

Oklahoma City Jurisdictional Scan

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Prepared for the City of Oklahoma City by CAPA Strategies

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Background & Introduction

The jurisdictional scan is a comprehensive review of existing codes, plans, and policies governing Oklahoma City (OKC) that are potentially relevant to heat mitigation and adaptation. This review aims to identify the goals and requirements that could facilitate or hinder the City's efforts to address the urban heat island (UHI) effect. The Jurisdictional Scan Report provides a synthesis of current conditions in OKC and illuminates gaps, barriers, and opportunities germane to heat action. This information may guide the City towards actions that align with existing plans and policies, and offer insight into "UHI Adaptation & Mitigation Levers" to advance heat resilience locally.

Jurisdictional Scan Process

The jurisdictional scan process involves systematic examination of existing documents directly or indirectly linked to urban heat conditions and heat resilience (Table 1). These documents, many of which were provided by the OKC Office of Sustainability, encompass comprehensive plans, reports, codes on the natural and built environment, and cross-cutting materials with explicit or implicit relevance to the topic of UHI mitigation and adaptation. The scan includes a broad spectrum of content, including municipal ordinances, community assessments, emergency protocols, and sustainability goals.

Table 1: List of documents and materials reviewed during the jurisdictional scan process

Plans (Comprehensive, hazard mitigation, functional, climate/sustainable, neighborhood)
<i>Oklahoma City Metropolitan Area Tree Canopy Assessment (2019)</i>
<i>Oklahoma County Hazard Mitigation Plan (2019 update)</i>
<i>City of Oklahoma City, Hazard Mitigation Plan (2022 update)</i>
<i>City of Oklahoma City, Emergency Operations Plan (2023)</i>
<i>Ozone Alerts Days (2022)</i>
<i>planokc (2020)</i>
<i>greenokc (2020)</i>
<i>adaptokc (2020)</i>
<i>So8th: A Community Vision (2023)</i>
Municipal Ordinances and Codes
International Building Code (2018)
International Energy Conservation Code (2009)
OKC Municipal Code, Chapter 38: Parks Recreation, Cultural Affairs, Etc.
OKC Municipal Code, Chapter 59: Zoning and Planning Code
Other assessments and summary reports
<i>Lynn Lifestyle Summary - Northeast Oklahoma City (2016)</i>
<i>Cost of Nonattainment Study for the Oklahoma City Area</i>

After appropriate documents and materials were identified with the help of the OKC Office of Sustainability and through supplemental research, they were categorized according to type. Possible categories include comprehensive plans, sustainability plans, functional plans, climate/sustainability plans, neighborhood plans, zoning ordinances and codes, and emergency protocols. Each type was then reviewed for direct references to urban/extreme heat; specific goals or actions related to heat mitigation or adaptation; and indirect references to heat-adjacent content such as urban forestry and greening, or public health and transportation. Attention was paid to identifying strengths, weaknesses, gaps, and opportunities for effective and equitable interventions. This approach aims to ensure a comprehensive understanding of jurisdictional frameworks and facilitate informed decision-making to enhance community heat resilience and well-being.

Results

This section provides a fuller description of the documents and materials reviewed (as listed in Table 1), and identifies “UHI Adaptation & Mitigation Levers” (Table 2). These “levers” refer to linkages with urban heat and identify potential pathways to mitigation or adaptation solutions. Provisions, strategies, and actions that could advance heat mitigation or adaptation are highlighted, as are objectives and actions that could hinder heat resilience efforts. This serves the purpose of identifying gaps and opportunities related to urban heat in OKC, thereby informing future policy decisions and intervention strategies.

Table 2: Results of the jurisdictional scan and UHI levers

Plans & Guidance Documents		
Document	Description	UHI Adaptation & Mitigation Levers
<i>Oklahoma City Metropolitan Area Tree Canopy Assessment (2019)</i>	<p>This is a comprehensive assessment of the extent and health of tree canopy cover across the broader Oklahoma City metropolitan region, as well as benefits of urban canopy.</p> <p>The assessment identifies and quantifies the area’s land cover, while focusing on environmental benefits such as energy savings, air and water quality improvements, stormwater interception, urban heat island mitigation, quality of living, and other socioeconomic enhancements.</p>	<p>Area-wide tree canopy coverage in OKC is 22.4% with a maximum potential for 59.1%. Canopy coverage is 10% lower in urbanized areas while the impervious surface coverage is 30% higher. This points to an area of need for urban canopy, as well as a potential barrier as impervious surfaces may be difficult to de-pave and plant.</p> <p>The assessment identified potential planting locations across the municipal area to alleviate UHI impacts and recommended a strategic focus on tree planting priorities in the areas that lack enough canopy coverage. Important areas for planting include parks, trails, sidewalks, and open space.</p> <p>The assessment found nearly 65 million trees that are providing nearly \$150 million in environmental benefits; a quantifiable economic impact of urban canopy which may help make the case for future expansion.</p>
<i>Oklahoma County Hazard Mitigation Plan (2019 Update)</i>	<p>The overarching plan outlines mitigation strategies to reduce the impact of hazards, including extreme heat, on the community. It involves in-depth assessment of the risks and vulnerabilities the community faces, as well as identifying specific actions and projects to mitigate those risks.</p>	<p>Noted in the plan: The State of OK has recognized heat as a “hazard of concern.”</p> <p>The County plan identifies heat-vulnerable populations that may be the focus of future outreach and public health campaigns:</p> <p>(1) the elderly; (2) infants and children up to four years of age; (3) individuals who are physically ill (e.g., heart disease or high blood pressure); (4) low-income persons that cannot afford cooling; and (5) the general public who may overexert during work or exercise during extreme heat events.</p>

		<p>The following broad mitigation goals and accompanying objectives can be leveraged to support UHI mitigation and climate adaptation efforts:</p> <p>Goal 1: Emergency Services “Improve the ability of the emergency services providers to respond to events and to aid in the overall recovery of the community.”</p> <p>Goal 2: Prevention “Prevention measures are intended to keep a hazard risk problem from occurring or getting worse. They help ensure that future development does not increase hazard losses.”</p> <p>Goal 4: Protection of Life and Property “This goal is associated with the implementation of activities that protect citizen life and property...”</p> <p>Goal 5: Public Awareness and Partnerships “Promote coordination and communication between individual citizens, private businesses, public agencies and non-profit organizations...”</p> <p>Specific mitigation actions noted, informed by the goals above, include:</p> <ul style="list-style-type: none"> • Prevention (of hazard losses) • Public education and awareness • Natural resource protection • Emergency services <p>Example applications for UHI mitigation:</p> <ul style="list-style-type: none"> • Consider ‘best-practices’ to prevent heat-related losses when updating comprehensive or public health plans. • Launch robust heat awareness and education campaigns for residents. • Update zoning laws to prioritize natural resource protection, open space preservation, and stormwater management. • Direct funds toward heat emergency response strategies such as public cooling centers.
<p>City of Oklahoma City, <i>Hazard Mitigation Plan</i> (Update 2022)</p>	<p>This is a comprehensive assessment of natural hazards facing OKC and derives information from the Oklahoma County Hazard Mitigation Plan update (2019). Content includes information on vulnerabilities, impacts, and mitigating actions. Extreme heat is included as a hazard and is described according to extent, probability of future events, and vulnerability and impacts.</p>	<p>Mitigation actions that pertain to extreme heat:</p> <p>Mitigation Action 15: Non-governmental Organizations (NGO) provide fans and bottled water to vulnerable populations during periods of extreme heat.</p>

		<p>Mitigation Action 31: Using a variety of methodologies, educate and inform employees, residents, businesses, and visitors about natural hazard risks and vulnerabilities with the goal of increasing the community's resilience.</p> <p>Mitigation Action 32: Increase the receipt of alerts and warnings for natural hazard events by people with disabilities, vulnerable populations, and low-income individuals.</p> <p>Mitigation Action 16: Calls for construction of canopies over parking facilities to protect against hail. Canopies that provide shade may also reduce UHI.</p> <p>There are relatively few heat-related mitigation actions identified (3), especially compared to the number of actions identified for flooding (13). OKC might aim to integrate heat mitigation projects with flood mitigation efforts which may be considered more important or fundable.</p>
<p>City of Oklahoma City, <i>Emergency Operations Plan</i> (2023)</p>	<p>The plan provides a framework through which the city prepares for, prevents, responds to, and recovers from the impacts of major emergencies that could adversely affect the health and welfare of residents. Extreme heat is identified as a hazard with high probability and high risk.</p>	<p>Within Annex: Public Protection & Evacuation, the following is noted: "Extreme heat and drought are common throughout Oklahoma, but have not required large scale evacuations. At-risk residents without air conditioning may be relocated to local shelters during periods of extreme heat."</p> <p>The above is the only heat-specific recommendation provided in the Emergency Operations Plan and it is recommended that a more detailed heat emergency response protocol be established. This might include strategies for outreach to high-risk residents, opening misting/cooling/watering stations, distributing resources to and/or checking on homeless residents. However, these actions are not currently indicated in the Emergency Operations Plan, which may pose a challenge to implementation.</p>
<p><i>Ozone Alert Days</i> (2022)</p>	<p>This information from the Association of Central Oklahoma Governments (ACOG) provides guidance related to air quality and how to reduce pollution.</p>	<p>Specific strategies that are suggested by ACOG to reduce air pollution may also be useful on very hot days, when air pollution is often at its worst. Noted strategies include not idling the car, driving less, and conserving energy by setting air conditioners to a higher temperature.</p> <p>Heat is not specifically mentioned in this guidance. However, because air pollution is a significant concern in OKC, look for intervention options that address heat and air pollution at the same time; for example, increased vegetation, traffic calming, and home weatherization so that ACs can be safely set to a higher temperature/run less intensively.</p> <p>An additional <i>Cost of Non-Attainment</i> study conducted by ACOG in 2022 found that ozone nonattainment poses significant risks to public health,</p>

		<p>particularly affecting individuals with respiratory conditions, cardiovascular issues, and outdoor workers. Again, heat and air pollution are closely linked and there are opportunities to address both simultaneously. If air pollution/respiratory health messaging is more familiar or effective locally, framing interventions around air quality may offer a pathway for introducing complementary heat mitigation or adaptation strategies</p>
<p><i>planokc</i> (2020)</p>	<p>This is OKC's first new comprehensive plan since 1977 and is the foundation for policy, infrastructure, and planning decisions.</p> <p>In addition to the <i>greenokc</i> component reviewed below, Chapter 2 and Chapter 3 of this plan are particularly relevant to UHI mitigation and adaptation.</p>	<p>Four goals identified in <i>Chapter 2: Development Guide</i> can be directly leveraged to support UHI mitigation and adaptation efforts:</p> <p>G-6: "Strive to preserve natural open spaces, including native prairies, and re-plant native vegetation to take advantage of their drought tolerance and deep root structures that slow and adsorb stormwater runoff and reduce erosion by anchoring the soil.</p> <p>G-26: "Preserve mature, healthy trees and incorporate them into the design of new development or redevelopment projects to the greatest extent possible. Include provisions and best management practices to ensure proper tree protection throughout the construction process."</p> <p>G-29: "[Promote] the use of building and roofing materials that reduce heat island effects."</p> <p>E-31: "Incorporate natural features (such as ponds, lakes, streams, rock outcroppings, stands of mature trees, and/or sizable individual trees) into the design of all residential, commercial, and industrial projects</p> <p>Development policies for medium and high intensity urban areas include references to pedestrian connectivity, increasing bicycle routes and sidewalks.</p> <p>Chapter 3: Infrastructure and Investment calls for "livable streets" which include options for multi-modal transportation such as walking, cycling, and public transit. This sets a foundation for future street development that encourages active transportation and reduces the use of personal vehicles, which contribute to the UHI effect.</p>
<p><i>greenokc</i> (2020)</p>	<p>This is the environmental and natural resources component of <i>planokc</i>. This is a strong foundation upon which to build future UHI mitigation or adaptation projects and plans, especially those that rely on a tree-based on green space-based strategy.</p>	<p>The <i>greenokc</i> component of <i>planokc</i> is heavily focused on strategies to maintain the natural environment, improve green building practices, and directly or indirectly mitigate UHI.</p> <p>Specific points that are relevant to this topic include: limiting the amount of total impervious area (TIA) by increasing density; implementing policies that decrease or remove parking requirements in non-urban areas; and incentivizing green roofs and rainwater collection processes. The plan also offers support for energy efficiency and alternative energy systems.</p>

		<p>Initiatives most relevant to UHI measures and the corresponding policies/goals that address them:</p> <p>Initiative 1: Preserve or enhance natural areas and open space connectivity is conducive to the widespread distribution of green and open spaces that mitigate UHI. Interconnected green spaces are more effectively cooling than disparate, smaller ones, and contiguous green areas provide cool paths for pedestrians and wildlife. G-1, G-2, G-3, G-4, G-5, G-6, G-7, G-8, G-9, G-10, G-13, G-14, G-15, G-16, G-18, G-20, G-21, G-22, G-23, G-24, G-25, G-27, G-29, G-30, G-35, G-36, G-43, G-44, SU-8, L-34, L-41, P-4, P-18, P-25, P-31, and ST-17</p> <p>Initiative 3: Establish a comprehensive urban forestry program is directly applicable to UHI strategies associated with tree planting, maintenance, and preservation. G-2, G-4, G-5, G-7, G-8, G-14, G-21, G-24, G-25, G-26, G-27, G-29, and G-30</p> <p>Initiative 5: Improve air quality is conducive to urban designs that decrease the need for vehicle use, decrease vehicle emissions, and encourage the presence of trees. G-9, G-10, G-23, G-24, G-25, G-29, G-30, G-31, G-32, G-33, G-34, G-35, G-36, SU-2, SU-19, C-11, C-13, C-16, C-20, C-21, C-29, C-35, C-36, C-38, C-39, and C-42 G-1, G-2, G-3, G-4, G-5, G-6, G-7, G-9, G-13, G-15, G-16, G-43, and G-44</p> <p>Initiative 6: Increase the use of green building practices is conducive to cool building materials, alternative energy and energy efficient systems, and cool roofs. G-1, G-2, G-3, G-5, G-9, G-10, G-12, G-14, G-18, G-19, G-20, G-29, G-30, G-31, G-34, G-35, G-36, E-36, P-27, and SE-8</p> <p>Initiative 8: Promote environmental stewardship is conducive to community-supported tree and vegetation management strategies. G-9, G-24, G-27, G-28, G-31, G-32, G-36, G-37, G-40, G-41, G-43, G-44, and L-42</p> <p>Initiative 9: Enrich biodiversity and natural habitats in urban, suburban and agricultural areas is conducive to tree and open space preservation, as well as the introduction of diverse native species that provide heat mitigation, as well as the introduction of diverse native species that provide heat mitigation, as well as air and water quality benefits. G-1, G-2, G-3, G-4, G-5, G-6, G-7, G-9, G-13, G-15, G-16, G-43, and G-44</p>
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<p><i>adaptokc</i> (2020)</p>	<p>This is OKC's first sustainability plan and an implementation element of <i>planokc</i>. The plan identifies extreme heat as one of eight "issue areas" that are directly addressed.</p>	<p>The plan identifies numerous strategies that are supportive of UHI mitigation or adaptation. The most notable initiatives include:</p> <ul style="list-style-type: none"> • Chapter 2, Initiative 1. Reduce energy emissions and Initiative 2. Use and promote renewable energy <ul style="list-style-type: none"> › Plan language that supports solar panels in particular could be helpful in establishing new regulations that allow for strategies like microgrids and community solar projects • Chapter 3, Initiative 4. Mitigation areas of high heat exposure <ul style="list-style-type: none"> › Noted strategies include setting a tree canopy target, measuring urban heat islands, eliminating minimum parking requirements, using reflective and green roofs, and preserving trees • Initiatives in Chapter 3 pertaining to water management and quality, and local food production, may provide some opportunity for integration with UHI measures such as blue-green stormwater infrastructure and community gardens • Chapter 4, Initiative 1. Reduce transportation emissions <ul style="list-style-type: none"> › Emissions reductions improve air quality and may simultaneously reduce urban heat, particularly if reductions are achieved through a reduction in vehicle traffic › This initiative includes language related to bicycling, which may be combined with goals to increase options for multi-modal transportation
<p><i>So8th: A Community Vision</i> (2023)</p>	<p>This vision includes a master plan and equitable redevelopment recommendation for property owned by the Oklahoma City Urban Renewal Authority (OCURA) in So8th.</p>	<p>The following recommendations from So8th can be leveraged to alleviate UHI and are applicable in any environmental justice area of the city:</p> <ul style="list-style-type: none"> • Implement green, public space such as parks that bring people together and may take the place of currently paved spaces • Establish "ecological corridors" to physically connect the OKC community with green spaces • Create a green buffer zone and vegetative sound walls around industrial sites • Support existing natural features and acknowledge that urban green space is not just an "amenity," but an important aspect of community health and well-being • Require minimum green space around new development • Prioritize natural flora and fauna in sustainability measures

Municipal Ordinances and Codes

Document	Description	UHI Adaptation & Mitigation Levers
International Building Code (2018)	<p>The International Building Code (IBC) is a comprehensive set of regulations aimed at ensuring the safety and structural integrity of buildings. According to the OKC Development Center, the City has adopted the 2018 version of the IBC.</p>	<p>The IBC code does not specifically address heat mitigation, though one notable example concerns rooftop options:</p> <ul style="list-style-type: none"> Chapter 15, Section 1505.9 and 1505.10 make allowances for photovoltaic (solar) roof installations and vegetated roofs <p>Limitations in code:</p> <ul style="list-style-type: none"> Guidance from the IBC only pertains to new developments, and the code does not specify required retrofits for older buildings that are not up to standard. Efforts to impose building requirements for UHI mitigation or adaptation purposes which go beyond the IBC will likely need to be achieved through incentives rather than mandates. Chapter 12, Section 1202 requires temperature control inside buildings but this only extends to heating, not cooling
International Energy Conservation Code (2009)	<p>The International Energy Conservation Code (IECC) is an accompaniment to the IBC and sets standards for energy efficiency in residential and commercial buildings. According to the OKC Development Center, the City has adopted the 2009 version of the IECC.</p>	<p>As the code concerns energy efficiency, it provides a clear link to select UHI mitigation strategies. The IECC requires that residential and commercial structures meet building envelope standards per Chapter 4, Section 402 and Chapter 5, Section 502).</p> <p>Limitations in code:</p> <ul style="list-style-type: none"> Guidance from the IECC only pertains to new developments, and the code does not specify required retrofits for older buildings that are not up to standard. Efforts to impose efficiency requirements for UHI mitigation or adaptation purposes which go beyond the IECC will likely need to be achieved through incentives rather than mandates. It is not clear that building envelope standards in the 2009 code reflect the latest and best standards for UHI mitigation. The IECC does not specify any energy efficiency certifications such as LEED or EnergyStar.

<p>OKC Municipal Code, Chapter 38: Parks Recreation, Cultural Affairs, Etc.</p>	<p>This chapter includes a set of regulations that govern the use and park and recreational sites, including fees, use provisions, and decision-making.</p>	<p>This chapter does not provide explicit opportunities to advance UHI mitigation or adaptation, though parks are often considered low-hanging fruit when it comes to green space provision and tree planting.</p> <p>The code contains no requirements for tree coverage and trees are not a required park amenity, though trees are recommended around sitting areas to create shade. Although trees are not required in parks, they may still be a viable option there.</p> <p>The code stipulates that walking paths must be concrete, decomposed granite or asphalt pedestrian paths. This does not clearly allow for alternative materials such as permeable pavements.</p>
<p>OKC Municipal Code, Chapter 59: Zoning and Planning Code</p> <p>Article VI: Zoning and Base Districts</p>	<p>This article includes a set of regulations that govern land use, development, and construction within OKC. These codes are designed to promote orderly growth, protect public health and safety, preserve natural resources, and maintain the quality of life for residents</p>	<p>The code underscores the importance of green spaces and design by prioritizing agricultural preservation in Agricultural Districts (AA) and implementing design standards such as open space requirements, setback guidelines, and maximum lot sizes in Residential Districts (RA2 and RA). That latter limits the percentage of a lot covered by buildings and pavement and helps maintain permeable surfaces, allowing for natural water absorption. Additionally, the allowance for Urban Farms (UH) and Roof Gardens in various districts permits additional green spaces.</p> <p>Special purpose districts like the Bricktown Core Development District and the Scenic River Overlay District enforce specific measures. The use of brick building materials can amplify urban heat footprint, while the promotion of tree planting near rivers can enhance natural cooling effects of a water body.</p>
<p>OKC Municipal Code, Chapter 59: Zoning and Planning Code</p> <p>Article XI: Landscaping and Screening Regulations</p>	<p>This article provides regulations governing landscape elements, particularly plant materials. Regulations apply to proposed developments and are meant to enhance, protect and promote the economic, ecological and aesthetic environment for the safety, comfort and enjoyment of citizens.</p>	<p>Code language encourages the integration of green spaces and native species into the urban landscape, emphasizes the importance of water-efficient practices, and recognizes the value of existing vegetation. The latter point may be particularly useful if the City aims to develop a tree preservation program and/or improve maintenance of existing trees and other UHI-mitigating vegetation.</p> <p>The code encourages the use of heat island reduction strategies through its provisions for site development and landscaping, such as installation of shade trees, shrubs, and other vegetation to provide shade and reduce heat absorption on building sites.</p>

Other assessments and summary reports

Document	Description	UHI Adaptation & Mitigation Levers
<p><i>Lynn Lifestyle Summary - Northeast Oklahoma City (2016)</i></p>	<p>This report provides information about health, well-being, environmental conditions, community experiences, and needs in Northeast OKC.</p>	<p>This report does not make any direct connections between community well-being and heat. However, it identifies several issue areas that, if addressed, may offer opportunities to mitigate the UHI effect.</p> <p>Notable findings:</p> <ul style="list-style-type: none"> • “According to respondents of the qualitative study, Northeast Oklahoma City is lacking the infrastructure and resources needed to sustain a healthy population. Northeast Oklahoma City exhibits the basic hard infrastructure components such as roads, utilities, and telecommunication networks. However, many respondents cited the need for sidewalks in public areas, including the local neighborhoods. According to 30.35% of structured interview respondents, Northeast Oklahoma City is in need of additional sidewalks. Focus group participants also mentioned that many areas were poorly lit or had no type of street lighting, and that additional sidewalks were needed.” • “According to all qualitative information received, walking is the physical activity that the population would enjoy and be most likely to engage in on a consistent basis.” • “Air pollution sources vary by community. In urban communities, like the tri-zip area, common air pollutants are exhaust fumes from commuters, businesses, and factories.” • “Half of the focus groups stated that public transportation was inadequate in meeting the needs of the population.” <p>The above four quotes point to the same conclusion; that pedestrian-friendly infrastructure, public transportation options, and complete streets could address multiple problems including heat, air quality, and community health.</p> <p>Even though parks exist in the area of Northeast OKC, according to this report, most 1) do not have night lighting, 2) have dirt or no parking lots, 3) walking trails are very short and unlit, 4) lack drinking fountains and, 5) provide few bathroom facilities. Drinking fountains are a potential UHI adaptation solution that could make parks more hospitable. The City might also consider creating parking lots from permeable pavers rather than blacktop or concrete to absorb stormwater and reduce heat.</p>

<p><i>Cost of Nonattainment Study for the Oklahoma City Area</i></p>	<p>The study delves into the potential risks associated with a nonattainment designation for ozone standards in the OKC area. It assesses both the regulatory and economic impacts of such a designation and emphasizes the importance of preemptive action to maintain compliance with ozone standards.</p>	<p>Ozone nonattainment poses significant risks to public health, particularly affecting individuals with respiratory conditions, cardiovascular issues, and outdoor workers. This is not directly related to heat, though high temperatures can exacerbate the effects of pollution exposure. Heat and air quality may be coupled in future discussions related to public health and environmental quality to maximize impact and appeal to different stakeholder groups or funders.</p>
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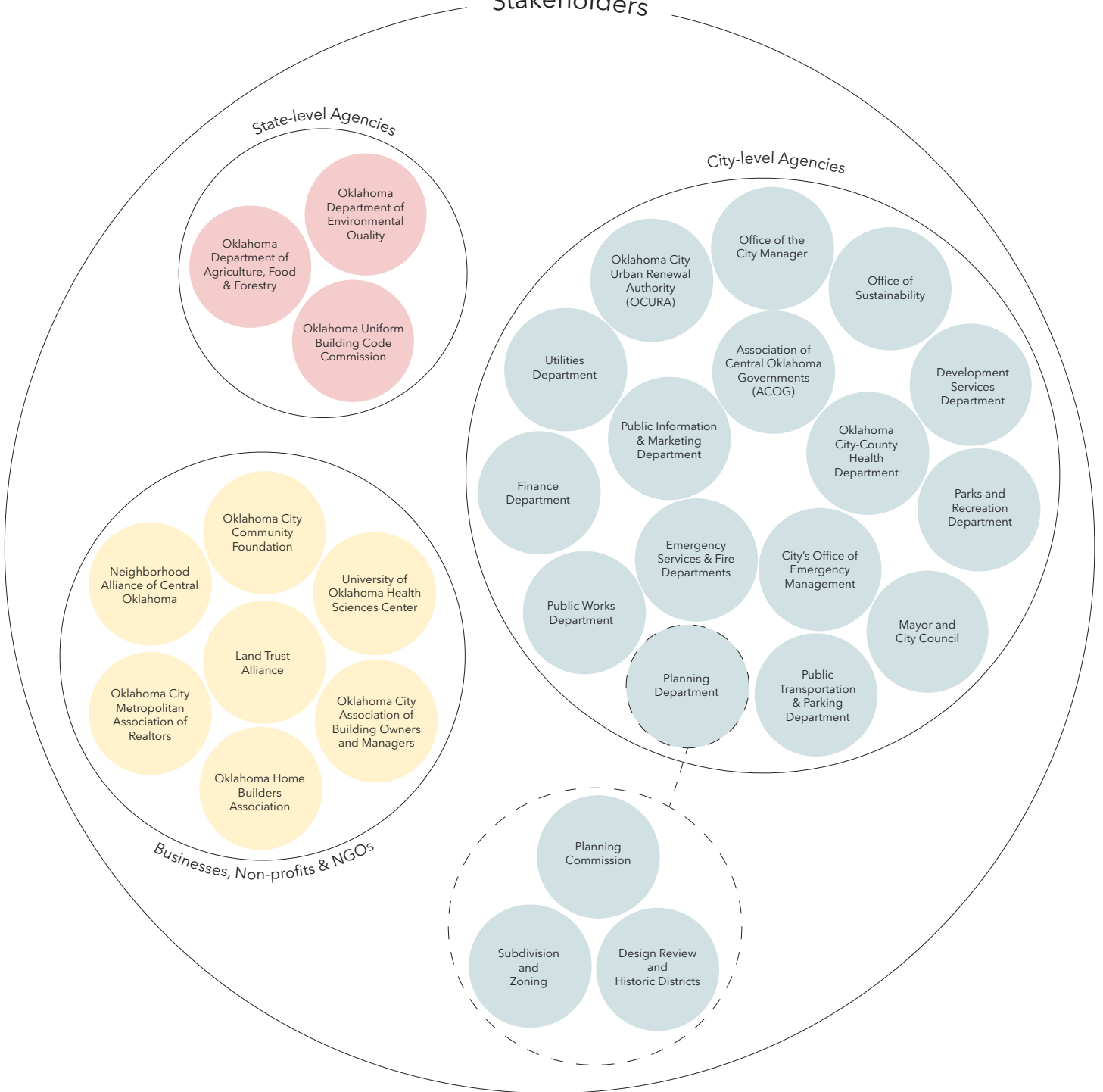
While each of the materials described above stands on its own, there is significant overlap in the themes, goals, and strategies identified which pertain either directly or indirectly to UHI. For instance, the International Energy Conservation Code (IECC 2009) within the building code sets mandatory standards for energy efficiency in construction and renovation projects, covering aspects such as insulation, HVAC system efficiency, and renewable energy utilization. Concurrently, *adaptokc* aims to advance energy conservation through policies targeting emission reduction, renewable energy promotion, and energy efficiency programs for residents and businesses. Similarly, the Oklahoma City Metropolitan Area Tree Canopy Assessment prioritizes strategic tree planning for critical areas like parks and sidewalks. This aligns with Municipal Code Article XI: Landscaping and Screening Regulations and initiatives laid out in *greenokc*, which emphasize the importance of green infrastructure in reducing urban heat island effects and supporting other ecological functions. Among all documents reviewed, most levers available for UHI mitigation or adaptation strategies apply to trees (planting and preservation) and emissions reductions (via changes to transportation and/or energy efficiency in buildings). Hazard mitigation and emergency management documents lay the groundwork for heat emergency response protocols, but specific actions are not fully developed.

Stakeholder mapping

Stakeholder mapping was conducted alongside the document review process to identify diverse entities shaping the regulatory and planning landscape in OKC. Stakeholders were noted as they appeared in documents and supplemental research, including individuals and entities such as governmental bodies, regulatory agencies, community groups, businesses, and others with a role in the jurisdiction’s policies, regulations, and decision-making processes. Those identified participate in environmental management, urban planning, infrastructure development, public health, and/or community engagement. These jurisdictional actors can inform strategic decision-making, develop communication and engagement strategies for special interest groups or populations, and facilitate adoption of urban heat resilience strategies.

State-level agencies are dedicated to environmental quality, forest services, and building codes while city departments encompass planning, zoning, sustainability, public works, and emergency services. Moreover, elected officials, advisory bodies, educational institutions, and industry associations play pivotal roles in shaping local policy. The involvement of businesses, NGOs, and non-profits further enhances collaboration and collective efforts to address significant challenges and foster equitable urban heat resilience in OKC.

Stakeholders



Gaps & Limitations

The current landscape of plans, codes, and policies in OKC showcases considerable recognition of and support for heat resiliency measures. This is especially true for measures concerning trees/greening and emissions reductions. Existing materials prioritize mitigation of climate change (including heat) through emissions reduction measures. These include changes to transportation infrastructure, and improvements in energy efficiency requirements. Additionally, noted goals may reduce the UHI effect through changes in the built, urban environment, such as changes in building configuration and density, and the introduction of more tree canopy. Any of these strategies may be particularly implementable given the apparent backing in multiple plans and code language.

Measures that promote short-term heat risk (e.g., emergency preparedness) and individual resilience are less prominent in existing documents. For example, the *Oklahoma County Hazard Mitigation Plan* identifies heat as a threat and proposes general solutions like prevention and education/awareness; however, the plan does not detail actionable steps or protocols that could be followed to achieve stated goals. The City of OKC's *Hazard Mitigation Plan* is more specific, calling for the distribution of fans and water bottles, education and information campaigns, and alert systems related to heat. However, specific goals or implementation directions are unclear. Furthermore, the City's *Emergency Operations Plan* makes only a single reference to a heat-specific response strategy: evacuating vulnerable individuals without air conditioning to shelters. Given the potential for extreme heat events in OKC, perhaps combined with air pollution, there is a notable opportunity for the City and partners to shore up emergency response plans for that specific hazard. The City might also consider opportunities to expand upon bottled water and fan giveaways to ensure that individuals are safe, and encourage individual resilience-building in the off season with supports like home weatherization and education. Unlike changes to the built environment which may require difficult code amendments or drafting of new legislation, emergency protocols and community education can be achieved with relative ease.

Like many cities, OKC's ability to implement the goals and policies stated in *planokc* and related documents may be limited by two factors. First, while plan language signals a general awareness and acceptance of issues pertaining to urban heat, sustainability, and greening, many of the desired outcomes are not legally enforceable. Codes like the IBC and IECC are not extensive or creative when it comes to mandated heat-mitigation solutions. Furthermore, the City will be limited in its ability to strengthen the municipal code if mandates conflict with state-level guidance, per the Dillon Rule. A possible solution is to incentivize, rather than mandate, specific behaviors and development standards. Secondly, many of the stated goals and policies are not accompanied by clear guidance for how to implement them. In the future, there will be a need to clarify the steps that must be taken to reach desired outcomes. Establishing milestones and success metrics is a useful strategy in plotting out and tracking progress toward goals.

Opportunities & Future Directions

In the future, the City of OKC might focus more specifically on heat by developing a heat-specific action plan, resilience plan, and/or emergency response protocol. Additionally, the City could create detailed guidelines to facilitate implementation of the many goals and policies identified in this scan, or aim to have unenforceable goals codified in new legislation. In the meantime, there are numerous actions the City might take to address UHI that align with stated goals in existing plans, policies, and codes. While some strategies may necessitate substantial code revisions or infrastructure investments, others can be implemented within the current framework. By prioritizing measures that seamlessly integrate into ongoing efforts and regulatory structures, OKC can efficiently bolster its resilience to extreme heat events and improve residents' quality of life.

1. Develop an urban forestry plan outlining goals, strategies, and actions for managing, preserving, and expanding the urban tree canopy in alignment with numerous tree-related goals and policies identified during the scan.
2. Create clear policies to protect and care for existing trees. Tree protection ordinances can be introduced to regulate removal, pruning, and preservation of trees on both public and private property. For private property, consider incentives such as tax breaks, grants, or fee waivers to encourage tree planting and preservation.
3. Enforce emissions controls on vehicles, including regular inspections for compliance with emission standards and incentivizing low-emission or electric vehicles to reduce sources of nitrogen oxides (NOX) and volatile organic compounds (VOCs). In addition, continued investment in public transportation improvements offers opportunities to reduce ozone and its health-related impacts.
4. Continue to pursue opportunities for renewable energy, such as solar microgrids, wind, and geothermal to create energy redundancies and address increasing energy consumption.
5. OKC uses the International Energy Conservation Code (IECC) 2009 to promote energy efficiency in its buildings. The City might consider updating its building and energy codes to newer iterations, such as the 2015 IECC or later versions, to reflect advancements in energy-efficient technologies and practices. There is also an opportunity to rigorously enforce these existing or updated codes, ensuring compliance across all construction projects.
6. Consider the heat adaptation and mitigation strategies listed below:

Heat adaptation & mitigation strategies	Examples
Trees	Planning, maintenance and preservation; Manual of the best tree management practices; Tree care guidelines
Cool roofs	High albedo (reflective) roofs; Light colored walls, roofs, and pavements; Guidelines for developers
Green roofs	Vegetated systems; Guidelines for developers
Blue-green infrastructure	Bioswales; Permeable pavements; Guidelines for landscape architects and developers
Energy efficiency programs	Insulation and air sealing retrofits; Passive cooling measures; Free home energy audits and weatherization assistance to homeowners; City investment in energy retrofits in public and affordable housing
Renewable energy	Technical assistance, guidelines and outreach to promote renewable energy (solar, geothermal, wind) among residents, property owners and businesses
Low impact development measures	Limit impervious areas; Add canopy coverage requirements for public and private properties (update to municipal code needed)
Cooling Centers and watering Stations	Expand accessible cooling centers and/or misting stations, shade structures, and drinking water stations in public parks and other high-use spaces
Open/green space	Native plants and vegetation; Natural open spaces, including native prairies, cool corridors, community gardens, and urban agriculture
Community education & outreach	Heat stress and impacts awareness; Protective behaviors education; Outreach to most vulnerable residents (e.g., elderly, homeless) Outreach about and application assistance for local, state, or federal subsidies related to home weatherization and energy bill support (focus on low-income homeowners) Promote awareness of the role of trees
Heat relief kits	Hydration packs, sun hats, reusable water bottles