MEMORANDUM

To: Environmental Quality and Sustainability Committee ("EQSC")
From: Urban Heat Island and Tree and Shade Subcommittee
Date: Approved December 7, 2021
Re: Heat Equity Policy

The City of Phoenix ("City") Urban Heat Island and Tree and Shade Subcommittee ("Subcommittee") was tasked with providing a recommendation to the Environmental Quality and Sustainability Committee on the need for a City-wide Heat Equity policy. This memorandum serves to provide the information requested by the EQSC, as well as to any relevant or interested stakeholders or City staff.

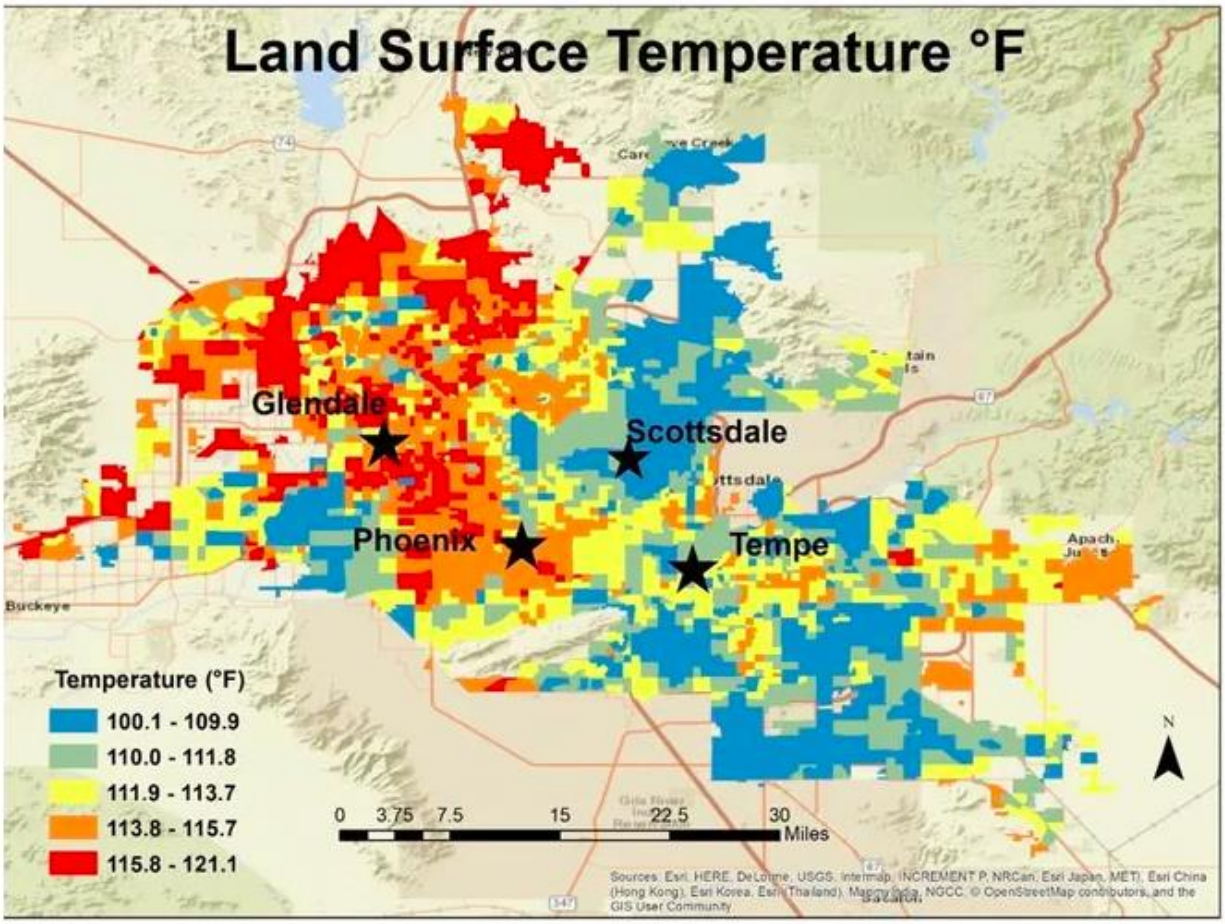
When developing these recommendations, the Subcommittee obtained input from heat experts at Union of Concerned Scientists and utilized expertise from the Subcommittee members themselves.

With temperatures steadily rising year over year, it is more important than ever to create healthier communities by enhancing shade for pedestrians and providing cooling resources for those exposed to the most heat vulnerable areas. It is important that the needs of all residents, including overburdened and underserved communities, disadvantaged communities, and heat vulnerable communities, are considered when executing City programs related to heat relief.

Studies show that heat does not affect everyone in the City equally. Temperatures have been measured between 3 and 5 degrees warmer on average in neighborhoods with large Latino and low-income populations as compared to wealthy areas with predominantly white populations and some Phoenix neighborhoods can be as much as 10 to 13 degrees hotter than others in the summer.[1] Latino neighborhoods often lack tree canopy and associated shade compared with other more affluent parts of the city. Shade can reduce the heat load on the human body by as much as 50 degrees Fahrenheit on hot and sunny days in the middle of summer.[2]

[1] James, Ian. AZCentral. Low-income and Latino neighborhoods endure more extreme heat in the Southwest, stud shows. Available at: https://www.azcentral.com/story/news/local/arizona-environment/2021/03/15/poor-and-latino-neighborhoods-endure-hotter-temperatures-study-finds/6920826002/. March 2021.

[2] Hermosillo, Iris. ASU shade research could help guide urban heat island mitigation strategies. https://www.abc15.com/weather/impact-earth/asu-shade-research-could-help-guide-urban-heat-island-mitigation-strategies August 2021.



Temperatures throughout the Phoenix area on August 22, 2019, as mapped by Jake Dialesandro and other researchers as part of a study of heat disparities in urban areas across the Southwest. *Map Courtesy Of Jake Dialesandro (University Of California, Davis)*

A recent community survey[3] completed in South Phoenix by the Maricopa County Department of Public Health to understand the experience of energy insecurity revealed those with severe and high energy burdens experienced more limitations to the use of their cooling systems and were less likely to have used utility assistance programs. The survey identified the most common reason that residents did not use utility assistance programs was lack of awareness, lack of contact information and assuming they did not meet qualification. Alarmingly, over 40% of those with severe energy burdens reported feeling that their health is at risk due to heat, whereas only 20 percent of those with low energy burdens reported feeling that their health is at risk due to heat.

A 2019 report "Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days" and peer-reviewed study found that increases in potentially lethal heat driven by climate change will affect every state in the contiguous United States in the decades ahead. In the Phoenix metro region, historically there have been 16 days per year on average with a heat index above 105 degrees Fahrenheit. This would increase to 71 days per year on average by midcentury and 97 by the century's end. Limiting warming to 2

[3] Bishop, Tony, MHP, Epidemiology Data Analyst from Maricopa County Department of Public Health. Energy Insecurity Community Survey (Slide Deck Presentation). November 2021. (*Full Report Pending*)

degrees Celsius above pre-industrial levels would cap the frequency of such days at an average of 57 per year on average. These findings emphasize the need for the City to implement swift measures to reduce heat-trapping emissions to limit the frequency of potentially lethal heat days and to protect the health and safety of residents in Phoenix today. The city should work across jurisdictions to ensure that efforts to reduce greenhouse gas emissions are robust and creating a city-wide Heat Equity Policy is one essential piece in protecting residents.

Existing City Goals, Policy, and Recommendations Related to Heat Equity

Phoenix is exploring ways to address the impacts of rising heat in the built environment and add more trees throughout the city via projects like cool corridors and through creative partnerships with NGOs and community organizations. These efforts are expected to continue and increase over the next several years with the creation of the first in the country, publicly funded Office of Heat and Mitigation.

Now, the City of Phoenix has the opportunity to continue demonstration of national and international heat leadership by passing a city-wide Heat Equity Policy.

City of Phoenix and American Forests Memorandum of Understanding on Tree Equity

The City of Phoenix has already officially recognized that heat does not affect everyone equally. In April 2021, the City of Phoenix entered into a partnership with American Forests to work together to achieve "tree equity" by 2030 in order to grow urban forests in heat vulnerable communities. American Forests describes tree equity as making sure all neighborhoods get the benefits trees provide. Through a memorandum of understanding, the City and nation's oldest conservation nonprofit is working with neighborhood groups, nonprofits, businesses and researchers to identify inequities and attract funding to preserve existing trees and plant new ones.

UHITS/EQSC Cool Corridors Recommendations

In June 2021, UHITS and EQSC[4] provided recommendations for the development of a city-wide Cool Corridors Program to the City Manager's office and to Phoenix City Council. These recommendations stressed the need to prioritize heat vulnerable communities and high pedestrian activity/need street segments with city investments in the Cool Corridors Program:

> *EQSC and UHITS urge the city to prioritize the health and well-being of heat vulnerable communities when deciding on strategies to reduce the impact of heat to ensure those most at risk are protected. With input from existing data, residents, and city staff with direct knowledge of communities (such as Neighborhood liaisons within the Neighborhood Services Department), we encourage staff to identify neighborhoods that are the highest priorities for cool corridor investments, recognizing that some places in the city will have much greater needs than others.*

[4] The Cool Corridors Recommendations were unanimously approved by the UHITS Subcommittee on April 6th, 2021 and by EQSC on June 10th, 2021.

Within selected neighborhoods, staff should work with communities and other experts identify the priority/feasibility of street segments for cool corridor investments, recognizing that residents have valuable information on site specific needs and considerations.[5]

EQSC encouraged the Phoenix City Council to take the following actions to guide the development and implementation of a city-wide Cool Corridors Program:

Create and adopt a city-wide Cool Corridors Policy that: 1) supports a holistic approach to creating a network of connected Cool Corridor routes throughout the city, and 2) aligns with the Cool Corridors Program vision contained in these recommendations which prioritize corridor development for populations most at risk from extreme heat and those that may experience a disproportionate impact from heat.

City of Phoenix Climate Action Plan Equity Considerations

On October 12, 2021, the City of Phoenix passed the Climate Action Plan ("CAP").[6] In this Climate Action Plan several goals were set on mitigation of the impacts of extreme heat. This City of Phoenix CAP has been designed as a living document. Implementing the heat related goals without delay, while refining priorities and goals is essential to addressing the life-threatening and economic impacts from loss of work hours due to heat on City of Phoenix residents and surrounding communities.

A significant climate action[7] identified in the CAP is to:

1. Create an inclusive and equitable city, prioritizing investments in previously underserved communities, proactively seeking community input on all major climate policy and related budget decisions and embedding equity in all climate actions.

An example of the CAP Heat goals related to vulnerable communities are listed in Appendix A. In addition, it is noted that Heat Goal 2.7 Coordinate and track the planting of trees to achieve the 25% tree and shade canopy goal will rely on input and recommendations from the UHITS sub-committee will be provided to the EQSC for approval and then will be passed on to City Council.

Goal 2.7 - Coordinate and track the planting of trees to achieve the 25% tree and shade canopy goal. At the direction of the Phoenix City Council, the Environmental Quality and Sustainability Commission (EQSC) created the Urban Heat Island/Tree and Shade Subcommittee (UHITS) with the purpose to evaluate, analyze and recommend policies to address the issues surrounding Urban Heat and to advance implementation of the Phoenix Tree and Shade Master Plan. Input and

[5] Cool Corridors Memo, EQSC, June 10th, 2021

[6] Available at: https://www.phoenix.gov/oepsite/Documents/2021ClimateActionPlanEnglish.pdf

[7] See Page 6 of CAP https://www.phoenix.gov/oepsite/Documents/2021ClimateActionPlanEnglish.pdf

recommendations from the sub-committee will be provided to the EQSC for approval and then passed on to City Council.

The Phoenix CAP Environmental Justice and Equity section also recognizes that some residents experience the impacts of climate change much more acutely than others, and that "black, Indigenous, and People of Color, lower-income individuals, historically underrepresented groups, children and older adults, and those experiencing multiple environmental burdens are disproportionately impacted by climate change." The CAP was written based on the following values related to overburdened and disproportionately impacted communities:

VALUE 1: Equitable Representation - The Climate Action Planning process should provide easily accessible opportunities for any interested person to participate.

VALUE 2: Prioritizing Benefits - Climate Action Planning strategies with the potential to provide benefits to individuals or communities, overburdened communities should be prioritized.

VALUE 3: Economic Impacts - Climate Action Planning strategies should reduce costs, including currently externalized costs, and increase economic benefits for overburdened communities wherever possible.

VALUE 4: Health Impacts - Climate Action Planning strategies should minimize negative health impacts and increase health benefits for disproportionately impacted communities.

VALUE 5: Access to Solutions - Climate Action Planning strategies should promote clean technologies in ways that are equitable for all living in Phoenix.

VALUE 6: Building Resilience - Climate Action Planning strategies should improve resilience and quality of life for overburdened[8] communities.

UHITS Recommendations for a City-wide Heat Equity Policy

UHITS recommends that the City of Phoenix develop and pass a Heat Equity Policy that would serve as the framework for ensuring that heat relief investments are equitable and just. The City should continue to build upon current work to measure population vulnerability to urban heat and build upon current strategies such as cooling stations, cool corridors, cool roofs, and tree/shade to mitigate the risk to the most vulnerable and impacted residents. This should include a clear definition of "heat vulnerability" and "vulnerable communities."

[8] According to the Phoenix 2021 CAP, "Overburdened communities are, as defined by EPA: Minority, low-income, tribal, or indigenous populations or geographic locations in the United States that potentially experience disproportionate environmental harms and risks. This disproportionality can be as a result of greater vulnerability to environmental hazards, lack of opportunity for public participation, or other factors. Increased vulnerability may be attributable to an accumulation of negative or lack of positive environmental, health, economic, or social conditions within these populations or places. The term describes situations where multiple factors, including both environmental and socio-economic stressors, may act cumulatively to affect health and the environment and contribute to persistent environmental health disparities."

A citywide Heat Equity policy would ensure that equity and justice are at the forefront of all heat-related policies to make sure the measures are accessible and feasible for all residents, and are equitable for vulnerable residents. Designing and implementing policies by consulting community experts, including residents who live or work in the most vulnerable communities, is essential to ensuring success at protecting all communities from the impacts of heat.

A city-wide Heat Equity Policy could serve to embolden the City to take the following robust action related to wholistically addressing heat in overburdened and disproportionately impacted communities:

- Work with ASU and AZDHS to assess the burden of chronic heart, lung, and kidney disease on indoor and outdoor workers due to exposure to extreme heat.
- Monitor Emergency Room and hospitalization data (and death certificate data) to determine the impact of extreme heat and if current mitigation efforts are making a difference. Coordinate with AZDHS and th CDC on the Building Resilience Against Climate Effects (BRACE)[9] framework that allows health officials to develop strategies and programs to help communities prepare for the health effects of climate change.
- Prioritize albedo increase applications in neighborhoods where population vulnerability to extreme outdoor heat is highest. Recent research in urban areas of Maricopa County has shown that deploying cool roofs in areas with the highest population heat sensitivity is 3-5 times more effective than either deploying cool roofs equally throughout the urban area or in areas with low population sensitivity to heat (Broadbent et al 2021[10])
- Existing City of Phoenix programs for emergency utility assistance (Human Services Department) and home weatherization (Neighborhood Services Department) have US citizenship requirements that render ineligible many of the most heat-vulnerable Phoenicians. Heat mortality and morbidity do not discriminate based on immigration status; neither should programs to assist the most vulnerable community members. The City should extend eligibility for the emergency utility assistance and home weatherization programs to all persons residing in Phoenix regardless of immigration status.
- Work with community leaders and residents to design programs (one example is New York City's Be A Buddy Program) to check on neighbors and vulnerable residents during high heat days and to inform residents on the health risks of extreme heat, the symptoms of heat-related illnesses, and when and how to seek medical attention.
- Explore rainwater diversion programs that will provide water capture on low income residents' yards allowing trees and landscaping for those that cannot afford to pay for city water.

[9] CDC BRACE website: https://www.cdc.gov/climateandhealth/BRACE.htm

[10] UCS Paper Available at https://www.sciencedirect.com/science/article/abs/pii/S0048969721064044?via%3Dihub

- Continue to prioritize housing for the homeless and wellness checks during high heat days.
- Encourage the use of heat resistant building materials.
- Work with community leaders and residents to develop local/neighborhood strategies for addressing heat, including protecting established and mature existing trees, planting more trees, and establishing shaded walking paths in high pedestrian areas and around public transit stops.
- To protect public and private sector outdoor workers from extreme heat, the City should enact (occupational safety equivalent of OSHA) protections aimed at reducing workplace injuries, illness, and fatalities due to extreme heat. Some safety measures include regular paid breaks in cool or shaded environments, access to water, emergency response protocols for employees suffering from heat illness, proper training for employers and employees on heat stress illness and prevention, and access to protective clothing. Measures should also be taken to ensure that workers in indoor occupations who experience extreme heat temperatures and/or lack of cooling systems have access to breaks, cool spaces, and water. These protections should be available to workers regardless of immigration status, accessible to workers in their language of origin, and clearly state that workers will face no retaliation.
- The City should consult public health officials, workers and worker centers, worker-led non-governmental organizations, occupational safety and health experts, to design protections for workers from extreme heat.
- These worker protections are essential. A Union of Concerned Scientists peer-reviewed article[11] and report finds that:
    - One in five adults employed in Maricopa County has a job that requires a high degree of outdoor work.
    - Maricopa County has historically had the highest exposure of outdoor workers to extreme heat of any county in the contiguous US ("exposure" here is defined as person-days per year, or the multiple of the number of outdoor workers times the number of days per year with a heat index above 100 °F).
    - By midcentury, outdoor workers in Maricopa County are projected to lose between 22 and 27 workdays per year because extreme heat would create unsafe working conditions--that's compared to about 9 days per year historically.
    - As extreme heat becomes more frequent and more severe, outdoor workers' earnings in Maricopa County would be increasingly at risk. By midcentury, outdoor workers could lose 9-11% of their earnings because of dangerous

[11] Too Hot To Work Article by Union of Concerned Scientists (2021): https://ucsusa.org/resources/too-hot-to-work

working conditions. Collectively for the county, that amounts to $2.0-$2.3 billion in lost earnings every year.

- People identifying as Hispanic or Latino are disproportionately represented in outdoor occupations in Arizona. Nearly half (48%) of all outdoor workers in the state identify as Hispanic or Latino despite comprising roughly 32% of the population.

Appendix A

City of Phoenix Climate Action Plan - Goals Related to Heat Vulnerable Communities

Goal 1.1 Develop walkshed mapping tool to identify key pedestrian corridors and priority routes for adding shade in vulnerable neighborhoods and increase shade provided by trees or constructed shade. A next generation Walkshed mapping tool, based on the principles of a model developed by Harvard students studying in Phoenix, is being developed in partnership with ASU to identify key pedestrian corridors and priority routes for adding shade in vulnerable neighborhoods. The tool considers zero car households, proximity to schools, shopping and transit, and identifies the most likely routes or "walkshed" that pedestrians would likely take in a given neighborhood. The tool is being piloted in 2021 and will be used to select corridors for implementing priority tree and shade elements.

Goal 1.2 - Update Phoenix's Walkable Urban Code to include additional heat mitigation standards. The Walkable Urban Code is applicable to and regulates some development within Transit Oriented Development Districts and in proximity to high-capacity transit. Additional heat mitigation standards are being considered to be included in the code, along with the current shade requirements

Goal 1.3 Achieve "Tree Equity" where all of Phoenix's neighborhoods will reach a minimal standard of tree canopy cover that is feasible and appropriate for the city's desert climate and conditions by 2030. A new MOU with American Forests signed in 2021 hopes to achieve "Tree Equity" where all of Phoenix's neighborhoods will reach a minimal standard of tree canopy cover that is feasible and appropriate for the city's desert climate and conditions by 2030. Tree Equity is the term American Forests trademarked to raise awareness about the need to address historic disparities in tree canopy in cities throughout the United States. The current Tree Equity Score for each neighborhood can be viewed at treeequityscore.org

GOAL 2 TARGET 2 Increase shade provided by trees or constructed shade in 'flatland parks' (not preserves) and street rights-of-ways to achieve a 25% tree and shade canopy in pedestrian areas by 2030, prioritizing communities most vulnerable to heat, particularly within and connecting to Transit Oriented Development Districts, Village Cores, and Centers.

Goal 2.3 Implement Project sunBLOCK, which includes permanent and temporary public art microclimates. Project sunBLOCK is composed of permanent and temporary public art microclimates that lower the intense heat confronting pedestrians along key corridors in two of Central Phoenix's hottest neighborhoods by 2023. The project brings community, artists, designers and environmental specialists together to create designs that both visually and physically cool transit stops and surrounding streetscapes.

Goal 2.4 - Continue to implement the Tree and Shade Master Plan to establish 25% tree and shade canopy in streets and pedestrian areas by 2030. The Tree and Shade Master Plan launched in 2010 with a vision to double the tree and shade canopy by 2030. The Tree and Shade Master Plan implementation is supported by over $5 million in annual funding to city departments as part of a city-wide program with over 4,000 trees now being planted annually on city streets, parks and rights of way. This goal is further supported by the tree planting as part of the cool corridors with an additional 1,800 trees per year and an additional 1,000 trees per year through public donations for a total anticipated tree planting of 6800 trees annually.

Goal 2.6 - Increase shade at public transit stops in the city. An overarching goal of the T2050 plan was to provide all residents in the city with accessible transit and build ridership. Within that goal is the element to provide shade at all 4,050 bus stops in the city. Currently, 2,680 of those bus stops have constructed shade structures.