio community has thrived around the river called "Yanaguana" (precious land) by the native peoples who lived here over 10,000 years ago. Today, San Antonio 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 climate change, the most significant threat to our community and the world — we have chosen to rise to the challenge of enhancing San Antonians' quality of life for generations to come.

CLIMATE IMPACTS TO SAN ANTONIO

Human-caused climate change presents a global challenge. The greenhouse gases (GHGs) we release by burning fossil fuels have raised the earth's temperature by 1.8°F since the beginning of the Industrial Era, causing a range of effects across the world: rising sea levels, expanding deserts, stronger hurricanes, acidifying oceans, and extinction of plant and animal species.[2]

Here in San Antonio, we too have begun to feel impacts of climate change. Since the 1950's and 60's, our city has experienced warmer summers and winters; more extreme and frequent heat waves; an increase in days over 100 degrees; and more variable and extreme precipitation.[3]

Climate projections show that our city's future will likely be even hotter and drier. By 2040, we will likely experience summer maximum temperatures 4°F higher on average, 24 additional days over 100°F each year, and 3" less rain each year.[4]

If global GHG emissions continue at current rates, climate projections for San Antonio become even more dire as the decades pass. Within the lifetimes of today's children, as early as 2071, we could endure summer maximum temperatures 10° higher on average, 94 additional days over 100° each year, and 8 days exceeding 110° each year if we do nothing.

Without a plan to reduce our emissions and prepare San Antonio for these impacts, our city — and our people — are at risk. Climate change threatens everything we value, the resilience of our natural resources, our physical infrastructure, our financial security and economic competitiveness, and not least our health and well-being.

This CAAP lays a roadmap to protect what we love about San Antonio, ensuring that it remains a vibrant, thriving city for generations to come.

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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.

RESPONDING TO THE CHALLENGE

Though San Antonio is only one spot on the world map, we are not alone in taking climate action. We are connected to the Paris Agreement, a global effort by 185 nations to reduce GHGs and adapt to climate impacts.[5]

Here in the U.S., 407 cities representing over 70 million Americans have committed to upholding the Paris Agreement. San Antonio joined these cities in June 2017, when our City Council passed a resolution (2017-06-22-0031R) in support of the Paris Climate Agreement and Mayors' National Climate Action Agenda.[6] With this action, San Antonio joined the growing list of cities taking responsibility for their share of this global problem.

In December 2017, the SA Climate Ready planning process began. A community effort from start to finish, SA Climate Ready involved a diverse coalition of 90 area leaders from business and industry, school districts, higher education institutions, neighborhood associations, the military, chambers of commerce, the transit and housing authorities, public utilities, trade associations, and environmental nonprofit groups. These leaders served on a Steering Committee and five Technical Working Groups that met monthly throughout 2018 to develop this CAAP. Throughout the process, SA Climate Ready also solicited significant input from the community at large, engaging thousands of residents at dozens of open houses, neighborhood and stakeholder meetings, as well as at community events, and through surveys.

At its heart, SA Climate Ready sought answers to the following questions: What is San Antonio's share of responsibility for global climate change? How can we reduce San Antonio's GHG emissions to align with keeping global temperature increase to 1.5 degrees Celsius (2.7°F)? How can we prepare San Antonio for the projected impacts of climate change? How do we ensure that our response is just and equitable for all?

This CAAP presents our community's answers to these questions.

ABOUT THE PLAN

So that we know the path to take to carbon neutrality, San Antonio's community and municipal **Greenhouse Gas Emissions** Inventory for 2016 is included in the plan. This inventory provides a baseline for measuring our progress at reducing emissions in the future. It also breaks out emissions by sector (e.g., transportation, buildings), revealing where we have the greatest potential for GHG reduction.

Reducing Greenhouse Gases outlines strategies for reducing San Antonio's GHG emissions. It organizes strategies in six broad categories: increase carbon-free energy; reduce building energy consumption; advance the circular economy; increase circularity; promote biodiversity and healthy ecosystems; and educate and enable.

Preparing for a Changing Climate outlines strategies to prepare San Antonio for climate risks and impacts. It organizes strategies in seven broad categories: increase infrastructure resilience; strengthen public health systems; enhance emergency management and community preparedness; promote, restore, and protect green infrastructure and ecosystems; protect local food security; increase resiliency awareness and outreach; and ensure equity in adaptation.

Implementing the Plan lays out a process for carrying out the strategies in this CAAP. Importantly, this CAAP is a roadmap, setting a trajectory for achieving our mitigation and adaptation goals and that will require continued commitment on the part of the whole San Antonio community.

The ethical framework grounding the CAAP is a focus on **Climate Equity**. It acknowledges that San Antonio's history has produced social inequities that, if unaddressed, will worsen with climate change. This section underscores our shared commitment to

Mayors, governors, and business leaders first began signing the "We Are Still In" declaration in June 2017 as a promise to world leaders that Americans would not retreat from the global pact to reduce emissions and stem the causes of climate change. The bipartisan coalition includes over 3,500 representatives from all 50 states, spanning large and small businesses, mayors and governors, university presidents, faith leaders, tribal leaders, and cultural institutions.[7]

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Climate Change presents an enormous challenge not only environmentally, but also when considering the preservation of San Antonio's tangible and intangible heritage. Heritage anchors social memory and cohesion, informs community identity, and instills a sense of place. This is essential in sustaining inherent resilience.

equitable climate action and presents a tool — the climate equity screening mechanism — for operationalizing this commitment.

A GRAND GOAL

Our goal is to make San Antonio carbon neutral by 2050—meaning that three decades from now, our city will contribute no net carbon into the atmosphere. This goal, though grand, is attainable. We have already made advances in energy efficiency and have begun shifting from fossil fuels toward carbon-free sources, achieving:

- A 10% reduction in total GHG emissions from 2014 to 2016, despite population and economic growth;
- Recognition in 2018 as the #7 city in the nation and first in Texas for locally installed solar photovoltaic capacity;[8]
- Adoption of the most advanced International Energy Conservation Code (IECC) for buildings, setting the city apart as one of the most energy-efficient in the nation; and
- A savings of 771 megawatts (MW) of energy since 2009 through CPS Energy's Save for Tomorrow Energy Plan (STEP),[9] eliminating the need for a new fossil fuel power plant.

Building on these achievements, we will continue to harness collaborative partnerships, technology, and innovation—resources our city possesses in abundance—to realize our carbon-neutral goal.

WHAT IS SA CLIMATE READY?

- ✔ **SA Climate Ready is San Antonio's climate action & adaptation plan to meet the present and future challenges of climate change.**
- ✔ **SA Climate Ready provides strategies for ensuring economic prosperity and quality of life.**
- ✔ **SA Climate Ready prioritizes clean air, public health, water quality and conservation, good jobs, transportation choices, clean and secure energy and emergency preparedness.**
- ✔ **SA Climate Ready supports market transitions, consumer options, and prepares residents, businesses, and institutions for an unpredictable climate.**
- ✔ **SA Climate Ready identifies a process for equity and affordability to ensure that a Climate Ready San Antonio benefits all of our residents.**
- ✔ **SA Climate Ready is grounded in best available climate science and best practices.**

ACRONYMS & DEFINITIONS

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.

Biodiversity: 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 and non-renewables such as nuclear.

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

Carbon Capture and Storage: 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, increased instability and reduced predictability, 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).

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 most socially vulnerable to it. 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 benefits 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 Sensitive Design: is defined as a process that considers microclimates (e.g., sun, wind, temperature) when designing for future urban conditions while considering pedestrian activity and building performance, especially with respect to energy conservation. Adapted from: Tapias, E. and Schmitt, G. "Climate-sensitive urban growth: outdoor thermal comfort as an indicator for the design of urban spaces," The Sustainable City, IX, Vol. 1 623, 2014.

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 within the geographic boundary of 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.

EcoDistrict: As defined by the Center for Neighborhood Technology, EcoDistricts provide sustainability solutions that use a district scale to achieve greater impact. They link energy, transportation, water, and land use in an integrated, efficient resource system.

Ecological Planning: The process of understanding, evaluating, and providing options for the use of landscape to ensure a better fit with human habitation. Adapted from: Ndubisi, F. Ecological Planning: A Historical and Comparative Synthesis, 2003.

Ecosystem services: Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food or fibre, (3) regulating services such as climate regulation or carbon sequestration, and (4) cultural services such as tourism or spiritual and aesthetic appreciation. From https://www.ipcc.ch/sr15/chapter/glossary/.

Energy Capacity: Maximum electric output that an electricity generator can produce under specific conditions.

Energy Industries: Industries within San Antonio city boundaries that produce emissions from energy production and energy use, i.e. energy used for refining.

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.

Greenhouse Gases (GHGs): Gases that absorb heat in the atmosphere near the Earth's surface,

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ACRONYMS & DEFINITIONS (CONT.)

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.

Green Infrastructure; Blue-Green Infrastructure: The interconnected set of natural and constructed ecological systems, green spaces and other landscape features. It includes planted and indigenous trees, wetlands, parks, green open spaces and original grassland and woodlands, as well as possible building and street-level design interventions that incorporate vegetation. Green infrastructure provides services and functions in the same way as conventional infrastructure. Blue-Green Infrastructure can be an important means of dealing with flooding and extreme storm events by distributing water through its network of interconnected reservoirs, wetlands, and associated (natural) open spaces along rivers. Adapted from https://www.ipcc.ch/sr15/chapter/glossary/ and Ghofrani, Z. et al, A Comprehensive Review of Blue-Green Infrastructure Concepts, International Journal of Environment and Sustainability, Vol. 6 No. 1, 2017.

Industrial Processes and Product Use (IPPU): 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.

Low Impact Development: As defined by the San Antonio River Authority, Low Impact Development (LID) is a sustainable land planning and engineering design approach that manages stormwater runoff as close as possible to where it falls as rain. Examples are rain gardens, stormwater harvesting cisterns, and permeable pavement. From https://www.sara-tx.org/lid-sustainability/low-impact-development/

Marginalized Communities: Groups that are disproportionately burdened by the impacts of climate change or that 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).

Metric Tons CO_2 Equivalent ($MtCO_2e$): 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. Often reported as Million metric tons Co_2 equivalent ($MtCO_2e$).

Micro-Mobility: Modes of transport that are provided by very light vehicles such as electric skateboards, e-bikes, e-scooters, and docked bikes.

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: Natural capital can be defined as the world's stocks of natural assets which include geology, soil, air, water and all living things. It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible. From https://naturalcapitalforum.com/about/.

Natural Capital: San Antonio's municipal inventory includes emission from sources under direct control of the San Antonio City Government, including city-owned facilities, city-owned vehicles, including 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 (3.6°F) above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius (2.7°F).

Regeneration: To improve a place or system so that it is active or producing again; to grow again.

Representative Concentration Pathways (RCPs): Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases (GHGs) and aerosols and chemically active gases, as well as land use/land cover (Moss et al., 2008). The word representative signifies that each RCP provides only one of many possible scenarios that would lead to the specific radiative forcing characteristics. The term pathway emphasizes that not only the long-term concentration levels are of interest, but also the trajectory taken over time to reach that outcome (Moss et al., 2010).

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.

Resilience Hub: Community-serving facilities augmented to support residents and coordinate communications, resource distribution and services before, during, or after a natural or man-made hazard event.

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.

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 (UHI): 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.

Water Recycling Processes: Processes encompassing the conversion of wastewater to water through the removal of contaminants.

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.

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A DOCUMENTED CALL TO ACTION

THREATS TO THE INSURANCE MARKET: A 2019 survey of 247 insurance actuaries identified climate change as the top emerging risk. Climate change was ranked higher than cyber damages, financial instability, and terrorism. This is reflective of a significant portion of the U.S. economy where insurance spending makes up $5 trillion annually, approximately 11% of America's GDP.[10]

THREATS TO THE U.S. ECONOMY: The Fourth National Climate Assessment, published in November 2018 and authored by hundreds of climate scientists and 13 U.S. Federal Agencies, predicts that the U.S. economy will shrink by as much as 10% by the end of the century if global warming continues at its current pace.[11]

THREATS TO PUBLIC HEALTH: The World Health Organization states that "The severity of the impact of climate change on health is increasingly clear." The most direct link between climate change and human health is air pollution resulting from burning fossil fuels for energy, transport, and industry. Air pollution is the second leading cause of deaths from noncommunicable diseases, leading over to 4.2 million deaths per year.[12]

THREATS TO NATIONAL SECURITY: Climate change represents a national security threat as "Global environmental and ecological degradation, as well as climate change, are likely to fuel competition or resources, economic distress, and social discontent through 2019 and beyond."[13]

THREATS TO BOND RATINGS: Credit rating agencies are being pushed by investors to consider climate change risk in bond ratings; with all three of the big credit rating agencies issuing guidance on municipal ratings and climate change. Municipalities that do not have adequate mitigation and adaptation plans in place will see an economic impact and "may have to increase taxes to offset the increased bond return demanded by investors."[14]

THREAT TO WORLD HERITAGE SITES: World Heritage properties, such as the Alamo and the San Antonio Missions, "are affected by the impacts of climate change at present and in the future and their continued preservation requires understanding these impacts in order to respond to them effectively."[15]

THE CASE FOR ACTION: WHY ACT NOW?

Governments, businesses, and organizations are recognizing the growing risks posed by climate change as well as associated costs. In 2017 alone, climate change resulted in worldwide damages of $340 billion.[16] Local communities are in a unique position to develop greenhouse gas reduction strategies and policies that they can directly influence while leveraging investments that are already established. Cities across the globe have taken on this challenge and are proving that they can respond to climate change, increase economic growth, and prepare for a better future. In fact, 27 of the world's largest cities have been successfully reducing their emissions at a rate of 2% per year, while their populations have grown by 1.4% per year and their economies have grown by 3% per year.[17]

San Antonio's history of successful sustainable initiatives provides a solid platform from which to springboard forward-thinking advancements that will continually improve the quality of life, security, and economic vitality of our community. However, implementation will rely on overcoming these potential challenges:

- **Technology:** While many current technologies can aid in the implementation of the strategies in this plan, proven technological solutions may not yet be available to meet long-term GHG reduction goals.
- **Cost:** The transition to a Climate Ready San Antonio means transforming our energy, building, and transportation sectors. As part of this transition, new policies, programs, and technologies will be required, many of which will result in associated costs. Financial modeling to support emissions reductions requires a transition to a lifecycle cost model that considers potential risks and benefits. Not only is this modeling more complicated, in many cases good data does not yet exist.
- **Consumer Options & Behavioral Change:** Humans are creatures of habit, and transitioning to new ways of traveling, buying, and acting can take time. Responding to climate change will require a change in human behavior: a reduction in consumption and a reprioritization of decision making.

Through the SA Climate Ready process, our community has concluded that it makes sense to take on these challenges. In so doing, we are preparing for a healthier and productive future for all our residents.

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A TRACK RECORD OF INVESTMENTS FOR OUR FUTURE

The mitigation and adaptation strategies presented in the CAAP, provide a renewed focus towards mitigating and responding to climate change in our city, but the ideas are not new. San Antonio has a proud history of conservation, ensuring our resources are available and cost-effective for our residents. Some examples of forward-looking programs and investments include:

Build San Antonio Green

- Over 7,800 building projects including single-family homes, multifamily, mixed-use, and commercial projects have been certified green since 2001.
- The overall efficiency of these buildings has prevented more than 225 million pounds of CO_2 and has led to a reduction of 13.1 megawatts in peak demand.

Edwards Aquifer Protection Program[18]

- $247 million committed to the protection of 156,475 acres of land over the aquifer's contributing and recharge zone since 2000.
- The protected land will continue to reduce potential threats to water quality and quantity of the primary source of drinking water for San Antonio residents.
- Protects green spaces, biodiversity and captures and stores carbon.

Energy Efficiency Fund

- Between 2011 and 2018, the Energy Efficiency Fund has completed 409 projects within 187 municipal facilities resulting in $1.5M in avoided costs.
- In those municipal facilities, there has been a 16% reduction in electricity consumption.
- Established as a revolving fund, it has turned a one time inflow of grant funding into a permanent source of revenue for energy projects. San Antonio is the only city in Texas with such a program in place.

Flood Control Projects

- A combined total of over $2 billion in drainage infrastructure projects has been invested by the City of San Antonio and Bexar County since 2010.
- San Antonio has led the state in adoption of Atlas 14 rainfall standards, ensuring that San Antonio is better prepared for current and future rain events.
- Participation in the Bexar Regional Watershed Management (BRWM) partnership has enhanced coordination between regional partners, resulting in more efficient distribution of resources to address flood control needs in San Antonio's watersheds. The BRWM is currently utilized as a model for future flood control planning efforts by the state of Texas.

Howard W. Peak Greenway

- $190 million committed since 2000.
- 65 miles of trails completed, 24 miles in design, 14 miles currently under construction, and an additional 12 miles in planning with a shared vision of creating a "ring" around the city.
- Increases connectivity, provides recreational and commuting opportunities, reduces reliance on fossil fuel powered vehicles.

Save for Tomorrow Energy Plan (STEP)

- Designed to reduce the community's demand for electricity by 771 megawatts (MW), which is equivalent to the output of a large power plant, by the end of 2020.
- Customer particpation has been so successful that STEP will exceed its original MW reduction goal a year early.
- It is expected that San Antonio will reduce its electric demand by more than 800 MW, at an estimated final cost of $719 million which is 15% less than origianly forecasted.

Tree Canopy Preservation and Mitigation Fund

- $13.8 million expended since 2006 in support of tree preservation, tree planting, and educational activities.
- Improves air quality, helps to mitigate extreme heat impacts and manage stormwater, captures and stores carbon, supports biodiversity, and improves the quality of life and property values.

Under 1 Roof[19]

- $5.25 million committed through Fiscal Year 2019.
- Provides funding for energy efficient roofs on homes owned by residents with incomes at or below 80% of the area median income.
- Reduces energy consumption, heating and cooling costs, and mitigates the impacts of Urban Heat Islands.

Water Conservation

- $162 million invested in residential and commercial conservation programs by the San Antonio Water System between 1992 and 2018.
- As a result of this investment, San Antonio has benefited from $762 million in avoided costs associated with water and wastewater demand. These prudent investments continue to improve resilience, support water security, and help prepare San Antonio for the future.
- The San Antonio River Walk supports conservation efforts by utilizing recirculated flood water, eliminating the need to use Edwards Aquifer water or other sources and helping to preserve the River Walk's $3 billion annual economic impact to the City.

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BENEFITS OF PRIVATE SECTOR ACTION

Increased Profitability, Reduced Costs, and Efficiency

Setting GHG emissions reduction targets can be beneficial, especially when aligned with cost reduction goals. This is because reducing GHG emissions can lead to greater operational efficiency and competitiveness.

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 businesses 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 decision-makers 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

Customers today are looking for their purchases to reflect their values. With a third of customers considering green and social impacts in their brand decisions, and with 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.[20] 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.

Business Action

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.

Carbon Disclosure Project (CDP): A global disclosure system 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.[21]

Science-Based Targets (SBTs): The SBT initiative has become the international standard for carbon mitigation targets, with over 500 companies committing, including 17% of Global Fortune 500 companies.[22]

Task Force on Climate-Related Financial Disclosures (TCFD): TCFD 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.[23]

DRAFT

MITIGATION
Reducing or preventing emissions from greenhouse gases

EXAMPLE:
Increasing renewable energy

Reducing energy use in buildings

Increasing cleaner and more efficient vehicle use

ADAPTATION
Actions that help to reduce the negative effects of climate change

EXAMPLE:
Flood-proof roadways & critical infrastructure

Develop a community wildfire protection plan

Increase tree canopy

GREENHOUSE GAS INVENTORY & CLIMATE PROJECTIONS

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 creates a framework for both mitigation and adaptation. The following chapters present a detailed discussion of the strategies for both mitigation and adaptation.

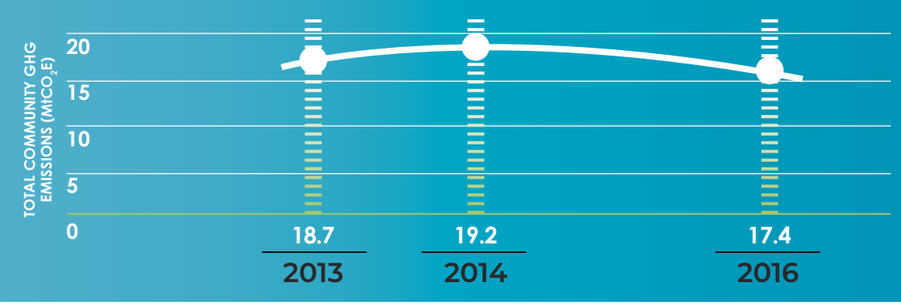
The remainder of this chapter presents the baseline for the mitigation and adaptation strategies identified in the CAAP. The baseline against which mitigation and adaptation strategies are evaluated varies in the context as well as the ability to numerically quantify the captured data. For mitigation, 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.[24]

San Antonio's total community emissions in 2016 were 17.4 million metric tons of carbon dioxide equivalent ($MtCO_2e$).[25] Even though San Antonio's population grew by 6% between 2014 and 2016, the city's GHG emissions decreased by 10% during the same period. This decrease was driven primarily by CPS Energy's shift away from carbon-intensive electricity sources (e.g., coal) and toward cleaner sources (e.g., natural gas, solar, and wind).

HISTORIC SAN ANTONIO COMMUNITY
GHG EMISSIONS



GREENHOUSE GAS EMISSIONS INVENTORY

SECTOR EMISSIONS

The two largest sources of GHG emissions in San Antonio are the stationary sector (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.

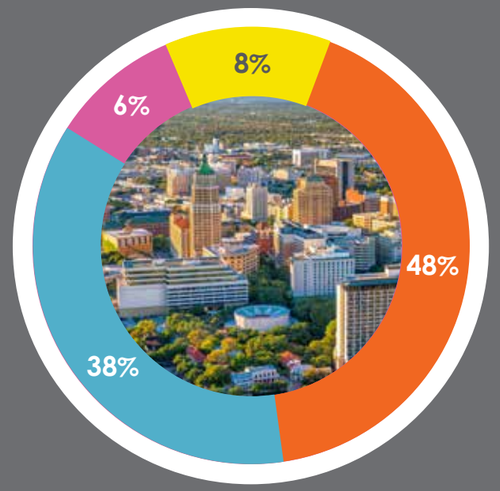
Stationary (Energy Use in Buildings) The stationary sector includes emissions related to energy use in commercial, residential, and industrial buildings as well as emissions related to energy production and use to supply energy to San Antonio. The majority of San Antonio's stationary emissions are related to electricity and natural gas supplied by CPS Energy. 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.

Industrial Processes and Product Use (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.

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.

2016 SAN ANTONIO COMMUNITY GHG EMISSIONS



17.4 $MtCO_2e$ total

48% STATIONARY, ENERGY USE IN BUILDINGS

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

38% TRANSPORTATION

- 34% Private transportation, i.e., heavy trucks, 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

The 2016 San Antonio Community GHG Inventory follows the Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC).[26] This protocol allows for selection between different reporting levels. Based on the data available, the community inventory follows the BASIC reporting level focusing on Scope 1 and 2 emissions, exceeding the requirements of this level by including the largest industrial process emissions.

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

LET'S GET CLIMATE READY

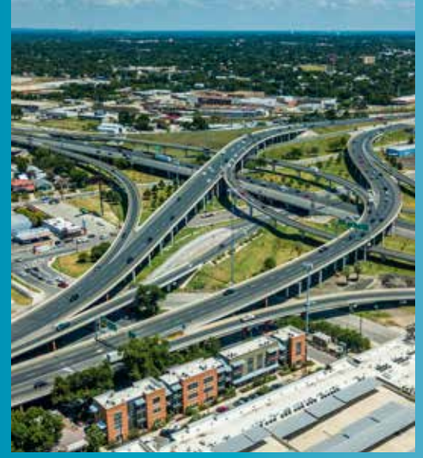
DRAFT DRAFT

THE IMPACT OF GLOBAL WARMING POTENTIAL

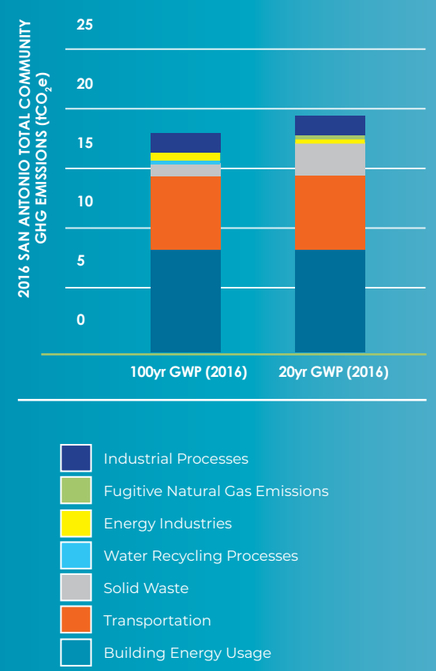
Standard GHG accounting methodologies generally track seven key Greenhouse Gases: **carbon dioxide, methane, nitrous oxide, perfluorinated chemicals, hydrofluorocarbons, sulfur hexafluoride, and nitrogen trifluoride**. These GHGs differ in their ability to absorb energy and the amount of time they will remain in the atmosphere, so they are all converted to a common unit for comparison: carbon dioxide equivalent (CO_2e) 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 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).[27] GWP values are generally considered over two time frames: 20 years and 100 years. For long-lived like nitrous oxide, the GWP is virtually the same for both time frames, 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 the 100-yr GWP.

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 12.6% from 17.4 $MtCO_2e$ (metric tons of carbon dioxide equivalent) to 19.6 $MtCO_2e$. Under both scenarios, the stationary (energy use in buildings) 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

IPCC 5th Assessment Report (published in 2014) https://www.ipcc.ch/pdf/assessment-report/ar5/ wg1/WG1AR5_Chapter08_FINAL.pdf

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 municipal operations as well as identify 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)[28,29] developed by ICLEI-Local Governments for Sustainability.

In total, the San Antonio City government emitted 0.46 $MtCO_2e$ 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 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,[30] as well as a reduction in the emissions from landfills.

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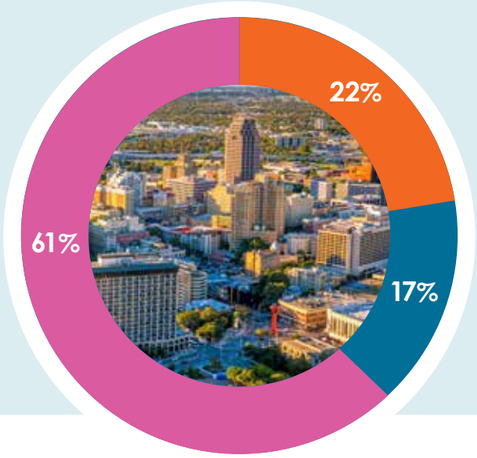
2016 SAN ANTONIO MUNICIPAL GHG EMISSIONS

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 CO_2 and is the reason why the emissions from this sector look so large compared to the others.

City-Owned Landfills The landfill sector includes emissions (mostly methane) from closed landfills operated by the City. Seven of the nine known landfills in San Antonio 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 within this 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%).

Stationary (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

17% 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.

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CLIMATE PROJECTIONS: SAN ANTONIO'S CLIMATE FUTURE

San Antonio has always been hot, but 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 had in any decade since record-keeping began in the 1890s.[31]

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.[32] 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.

In general, the increase in temperatures and shifts in expected precipitation are consistent with national and global trends. GHG 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 earth's ability to absorb these emissions, resulting in excessive amounts of heat-trapping gases 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

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.

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

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MITIGATION:
REDUCING GREENHOUSE GASES

Meeting GHG emissions reductions outlined in the Paris Agreement is possible. It will require a concerted effort by all San Antonians to design and improve buildings for energy efficiency, expand clean transportation options, and reduce overall consumption. The City will support this transformation to a carbon neutral future by prioritizing our resources, enacting polices, and incentivizing change.

The need for climate action is urgent. After three steady years of decline, preliminary estimates indicate that GHG emissions in the United States rose by 3.4% in 2018.[33] This marks the largest increase in eight years, even with a near-record number of coal plants retiring. The emissions increase is largely attributed to industrial emissions (+ 5.7%) and transportation emissions, including diesel for trucking and jet fuel for air travel, (+3%). To meet the Paris Agreement goals, San Antonio must reduce community-wide greenhouse gas emissions a minimum 0.5 $MtCO_2e$ per year through 2050.

WHAT IS THE RESULT OF A HALF DEGREE OF WARMING?

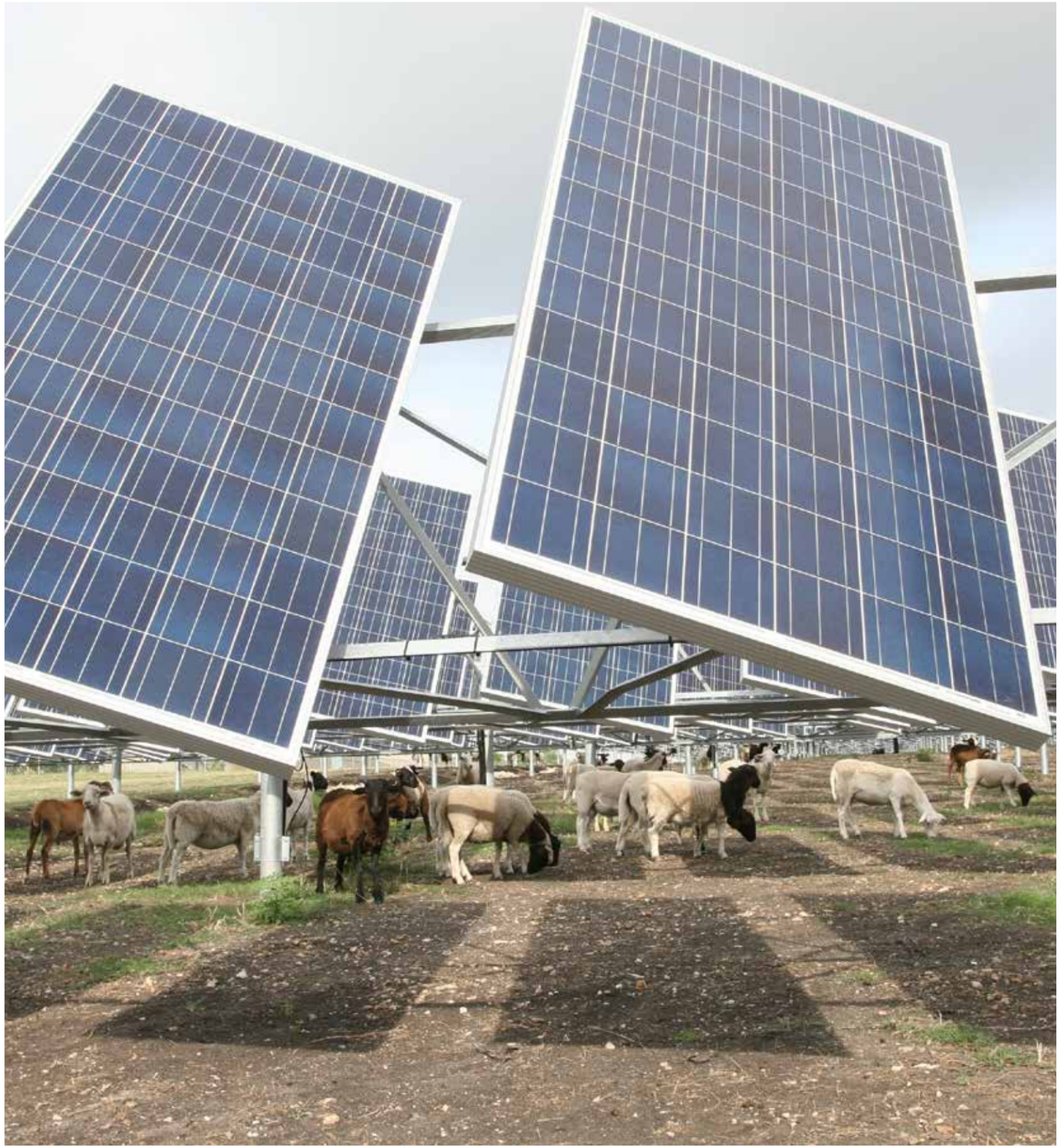
The difference between the world meeting the goal of limiting global temperature increase to 1.5°C (2.7°F) compared to 2°C (3.6°F) is considerable. The extra half-degree Celsius (0.9°F) of warming would magnify the global impacts of climate change substantially.
For example, it would:

- **More than double the human population exposed to severe heat at least every five years.**
- **Increase by 10 times the number of ice-free summers in the Arctic Ocean.**
- **Increase the loss of coral reefs by 30% (for a total loss of 99%).**
- **Add 10 million people to the number that will be exposed to flooding.[34]**

THE PARIS AGREEMENT AND 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),"[35] 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.[36] At the current GHG emissions rate, the world will reach the 1.5°C (2.7°F) threshold between 2030 and 2052. Based on a special report prepared by the Intergovernmental Panel on Climate Change (IPCC) in 2018, global net emissions must be reduced 45% from their 2010 levels by 2030 and the world must reach carbon neutrality by 2050 to meet the Paris Agreement.[37]

The window for climate action is rapidly closing if we are to maintain a possibility of limiting global temperature increase to 1.5°C (2.7°F). 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 rest of the century.



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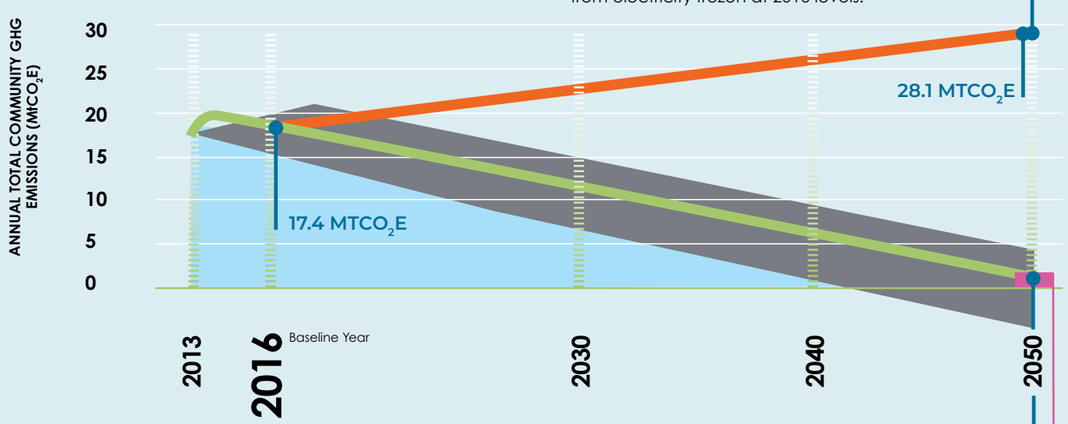
SAN ANTONIO'S PATH TO CARBON NEUTRALITY

Avoiding the most serious climate change impacts will require significant emissions reductions in the next decade. As one of the fastest growing cities in the nation, San Antonio has a particular challenge of reducing emissions alongside the projected increase in population. To meet the goal of carbon neutrality by 2050 San Antonio has set the following interim goals[38]:

INTERIM GHG REDUCTION TARGETS	2030	2040	2050
Total Emissions: percent reduction over 2016 GHG emissions	41%	71%	100%

INTERIM GHG REDUCTION TARGETS	2030	2040
Stationary emissions	41%	74%
Transportation emissions	47%	75%
Solid waste emissions	32%	54%
Water supply emissions	<1%	<1%
Industrial process emissions	23%	56%



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 emission factors 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 capture and storage, as called out in the mitigation strategies. Detailed estimates for the potential of these solutions will develop as international best practices are tested.

*The linear pathway depicts a straight line to carbon neutrality and serves as a guide as San Antonio implements this plan and tracks progress. Implementation requires that current science is continually evaluated, such as demonstrated in the IPCC's Special Report: Global Warming of 1.5°C. (see diagram on p.64).

Carbon Neutral Target
San Antonio's carbon neutral target reflects a 100% reduction in emissions by 2050 as compared to a 2016 baseline. Approximately 12% of this required reduction will need to be met with currently unproven technologies or policies and/or negative emissions solutions including carbon capture and storage.

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HOW WILL SAN ANTONIO REDUCE GHG EMISSIONS?

Six Community Mitigation Strategy groupings were identified as priorities through the SA Climate Ready planning process. They are: Increase Carbon-Free Energy; Reduce Building Energy Consumption; Reduce Tranportation Energy; Advance the Circular Economy; Promote Biodiversity and Healthy Ecosystems; and, Educate & Empower. Within each of these six groupings, specific strategies are listed, and are further detailed on pages 34-39.

For each strategy, implementation partners are identified as well as whether the strategy could be implemented in the near or long-term. Other values, or co-benefits, of each strategy are also identified and include: air quality, natural capital/ecosystem services, quality jobs, health outcomes and affordability. Additionally, potential constraints to strategy implementation are identified, as well as if the strategy is found in other city plans.

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. In partnership with CPS Energy, San Antonio will focus on a transition from fossil fuel energy sources to a less carbon intensive portfolio.

2. Reduce Building Energy Consumption

Reducing the energy consumption of our buildings will reduce the need for energy generated by high-carbon sources. This strategy goes hand-in-hand with transitioning to carbon free energy.

3. Reduce Transportation Energy Consumption

More than one-third of San Antonio's GHG emissions come from our transportation systems. To reduce GHG emissions from our transportation system, San Antonio will need to utilize smart initiatives, including promotion of cleaner vehicles and reducing vehicle miles traveled, by transforming how we develop our communities and how people get around.

4. Advance the Circular Economy

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 measures that reduce consumption, minimize waste, and encourage material reuse. Together these strategies will work to reduce the greenhouse gases emitted by the waste stream and landfills.

5. Promote Biodiversity and Healthy Ecosystems

Healthy, properly functioning natural ecosystems can absorb emissions. In addition to protecting and preserving existing natural ecosystems, these strategies promote the development of solutions to mimic natural responses.

6. Educate & Empower

Educating residents and businesses about climate action as well as enabling San Antonians to make behavorial and technological changes is an essential element of reducing Greenhouse Gas emissions. This can be accomplished through policy, training, incentives, financing, and tracking.

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COMMUNITY MITIGATION STRATEGIES

LEGEND

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

Constraints
- A Awareness
- BC Behavior Change
- I Investment
- P Policy
- T Technology

In Current City Plan*
- Y Yes

*Strategy is listed in current City of San Antonio or partner agency plan.

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

		STRATEGIES	LEAD / PARTNER AGENCY	PHASE	GHG	CONSTRAINTS	IN PLAN	AQ	NC	QJ	H	A
INCREASE CARBON-FREE ENERGY	1	REDUCE THE CARBON INTENSITY OF SAN ANTONIO'S ENERGY SUPPLY Work with CPS Energy on the implementation of their "Flexible Path" to drive towards carbon neutrality by 2050.	CPS ENERGY Office of Sustainability, Finance Department	NT	H	I, P, T	Y	✓		✓	✓	✓
	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	I	Y	✓	✓	✓	✓	✓
	3	FUEL SWITCHING As evolving technologies becomes increasingly economical and efficient, promote and incentivize the use of cleaner fuel sources for existing buildings, including industrial process applications.	CPS ENERGY	LT	L-M	I, BC		✓	✓	✓	✓	
REDUCE BUILDING ENERGY CONSUMPTION	4	COMMERCIAL & MULTIFAMILY BENCHMARKING & DISCLOSURE ORDINANCE Through a diverse stakeholder process, consider a benchmarking and disclosure ordinance for large commercial, industrial, and multifamily buildings (above 50,000 sq. ft.). The initial phase should include a voluntary pilot or accelerator program for leading property owners.	OFFICE OF SUSTAINABILITY Development Services Department, CPS Energy, SA 2030 District	NT	L-M	I, P	Y	✓		✓		✓
	5	COMMERCIAL AND RESIDENTIAL ENERGY AND WATER RATING SYSTEM Thorough and diverse stakeholder process and to inform owners, builders, renters, and potential buyers, develop and pilot an energy and water rating system for commercial and residential properties.	OFFICE OF SUSTAINABILITY SAWS, CPS Energy	LT	L	I, P		✓			✓	✓
	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, taking into consideration technical and economic feasibility.	DEVELOPMENT SERVICES DEPARTMENT Office of Sustainability, Office of Historic Preservation	LT	H	I, P	Y	✓		✓		✓
	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.	CPS ENERGY Office of Historic Preservation, Office of Sustainability, Build San Antonio Green, San Antonio 2030 District	NT	M	A, BC, I, P	Y	✓		✓	✓	✓
	8	REDUCE WATER CONSUMPTION Support efforts to continue reduction of San Antonio's total per capita water consumption in alignment with the SAWS Water Management Plan.[39]	SAWS SARA	LT	L	A, BC, I	Y	✓	✓			✓
REDUCE TRANSPORTATION ENERGY CONSUMPTION	9	CLEANER AND MORE EFFICIENT VEHICLE TECHNOLOGIES Encourage the accelerated adoption of and transition to clean and more efficient vehicle technologies for personal vehicles, trucks, transit, and freight.	OFFICE OF SUSTAINABILITY Building & Equipment Services, Office of Management & Budget, Purchasing, CPS Energy	NT	H	BC, I, T	Y	✓			✓	
	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	I, P, BC	Y	✓			✓	
	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, Center City Development & Operations, Office of Innovation	LT	L-M	I, P, BC	Y	✓	✓		✓	✓
	12	SUSTAINABLE LAND PLANNING AND DEVELOPMENT Support and incentivize the development and redevelopment of more compact, connected, cost-effective, and resilient neighborhoods and districts.	PLANNING DEPARTMENT Transportation & Capital Improvements, Neighborhood & Housing Services, Office of Sustainability	LT	L-M	I, P	Y	✓	✓		✓	✓
	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	A, T, P	Y	✓		✓		✓

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

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COMMUNITY
MITIGATION STRATEGIES
CONTINUED

LEGEND

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

Constraints
- A Awareness
- BC Behavior Change
- I Investment
- P Policy
- T Technology

In Current City Plan*
- Y Yes

*Strategy is listed in current City of San Antonio or partner agency plan.

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

		STRATEGIES	LEAD / PARTNER AGENCY	PHASE	GHG	CONSTRAINTS	IN PLAN	AQ	NC	QJ	H	A
ADVANCE THE CIRCULAR ECONOMY	14	COMMERCIAL WASTE REDUCTION Building on the City of San Antonio Solid Waste Management Department's ReWorksSA Program,[40] continue to reduce landfilled commercial waste.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability	LT	L-M	I, BC	Y	✓	✓	✓	✓	✓
	15	RESIDENTIAL WASTE REDUCTION Continue to reduce landfilled residential waste with the goal to become a zero-waste community.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability	NT	L-M	BC, I, T	Y	✓	✓	✓	✓	✓
	16	ORGANICS DIVERSION Accelerate the diversion of organics from landfills to the highest and best use opportunities and ensure low-carbon composting solutions.	**SOLID WASTE MANAGEMENT DEPARTMENT** Office of Sustainability	NT	M	BC, I, T	Y		✓	✓	✓	
	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.	**OFFICE OF SUSTAINABILITY** Solid Waste Management Department, Office of Innovation, Economic Development Department, Office of Historic Preservation	LT	L	BC, I, T				✓		✓
	18	REDUCED-LANDFILL CONSTRUCTION Building on CoSA's Deconstruction Pilot Program,[41] accelerate the acceptance of low-waste construction projects through education, incentives, and partnerships, continue to pursue zero-landfill waste practices for all construction projects.	**OFFICE OF SUSTAINABILITY** Solid Waste Management Department, Office of Historic Preservation	LT	L	I, P	Y			✓		✓
PROMOTE BIODIVERSITY AND HEALTHY ECOSYSTEMS	19	CARBON CAPTURE AND STORAGE Develop and implement a plan for carbon capture and storage that takes advantage of all available solutions including increasing plant material, restoring the soil landscape, increasing the use of Green Infrastructure, including increasing the tree canopy, enhancing wetlands, and implementing technological solutions that also support biodiversity and the regeneration of native species and ecosystems.	**OFFICE OF SUSTAINABILITY** San Antonio River Authority, Green Spaces Alliance of South Texas, UTSA	LT	M	I, P, T	Y	✓	✓		✓	
	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 and ecosystems.	**OFFICE OF SUSTAINABILITY** Office of Emergency Management, San Antonio Metropolitan Health District, Planning, Development Services Department, Neighborhood & Housing Services, Parks & Recreation, SARA	NT	M	I, P	Y	✓	✓		✓	✓
	21	ECOLOGICAL PLANNING AND CLIMATE SENSITIVE DESIGN Integrate climate mitigation and adaptation into existing land development review and permitting processes with a goal of maximizing the benefits of natural geographic and watershed features.	**DEVELOPMENT SERVICES DEPARTMENT** Office of Sustainability, Office of Historic Preservation	NT	L-M	P	Y		✓	✓	✓	
EDUCATE AND EMPOWER	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	I, BC	Y	✓	✓	✓	✓	✓
	23	SA TOMORROW PLANS Fund, track, and achieve the goals of the SA Tomorrow Sustainability, Comprehensive, and Multi-Modal Transportation Plans,[42] specifically the portions of those plans offering significant mitigation and adaptation opportunities.	**PLANNING, TRANSPORTATION & CAPITAL IMPROVEMENTS, OFFICE OF SUSTAINABILITY, CITY MANAGER'S OFFICE, OFFICE OF MANAGEMENT & BUDGET, VIA**	NT	M	I, P	Y	✓	✓	✓	✓	✓
	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	I, P	Y	✓	✓	✓	✓	
	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	P	Y	✓			✓	✓
	26	GHG REDUCTION QUANTIFICATION Complete a comprehensive scope 3 or consumption-based assessment for San Antonio's community sector.	**OFFICE OF SUSTAINABILITY**	NT		I		✓	✓	✓	✓	
	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		I	Y	✓	✓		✓	
	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	P	Y	✓		✓	✓	✓

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MUNICIPAL MITIGATION STRATEGIES

San Antonio's municipal government will take the lead on GHG mitigation efforts within the City. While 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 implementing them in the broader community. The City of San Antonio commits to a greener and more efficient government to benefit all San Antonians and will continue to strive for excellence through implementation of City plans, including the SA Tomorrow Sustainability, Comprehensive and Multi-Modal Transportation Plans.

LEGEND

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

Constraints
- **A** Awareness
- **BC** Behavior Change
- **I** Investment
- **P** Policy
- **T** Technology

In Current City Plan*
- **Y** Yes

*Strategy is listed in current City of San Antonio or partner agency plan.

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

		STRATEGIES	LEAD DEPARTMENTS	PHASE	GHG	CONSTRAINTS	IN PLAN	AQ	NC	QJ	H	A
REDUCE BUILDING ENERGY CONSUMPTION	M1	BENCHMARKING AND PUBLIC DISCLOSURE OF BUILDING ENERGY CONSUMPTION Benchmark and publicly disclose building energy and water use for municipal buildings.	Office of Sustainability, Finance Department	NT	L	P	Y	✓			✓	
	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	P	Y	✓			✓	✓
	M3	ZERO NET ENERGY BUILDINGS Achieve ZNE for all municipal buildings by 2040.	Transportation & Capital Improvements, Office of Sustainability	LT	H	I, P	Y	✓		✓	✓	✓
	M4	COOL/GREEN ROOFS Install cool or green roofs on municipal government buildings, as appropriate.	Transportation & Capital Improvements	LT	L	I, P	Y	✓	✓	✓	✓	✓
REDUCE TRANSPORTATION ENERGY CONSUMPTION	M5	STREETLIGHT CONVERSION Convert all streetlights to LEDs with daylight sensors by 2021 and implement the recomendations of the Urban Lighting Master Plan.	Finance Department, CPS Energy	NT	L	I	Y			✓		✓
	M6	CLEANER AND MORE EFFICIENT VEHICLE TECHNOLOGIES Convert all fleet passenger vehicles and small trucks to more efficient options by 2025, with a priority on electrification based on recommendations of the Electric Fleet Conversion and Infrastructure Study, currently in development. Additionally, research and pilot the electrification of heavy trucks.	Office of Sustainability, Building and Equipment Services, Solid Waste Management Department, Transportation & Capital Improvement	NT	H	I	Y	✓			✓	
	M7	TRANSPORTATION DEMAND MANAGEMENT Reduce the GHG impact of employee commuting.	SA Metro Health District, Transportation & Capital Improvements, Human Services	NT	L-H	I, P, BC	Y	✓		✓	✓	✓
	M8	AIRPORT ACCREDITATION Consider pursuing and achieving Airport Carbon Accreditation.	Aviation	LT	H	I		✓			✓	
ADVANCE THE CIRCULAR ECONOMY	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 as well as consideration of City investments.	City Manager's Office, Mayor and City Council, Office of Management & Budget, Office of Sustainability	NT	L	P, BC	Y	✓	✓	✓	✓	✓
	M10	ENVIRONMENTALLY PREFERABLE PURCHASING Update the City's green purchasing policy to consider the life cycle impacts when choosing products.	Finance Department	LT	L	P	Y			✓	✓	
	M11	GREEN SPECIFICATIONS Reduce the GHG impact of materials specified in public works and roadway projects.	Transportation & Capital Improvements, Finance Department	NT	L	P	Y	✓		✓		
	M12	ZERO WASTE Strive to 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	BC	Y	✓	✓		✓	✓
EDUCATE & ENABLE	M13	GHG EDUCATION Develop and implement a comprehensive sustainability and GHG education program for municipal employees.	Office of Sustainability	NT	L	BC	Y	✓	✓	✓		

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In recent decades, changes in climate have caused impacts on natural and human sytems 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."[43]

- IPCC 5th Assessment Report, 2014

ADAPTATION: PREPARING FOR A CHANGING CLIMATE

Our climate is becoming not only more extreme, but unpredictable from climate change. Projections show that 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 with an increased risk of severe flooding. 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 Vulnerability and Risk Assessment completed as part of the CAAP identifies 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 to vulnerable groups from heatwaves**
2. **Increased impacts from high ozone concentrations**
3. **Increased infrastructure damage from wildfires**

MEDIUM RISKS

4. **Increased injury and mortality at low water crossings**
5. **Increased exposure and risk of injury to vulnerable groups from precipitation**
6. **Increased infrastructure damage from precipitation**
7. **Increased occurrence of vector-borne diseases**
8. **Increased need for waste and debris management**
9. **Reduced local food security from reduced production**
10. **Reduced abundance and health of native species and ecosystems**
11. **Increased mobility disruption for residents and City staff**
12. **Increased need for emergency management resources**

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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 rise, 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 impacts, while higher global GHG emissions will 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. 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 lessen the associated potential risks. Without adaptation actions to improve our resilience to these impacts, "climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century."[44]

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 rise than those who have air conditioning in their homes, cars, and workplaces.

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 increased resilience by focusing on the actions needed to mitigate the twelve climate-related priority risks identified in the Vulnerability and Risk Assessment. The Vulnerability & Risk Assessment is available online at www.saclimateready.org under Resources in the Document Library.

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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 investing in mitigation and adaption actions today will help to reduce the cost and severity of future impacts.

1. Increased Health Risks from Heat Exposure

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,[45] which may translate to a 9% to 20% increase in the death rate for elderly populations in San Antonio. Across the Southern Plains (Texas, Oklahoma, and Nebraska), and under a high emissions scenario, lost wages and premature deaths will result in economic impacts of $28 billion and $19 billion per year respectively by 2090.[46]

2. Ozone and Human Health

Exposure to 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.[47] For Bexar County, studies show that marginal nonattainment of ozone levels above the current National Ambient Air Quality Standard (NAAQS), which is Bexar County's current status, result in 19 additional deaths annually, with an associated cost of $170 million.[48] Beyond 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.[49]

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[50] region. Climate models show that these types of wildfire events could become more common in our region.

We don't often think of wildfire threat as significant to San Antonio, but between 2007 and 2014, the City experienced 83 wildfire events – averaging nine events and costing $27,778 per year. Two recent wildfires in 2011 and 2014 resulted in approximately $250,000 (2014 USD) in property damage.[51] Within our metropolitan area, it is estimated that there are 15,649 homes in areas of high wildfire risk[52] 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.

4. Impact on Infrastructure

Projected climate impacts to infrastructure in the Southern Plains, such as rail and urban drainage, are among the highest of all regions. Increases in electricity costs to meet projected increases in demand in the Southern Plains are high, rising from $0.57 billion per year in 2050 to $1.7 billion per year by 2090 under high emissions scenarios.[53]

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ADAPTATION STRATEGIES

LEGEND

RISK	Benefits	LEAD & PARTNER AGENCIES	Initiation Phase
This column is linked to the risks listed on page 41.	👍 = Yes	**LEAD** Agency leading the initiative Partner Agencies supporting the initiative.	**NT** Near-term (initiated by 2021) **LT** Long-term

		STRATEGIES	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 Work with responsible parties to ensure that they identify and undertake critical infrastructure (transportation, building, IT and telecoms, utilities sectors) risk assessments once updated flood plains are available 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	LT
	3	HEAT RISK ASSESSMENT Undertake risk assessment for managing the impacts of extreme heat with a focus on low-income, 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 Once FEMA floodplains are updated using Atlas 14[54] rainfall intensity values, undertake a prioritized assessment of flood resilience options for all low-lying roadways.	4	Extreme Precipitation Heatwaves		**TRANSPORTATION & CAPITAL IMPROVEMENTS**	NT
	5	PROTECT TRANSIT RIDERS Work with VIA to assess public transportation routes, stops, and associated infrastructure and identify potential shelter improvements to prepare for extreme weather events.	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 and consider future extreme precipitation levels. Atlas 14 rainfall intensity values were codified in April 2019. FEMA floodplains will be updated between 2020 and 2023.	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 a 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	LT
	10	FLOOD-PROOF CRITICAL INFRASTRUCTURE Work with responsible parties to 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 and also incorporating future climate projections. Atlas 14 rainfall intensity values were codified in April 2019. FEMA floodplains will be updated between 2020 and 2023.	4, 5, 6, 11, 12	Extreme Precipitation	👍	**OFFICE OF SUSTAINABILITY** Transportation & Capital Improvements, CPS Energy, SAWS, SARA, VIA, Neighborhood & Housing Services	LT
	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, SARA	LT
	12	PRODUCE A CLIMATE HERITAGE STRATEGIC PLAN Develop guidelines for determining the appropriate treatments of cultural sites 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 peergroups 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** Office of Sustainability	NT

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ADAPTATION STRATEGIES

LEGEND

RISK	Benefits	LEAD & PARTNER OFFICES	Initiation Phase
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		STRATEGIES	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**	LT
	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. Identify priority locations to pilot Resiliance Hubs.	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**	LT
	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 and other extreme weather events.	11	Extreme Precipitation		**TRANSPORTATION & CAPITAL IMPROVEMENTS** VIA Metropolitian Transit	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 Department	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 & 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 and 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, and further develop Best Management Practices (BMPs). Consideration should be given to avoid potential disruption to critical infrastructure, such as overhead power lines.	1	Various (all)	👍	**PARKS & RECREATION** Development Services Department, SARA	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** Development Services Department, SARA, Alamo Area Monarch Collaborative, Texas Parks & Wildlife	LT

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ADAPTATION STRATEGIES

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RISK	Benefits	LEAD & PARTNER OFFICES	Initiation Phase
This column is linked to the risks on listed on page 41.	👍 = Yes	**LEAD** Agency leading the initiative Partner Agency(ies) supporting the initiative.	**NT** Near-term (by 2021) **LT** Long-term

		STRATEGIES	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 to which food supply chain is resilient (SA Tomorrow, FS5, FS6).	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. Green Spaces Alliance of South Texas, San Antonio Food Bank	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, Development Services Department	LT
INCREASE RESILIENCEY AWARENESS & 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

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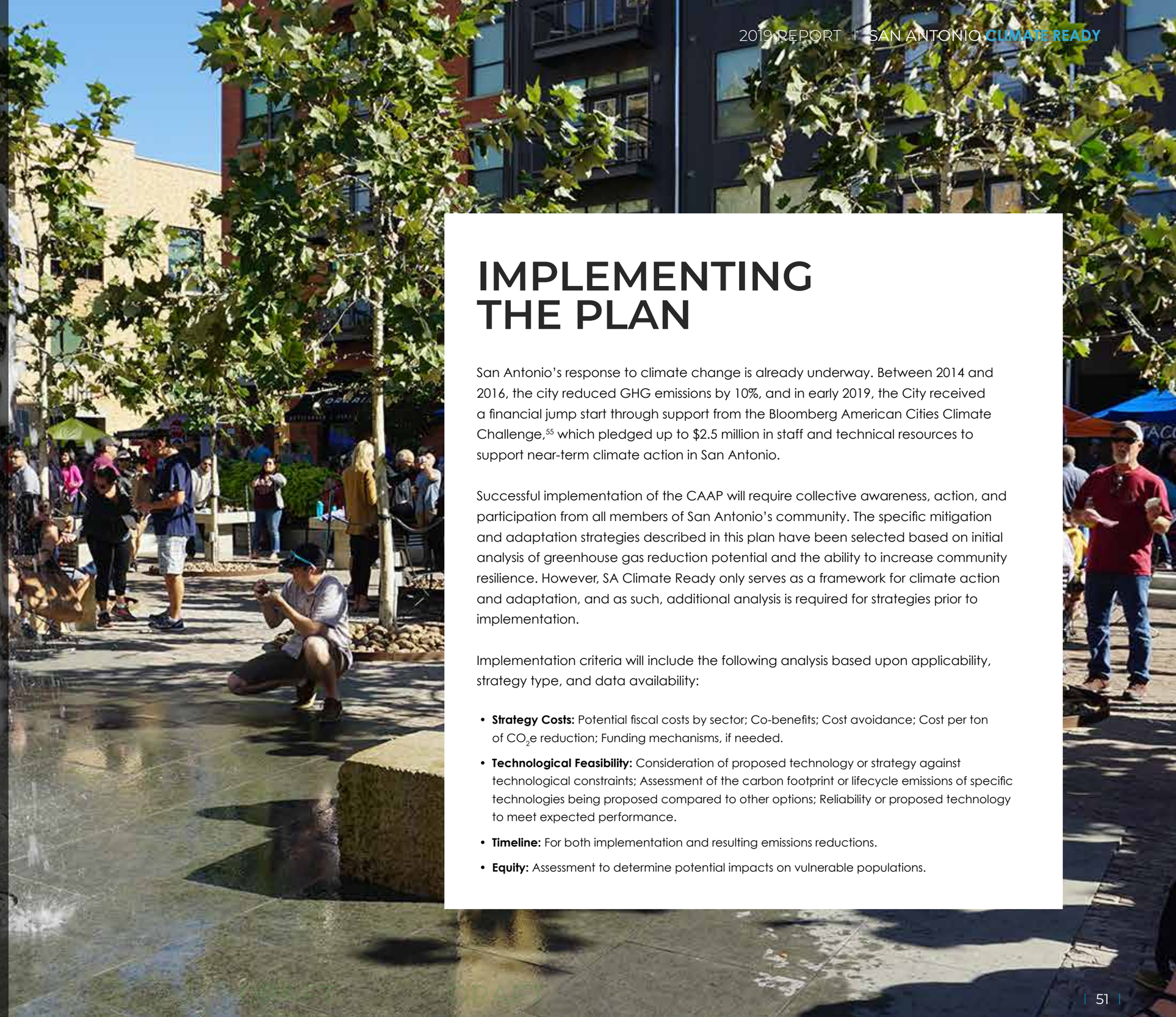
Both climate action and adaptation demand the collective commitment of the entire community.



IMPLEMENTING THE PLAN

San Antonio's response to climate change is already underway. Between 2014 and 2016, the city reduced GHG emissions by 10%, and in early 2019, the City received a financial jump start through support from the Bloomberg American Cities Climate Challenge,[55] which pledged up to $2.5 million in staff and technical resources to support near-term climate action in San Antonio.

Successful implementation of the CAAP will require collective awareness, action, and participation from all members of San Antonio's community. The specific mitigation and adaptation strategies described in this plan have been selected based on initial analysis of greenhouse gas reduction potential and the ability to increase community resilience. However, SA Climate Ready only serves as a framework for climate action and adaptation, and as such, additional analysis is required for strategies prior to implementation.

Implementation criteria will include the following analysis based upon applicability, strategy type, and data availability:

- **Strategy Costs:** Potential fiscal costs by sector; Co-benefits; Cost avoidance; Cost per ton of CO_2e reduction; Funding mechanisms, if needed.
- **Technological Feasibility:** Consideration of proposed technology or strategy against technological constraints; Assessment of the carbon footprint or lifecycle emissions of specific technologies being proposed compared to other options; Reliability or proposed technology to meet expected performance.
- **Timeline:** For both implementation and resulting emissions reductions.
- **Equity:** Assessment to determine potential impacts on vulnerable populations.

IMPLEMENTATION PROCESS

Implementation of the SA Climate Ready Plan will follow a specific process. Prior to implementation, any ordinance, rule, regulation or policy will be reviewed, and approved, if required, by the City Council after providing sufficient opportunities for stakeholders and the general public to review such policy or regulation. This plan will be reassessed and updated every three to five years from the adoption date, taking into account new science and local context, updated costs and benefits, and community priorities to ensure that San Antonio has the best opportunity to achieve our shared goals of climate action and adaptation.

Key performance indicators to be tracked include total and per capita GHG emissions, GHG reduction progress by sector, and progress towards priority actions (priority actions will be highlighted 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 performance indicators into the SA Tomorrow sustainability dashboard.[56] Reporting CAAP metrics through the dashboard will ensure that decision-makers and community leaders 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 performance indicators as part of the publicly available sustainability report.
- Direct the completion of a full GHG inventory assessment every two years starting with 2018 data.

GOVERNANCE

A **CAAP Technical and Community Advisory Committee** will advise City Staff and provide input on the implementation of the CAAP as the City works to achieve greenhouse gas reduction and adaptation goals. Diverse perspectives and expertise is critical for successful implementation of the CAAP framework. At regularly scheduled public meetings, the committee will provide input regarding annual priorities and the equitable implementation and update of the CAAP. This committee will provide an annual progress report to City Council on committee activities and subcommittees may be formed as necessary.

To ensure representation of a diversity of sectors and perspectives, the CAAP Technical and Community Advisory Committee will include stakeholders who will be selected through a coordinated effort between the Office of Sustainability, the Mayor's Office, the City Manager's Office, and City Council. In general, this advisory committee composition will include:

- Representatives from lead agencies responsible for short-term priority actions.
- Key Stakeholders, including scientific and trade professionals, community influencers and neighborhood leaders, business and institutional partners, environmental representatives, and climate and social justice representatives.

The **Climate Equity Advisory Sub-Committee** will be made up of representatives from community-based organizations representing the interests of low-income populations, communities of color, and other vulnerable populations and will provide input on the implementation of the CAAP to ensure an equity-centered approach.

Specific responsibilities include:

- Bringing diverse stakeholder opinions to the table, with a specific focus on marginalized communities to ensure marginalized individuals are included in planning and decision-making.
- Piloting the Climate Equity Screening Tool, through review of implementation actions, 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 Technical and Community Advisory Committee.
- Identifying, tracking and reporting climate equity metrics.

A **CoSA CAAP Executive Team** will be established to provide strategic direction and to ensure overall organizational alignment on work related to the CAAP including execution with current and future policies, projects, programs, and budgets to maximize efficiency and accelerate outcomes.

A CoSA CAAP Delivery Team will serve as a cross-functional and interdepartmental team to manage the successful execution of the CAAP. This group will be led by the Office of Sustainability and be comprised of representatives from within the municipal government with the charge of working collaboratively on implementing the CAAP.

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 coordinate the development of 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.

In addition, CAAP goals and objectives should be considered in the development of the City of San Antonio's state and federal legislative agendas and policy positions

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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 most 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 benefits 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.

SAN ANTONIO'S COMMITMENT TO CLIMATE EQUITY

Climate change affects everyone, but not all people are impacted equally. Across the world and right here in San Antonio, many people are burdened by climate change and some experience worse outcomes to climate impacts than others. All members of our community will experience climate impacts, but the following communities are particularly vulnerable[57]:

- Communities of color
- Low-income communities
- Seniors
- People with disabilities

Marginalized communities experience heightened risk and increased sensitivity to climate change and have less capacity and fewer resources to cope with, adapt to, or recover from climate impacts. In the coming decades, we expect the projected changes in San Antonio's climate to negatively impact all residents, especially those living in heat-prone and flood-prone areas of the city and those who work outside. However, marginalized communities possess many 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
- Reduced mobility due to flooding, extreme weather, extreme heat and related impacts to transportation infrastructure
- High exposure to GHG emission sources and environmental pollution
- Lack of representation in local government
- Lack of financial means to respond to environmental and economic stresses

Equity is at the heart of our CAAP. As such, we aim to ensure San Antonio's most marginalized communities are meaningfully engaged in climate planning and implementation and that policymakers have the tools to prioritize equitable outcomes in CAAP-related decision-making.

RECOGNIZING HISTORY TO ADDRESS THE FUTURE

Government plays a key role in addressing local climate action, just as it bears some of the responsibility for driving systemic change that eliminates inequities. Understanding the historical legacies, structures, and policies that have resulted in and continue to perpetuate racial and economic inequities in San Antonio can assist in understanding why some communities are more burdened by the effects of climate change than others.

From policies in1826 that codified racial segregation in housing by restricting where black residents could live to "redlining" in the 1930's that categorized neighborhoods with high populations of African American and

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Latino residents as "definitely declining" or "hazardous" as a means to deny home loans to people living in these communities,[58] the result has been high concentrations of poverty, disinvestment, and a legacy of inequity that continues today.

In San Antonio, marginalized communities are particularly burdened due to historic and current inequities in housing, health care, education, criminal justice, jobs, and other quality-of-life outcomes that stem from decades of practices and policies that have made them particularly vulnerable to a changing climate. Specifically, housing discrimination and segregation, neglected infrastructure, and a lack of investment in public amenities, particularly in low-income neighborhoods, exemplify the structural and institutional forms of racism contributing to current inequities and increased climate vulnerabilities.

While it is important to acknowledge and address burdens faced by marginalized communities, it is also important to recognize that there is much to be learned from them, as they embody many qualities that personify what a sustainable and climate ready community is. These traits include a reliance on walking and transit, local food production, minimizing waste, smaller homes with minimal water and energy use, and a strong sense of community and social cohesion.

THE VISION: DEFINING CLIMATE EQUITY

SA Climate Ready is part of a 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.

THE CITY'S COMMITMENT

The City of San Antonio is committed to ensuring climate equity in the implementation of climate action and adaptation strategies. Prior to implementation of each strategy, key community equity stakeholders will help evaluate each strategy outlined in CAAP using the Climate Equity Screening Tool. This screening tool will allow the City to identify potential burdens to vulnerable groups, reduce and eliminate these burdens, and find opportunities to improve quality of life for vulnerable groups. This approach will ensure that the different experiences and perspectives of the San Antonians whose lives will be most impacted by climate change, will help guide decision-making around climate action and adaptation, and help identify benefits and unintended consequences.

As discussed above, the Screening Tool (pages 58-59), which will be continually refined and tested to ensure clear equity gains, is centered on five climate equity themes:

1. Access and Accessibility

Increased access to jobs, housing, transportation, funding, education, healthy foods, and clean air

2. Affordability

Lower / more predictable costs related to basic living needs (e.g. housing, food, utilities, healthcare, transportation, etc.) for marginalized communities

3. Cultural Preservation

Respecting and honoring cultural relevance & history

4. Health

Increased health (physical and mental)for vulnerable communities

5. Safety and Security

Mitigation of potential threats as well as access to critical lifelines. when (or before) threats are experienced

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IMPLEMENTING CLIMATE EQUITY: SCREENING TOOL

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 the community?		
Could this reduce urban heat island effects?		
Other considerations?		
SUMMARY:		

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METHODOLOGY

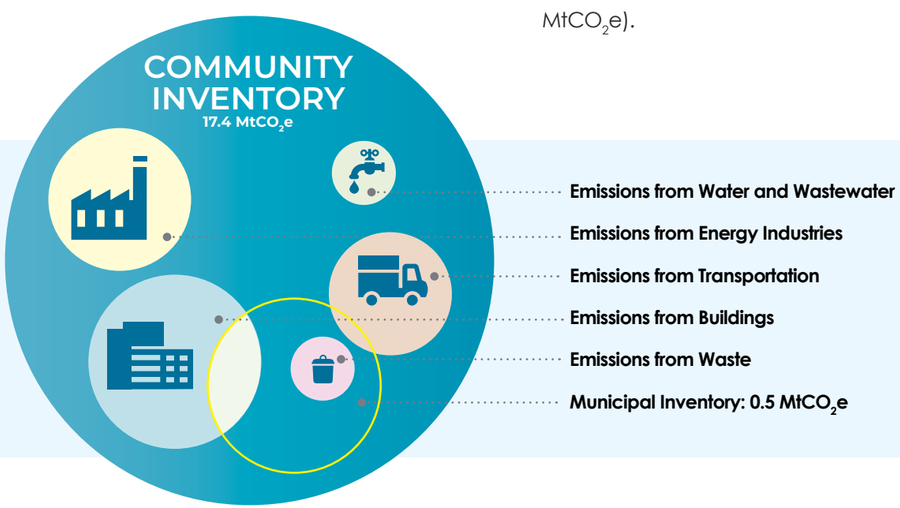
This appendix includes summaries of the various methodologies used in the development of the CAAP. In many cases, more detailed methodologies can be found in the companion reports, including the 2016 GHG Emissions Inventory, the 2018 Climate Projections for the City of San Antonio, and the 2019 Vulnerability and Risk Assessment.

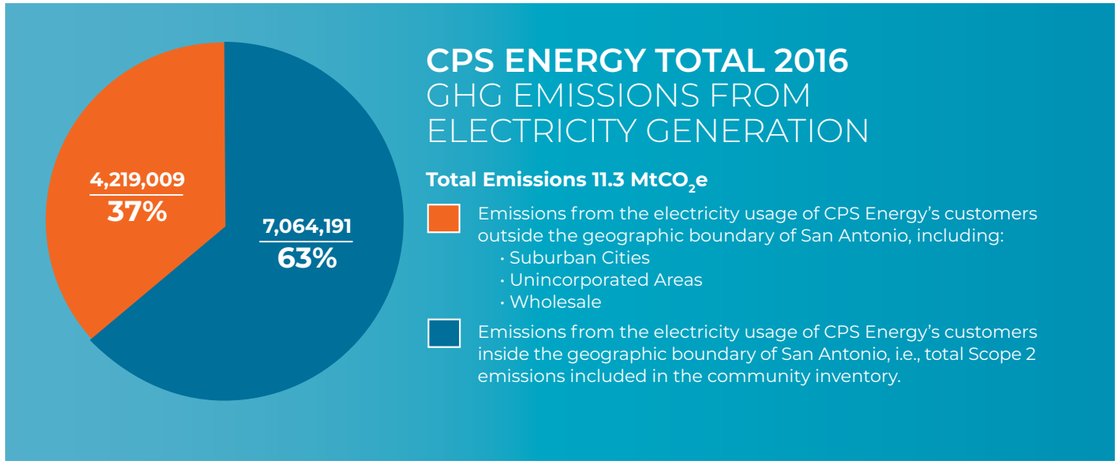
1. GHG Inventory

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 includes only 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 emissions 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),[59] 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),[60] 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 GHG 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.[61]

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 and industrial processes. The community inventory data was collected using the City Inventory Reporting and Information System (CIRIS) tool developed by C40 Cities.[62]

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 only and should not be added to the community inventory

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METHODOLOGY CONT.

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:

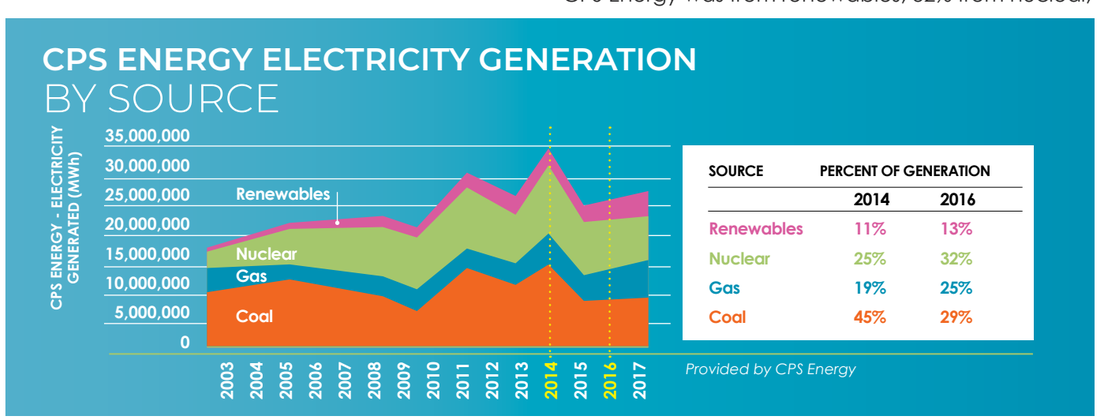
- **Carbon dioxide (CO_2)**
- **Methane (CH_4)**
- **Nitrous oxide (N_2O)**
- **Hydrofluorocarbons (HFCs)**
- **Perfluorocarbons (PFCs)**
- **Sulfur hexafluoride (SF6)**
- **Nitrogen trifluoride (NF3)**

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 (CO_2e); 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 timeframe. The standard GWP values used in the 2016 San Antonio GHG inventory are the 100-yr GWPs from the IPCC 5th Assessment report.[63]

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 the 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 CO_2 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. Business as Usual 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 one of 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 increase 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.[64]
  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

In 2018 the Intergovernmental Panel on Climate Change (IPPC) released the "Special Report: Global Warming of 1.5°C." This long awaited report, provides clarity around the global emissions reductions required to keep global warming below 1.5°C. For reduction pathways that are technically feasible currently, i.e. include no or limited overshoot of 1.5°C, the report states that "global anthropogenic CO2 emissions decline by about 45% from 2010 levels by 2030, reaching net zero around 2050," as illustrated in the 1.5°C pathway graphic on page 64. To limit global warming to below 2°C, "CO2 emissions are projected to decline by about 25% by 2030 in most pathways and reach net zero around 2070."[65]

The pathway to reach carbon neutrality can take many forms, but the science agrees on the fact that in order to limit global warming to 1.5°C or even 2°C "requires rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems."[66]

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METHODOLOGY CONT.

In response to the need for significant process, San Antonio has prioritized the most impactful strategies for action first.

4. Prioritization: GHG Mitigation Potential

GHG mitigation strategies identified by the Technical Working Groups underwent a vetting and prioritization process which included identification of the GHG reduction potential. The reduction potential was estimated for each strategy, as possible, using the Climate Action for Urban Sustainability (CURB) tool[67] 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 POTENTIAL: The CURB tool was used to estimate most of the mitigation strategies, but some could not be modeled through the tool. For those strategies, the consultant team relied on expert and stakeholder knowledge, as well as literature reviews of high-quality academic papers, industry reports, and internationally vetted estimation tools.

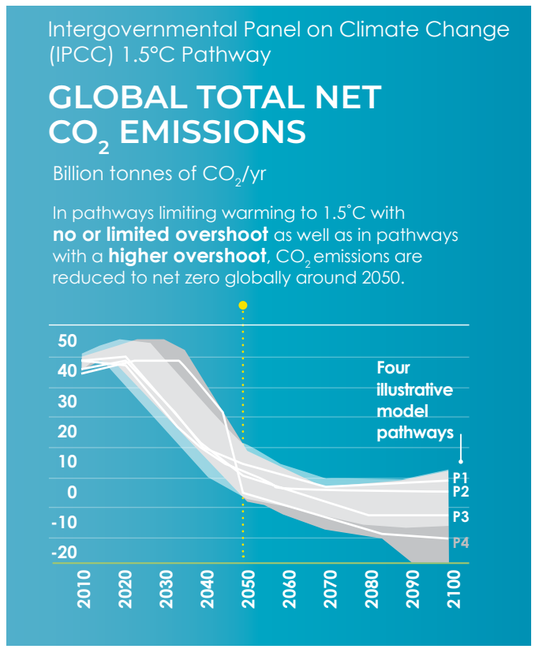
GHG reduction potential is forecasted to 2050 to support modeling of San Antonio's pathway to the carbon-neutral goal, but the longer-term estimates should be considered highly variable. It is expected that the estimates will be periodically updated as technologies, economics, and proven mitigation strategy 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 was estimated and applied to the relevant sectors.

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, 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



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 $kgCO_2e$ / 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. 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 AND PROCESS USE(IPPU)	The BAU scenario assumes that IPPU emissions experience zero growth past 2016.	The modeled GHG mitigation of the IPPU sector identifies a 50% reduction of IPPU 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.

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 neutrality was defined as no perceived correlation.

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 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?

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METHODOLOGY CONT.

- 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 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,[68] 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.[69] 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 the negative impacts of 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 a 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:

- **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.

ACKNOWLEDGMENT

On August 14, 2019, the SA Climate Ready Steering Committee convened to discuss the August 2019 Draft of the Climate Action and Adaptation Plan. At this meeting they were presented with the summary of a meeting of the five SA Climate Ready Technical Working Groups held on August 12, 2019 and asked to come to consensus on various aspects of the plan. While there was consensus on the majority of items, the following items were not agreed upon by the full committee for inclusion in the SA Climate Ready Plan.

Community Strategy # 1 - Reduce the Carbon Intensity of San Antonio's Energy Supply

- The path to carbon neutrailty should not be solely connected to the CPS Energy Flexible Path.
- CPS Energy should retire coal plants by 2025.
- CoSA should create an Energy Resource and Rate Planning Group

Community Mitigation Strategy #4 - Commercial and Multifamily Benchmarking and Disclosure Ordinance

- Change to be voluntary and utilize incentives for compliance.

Community Mitigation Strategy # 9 - Cleaner and More Efficient Vehicle Technologies

- Change to include carbon-free vehicles, electrification, and to set a target date of carbon neutrality by 2050.

San Antonio's Path to Carbon Neutrality

- Linear pathway is not aggressive enough.
- Update to be consistent with C40 Cities methodology for developed countries.
- Stationary emissions reduction target needs to be more aggressive.

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PUBLIC ENGAGEMENT SUMMARY

PHILOSOPHY AND OBJECTIVES

Building a community plan requires input from all voices in our community – gathering ideas and understanding community priorities. The CAAP process sought to bring these diverse perspectives to the table, allowing community members to shape this critical community plan.

The CAAP Public Engagement Plan set two overarching goals for community engagement:

- **Goal #1:** To engage a geographically and demographically diverse sample of San Antonians throughout the planning process with a goal to achieve demographic representation.
- **Goal #2**: To foster valuable engagement of San Antonians on climate mitigation and adaptation strategies. The CAAP is meant to create a dialogue around the issues and opportunities San Antonio faces on its path toward becoming a climate responsive and resilient community.

To achieve these goals, the Office of Sustainability employed a diversity of engagement methods throughout the plan development, including:

- Public meetings and open houses
- Social media campaigns
- Surveys
- CAAP Steering Committee and Technical Working Group meetings
- Email Notifications
- Targeted stakeholder meetings
- SA Climate Ready website (https://saclimateready.org/)

Equity and inclusion were critical priorities of the CAAP engagement approach. Through targeted engagement, the CAAP aimed to reach marginalized communities, including communities of color, residents living in or near poverty, and groups with limited English language skills. Through the support of the Urban Sustainability Directors Network (USDN), the City of San Antonio also hosted a Climate Equity Fellow, whose work focused on increasing the City's level of engagement with marginalized residents. Zip codes in City Council districts 1 through 5 were focus areas for these engagement activities based on an assessment of the Distressed Communities Index (DCI), Life Expectancy, Tree Canopy, Urban Heat Island, Flood Risk, and Race.

WHAT WE HEARD

CAAP public engagement officially kicked off on December 7, 2017 an event at the UTSA downtown campus where renowned climate scientist Dr. Katherine Hayhoe presented to 275 people. Over the course of the next year-and-a-half, the City and partners hosted more than 300 events, reached over 10,000 San Antonians, and collected over 2,800 feedback responses on the draft CAAP.

Feedback received from the community during the public engagement process was reviewed by city staff and the consultant team to ensure that the resulting CAAP represented the voice of the San Antonio community. The final survey, which asked community members to note their agreement with proposed mitigation and adaptation measures in the draft CAAP, showed at least a 70% approval rate (4 or 5-star rating given on a 5-star rating system) for all measures addressed in the survey.

Feedback was also collected from the community in the form of open comments during public events, in-person meetings, phone calls, emails, letters, surveys, and the SA Climate Ready website. Five key themes emerged from community member and stakeholder open comments on the draft CAAP.

- General support for the plan or specific topics / measures with in the plan.
- A call for the end of fossil fuels, specifically for electricity production. Most comments also mentioned a timeline of 2030 or sooner for this action.
- Concerns around the lack of detailed cost analysis, i.e. the plan not specifically stating the price tag of implementing each of the measures in the CAAP and a lack of cost analysis around the potential impacts of climate change.
- A call for emissions reductions to be prioritized and enacted as soon as possible.
- Concern about the effect of extreme weather events on the city.

Steering Committee and Technical Working Group Meetings

Steering Committee and Technical Working Group meetings were held monthly between March 2018 and December 2018. These meetings were open to the public and streamed live via Facebook, and community members were encouraged to provide public comments.

Community Events

Community events constituted the majority of CAAP engagement. Public meetings and open houses were held at libraries, community centers, schools, and other neighborhood gathering spaces. Over the course of the engagement process almost 6,000 community members attended a total of 92 community events.

Surveys

CAAP surveys were made available to the public through the SA Climate Ready website, via email, and at community engagement events in both English and Spanish.

TOTAL CAAP ENGAGEMENT

(as of May 20, 2019)

# of Business Events	# of Community Events	# of Targeted Stakeholder Events	# of Total Events to Date
48	105	201	354
# of Business Event Attendees	**# of Community Event Attendees**	**# of Targeted Stakeholder Event Attendees**	**# of Total Attendees**
541	6,412	4,465	11,418

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PUBLIC ENGAGEMENT SUMMARY

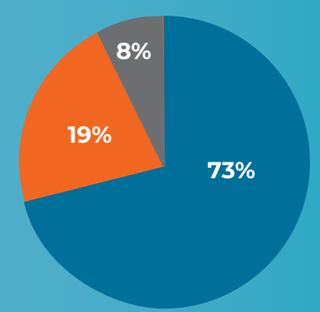
CONT.

As of August 20, 2019, a total of **6,332** surveys were completed through the CAAP process.

- Planning for All: Now & Tomorrow (1,530)
- Vision & Priorities for a Climate Ready SA (984)
- Let's Get Climate Ready (914)
- Draft Plan Feedback (2,904)

A selection of the results from these surveys is shared throughout the remainder of this Appendix.

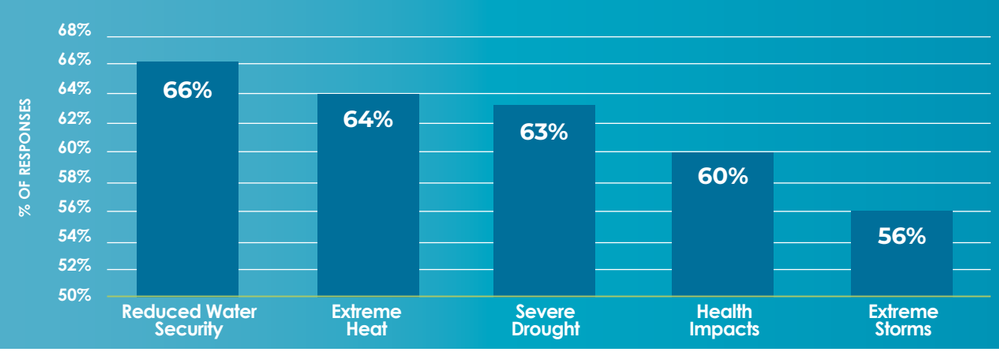
PLANNING FOR ALL: NOW & TOMORROW (1530 RESPONSES)



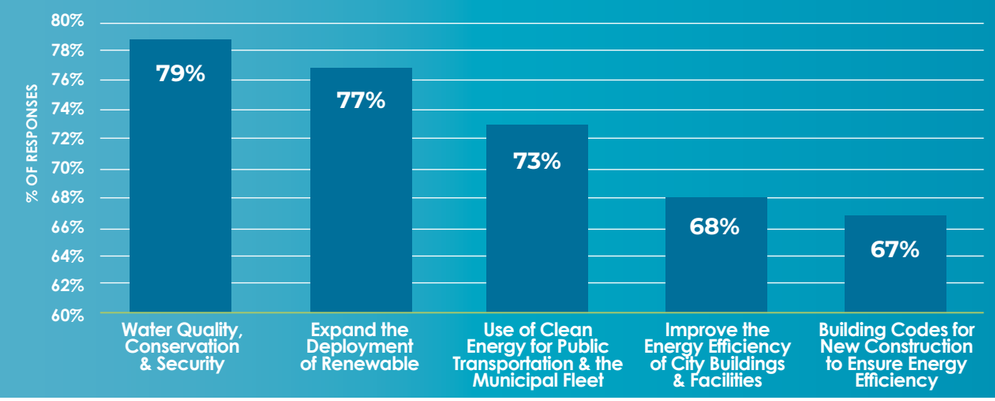
Do you agree that damage to our climate is primarily caused by human activity?

- Yes
- No
- I Don't Know

Survey respondents indicated the following areas of concern as their top five regarding damage to our climate.

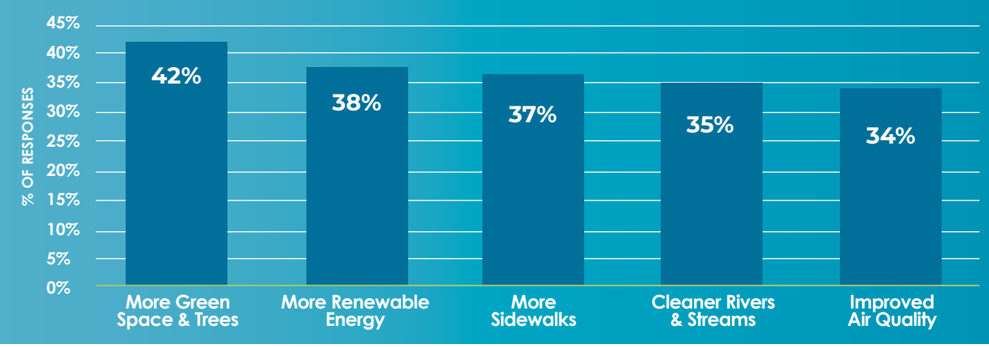


Survey respondents indicated the following actions as the top five they would support to address our damaged climate.

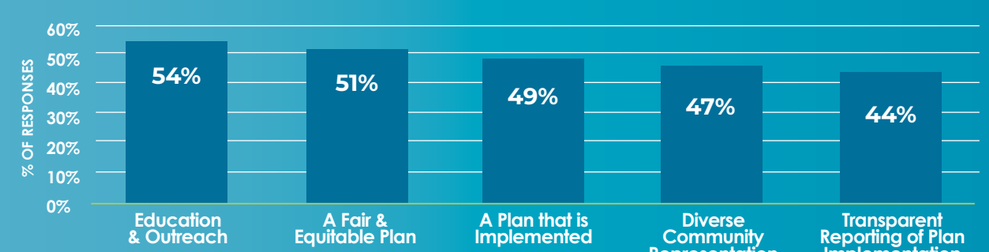


VISION & PRIORITIES: CLIMATE READY (984 RESPONSES)

Survey respondents indicated the following top five elements as part of their vision of a Climate Ready SA.



Survey respondents indicated the following top five priorities for the SA Climate Ready planning process.



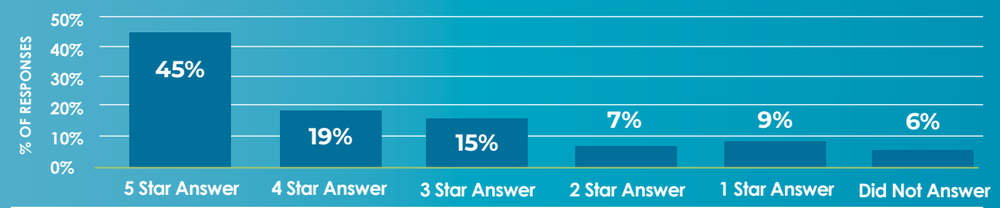
PUBLIC ENGAGEMENT SUMMARY

CONT.

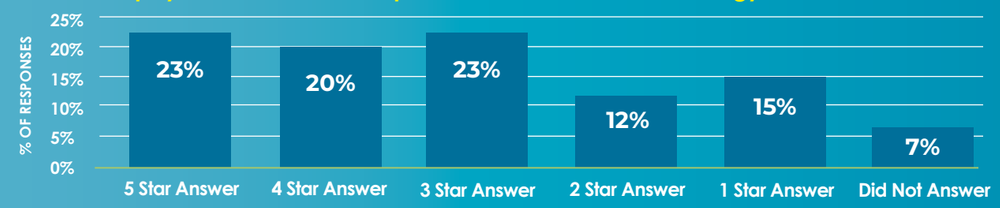
LET'S GET CLIMATE READY (914 RESPONSES)

Please rate your willingness to pay more on your utility bills to support cleaner energy for San Antonio. One star means "I am not willing at all;" 5 stars mean "I am very willing."

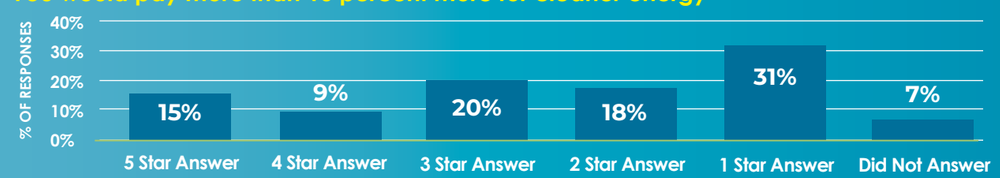
You would pay up to 5 percent more on your utility bills for cleaner energy



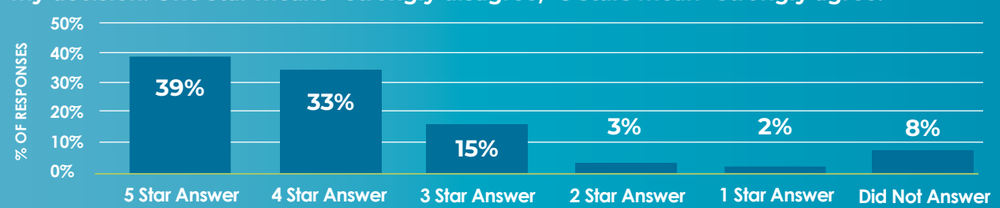
You would pay between 5 and 10 percent more for cleaner energy



You would pay more than 10 percent more for cleaner energy

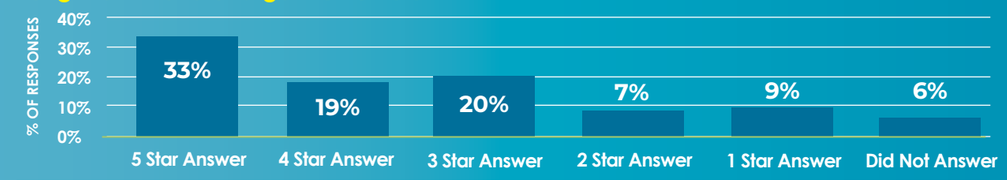


Knowing the energy and water costs before purchasing or renting a home would affect my decision. One star means "strongly disagree;" 5 stars mean "strongly agree."

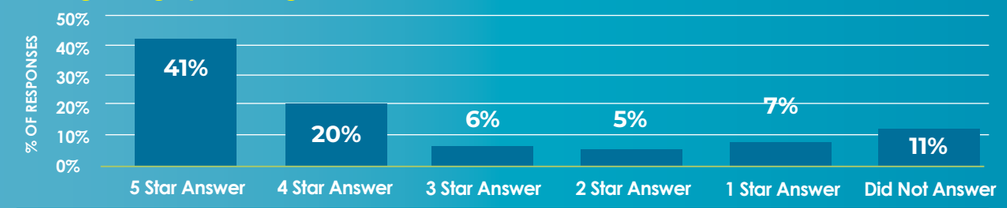


Please rate each factor in your decision to purchase or car-share an electric vehicle rather than a gas vehicle. One star means "not at all important;" 5 stars mean "very important."

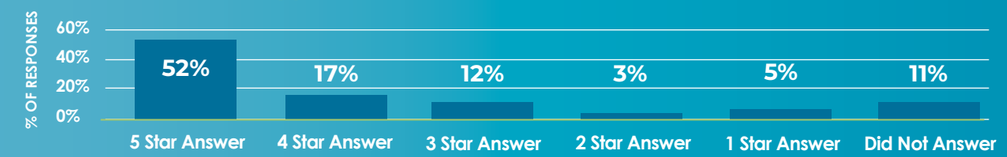
Length of time to charge the vehicle



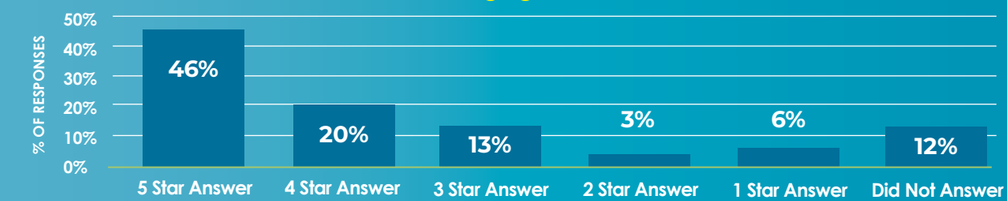
Mileage range per charge



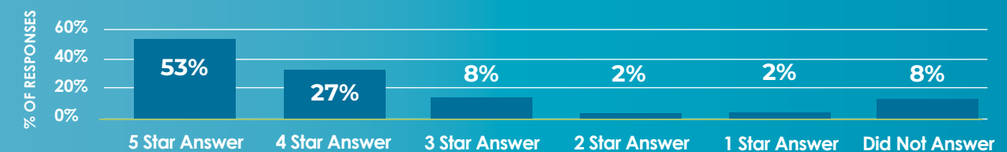
Cost of electric vehicle(s)



Number and location of available recharging stations



Equity: People who are most impacted by climate change should be included in defining solutions. One star means "strongly disagree;" 5 stars mean "strongly agree."



PUBLIC ENGAGEMENT SUMMARY

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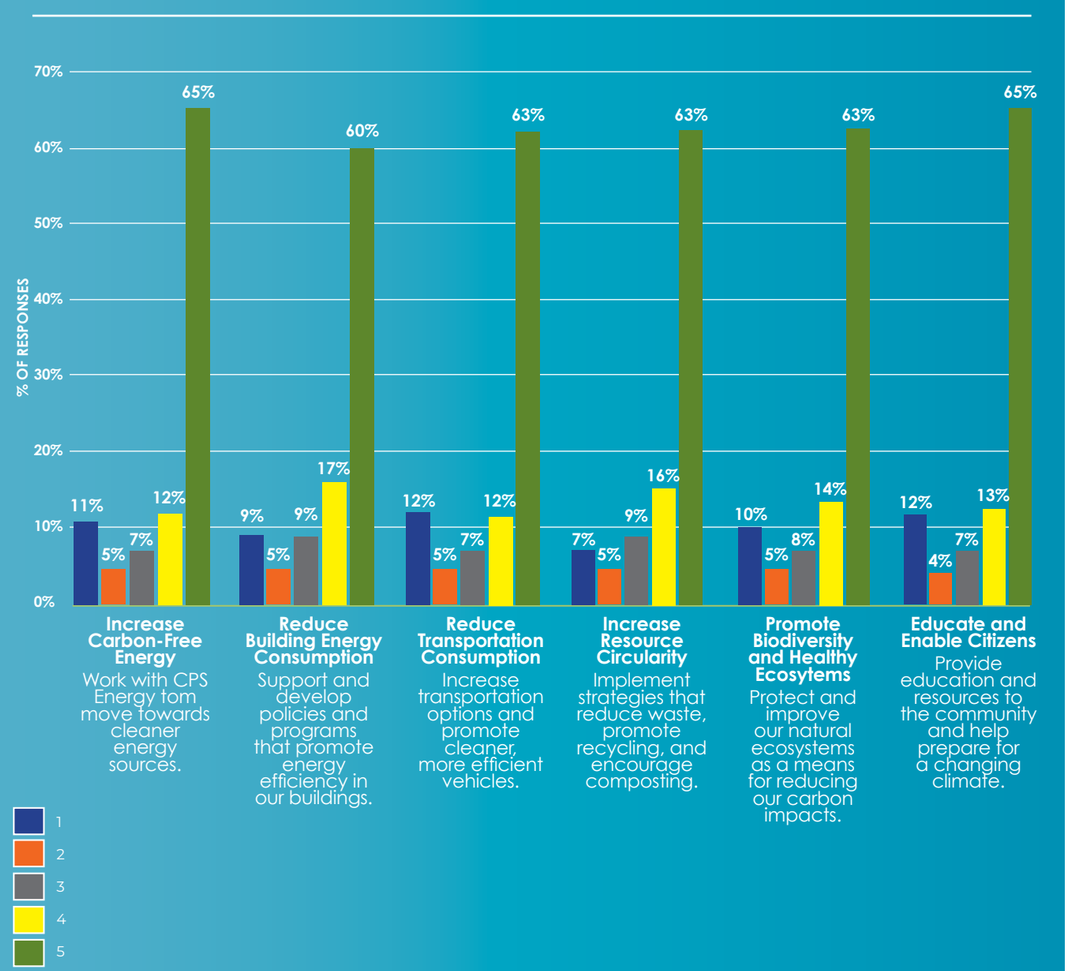
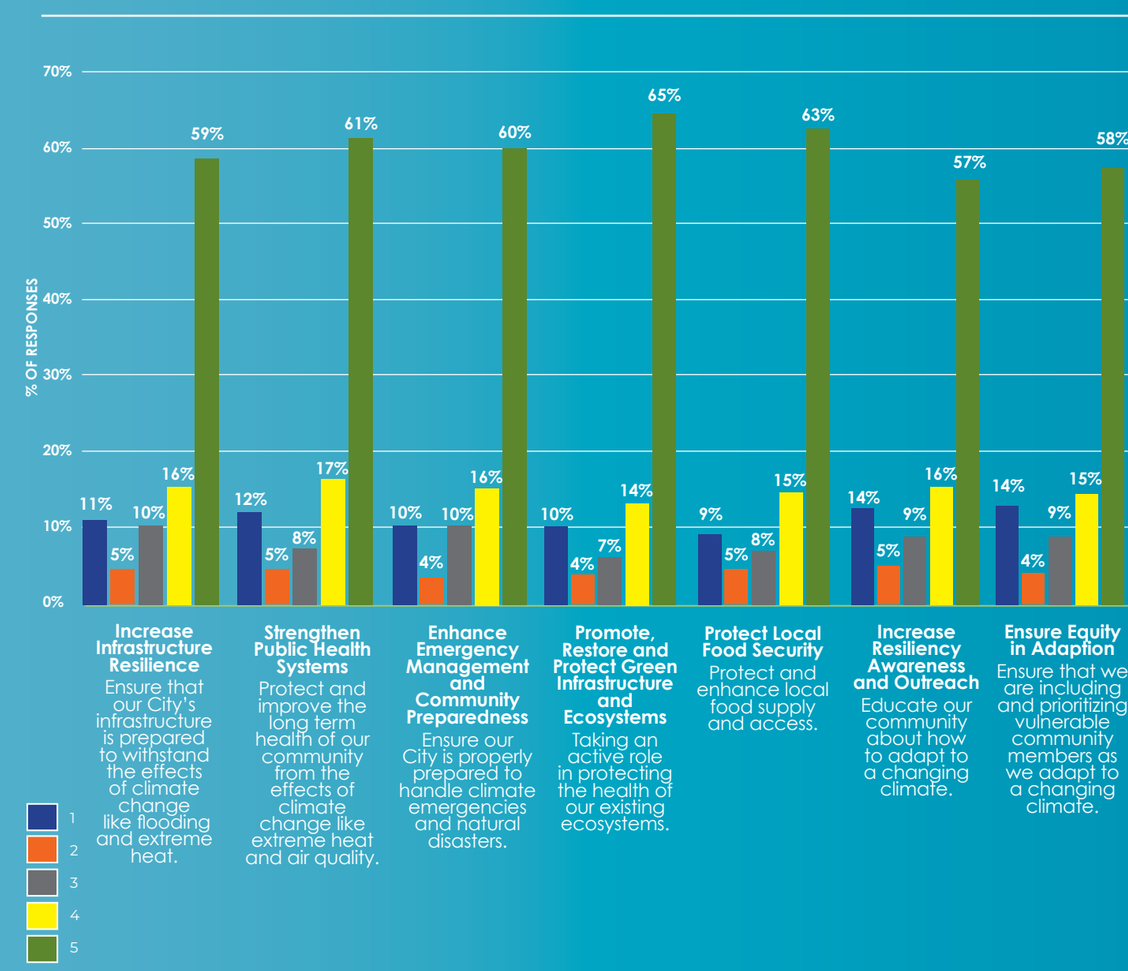
DRAFT PLAN FEEDBACK (2,303 RESPONSES)

How important do you believe it is to implement the CAAP's mitigation goals and strategies (1 being not important, 5 being very important)?



DRAFT PLAN FEEDBACK (2,303 RESPONSES)

How important do you believe it is to implement the CAAP's adaptation goals and strategies (1 being not important, 5 being very important)?



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PUBLIC ENGAGEMENT SUMMARY

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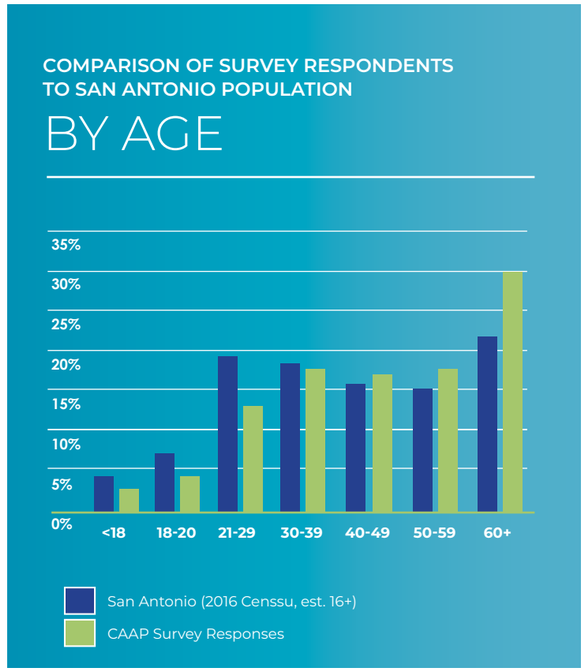
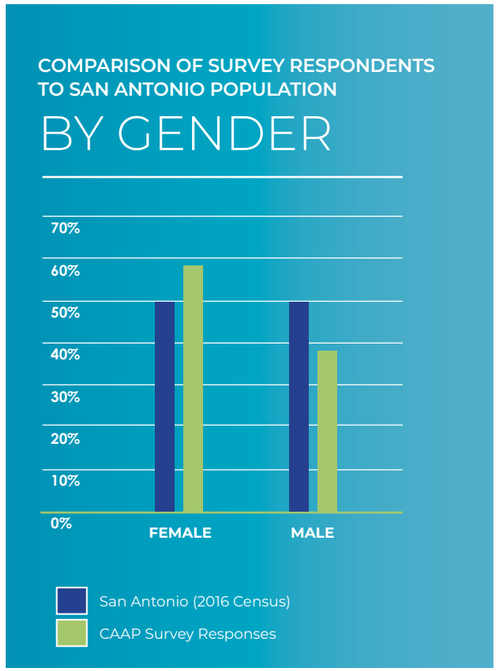
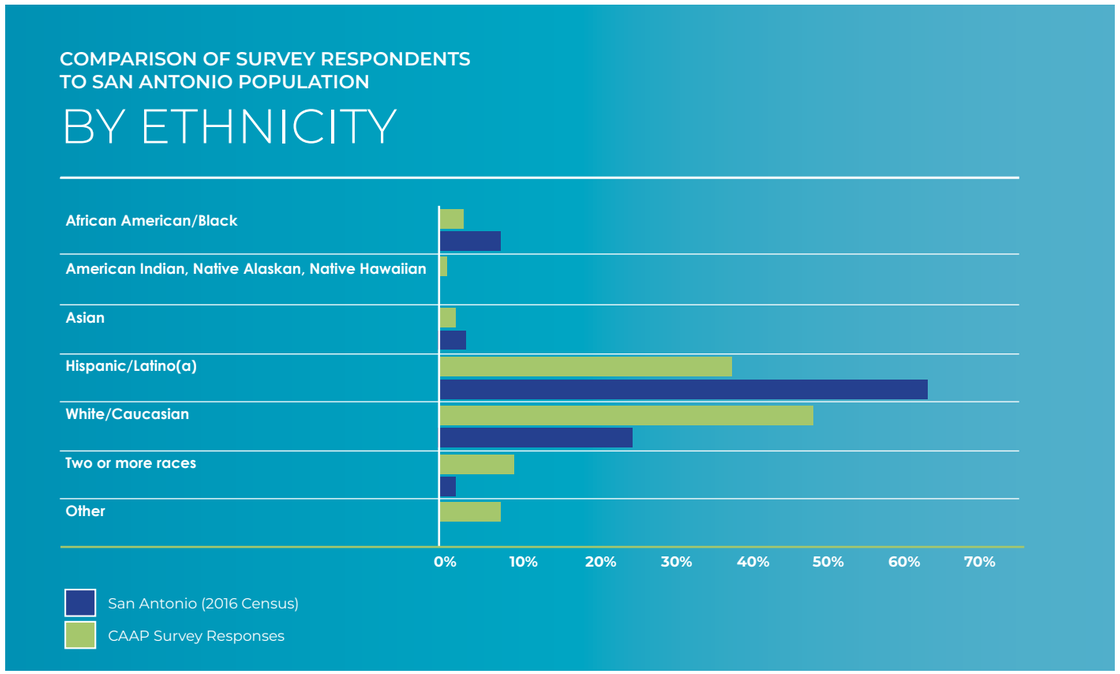
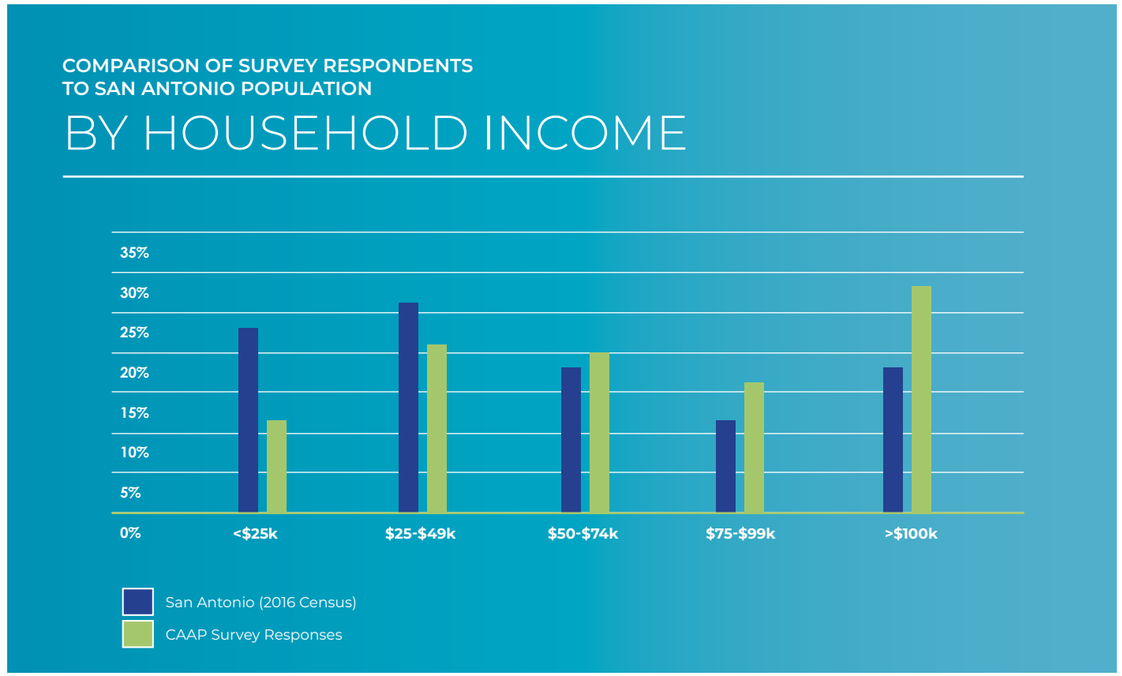
THE DEMOGRAPHICS

Demographically and geographically diverse engagement was a core goal of the CAAP stakeholder outreach process. As such, data was collected throughout the engagement process to support the Office of Sustainability in understanding what voices were successfully being collected in engagement activities and where focused activities were needed to fill gaps. No engagement process will be 100% representative of a community, but through demographic analysis the Office of Sustainability was able to secure input from a diversity of community voices. Detailed demographic data was collected for all four surveys and the demographics of the survey respondents were compared to overall demographics for the City of San Antonio through the following graphs.









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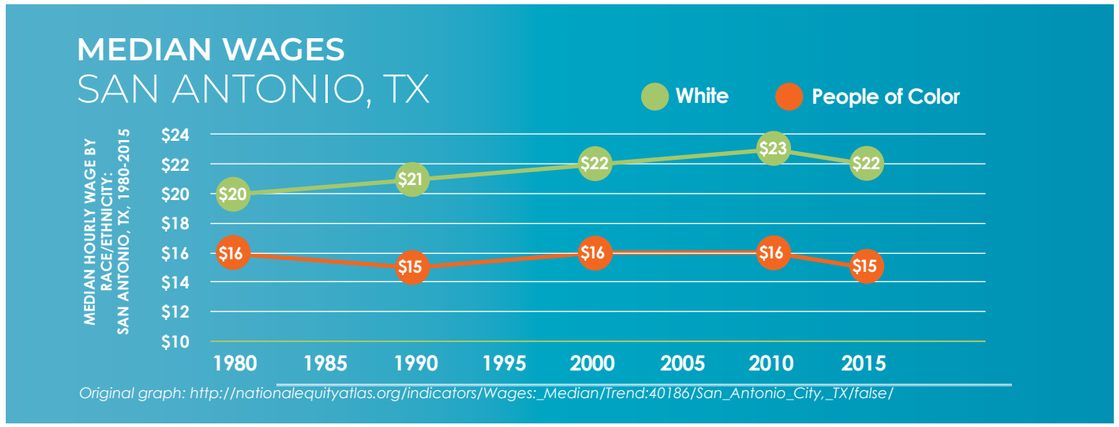
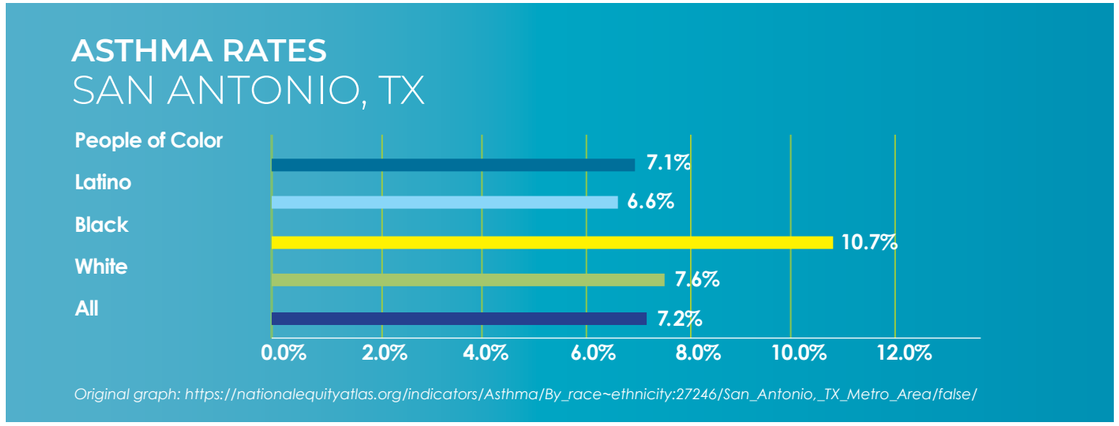
CLIMATE EQUITY INDICATORS

The extent to which marginalized communities face hardships resulting from historical inequities is not always top of mind. The following charts, from the National Equity Atlas,[70] serve as a reminder of the economic inequities experienced in San Antonio that place our marginalized communities at greater risk of climate-related impacts. Working with local climate and social equity leaders, key climate equity indicators will be identified and tracked as part of plan implementation.

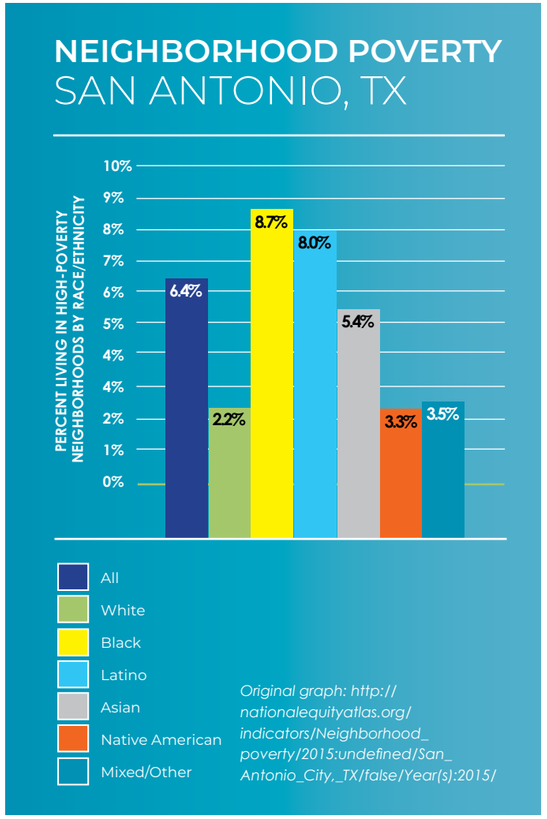


Median Wages Equitable wages would reflect differences in education, training, and experience but would not vary systematically by race. In 2015, San Antonio had a significant difference in median wages, with workers of color earning $7 less than the median hourly wage for White workers. Residents on limited incomes are more vulnerable and less able to adapt to climate change in terms of costs associated with energy, mobility, health issues, and the ability to respond to natural disasters.



Asthma Rates Many of our marginalized communities are more likely to suffer from health impacts, such as asthma, which will be exacerbated by reduced air quality as a result of a changing climate.

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."[71] 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.



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POTENTIAL MITIGATION STRATEGY DETAILS

Much of the input the community offered during the CAAP development process centered around detailed implementation opportunities, i.e. programs, incentives, and polices to deliver on the GHG reduction goals. These detailed actions were gathered from the community , as well as from best practices, and were evaluated by city staff and consultants to ensure that GHG reduction goals would be met through comprehensive strategy implementation. The tables captured in this appendix present the proposed implementation actions from this process, outlining steps for San Antonio to take in order to deliver on the mitigation goals and strategies outlined in the CAAP. As discussed in previous sections, strategies will be further evaluated prior to implementation and additional strategies may be identified in future plan updates.

IMPLEMENTATION COMMUNITY

		STRATEGIES	IMPLEMENTATION ACTIONS
Increase Carbon-Free Energy	1	Reduce the Carbon Intensity of San Antonio's Energy Supply	✔ Reduce generation from all fossil fuel sources, with an aggressive focus on eliminating coal sources. Technological, economic, and reliability variables will be evaluated. ✔ Increase the penetration of renewable or other carbon-free resources to supply a minimum of 50% of San Antonio's energy capacity by 2040 and 100% by 2050. ✔ Continue energy planning between the City, CPS Energy, key stakeholders, and the general public to ensure continued collaboration towards carbon reduction goals. ✔ Evaluate and implement 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	✔ Assess the long-term economic viability and effectiveness of alternative and increasingly cleaner fuels for existing buildings, and where optimal, propose programs that promote and incentivize their adoption and continued development. ✔ Monitor industry progress while developing ongoing education programs about the benefits of increasingly cleaner and alternative fuel technology for existing buildings.
Reduce Building Energy Consumption	4	Commercial & Multifamily Benchmarking & Disclosure Ordinance	✔ Using a robust and diverse stakeholder process, and considering data privacy, consider a phased reporting system for managing the process of energy benchmarking and disclosure. ✔ Property owners should receive support on benchmarking and reporting tools, such as EPA's Energy Star Portfolio Manager.[72]
	5	Commercial and Residential Energy and Water Rating System	✔ Review national best practices and work with diverse stakeholders to develop and pilot a process that could be employed to make publicly available results of an energy and water rating system to support consumer options in real estate decision-making.
	6	Zero Net Energy (ZNE) 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 Unified Development Code (UDC). ✔ Develop multiple pathways for ZNE compliance.
	7	Energy Efficiency Programs	✔ Identify and allocate 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 (Initiated by 2021)

= Long-term

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IMPLEMENTATION COMMUNITY CONT.

		STRATEGIES	IMPLEMENTATION ACTIONS
Reduce Transportation Energy Consumption	9	Cleaner and More Efficient Vehicle Technologies	✔ 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 VIA Metropolitan Transit Regional Centers. ✔ Explore the development of vehicle-free zones within the Regional Transit Centers and specialized overlay districts focused on Transit-Oriented Development and affordable housing. ✔ Reduce 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[73] 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[74] and AAMPO's Alamo Commutes program.[75]
	11	Connectivity / Walkability	✔ Expand protected micro-mobility infrastructure, e.g., sidewalks and bike lanes, and implement 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 community, 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.
Advance the Circular Economy	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. ✔ Identify specific recycling targets for specific commodities based on GHG reduction potential. ✔ 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 materials.
	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.

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IMPLEMENTATION COMMUNITY CONT.

		STRATEGIES	IMPLEMENTATION ACTIONS
Promote Biodiversity and Healthy Ecosystems	19	Carbon Capture and Storage	✔ Develop a plan for carbon capture and storage within the City boundaries, including a carbon capture and storage baseline for the City ✔ Develop a tracking mechanism to monitor around carbon capture and storage.
	20	Urban Heat Island	✔ Increase San Antonio's tree canopy in line with Tree City USA through continued implementation of existing ordinances and identify opportunities for CoSA and partner agencies to increase canopy on city-owned properties and right-of-way in areas most directly benefiting 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, community gardens, and pollinator gardens. ✔ Preserve open space and native ecosystems on publicly owned land or in targeted priority areas.
	21	Ecological Planning and Climate Sensitive Design	✔ Pilot a process to identify the GHG emissions of building and infrastructure 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 & Empower	22	GHG Education and Training	✔ Develop a comprehensive education platform that crosses socio-economic classes to serve all ages, races, and incomes 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 progress 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	✔ Evaluate 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. ✔ Rate structures must be fair and equitable, allow for adequate recovery of costs, be competitive, easily understood, and enable appropriate regulatory and legislative compliance.
	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, area municipalities, and other key partners to share best practices and work towards regional mobility and energy 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, green bonds, and performance contracts. ✔ Work with regional and state partners to employ the most effective financing mechanisms.

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IMPLEMENTATION MUNICIPAL

		STRATEGIES	IMPLEMENTATION ACTIONS
Reduce Building Energy 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 methods to publicly disclose energy and water 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, as well as demand management and green leasing requirements. ✔ Develop an implementation plan to generate or procure renewables to cover municipal electricity consumption. ✔ Explore the potential benefits of renewable thermal energy to cover municipal building energy consumption.
	M3	Zero Net Energy (ZNE) Buildings	✔ Set a standard for maximum 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 Energy 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 sensors, or air quality monitoring.
	M6	Cleaner and More Efficient Fleet Vehicles	✔ Update the municipal government vehicle procurement policy to ensure all new vehicle purchases support efficiency and carbon reduction objectives. ✔ Explore the potential of increasing the use of cleaner and more efficient vehicles, with a priority on electrification based on the recommendations of the Electric Fleet Conversion and Infrastructure Study, currently in development, for commuting through a government financing plan for leasing these vehicles.
	M7	Transportation Demand Management	✔ Encourage alternative scheduling, i.e. work from home one day a week, telecommuting, carpooling, or compressing 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.
Advance the Circular Economy	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 & Empower	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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REFERENCES

SA CLIMATE READY

1. San Antonio was established May 1, 1718.
2. IPCC, (2018). Global warming of 1.5°.
3. Hayhoe, K. (2015). Climate Trends in San Antonio and an Overview of Climate Projections for the South Central Region.
4. Sharif, Hatim. UTSA College of Engineering. SA Climate Ready: "Climate Projections for the City of San Antonio." (SA Climate Projections). June 28, 2018.
5. Paris Agreement Status of Ratification (2019).
6. Climate Mayors (2018).
7. https://www.wearestillin.com/
8. https://environmenttexas.org/reports/txe/shining-cities-2018
9. https://www.cpsenergy.com/en/about-us/programs-services/save-for-tomorrow-energy-plan.html

THE CASE FOR ACTION

10. https://grist.org/article/insurance-experts-rank-climate-change-as-top-risk-for-2019/
11. https://nca2018.globalchange.gov/
12. https://apps.who.int/iris/bitstream/handle/10665/276405/9789241514972-eng.pdf?ua=1
13. https://www.dni.gov/files/ODNI/documents/2019-ATA-SFR---SSCI.pdf
14. https://www.moodys.com/research/Moodys-Climate-change-is-forecast-to-heighten-US-exposure-to--PR_376056
15. https://whc.unesco.org/en/climatechange/
16. https://grist.org/article/insurance-experts-rank-climate-change-as-top-risk-for-2019/
17. https://www.globalclimateactionsummit.org/27-cities-have-reached-peak
18. https://www.sanantonio.gov/EdwardsAquifer
19. https://www.sanantonio.gov/NHSD/Programs/Repair
20. https://climatecommunication.yale.edu/publications/do-younger-generations-care-more-about-global-warming/
21. https://www.cdp.net/
22. https://sciencebasedtargets.org/
23. https://www.fsb-tcfd.org/

GREENHOUSE GAS INVENTORY & CLIMATE PROJECTIONS

24. https://ghgprotocol.org/greenhouse-gas- protocol-accounting-reporting-standard-cities
25. In 2016, CPS Energy was responsible for total emissions of 11.3 MtCO2e, from electricity generation. Per the LGOP reporting method, only the emissions from electricity generation that are accounted for by Scope 2 usage within the City of San Antonio's geographic boundary are included in the GHG inventory totals (7.1 MtCO2e). As a municipal plan, the SA Climate Ready Climate Action and Adaptation Plan (CAAP) addresses GHG reductions for CPS Energy emissions within the City of San Antonio jurisdictional boundary.
26. https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities
27. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf
28. Municipal emissions are also included in the community inventory, so municipal emissions should not be added to the community inventory total, as that would result in a double-counting of the municipal government emissions sources.
29. http://www.theclimateregistry.org/tools- resources/reporting-protocols/local-goverment- operations-protocol/
30. https://www.sanantonio.gov/sustainability/Energy-Efficiency
31. National Oceanic and Atmospheric Administration
32. Sharif, Hatim. UTSA College of Engineering. SA Climate Ready: "Climate Projections for the City of San Antonio." (SA Climate Projections). June 28, 2018.

MITIGATION: REDUCING GREENHOUSE GASES

33. .https://rhg.com/research/preliminary-us-emissions-estimates-for-2018/
34. https://www.wri.org/blog/2018/10/half-degree- and-world-apart-difference-climate-impacts- between-15-c-and-2-c-warming
35. https://unfccc.int/sites/default/files/english_paris_agreement.pdf
36. https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/
37. https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/
38. Interim targets were developed by modeling the expected emissions that would result from implementing the carbon mitigation measures outlined in the plan using The Climate Action for Urban Sustainability (CURB) tool developed by the World Bank Group. These estimates were considered against a top-down vision of how San Antonio must reduce emissions to get to the 2050 goal of carbon neutrality, and in some cases were adjusted slightly to develop the most appropriate sectoral-targets for 2030.
39. https://www.saws.org/conservation/plan/
40. https://www.reworkssa.org/
41. https://www.sanantonio.gov/historic/Programs/Deconstruction
42. https://satomorrow.com/

ADAPTATION: PREPARING FOR A CHANGING CLIMATE

43. IPCC 5th Assessment Report, 2014. https://www.ipcc.ch/report/ar5/syr/
44. US 4th National Climate Assessment (NCA4), 2018. https://www.globalchange.gov/nca4
45. US 4th National Climate Assessment (NCA4), 2018. https://www.globalchange.gov/nca4
46. EPA's Multi-Model Framework for Quantitative Sectoral Impacts Analysis: https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=OAP&dirEntryId=335095
47. US 4th National Climate Assessment (NCA4), 2018.
48. How Ozone Pollution Affects Public Health in San Antonio: An Analysis Commissioned by the City of San Antonio, 2017. https://www.sanantonio.gov/Portals/0/Files/Sustainability/OzoneHealth/final-report.pdf
49. Potential Cost of Nonattainment in the San Antonio Metropolitan Area, 2017. https://www.aacog.com/DocumentCenter/View/41742/Contract_582-16-60180_Deliverable_5-2_Cost_of_Nonattainment_Analysis_Rev0?bidId=
50. US 4th National Climate Assessment (NCA4), 2018.
51. SA Hazard Mitigation Plan (HMAP), Section 8: Wildfire, 2017.
52. City of San Antonio Community Wildfire Protection Plan (CWPP), 2016
53. EPA's Multi-Model Framework for Quantitative Sectoral Impacts Analysis: https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=OAP&dirEntryId=335095
54. https://www.noaa.gov/media-release/noaa-updates-texas-rainfall-frequency-values

IMPLEMENTING THE PLAN

55. https://www.bloomberg.org/program/ environment/climatechallenge/#overview
56. https://www.sasustainability.com/dashboard

SAN ANTONIO'S COMMITMENT TO CLIMATE EQUITY

57. https://www.apha.org/topics-and-issues/climate-change/vulnerable-populations
58. https://coateslibrary.omeka.net/exhibits/show/claudeblack/community/involvement/redlining

APPENDIX I: METHODOLOGY

59. http://www.theclimateregistry.org/tools- resources/reporting-protocols/local-goverment- operations-protocol/
60. https://ghgprotocol.org/greenhouse-gas- protocol-accounting-reporting-standard-cities
61. https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities
62. https://resourcecentre.c40.org/resources/reporting-ghg-emissions-inventories
63. https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf
64. CPS Energy developed the Flexible Path, or "Flex Path" in 2018 as a guide to plan for, develop, and/or install new energy sources through 2040 (https://cpsenergy.com/flexiblepath). Between 2018 and 2040, the Flex Path projects an increase in renewable energy capacity from 22% to 50%, while energy from gas and coal decline from 64% to 20% of total generation.
65. https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/
66. https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/
67. https://www.worldbank.org/en/topic/urbandevelopment/brief/the-curb-tool-climate-action-for-urban-sustainability
68. Sharif, Hatim. UTSA College of Engineering. SA Climate Ready: "Climate Projections for the City of San Antonio." (SA Climate Projections). June 28, 2018.
69. Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation, ICLEI-Local Governments for Sustainability

APPENDIX III: CLIMATE EQUITY INDICATORS

70. http://nationalequityatlas.org/
71. http://nationalequityatlas.org/indicators/Neighborhood_poverty

APPENDIX IV: POTENTIAL MITIGATION STRATEGY DETAILS

72. https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager
73. https://htaindex.cnt.org/
74. http://www.viainfo.net/wp-content/uploads/2018/05/2016_0824_VIA_2040_LRP.pdf
75. http://www.alamocommutes.org/

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Roberto C. Treviño, District 1
Jada Andrews-Sullivan, District 2
Rebecca J. Viagran, District 3
Dr. Adriana Rocha Garcia, District 4
Shirley Gonzales, District 5
Melissa Cabello Havrda, District 6
Ana Sandoval, District 7
Manny Peláez, District 8
John Courage, District 9
Clayton Perry, District 10

CITY MANAGER'S OFFICE

Erik Walsh, City Manager
Roderick Sanchez, Assistant City Manager

OFFICE OF SUSTAINABILITY

Douglas Melnick, AICP, CNU-A, ISSP-SA, Chief Sustainability Officer
Carmen Almaguer, Executive Secretary
Cynthia Dittrich, Fiscal Administrator
Julia Murphy, AICP, MSCRP, Deputy Chief Sustainability Officer
Murray Myers, Municipal Sustainability Manager
Golda Obinzu, PE, MBA, CEM, LEED AP® BD+C, Energy Manager

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Nils Frenkel, Director, Navigant
Dr. Noah Goldstein, LEED AP, Director, Navigant
Paula Gold-Williams, President & CEO, CPS Energy
Iris Gonzalez, Former Climate Equity Fellow, Office of Sustainability, City of San Antonio
Dr. Katharine Hayhoe, Director, Climate Science Center, Texas Tech University
Sarah Khayyatzadeh, Intern, Office of Sustainability, City of San Antonio
Lisa Lin, LEED AP BD+C, Former Climate Program Manager, City of San Antonio
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Lindsay G. Ratcliffe, Lecturer III, UTSA
Desirée Williams-Rajee, Founder & Principal, Kapwa Consulting
Angela Rodriguez, Interim Director Climate & Sustainability, CPS Energy
Derek Rosendahl, Ph.D., Postdoctoral Research Associate, South Central Climate Science Center, University of Oklahoma
Sheryl Sculley, Former City of San Antonio Manager
Hatim Sharif, Ph.D., P.E., College of Engineering, UTSA
Danielle Vitoff, LEED AP(R), True Advisor, Associate Director, Navigant
Christopher Wilcut, CEM, Former Climate Program Manager, City of San Antonio
Donald J. Wuebbles, Ph.D., Department of Atmospheric Sciences, University of Illinois

STEERING COMMITTEE

Anita Ledbetter, Build San Antonio Green (Co-Chair)
Dr. Olufemi Osidele, Self Employed Consultant (Co-Chair, E&B Liaison)
Jeffrey Arndt, VIA Metropolitan Transit (T&LU Liaison)
Naomi Arredondo, Boys & Girls Clubs of San Antonio
Sara Beesley, Mitchell Lake Audubon Center (W&NR Liaison)
Peter Bella, Climate Action SA
DeeDee Belmares, Moms Clean Air Force
Belarmino Castellanos, Whataburger
Emily Christy, USAA
Steven Clouse, San Antonio Water System
Matt Cox, Kimley-Horn and Associates, Inc./RECSA
Trey Dawson, Pape-Dawson Engineers, Inc./RECSA
Diane M. Duesterhoeft, St. Mary's University/ San Antonio Interfaith Environmental Network
Dr. Carlos A. Garcia, UIW (W&C Liaison)
Stephen Graham, San Antonio River Authority
Jessica O. Guerrero, Vecinos de Mission Trails (CE Liaison)
Gregory Harman, Sierra Club, Lone Star Chapter
Krystal Henagan, Moms Clean Air Force
Harjot Kaur, Resident
Samuel J. Klein, JBSA
Kristi G. Villanueva, West San Antonio Chamber of Commerce

CLIMATE EQUITY TECHNICAL WORKING GROUP (TWG)

Tim Barr, Methodist Healthcare Ministries
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
Dr. Alfred Montoya, Trinity University
Hector Morales, San Antonio Apartment Association
Mario Obledo, San Antonio Food Bank
Frankie Orona, Society of Native Nations
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Leslie Provence, Food Policy Council of San Antonio
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ENERGY & BUILDINGS TWG

Mario Bravo, Environmental Defense Fund
Stephen Colley, Stephen Colley/Architecture
Julia Emerson, Highland Commercial Properties
Timothy Heinle, OCI Solar Power LLC
Elizabeth Kertesz, San Antonio 2030 District
Lina Luque, Build San Antonio Green
Sandra Montalbo, Overland Partners
James Nichols, Joeris General Contractors/RECSA
Virginia Palacios, South-Central Partnership for Energy Efficiency as a Resource (SPEER)
Jason Pittman, Go Smart Solar
Russell Seal, Alamo Group Sierra Club
Shane Siebenaler, Southwest Research Institute
Aaron Stein, San Antonio Independent School District
Kaiba White, Public Citizen
Erin Zayko, Resident

TRANSPORTATION & LAND USE TWG

Allison Blazosky, Alamo Area MPO
Buck Benson, Pulman Cappuccio Pullen Benson & Jones, LLP/RECSA
Brian Buchanan, VIA Metropolitan Transit
Chris Corbett, HEB Grocery
Steven Duong, AECOM
Sara Mendiola, San Antonio River Authority
Leslie Ostrander, DR Horton
Cameron Patterson, Overland Partners
Meg Reyes, JBSA
Jody Sherrill, CoSA Planning Commission
JD Simpson, San Antonio Bike Share
Cynthia Merla Spielman, Beacon Hill Area Neighborhood Association
Janel Sterbentz, Bike San Antonio
Casey Whittington,The Whittington Group/RECSA

WASTE & CONSUMPTION TWG

Lisa Cervantes, Resident
John Davis, Heil of Texas
Mitch Hagney, Local Sprouts/ Food Policy Council SA
Kate Jaceldo, Compost Queens
June Kachtik, Neighborhood Representative
David Lopez, Business and Management Consultant/ Retired SWMD
Christopher Moken, Re-Mat
Dr. Kevin Salfen, University of the Incarnate Word
Ryan Whiteside, Republic Services
Georgia Zannaras, AACOG

WATER & NATURAL RESOURCES TWG

Bryan Blaisdell, AECOM
Melissa Bryant, San Antonio River Authority
Dr. Terry Burns, Alamo Group Sierra Club
Beto De León, Southwest Worker's Union - Centro por la Justicia
Kevin Ellis, National Center for Appropriate Technology
Karen Guz, SAWS
Lissa Martinez, Texas Master Naturalist
Dr. Meredith McGuire, Alamo Group Sierra Club
Annalisa Peace, Greater Edwards Aquifer Alliance
Darren Thompson, San Antonio Water System
Steve A. Tomka, Raba Kistner Environmental/PEPP
Brandon Wenzel, Wenzel & Associates
James Winterle, Edwards Aquifer Authority
Kate Zerrenner, Environmental Defense Fund

PROJECT TEAM

CITY OF SAN ANTONIO OFFICE OF SUSTAINABILITY

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LET'S GET CLIMATE READY

SA Climate Ready is San Antonio's plan to meet the present and future challenges that come with a changing climate. Mitigation measures address the needs of all residents while supporting the systems that advance our City's resiliency.

SA CLIMATE READY

Address
1400 S. Flores,
Unit #2
San Antonio, TX
78204

Telephone
210.207.6103

E-mail:
sustainability@sanantonio.gov

saclimateready.org

SA TOMORROW sustainability plan

CITY OF SAN ANTONIO

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