

**Healthy Urban Environments (HUE) Initiative
Arizona State University**



Project Update: Fourth Quarter, 2020

Date of Report: April 30, 2020

Project Overview

As outlined in the Healthy Urban Environments (HUE) Initiative proposal, ASU has launched HUE as a solutions-focused research, policy and technology incubator to rapidly develop, test and deploy heat-mitigation and air-quality improvement strategies and technologies. This will be accomplished through four project components: 1) research, solutions and innovation incubator; 2) communication, networking and solutions hub; 3) implementation and evaluation of new insight in real world contexts; and 4) public, workforce and management education and capacity building. The schedule for delivery of each component as proposed is shown below; we will report on progress for each of these components separately in the following pages.

HUE Work Plan - Gantt Chart	Project Year	1				2				3			
	Calendar Year	2019				2020				2021			
	Project Quarters	1	2	3	4	1	2	3	4	1	2	3	4
Communication, networking and solutions hub													
Convene ASU heat and air quality researchers													
Create Network of Concerned Parties and Advisory Council													
Aggregate relevant plans from local and external entities													
Research, solutions and innovation incubator													
Laboratory Investigations - Year 1													
Laboratory Investigations - Year 2													
Laboratory Investigations - Year 3													
Pilot Field Experiments													
Model Proposed Interventions													
Behavioral Research on Perceptions of Heat and Air Quality													
Implementation and Evaluation													
Scale-up of Proposed Interventions													
Evaluate Changes of Perceptions													
Public, workforce, and management education + capacity building													
Workforce, Public, and Management Educational Programs													
Share Solutions for Relevant Stakeholders													
Offer Training for New Jobs													

Figure 1. Gantt Chart for ASU Healthy Urban Environments project deliverables.

1. Research, Solutions and Innovation Incubator

Overview:

ASU will develop a research, solutions and innovation incubator to test novel heat and air pollution mitigation technologies; deploy field demonstration projects to quantify the heat and air quality mitigation effectiveness; and modeling projects to simulate the impact of heat and air quality mitigation approaches.

April 30, 2020 Status:

For the second year of investments, HUE convened our Network of Concerned Parties and solicited concepts as reported in our last quarterly report. Based on that workshop, we issued a formal Request for Proposals for projects either led-by or with strong engagement from the stakeholder community as well as leading researchers from ASU. Proposals were due February 14, 2020 and we received 17 submissions. We identified nine projects that fulfill HUE's mission of leading solutions-based projects to help mitigate urban heat and air quality. These nine projects are summarized below.

Benefits of Reflective Parking Lot Coatings for mitigating heat in Maricopa County Arizona State University and Maricopa County Facilities Department

The development of Maricopa County with widespread impervious surfaces has contributed to the urban heat within the city. Municipalities have begun to experiment with heat mitigating grey-infrastructure such as reflective asphalt coatings to lower urban temperatures. Maricopa County will apply a reflective asphalt emulsion sealcoat to 50% of a recently asphalted downtown parking lot. The first phase of the project will measure the surface energy balance and near-surface temperatures before and after coating application. The second phase will simulate widespread implementation of reflective coatings for the total parking lots in Maricopa County. The final phase is a benefit-cost analysis of the various application scenarios across Maricopa County. The findings from this research will guide future implementation of reflective coatings.

Heat maps for Decision Making:

City of Tempe and Arizona State University

The Tempe Heat Intervention Mapping project will result in “desktop” ready tools that compile existing data for decision-making in the context of urban heat. This tool will provide support for the 2021 Climate Action Plan update and include an integrated heat map at the macroscale for larger spatial scale planning and microscale for targeted, human-scale design projects. The project also includes the production of educational videos and heat training materials for city staff and residents, and community heat walks.

Heat Ready Schools:

Arizona State University and Paideia Academies

High temperatures affect student behavior and cause students to be listless, fatigued, and restless, which impacts their educational environment and potentially compromises learning. Playgrounds and schoolyards have minimal shade and higher surface temperatures, creating

miniature urban heat islands. Capitalizing on the City of Phoenix “HeatReady” program underway, this research targets schoolchildren and heat preparedness within schools to mitigate high temperatures and health concerns. The goal is to create an evaluation tool for “HeatReady Schools” whereby Heat Ready Schools are those that are increasingly able to identify, prepare for, mitigate, track, and respond to the negative impacts of heat.

Hydro Hats:

Arizona College Prep/Erie High School and Arizona State University

The Arizona College Prep-Erie High School student led team developed a prototype for identifying heat related illness symptoms that is a wearable device, the “HydroHat.” Proof of concept for this detector system was completed in 2019 with the Arizona College Prep-Erie High School football team using a commercially available wicking cap. Temperatures taken before and after a 2 minute run showed a decrease of 2F. The HydroHat is a sensor integrated version of the wicking cap that links to a mobile app for real-time viewing. Prototypes will be built and tested on student athletes to determine efficacy and app messaging.

Raising awareness about extreme heat in Maricopa County Manufactured/RV Homes:

Maricopa County Health Department

Mobile home residents are at increased risk for extreme heat; 23% of indoor deaths occur in trailer/RV/mobile homes. Currently, mobile home communities comprise 6% of all homes in Maricopa County. Two workshops for residents, community partners, volunteers, and researchers will be held to highlight heat safety and precautionary behaviors. Surveys will be administered at both workshops will measure behavior modifications, heat perception, and barriers to cooling. A toolkit highlighting mobile home-specific adaptations, mitigations, and resources will be developed based upon research findings.

Measuring the Urban Canopy and Cool Corridors:

City of Phoenix and Arizona State University

The City of Phoenix, through the Tree and Shade Master Plan, has a goal of increasing the tree and shade canopy by 25% by 2030. Using remote sensing software, eCognition, the Phoenix Water Department is able to forecast water demand by identifying water-intensive landscaping. The resulting GIS shapefile will illuminate the existing tree inventory. This will be compared to the ASU WalkShed model (which identifies high-pedestrian corridors) to prioritize tree planting projects within the city. A visualization tool will be developed for use on Phoenix’s Open Data platform, ASU’s Heat and Air Quality Repository, and the Arizona Environmental Public Health Tracking network’s data portal.

Shading the Walkshed to create a healthier urban environment:

Valley Metro and Arizona State University

According to Valley Metro’s 2019 Origins and Destinations Survey, 58 percent of light rail transit (LRT) riders have access to a car but choose to ride transit, and 73 percent of riders walk the whole way to the LRT platform. Since the light rail opened in 2008, Valley Metro consistently sees trends where light rail ridership peaks in April and October, then declines in June and July, questioning if the summer heat is bringing people back to their cars, and

how this trend might be exacerbated as temperatures rise. There are no shading requirements for pedestrian routes to LRT stations; surrounding areas are city owned and not under the purview of Valley Metro. The goal of this project is to determine the costs and benefits of shading the walk shed near LRT stations using three different shading methods: shade structure, tree coverage, and shade from high rise buildings. Using surveys, walkshed air temperature readings, and measurements of the impacts of additional shade structures, the findings will be recorded in the Urban Design Guidelines to assist cities in planning pedestrian friendly transit infrastructure.

Teleworking:

Arizona State University, Arizona Department of Environmental Quality, City of Phoenix, City of Tempe, and Valley Metro

Maricopa County has exceeded the federal health standards for ozone over a dozen times in 2019, burdening residents' health and increasing financial costs for businesses due to the non-attainment status. Telecommuting is a proven strategy for businesses seeking to reduce employee drive-alone vehicle emissions. This project will develop a telecommuting toolkit that contains a concise, graphical guide for Human Resources departments seeking to develop telecommuting programs. The toolkit will be developed using best practices from existing telecommuting programs in Arizona and the U.S., focus groups with Human Resource representatives, and surveys. As the notion of teleworking has changed dramatically in the last two months, we are revisioning how this project will proceed in the current environment where travel-restrictions are now the norm and not the exception.

Zoo Parking:

City of Phoenix, Arizona Center for Nature Conservation/Phoenix Zoo and Arizona State University

The City of Phoenix, in cooperation with the Arizona Center for Nature Conservation/Phoenix Zoo, is retrofitting and expanding the parking area used by the Zoo. The parking lot redesign includes features to address heat and storm water issues by using shade trees, storm water swales, and increased shade structures along pedestrian pathways. Using matching funds from the City of Phoenix and the private sector, improvements will be installed in 2021. The project will evaluate both pre and post conditions in the parking areas using ASU heat mapping approaches and water quality monitoring equipment.

2. Communication, Networking and Solutions Hub

Overview:

Arizona State University (ASU) will convene workshops to share mitigation approaches, initiate new inquiries to expand on urban heat and air quality improvement strategies, and provide summative reports on relevant community strategies for interventions for urban heat and air quality.

April 30, 2020 Status:

First, HUE as a central convener of local stakeholders to address the common challenge of improving local communities as they address urban heat and air quality, requires a dedicated project manager who is passionate to this mission. Unfortunately, our prior project manager had to relocate for personal reasons. HUE is very excited to announce that Liza Oz-Golden has been recruited as the new HUE project manager. Liza has a strong background in urban planning and was recruited to HUE from the Maricopa County Department of Public Health. In Public Health, she was an integral member of the team addressing health impacts from extreme heat. With this experience, she brings to HUE a wealth of knowledge, experience and strong links to local stakeholders. Beyond that, she is incredibly passionate about improving the lives of local community members and is quickly becoming the keystone of the HUE communication, networking and solutions hub.

HUE has also been an active participant in the newly formed group, Arizona Resilience and Preparedness for Extreme Heat Coordination and will assume a leadership role in May 2020. The purpose of this group is to provide better coordination among Maricopa Association of Governments, Emergency Management, Arizona's major cities, health departments, the National Weather Service, and non-profits that provide heat relief. Messaging, water bottle collection, and siting and operation of cooling centers are discussed within the context of COVID-19 social distancing measures and best practices are being shared. HUE is supporting a graduate student who will be conducting interviews with city personnel from various departments including emergency management, neighborhood services, and sustainability/environmental, to gain deeper insights into summer heat health management as well as maintaining a webpage and disseminating information to participants.

3. Implementation and Evaluation of New Insights in Real World Context

Overview:

ASU will test new solutions developed as part of HUE; conduct surveys and in-depth interviews with community members; and enable Technology Transfer and Intellectual Property licensing on all projects sponsored by HUE.

April 30, 2020 Status:

The coronavirus pandemic has challenged our economic, social, and cultural systems, dramatically changed our daily lives, and created added uncertainty to future plans. At the HUE, we are committed to protecting the health and safety of our community of researchers, innovators, and stakeholders. We are concerned about the impact of increasing urban heat during social distancing requirements and the greater vulnerability to COVID-19 for those in areas of poor air quality especially in the upcoming hot summer months.

The mission of HUE, though unchanged, becomes more significant and urgent.

HUE is committed to improving thermal comfort and decreasing air pollution exposure for all residents and communities in Maricopa County. We are striving to serve as a nationally recognized model for creatively managing urban heat and air quality. HUE remains a research,

policy and tech incubator that rapidly develops, tests, and deploys heat-mitigation and air-quality solutions.

The concepts initially proposed for HUE's second year are all still relevant for this mission. However, some of these new projects, adding to the portfolio of eight projects funded last year, may be delayed or be required to adjust their scope; however, none of the projects funded by HUE have been derailed due to the COVID-19 pandemic.

4. Public, Workforce, and Management Education and Capacity Building

Overview:

ASU will enable capacity through development and implementation of workshops aimed at stakeholders and community members; create online modules to be integrated into existing ASU outreach programs; and develop material for new workforce training programs.

April 30, 2020 Status:

We had originally planned a workshop for late spring/early summer to discuss strategies for heat adaptation with local communities. In light of the current conditions, this has been shelved. As an alternative, the project team at HUE has started initial discussions on a webinar workshop to discuss urban heat and the impact of the covid pandemic on community response to heat interventions. As many local agencies rely on communal cooling centers and water distribution during summer months, HUE seeks to convene local stakeholders to discuss alternative strategies to accomplish this objective while observing social distancing guidelines. We anticipate a more complete discussion of this effort in the next quarterly report.