



# CLIMATE ACTION PLAN

City of Tempe 2019



Sustainable  
Tempe

# Letter from the Mayor

To City of Tempe Residents:

Tempe demonstrates how taking local action can have a global impact. As a commitment to sustainability, our city joined the Global Covenant of Mayors for Climate and Energy to cut our greenhouse gas (GHG) emissions and prepare for the effects of climate change. We are setting Tempe on a path to sustainability and resilience with our first ever Climate Action Plan (CAP). Our plan focuses on transportation and energy use because they are the main sources of emissions in our community. In addition to reducing our emissions, we must adapt to our already changing climate by making sure our city is prepared for extreme heat. Through this plan and the work of our Office of Diversity and Strategic Management, we are ensuring our climate actions address vulnerable populations and frontline communities. Tempe will take local action, to be part of global solutions, by reducing emissions and preparing for the impacts of extreme heat.

Alongside the community actions in the Climate Action Plan, we are also taking steps as a city to embed sustainability into municipal operations. One of our Council-adopted performance measures is to achieve carbon neutrality in municipal operations by 2050, with a strategy of using 100% renewable electricity sources by 2035. Tempe moved towards carbon neutrality by investing in the Johnny G Martinez Water Treatment Plant Solar Project. Over 2,000 solar panels at the plant supply 25% of the power needed for that facility and helped Tempe have 10% of municipal electricity come from clean sources. We can build on the success of municipal actions by taking climate action in our community, such as the construction of the Tempe Streetcar. The streetcar will provide Tempeans another option to get around the city that is not a single-occupancy vehicle. It also helps us lower carbon emissions and local air pollution to make our city a more enjoyable place to live and visit. We can prepare for our future by improving internal city operations and working toward community solutions with businesses and residents.

With the help of hundreds of Tempe residents and city staff, Arizona State University (ASU), and the School for the Future of Innovation in Society, it is my pleasure to introduce Tempe's first-ever Climate Action Plan. This plan identifies actions the city, businesses, and residents can take to lower our emissions and make sure our city is resilient to extreme heat. The City will work with every Tempean to implement the actions in our Climate Action Plan to ensure we remain a great city to live in, with a vibrant economy, for generations to come.

Sincerely,



Mark Mitchell, Mayor

# Acknowledgements

We are deeply thankful for the community collaboration and input that went into this plan. Below are some of the main contributors that made Tempe's first CAP possible:

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# EXECUTIVE SUMMARY

Tempe's 2019 Climate Action Plan (CAP) is an opportunity for our city to take local action on global climate change by reducing our greenhouse gas (GHG) emissions and adapting to the changing climate. We plan to do so in a way that is accessible and benefits all members of our community.

GHG emissions are estimated through a GHG emissions inventory, which documents all sources of emissions throughout a community or organization in a given year. In 2015, the City of Tempe completed a community inventory that details how many metric tons (MT) of carbon dioxide equivalents (CO<sub>2</sub>e) are emitted across all homes, businesses, and institutions. We also completed a municipal inventory that is guiding action in city operations. This CAP will support Tempe in becoming carbon neutral as a community.

To address these community emissions and adapt to climate change, the CAP focuses on emissions reduction and resilience to extreme heat.

## Emissions Reduction

Tempe can become more livable and economically vibrant for all its residents and businesses by further investing in energy and transportation technologies that reduce GHG emissions. The transportation and energy sectors account for 99% of community emissions. We must invest in transforming how we move around people and how our utilities produce energy.



### Energy

Tempe can support businesses and residents in adopting energy upgrades that save money and grow Arizona's clean energy economy. Additionally, working with utility companies to increase renewable energy use is a priority for Tempe.



### Transportation

Tempe is a leader in Arizona for transportation, demonstrated by the Orbit bus system, bike and pedestrian infrastructure, light rail, and the current construction of the streetcar. Tempe will continue to invest in alternative transportation options to improve our air quality and connect the city without relying on single-occupancy vehicles.

## Resilience

Resilience is demonstrated when a system thrives after something disrupts it. Urban resilience means creating the capacity for our city to respond to threats and shocks while still achieving Tempe's sustainability goals. Tempe must adapt to climate change threats that are already impacting our city and be prepared for the threats to come.



### Extreme Heat

By investing in infrastructure that will cool Tempe, we are creating a city that can protect residents against extreme heat, including our most vulnerable populations. Cultivating this resilience can reduce negative health, environmental, and economic impacts that arise with increasing temperatures.

## CAP 2021 Update

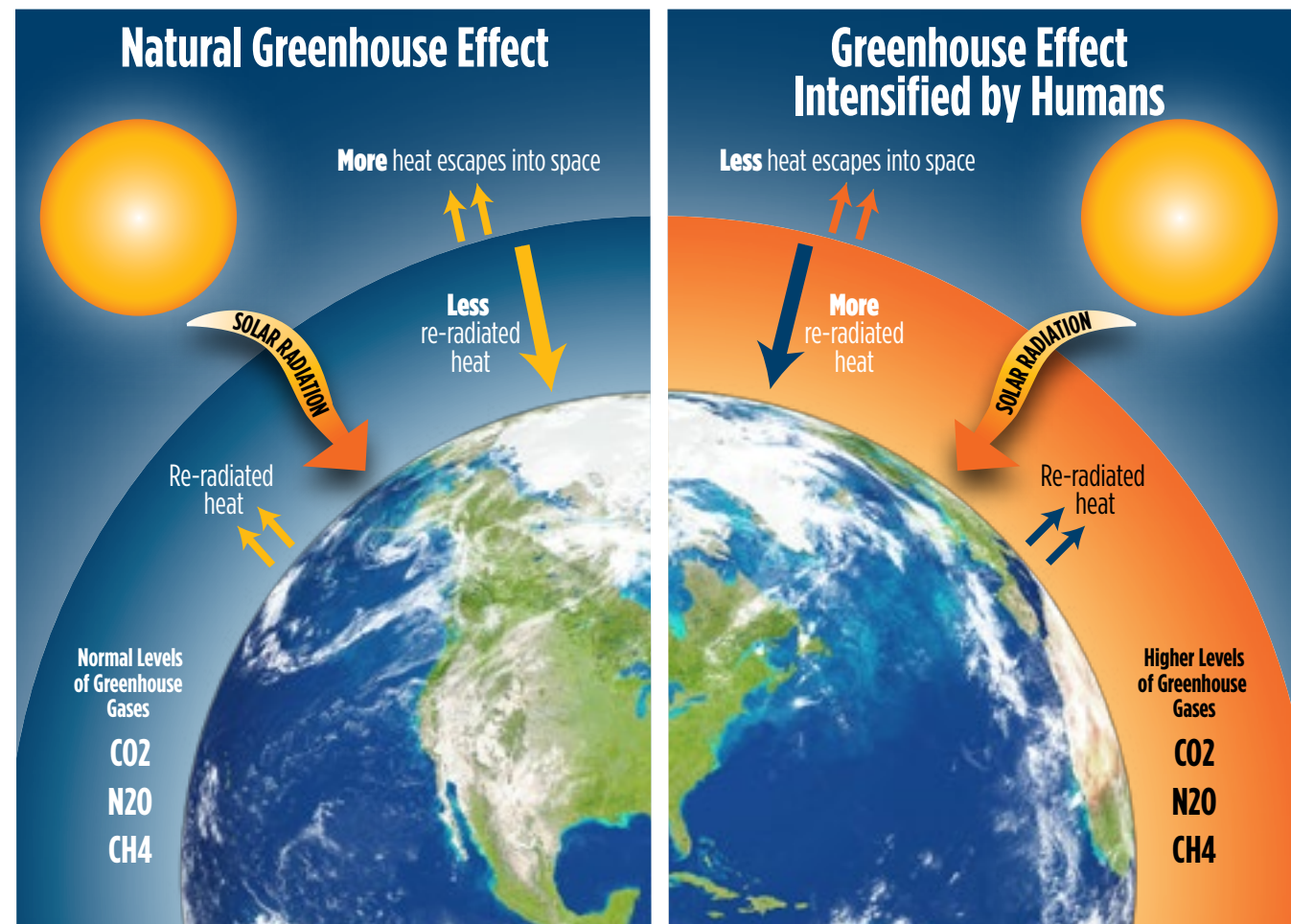
Tempe will begin to work on an update to the CAP throughout 2020 for presentation to City Council in Fall 2021. Tempe will continue to build upon the actions in the 2019 CAP to achieve our performance measures and goals in an inclusive manner. The CAP 2021 Update will be a plan guided by five principles: fiscal responsibility, enterprise, equity, engagement, and evidence.

# OVERVIEW

The following sections will introduce key concepts in the CAP. To understand the nature of the twelve actions in the plan, it is helpful to understand the concepts of GHG emission reduction and resilience. Additionally, the differences between community and municipal climate actions will be explained.

## What is Climate Change?

Climate change is happening because of anthropogenic, or human-induced, GHG emissions being released into the atmosphere as by-products of the fossil fuels used for energy and transportation. These GHGs include carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), and methane (CH<sub>4</sub>). GHG emissions speed up the greenhouse effect, the natural process that heats up our Earth and allows it to be habitable. However, large amounts of GHG emissions block the solar radiation trying to escape our atmosphere, which leads to increased temperatures and irregular weather patterns. It is becoming more apparent that climate change will have a major impact on infrastructure, natural resources, the economy, and public health. The City of Tempe recognizes the significance of climate change and the need to reduce emissions and create resilience.



(Source: Global Change)

## Purpose and Benefits of a Climate Action Plan

This CAP serves as a guideline for the City of Tempe's path toward a sustainable and resilient future that will benefit the entire city. It is a detailed framework for measuring and reducing GHG emissions and climate change impacts. The CAP includes an inventory of previous years' GHG emissions, Tempe's emissions reduction goals, and prioritized actions. The CAP can help Tempe achieve the largest and most cost-effective solutions in conjunction with other city goals and priorities.

Having a Climate Action Plan is critical to create a thriving community for the future residents of Tempe. The CAP develops strategies to conserve resources and make quality of life improvements, which will be notably beneficial to our most vulnerable populations. These strategic, sustainable improvements can include energy efficiency programs to lower utility costs, increasing public transit to reduce GHG emissions and traffic congestion, and adopting green infrastructure (GI) or urban forestry methods to reduce the effects of extreme heat.

## What is in the Climate Action Plan?

### Emissions Reduction



#### Energy

- Tempe can invest in cleaner, renewable energy options for residential, commercial, and municipal buildings to reduce GHG emissions.



#### Transportation

- Tempe can create a 20-minute city that provides accessible transportation for all residents by increasing transportation options and supporting more electric vehicles (EVs).

### Resilience



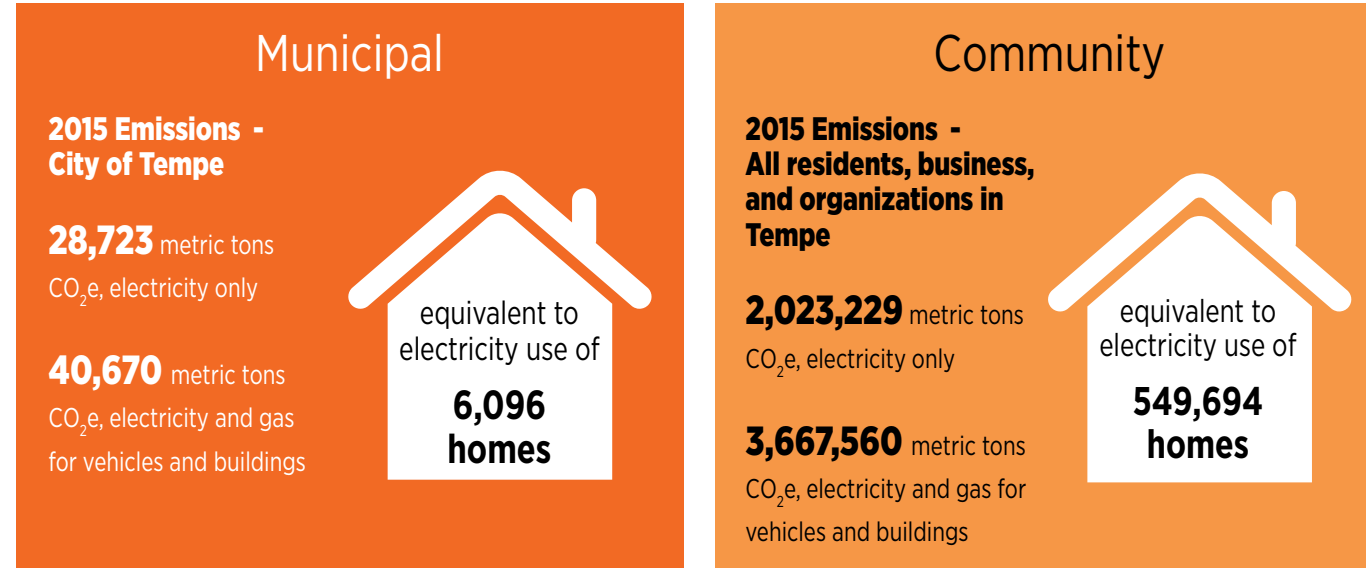
#### Extreme Heat

- Tempe can prepare for extreme heat by investing in buildings, infrastructure, and urban forestry.

# Baseline Greenhouse Gas Emissions: Municipal vs Community

In 2015, the City of Tempe conducted two GHG emissions inventories to determine the sectors that were emitting the most GHGs into the atmosphere. The data collected from the inventories are being used to formulate goals and strategies for the future.

## GHG Emissions Baseline



In Tempe, GHG emissions come from three main sources: the energy used to power buildings, the infrastructure that creates and delivers that energy to our homes and businesses, and the transportation systems that we use to move around the city.

## What is the Difference Between Municipal and Community GHG Emissions?

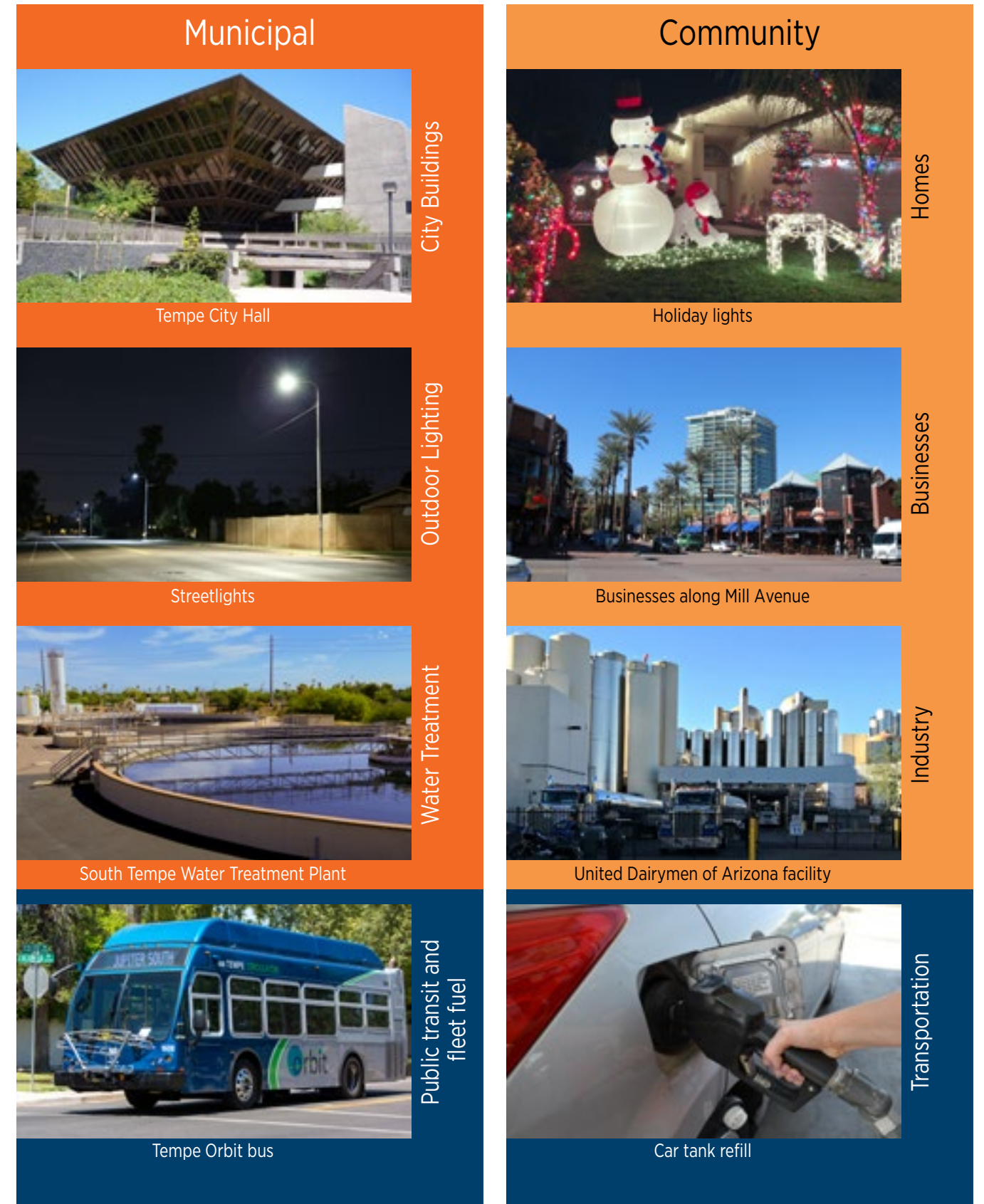
Both the municipal and community GHG emissions inventories show how transportation and energy use contribute to GHG emissions. But the community emissions inventory looks at how much the community-at-large produces, while the municipal emissions inventory looks at the emissions created by the city when operating the city government and providing city services to residents.

Community energy emissions account for the electricity powering residential, commercial, and industrial spaces. Community transportation emissions come from all the people driving through and in Tempe.

Municipal emissions account for city facilities and operations managed by the City of Tempe. These include our city buildings, like the police stations and libraries, our streetlights, our water treatments plants, and our city transit and fleet.

# Municipal vs Community GHG Emissions Sources

The orange denotes GHG emissions from energy production and the blue denotes transportation emissions



# Development of the Climate Action Plan

In 2016, Mayor Mark Mitchell and the Tempe City Council committed to the four-step process of the Global Covenant of Mayors for Climate and Energy (formerly the Mayor's Compact):

**Phase 1** Sign Letter of Intent from Mayor and Council.

**Phase 2** Complete a community GHG emissions inventory.

**Phase 3** Set a community target to reduce GHG emissions.

**Phase 4** Develop Climate Action Plan.



## Partnership with Arizona State University

The City of Tempe partnered with Arizona State University on the development of Tempe's first Climate Action Plan. Dr. Lauren Withycombe Keeler co-designed workshops with the City of Tempe to introduce sustainability and resilience concepts to City staff. The Future Shocks and City Resilience workshop (co-led with Dr. Arnim Wiek) was funded by the National League of Cities and Wells Fargo through the Leadership in Community Resilience program. The second workshop, AudaCity, was funded by the Global Consortium for Sustainability Outcomes (GCSO). AudaCity developed skills to help Tempe set more ambitious goals and develop corresponding strategies, such as the Climate Action Plan.

These initial workshops led to Dr. Keeler working with the City of Tempe on Tempe's first Climate Action Plan. GCSO funded Michele Crim from the City of Portland and Fletcher Beaudoin from Portland State University to visit Tempe, mentor City staff, and kick off Tempe's CAP with a keynote address to Tempe residents. Through this important partnership, Arizona State University brought resources, methods, and knowledge to support Tempe in learning how to approach climate action.

# Community Engagement

Arizona State University and the City of Tempe co-developed a community engagement process to ensure that residents, students, experts, nonprofits, and the business community were engaged in the development of the CAP. The process included interviews with City staff and key stakeholders, public forums on each focus area, expert forums, online forums with survey questions, and an open house for residents to review the proposed actions at the Tempe Community Center campus. For a full description of the community engagement, please see the public participation report on our website: [tempe.gov/ClimateAction](http://tempe.gov/ClimateAction).

## Interviews

Dr. Keeler and her students conducted interviews with over forty City of Tempe staff and key partners to determine areas of opportunity for Tempe to take action. The interviews laid the foundation for the rest of the engagement process and resulted in a set of recommendations to the Office of Sustainability and senior management of the City of Tempe.

## Engagement with City Departments

The Office of Sustainability worked closely with City departments in the development of potential climate actions. The Engineering and Transportation Department played a critical role in the development of the transportation and energy sections of the plan. Community Development, Fire, Police, and Strategic Management and Diversity supported work on extreme heat and emergency management.

## Forums

Dr. Keeler and her students designed public and expert forums for each focus area to get resident and expert feedback on how the City can address energy, transportation, and extreme heat. The City of Tempe Neighborhood Services and Media Relations and Communications staff created promotional materials and co-facilitated the events. Input from these forums led to the creation of the twelve actions in the plan. Dr. Thad Miller and his students from the School for the Future of Innovation in Society co-lead the transportation forums, with a focus on the role of autonomous vehicles (AVs) in climate action. All forums had an online component for residents and stakeholders who could not attend to express their opinions and shape the plan.

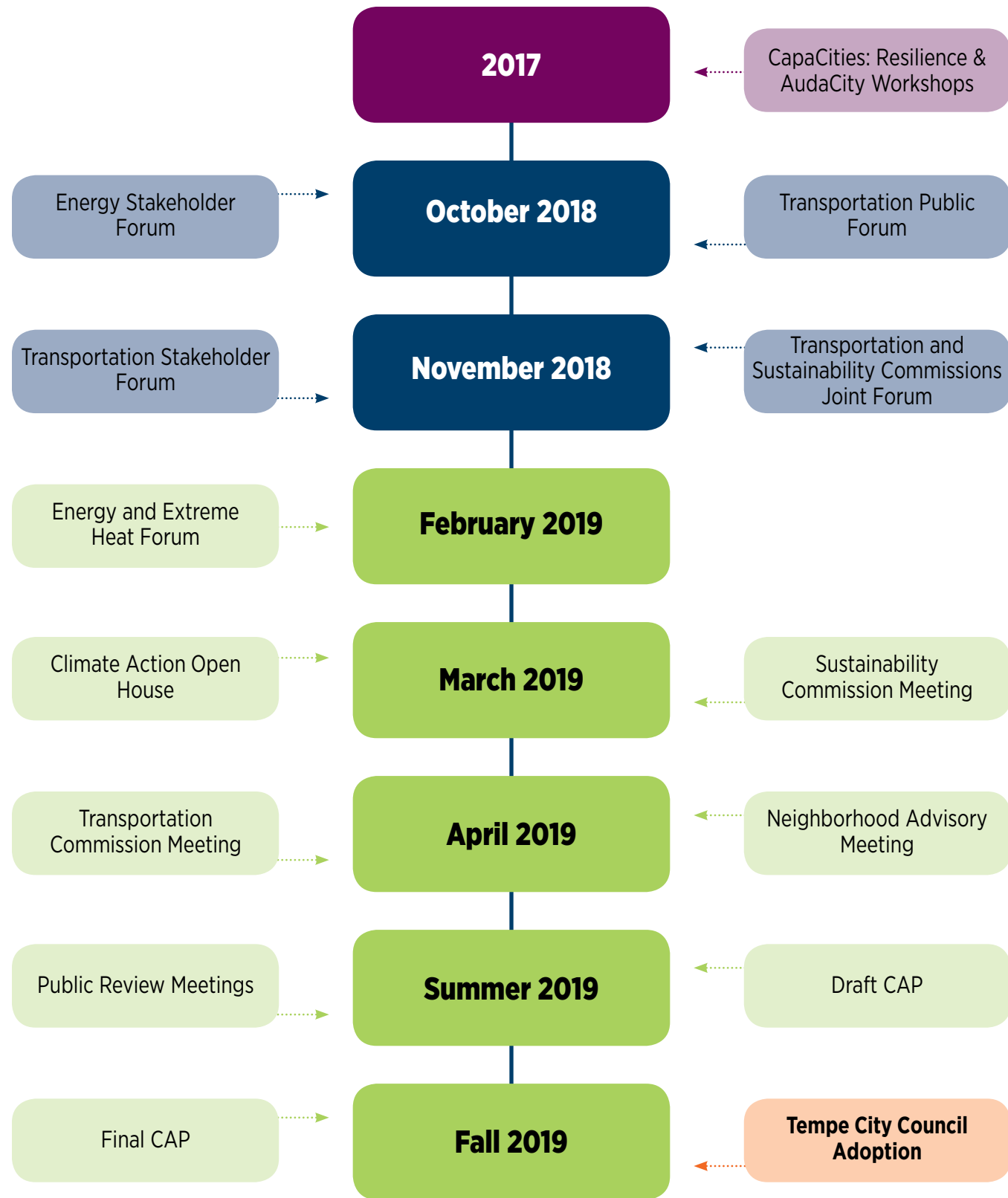
## Open House

An open house was held in March 2019 for residents and partners to review the proposed twelve actions in the plan. Their feedback is included in the Resident Input section of each action.

## Sustainability Commission

Tempe's Sustainability Commission has overseen the entire planning process, and the chair and vice chair of the commission hosted the Climate Action Plan open house. The Commission selected the four highlight actions of the plan and are working to ensure the highlight actions are implemented and cemented into city policy and budgets in the next several years.

# Timeline of CAP Project



# COMMUNITY ACTIONS



The City of Tempe will implement twelve actions to prepare for and respond to climate change. The twelve actions are divided into three focus areas: energy, transportation, and extreme heat. Each of the twelve actions includes an action description, the city council strategic priorities being met, key features, resident input received, and how collaboration can make the action happen. The Office of Sustainability and Tempe's Sustainability Commission have indicated four highlight actions that need our community's immediate attention.

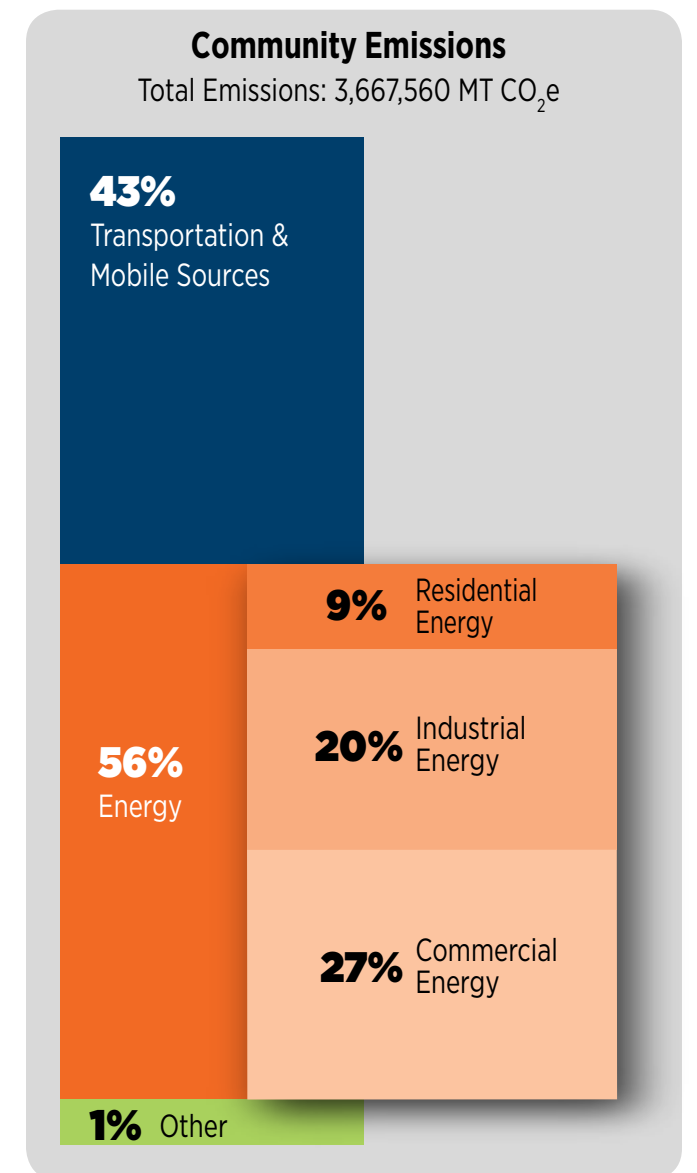
## Emissions Reduction

The primary cause of climate change is the overabundance of GHG emissions in Earth's atmosphere. The Tempe community emits 3,667,560 MT CO<sub>2</sub>e, with energy and transportation accounting for 99% of these community GHG emissions.

Energy and transportation are the focus of the CAP to reduce GHG emissions and reach Tempe's sustainability goals. Residential, commercial, and industrial energy use contribute to most of the city's community GHG emissions, with transportation emissions accounting for the rest of these emissions.

Reducing the amount of GHG emitted will have a substantial positive impact on the health and well-being of Tempe residents. Taking climate action in energy and transportation will make Tempe a better place to live by bolstering our clean energy economy and transportation infrastructure.

The City of Tempe will adopt a community carbon neutrality performance measure. This CAP contains initial actions to move Tempe towards carbon neutrality.





# ENERGY

The electricity that powers everyday residential, commercial, and industrial needs is essential to modern life in Tempe. Coal and natural gas make up at least 50% of the energy sources that power Tempe’s electrical grid. Because 56% of our GHG emissions are coming indirectly from electricity usage, it is important to consider our energy sources. Our overreliance on nonrenewable energy sources can be solved by using more clean energy, such as nuclear, solar storage, and carbon capture. This would allow Tempe to have a stable source to meet the city’s needs now and into the future. By converting to clean energy, Tempe can stimulate the growth of a clean energy economy. The cultivation of a new economy that encourages climate action will be pursued by the City in the following ways:

## SUPPLY

**The City can work with utility companies to increase the use of clean and renewable energy.**

- **Clean Energy:** Focus on increasing the use of clean and renewable energy
- **Storage:** Increase the use of battery storage for solar energy

**The City can provide tools for residents and businesses to make smart energy choices.**

- **Energy Upgrades:** Allow businesses and residents to use technology that requires less energy
- **Energy Management:** Allow businesses and residents to lower their energy use by having the ability to manage it
- **Load Shifting:** Optimize operations to use more energy in the middle of the day when energy is less expensive and solar energy is abundant
- **Financing:** Provide access to funds to invest in energy upgrades

## DEMAND

The following actions are being pursued by Tempe to support an energy efficient city:



### Resilient energy hubs:

- A resilient energy hub allows for a city to meet the power needs of its most vulnerable populations in case of emergency.
- This is important because every Tempe resident deserves to have access to air conditioning and power in the case of a natural disaster or extreme heat day.
- These resilient energy hubs will be located throughout the city at selected community spaces like fire stations, community centers, schools, and churches that can be outfitted with solar panels, battery storage, and other resilient technologies.



### Revolving fund:

- A revolving fund allows businesses access to the money needed to invest in energy upgrades.
- This is important because it lowers the barriers to invest in energy-efficient technologies and infrastructure for local businesses.



### Sustainability platform:

- A shared website platform can be created to make sure businesses are aware of opportunities for energy upgrades.
- The City of Tempe, Tempe Chamber of Commerce, Local First Arizona, Downtown Tempe Authority, and SRP/APS can inform businesses about sustainable practices and opportunities.



### Solar EV charging stations:

- Workplace charging stations powered by solar panels can be used to charge vehicles during the day while the sun is shining.
- These pilot projects can educate residents and businesses about how shifting the energy load to the middle of the day can support the use of clean energy.
- Tempe can launch a flagship project for EV charging in the form of a public-private partnership (PPP) between the city, businesses, and utilities.
- The City of Tempe will explore the viability of installing EV charging stations in new housing and community developments.





# Highlight Action

## 1. Resilient energy hubs

### Description

Resilient energy hubs are fire stations, community centers, schools, and churches that are outfitted with solar panels, battery storage, and other resilient technologies. In the event of an emergency that compromises the electric grid, these hubs will ensure that first responders and evacuees have access to electricity. Outfitting areas of first refuge with an independent energy source means Tempe residents will have a place to get cool on extremely hot days or in the event of a power outage. Current energy policy is a barrier when installing solar on the community spaces that will serve as resilient energy hubs. By partnering with APS and SRP, the City of Tempe can seek to create energy policy that uses renewable energy to keep Tempe residents cool and safe.

**Resilient Energy Hubs that run on stored solar energy will keep residents safe during heat and storm-related emergencies.**

### Alignment with Strategic Priorities



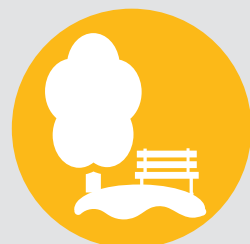
**Sustainable Growth & Development**

Investing in solar and battery storage in city buildings supports Tempe's 100% renewable energy strategy.



**Safe & Secure Communities**

A stable electric grid with redundancies in case of emergencies is essential to having a safe and secure community.



**Quality of Life**

Resilient energy for areas of first refuge ensures Tempe residents can keep cool during emergency events.

# Key Features

Partner with utilities to reduce barriers to adding solar and battery storage to fire stations, community centers, schools, and churches.

Ensure that first responders and evacuees have energy sources in the event of a power outage.

Prioritize placing first resilient energy hubs close to frontline communities (i.e. low-income and aging populations).

Align resilience efforts with the council-adopted goal of carbon-neutral municipal operations by 2050.



Solar panels on JGM water treatment plant (source: City of Tempe)



Solar panels on Tempe Police Department building (source: City of Tempe)

# Resident Input

Some residents believe that vulnerable populations must be considered when deciding the location of resilient hubs.

*“Do any of the ‘clean energy’ goals address our most vulnerable communities or populations?”*

During a public forum, some residents believed other forms of emergency relief, besides battery storage, should be incorporated.

*“Think bigger than batteries!”*

*“And water! Please!”*

# Collaboration

The City intends to pilot resilient energy hubs in areas of first refuge by determining the potential energy needs for buildings during an emergency. To pursue this, partnerships have been created between different community partners and organizations to implement this project.

### Key Partners: APS and SRP

- Determine appropriate technologies to use for the resilient energy hubs
- Work with Tempe to modify energy policy to support resilient hub installation

### Key Partner: Arizona State University

- Co-write grants to fund design of the resilient energy hubs
- Make construction template for the creation of resilient energy hubs across the city
- Work with the Information Technology department and Tempe residents to determine appropriate locations

### Residents:

- Work with city and key partners to determine sites for resilient energy hubs in or near neighborhoods
- Find other pilot projects, like tree plantings and collective action projects, that can build a sense of community around future resilient energy hubs
- Determine the potential needs of a community during an emergency with local organizations and neighbors
- Collaborate with local organizations and neighbors to proactively determine the potential needs of a community during an emergency



# Best Practice

The City of Tempe believes that gaining insight and inspiration from our peer cities in the United States will help our city develop effective actions to reduce GHG emissions. Tempe has researched actions that other cities have taken to combat climate change to expand upon the actions that these cities have practiced and implemented.

### Energy Resilient Power Hub – New York City, NY

After the infamous Hurricane Sandy in 2012, New York City looked to improve its electric grid to prepare for future weather catastrophes. The power outages throughout the city sparked Bright Power, an energy management company, to invest in and develop durable solar panels and energy storage on multifamily buildings and small businesses, to ensure continuous power through harsh, unexpected weather conditions. This Resilient Power Hub (RPH) is essentially a single-building power plant. Some benefits of the RPH include the following:

- Reduce building energy costs
- Produce energy that can be used on site
- Contribute to New York City’s decentralized and resilient micro-grid movement
- Multifamily homes can use RPH for electricity and water needs



Installation of RPH solar photovoltaics on NYC building (Source: NYCEDC)



## 2. Revolving fund



Aerial photo of Tempe Public Library (source: City of Tempe)

## Key Features

Funds dedicated to energy-efficient technologies like light-emitting diode (LED) lights and more efficient freezers and heating, ventilation, and air conditioning (HVAC) systems

Reduces carbon emissions from building operations

Outreach via faith-based institutions, news channels, radio, etc.

Makes energy-efficient upgrades affordable to small businesses and schools

Once established, the fund is self-sustaining

## Description

A revolving fund which begins with an initial donation can be used to give out loans for energy efficiency upgrades. Tempe could fund a 501c3 with this donation and use it to support businesses and schools in upgrading their infrastructure. The loans could initially be made available to local businesses and schools that are interested in saving money by reducing their energy use. If the revolving fund runs successfully, fund applications can be extended to residential customers with a focus on frontline communities.



LED lighting at Tempe City Hall (source: City of Tempe)

## Resident Input

Some residents support this, but believe there must be collaboration between community partners to spread information about the program.

*“Would this [mean] partnering with...solar companies?”*

Some residents from a public forum think that where and how the city gains funding for this is important.

*“Money talks, especially on paper and in politics.”*

## Alignment with Strategic Priorities



**Sustainable Growth & Development**

This fund could support schools, businesses, and residents in adopting energy-efficient upgrades.



**Financial Stability & Vitality**

Supporting businesses and residents to upgrade their infrastructure will save them money and support Tempe's local economy.



**Safe & Secure Communities**

Having access to affordable energy is an important part of long-term economic security.

## Collaboration

The city intends to find sources of capital for a revolving fund to give businesses the opportunity to invest in energy upgrades. To achieve this, Tempe must act with different partners to implement the fund.

### Key Partner: Tempe Chamber of Commerce

- Build on success of previous loan program to build a fund in partnership with the City of Tempe and energy utilities



### Key Partners: APS and SRP

- Work with business community and energy upgrade contractors to streamline energy upgrade processes





### 3. Sustainability platform



Energy upgrades at local business, House of Tricks (source: City of Tempe)

## Key Features

Website with energy efficiency programs and access to estimated cost savings

SRP: Helping people understand their energy bill

CoC: Sustainability pledge

LFA: GreenBiz Certification

Reduce emissions from commercial buildings

Alignment with Tempe's strategic priorities

## Description

The City of Tempe, Tempe Chamber of Commerce (CoC), Local First Arizona (LFA), Downtown Tempe Authority (DTA), SRP, APS, and other interested parties could create a website that provides information to businesses on energy efficiency programs. These could also include the Sustainability Pledge (CoC) and the GreenBiz Certification (LFA), a tool to calculate which programs a business qualifies for and the amount of expected savings to help businesses understand their energy bill. This website could be co-hosted by the city and the CoC. To kick-off the website, SRP and APS can host an energy efficiency or load shifting challenge.



Energy efficiency programs (source: SRP)

## Resident Input

During a public forum, some residents viewed this action as a good way to encourage information channels between businesses about best practices when transitioning to sustainable methods.

*“It also has to be made easy and economical to transition.”*

Some residents are concerned about business involvement in this platform.

*“Consider what the actual barriers for implementation are for businesses.”*

## Alignment with Strategic Priorities



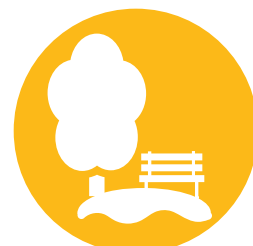
Financial Stability & Vitality

Sustainable business practices are sound business practices. By implementing energy upgrades and reducing resource use, businesses can save money.



Sustainable Growth & Development

This platform would guide businesses in adopting sustainable practices and technologies.



Quality of Life

By helping businesses use less energy, the City of Tempe is helping ensure that it is a livable city in the future.

## Collaboration

The City of Tempe is convening the business community, interested nonprofits, and energy utilities to support a platform for sharing best practices when investing in energy upgrades. For this network, Tempe must form partnerships that cultivate meaningful communication channels.



**Key Partners: Tempe Chamber of Commerce and Local First Arizona**

- Build on success of past sustainability programs to coordinate efforts with SRP and APS



**Key Partners: APS and SRP**

- Determine best practices for commercial energy upgrades within the business community





## 4. Solar EV charging stations



Tempe EV (source: PlugShare)

## Key Features

Enable EV charging in Tempe to attract more EVs

Test impact of scaled EV charging on mid-day electricity demand

City could provide support programs for low-income residents

EV charging could be put in the city code

## Description

A major barrier to putting more solar energy on the grid is that most electricity from solar is generated during the day, but most electricity is consumed in the late afternoon and evening. If solar power could charge EVs during the day, and EVs could charge homes at night, this would help address the mismatch between electricity generation and use. Tempe could be part of this solution. Tempe can launch a flagship project for EV charging in the form of a public-private partnership (PPP) between the city, businesses, and the utilities. EV chargers powered by solar energy could be available in prominent areas, like parking lots or local office complexes. The PPP could create a working group to explore how solar EV charging could be used to power homes to then create a pilot project to trial across the city.



Electric vehicles (source: City of Tempe)

## Resident Input

During a public forum, some residents stated that charging stations should be integrated into public and private spaces.

*“I like this as EVs aren’t going anywhere. It’ll grow, so it makes sense for the city to adapt.”*

Some residents are concerned that EV technology is still not accessible for the public.

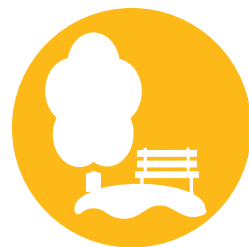
*“What about people who cannot afford the change to an EV?”*

## Alignment with Strategic Priorities



**Sustainable Growth & Development**

Air quality will improve with fewer gasoline powered cars to move people around the city.



**Quality of Life**

By helping businesses become sustainable, the City of Tempe is helping ensure that it is a livable city in the future.



**Safe & Secure Communities**

A stable electric grid is essential to having a safe and secure community.

## Collaboration

Tempe wants to work with businesses and energy utilities to streamline solar car charging pilots. To ensure the project’s success, Tempe must create partnerships that will lead to access to these charging stations in the city.

### Key Partner: APS

- Use pilot projects to convey how load shifting to EVs can support investments in the clean energy economy



### Key Partner: Arizona State University

- Promote research on importance of load shifting (i.e. using electricity when the sun is shining) and the best locations for the charging stations





# TRANSPORTATION

Our transportation system in the Valley is built around the single-occupancy vehicle. In Tempe, transportation contributes to nearly half of the community's GHG emissions. One of the first steps to achieve a sustainable city is to change the car-centric culture that causes traffic congestion and pollution. To reduce dependence on vehicle trips, and their associated GHG emissions, Tempe must prioritize investments in alternative forms of transportation. More people will transition from single-occupancy vehicles to alternative forms of transportation when it is as convenient and accessible to all residents as the car. Encouraging Tempe drivers to use different modes of transportation will benefit Tempe's environment and increase the livability for residents and visitors. The creation of a more robust transportation system will be pursued by the city in the following ways:

## Programs

The City of Tempe can introduce strategies that decrease the number of single-occupancy vehicles on our roads to decrease GHG emissions.

- Transportation Demand Management (TDM)
- Communication, education, and outreach (ongoing)

## Policy

The city can implement transportation policies to promote the use of clean, alternative modes of transportation.

- Require and encourage EV charging stations
- Encourage or incentivize walking, biking, transit, and carpooling

## Infrastructure

Roadway infrastructure can be designed and constructed to support cleaner alternative modes of transportation.

- Right of way and multi-use paths can be designed to complement alternative transportation modes
- Public transit including streetcar expansion and dedicated land Bus Rapid Transit (BRT)
- Bike/pedestrian

## Vehicles

Switch from conventional gasoline powered vehicles to vehicles that emit less GHGs.

- Electric Vehicle (EV)
- Automated Vehicles (AV)

The following transportation actions are being pursued by Tempe:



## Transportation Demand Management (TDM):

- TDMs are an effective way to connect property owners, schools, employers, employees and government agencies to promote alternatives to single-occupant commuting, thereby reducing the number of vehicles using the transportation system during its most congested hours: morning and afternoon commute.
- The TDM can be custom-designed for the community's needs but is typically a private-public partnership (PPP) that aims to reduce traffic congestion.



## Encourage walking, biking, and public transport in city projects:

- This action will further Tempe's Vision Zero and 20-minute city initiatives to improve walking, biking and transit services to make destinations more accessible to residents and visitors.
- Creating a walkable, bikeable, and transit-friendly city means increasing the availability, convenience, and safety of these transportation methods.



## EV charging:

- Tempe can increase the number of public charging stations and amend building codes to support their installation.
- An increase in charging stations can lead to an increase in EV ownership.
- EVs can contribute to the reduction of GHG emissions by reducing the emissions coming from fossil fuel-powered vehicles.



## Smart mobility guide:

- A mobility guide will be formed to lay the groundwork for policies encouraging autonomous vehicles (AVs).
- The mobility guide ensures that all city departments are prepared for AVs on Tempe roads.
- AVs can reduce traffic congestion, support transit, create safer transportation and reduce GHG emissions.



# Highlight Action



## 1. Transportation Demand Management (TDM)

### Description

With bicycle and pedestrian facilities, light rail, the bus system and a new streetcar, Tempe leads Arizona cities in providing alternative transportation options. However, more is needed to get people out of their cars. A TDM would support Tempe businesses and schools in using alternative transportation and reducing single-occupant trips. TDM are PPPs that allow businesses and government agencies to pool their resources to support commuter transportation strategies, like walking, biking, using transit, carpooling, and alternative work schedules. TDMs allow for a greater understanding of the transportation options available to Tempe residents and workers, while also improving air quality and lowering GHG emissions.

**Employers and multi-family developments can partner to promote alternative transportation use that reduces traffic, car use and emissions.**

### Alignment with Strategic Priorities



Financial Stability & Vitality

Reduces congestion at a much lower cost than roadway expansion projects.



Sustainable Growth & Development

Helps businesses attract and retain employees, achieves corporate sustainability goals, and reduces transportation costs.



Quality of Life

Provides more transportation options, less traffic, and shorter commute times to reduce stress and improve air quality.

# Key Features

Encourages transit use, walking, biking, and carpooling/vanpooling

Reduces single-occupancy vehicle trips

Public-Private Partnership



Tempe Streetcar (source: Valley Metro)



Downtown Tempe (source: City of Tempe)

# Resident Input

Some residents view the creation of a TDM program as a good way to reduce congestion, but worry it will increase congestion in other areas.

*“Can we reduce congestion in Tempe without adding to congestion in neighboring municipalities?”*

Some residents think it's important to consider vulnerable populations when forming this action.

*“Make certain to consider needs of low-income and homeless populations.”*

# Collaboration

The City of Tempe can explore how to improve transportation choices by collaborating with residents and local businesses.

**Key partners (DTA, Valley Metro, and Tempe CoC):**

- Local organizations can work together to improve coordination of congestion reduction and have a variety of travel demand management efforts
- Partners can pool their resources for strategic investments that support commute options, like using carpool apps or shuttles

**Businesses:**

- Tempe businesses, property management companies and schools can collaborate to share resources and lower the cost of providing transportation options to employees, residents and students

**City:**

- The city can support the TDM by funding promotional programs and education initiatives

# Best Practice

The City of Tempe believes that gaining insight and inspiration from our peer cities in the United States will help our city develop effective actions that reduce GHG emissions. Tempe has researched what other cities have done to combat climate change and address traffic congestion.

**Transportation Demand Management Program – Austin, TX**

The City of Austin has implemented a TDM program to mitigate air pollution, reduce GHG emissions, and lower traffic congestion. The TDM program aims to improve mobility in cost-effective ways by changing how residents get around the city, rather than trying to build out of the current congestion. Austin's TDM program has coordinated with several city organizations to create alternative modes of transportation that are available to the public. The TDM program has illustrated that no single strategy on its own will solve traffic congestion, but instead a wide variety of actions should be taken together to reach the goals.

The TDM program predicts success in the following areas:

- Increase in transit ridership by 3-10%
- Increase in ride sharing by 1-15%
- Increase in van pools/shuttles by 1-13%

(Source: Transportation Demand Management Program, Austin Transportation Department)



Austin transit bus





## 2. Encourage walking, biking, and public transport in city projects



GRID rideshare bikes (source: City of Tempe)

## Key Features

Improves transit service and pedestrian environment, adds bike facilities, provides transit stop amenities, converts/narrows travel lanes, and adds road medians

Increases safety, comfort, convenience, and access for all users, which can reduce fatalities and serious injury crashes

Encourages walking, biking, and transit use; supports businesses and the local economy; and creates healthy places that foster community livability

Reduces speeding and per-person delay

## Description

The increase in available options for walking, biking, or riding transit will improve our transportation system and reduce our carbon footprint. In coordination with the City’s Vision Zero and 20-minute city initiatives, safe street and intersection designs that prioritize pedestrians, bicyclists, and transit riders can be installed in transportation infrastructure projects. This could require reallocation of street and intersection space to better serve the full range of users. A broad array of redesign measures can be considered, taking into account the needs and preferences of the community.



Downtown Tempe (source: City of Tempe)

## Resident Input

Some residents support alternative transportation options that are accessible and accommodating for all people.

*“Yes! More of this with shade and edible landscaping.”*

*“Right – build the infrastructure for the desired behavior.”*

A resident suggested making car-free roads around Mill and ASU.

*“Maybe making roads that don’t have cars or use AVs on Mill and around ASU?”*

## Alignment with Strategic Priorities



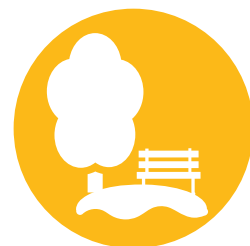
Financial Stability & Vitality

Provides a congestion mitigation alternative to expensive roadway expansion projects.



Safe & Secure Communities

Creates safe intersections and corridors, which reduces fatal and serious injury crashes.



Quality of Life

Supports safe and low-stress connections for residents and workers, resulting in reduced trips by car and reduced traffic congestion.

## Collaboration

The City of Tempe can work with Tempe businesses and residents to design roads that promote safe trips for all types of travel.

### City:

- Continue to have an inclusive engagement process that ensures all resident needs are heard during planning of future transportation projects

### Residents:

- Participate in the design process for future transportation projects and modes

### Arizona State University:

- Support the city in using best practices to become a 20-minute city with low-carbon transportation options and reduced congestion





### 3. EV charging



Electric vehicle charging station (source: Arizona State University)

## Key Features

Increases the number of public charging stations

Increases public visibility of EVs

Supports residents and business owners in hosting charging stations

Educates residents on the benefits of EVs

Works with utilities and partners to increase access to charging stations

## Description

Increasing the use of EVs will reduce GHG emissions in Tempe. Tempe can triple the number of public charging stations available to residents by 2022. Through expanding charging infrastructure, Tempe can lower the barriers to own an EV. Tempe can also amend building codes to require that new buildings are charging station-ready, which will lower the costs of retrofitting buildings.

## Alignment with Strategic Priorities



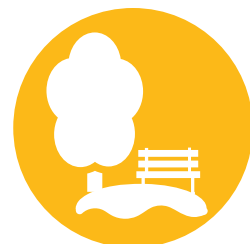
Financial Stability & Vitality

Provides public access to charging stations so that EV owners are less dependent on home charging.



Sustainable Growth & Development

Supports adoption of EVs and improves local air quality in Tempe neighborhoods.



Quality of Life

Improves air quality and public health outcomes.

## Collaboration

Businesses, electric utilities, residents, and the City of Tempe can improve air quality and reduce carbon emissions by making it easier to own and operate EVs in Tempe.

### City:

- Add charging infrastructure for its own EV fleet to serve as a model for the rest of the city
- Promote EVs through encouraging the installation of electric charging in commercial and residential properties

### Key stakeholders (APS and SRP):

- Support pilot projects that increase the number of EVs in Arizona
- Support installation of charging stations to increase the availability of EV charging throughout the city

### Residents:

- Can support changes to city codes that require buildings be equipped with the ability to easily install EV charging stations
- Exploring options to buy their own EVs and install their own charging stations



## Resident Input

Some residents believe that EV technology should be encouraged by the city.

*“Yes! This is very easy and within reach.”*

Some people wonder how EVs impact the amount of GHG emissions produced.

*“Does this increase emissions elsewhere due to the creation of electricity? The electricity source should be considered.”*



## 4. Smart mobility guide



Waymo AV (source: City of Tempe)

## Key Features

- Provides a comprehensive review of opportunities and risks associated with AVs
- Reviews zoning and development codes and identifies possible changes
- Reviews roadway design to provide possible future roadway configurations
- Models and analyzes possible traffic impacts under different scenarios
- Reviews data sharing processes, protocols, and use
- Determines possible revenue impacts and explore alternative revenue sources
- Begins to develop a policy framework for operation of AVs in Tempe

## Description

Autonomous vehicles (AVs) present Tempe with many opportunities for improving transportation, but also a number of risks. Tempe and ASU researchers will develop a new mobility readiness guide, which will provide the necessary groundwork for developing policies to ensure that the adoption and use of AVs result in a more-sustainable transportation system. The readiness guide will provide a comprehensive review of Tempe policies and codes that may help or hinder the adoption of AVs. Tempe believes that AVs can improve mobility, assure safety, and reduce the carbon footprint of the transportation system.



## Resident Input

Some residents think the city should incorporate more AVs into city operations.

*“AVs are the future! Safer, more reliable, and they never text while driving!”*

Some residents are worried about the viability of AVs in Tempe.

*“How would you make sure that these are accessible to populations that need them and not just who can afford them?”*

## Alignment with Strategic Priorities



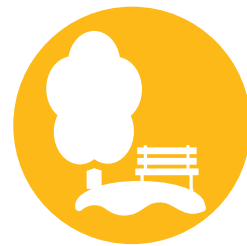
Sustainable Growth & Development

AVs can lower congestion, use roadways more efficiently, and reduce the number of single-occupancy vehicle (SOV) trips.



Safe & Secure Communities

AVs will make our roads safer by removing human error, which is a factor in 90% of roadway crashes.



Quality of Life

AVs can help increase accessibility for mobility-limited demographics to ensure that all residents have access to this technology.

## Collaboration

Tempe and its partners can develop policies to guide the use of AVs in a way that supports the city’s carbon reduction, safety, mobility, and congestion mitigation goals.

### Arizona State University:

- The School for the Future of Innovation in Society can co-produce the Smart Mobility guide to help the city set guidelines for how to operate AVs in Tempe

### Key Stakeholders (MAG, GPEC, local municipalities, and Maricopa County):

- Work with the City of Tempe to coordinate regional efforts to govern AV and smart mobility technologies

### City:

- City departments including Public Safety, Engineering and Transportation, Community Development, Economic Development, and Information Technology can work together to coordinate efforts with new AV firms that are operating in Tempe





# RESILIENCE

The threat of extreme heat is intensifying due to climate change and the urban heat island (UHI) effect. Record-breaking temperatures are sweeping Tempe and the Phoenix valley, presenting obstacles to keep Tempe safe. Extreme heat has caused an increase in heat-related deaths and hospitalizations, especially among children, the elderly, and homeless people. In addition to these health concerns, extreme heat decreases the efficiency of HVAC systems, which drives up electricity costs and usage. Extreme heat also negatively effects Tempe's economy, as tourism tends to decrease in uncomfortable weather conditions. It is important for Tempe to adapt to climate disturbances through infrastructure changes and community-driven action. Resilience to extreme heat will ensure that Tempe can remain a stable urban center that protects the health of the public and the environment. Adapting to our changing climate will be pursued by the City in the following ways:



## Buildings

Implementation of green construction codes will require new buildings to increase shade coverage and use of cool materials.

## Infrastructure

Green infrastructure (GI) allows buildings, parks, and streets to collect runoff stormwater to cool the urban city and reduce costs of watering.

## Urban Forestry and Vegetation

Continue to increase the tree coverage for Tempe's Urban Forestry Master Plan to provide shade and cooler temperatures in Tempe.

## Preparedness and Response

The hiring of an Emergency Manager will help prepare Tempe for emergencies including extreme heat days.

The following actions are being pursued by Tempe to establish resilience to extreme heat:



### Green infrastructure:

- Green infrastructure (GI) collects stormwater to help grow vegetation to cool our urban area.
- GI can save water, prevent flooding, and create shade.
- GI can include street curb design to alter the flow of stormwater and rooftop gardens that absorb water and create shade for urban cooling.
- Work within the city to create an education outreach initiative to inform Tempe residents about the cost benefits of GI



### Green Construction Code:

- The International Green Construction Code (IGCC) helps to cool the city by incorporating sustainable components of urban cooling.
- Shade and cool materials are components of the IGCC.



### Urban Forestry Master Plan:

- Investing in the Urban Forestry Master Plan will increase the urban tree population to cool the city and improve air quality.
- Tempe can increase staff to help with tree planting and irrigation funding.
- Tempe can continue volunteer efforts and pilot projects to expand its urban tree canopy.



### Emergency management program:

- An Emergency Manager can work to make sure that public safety is not compromised on extreme heat days.
- An Emergency Manager can draft an extreme heat prevention plan to coordinate among the city, residents, schools, and businesses to ensure the city is resilient during extreme heat.



# Highlight Action

## 1. Green infrastructure (GI)

### Description

Tempe can save water and cool the city by designing landscapes that capture stormwater, while also growing vegetation for shade and cooling. Design standards for GI and Low-Impact Development ensure cities and developers consider stormwater and urban cooling when creating the landscape of new developments, parks, and streetscapes. Scottsdale and Phoenix have led an effort with ASU's Sustainable Cities Network to develop design standards for stormwater management to cultivate cool landscapes and urban shade. These standards can be adopted by Tempe's City Council, so that outdoor spaces in Tempe are protected against extreme heat and floods.

**GI and Low-Impact Development Design Standards will save water and keep Tempe cool.**

### Alignment with Strategic Priorities



Financial Stability & Vitality

GI reduces energy costs and saves water.



Sustainable Growth & Development

Increasing shade reduces exposure to extreme heat and ultraviolet radiation.



Quality of Life

GI makes the city more livable by increasing comfort and walkability.

# Key Features

Supports urban cooling

Creates shade

Saves water

Captures stormwater

Keeps streets clear during storms



GI project at Rio Salado & Hardy (source: City of Tempe)



Grated curbs allow stormwater to pass through (source: City of Mesa)

EXTREME HEAT

COMMUNITY ACTION

# Resident Input

Many residents agree that adopting this will have positive impacts for our city and the environment.

*“Critical to reduce water use, great!”*

*“Yes, please! Requiring green infrastructure is key and shouldn’t be side-stepped through petition for exemption.”*

Some residents from a public forum were concerned about the irrigation water quality for the plants.

*“I support this, but make sure residents understand stormwater quality and their impact on it.”*

*“How clean is the water? What if the runoff hurts the plants?”*

# Collaboration

Tempe can build on regional best practices and coordinate with partners by adopting new standards to ensure all new public and private developments use stormwater to support vegetation and cooling throughout the city.

### Arizona State University:

- Convene City staff, landscape architects, residents and private developments to ensure all stakeholders know the benefits of GI and why they should be incorporated into all new projects
- Work with Maricopa County Flood Control and local municipalities to adopt regional standards for GI and low-impact development

### Businesses and Developers:

- Learn from best practices at ASU, other cities, and private developments to incorporate smart stormwater management, trees, and shade into new developments

### City:

- Adopt GI and low impact development standards for all city projects
- Work with developers to incorporate GI into private development

### Residents:

- Support GI pilot projects in their neighborhoods, schools, and businesses to ensure all development and street projects include GI
- Tailor GI projects for single family and multifamily residences



# Best Practice

The City of Tempe believes that gaining insight and inspiration from our peer cities in the United States is beneficial to perform effective actions to increase extreme heat resilience. Tempe has researched actions that other cities have taken to adapt to extreme heat and flooding to learn from their experiences.

### Green Infrastructure / Low-Impact Development –Mesa, AZ

Mesa, Arizona has become more sustainable by managing stormwater runoff to reduce urban flooding and infrastructure damage costs. Mesa drafted the Low-Impact Development Toolkit in 2015 to pave the way for various green building techniques and methods to deal with stormwater runoff. The city is already implementing the infrastructure designs, which have proved to be effective in reducing stormwater runoff and beneficial to urban cooling. The main elements of the GI are as follows:

- Green street methods: Manipulating the shape and size of a street curb to change the flow of runoff towards roadside vegetation
- Vegetated swale: Restoring washes with vegetation to create natural drainage patterns and flood protection
- Bioretention: Basins, cells, and planters that act to reduce and absorb/infiltrate runoff to supply plants with needed water and replenish groundwater
- Permeable pavement: Stabilized aggregate and porous materials are used to make pavements permeable to stormwater to reduce runoff and increase storage volume
- Green roof: Rooftop gardens, installed over waterproofing membranes, are naturally grown with stormwater, reducing runoff

Source: Low-Impact Development Toolkit, City of Mesa, Arizona



Eastmark Master Planned Community in southeast Mesa (source: City of Mesa)

# Highlight Action

## 2. Green construction code

### Description

The International Green Construction Code (IGCC) encourages more structural shade, requires more tree canopy coverage, and supports the use of cool materials. Buildings constructed to the IGCC are more sustainable than buildings constructed under traditional codes. Adopting IGCC as an optional code in Tempe would guide new developments to provide shade, as well as using smart surfaces and cool materials to keep the city cooler, day and night.

**Tempe buildings should keep occupants and pedestrians cool.**

### Alignment with Strategic Priorities



Financial Stability & Vitality

Green construction practices that include shade and cool materials reduce energy costs.



Sustainable Growth & Development

Increasing shade in Tempe reduces exposure to extreme heat and ultraviolet radiation.



Quality of Life

Shade and cool materials make the city more livable by increasing comfort and walkability.

# Key Features

New optional building code

Encourages more structural shade

Promotes more tree canopy coverage

Spreads the use of cool materials

Celebrates developers that construct a new building using the IGCC



Tempe Transportation Center (source: City of Tempe)



Garden rooftop and cool materials (source: City of Tempe)

## Resident Input

Many residents from a public forum agree that shade and greywater are critical infrastructure in the Valley.

*“This is one of the critical needs of the Valley of the Sun – more shade!”*

*“Greywater should be a requirement not an aspiration.”*

Some residents believe that these codes should be mandated with government regulations.

*“Optional is inadequate.”*

## Collaboration

The City of Tempe intends to find opportunities to increase the number of green buildings built in the city. Tempe can collaborate with developers and residents on piloting the use of the IGCC.

### City:

- Pilot the use of the IGCC in new city buildings, such as Fire Station #2
- Work with developers to find opportunities to pilot the use of the IGCC in private developments
- Pilot use of smart surfaces and cool materials in city projects

### Developers:

- Pilot the use of the IGCC in new developments
- Pilot use of new shade and cool material technologies

### Arizona State University:

- Continue to construct state-of-the-art green buildings using standards like LEED Platinum and the Living Building challenge
- Seek opportunities to produce the cost-benefit analysis of the energy savings that can be seen from using the IGCC
- Research effectiveness of emerging cooling technologies and smart surfaces



## Best Practice

The City of Tempe believes that gaining insight and inspiration from our peer cities in the United States will help our city develop effective actions to increase extreme heat resilience. Tempe has researched actions that other cities have taken to update their building practices to make their cities more resilient to climate change impacts.

### Green Building Code – Scottsdale, AZ

Scottsdale established a green building program that is adaptable to the extreme heat and weather present in the Phoenix metropolitan area. The program encourages a systems-based approach, through design and building code, to minimize environmental impact and energy consumption while keeping occupants comfortable and healthy.

#### Residential building codes include the following:

- Building entrances protected from direct summer sun
- Roofs with 50% of run-off diverted to landscape areas (natural irrigation)
- Smart irrigation controllers that regulate irrigation based on current weather/soil conditions
- Solar-ready roof zones with at least 500 square feet of free roof
- Kitchen faucets limited to flow rate of 1.8 gallons per minute

#### Commercial building codes include the following:

- On-site EV charging stations or preferred parking for low-emission/hybrid vehicles
- On-site renewable energy system designed to generate at least 3% of total estimated annual electric energy use
- Indoor paints, coatings, etc. are within low VOC (volatile organic compound) content limits

Green Building Code. Scottsdale, AZ (source: City of Scottsdale)



Appaloosa Branch Library located in north Scottsdale, AZ (Source: DWL Architects + Planners, Inc.)





### 3. Urban Forestry Master Plan (UFMP)



## Key Features

Supports planting and maintenance

Promotes adequate staffing to support the expansion of Tempe's tree canopy

Organizes volunteers and community efforts to plant, maintain, and water our trees

Can target streets and parks in the hottest areas of the city

Supports targeting efforts to combat extreme heat as experienced by low-income residents

Further invests in pilot projects that model best practices to conserve water

## Description

Tempe adopted an Urban Forestry Master Plan (UFMP) in 2017. The City recently hired an Urban Forester to support increasing the city's tree canopy. The UFMP promotes the planting and maintenance of trees in city parks, streets, and major city intersections. The plan supports efforts to create more urban forestry volunteer efforts, pilot projects, and tree planting events on city property. The City can continue to increase these programs by increasing staff, funding trees, and finding resources to improve irrigation, add green infrastructure (i.e. bioswales), and install greywater systems. Every budget year presents an opportunity to ensure that the City is fully investing in our urban forestry program to provide shade and to help cool our city.

## Collaboration

The City of Tempe has budgeted to have the first Urban Forester in Arizona. There is an opportunity to develop the best urban forestry program in the Southwestern United States, which can play a role in combating extreme heat by protecting our residents from experiencing the worst impacts of extreme heat days. Coordination between city staff, nonprofits, and residents will be critical to support the growth of Tempe's urban forest.

### City:

- Coordinate with staff from Engineering and Transportation, Community Services, and Community Development to create policies and programs to plant and maintain trees on city property
- Coordinate with Tempe Municipal Utilities, SRP and APS, to promote residential tree planting programs

### Nonprofits:

- Organizations, such as Trees Matter and Watershed Management Group, can continue to pursue grants to support pilot projects that demonstrate best practices in urban forestry and green infrastructure
- Continue to look for opportunities, such as the Carbon Offsets program, to fund tree plantings

### Residents:

- Residents, neighborhood associations, and homeowners associations can use the MaryAnne Corder Neighborhood Grants to support tree-planting projects

## Resident Input

Many residents supported use of shade throughout the city.

*“One of the most critical needs – shade.”*

Multiple residents from a public forum talked about using greywater in city operations.

*“Use greywater systems to conserve water!”*

## Alignment with Strategic Priorities



Financial Stability & Vitality

Green building practices that include water reuse can reduce energy costs.



Sustainable Growth & Development

Increasing shade reduces exposure to extreme heat and ultraviolet radiation.

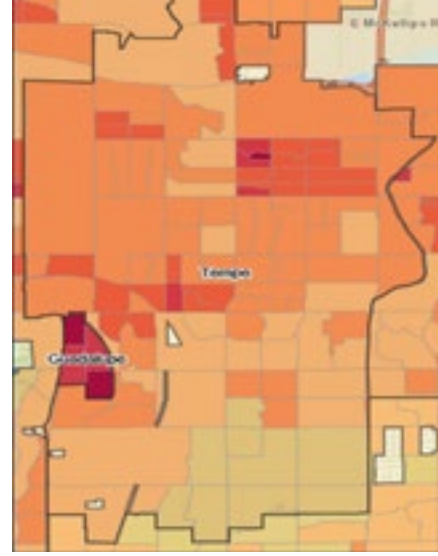


Quality of Life

By making our city more walkable and comfortable, the City of Tempe is ensuring that it is a livable city in the future.



## 4. Emergency Management



Tempe heat map (source: City of Tempe)

## Key Features

Full-time permanent position dedicated to ensuring that Tempe is ready for emergencies and threats

Can coordinate with City staff, residents, schools, nonprofits, and the business community to prepare

Can seek additional funding for projects and research to ensure that the city is lowering the risks presented by extreme heat

Supports Tempe in creating resilience hubs where residents can go during emergencies

## Description

Tempe has an opportunity to hire an Emergency Manager who will be responsible for ensuring that the city is prepared for a wide range of potential threats. A prevention plan for extreme heat could ensure that first responders and residents are prepared for extreme heat days by having water, wearing appropriate clothing, having access to accessible buildings, and staying in air-conditioning when possible. Arrangements can be made to increase the number of cooling centers. The Emergency Manager can work on ensuring that future buildings and city infrastructure are resilient to extreme heat.

## Collaboration

The City of Tempe created a new position for an Emergency Manager in the fiscal year (FY) 19-20 budget. There is an opportunity for the Emergency Manager to support efforts to make the city more resilient to extreme heat by working to prevent deaths and illnesses caused by extreme heat and improving how the city communicates about extreme heat. There is also the opportunity for the new manager to support the creation of more hydration stations, cooling centers, and other mechanisms to ensure Tempe has an effective heat relief program. For this work to be successful, the following partners can support this effort:

### City:

- Providing resources to the new Emergency Manager to build partnerships inside and outside the city to coordinate emergency management efforts
- Coordinating efforts with City staff to ensure Tempe is prepared for extreme heat days by making sure that City buildings and programs support urban cooling

### Arizona State University:

- Continuing to take a holistic approach to emergency management that combines disaster preparedness, resilience, and sustainability
- Hosting workshops to ensure Tempe is working with local and regional partners to prepare for extreme heat



### Residents:

- Coordinating with neighbors to develop heat resilience programs that ensures neighbors work together on urban cooling projects and disaster preparedness training

## Resident Input

Many residents during a public forum agreed that extreme heat is important to consider.

*“Extreme heat is a critical choice.”*

Residents recognize the importance of collaborating with other organizations and cities.

*“How will the city collaborate and cooperate with neighboring cities to achieve this action?”*

## Alignment with Strategic Priorities



Safe & Secure Communities

An Emergency Manager can ensure that public safety is not compromised on extreme heat days.



Sustainable Growth & Development

Increasing the city's capacity to work with resilience will ensure that Tempe is prepared for climate disasters, like extreme heat.



Financial Stability & Vitality

Preparedness and prevention planning can reduce the costs of response and recovery to extreme weather events.

EXTREME HEAT

COMMUNITY ACTION

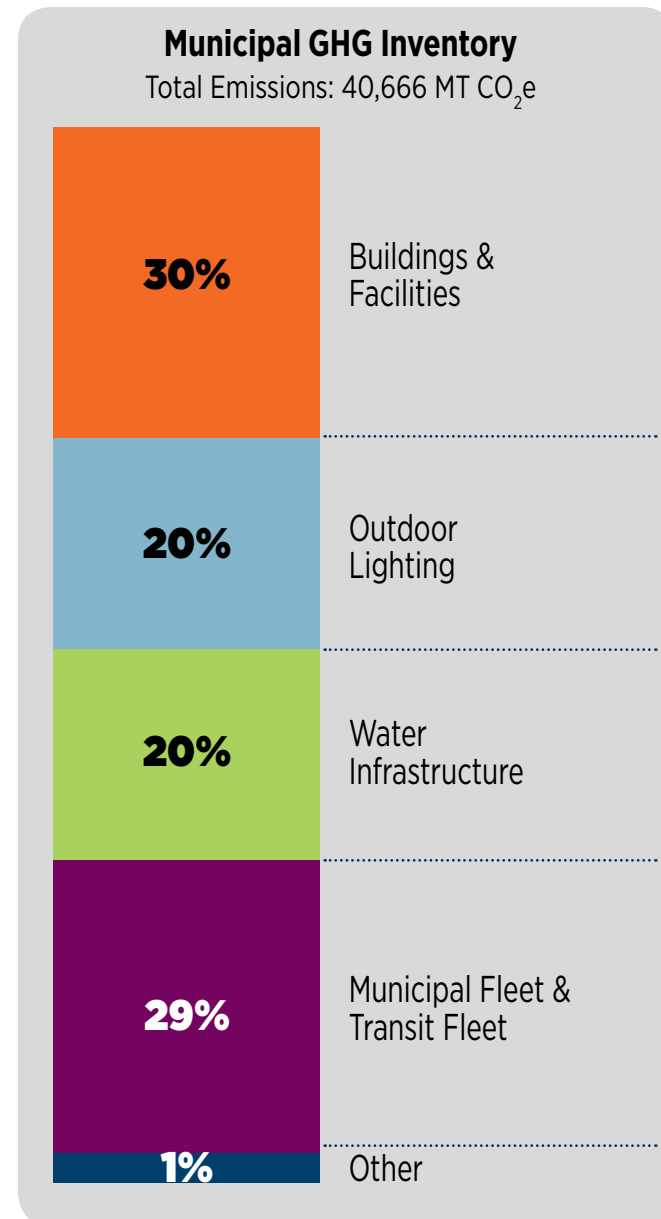
# MUNICIPAL ACTIONS

In addition to the twelve community actions, the city government has considered what actions it can perform to be sustainable and resilient. In 2015, Tempe collected data to form the city's first municipal GHG emissions inventory. This GHG emissions inventory allowed Tempe to identify what operational changes can be made to reduce carbon emissions. The city set a goal of carbon neutrality in municipal operations by 2050 with a strategy of 100% renewable energy by 2035. The following sections provide strategies the city will employ to decrease GHG emissions in city operations.

## Municipal GHG Inventory

In 2015, the total municipal emissions were 40,666 MT of CO<sub>2</sub>e. Approximately 70% of the city's GHG emissions were from electricity production, while roughly 30% of total emissions came from the transportation sector. Tempe currently owns 120 buildings, which accounts for 30% of the city's electricity consumption and GHG emissions. Another prime component of electricity consumption is outdoor lighting, which includes 17,000 streetlights, park lights, and traffic signals. The City of Tempe manages two drinking water treatment plants that consume approximately 22 million kWh of electricity per year, or 20% of the municipal GHG emissions. Tempe's municipal fleet comprises vehicles such as garbage trucks, law enforcement vehicles, field trucks, and code compliance cars. The transit fleet includes city buses and the light rail. Solid waste, signified as "Other", is transported to neighboring cities, specifically Phoenix, for disposal.

Office of Sustainability (2019).  
Municipal GHG Inventory. Tempe, AZ  
(source: City of Tempe)



## Municipal GHG Sources

The following chart describes Tempe's main GHG sources and their percentage of total municipal GHG emissions.

GHG Sources	Percent of Total Municipal GHG Emissions	Description
 City Buildings	30%	City buildings such as the library, city hall, police stations, fire stations, community centers, and office buildings require electricity for lighting, air conditioning, computers and office equipment. Local utilities provide electricity from gas, coal, nuclear and renewable energy sources.
 Outdoor Lighting	20%	The city's streetlights, park lights, path lights, and traffic signals use electricity provided by two local utilities.
 Water Infrastructure	20%	Drinking water is filtered and treated at Tempe's two water treatment plants, then pumped out to provide clean drinking water to businesses and homes throughout Tempe. Pumps, motors, and equipment used in the water treatment process are powered by electricity.
 Municipal Fleet & Transit Fleet	29%	Local buses, police cars, garbage trucks, and other city vehicles burn fossil fuels.

To work toward carbon neutrality in our city, the City can make investments to reduce energy use in city buildings, outdoor lighting, and water infrastructure, while also greening our city fleet. Over the last several years, we have made important investments in city buildings, outdoor lightning, water infrastructure, and the municipal and transit fleet. The City of Tempe intends to invest further in these areas in the next several fiscal years.

## City Buildings:



Tempe Boys and Girls Club (source: City of Tempe)

Tempe has completed the following actions to reduce carbon emissions derived from city buildings:

- Conducted annual assessments of city buildings to determine energy-efficient upgrades for lighting and electrical equipment
- Retrofitted city buildings with new HVAC units to reduce energy demand and the city's carbon footprint
- Installed solar panels at six city facilities to power buildings with renewable energy. The city will continue to make clean energy investments through partnerships with APS and SRP.

Next action to improve sustainability in city buildings:

- Facilities Sustainability Plan: The city is creating a roadmap to identify which long-term energy efficiency investments to make in city facilities.



**NEXT ACTION**

Kiwanis Wave Pool facility (source: City of Tempe)

## Outdoor Lighting:

Tempe has completed the following action to reduce carbon emissions derived from outdoor lighting:

- Converted 4,000 high-pressure sodium street lights to LED street lights.



Kiwanis Tennis Center (source: city of Tempe)

Next actions to improve sustainability in outdoor lighting:

- Street lights: Tempe will continue to replace high-pressure sodium street lights and incorporate LED lights into street lights and path lights.
- Park lights: The city will convert inefficient park lighting to LEDs.
- Facility lights: The city will continue to upgrade exterior lighting to LEDs.



**NEXT ACTION**

LED park lighting (left) (source: City of Tempe)

## Water Infrastructure:



JGM Water Treatment Plant (source: City of Tempe)

Tempe has completed the following action to reduce carbon emissions derived from water infrastructure:

- Researched what equipment and technologies can be changed to lower the energy used to treat and transport water throughout the city.

## Municipal Fleet & Transit Fleet:



EV charging station at Arizona State University (source: City of Tempe)

Tempe has completed the following actions to reduce carbon emissions derived from its municipal and transit fleet:

- Added 20 EVs to the municipal fleet to reduce fossil fuel use.
- Installed 28 EV charging stations at city facilities to encourage accessible access to EV infrastructure.



**NEXT ACTION**

South Water Treatment Plant (source: City of Tempe)

Next action to improve sustainability in the city's water infrastructure:

- Efficiency study: A study is currently underway to assess the city's water treatment plants, wells, and pumps to determine how to optimize water and energy use. The study will provide recommendations for upgrades and improvements at the two water treatment plants.

Next actions to improve sustainability in the municipal and transit fleet:

- Electric vehicle feasibility study: The city is looking at its current electric infrastructure at city facilities to determine what capacity is needed to install future EV charging infrastructure.
- Increase EV purchasing: The city will continue to invest in both electric and hybrid vehicles for the city's fleet, while reducing purchases of fossil-fueled vehicles.
- Transit fleet upgrades: In addition to investments in cleaner forms of transit, Tempe's Orbit and Flash buses are gradually switching to alternate fuels instead of using diesel gasoline. Transit is using compressed natural gas (CNG), which produces far less GHG emissions than conventional diesel fuel.



**NEXT ACTION**

CNG garbage truck (source: City of Tempe)

# Upcoming Investments

Over the next two fiscal years, the city can invest in the following ways to achieve municipal carbon neutrality.

GHG Sources	Percent of Total Municipal GHG Emissions	Municipal Actions	
		FY 2019-2020	FY 2020-2021
 <p>City Buildings</p>	30%	The city will complete the first phase of our facility sustainability plan to identify the next five years of energy upgrades.	Tempe can invest in solar with battery storage.
 <p>Outdoor Lighting</p>	20%	Tempe will invest in LED outdoor lighting in parks, transit projects, and city buildings.	The budget request will reflect a four-year financing strategy for arterial streetlights.
 <p>Water Infrastructure</p>	20%	A water treatment analysis may identify opportunities for energy upgrades.	Possible new energy upgrades in Capital Investment Projects (CIP).
 <p>Municipal Fleet &amp; Transit Fleet</p>	29%	An EV charging station feasibility study will be done to determine which city facilities will add new EV charging infrastructure.  The city will consider new alternative fuel buses.	Up to 30% of the new municipal fleet purchased will be EVs.

## MUNICIPAL ACTIONS

# MOVING FORWARD

## Climate Action Plan 2021 Update

Tempe's 2019 Climate Action Plan (CAP) sets out an initial twelve actions to put Tempe on a path toward community carbon neutrality. The city's journey toward a carbon-neutral future will only accelerate with the adoption of the 2019 CAP. Tempe is already looking to expand and improve on its first CAP with the CAP 2021 Update. Five guiding principles for the CAP 2021 Update have been identified by Tempe's Sustainability Commission and the Office of Sustainability: fiscal responsibility, enterprise, equity, engagement, and effectiveness and evidence. We will work with residents, businesses, and nonprofits to implement the first twelve actions and to create a CAP update that exemplifies these principles. We elaborate these principles here, as a part of Tempe's first CAP, to communicate the City's commitment to climate action that aligns with Tempe's unique character and needs.

### Fiscal Responsibility

Tempe will make investments in emissions reduction and resilience that are financially sound. The City of Tempe will:

- Encourage energy-efficient upgrades to save energy and money
- Prioritize investments with clear financial returns
- Prioritize investments that maximize community benefit
- Provide the cost of inaction when possible
- Consider building the price of carbon into city decision making

### Fiscal Responsibility in Action

The City of Tempe is investigating the use of internal carbon pricing to understand the carbon emissions associated with city decisions. If the City knows the carbon emissions associated with different city decisions, it can opt to select programs and services that reduce emissions and are cost-effective.

### Enterprise

Tempe will focus on the critical role of local businesses in sustaining climate action by investing in and promoting new business practices and the deployment of new technologies. The City of Tempe will:

- Support businesses in prioritizing clean air through investments in clean energy and transportation
- Inform and incentivize businesses to adopt energy upgrades, sustainable transportation, and green infrastructure practices
- Communicate climate action by businesses to attract workers and new businesses who value sustainability
- Incubate new businesses that support climate action



Singh Meadows farmer's market

### Enterprise in Action

The Cities of Tempe and Phoenix have partnered with Arizona State University and Local First Arizona to grow a local food economy that embraces climate action. The project supports Tempe businesses in energy, water, and food practices. This project aims to highlight the role the business community and entrepreneurs can play in tackling carbon emissions and resilience.

## Equity and Engagement in Action

Equity in Action is a Tempe project that works with underrepresented groups to develop and test new policies and programs that make Tempe more equitable. The City of Tempe, in partnership with Vitalyst Health Foundation, funds social justice organizations and community representatives to participate in redesigning city policies and processes to reflect the values and needs of all Tempe residents. Tempe is committed to building city staffs' understanding of the implications of race, culture, and socio-economic status on public processes to advance equitable opportunities for all.

## Equity

Tempe will work to include all voices in city decision making by addressing structural racism and equity challenges in our city. The City of Tempe will:

- Consider people first, and underrepresented groups, in the creation of city programs and policies
- Practice targeted universalism, which means pursuing policies and programs that are targeted at underrepresented groups, but that will create benefits for all of Tempe
- Build a culture of belonging where all people feel like they can influence the future of Tempe
- Foster a culture of radical responsibility, which means working to help our neighbors and improve our local environment
- Prioritize climate actions that create jobs and offer opportunities for professional development.

## Engagement

Tempe will create a climate action plan and a planning process that residents can interact with and understand. The City of Tempe will:

- Conduct neighborhood- and school-focused engagements
- Consider use of Resilience Hub model to engage residents and provide resources for local action
- Employ creative gaming and virtual engagement platforms
- Create a culture of sharing and community support
- Prioritize community-focused solutions



## Effectiveness and Evidence

Tempe will make investments in carbon reduction and resilience to climate change that are effective and evidence based. This will help ensure that actions in the CAP actually reduce emissions and increase our resilience as intended. The City of Tempe will:

- Select evidence-based climate actions known to be effective
- Monitor the impact of climate actions to ensure they have the desired effect
- Use data and research to create argument for building equity and climate action into all decision making
- Partner with Arizona State University to support large-scale research and infrastructure to reduce GHG emissions and increase resilience to the impacts of climate change



## Effectiveness and Evidence in Action

The Health Impact Project, funded by the Robert Wood Johnson Foundation and The Pew Charitable Trusts, is partnering with the City of Tempe and Arizona State University to address extreme heat in Tempe. The project is focused on collecting temperature and public health data during extreme heat days in Summer 2019. The data collected will help inform how Tempe builds future playgrounds, multi-use parks, parking lots, and arterial walls. This pilot project will demonstrate how ASU professors and students can provide evidence for city decision making.

# Glossary

**CAP:** Climate Action Plan; a plan to reduce emissions and make investments in resilience

**CO<sub>2</sub>e:** Carbon dioxide equivalent; a way to translate other greenhouse gases, like methane, sulfur oxides, and nitrogen oxides, into an equivalent amount of carbon dioxide

**Emissions reduction:** Using energy and transportation methods that produce less greenhouse gas emissions than fossil fuel sources

**FY:** Fiscal year; the government's budget from July 1 to June 30 of the next year

**GHG:** Greenhouse gases; gases like carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), sulfur oxides (SO<sub>x</sub>), and nitrogen oxides (NO<sub>x</sub>) that trap heat in the atmosphere

**GHG inventory:** Estimation of the amount of greenhouse gases produced from a community or an organization within a year

**MT:** Metric ton; equals approximately 2,205 pounds

**Resilience:** The ability of a system to thrive after something disrupts it

**Sustainability:** Balancing the environmental, social, and economic needs of today without compromising those needs for tomorrow

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**Want to learn more about sustainability  
at the City of Tempe?**

Check out our website at [tempe.gov/SustainableTempe](http://tempe.gov/SustainableTempe).

For information about Tempe's Sustainability Commission,  
visit [tempe.gov/SustainabilityCommission](http://tempe.gov/SustainabilityCommission).

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