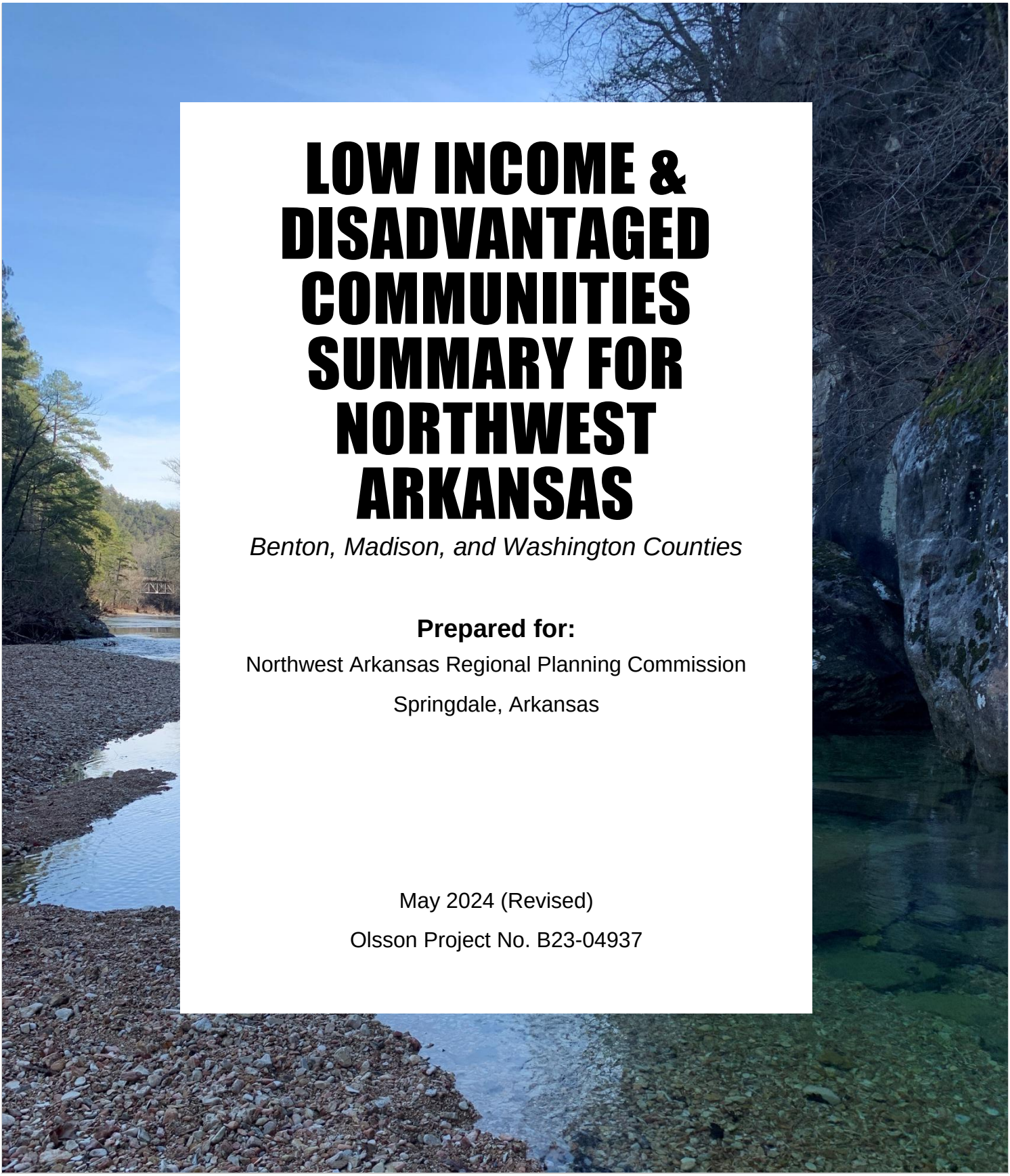
Appendix A

Low-Income and Disadvantaged Community Summary



LOW INCOME & DISADVANTAGED COMMUNIITIES SUMMARY FOR NORTHWEST ARKANSAS

Benton, Madison, and Washington Counties

Prepared for:

Northwest Arkansas Regional Planning Commission

Springdale, Arkansas

May 2024 (Revised)

Olsson Project No. B23-04937

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1. INTRODUCTION

Northwest Arkansas (NWA) encompasses a broad spectrum of communities, varying in socioeconomic backgrounds, including urban, suburban, and rural areas. Within NWA, low-income and disadvantaged communities (LIDAC) have been identified at the census tract level using the U.S. Environmental Protection Agency's (EPA) Climate & Economic Justice Screening Tool (CEJST). This summary describes the results of an analysis of the data contained on the CEJST and serves the purpose of pinpointing communities categorized as LIDAC as part of the planning initiative for the EPA's Climate Pollution Reduction Grant (CPRG) program. This program involves a three-county climate action planning process, and the EPA recognizes these communities as low-income and disadvantaged.

2. METHODS & MATERIALS

This study employed a publicly available screening tools to identify low-income and disadvantaged communities in NWA. The following sections outlines the tools and methods used.

2.1 Climate & Economic Justice Screening Tool

The CEJST (CEQ 2024) is a geospatial mapping tool created with the specific goal of identifying marginalized and overburdened communities that suffer from pollution and lack of investment. The CEJST helps policymakers, researchers, and organizations pinpoint areas where vulnerable populations face disproportionate environmental and economic burdens. It is often used in the context of environmental justice and initiatives aimed at addressing disparities in environmental quality and access to resources, such as the Justice40 Initiative. Census tracts were identified through the CEJST as either disadvantaged, partially disadvantaged, or not disadvantaged. Furthermore, any census tract identified as disadvantaged by the CEJST is defined as a LIDAC.

The CEJST typically considers a variety of burden categories when assessing whether a community is disadvantaged. Within each burden category, different indicators are used as data points or measurements to assess the environmental and social conditions in a community. Communities in a census tract are considered to be disadvantaged when they are at or above the 90th percentile for one or more of these burden indicators, while also being at or above the threshold for the socioeconomic burden associated with each burden category. Combined, these

burden and socioeconomic thresholds help identify communities that face a disproportionate burden of environmental pollution and economic challenges.

Associated socioeconomic thresholds used in CEJST include:

1. **Low Income:** People in household where income is less than or equal to twice the federal poverty level and does not include students enrolled in higher education.
    - Associated with all of the above Burden Categories below, except Workforce Development.
2. **High School Education:** Percent of people above the age of 25 whose high school education is less than a high school diploma.
    - Associated with Workforce Development only.

Burden Categories used in CEJST include:

1. **Climate Change*:*** This category assesses the impact of climate change-related factors, such as extreme weather events, rising temperatures, and sea-level rise, on communities. It helps identify areas vulnerable to climate change effects.
    - Burden indicators: Expected agriculture lost rate, Expected building loss rate, Expected population loss rate, Projected flood risk, and Projected wildfire risk.

    Associated socioeconomic threshold: at or above the 65th percentile for low income.
2. **Energy:** The energy category considers factors related to energy production, distribution, and consumption in a community. This can include the presence of power plants, energy infrastructure, and energy efficiency measures.
    - Burden indicators: Energy cost and PM2.5 in the air.

    Associated socioeconomic threshold: at or above the 65th percentile for low income.
3. **Health:** Health categories evaluate the health status of a community, including rates of illnesses and diseases, particularly those linked to environmental pollution and hazards.
    - Burden indicators: Asthma, Diabetes, Heart disease, and Low Life Expectancy.

    Associated socioeconomic threshold: at or above the 65th percentile for low income.

4. **Housing:** This category looks at housing conditions within a community, including factors like housing quality, affordability, and overcrowding. Poor housing conditions can affect residents' well-being.

    - Burden indicators: Housing cost, Lack of green space, Lack of indoor plumbing, and Lead paint.

    Associated socioeconomic threshold: at or above the 65th percentile for low income.

5. **Legacy Pollution:** Legacy pollution refers to the historical contamination of land and water resources from past industrial or hazardous waste activities. This category assesses the presence of such legacy pollution and its impact on communities.

    - Burden indicators: Abandoned mine land, Formerly Used Defense Sites, Proximity to hazardous waste facilities, Proximity to Risk Management Plan facilities, and Proximity to Superfund sites.

    Associated socioeconomic threshold: at or above the 65th percentile for low income.

6. **Transportation:** Transportation categories consider factors related to transportation infrastructure, such as proximity to highways, public transportation options, and traffic-related pollution. They also assess transportation equity and access.

    - Burden indicators: Diesel particulate matter exposure, Transportation barriers, and Traffic proximity and volume.

    Associated socioeconomic threshold: at or above the 65th percentile for low income.

7. **Water and Wastewater:** This category assesses the quality and availability of water resources, as well as wastewater treatment infrastructure. Access to clean and safe drinking water is a critical component of environmental justice.

    - Burden indicators: Underground storage tanks and releases and Wastewater discharge.

    Associated socioeconomic threshold: at or above the 65th percentile for low income.

8. **Workforce Development:** Workforce development categories consider employment opportunities, job training programs, and economic development initiatives in a community. Access to meaningful employment can significantly impact residents' well-being.

- Burden indicators: Linguistic isolation, Low median income, Poverty, and Unemployment.

Associated socioeconomic threshold: at or above the 65th percentile for low income, and more than 10% of people ages 25 years or older whose high school education is less than a high school diploma.

2.2 EJ Screen Tool

Additionally, the EPA's EJScreen Tool (EPA 2024) was also utilized to further gather data and information pertaining to the assessment of LIDAC communities. EJScreen is an online mapping and screening tool developed by the EPA. It stands for "Environmental Justice Screening and Mapping Tool." EJScreen is designed to help identify areas in the United States that may be disproportionately burdened by environmental pollution and other stressors, especially in terms of environmental justice concerns.

3. RESULTS

The CEJST relies on American Community Survey data from 2015-2019. According to this dataset, NWA has a population of about 514,259 people across three counties, which includes:

- Benton County with a population of 265,759;
- Washington County with a population of 232,289; and
- Madison County with a population of 16,211.

Overall, 37% of the population in NWA live in a LIDAC. By county, the percentage of the population living in a LIDAC are as follows:

- 32% in Benton County;
- 76% in Madison County; and
- 39% in Washington County.

Throughout NWA, a total of 33 census tracts are identified as meeting the criteria for being a LIDAC (see Figure 1 below). Within these tracts, there are a couple of trends that were identified during the data analysis. First, of the LIDAC tracts in Madison County, each one meets or exceeds the threshold of four or more burden indicators, while in Washington County only 13% of the LIDAC communities meet or exceed the threshold for four or more burden indicators. However,

in Washington County, 54% of the LIDAC communities meet or exceed the threshold of two or three burden indicators.

In total, eighteen of the LIDAC tracts identified in NWA meet or exceed the thresholds for two or more burden indicators. Of these eighteen tracts, five meet or exceed the threshold for four or more of the following burden indicators: Projected Wildfire Risk, Energy Cost, Heart Disease, Lack of Indoor Plumbing, Proximity to Risk Management Plan Facilities, Transportation Barriers, and Linguistic Isolation.

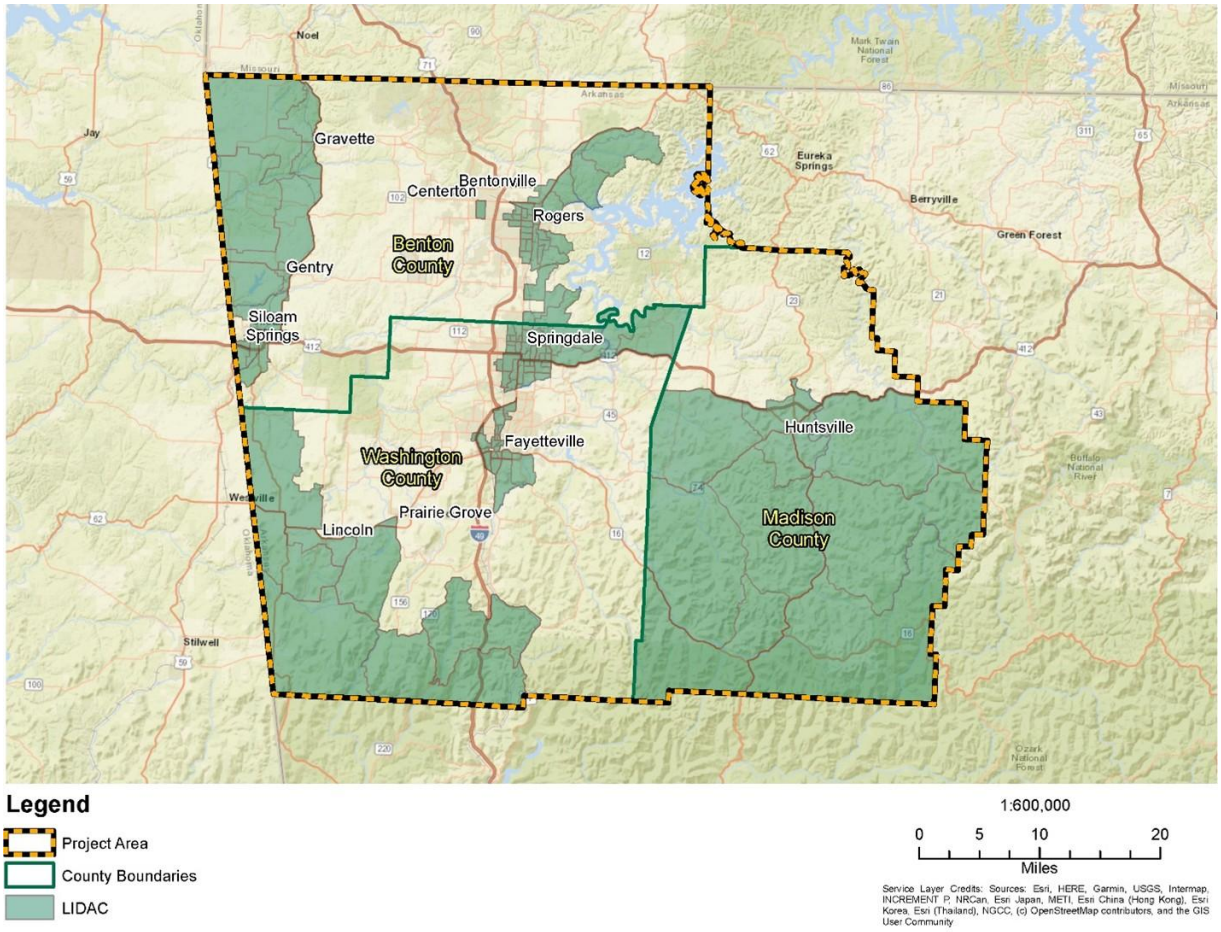

Figure 1. Map of the LIDAC Communities Within Northwest Arkansas.

4. REFERENCES

Council on Environmental Quality (CEQ). 2024. “Climate and Economic Justice Screening Tool” Accessed May 2024. https://toolkit.climate.gov/tool/climate-and-economic-justice-screening-tool

Environmental Protection Agency (EPA). 2024. “EJScreen: Environmental Justice Screening and Mapping Tool”. Accessed May 2024. https://www.epa.gov/ejscreen

LOW INCOME & DISADVANTAGED COMMUNIITIES SUMMARY FOR NORTHWEST ARKANSAS

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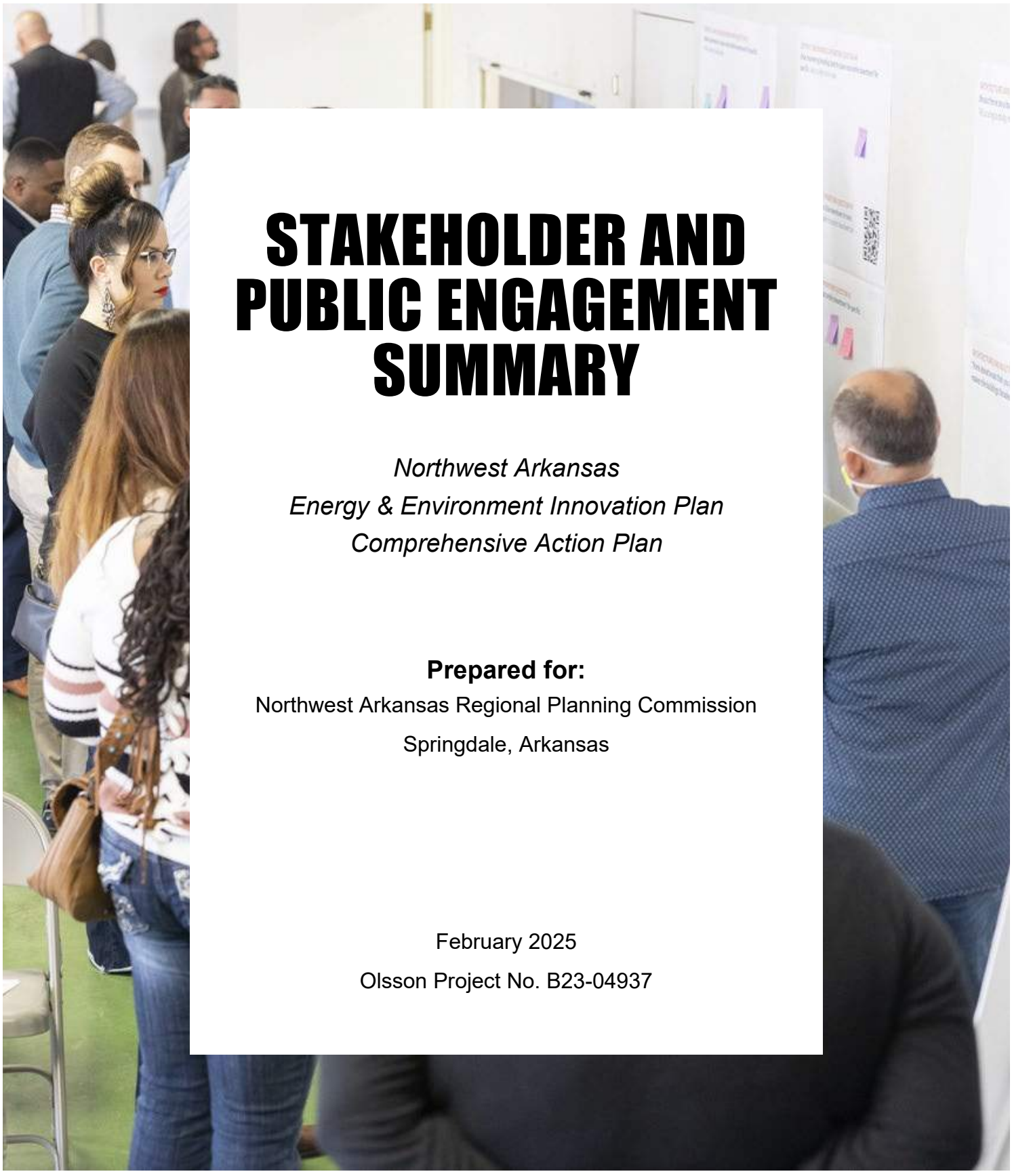
Appendix B

Stakeholder and Public Engagement Summary



STAKEHOLDER AND PUBLIC ENGAGEMENT SUMMARY

Northwest Arkansas
Energy & Environment Innovation Plan
Comprehensive Action Plan

Prepared for:

Northwest Arkansas Regional Planning Commission

Springdale, Arkansas

February 2025

Olsson Project No. B23-04937

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1. INTRODUCTION

Climate Pollution Reduction Grants Program

Northwest Arkansas received a $36.25 million federal grant from the U.S. Environmental Protection Agency (EPA) for environmental projects to reduce carbon emissions and enhance sustainability in Benon, Washington, and Madison Counties. This grant is part of the Climate Pollution Reduction Grant Program and is divided into **planning** and **implementation**. The Northwest Arkansas Regional Planning Commission (NWARPC) facilitated the awarded $36.25 million **planning grant**, which is divided into two phases.

Phase One: Priority Action Plan (PAP) is phase one in the planning grant and released in May 2024 by the NWARPC, identifying the region's top priorities, as required by the EPA's Climate Pollution Reduction Grant planning grant.

Phase Two: Comprehensive Action Plan (CAP) is the second phase in the planning grant and submitted in early 2025.

Stakeholder and Public Engagement

Stakeholder and public engagement are critical to public processes; this project is no exception. Engagement with low-income and disadvantaged communities (LIDACs) was a priority of this public participation process as a requirement of the Climate Pollution Reduction Grants (CPRG) Program. Per the Environmental Protection Agency, planning grant recipients must meaningfully engage with affected LIDACs in developing the planning grant deliverables.

Per the *Climate Pollution Reduction Grants Program: Technical Reference Document for States, Municipalities, and Air Pollution Control Agencies*:

> *In climate action planning, a meaningful engagement process ensures that the full range of greenhouse gas emission reduction measures' potential impacts (both benefits and disbenefits) are understood and considered. Such engagement can help ensure that planning grant recipients:*
>
> - *Communicate with residents of LIDACs about greenhouse gas reduction measure opportunities in their areas.*
> - *Minimize to the extent possible any anticipated disbenefits to residents of LIDACs.*
> - *Identify and incorporate community-driven priorities into plan design and engage with residents of LIDACs throughout plan implementation.*
> - *Continue engagement with residents, leaders, and representatives of LIDACs into the future.*

> *Engagement strategies can cover multiple communities and should include linguistic, cultural, institutional, geographic, and other differences to assure meaningful participation. Meaningful engagement under the Climate Pollution Reduction Grant program should include early outreach, sharing information, and soliciting input on the development of the Priority Action Plan and Comprehensive Action Plan, especially in the LIDACs.*

To ensure compliance with the above guidance, the NWARPC actively engaged with Madison, Washington, and Benton counties and took a targeted approach to engagement with LIDACs within the counties after completing the LIDAC identification and analysis task. This appendix summarizes those efforts. Note that this appendix only summarizes the engagement efforts undertaken for the Comprehensive Action Plan phase of the project.

2. PUBLIC ENGAGEMENT PLAN

Olsson developed a public engagement plan (PEP) for the Comprehensive Action Plan (CAP) process as the first deliverable for the engagement process to guide public and stakeholder participation efforts.

The PEP included here is for the Comprehensive Action Plan (CAP) and offers general guidelines for the engagement process, a list of public engagement spectrums being utilized, and a detailed schedule of engagement tactics and coordination tasks. The CAP PEP was continuously updated throughout the Comprehensive Action Plan process and Status Report phases.

To view the entire PEP for the CAP, see ***Public Engagement Plan*** as follows.

Public Engagement Plan

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Public engagement is a process that brings people together to address issues of common importance, to solve shared problems, and to bring about positive social change. Effective public engagement invites average citizens to get involved in deliberation, dialogue, and action on public issues that they care about. And it helps leaders and decision makers better understand the perspectives, opinions, and concerns of citizens and stakeholders.”

- Unknown

General Guidelines

Review and Quality Control. All public-facing material will be reviewed by the Northwest Arkansas Regional Planning Commission (NWARPC) prior to publishing to ensure the material is consistent with the organization's preferred messaging, brand, and communication style.

Work Sharing and Coordination. Each item/task shown in this PEP will be developed through coordination between Olsson and the NWARPC. Olsson will share marketing materials with the NWARPC's project manager and staff members for distribution.

Engagement Tactics vs. Coordination Tasks. Within the body of this PEP, Engagement Tactics (ET) and Coordination Tasks (CT) are referenced. ETs refer to times when Olsson or NWARPC will actively be engaging with stakeholders and/or the public. CTs refer to times of coordination and planning for ETs to function successfully.

This Public Engagement Plan (PEP) supports and reinforces the principles and goals of the NWARPC Public Participation Plan.

PEP Snapshot

NWARPC PROJECT CONTACTS

Tim Conklin

Nicole Gibbs

PUBLIC ENGAGEMENT SPECTRUM LEVELS

Inform, Consult, and Involve

Phase Two: Comprehensive Action Plan (CAP)

COMPLETE?	TYPE	TASK + DESCRIPTION	LEAD PARTY	DATE
X	CT	**Update Public Engagement Plan.** Olsson will revise the brief public and stakeholder engagement plan and will direct engagement activities throughout both the CAP and Status Report phases of the Project.	Olsson	May 8, 2024
X	CT	**Meeting to Discuss Revised Engagement Plan.**	Olsson / NWARCP	June 4, 2024
X	CT	**Prep Meeting for Stakeholder Committee Meeting #1.** Prior to Stakeholder Committee Meeting #1, Olsson will meet virtually with NWARPC and lead a meeting to discuss the draft plan for Stakeholder Committee Meeting #1. The purpose of this prep meeting is to gather NWARPC feedback on the program for Stakeholder Committee Meeting #1.	NWARPC/Olsson	July 2, 2024
X	ET	**Stakeholder Committee Meeting #1.** Olsson will host a virtual Zoom Stakeholder Committee Meeting #1, staffed with four Olsson team members. NWARPC will be responsible for staffing the meeting as well. The purpose of the meeting is to update the stakeholder group on the PAP, the grant submission and timeline, and anticipated outcomes for the CAP.	Olsson	July 17, 2024, 10:30 a.m. – 12:00 p.m. via Zoom
X	CT	**Project Webpage Update #1.** Olsson will coordinate with NWARPC to prepare updated material for the project webpage. Olsson will submit the recommended webpage language	Olsson/NWARPC	July 17, 2024

		updates to NWARPC. NWARPC will implement the updates.		
X	ET	**Event at the library with City of Fayetteville.** Event link: https://www.faylib.org/event/11022126.	Olsson/NWARPC	July 18, 2024
X	ET	**Marketing and Outreach Materials.** Olsson will develop content for one (1) email blast to share the project webpage updates.	Olsson	July 22, 2024
X	CT	**Stakeholder Committee Meeting #1 Summary Deliverable.** Olsson will prepare a concise summary of the process and findings from Stakeholder Committee Meeting #1. This deliverable will be an appendix to the CAP.	Olsson	July 26, 2024
X	CT	**Prep Meeting for Public Open Houses.** Before the public open houses, Olsson will meet virtually with NWARPC and lead a meeting to discuss the draft plan for the open houses. The purpose of this prep meeting is to gather NWARPC feedback on the program for the open houses.	Olsson	August 7, 2024, 9:00 a.m. – 11:00 a.m. via Teams *(same meeting as below)*
X	CT	**Prep Meeting for Stakeholder Committee Meeting #2.** Before Stakeholder Committee Meeting #2, Olsson will meet virtually with NWARPC and lead a meeting to discuss the draft plan for Stakeholder Committee Meeting #2. The purpose of this prep meeting is to gather NWARPC feedback on the program for Stakeholder Committee Meeting #2.	NWARPC/Olsson	August 7, 2024, 9:00 a.m. – 11:00 a.m. via Teams *(same meeting as above)*
X	ET	**Public Survey Draft.** Olsson will design, build, and administer one (1) additional online public survey via SurveyMonkey. The survey will be drafted by Olsson and reviewed by NWARPC. A link to the survey will be	Olsson	August 9, 2024

		available on the Project website and included in the public open house handout. This is the date that the survey draft will be delivered to NWARPC for review.		
X	ET	**Public Survey Launch.** Final version launched via the project webpage.	Olsson / NWARPC	August 19, 2024
X	ET	**Stakeholder Committee Meeting #2.** Olsson will host a virtual Zoom Stakeholder Committee Meeting #2, staffed with four Olsson team members. NWARPC will be responsible for staffing the meeting as well. The meeting's purpose is to share information about the public survey and open house meetings with stakeholders to encourage their networks' participation.	Olsson	August 21, 2024, 9:00 a.m. – 10:30 a.m. via Zoom
X	CT	**Project Webpage Update #2.** Olsson will coordinate with NWARPC to prepare updated material for the project webpage announcing the open houses and survey.	Olsson/NWARPC	August 23, 2024
X	CT	**Send Public Open House Draft Materials.** Olsson will develop content for the open houses (boards/posters, sign-in sheets, comment forms, and handouts). Olsson will submit the materials to NWARPC for review and approval on this date.	Olsson	August 28, 2024
X	CT	**Stakeholder Committee Meeting #2 Summary Deliverable.** Olsson will prepare a concise summary of the process and findings from Stakeholder Committee Meeting #2. This deliverable will be an appendix to the CAP.	Olsson	August 30, 2024
X	CT	**Public Open House/Survey Advertisement #1.** Boost Facebook post (all three languages); send reminder emails.	NWARPC	September 4, 2024

X	CT	**Provide Comments on Public Open House Materials.** Send comments back on materials to Olsson.	NWARPC	September 5, 2024
X	CT	**Send Final Public Open House Materials.** Olsson will incorporate NWARPC's comments on the materials and will send the final public open house materials to NWARPC. NWARPC will coordinate printing, mounting, etc. of the materials and will bring the materials to the open house venues.	Olsson/NWARPC	September 10, 2024
X	CT	**Public Open House/Survey Advertisement #2.** Boost Facebook post (all three languages); send reminder emails.	NWARPC	Mornings of September 17 and 19, 2024
X	ET	**In-Person Public Open Houses.** Olsson will coordinate and facilitate two (2) in-person public open houses, adequately spaced within the region. The open house meetings will include a summary of the PAP phase, measures proposed in the grant application, an introduction to the CAP phase, and other relevant information.	Olsson / NWARPC to line up translators	**MADISON COUNTY/HUNTSVILLE OPEN HOUSE:** September 17, 2024, 4:00 p.m. – 7:00 p.m., Carroll Electric Cooperative Corporation Community Room **BENTON COUNTY AND WASHINGTON COUNTIES/SPRINGDALE OPEN HOUSE:** September 19, 2024, 6:00 p.m. – 8:00 p.m., Jones Center
X	CT	**Marketing and Outreach Materials.** Olsson will develop content for two (2) press releases, six (6) social media posts (including three paid posts in targeted LIDAC areas), and four (4) email blasts to promote the popup events or other relevant events.	Olsson	September 2024
X	ET	**Pop-up Events.** Olsson will host with NWARPC a project booth or space for	Olsson	*See CAP Stakeholder and Public Engagement*

		up to six (6) in-person pop-up events at already planned community events. Olsson will provide educational material about the Project and have a brief engagement exercise for people who stop by to raise awareness about the plan, survey, open houses, or other relevant events.		*Summary for details* July 18 September 16 September 26 September 22 September 26 September 27
X	CT	**Survey Advertisement #3.** Boost Facebook post (all three languages); send reminder emails.	NWARPC	October 9, 2024
X	CT	**Prep Meeting for Stakeholder Committee Meeting #3.** Prior to Stakeholder Committee Meeting #3, Olsson will meet virtually with NWARPC and lead a meeting to discuss the draft plan for Stakeholder Committee Meeting #3. The purpose of this prep meeting is to gather NWARPC feedback on the program for Stakeholder Committee Meeting #3.	NWARPC/Olsson	October 10, 2024, 2:00 p.m. – 3:00 p.m. via Microsoft Teams
X	CT	**Survey Advertisement #4.** Boost Facebook post (all three languages); send reminder emails.	NWARPC	October 23, 2024
X	CT	**Survey Advertisement #5.** Boost Facebook post (all three languages); send reminder emails.	NWARPC	October 30, 2024
X	CT	**Close Survey.** Olsson will close the survey and analyze the results to incorporate into Stakeholder Committee Meeting #3.	Olsson	October 31, 2024
X	ET	**Stakeholder Committee Meeting #3.** Olsson will host a two-hour virtual Zoom Stakeholder Committee Meeting #3, staffed with four Olsson team members. NWARPC will be responsible for staffing the meeting as well. The meeting's purpose is to review public input and other technical data to draft additional measures for stakeholder	Olsson	November 6, 2024, 1:30 p.m. – 3:00 p.m. via Zoom

		feedback.		
X	CT	**Stakeholder Committee Meeting #3 Summary Deliverable.** Olsson will prepare a concise summary of the process and findings from Stakeholder Committee Meeting #3. This deliverable will be an appendix to the CAP.	Olsson	November 5, 2024, 1:30 p.m. - 3 p.m. Virtual Zoom Meeting
X	ET	**LIDAC-Specific Meeting.** Independent virtual meeting to build awareness and gather feedback on the proposed measures, ensuring they effectively address community needs and impacts. Led by Olsson, supported by NWARPC.	Olsson	December 5, 2024 1:30 p.m. - 3 p.m. Virtual Zoom Meeting
X	ET	**Corporate Stakeholder Meeting.** Independent virtual meeting for corporations to share sustainability and environment plans to foster mutual awareness and collaboration, while effectively embedding them into the NWAEEI plan and identifying gaps. Led by NWARPC, facilitated by Olsson.	NWARPC	December 6, 2024 9:30 a.m. - 11 a.m. Virtual Zoom Meeting
X	CT	**Prep Meeting for Stakeholder Committee Meeting #4.** Prior to Stakeholder Committee Meeting #4, Olsson will meet virtually with NWARPC and lead a meeting to discuss the draft plan for Stakeholder Committee Meeting #4. The purpose of this prep meeting is to gather NWARPC feedback on the program for Stakeholder Committee Meeting #4.	NWARPC/Olsson	February 4, 2025
X	ET	**Stakeholder Committee Meeting #4.** Olsson will host a two-hour virtual Zoom Stakeholder Committee Meeting #4, staffed with four Olsson team members. NWARPC will be responsible for staffing the meeting as well. The	Olsson	February 12, 2025 1:30 p.m. – 3:00 p.m. Virtual Zoom Meeting

		purpose of the meeting is to present the draft CAP for stakeholder feedback prior to being finalized.		
X	CT	**Stakeholder Committee Meeting #4 Summary Deliverable.** Olsson will prepare a concise summary of the process and findings from Stakeholder Committee Meeting #4. This deliverable will be an appendix to the CAP.	Olsson	February 13, 2025
X	CT	**Engagement Summary (Complete for Phase Two - CAP).** Olsson will finalize the complete engagement summary for the CAP phase.	Olsson	February 13, 2025
	CT	**Project Website Update #3.** Olsson will coordinate with NWARPC to prepare updated material for the project webpage, including the draft plan.	Olsson/NWARPC	February 21, 2025

3. STAKEHOLDER COMMITTEE

In coordination with the consultant team, the Northwest Arkansas Regional Planning Commission (NWARPC) identified potential members for the stakeholder committee. These members were identified, in part, because of their eligibility to participate in the CPRG implementation grant process and associated Notice of Funding Opportunity and/or their ability to implement the identified measures. The NWARPC worked to ensure representation from a variety of sectors. Email invitations were extended to the identified stakeholders to join the committee. The following table details the stakeholder committee.

CATEGORY	ORGANIZATION
Project Partners	ADEQ
Project Partners	Metroplan
Project Partners	Fort Smith
Project Partners	Arkansas Department of Transportation (ARDOT)
Education/Health	Arkansas Department of Health
Project Partners	Olsson
Project Partners	Northwest Arkansas Regional Planning Commission (NWARPC)
City/County	Fayetteville
City/County	Springdale
City/County	Rogers
City/County	Bentonville
City/County	Bentonville Utilities
City/County	Washington County
City/County	Benton County
City/County	Siloam Springs
City/County	Bella Vista
City/County	Centerton
City/County	Johnson
City/County	Lowell
City/County	Greenland
City/County	West Fork
Transportation	ORT
Transportation	Razorback Transit
Transportation	XNA

Education/Health	University of Arkansas Sustainability Officer
Education/Health	University of Arkansas System Division of Agriculture
Education/Health	University of Arkansas Mechanical Engineering
Education/Health	University of Arkansas
Education/Health	NWACC
Education/Health	Northwest Technical Institute
Education/Health	Washington Regional
Education/Health	Mercy
Education/Health	Northwest Medical Center
Education/Health	UAMS

CATEGORY *(CONTINUED)*	**ORGANIZATION** *(CONTINUED)*
Community Partners	Illinois River Watershed Partnership
Community Partners	Beaver Watershed Alliance
Community Partners	Beaver Water District
Community Partners	NWA Council
Community Partners	UAEX
Community Partners	Walton Family Foundation
Community Partners	Trailblazers
Community Partners	Runway Group
Community Partners	Watershed Conservation Resource Center
Community Partners	NWA Land Trust
Community Partners	The Nature Conservancy
Community Partners	Audubon Delta
Industry-Energy	Arkansas Advanced Energy Association
Industry-Energy	Stitt Energy
Industry-Energy	Entegrity
Industry-Energy	Carroll Electric
Industry-Energy	Ozarks Electric
Industry-Energy	SWEPCO
Industry-Energy	Black Hills
Industry-Energy	Emerald Solutions
Industry-Energy	Food Recycling Solutions
Industry-Energy	EggNite Agricultural Solutions
Employers	Walmart
Employers	JB Hunt
Employers	Georges
Employers	Tyson

Employers	Simmons Food
Employers	McKee Foods
Employers	Arvest
Employers	Collier Drug Stores
Employers	Goodwill Industry of Arkansas
School Districts	Fayetteville School District
School Districts	Rogers School District
School Districts	Bentonville School District
School Districts	Springdale School District
Madison County	Huntsville School District
Madison County	County Government
Madison County	Huntsville City Government
Solid Waste	Boston Mountain Solid Waste
Solid Waste	Benton County Solid Waste District
Solid Waste	Waste Management Ecovista Tontitown Landfill
Building/Construction	Newell Development
Building/Construction	Specialized Realty Group

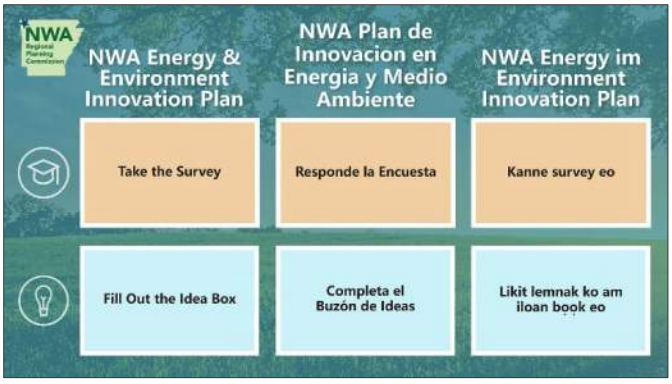
4. MARKETING AND OUTREACH EFFORTS

Various marketing and outreach tools were developed and utilized throughout the engagement process, including email blasts, social media boosted and non-boosted posts, press releases, posters/flyers, and a project webpage. The project team also attended events to further spread the word about the project.

It was important to provide outreach materials in English, Spanish, and Marshallese. Hispanic, Latino, and Marshallese residents makeup nearly 20% of the population in Northwest Arkansas. The City of Springdale alone is home to the largest community of Marshallese nationals in the continental U.S. Incorporating both Spanish and Marshallese languages and cultural awareness was of great importance for the NWAEEI Plan, relying on partnerships in the community to assist with translations, understanding cultural perceptions, learning resident's needs, and co-hosting public meetings.

Project Webpage

NWARPC hosted and regularly updated a project webpage on its website, which featured information and project materials in English, Spanish, and Marshallese.



Events Attended

The project team attended the following events and hosted a table or presented about the project:

- **July 18, 2024** - Sustainability and Resilience Planning in NWA public event at Fayetteville Public Library with Peter Nierengarten, Tim Conklin, and Eric Fuselier
- **September 16, 2024** - Arkansas Coalition of Marshallese Faecebook Live Event with Philmar Mendoza-Kabua (interpreter) and Eric Fuselier

- **September 26, 2024** - Downtown Springdale Alliance Live @ Turnbow Park
- **September 22, 2024** - NWA Bike-a-Palooza- Bentonville cycling event attended by Luke Aitken
    - Notes from Luke Aiken
        - Spoke with multiple Walmart corporate staff. Walmart staff mentioned the company's Project Gigaton - aiming to avoid/avert 1 gigaton of GHG emissions by 2030. These employees also mentioned Walmart's 0 emissions goal across their global operations by 2040, they plan to hit the goal without use of carbon offsets and specifically by investing in renewable energy sources, zeroing out emissions from their fleet (including trucks), and by transitioning to low impact refrigerants and all electric heating in all their stores, data centers and DC's.
        - Main focus of conversation with one individual Walmart employee was around the transition to lower impact refrigerants and all electric heating. The individual was particularly interested in how local governments could become advocates for electrification in both facilities management and fleet vehicle procurement/mgmt.
        - Multiple citizens also mentioned that major employers could play a larger role in funding public transportation like regional bus service, as they contribute to transportation demand during peak commute hours.
- **September 26, 2024 -** Downtown Springdale Alliance Live @ Turnbow Park event attended by Luke Aitken and Eric Fusilier of Olsson.
    - Notes from Luke Aitken
        - Many citizens we spoke with emphasized the need for more frequent bus service in Springdale and late night or 24-hour transit service to serve the large workforce in Springdale centered around meat packing. Some citizens also mentioned that they would like to be able to use their cars less frequently but the lack of frequent bus routes and complete sidewalks in Spring dale make that difficult.
        - The focus of a few conversations with the public was centered around the leadership roles cities and large employers can play in changing common practices in the region. Examples provided were shifting toward renewable energy in municipal buildings and corporate campuses, fleet management/electrification, water conservation (Tyson mentioned as a company that could do more to conserve water and reduce waste), and waste management/reduction programs such as composting (Fayetteville's compost program given as one example).
    - **September 27, 2024 -**Railyard Live @ Downtown Rogers, event attended by Luke Aitken and Eric Fusilier of Olsson

- Notes from Luke Aitkin
  - Main focus of conversations here were around expanding recycling services in the area and improving connectivity from schools to neighborhoods and parks to neighborhoods to allow more foot and bike traffic through town and also to cut down on traffic congestion overall and reduce vehicle emissions from idling specifically in longer and longer school pickup and drop off lines around the areas school.

Email Outreach

The following emails were sent to NWARPC contact lists:

- **October 16, 2024** - Chambers of Commerce - requested to include in communication channels
  - Downtown Fayetteville Coalition (Business Association)
    - Shared with merchant group email list
  - Fayetteville Chamber of Commerce
  - Bentonville Chamber of Commerce
  - Rogers-Lowell Area Chamber of Commerce
  - Springdale Chamber of Commerce
    - Added to newsletter on 10/21/24 and 11/4/24 (see below)

Facebook Outreach

NWARPC boosted four Facebook posts, as follows:

- **September 5, 2024** boosted post announcing public open houses' Facebook events and graphic in all three languages (English, Spanish, Marshallese)
  - $40 ad, boosted for 14 days
- **September 16, 2024** boosted post promoting public open houses and graphic f in all three language/translations (English, Spanish, Marshallese)

  - $15 ad, boosted for 2 days
- **October 11, 2024** boosted post with survey link and call to action in all three language/translations (English, Spanish, Marshallese)
  - $40 ad, boosted for 15 days
- **October 24, 2024** boosted post highlighting survey and idea box graphic
  - $40 ad, boosted for 6 days

Additional Outreach

Northwest Arkansas Regional Planning Commission shared monthly project updates to Technical Advisory Committee (TAC) and Northwest Arkansas Regional Planning Commission (RPC) Policy Committee meetings

Press Release announcing public open houses and public comment period were shared to local media outlets.

See ***Press Releases*** as follows.

FOR IMMEDIATE RELEASE

Contact: Tim Conklin
Phone: 479-751-7125
E-mail: tconklin@nwarpc.org

NWARPC ASKS FOR PUBLIC'S INPUT ON NORTHWEST ARKANSAS ENERGY & ENVIRONMENT INNOVATION (EEI) COMPREHENSIVE ACTION PLAN (PHASE 2)

SPRINGDALE, AR September 17, 2024 – The Northwest Arkansas Regional Planning Commission (NWARPC) is asking for the public's input on the Northwest Arkansas Energy & Environment Innovation (EEI) Comprehensive Action Plan (Phase 2) to sequester and reduce pollutant emissions in the region. This phase of the planning work follows the NWARPC Board adoption of the Northwest Arkansas Energy & Environment Innovation Priority Action Plan (Phase 1) in May 2024.

Two public open houses are scheduled to share information about the planning process and gather the public's input on regional goals and actions to create a more resilient future for Northwest Arkansas. The open houses will be held **Tuesday, September 17, 2024 from 4:00pm-7:00pm** at the Carroll Electric Community Room, 5056 Hwy 412B, Huntsville, AR and **Thursday, September 19, 2024 from 6:00pm-8:00pm** at the Jones Center (Room 226), 922 E. Emma Ave., Springdale, AR. Both open houses are drop-in events. Spanish and Marshallese interpreters will be available at the September 19 Open House at the Jones Center.

In addition to the public open houses, NWARPC is asking for the public's input via an online survey and online idea box. Both the survey and idea box are available at www.nwarpc.org/energy-environment-innovation-plan/.

The Northwest Arkansas regional plans are components of the statewide Arkansas Energy & Environment Innovation (EEI) Plan, which is aimed at reducing pollutant emissions, creating high-quality jobs, and spurring economic growth in the state. NWARPC is collaborating with the Arkansas Department of Energy & Environment (ADEE), Metroplan, and the City of Fort Smith to develop the metropolitan area's components of the Arkansas EEI Plan, which is funded through a $3 million grant to ADEE from the U.S. Environmental Protection Agency (EPA).

The EEI Priority Action Plan (Phase 1) enabled the Arkansas Tri-Region Coalition to be eligible to receive the $99,999,999 million Climate Pollution Reduction Grant (CPRG) to implement each region's Energy & Environment Innovation (EEI) Priority Action Plan (PAP). In Northwest Arkansas, $36.25 million of the award will fund 18 "Green Network" projects across ten (10) cities, and two (2) supporting regional-serving programs (a Workforce Training Program and an E-bike Incentive Program) to protect and restore natural cores and corridors and increase access to connected active transportation networks.

This second phase of the planning work will continue to develop recommendations for the Northwest Arkansas Energy & Environment Innovation (EEI) Comprehensive Action Plan (CAP), anticipated to be finalized in early 2025. Together, the NWA Priority Action Plan (Phase 1) and NWA Comprehensive Action Plan (Phase 2) will make up the NWA EEI Plan. Opportunities for future public input will be available throughout the entire planning process.

Those unable to attend the open houses can access project materials at www.nwarpc.org/energy-environment-innovation-plan.

For more information, contact Tim Conklin at tconklin@nwarpc.org, 479-751-7125 or visit www.adeq.state.ar.us/air/planning/eei/.

5. STAKEHOLDER COMMITTEE MEETINGS

Stakeholder Committee Meeting #1 (CAP)

To assist in creating the CAP portion of the Northwest Arkansas Energy and Environment Innovation Plan, a virtual stakeholder committee meeting was held on July 17, 2024, from 10:30 a.m. to 12 p.m. via Zoom to educate and connect stakeholders with specific interests and influence on the project and gather input on topics and measures particular to the CAP.

Stakeholders were identified by the NWARPC, as previously described in ***Stakeholder Committee***, and invited via email. The meeting was attended by 49 stakeholders including representatives from many public, non-profit, and private sectors, listed below. Representatives from the NWARPC and the consultant team facilitated the meeting. The meeting format included a welcome and brief introduction of the project team and a project update, and the following agenda:

- Environmental Protection Agency's Climate Pollution Reduction Grants (EPA CPRG),
- NWARPC's grant activity thus far,
- Greenhouse Gas Emission- national, state, and regional
- Review of priority measure from PAP,
- Review implementation grant project summary list
- Planned stakeholder and public engagement process,
- GIS tool demonstration
- Next steps and upcoming events

Stakeholder Committee Meeting #1 Attendees

- Alford Drinkwater, Advanced Environmental Recycling Technologies
- Aaron Pinedo, Arkansas Department of Transportation
- Glen Hooks, Audubon Society
- Lane Crider, Beaver Water District
- Josh Beam, Benton County
- Charlie Spakes, Black Hills Energy
- David Scoggin, Black Hills Energy
- Robyn Reed, Boston Mountain Solid Waste District
- Taylor Osburn, Boston Mountain Solid Waste District
- Christopher Hyatt, City of Bella Vista
- Doug Tapp, City of Bella Vista
- Justin Culpepper, City of Bella Vista
- Taylor Robertson, City of Bella Vista

- Dan Weese, City of Bentonville
- Lisa Babington, City of Bentonville
- Tom Adler, City of Bentonville
- Lorene Burns, City of Centerton
- Alison Jumper, City of Fayetteville
- Leif Olson, City of Fayetteville
- Matt Mihalevich, City of Fayetteville
- Peter Nierengarten, City of Fayetteville
- Joshua Robertson, City of Fort Smith
- Quinton Harris, City of Rogers
- Ben Rhoads, City of Siloam Springs
- Kris Paxton, City of Siloam Springs
- Markos Mylonas, Entegrity
- Julie Williams, Fayetteville Public Schools
- Keaton Smith, First Horizon Bank
- Erin Billings, Georges
- Kenneth Sandlin, Georges
- Leif Kindberg, Illinois River Watershed Partnership
- Rob Smith, NWA Council
- Grady Spann, NWA Land Trust
- Justin Northcutt, Ozark Electric Cooperative
- Jason Willey, State of Arkansas
- Richard McMullen, State of Arkansas
- David Criswell, Trailblazers
- Eric Boles, University of Arkansas
- Nicole Gibbs, NWA Regional Planning Commission
- Luke Aitken, NWA Regional Planning Commission
- Nicole Gibbs, NWA Regional Planning Commission
- Tim Conklin, NWA Regional Planning Commission
- Tim Reavis, NWA Regional Planning Commission
- Taylor Plummer - Olsson (Olsson), Olsson
- Andy Brewer, Olsson
- Claire Meara, Olsson
- Eric Fuselier, Olsson
- Katrina Wille, Olsson
- Stacey Roach, Olsson

To view the entire ***CAP Stakeholder Meeting Presentation #1***, see presentation slides as follows.

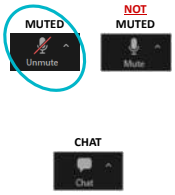
NWA Regional Planning Commission

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

COMPREHENSIVE ACTION PLAN (CAP)
STAKEHOLDER MEETING #1
JULY 17, 2024 | 10:30 AM - 12:00 PM
ZOOM VIRTUAL MEETING

HOUSEKEEPING

- Please keep yourself muted throughout the meeting
- This meeting will be recorded
- If you have technical issues during the meeting, email **Stacey Roach** at *sroach@olsson.com*
- **Nicole Gibbs** will provide the meeting presentation slides in a follow-up email
- If you have questions during the meeting, please utilize the chat function



2

PRESENTERS

Tim Conklin, AICP
Executive Director
NWARPC

Nicole Gibbs, AICP
Regional Planner
NWARPC

Eric Fuselier, PWS, ENV SP
Project Manager
Olsson

3

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

Fayetteville-Springdale-Rogers AR Metropolitan Statistical Area (MSA)

5

CPRG PLANNING GRANTS

- **EPA awarded $250 million in formula grants to states, tribes, and local governments under its Climate Pollution Reduction Grants (CPRG) Program.**
- **Grant recipients will use funds to develop plans for reduction of greenhouse gas (GHG) and other pollutant emissions within their covered jurisdiction.**

CPRG IMPLEMENTATION GRANTS

- EPA will award $4.6 billion in competitive grants for measures developed under the CPRG planning grant.
- EPA anticipates awarding individual grants between $2 million and $500 million, with funding tiers allowing comparably sized projects to compete against one another.
- Implementation grant guidance issued September 2023 with applications due April 1, 2024. Submission of CPRG priority plan is prerequisite to application for implementation grants.

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NWARPC GRANT ACTIVITY

- Studied greenhouse gas (GHG) emissions sources and existing area plans
- Held stakeholder/public outreach to develop/prioritize GHG reduction measures
- Submitted Priority Action Plan (PAP) to ADEE in December 2023
- Submitted **Tri-Region CPRG Implementation Grant Application** April 2024
- Adopted **NWA Energy & Environment Innovation Plan - Priority Action Plan (PAP)** (May 22, 2024 - NWARPC Board)
- Began preparation of **NWA Energy & Environment Innovation Plan Comprehensive Action Plan (CAP)**

Source: www.fhwa.dot.gov/innovation/everydaycounts/edc-7/integrating_ghg.cfm

7

THE PROCESS AND PLAN PHASES

We're working on *THIS* right now!

1 PRIORITY ACTION PLAN
SEPT 2023 – MAY 2024
- Reviewed existing regional action plans
- Engaged the public and stakeholders
- Prepared at least three Priority Actions for inclusion in state-wide plan

2 COMPREHENSIVE ACTION PLAN
APRIL 2024 – FEB 2025
- Engage the public and stakeholders
- Prepare at least three additional Comprehensive Actions for inclusion in the state-wide plan

3 STATUS UPDATES
BEGINNING IN 2027
- Required to report on progress made
- Project updates will be made available to the public

8

QUESTIONS?

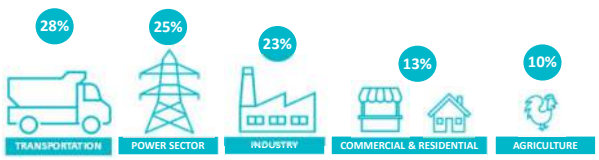
SEND THEM IN THE CHAT

GREENHOUSE GAS (GHG) EMISSIONS

NATIONAL, STATE, AND REGIONAL

UNITED STATES GHG EMISSIONS

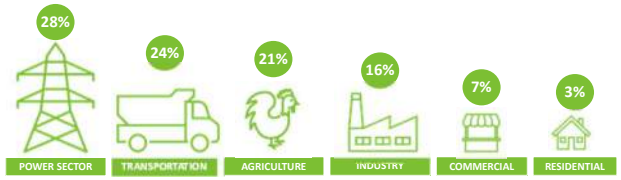
- The transportation sector is currently the largest contributor to GHG Emissions in the U.S.
- Carbon dioxide makes up 79% of U.S. GHG emissions followed by methane (12%), nitrous oxides (6%), and fluorinated gases (3%)



Source: www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

ARKANSAS GHG EMISSIONS

- The power sector is currently the largest contributor to GHG Emissions in Arkansas
- Carbon dioxide makes up 70% of Arkansas GHG emissions followed by methane (19%), nitrous oxides (10%), and fluorinated gases (3%)

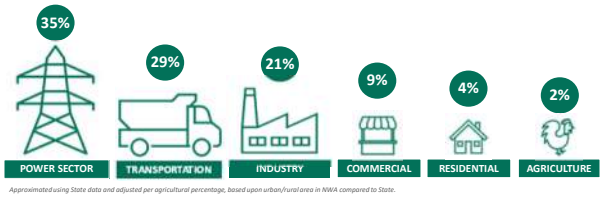


Source: Arkansas Greenhouse Gas Emissions (CO_2e), 2020 obtained from U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks by State: 1990 - 2020

NORTHWEST ARKANSAS (NWA) GHG EMISSIONS

APPROXIMATION

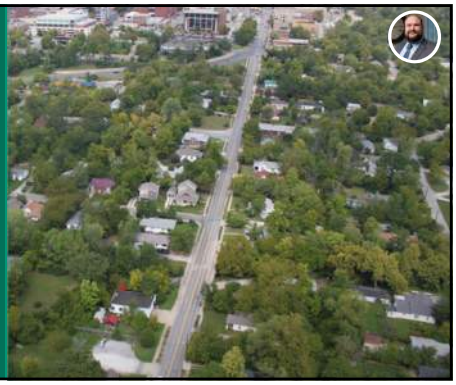
- The power sector is currently the largest contributor to GHG Emissions in NWA
- Agricultural emissions in NWA are approximated at 2%



Approximated using State data and adjusted per agricultural percentage, based upon urban/rural area in NWA compared to State.

CARBON SINKS IN NWA

- Forests account for 38.7% of regional carbon sequestration
- Forests cover 53.9% (910,880 acres) of land area in the region (Fayetteville-Springdale-Rogers AR MSA)



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ENERGY & ENVIRONMENT INNOVATION PLAN

PRIORITY ACTION PLAN (PAP) MEASURES

PRIORITY ACTION PLAN MEASURES

TRANSPORTATION SECTOR

Implement smart infrastructure that leverages proven technologies to reduce emissions by:

- Expanding infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.
- Developing and implementing low/no emission ridesharing and e-bike programs, with priority given to LIDAC communities.
- Updating/adopting building and zoning codes to encourage walkable, bikeable, and transit-oriented development.

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PRIORITY ACTION PLAN MEASURES

TRANSPORTATION SECTOR

Implement smart infrastructure that leverages proven technologies to reduce emissions by:

- Upgrading vehicle fleets by replacing internal combustion engine vehicles with low/no emission vehicles.
- Incentivizing eligible agencies, businesses, and individual automobile owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIDAC communities.
- Expanding supporting infrastructure for electric vehicles (EVs), including bus fleets.

17

PRIORITY ACTION PLAN MEASURES

WASTE, WATER, & SUSTAINABLE MATERIALS MANAGEMENT

Develop and implement a waste minimization and management program that reduces carbon emissions, including:

- Providing incentives for community composting programs.
- Supporting development of a biochar pyrolysis facility and/or gasification facility.
- Providing incentives for anaerobic digester facilities to be implemented/constructed to divert organic waste that is currently being landfilled and/or land applied into compost and other agricultural and environmentally beneficial products.

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PRIORITY ACTION PLAN MEASURES

WASTE, WATER, & SUSTAINABLE MATERIALS MANAGEMENT

Develop and implement a waste minimization and management program that reduces carbon emissions, including:

- Providing incentives or a voucher system to improve waste management for rural populations.
- Developing a regional Materials Recovery Facility (MRF) with end-market transparency.

19

PRIORITY ACTION PLAN MEASURES

CARBON REMOVAL MEASURES

Develop and implement a program to improve or increase carbon sequestration on city- and privately-owned lands and using a program of land conservation and acquisition, including:

- Planting native tree and plant species that provide optimal carbon sequestration benefits in publicly owned parks, trails, and rights-of-way and on privately owned lands.
- Restoring degraded prairies, forests, riparian buffers, streams, and wetlands in parks, trails, rights-of-ways and private lands.
- Identifying lands with high carbon sequestration value and creating programs for the protection and restoration of these lands through fee-simple acquisition, conservation easements, or other means. Consider co-benefits.

20

PRIORITY ACTION PLAN MEASURES

CARBON REMOVAL MEASURES

Develop and implement a program to improve or increase carbon sequestration on city- and privately-owned lands and using a program of land conservation and acquisition, including:

- Developing conservation plans for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value.
- Incentivizing agricultural practices to reduce carbon emissions and create carbon capture.

21

PRIORITY ACTION PLAN MEASURES

BUILDINGS

Develop a residential-commercial-industrial energy efficiency and innovation program to:

- Establishing an incentive program for implementing end-use energy efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting.
- Providing incentives for the adoption and implementation of up-to-date building energy codes.
- Develop voluntary programs and policies that promote low and zero-emission options and vehicle charging, focusing on buildings in rural and LIDAC areas, multi-family residential buildings, and commercial buildings.

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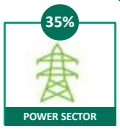
PRIORITY ACTION PLAN MEASURES

ELECTRIC POWER SECTOR



Develop and implement a regional/statewide renewable energy innovation program to:

- Installing renewable energy and energy storage systems on municipal/government facilities.
- Developing distributed and community-scale renewable energy generation and storage, including in LIDAC and rural communities.
- Developing and implementing programs that support smart-grid and/or behind-the-meter technologies.

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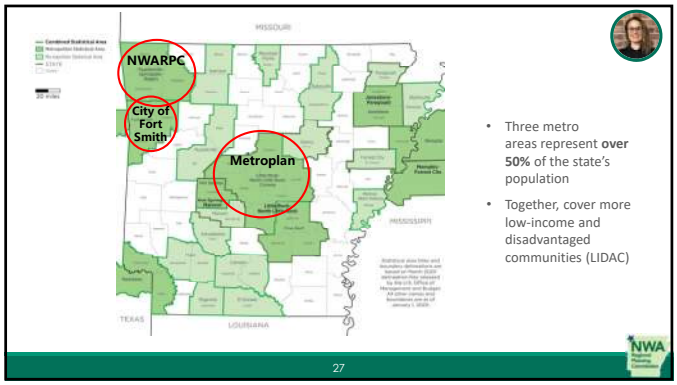
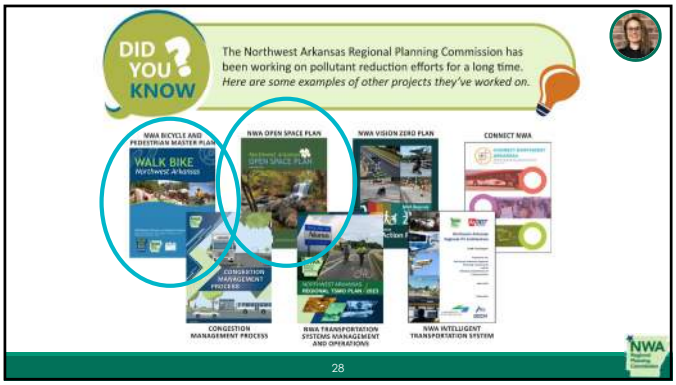
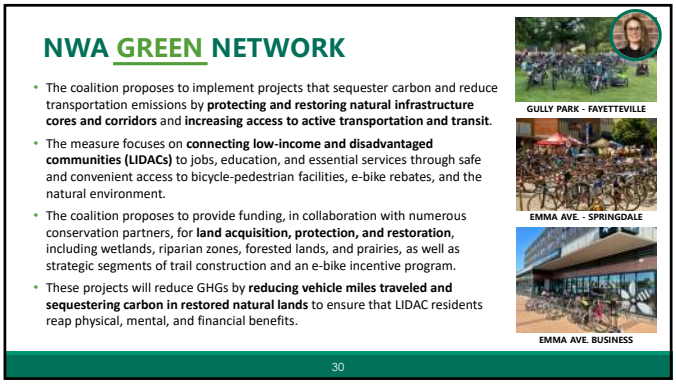
ENERGY & ENVIRONMENT INNOVATION PLAN
IMPLEMENTATION GRANT APPLICATION


IMPLEMENTATION GRANT APPLICATION
GRANT PARTNERS
• Metroplan
• City of Fort Smith
• 50 Agencies Statewide
Award notification: August 1, 2024
NWA Green Network = Carbon Removal + Active Transportation (Mode Shift + E-Bike Rebate)
26


NWARPC
City of Fort Smith
Metroplan
• Three metro areas represent over 50% of the state's population
• Together, cover more low-income and disadvantaged communities (LIDAC)
27


DID YOU KNOW
The Northwest Arkansas Regional Planning Commission has been working on pollutant reduction efforts for a long time. Here are some examples of other projects they've worked on.
NWA BICYCLE AND PEDESTRIAN MASTER PLAN
NWA OPEN SPACE PLAN
NWA VISION ZERO PLAN
CONNECT NWA
CONGESTION MANAGEMENT PROCESS
NWA TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS
NWA INTELLIGENT TRANSPORTATION SYSTEM
28


NWA GREEN NETWORK =
CARBON REMOVAL + ACTIVE TRANSPORTATION (MODE SHIFT + E-BIKE REBATE)
MAP 4.1 REGIONAL BICYCLE & PEDESTRIAN NETWORK
29

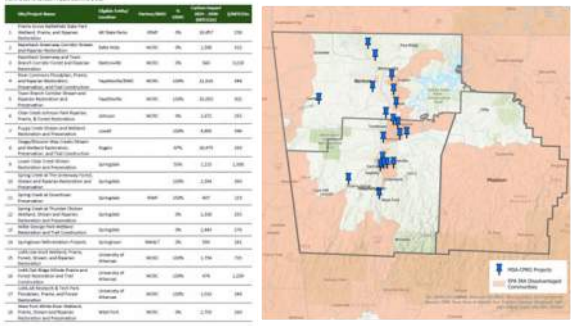

NWA GREEN NETWORK
• The coalition proposes to implement projects that sequester carbon and reduce transportation emissions by protecting and restoring natural infrastructure cores and corridors and increasing access to active transportation and transit.
• The measure focuses on connecting low-income and disadvantaged communities (LIDACs) to jobs, education, and essential services through safe and convenient access to bicycle-pedestrian facilities, e-bike rebates, and the natural environment.
• The coalition proposes to provide funding, in collaboration with numerous conservation partners, for land acquisition, protection, and restoration, including wetlands, riparian zones, forested lands, and prairies, as well as strategic segments of trail construction and an e-bike incentive program.
• These projects will reduce GHGs by reducing vehicle miles traveled and sequestering carbon in restored natural lands to ensure that LIDAC residents reap physical, mental, and financial benefits.
GULLY PARK - FAYETTEVILLE
EMMA AVE. - SPRINGDALE
EMMA AVE. BUSINESS
30

GRANT PROJECTS

- 18 community-identified and led projects
  (Restoration/Preservation/Trail Construction, LIDAC focus)
- E-bike Incentive Program – Trailblazers
  (mode-shift, LIDAC focus)
- Workforce Training Program – WCRC/IRWP/BWA/AAEF
  (best practices, workforce development, sustainable landscaping, LIDAC focus)

https://peopleforbikes.cdn.prismic.io/peopleforbikes/2eb4e948-75b0-4f31-976c-fb147d5a1b11_Electric+Bicycle+Incentive+Toolkit.pdf

31



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TRAILBLAZERS

ILLINOIS River WATERSHED PARTNERSHIP
JOHNSON ARKANSAS EST. 1836
WATERSHED CONSERVATION RESOURCE CENTER
BELLA VISTA
ROGERS ARKANSAS
BEAVER WATERSHED ALLIANCE
Beaver Water District
CITY OF FAYETTEVILLE ARKANSAS
UNIVERSITY OF ARKANSAS
Arkansas State Parks
THE CITY OF BENTONVILLE
NORTHWEST ARKANSAS LAND TRUST
SPRINGDALE

OVER 50 AGENCIES PARTNERED STATEWIDE ON THE IMPLEMENTATION GRANT PACKAGE

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PHASE 2 TASKS

- MINIMUM OF THREE ADDITIONAL GHG REDUCTION MEASURES
- NATURE-BASED SOLUTIONS ENVIRONMENTAL INVENTORY
- CAP PROGRAM/POLICY/PROJECT EVALUATION
- CAP DOCUMENT PREPARATION

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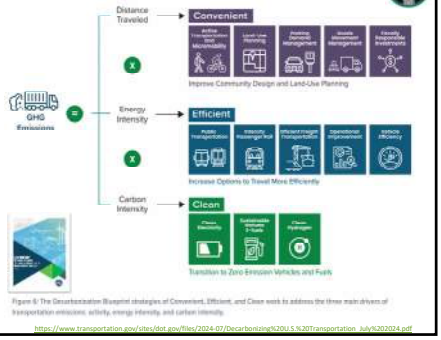
GHG REDUCTION MEASURE "DEEP DIVE" - TRANSPORTATION

- **"Green Network" Natural Cores and Corridors** - Carbon Sequestration and GHG Reduction through Active Transportation Networks
- **Land-Use/Growth Scenarios** – GHG Reduction through Development Patterns and Mobility Choice/Mode Shift
- **Technology Advancement and Zero-Emission Vehicles/Fuels** - GHG Reduction through ITS, TSMO, CMP, and EV

DECARBONIZATION BLUEPRINT STRATEGIES



https://www.transportation.gov/sites/dot.gov/files/2024-07/Decarbonizing%20U.S.%20Transportation_July%202024.pdf

36

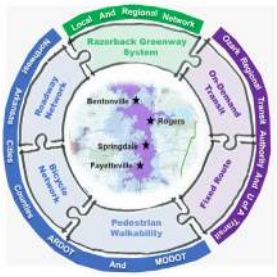
OUR GOAL IS TO MOVE PEOPLE...

WALK, BIKE, CAR, TRANSIT, GREENWAY

Roadway Network
A designed roadway network to provide safe multimodal options to manage areas of high congestion and expand street grid connectivity.

Bicycle Network
An expansive cross-county network for bicycles, scooters and emerging mobility technology.

Pedestrian Walkability
Creating a safe pedestrian environment with convenient access to daily needs and mobility options.



Razorback Greenway and Trail System
A greenway and trail system to connect neighborhoods, services, and destinations.

Fixed Route
Regional and local bus routes provide reliable access to key destinations.

On-Demand Transit
Provides custom trips within designated service areas to augment fixed routes.

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INCORPORATION INTO OTHER NWA PLANS

NWA ENERGY & ENVIRONMENT **COMPREHENSIVE** ACTION PLAN

COMING SPRING 2025

2050 METROPOLITAN TRANSPORTATION PLAN (MTP)
1 Million People - 3 Land Use Patterns/Growth Scenarios

NEAR-TERM, HIGH-PRIORITY, IMPLEMENTATION-READY MEASURES - TIE INTO LONG-TERM PLANNING, POLICIES, AND FUNDING STRUCTURES

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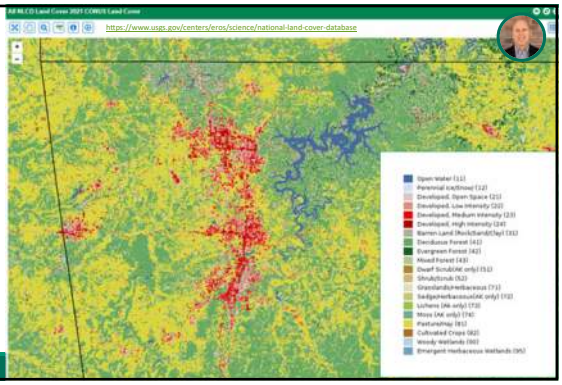
2021 National Land Cover Dataset



PHASE 2 PUBLIC OUTREACH

- **PURPOSE**
- **IN-PERSON**
  - Two open houses
  - Additional pop-up events
- **ONLINE**
  - Public survey
  - Social media ads promoting activities

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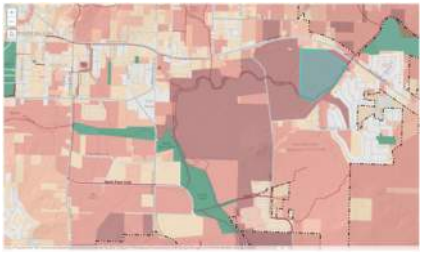
ENERGY & ENVIRONMENT INNOVATION PLAN

GIS TOOL DEMONSTRATION

NATURE-BASED SOLUTIONS REGIONAL ENVIRONMENTAL INVENTORY



https://maps.fayetteville-ar.gov/sustainability/climateresilience

42

TAKE THE SURVEY

Scan the QR code or visit the website at:
www.surveymonkey.com/r/NWARPC-EEI2

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NEXT STEPS

EVENT/DELIVERABLE	DATE/DUE DATE
Public Survey	August-October 2024
Stakeholder Meeting #2	August 21, 2024
Public Engagement Meetings	September 2024
Stakeholder Meeting #3	November 2024
Stakeholder Meeting #4	January 2025
Comprehensive Plan Supplement to ADEE	February 28, 2025
NWARPC Adoption of NWA EEI CAP	Spring 2025
Status Report Supplements	March 1, 2027

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THANK YOU!

Stakeholder Meeting #1 Engagement

Meeting Chat

During the meeting, comments in the chat were recorded and documented below.

- [Meeting Chat- Glen Hooks]: Re the electric power sector: we have recently opened a PSC stakeholder group to address the NWArk "load pocket" transmission issue. Might be of interest to folks on this Zoom. Happy to discuss more for anyone interested.
- Meeting Chat- Keaton Smith: I may have missed it, but I don't believe I saw much mention of expanded public transportation in the current plan. It seems like public transit would be a key strategy to drive residential densities that would reduce sprawl and preserve existing carbon sinks. Do we see expanded public transit as part of this plan?

Follow Up Survey

A survey was distributed to attendees at the end of the meeting and in a follow up email. The survey sought relevant information, data sets, or tools known by stakeholders or available in the community. Survey responses are shared below.

Survey Prompt:

A. *Do you have any relevant GIS datasets that would improve the Green Network mapping tool? If so, please list below. Datasets may include:*
    - *Existing and planned trail networks*
    - *Sites with streambank erosion*
    - *Impervious surfaces such as buildings, parking lots, and streets*
    - *Tree canopy*
    - *Areas that are frequently flooded during rain events*

B. *Are there any additional measures that should be included? If so, please comment below.*

- Josh Beam - Benton County:
    - A. I believe that all of the GIS data from the County has been shared with NWARP or is available from our IT department. The county has completed a number of streambank stabilization projects and have some ongoing projects as well. Through these areas we have more detailed topographic survey data of the streams and infrastructure with ACAD files of the projects. Not sure if this type of info would be of any benefit and most of these sites are in rural areas but if anyone would like it then we are happy to share.

- Peter Nierengarten - City of Fayetteville:
    - A. We are happy to help with the development of a regional mapping tool.

- Tom Adler - City of Bentonville:
    - A. I'd add a metric on tree canopy over trail. For example we have a trail along I St without any trees and it is miserable. Adding the People for Bikes Stress network would be great indicator of what quality of trail is existing.

- Leif Kinberg- Illinois River Watershed Partnership:
    - A. Yes, there are several datasets that I think would be incorporating including: 1. We are in the process of finalizing the Conservation-based Recreation Master Plan for the upper Illinois River which includes mostly existing datasets on streambank erosion, land cover and others. It will also include some new datasets on recreational access points, cultural heritage assets, and characterization of recreational assets. 2. We are finalizing the watershed management plan for the Illinois River watershed and there will be several datasets from this study that would be useful to incorporate. 3. USACE is finalizing the flood study for the Upper Illinois River watershed and I think there will be quite a bit of good datasets on frequency of flooding and related datasets. It will be completed this Fall.

- Glen Hooks- Audubon Delta:
    - A. Re the electric power sector, I recommend including recommendations for improving/adding additional transmission capacity in the region. This is necessary to both get more clean energy onto the grid and to properly plan for the pending retirement of SWEPCO's Flint Creek power plant. The utility plans to retire the plant in the 2030s. Note that the PSC currently has a stakeholder group open to work on the NWArk "load pocket". transmission issue that is a good place to become involved.

- Grady Spann -NWA Land Trust:
    - A. Possible
    - B. Maybe critical areas that impact water quality and natural areas that the plan encompasses that should be permanently protected. We have a priority map that may help out.

- Kristifier Paxton - City of Siloam Springs:
    - A. Our GIS Analyst, Steven Escalante, should be able to provide our available GIS datasets we have available.

- David Criswell - Trailblazers:
    - A. Existing and planned trails

- Ben Rhoads - City of Siloam Springs:
    - A. Yes on trails and flooding, not sure about the other items.
    - B. Not sure, but I will ask my GIS person!

Meeting Follow Up

Stakeholder feedback was also received by email following the meeting. A follow-up email was sent from NWARPC to the full committee, including those unable to join, providing meeting slides and a recording. An ongoing Idea Box via Microsoft Forms was also available to the Stakeholder Committee.
Comments collected via email are as follows.

- Tom Adler:
    - A VMT per capita goal covers land use, transportation network and active transportation and having a 100% renewable energy portfolio by 2040 captures the power side.
        - Find My VMT - Fehr & Peers (fehrandpeers.com)
        - Renewable and Clean Portfolio Standard (entergy-neworleans.com)
    - As a distant third measure, I'd suggest that trees and above ground power lines are incompatible – adopting a policy of undergrounding all powerlines by 2050 would provide carbon sequestration, make a better public realm, encourage more active transportation and make our power tornado proof for the next one.

Stakeholder Committee Meeting #2 (CAP)

To continue engaging the Stakeholder Committee throughout development of the Northwest Arkansas Energy and Environment Innovation Plan, a virtual stakeholder committee meeting was held on August 21, 2024, from 9:00 a.m. to 10:30 a.m. via Zoom to update stakeholders on new proposed measures and upcoming public outreach plans.

Stakeholders were identified by the NWARPC, as previously described in ***Stakeholder Committee***, and invited via email to attend. The meeting was attended by 48 stakeholders including representatives from many public, non-profit, and private sectors, listed below. NWARPC staff and the consultant team facilitated the meeting. The meeting format included a welcome and brief introduction of the project team and a project update, and the following agenda:

- Environmental Protection Agency's Climate Pollution Reduction Grants (EPA CPRG),
- NWARPC's grant activity thus far,
- Recap of CAP Stakeholder Meeting #1,
- Decarbonization blueprint strategies,
- Regional greenhouse gas emissions and sequestration,
- CAP's additional measures for transportation, agriculture, and industrial sectors,
- Planned stakeholder and public engagement process,
- Public survey,
- Next steps, and
- Additional grant opportunities.

Stakeholder Committee Meeting #2 Attendees

- Alford Drinkwater, Advanced Environmental Recycling Technologies
- Sunny Farmahan, ARDOT
- Aaron Pinedo, ARDOT
- Glen Hooks, Audubon Delta
- Holly Wren, Beaver Water District
- Becky Roark, Beaver Watershed Alliance
- Madison Kienzle, Benton County
- Robin Mizell, Black Hills
- Taylor Osburn, Boston Mountain Solid Waste District
- Richard Ims, Carbon Chicken
- Doug Tapp, City of Bella Vista
- Justin Culpepper, City of Bella Vista
- Dan Weese, City of Bentonville
- Travis Matlock, City of Bentonville
- Gary Wilson, City of Bentonville
- Lorene Burns, City of Centerton
- Alison Jumper, City of Fayetteville
- Leif Olson, City of Fayetteville
- Chris McNamara, City of Fayetteville
- Matt Mihalevich, City of Fayetteville
- Casey Wilhelm, City of Rogers
- Quinton Harris, City of Rogers
- John McCurdy, City of Rogers
- Ben Rhoads, City of Siloam Springs
- Chris Herrera, City of Springdale
- Julie Williams, Fayetteville Public Schools

- Keaton Smith, First Horizon
- Orlo Stitt, Holistically Green Living
- Rob Smith, NWA Council
- Grady Spann, NWA Land Trust
- Joel Gardner, Ozark Regional Transit
- Jeff Perry, Rogers Public Schools
- Douglas Zollner, The Nature Conservancy
- David Criswell, Trailblazers
- Darryl Holliday, University of Arkansas
- Adam Waddell, University of Arkansas
- Eric Boles, University of Arkansas
- Bridget Russell, Washington County
- Graham Thompson, Watershed Conservation Resource Center
- Nicole Gibbs, NWA Regional Planning Commission
- Tim Conklin, NWA Regional Planning Commission
- Tim Reavis, NWA Regional Planning Commission
- Luke Aitken, NWA Regional Planning Commission
- Cristina Scarlat, NWA Regional Planning Commission
- Taylor Plummer - Olsson (Olsson), Olsson
- Nick Steinke, Olsson
- Eric Fuselier, Olsson
- Lauren Hildreth, Olsson

To view the entire ***CAP Stakeholder Meeting Presentation #2***, see presentation slides as follows.

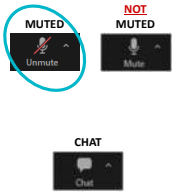
NWA Regional Planning Commission

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

COMPREHENSIVE ACTION PLAN (CAP)
STAKEHOLDER MEETING #2
AUGUST 21, 2024 | 9:00 AM - 10:30 AM
ZOOM VIRTUAL MEETING

HOUSEKEEPING

- Please keep yourself muted throughout the meeting.
- This meeting will be recorded.
- If you have technical issues during the meeting, email Lauren Hildreth at *lhildreth@olsson.com*.
- **Nicole Gibbs** will provide the meeting presentation slides in a follow-up email.
- If you have questions during the meeting, please use the chat function.



PRESENTERS

Tim Conklin, AICP
Executive Director
NWARPC

Nicole Gibbs, AICP
Regional Planner
NWARPC

Eric Fuselier, PWS, ENV, SP
Project Manager
Olsson

Nick Steinke, PE, CPEA, SFP
Industry Expert
Olsson

THE CPRG PROCESS

PROGRESS AND NEXT STEPS

THE PROCESS AND PLAN PHASES

We're working on *THIS* right now!

1

PRIORITY ACTION PLAN
SEPT 2023 – MAY 2024
- Reviewed existing regional action plans
- Engaged the public and stakeholders
- Prepared at least three Priority Actions for inclusion in state-wide plan

2

COMPREHENSIVE ACTION PLAN
APRIL 2024 – FEB 2025
- Engage the public and stakeholders
- Prepare at least three additional Comprehensive Actions for inclusion in the state-wide plan

3

STATUS UPDATES
BEGINNING IN 2027
- Required to report on progress made
- Project updates will be made available to the public

PHASE 2/CAP TASKS

THIS is what we're working on today!

- Minimum of **three** additional GHG reduction measures
- Nature-based solutions **regional** environmental inventory
- CAP program/policy/project evaluation
- CAP document preparation

PRIORITY ACTION PLAN MEASURES

- TRANSPORTATION SECTOR
- WASTE, RECYCLING, & SUSTAINABLE MATERIALS MANAGEMENT
- CARBON REMOVAL MEASURES
- BUILDINGS
- ELECTRIC POWER SECTOR

7

CAP STAKEHOLDER MEETING #1 RECAP

Survey Question #1: **Do you have any relevant GIS datasets that would improve the Green Network mapping tool?**

GIS data sets available from stakeholders include:

- Waterway data assets such as streambank stabilization, land cover, topographic data of streams and infrastructure, and flood study data
- Recreational data assets such as Illinois River access points and existing and planned trails

Some stakeholders have already shared data while others have data available or are unsure what their GIS department has

8

CAP STAKEHOLDER MEETING #1 RECAP

Survey Question #2: **Are there any additional measures that should be included in the Comprehensive Action Plan?**

Stakeholders suggested additional measures, including:

- Transportation network improvements including tree canopy cover on trails, incorporating the PeopleForBikes Bicycle Network Analysis and traffic stress analysis methodologies, and create a Vehicle Miles Traveled (VMT) per capita goal
- Electrical utility transmission capacity increase, renewable and clean energy standards, increasing clean energy grid input, a renewable energy 2040 goal, and preparing for future retirement of SWEPCO Plant
- Retrofit and design future regional utility infrastructure to withstand extreme weather events, such as undergrounding powerlines
- Water quality impact and permanent protection for natural areas, using a priority map with stakeholders

9

TODAY'S FOCUS – CAP ADDITIONAL MEASURES

We need to develop:

- **two new measures** (one for the **industrial** sector and one for the **agriculture** sector) and
- **further refine** some **transportation** sector measures.

This is what we need your help with today!

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GHG REDUCTION MEASURE "DEEP DIVE" - TRANSPORTATION

- **"Green Network" Natural Cores and Corridors** - Carbon Sequestration and GHG Reduction through Active Transportation Networks
- **Land-Use/Growth Scenarios** – GHG Reduction through Development Patterns and Mobility Choice/Mode Shift
- **Technology Advancement and Zero-Emission Vehicles/Fuels** - GHG Reduction through ITS, TSMO, CMP, and EV

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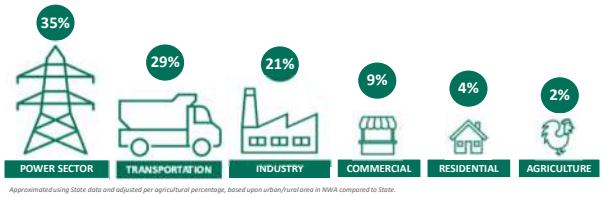
DECARBONIZATION BLUEPRINT STRATEGIES

https://www.transportation.gov/sites/dot.gov/files/2024-07/Decarbonizing%20U.S.%20Transportation_July%202024.pdf

NORTHWEST ARKANSAS (NWA) GHG EMISSIONS

APPROXIMATION

- The power sector is currently the largest contributor to GHG Emissions in NWA
- Agricultural emissions in NWA are approximated at 2%

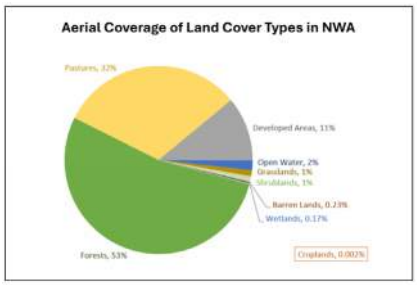


Approximated using State data and adjusted per agricultural percentage, based upon urban/rural area in NWA compared to State.

CARBON SINKS IN NWA

- Forests account for approximately 40% of regional carbon sequestration
- Forests cover approximately 53% (910,880 acres) of land area in the region (Fayetteville-Springdale-Rogers AR MSA)

14



CARBON SINKS IN NWA

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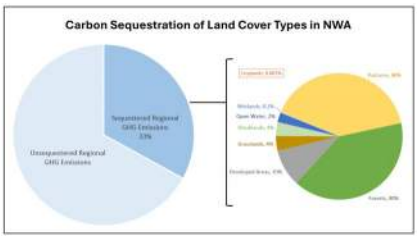
15



CAP DRAFT ADDITIONAL MEASURES

TRANSPORTATION SECTOR

Deep-Dive Measure #1 (Mode-Shift): Expand infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.

Deep-Dive Measure #2 (Land-Use/Growth Policies): Updating/adopting building and zoning codes and policies/long-range plans to encourage walkable, bikeable, and transit-oriented development.

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CAP DRAFT ADDITIONAL MEASURES

TRANSPORTATION SECTOR

29%

TRANSPORTATION

Deep-Dive Measure #3 (Clean Energy): Incentivize more efficient and lower/no emission modes of transportation by:

- Developing and implementing low/no emission ridesharing and e-bike programs, with priority given to LIDAC communities.
- Upgrading vehicle fleets by replacing internal combustion engine vehicles with low/no emission vehicles.
- Incentivizing eligible agencies, businesses, and individual automobile owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIDAC communities.
- Expanding supporting infrastructure for electric vehicles (EVs), including bus fleets.

19

CAP DRAFT ADDITIONAL MEASURES

AGRICULTURE SECTOR

2%

POWER SECTOR

Example draft measures:

- Incentive programs to fund electric agricultural equipment technologies
- Incentives for technologies and techniques that reduce nitrous oxide emissions from fertilizer application

20

CAP DRAFT ADDITIONAL MEASURES

AGRICULTURE SECTOR

2%

POWER SECTOR

Example draft measures:

- Providing incentives for anaerobic digester facilities to be implemented/constructed to divert organic waste that is currently being landfilled and/or land applied into compost and other agricultural and environmentally beneficial products such as renewable energy/fuel.
- Programs to support or incentivize agricultural use of biochar, such as by mixing with chicken litter or topsoil.

21

CAP DRAFT ADDITIONAL MEASURES

INDUSTRIAL SECTOR

21%

POWER SECTOR

Example draft measures:

- Standards addressing GHG emissions from industrial facilities and from energy production sectors, including emissions from industrial process heat and industrial processes.
- Programs to support or incentivize implementation of energy efficiency measures in industry, including energy audits, strategic energy management, equipment upgrades, and waste heat utilization.

22

CAP DRAFT ADDITIONAL MEASURES

INDUSTRIAL SECTOR

21%

POWER SECTOR

Example draft measures:

- Programs to support or incentivize GHG reductions in industrial energy use and industrial processes, including use of low/no carbon fuels, electrification, renewable energy, and process improvements.
- Programs to develop, expand, and support markets for low-embodied carbon materials and products, such as cement and steel.

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BREAKOUT SESSION (30 MINUTES)

- SELF-SELECT BREAKOUT ROOM

Industrial/Building/Efficiency: Standards addressing GHG emissions, energy efficiency measures, low-embodied carbon materials and products, etc.

Transportation: Expand bike/pedestrian/transit/active transportation infrastructure, low/no emission incentive programs, Updating/adopting building and zoning codes, advance infrastructure for electric vehicle (EVs), etc.

Agriculture: Nitrous oxide emissions reduction, anaerobic digesters, electric agricultural equipment technologies, etc.

INSTRUCTIONS

- Open Google Slides with the link in chat
- Click "More" on Zoom task bar
- Click "Join Breakout Room"
- Select room based on interest area

- SELECT A SCRIBE AND SPOKESPERSON
- WORK AS A TEAM TO FILL OUT YOUR GOOGLE SLIDE

25

CAP PUBLIC OUTREACH

IN-PERSON

- Two open houses
  - Madison County | Tues. Sep. 17 | Huntsville
  - Benton and Washington Counties | Thur. Sep. 19 | Springdale
- Additional pop-up events in Madison, Benton, and Washington Counties to be determined

ONLINE

- Public survey – now through 10/31
- Social media ads promoting in-person activities and survey
- *https://forms.office.com/r/Kigcn7e6sS*

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NEXT STEPS

EVENT/DELIVERABLE	DATE/DUE DATE
Public Survey	August 19 - October 31, 2024
Public Open Houses	September 17 and 19, 2024
Stakeholder Meeting #3	November 6, 2024
Stakeholder Meeting #4	January 2025
Comprehensive Plan Supplement to ADEE	February 28, 2025
NWARPC Adoption of NWA EEI CAP	Spring 2025
Status Report Supplements	March 1, 2027

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GRANT OPPORTUNITIES

Transportation

- USDOT Rebuilding American Infrastructure with Sustainability and Equity (RAISE)
- USDOT Charging and Fueling Infrastructure (CFI)
- Transportation Alternatives Program
- Recreational Trails Program
- Reconnecting Communities
- Rail Crossing Elimination

Water

- FEMA Building Resilient Infrastructure Communities (BRIC)
- FEMA Flood Mitigation Assistance

Energy

- Energy Efficiency and Conservation Block Grant Program (EECBG)

Environmental

- EPA Inflation Reduction Act Community Change Grants Program

Housing

- HUD Pathways to Removing Obstacles to Housing (PRO Housing)
- HUD Choice Neighborhoods

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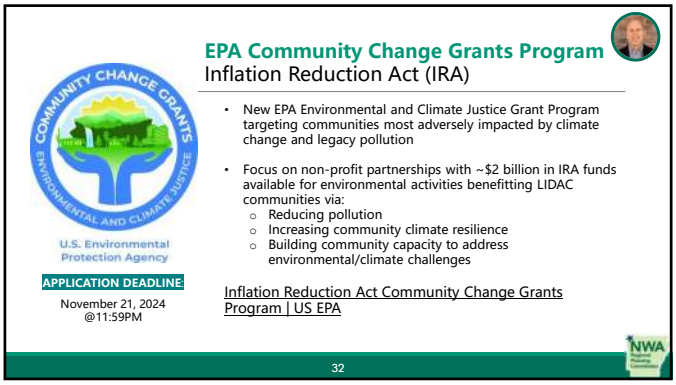
IN THE NEWS
Arkansas coalition receives $99.9 million EPA grant for environmental projects
Trailblazers to spearhead new e-bike rebate program across key Arkansas metros
Siloam Springs considers building gasification plant to get energy from waste as landfill nears end of life
Northwest Arkansas company gets $591,000 grant for poultry litter research
31


EPA Community Change Grants Program
Inflation Reduction Act (IRA)
COMMUNITY CHANGE GRANTS
ENVIRONMENTAL AND CLIMATE JUSTICE
U.S. Environmental Protection Agency
APPLICATION DEADLINE
November 21, 2024 @11:59PM
New EPA Environmental and Climate Justice Grant Program targeting communities most adversely impacted by climate change and legacy pollution
Focus on non-profit partnerships with ~$2 billion in IRA funds available for environmental activities benefitting LIDAC communities via:
Reducing pollution
Increasing community climate resilience
Building community capacity to address environmental/climate challenges
Inflation Reduction Act Community Change Grants Program | US EPA
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NWA
Regional Planning Commission
THANK YOU!
See you on November 6!

Stakeholder Meeting #2 Engagement

Stakeholders were asked to join breakout rooms during the meeting based on sectors: transportation, agriculture, industrial/building. The following is a summary of the sectors' example measures and responses based on the Google Slides seen below.

Transportation Sector
(Active Transportation / Ridesharing / E-Bikes / Auto Trip Reduction)

What sub-topics are critical to address in a transportation sector measure?	- Mode shift, safety improvement to bike ped network for comfort - E/W routes to supplement N/S and provide regional connection - Safety campaigns for drivers and cyclists - EV shift, charging and infrastructure for trucks and personal - Clean idle, freight tech for low emissions - Vehicle inspection for high emission vehicles (TX) - Percentage goals for ridership and walk/bike to work (corporate goals?) - Employer incentives for transit/mode shift, free fare or bike to work charity incentives - Waiving parking requirements for bike/transit focused development - Bike parking or transit stops near development nodes - Electrification vs. alternative Hydrogen fuels of bus fleets/hybrid buses - Higher ridership for transit - transit focused development to drive ridership increases - Regional fixed routes throughout NWA cities - Carpool /regional rideshare programming
What strategies are you aware of that have	- Cities implement code changes - bike parking policies that requires long term bike parking (safe, secure, dry)

Transportation Sector Example Measures

- **Measure #1**: Expand infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.
- **Measure #2:** Develop and implement low/no emission ridesharing and e-bike programs, with priority given to LIDAC communities.
- **Measure #3:** Reduce automobile trips and incentivize more efficient and lower/no emission modes of transportation by:

Transportation Sector
(Active Transportation / Ridesharing / E-Bikes / Auto Trip Reduction)

Are there any other stakeholders in the transportation and mobility sector we should reach out to?	- Large Employers (setting targets, Carpooling etc)
What other measures could stakeholders implement to reduce carbon emissions from transportation in NWA?	- Parking demand management practices at various levels (Private Prop. employers, public garages and city paid parking) - Dedicated bus lane or HOV targets at regional level
Are you aware of any other projects in NWA not reported during the Priority Action Plan phase that are aligned with the PAP measures?	- Free Glass and Waste/Recycling program via WFF - CNG/Gasification in Siloam?

Agriculture Sector

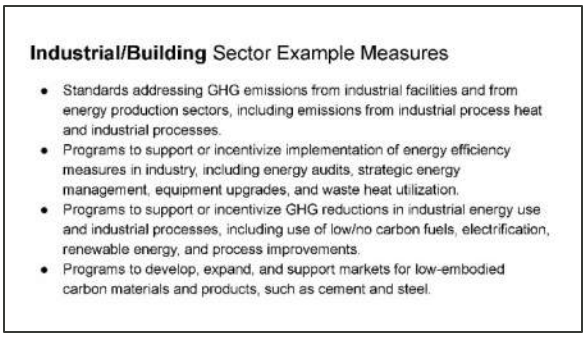
Are there any other stakeholders in the agriculture sector we should reach out to?	- Western Benton County Partnership - Farm Bureau - USDA NRCS - Conservation Districts - (ran out of time)
What role can city and county governments play in reducing agricultural carbon emissions in NWA?	
What hurdles might city and county governments in NWA face when working with the agricultural sector to reduce carbon emissions?	

Agriculture Sector Example Measures

- Incentive programs to fund electric agricultural equipment technologies
- Incentives for technologies and techniques that reduce nitrous oxide emissions from fertilizer application
- Incentives to promote anaerobic digesters to capture methane and generate renewable energy or produce renewable fuel
- Programs to support or incentivize agricultural use of biochar, such as by mixing with chicken litter or topsoil.

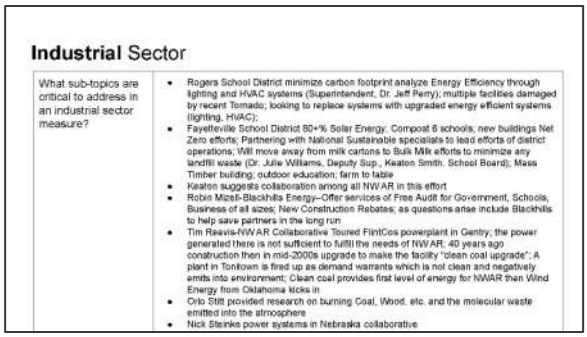
Agriculture Sector

What sub-topics are critical to address in an agriculture sector measure?	- Composting - aerobic digesters, tied into biochar, direct this to farmers in NWA region to learn how to apply it, nutrient ratios education - Workforce Development/Testing for Biochar - UA has staff to assist with this - We have landfills that cannot expand - take organics stream to upcycle to commodity - City Fay only city that takes food waste at this time - Biochar production (Ex: Taking storm/tornado waste to be turned into biochar and sequester Co2) + nutrients (poultry litter) - 3 million tons of poultry litter produced in NWA per year from 2 counties (Surplus of 300k tons per year not accounted for)
What hurdles do farmers in NWA face in reducing their carbon emissions?	- Farmers have to bring in compost - transportation is issue, testing is needed, education is needed, compost only good if you know what's in it - Public opposition to solution proposals - Hurdles in planning/land use - karst topography - Need more composting facilities, it's the least expensive way to go - Digesters can get expensive, can only handle so much feedstock per day - Need infrastructure to convert waste into commodity



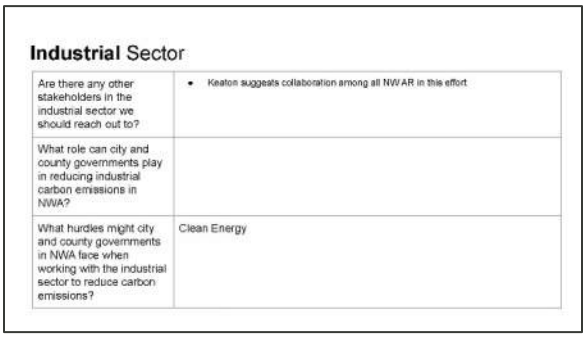
Industrial/Building Sector Example Measures

- Standards addressing GHG emissions from industrial facilities and from energy production sectors, including emissions from industrial process heat and industrial processes.
- Programs to support or incentivize implementation of energy efficiency measures in industry, including energy audits, strategic energy management, equipment upgrades, and waste heat utilization.
- Programs to support or incentivize GHG reductions in industrial energy use and industrial processes, including use of low/no carbon fuels, electrification, renewable energy, and process improvements.
- Programs to develop, expand, and support markets for low-embodied carbon materials and products, such as cement and steel.



Industrial Sector

What sub-topics are critical to address in an industrial sector measure?	• Rogers School District minimize carbon footprint analyze Energy Efficiency through lighting and HVAC systems (Superintendent, Dr. Jeff Perry); multiple facilities damaged by recent Tornado; looking to replace systems with upgraded energy efficient systems (lighting, HVAC); • Fayetteville School District 80+% Solar Energy; Compost 6 schools; new buildings Net Zero efforts; Partnering with National Sustainable specialists to lead efforts of district operations; Will move away from milk cartons to Bulk Milk efforts to minimize any landfill waste (Dr. Julie Williams, Deputy Sup., Keaton Smith, School Board); Mass Timber building; outdoor education; farm to table • Keaton suggests collaboration among all NWAR in this effort • Robin Mizell-Blackhills Energy--Offer services of Free Audit for Government, Schools, Business of all sizes; New Construction Rebates; as questions arise include Blackhills to help save partners in the long run • Tim Reavis-NWAR Collaborative Toured FlintCos powerplant in Gentry; the power generated there is not sufficient to fulfill the needs of NWAR; 40 years ago construction then in mid-2000s upgrade to make the facility "clean coal upgrade"; A plant in Tonkown is fired up as demand warrants which is not clean and negatively emits into environment; Clean coal provides first level of energy for NWAR then Wind Energy from Oklahoma kicks in • Orlo Stitt provided research on burning Coal, Wood, etc. and the molecular waste emitted into the atmosphere • Nick Steinke power systems in Nebraska collaborative



Industrial Sector

Are there any other stakeholders in the industrial sector we should reach out to?	• Keaton suggests collaboration among all NWAR in this effort
What role can city and county governments play in reducing industrial carbon emissions in NWA?	
What hurdles might city and county governments in NWA face when working with the industrial sector to reduce carbon emissions?	Clean Energy

Industrial/Building Sector

Example Measures

- *Standards addressing GHG emissions from industrial facilities and from energy production sectors, including emissions from industrial process heat and industrial processes.*
- *Programs to support or incentivize implementation of energy efficiency measures in industry, including energy audits, strategic energy management, equipment upgrades, and waste heat utilization.*
- *Programs to support or incentivize GHG reductions in industrial energy use and industrial processes, including use of low/no carbon fuels, electrification, renewable energy, and process improvements.*
- *Programs to develop, expand, and support markets for low-embodied carbon materials and products, such as cement and steel.*

Discussion Summary:

The Rogers School District is working to reduce its carbon footprint by upgrading to more energy-efficient lighting and HVAC systems, prompted by recent tornado damage. Fayetteville School District is advancing sustainability with over 80% solar energy, composting at six schools, and pursuing net-zero buildings, while also moving to bulk milk to cut landfill waste and adopting sustainable practices like mass timber construction. Black Hills Energy offers free audits and rebates to support schools and businesses in achieving long-term savings. FlintCo's

clean coal power plant in Gentry, complemented by a coal-fired plant in Tonitown and wind energy from Oklahoma, struggles to meet NW Arkansas' energy needs.

- Sub-topics:
    - Rogers School District: Focuses on reducing its carbon footprint by improving energy efficiency in lighting and HVAC systems. Recent tornado damage has prompted the district to consider upgrading to more energy-efficient systems.
    - Fayetteville School District: Utilizes over 80% solar energy, composts at six schools, and is implementing net-zero efforts in new buildings. They are transitioning from milk cartons to bulk milk to reduce landfill waste and are engaging in sustainable practices like mass timber construction, outdoor education, and farm-to-table initiatives. They are also working with national sustainability experts to enhance district operations.
    - Keaton Smith: Advocates for regional collaboration on sustainability efforts in Northwest Arkansas.
    - Robin Mizell from Black Hills Energy: Offers free audits and new construction rebates for schools, businesses, and government entities. Encourages including Black Hills Energy in sustainability planning to achieve long-term savings.
    - Tim Reavis: Discussed FlintCo’s power plant in Gentry, which uses a clean coal upgrade but cannot fully meet NW Arkansas' energy needs. Additional energy comes from a coal-fired plant in Tonitown and wind energy from Oklahoma as needed, both of which are less desirable due to environmental impacts.
    - Orlo Stitt: Provided insights on the environmental impact of burning coal and wood, focusing on the molecular waste released into the atmosphere.

<u>Verbatim Responses:</u>

- Sub-topics
    - Rogers School District minimize carbon footprint analyze Energy Efficiency through lighting and HVAC systems (Superintendent, Dr. Jeff Perry); multiple facilities damaged by recent Tornado; looking to replace systems with upgraded energy efficient systems (lighting, HVAC);
    - Fayetteville School District 80+% Solar Energy; Compost 6 schools; new buildings Net Zero efforts; Partnering with National Sustainable specialists to lead efforts of district operations; Will move away from milk cartons to Bulk Milk efforts to minimize any landfill waste (Dr. Julie Williams, Deputy Sup., Keaton Smith, School Board); Mass Timber building; outdoor education; farm to table
    - Keaton suggests collaboration among all NW AR in this effort

    - Robin Mizell-Blackhills Energy–Offer services of Free Audit for Government, Schools, Business of all sizes; New Construction Rebates; as questions arise include Blackhills to help save partners in the long run
    - Tim Reavis-NW AR Collaborative Toured FlintCos powerplant in Gentry; the power generated there is not sufficient to fulfill the needs of NW AR; 40 years ago construction then in mid-2000s upgrade to make the facility “clean coal upgrade”; A plant in Tonitown is fired up as demand warrants which is not clean and negatively emits into environment; Clean coal provides first level of energy for NWAR then Wind Energy from Oklahoma kicks in
    - Orlo Stitt provided research on burning Coal, Wood, etc. and the molecular waste emitted into the atmosphere
    - Nick Steinke power systems in Nebraska collaborative
- Challenges: clean energy costs

Agriculture Sector

Example Measures

- *Incentive programs to fund electric agricultural equipment technologies*
- *Incentives for technologies and techniques that reduce nitrous oxide emissions from fertilizer application*
- *Incentives to promote anaerobic digesters to capture methane and generate renewable energy or produce renewable fuel*
- *Programs to support or incentivize agricultural use of biochar, such as by mixing with chicken litter or topsoil.*

Discussion Summary:

In Northwest Arkansas, efforts to manage organic waste should focus on composting and biochar production, utilizing aerobic digesters and biochar to handle materials like storm debris, poultry litter, and other organics, which helps sequester CO2 and manage waste. The University of Arkansas supports workforce development and biochar testing. With limited landfill expansion options, upcycling organic waste is crucial. Fayetteville is the only city currently accepting food waste for composting. Challenges include transportation of compost, public resistance, land use issues due to karst topography, and the need for more composting infrastructure. Opportunities include the EQIP program for sustainable farming practices, connecting farmers to local markets to reduce emissions, and exploring silviculture and seaweed use for methane reduction.

- Sub-topics:

    - Composting and Biochar: Utilizing aerobic digesters and biochar to manage organic waste. Efforts are underway to educate farmers in Northwest Arkansas on nutrient ratios and application methods.
        - Biochar can be produced from storm or tornado waste, poultry litter (3 million tons annually), and other organic materials, helping to sequester CO2 and manage surplus poultry litter.
    - Workforce Development: The University of Arkansas (UA) offers assistance with biochar testing and workforce development in this area.
    - Landfill Limitations: Landfills in the region cannot expand, making it essential to upcycle organic waste into valuable commodities.
    - City of Fayetteville: The only city currently accepting food waste for composting.
- Challenges:
    - Transportation and Testing: Farmers face challenges with transporting compost and need education on its contents and benefits.
    - Public Opposition: Solutions face resistance from the public.
    - Land Use: Karst topography presents planning and land use challenges.
    - Infrastructure: There is a need for more composting facilities and infrastructure to convert waste into useful products. Digesters are costly and limited in capacity.
- Opportunities and Programs:
    - EQIP Program: Supports practices like cover crops and no-till farming to reduce carbon and improve soil health.
    - Local Markets: Connecting farmers to local markets can lower transportation-related carbon emissions.
    - Silviculture and Seaweed: Combining grasslands with forestry and using seaweed to reduce methane are promising practices.

<u>Verbatim Responses:</u>

- Subtopics:
    - Composting - aerobic digesters, tied into biochar, direct this to farmers in NWA region to learn how to apply it, nutrient ratios education
    - Workforce Development/Testing for Biochar - UA has staff to assist with this
    - We have landfills that cannot expand - take organics stream to upcycle to commodity
    - City Fay only city that takes food waste at this time
    - Biochar production (Ex: Taking storm/tornado waste to be turned into biochar and sequester Co2) + nutrients (poultry litter)
    - 3 million tons of poultry litter produced in NWA per year from 2 counties
        - (Surplus of 300k tons per year not accounted for)
- Challenges:

    - Farmers have to bring in compost - transportation is issue, testing is needed, education is needed, compost only good if you know what's in it
    - Public opposition to solution proposals
    - Hurdles in planning/land use - karst topography
    - Need more composting facilities, it's the least expensive way to go
    - Digesters can get expensive, can only handle so much feedstock per day
    - Need infrastructure to convert waste into commodity
- Other technologies or practices:
    - Low Hanging Fruit…is fruit
    - EQIP program can enable practices such as cover crops and practices that reduce carbon Transition to regenerative practices
    - No till farming and access to the needed equipment
    - Opportunities for farmers to connect to local markets to reduce transportation/carbon emissions from transportation
    - Silviculture - combining grasslands and forestry in riparian areas + an incentive worth it to farmers
    - Seaweed can reduce methane - look at non trad food sources
    - Biochar in poultry house - reduce ammonia in bedding materials
    - Biochar - multiple benefits to bird health and farmers
    - Animals naturally attracted biochar
- Other stakeholders: Western Benton County Partnership, Farm Bureau, USDA NRCS, Conservation Districts, (ran out of time)

Transportation Sector

Example Measures

- *Expand infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.*
- *Develop and implement low/no emission ridesharing and e-bike programs, with priority given to LIDAC communities.*
- *Reduce automobile trips and incentivize more efficient and lower/no emission modes of transportation*

Discussion Summary:

To improve transportation and mobility in Northwest Arkansas (NWA), focus on enhancing bike and pedestrian networks, promoting EV adoption with charging infrastructure, and implementing vehicle inspections for high-emission vehicles. Encourage higher transit ridership and

carpooling through incentives, integrate bike parking and transit stops into developments, and address challenges like EV infrastructure costs and transit funding. Engage large employers to set targets and consider additional strategies such as parking demand management and dedicated bus lanes. Review ongoing projects like the Free Glass and Waste/Recycling Program and CNG/gasification in Siloam, and identify any new projects that align with the Priority Action Plan.

- Sub-topics:
    - Mode Shift and Safety: Focus on improving bike and pedestrian networks for comfort and safety, with additional east-west routes to complement existing north-south routes and enhance regional connectivity.
    - Safety Campaigns: Implement campaigns aimed at improving safety for both drivers and cyclists.
    - EV and Charging Infrastructure: Promote a shift to electric vehicles (EVs) with emphasis on developing charging infrastructure for both personal vehicles and trucks, including clean idle technology and low-emission freight solutions.
    - Vehicle Inspection: Introduce vehicle inspections to identify and address high-emission vehicles.
    - Ridership and Transit Incentives: Set percentage goals for ridership and walking/biking to work. Offer employer incentives such as free fares or charity programs for biking to work. Consider waiving parking requirements for developments focused on bike and transit access.
    - Development and Infrastructure: Ensure bike parking and transit stops are incorporated into development plans. Consider electrification or hydrogen fuel options for bus fleets and hybrid buses.
    - Transit and Carpooling: Encourage higher ridership through transit-focused development and regional fixed routes. Support carpooling and regional rideshare programs.
    - Code Changes and Incentives: Implement city codes for secure and dry long-term bike parking. Offer rebates for electric chargers and infrastructure with utility support.
- Challenges:
    - Address cost and lead times for EV charging infrastructure, particularly for large vehicles and DC fast chargers. Overcome funding limitations for transit expansion.
- Additional Stakeholders: Consider reaching out to large employers, who can set targets and implement carpooling initiatives.
- Emission Reduction Measures:

    - Explore additional strategies for reducing transportation-related carbon emissions in Northwest Arkansas (NWA), such as:
        - Implementing parking demand management practices across private properties, employer sites, public garages, and city-paid parking areas.
        - Establishing dedicated bus lanes or high-occupancy vehicle (HOV) lanes at the regional level.
- Ongoing and New Projects:
    - Free Glass and Waste/Recycling Program: Offered through WFF.
    - CNG/Gasification in Siloam: Investigate any projects related to compressed natural gas (CNG) or gasification in Siloam Springs.
- Unreported Projects: Identify any additional projects in NWA that align with the Priority Action Plan (PAP) measures but were not previously reported.

<u>Verbatim Responses:</u>

- Subtopics:
    - Mode shift, safety improvement to bike ped network for comfort
    - E/W routes to supplement N/S and provide regional connection
    - Safety campaigns for drivers and cyclists
    - EV shift, charging and infrastructure for trucks and personal
    - Clean idle, freight tech for low emissions
    - Vehicle inspection for high emission vehicles (TX)
    - Percentage goals for ridership and walk/bike to work (corporate goals?)
    - Employer incentives for transit/mode shift, free fare or bike to work charity incentives
    - Waiving parking requirements for bike/transit focused development
    - Bike parking or transit stops near development nodes
    - Electrification vs. alternative Hydrogen fuels of bus fleets/hybrid buses
    - Higher ridership for transit - transit focused development to drive ridership increases
    - Regional fixed routes throughout NWA cities Carpool /regional rideshare programming
- Cities implement code changes - bike parking policies that requires long term bike parking (safe, secure, dry)
- Rebates for electric chargers and infra w utilities
- Challenges:
    - Cost and lead times of charging infra for EV shift, especially for larger vehicles and DC fast chargers (relevant for fleet shifts to EV)
    - Lack of funding for transit expansion

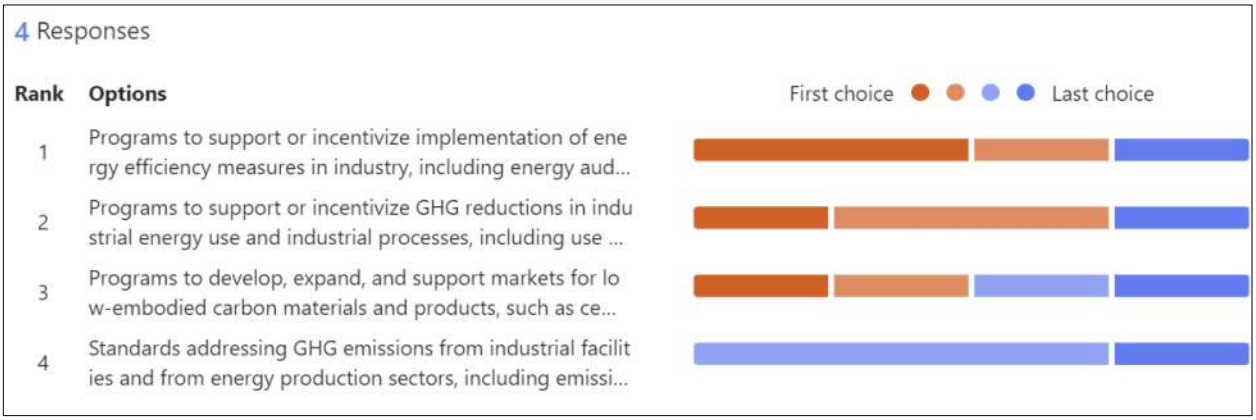
- Other stakeholders: Large Employers (setting targets, Carpooling etc)
- Other measures:
    - Parking demand management practices at various levels (Private Prop, employers, public garages and city paid parking)
    - Dedicated bus lane or HOV targets at regional level
- Other projects:
    - Free Glass and Waste/Recycling program via WFF
    - CNG/Gasification in Siloam?

Meeting Follow Up

Stakeholder feedback was also collected through a Microsoft Forms Survey following the meeting. This was shared via email in a follow up from NWARPC to the full committee, including those unable to join, also providing meeting slides and a recording. An ongoing Idea Box via Microsoft Forms was also available to the Stakeholder Committee.

Survey responses are as follows.

How would you rank the proposed measures for the Industrial/Building sector?



What measure(s) would you add for the Industrial/Building sector not listed above or on the Google Slides?

A Program to connect the best practices of modern construction and GHG reduction and offer that as an easily digestible piece of info for contractors to review (e.g. best practices/program flyer for any developer to know what's available)

Clean Energy Investment incentives.

What sub-topics are critical to address in an Industrial/Building sector measure that are not listed on the Google Slides?

Construction and Demolition Waste Recycling

What hurdles do industries in NWA face in reducing their carbon emissions?

Lacking funded Carbon Dioxide Removal (CDR) services to assist companies capture and remove carbon and give them carbon credits in the form of negotiable CORC's

Lack of clean energy options from current electric utilities

Are there any other stakeholders in the Industrial/Building sector we should reach out to?

Walmart and Tyson

What role can city and county governments play in reducing industrial carbon emissions in NWA?

Work with the private sector for "off-the-shelf" Pyrolysis reactors with carbon-negative technologies

Initiate benchmarking requirements for large buildings

What hurdles might city and county governments in NWA face when working with the Industrial/Building sector to reduce carbon emissions?

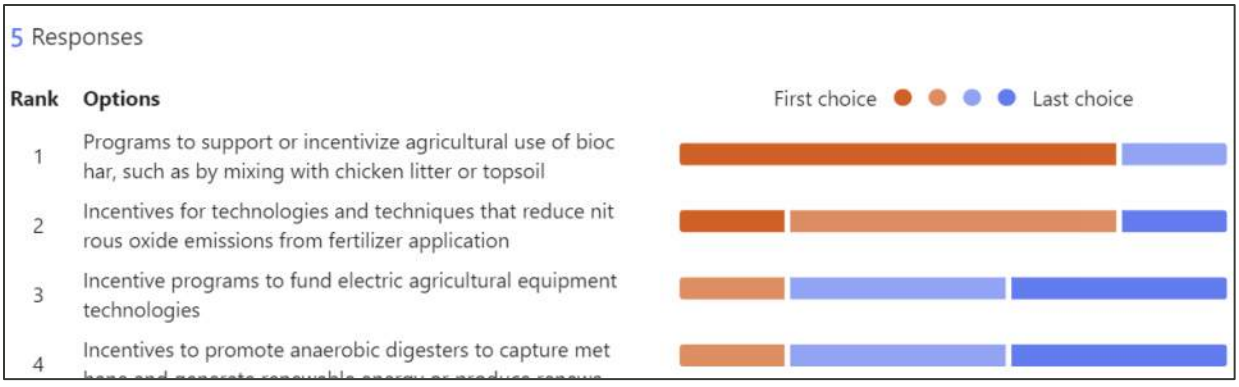
Cost

State pre-emption

Please share any additional comments for the Industrial/Building sector below.

No response.

How would you rank the proposed measures for the Agriculture Sector?



What measure(s) would you add for the Agriculture sector not listed above or on the Google Slides?

- Fund private-sector businesses to partner with local industries to launch pyrolysis reactor initiatives to create WTE and Biochar by-products for Ag use
- Incentives to increase soil carbon, based on starting soil samples that are below a city-determined action threshold, incentivizing carbon increase in soil demonstrated through soil testing up to a minimum carbon threshold that is considered regenerative.
- Offer free training for how to access federal ag funding through EPA EQIP program (~20% of farmers are EQIP members nationally, we should aim for 100% regionally, to maximize capture of federal ag funding per farm)
- Composting

What sub-topics are critical to address in an Agriculture sector measure that are not listed on the Google Slides?

- Development of an aggregation facility, or local aggregation facility model in sub-regions with high volumes of waste production (poultry litter aggregation, etc.)
- Feed miles - pushing local animal feed production (hemp seeds, etc.) to reduce overall food miles for, for instance, laying facilities.

What hurdles do farmers in NWA face in reducing their carbon emissions?

- Lack of local/regional aggregation facility to process their biomass into an upcycled commodity
- Cost/knowledge/incentives to do it properly.
- They operate on low margin already and do not want to change in a way that costs them even more.
- Resistance to change, inertia

What technologies or practices could be implemented to significantly reduce agricultural carbon emissions in NWA?

- Pyrolysis retorts on-farm in some cases but also at an established aggregation facility. Also use of Biochar in soil to immediately sequester CO2 and enhance soil quality long-term.
- Backing out chemical concentrates in favor of regenerative-model-derived fertilizers, such as up-cycled poultry litter, other biomass waste. PLEASE NOTE - Anaerobic Digestors do not meaningfully impact GHG emissions without added algae processing. The classic anaerobic digestor model looks good on paper, but when you actually measure the GHG impact, every atom of carbon that is converted to methane in the anaerobic digestor is then used for fuel and ends up in a molecule of CO2, so, anaerobic digestors push the emissions back on the timeline, but do not reduce them. Furthermore, the potential to leak methane anywhere in the process is

important to think about, because one molecule of Methane - CH4 - is 26-32x worse than CO2 in the atmosphere. So, without a robust plan for actually sequestering the carbon, anaerobic digestors can easily end up with more emissions than you started with.
- Biochar, recycled fertilizer that offsets chemical concentrates
- Industrial scale composting

Are there any other stakeholders in the Agriculture sector we should reach out to?

- Large poultry litter producers, agriculture and farming groups locally.
- Tyson, Georges & UA Farm and Ag Depts

What role can city and county governments play in reducing agricultural carbon emissions in NWA?

- Fund Carbon Dioxide Removal (CDR) services to assist companies capture and remove carbon and give them carbon credits in the form of negotiable CORC's
- As a facilitator and instigator of change.
- Offering carbon studies, establishing a minimum carbon soil content that means the soil obviously needs to be improved, and a maximum at which carbon content is considered normal/repaired, and facilitate form the city level a way to move up that carbon concentration, either with subsidy of products or incentives to do so for the farmer.

What hurdles might city and county governments in NWA face when working with the agricultural sector to reduce carbon emissions?

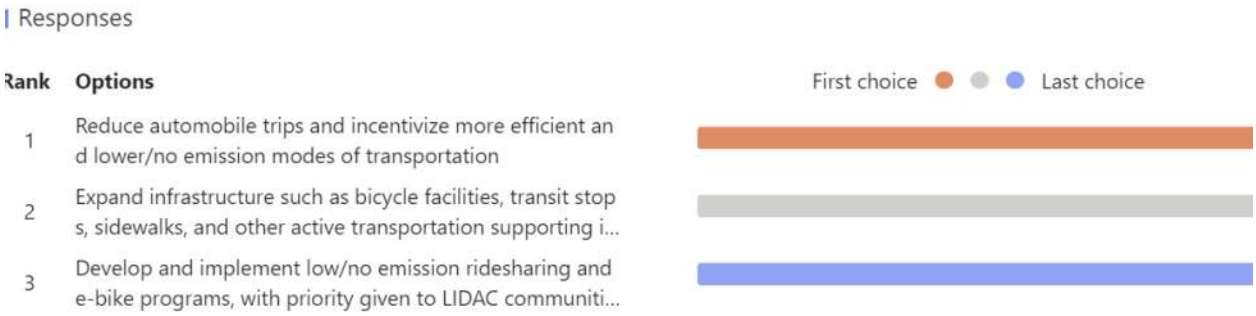
- Costs and location for aggregation site for a BECCS (Bio-Energy Carbon Capture System) + Offtake Utilization
- Changing a low-margin business while in-flight will be hard for farmer's to want to do, because it's connected to their position which is already low cash-flow and high risk.
- The farmers operate on extremely low margin and do not have cover to take risks or make changes mid-flight. They need cover somehow - permission and runway - to change, knowing it won't take their operation and bottom line.

Please share any additional comments for the Agriculture sector below.

- All the parts-and-pieces are on the ground (technology/science/know-how) to do this, but the farmer's need permission and runway to change mid-flight without taking all the risk of change on their shoulders.
- Sorry if I already sent this - I don't think the submission saved the first time. Anaerobic digestors - it should be noted that every atom of carbon converted to methane in an anaerobic digestor is then burned for fuel. So, Anaerobic digestion

pushes the GHG reduction down the timeline, but doesn't reduce it. Further, any CH4 leaked from the process is 26-32x worse for the climate change problem. So, an LCA - lifecycle analysis - of the anaerobic digestor plan in question should be developed to make sure it isn't actually making the GHG problem worse.

How would you rank the proposed measures for the Transportation sector?



What measure(s) would you add for the Transportation sector not listed above or on the Google Slides?

- Consider biochar-based asphalt for additional bike trails - a 6% biochar mix both increases the melt temperature of asphalt (more resilient to ambient temperature going up on the hottest days/as climate change worsens). If bike trail is laid with biochar-based asphalt at 6% biochar, 2in deep and 10ft across, then it would also permanently sequester ~140 metric tons of CO2/mile, which is worth ~$18,000 in carbon credit sales...per mile.
- Again, sorry if I already submitted this once but the form acted like it didn't save. For bike trail repairs, road expansions, etc., note that adding biochar to asphalt up to 6% gives it a higher melt temperature, making it more resilient to climate change moving forward - it won't melt or deform as much as we experience hotter summers, etc.. And note that, for a given stretch of bike trail - say 10ft wide and 2in deep - at 6% biochar, 140 tons of CO2 are reduced and ~$18k in carbon credit revenue can be produced PER MILE of new trail laid, offering a revenue stream from this construction. Biochar can come from regional waste or, pending development of that, from the market ($100-200/tn)
- EV Charging

What sub-topics are critical to address in a Transportation sector measure that are not listed on the Google Slides?

- Using the construction of new facilities to perform long-term GHG capture on day-1 using biochar as an opportunity filler in asphalt, concrete, etc. (high opportunity, see bike trail example above)
- Embedding carbon permanently in the actual material - the asphalt, the concrete, etc. (biochar can go in concrete up to 5% for load bearing, 30% for non-load bearing; improves strength and reduces weight of final concrete mix)

What strategies are you aware of that have been effective in encouraging transportation mode shift in other regions of a similar size to NWA?

Dedicated local funding for mass transit

What hurdles do local governments in NWA face to encouraging mode-shift in transportation?

Money necessary to support transit

Are there any other stakeholders in the Transportation sector we should reach out to?

Razorback Transit

Please share any additional comments for the Transportation sector below.

- The method for proving greenhouse gas reduction or project impact on GHG is through a LifeCycle Analysis (LCA). LifeCycle Analysis are put together in a specific way - guided by ISO standards 14040 and 14044. To defend or measure GHG claims, I would advise beginning the LCA analysis by partnering with a services firm or local group with expertise, and/or the University of Arkansas (Dr. Marty Matlock as a starting reference).
- Embedding biochar in construction materials will reduce cost of materials (cheaper filler), makes higher quality asphalt/concrete, and establishes day-1 permanent sequestration from the project and day-1 revenue streams from carbon credits. You'll want to start the lifecycle analysis (LCA) soon, as the LCA developed per ISO 14040/14044 standards is how any GHG claims will be defended. Dr. Marty Matlock at the UofA is a great first-contact on this, and you might partner with local firms or freelance Carbon Accountants for developing the LCA, probably using the industry best practice of developing the model in OpenLCA.

Are you aware of any other projects in NWA not reported during the Priority Action Plan phase that are aligned with the PAP measures?

- I'm with the Carbon Chicken Project, and I know we are working to do a lot that lines up with this PAP directly.
- NWA Load Pocket issue with SWEPCO delivery of power from Oklahoma

Please share any additional comments.

- Carbon Chicken Project, LLC has local expertise in Nature-based Carbon Capture and Removal and would like to be a major participant in the Metroplan
- Thanks for your time - please reach out with any questions.
- Looking forward to see what comes from this project!! Thanks so much for your time/effort on it!

Stakeholder Committee Meeting #3 (CAP)

To share drafted measures and receive input from the committee on the Northwest Arkansas Energy and Environment Innovation Plan, a virtual stakeholder committee meeting was held on November 5, 2024, from 1:30 p.m. to 3 p.m. via Zoom to inform and engage stakeholders and to collect their feedback on topics and measures related to the CAP.

Stakeholders were identified by the NWARPC, as previously described in ***Stakeholder Committee***, and invited via email, and attended by 38 committee members. NWARPC staff and the consultant team facilitated the meeting which included a welcome and brief introduction of the project team and the following agenda:

- Environmental Protection Agency's Climate Pollution Reduction Grants (EPA CPRG),
- NWARPC's grant activity thus far,
- Public survey results
- Demo of the regional climate resilience GIS mapping tool
- "Final draft" CAP measures
- Next steps
- Additional feedback opportunities.

Stakeholder Committee Meeting #3 Attendees

- Holly Wren, Beaver Water District
- Madison Kienzle, Benton County
- Lydia Wilkerson, Benton County Recycling
- Wendy Bland, Benton County Recycling
- Michael Veliquette, Bentonville School District
- David Scoggin, Black Hills Energy
- Taylor Osburn, Boston Mountain Solid Waste District
- Ashley Wardlow, Botanical Garden of the Ozarks
- Richard Ims, Carbon Chicken

- Turner Tomlinson, Carbon Chicken
- Christopher Hyatt, City of Bella Vista
- Dan Weese, City of Bentonville
- Tom Adler, City of Bentonville
- Travis Matlock, City of Bentonville
- Alison Jumper, City of Fayetteville
- Chris McNamara, City of Fayetteville
- Leif Olson, City of Fayetteville
- Matt Mihalevich, City of Fayetteville
- Peter Nierengarten, City of Fayetteville
- Joshua Robertson, City of Fort Smith
- Casey Wilhelm, City of Rogers
- John McCurdy, City of Rogers
- Lance Jobe, City of Rogers
- Ben Rhoads, City of Siloam Springs
- Tristan Hill, City of Springdale
- Shannon weathers, Emerald Building
- Keaton Smith, First Horizon Bank
- Erin Billings, Georges
- Bernadette Rhodes, Metroplan
- Jared Sullivan, Springdale Chamber of Commerce
- Douglas Zollner, The Nature Conservancy
- David Criswell, Trailblazers
- Eric Boles, University of Arkansas
- Bridget Russell, Washington County
- Anthony Hunter
- Jason Willey
- Orlo Stitt
- Richard McMullen
- Cristina Scarlat, NWA Regional Planning Commission
- Luke Aitken, NWA Regional Planning Commission
- Nicole Gibbs, NWA Regional Planning Commission
- Tim Conklin, NWA Regional Planning Commission
- Tim Reavis, NWA Regional Planning Commission
- Andy Brewer, Olsson
- Eric Fuselier, Olsson
- Katrina Wille, Olsson

- Lauren Hildreth, Olsson
- Stacey Roach, Olsson
- Taylor Plummer, Olsson

To view the entire ***CAP Stakeholder Meeting Presentation #3***, see presentation slides as follows.

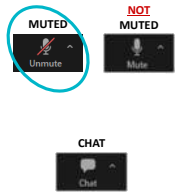
NWA Regional Planning Commission

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

COMPREHENSIVE ACTION PLAN (CAP)
STAKEHOLDER MEETING #3
NOVEMBER 6, 2024 | 1:30PM - 3:00PM
ZOOM VIRTUAL MEETING

HOUSEKEEPING

- Please keep yourself muted throughout the meeting.
- This meeting will be recorded.
- If you have technical issues during the meeting, email Lauren Hildreth at *lhildreth@olsson.com*.
- **Nicole Gibbs** will provide the meeting presentation slides in a follow-up email.
- If you have questions during the meeting, please use the chat function.



PRESENTERS

Tim Conklin, AICP
Executive Director
NWARPC

Nicole Gibbs, AICP
Regional Planner
NWARPC

Eric Fuselier, PWS, ENV SP
Project Manager
Olsson

Lauren Hildreth
Public Engagement
Senior Coordinator
Olsson

THE CPRG PROCESS

PROGRESS AND NEXT STEPS

THE PROCESS AND PLAN PHASES

We're working on *THIS* right now!

1

PRIORITY ACTION PLAN
SEPT 2023 – MAY 2024
- Reviewed existing regional action plans
- Engaged the public and stakeholders
- Prepared at least three Priority Actions for inclusion in state-wide plan

2

COMPREHENSIVE ACTION PLAN
APRIL 2024 – FEB 2025
- Engage the public and stakeholders
- Prepare at least three additional Comprehensive Actions for inclusion in the state-wide plan

3

STATUS UPDATES
BEGINNING IN 2027
- Required to report on progress made
- Project updates will be made available to the public

ARKANSAS INVESTMENT PRIORITIES

Comprehensive Climate Action Plan *Required Elements*

- Due two years from the date of award for states and metro areas (summer/fall 2025) and at close of grant for tribes and territories
- Covers GHG reduction measures across **all significant sources/sinks and sectors**
- Establishes near-term **and long-term** GHG emission reduction targets
- Adds additional required analyses to support robust implementation

7

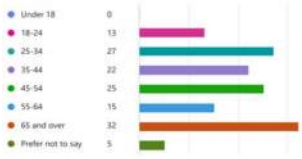
TODAY'S FOCUS:
TOOLS FOR PROGRESS AND MEASUREMENTS

We need to develop ideas for **measuring progress** toward **advancing regional measures**.

This is what we need your help with today!

8

PRELIMINARY PUBLIC SURVEY RESULTS



140 RESPONSES AND COUNTING

Geographic distribution: 56% Washington County, 42% Benton County

Age distribution: 23% aged 65 and over, 20% aged 25-34, 17% aged 45-54, 14% aged 35-44, 11% aged 55-64, 10% aged 18-24

Gender: 49% male, 44% female, 5% prefer not to say, 2% non-binary

Income: 26% earn $75k-$125k, 25% earn $125k or above, 23% earn $40k-$75k, 14% prefer not to disclose, 12% earn between $0-$40k

10

TRANSPORTATION SECTOR

HIGHEST PRIORITIES

- Constructing a **regional active transportation network** and providing opportunities for alternative modes of transportation, such as bicycles and public transit
- Updating/adopting building and zoning codes to **encourage walkable, bikeable, and transit-oriented development**; ranked as high importance by 28%

LOWEST PRIORITIES

- Incentivizing the **purchase of low/no emission vehicles;** 30% ranked this as less important
- Upgrading **city and county vehicle fleets;** 27% ranked this as less important

11

ENERGY SECTOR

HIGHEST PRIORITIES

- 76% of respondents in Northwest Arkansas advocate for **100% clean energy usage by 2050**, and 83% support carbon neutrality in government operations
- **Retrofitting facilities and improving energy standards** prioritized as the most critical actions, although opinions on specific technologies and initiatives vary

LOWEST PRIORITIES

- Developing **community-scale solar and alternative energy systems**; ranked as lower importance by 42%
- Utilizing technology to **reduce idling** (e.g., improving traffic signal timings); 50% ranked this as least important

12

BUILDING EFFICIENCY SECTOR

HIGHEST PRIORITIES

- Establishing an **incentive program for residential energy reduction** was viewed as the highest priority; 55% high priority
- Providing incentives for updated building energy codes; 51% high priority
- Improving **energy efficiency in public buildings and minimizing carbon footprint** of government buildings and public spaces

LOWEST PRIORITIES

- Providing **incentives to construction contractors for reducing carbon footprints**; ranked as the lowest priority by 32% and second lowest by 20%
- **Promoting low and zero-emission options in buildings**, especially in disadvantaged areas; lowest priority by 64%

13

WASTE, RECYCLING, AND SUSTAINABLE MATERIALS

HIGHEST PRIORITIES

- Providing **incentives and expanding access to community composting and food waste collection programs**; ranked as the highest importance by 29% of respondents and second highest by 22
- Developing a **construction and demolition recycling processing facility**; considered of mid-importance by 80% of respondents

LOWEST PRIORITIES

- Providing **incentives or a voucher system to improve waste management** for rural populations, including recycling; ranked as low importance by 78%
- Developing a **regional materials recovery facility** (MRF); considered mid importance by 56% and lowest importance by 30%

14

CARBON REMOVAL

HIGHEST PRIORITIES

- Planting **native trees and plants**; ranked high importance by 64%
- **Restoring degraded natural areas**; ranked high importance by 60%
- Incentivizing property owners to **improve carbon sequestration**, supported by 78%

LOWEST PRIORITIES

- Incentivizing **agricultural practices to reduce carbon emissions and create carbon capture**; ranked as the lowest priority by 47%
- Developing **conservation plans for new parks and recreation areas**; considered low importance by 66%

15

REGIONAL RESILIENCE

HIGHEST PRIORITIES

- **Retrofitting municipal and county water infrastructure with smart technologies** (65%) and educating and incentivizing water conservation for residents (58%)
- Creating **job opportunities** in local government for **sustainable land management**; 69% ranking it as high importance
- Ensuring that **low-income and vulnerable populations do not face disproportionately higher environmental and economic burdens**

LOWEST PRIORITIES

- **Incentivizing plumbing regulations and water efficiency standards** for new development; ranked as low importance (75%)
- Creating and/or expanding **workforce training opportunities for green building design** and construction, solar panel installation and maintenance, and EV workforce training; all ranked as lower importance

16

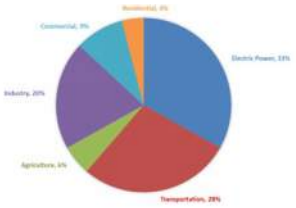
GREEN NETWORK GIS MAPPING TOOL (DEMO)

GREEN NETWORK GIS MAPPING TOOL
SCREEN SHARE

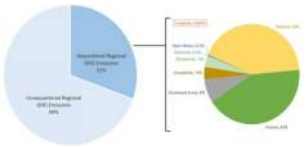
18

NWA Greenhouse Gas (GHG) Emissions and Sinks Inventory

2020 NWA Regional GHG Emissions Inventory



Carbon Sequestration of Land Cover Types in NWA



20

THE ROAD TO NET ZERO

- Aspirational goal of reaching net zero by 2050 in alignment with federal goals (EPA and USDOT)
- Majority of GHG emission reductions will need to occur in the **Electric Power**, **Transportation**, and **Industrial sectors**
- Assumes carbon sequestration remains constant

21

Decennial GHG Targets (MT CO2)

SECTOR	2020	2030	2040	2050
Electric Power	2,911,316	2,765,750	2,037,921	727,829
% reduction from 2020		5%	30%	75%
Transportation	2,470,208	2,223,187	1,729,146	617,552
% reduction from 2020		10%	30%	75%
Industry	1,764,434	1,587,991	1,323,326	705,774
% reduction from 2020		10%	25%	60%
Agriculture	488,507	439,656	366,380	195,403
% reduction from 2020		10%	25%	60%
Commercial	793,995	714,596	595,496	317,598
% reduction from 2020		10%	25%	60%
Residential	352,887	317,598	264,665	105,866
% reduction from 2020		10%	25%	70%
Total Emissions	8,781,347	8,048,778	6,316,934	**2,670,022**
Total % Reduction		8%	28%	70%
Carbon Sequestration	2,677,944	2,677,944	2,677,944	**2,677,944**
Total % Reduction	30%	33%	42%	100%
Net Emissions	6,103,403	5,370,834	3,638,990	**-7,922**
Net % Reduction	30%	39%	55%	100%

THE ROAD TO NET ZERO

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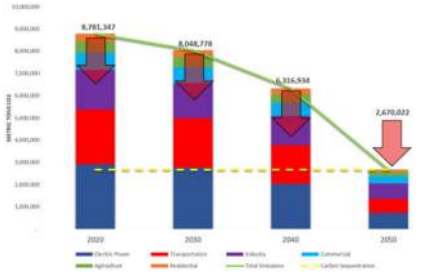
- Majority of GHG emission reductions will need to occur in the **Electric Power**, **Transportation**, and **Industrial sectors**
- Assumes carbon sequestration remains constant

22

Decennial GHG Targets (MT CO2)



CAP MEASURES

ENERGY SECTOR

33%

ENERGY

Develop and implement a regional/statewide renewable energy innovation program by:

- Installing renewable energy and energy storage systems on municipal/government facilities.
- Developing distributed and community-scale renewable energy generation and storage, including in LIDAC and rural communities.
- Developing and implementing programs that support smart-grid and/or behind-the-meter technologies.

25

CAP MEASURES

TRANSPORTATION SECTOR

28%

TRANSPORTATION

Measure #1: Expand infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.

Measure #2: Updating/adopting building and zoning codes and policies/long-range plans to encourage walkable, bikeable, and transit-oriented development.

26

CAP MEASURES

TRANSPORTATION SECTOR

28%

TRANSPORTATION

Measure #3: Incentivize more efficient and lower/no emission modes of transportation by:

- Developing and implementing low/no emission ridesharing and e-bike programs, with priority given to LIDAC communities.
- Upgrading vehicle fleets by replacing internal combustion engine vehicles with low/no emission vehicles.
- Incentivizing eligible agencies, businesses, and individual automobile owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIDAC communities.
- Expanding supporting infrastructure for electric vehicles (EVs), including bus fleets.

27

CAP MEASURES

INDUSTRIAL SECTOR

20%

INDUSTRIAL

Reduce GHG emissions in the industrial sector by developing and implementing:

- Programs to support or incentivize implementation of energy efficiency measures in industry, including energy audits, strategic energy management, equipment upgrades, and waste heat utilization.
- Programs to support or incentivize GHG reductions in industrial energy use and industrial processes, including use of low/no carbon fuels, electrification, renewable energy, and process improvements.

28

CAP MEASURES

BUILDINGS SECTOR

13%

BUILDINGS

Develop a residential/commercial energy efficiency and innovation program by:

- Establishing an incentive program for implementation of end-use energy efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting.
- Providing incentives for adoption and implementation of up-to-date building energy codes.
- Developing voluntary programs and policies that promote low and zero-emission options and vehicle charging, with a focus on buildings in rural and LIDAC areas; multi-family residential buildings; and commercial buildings.

29

CAP MEASURES

AGRICULTURE SECTOR

6%

AGRICULTURAL

Incentivize agricultural practices to reduce carbon emissions and create carbon capture, including:

- The implementation/construction of anaerobic digester facilities to divert organic agricultural waste that is currently being landfilled and/or land applied to tap methane.
- The implementation/construction of biochar pyrolysis facilities to convert organic waste into agricultural and environmentally beneficial products.

30

CAP MEASURES

WASTE & WASTEWATER

Develop and implement a waste minimization and management program that reduces carbon emissions by:

- Providing incentives for community composting programs.
- Supporting development of a biochar pyrolysis facility and/or gasification facility.
- Providing incentives for anaerobic digester facilities to be implemented/constructed at wastewater treatment facilities and to divert organic waste that is currently being landfilled and/or land applied into compost and into other agricultural and environmentally beneficial products or at waste.
- Providing incentives or a voucher system to improve waste management for rural populations.
- Developing a regional Materials Recovery Facility (MRF) with end-market transparency.

31

CAP MEASURES

CARBON REMOVAL

Develop and implement a program(s) to improve or increase carbon sequestration on the landscape through nature-based solutions and natural infrastructure by:

- Planting native tree and plant species that provide optimal carbon sequestration benefits in publicly owned parks, trails, and rights-of-way and on privately owned lands.
- Restoring degraded prairies, forests, riparian buffers, streams, and wetlands in parks, trails, rights-of-ways and private lands.
- Identifying lands with high carbon sequestration value, or for the development of new parks or recreation areas and create programs for the protection and restoration of these lands through fee-simple acquisition and/or conservation easements.
- Developing conservation plans for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value.

32

What does a net zero region or community look like in 2050?
(put in chat or unmute)

34

GROUP DISCUSSION (30 MINUTES)

- Ongoing/future **projects/programs/plans** that will support these measures *(put in chat)*
- **Ideas** on how to measure progress on advancing regional measures *(chat or discuss)*

35

PREVIOUS STAKEHOLDER FEEDBACK

PLANS/PROGRAMS ONGOING

- NWA Complete Streets Guide
- E-bike Rebate/Voucher programs
- Bike/Scooter Share programs
- Fayetteville Climate Action Plan
- UofA Climate Action Plan
- Corporate Sustainability Plans
- AR EV Infrastructure Deployment Plan
- Rogers Solar Program
- $15M NWARPC Funding Program (annually awarded)

PROJECTS ONGOING

- **CPRG $36.25M** NWA Green Network Projects/Programs
- **SS4A $25M** Fayetteville HIN Projects
- **SS4A $5.2M** Springdale Dean's Trail Project
- **RAISE $11.6M** Siloam Springs Main Street Project
- Solar Projects (Fayetteville, Rogers, BWD, JB Hunt)
- EV Charging Projects (JB Hunt, ORT CFI Award)
- Natural Area Restoration/preservation projects
- Highway 112 Complete Street; Connected Communities
- Carbon Chicken Project
- Biochar Facility

36

PREVIOUS STAKEHOLDER FEEDBACK

REGIONAL ACTION ITEMS

- Solar projects (public + private)
- Fleet electrification
- Clean energy/fuels
- Code amendments
  - *Buildings*
  - *Complete Streets/Development Patterns*
- Waste Diversion (C&D, Food, Mattresses, Recyclables)
  - *MRF*
  - *Food waste biodigester*
- Tree planting
- Preservation/restoration of natural spaces
- HOV, HOT, ride-share
- Regional high-capacity transit
- Local food production
- Conservation measures (water/energy)
- Infrastructure upgrades
- Transportation efficiencies (SMART/PROTECT)
- Workforce training

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NEXT STEPS

EVENT/DELIVERABLE	DATE/DUE DATE
Stakeholder Meeting #4	January 2025
Comprehensive Plan Supplement to ADEE	February 28, 2025
NWARPC Adoption of NWA EEI CAP	Spring 2025
Status Report Supplements	March 1, 2027

CLIMATE POLLUTION REDUCTION GRANTS

UPDATE! $100 Million Arkansas Tri-Region Coalition
EPA CPRG Implementation Grant Agreement – ***APPROVED!***

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9th Annual Arkansas Environmental Policy Summit

Conway, AR

Friday, November 8, 2024

This year's keynote is a panel presentation featuring the Arkansas Tri-Region Climate Pollution Reduction Grant (CPRG) Coalition, which was recently selected for a $100 million EPA CPRG grant for its "Energy and Environment Innovation for the Natural State" proposal.

This panel will feature:

- Tim Conklin, Executive Director, NWARPC
- Bernadette Rhodes, Senior Regional Planner, Metroplan
- Joshua Robertson, Director of Sustainability and Citizen Services, City of Fort Smith

https://act.audubon.org/a/aeps-2024

40

GRANT OPPORTUNITIES

Transportation
- USDOT Rebuilding American Infrastructure with Sustainability and Equity (RAISE)
- USDOT Charging and Fueling Infrastructure (CFI)
- Transportation Alternatives Program
- Recreational Trails Program
- Reconnecting Communities
- Rail Crossing Elimination

Water
- FEMA Building Resilient Infrastructure Communities (BRIC)
- FEMA Flood Mitigation Assistance

Energy
- Energy Efficiency and Conservation Block Grant Program (EECBG)

Environmental
- EPA Inflation Reduction Act Community Change Grants Program

Housing
- HUD Pathways to Removing Obstacles to Housing (PRO Housing)
- HUD Choice Neighborhoods

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EPA Community Change Grants Program
Inflation Reduction Act (IRA)

COMMUNITY CHANGE GRANTS
ENVIRONMENTAL AND CLIMATE JUSTICE
U.S. Environmental Protection Agency

APPLICATION DEADLINE:
November 21, 2024
@ 11:59PM

- New EPA Environmental and Climate Justice Grant Program targeting communities most adversely impacted by climate change and legacy pollution
- Focus on non-profit partnerships with ~$2 billion in IRA funds available for environmental activities benefitting LIDAC communities via:
  - Reducing pollution
  - Increasing community climate resilience
  - Building community capacity to address environmental/climate challenges

Inflation Reduction Act Community Change Grants Program | US EPA

42


NWA
Regional
Planning
Commission
THANK
YOU!

Stakeholder Meeting #3 Engagement

During the meeting, stakeholders were asked to share feedback or questions regarding proposed measures either verbally or in the meeting chat. Specific questions asked of the group included the future of NWA, projects or programs that will support proposed measures, and ideas on how to measure progress. A summary and verbatim responses of the discussion are below.

What does a net zero region or community look like in 2050?

Summary:

> To achieve the Net Zero by 2050 goal, stakeholders focused on improving electricity generation and efficiency, while continuing to increase transit options. Embracing circular economies and expanding public and electrified transit are crucial steps while enhancing traffic efficiency and providing easier access to low-emission vehicles will also make a big difference. Communities should be accessible by various transportation modes, and a regional active transportation network can help reduce auto trips. Industry and electricity emissions can be tackled with smarter electrical use and higher efficiency. Local clean energy sources like solar and wind are essential, along with upcycling waste and considering the carbon footprint of waste transport. Tracking progress in grid modernization will help accommodate increased clean energy production. Converting fleets to hydrogen or electric and developing biochar facilities are also important.

Verbatim Responses: collected via chat or meeting transcript.

- Keaton Smith - Need to replace a lot of electricity generation between now and then, while continuing to improve efficiency. Love the Net Zero by 2050 goal!
- Leif Olson - Complete, Compact, & Connected
- Turner Tomlinson - More circular economies where waste is greatly reduced. Much more public transit or electrified transit.
- Christopher Hyatt - Love the focus on all this. Mass transit with clean energy buses seems like an option to make a substantial impact. More focus on traffic efficiency as well like round-a-bouts or otherwise to keep traffic from idling at stoplights?
- Ben Rhoads - Easier access to low emission vehicles.
- Luke Aitken - Communities are conveniently accessible to residents of all ages by a variety of transportation modes including bus transit.
- Tristan Hill - A fully realized regional active transportation network suitable for all ages and abilities, hopefully to reduce needed auto trips
- Turner Tomlinson- For large impact on industry and electricity emissions…2050, that probably looks like a lot of smarter electrical use, higher efficiency everything,

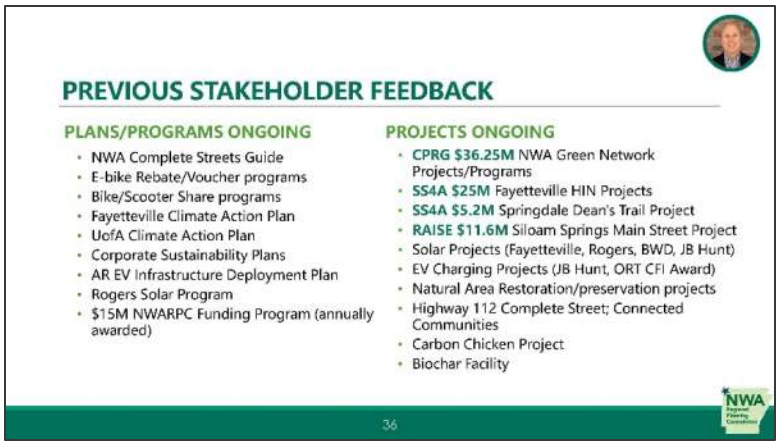
pushing industry to innovate within their processes or adopt lower emission technology.

- Richard Ims – Alter what is going in the landfill; Upcycle food waste and other materials (construction demolition); consider carbon footprint for transporting waste outside of the area
- Leif Olson - Clean energy creation locally within the region. Solar, wind, etc.
- Shannon Weathers – fleet conversion to hydrogen or electric; mass transit fleet maintenance; Shannon is developing a biochar facility in NWA
- Turner Tomlinson- Thinking of Beaver and JB Hunt implementing solar, by 2050, maybe more industry can be pushed to cover their own energy needs with solar, so that by then emissions are greatly reduced on both industry and grid energy generation sides
- Luke Aitken- Tracking progress toward Grid Modernization such as the rates of high voltage transmission line upgrades made, or installations of smart meters preformed could help measure the regions progress toward accommodating increased clean energy production.

What ongoing/future projects/programs/plans are known that will support proposed measures?

Summary:

Stakeholders discussed various initiatives and projects aimed at sustainability and emissions reduction. Walmart is encouraging 15% of its workforce to use alternative transportation to their new global campus. A $14.9 million investment is allocated for DC fast chargers for Ozark Regional Transit. The Carbon Chicken project focuses on bioenergy and carbon capture. The Ozark Market Center is considering a biodigestion facility for food waste. The “Safe Streets for All” project has secured $25 million and will be presented to the council in December. Peter Nierengarten shared a strategy for achieving net zero emissions by balancing reduced emissions with carbon sequestration and clean energy initiatives along with a chart of the City’s approach.



Verbatim Responses: collected via chat or meeting transcript.

See slide 36 from presentation for a list of known programs and projects (pictured above)

- Tim Conklin: Walmart with their employees has a program to try to get 15% of the workforce to walk or bike or take alternative forms of transportation to their new global campus.
    - $14.9 M for DC fast chargers to Ozark Regional Transit
    - Carbon chicken project (www.carbonchicken.com)
- Tim Conklin- the Ozark Market Center (Market Center of the Ozarks) they were interested in doing some type of bio digesting facility or or at least for food waste at that location.
- Matt Mihalevich- I just want to give you an update on our safe streets for all the 25,000,000. We actually got our final agreement yeah on Monday night and we'll be taking that to council December the 3rd to get that going so just want to share that.
- Peter Nierengarten: (See screenshot for table) This is how we've been trying to talk about our net 0 emission strategy [as the City of Fayetteville]. So this is, you know, zooming back out I think, but in terms of kind of what on the on the very left, what our existing carbon emission sources are and what we're trying to work towards in terms of a future emissions reduction strategy there in the middle combined with on the right our carbon sequestration. And so, you know, if we can get the carbon sequestration and our and our clean energy on the negative side of the carbon emission equation to balance with, you know, what are reduced emissions are on the top side of the line, then you know, that's, that this is how we're trying to talk about net 0 emissions and what net 0 emissions looks like at the city of Fayetteville, you know, for the, for the future under a future emissions scenario. So I just want to share this, you know, as a, as a graphic that I, we, we developed to try to explain this a little bit, this concept a little bit more graphically or pictorially to folks.

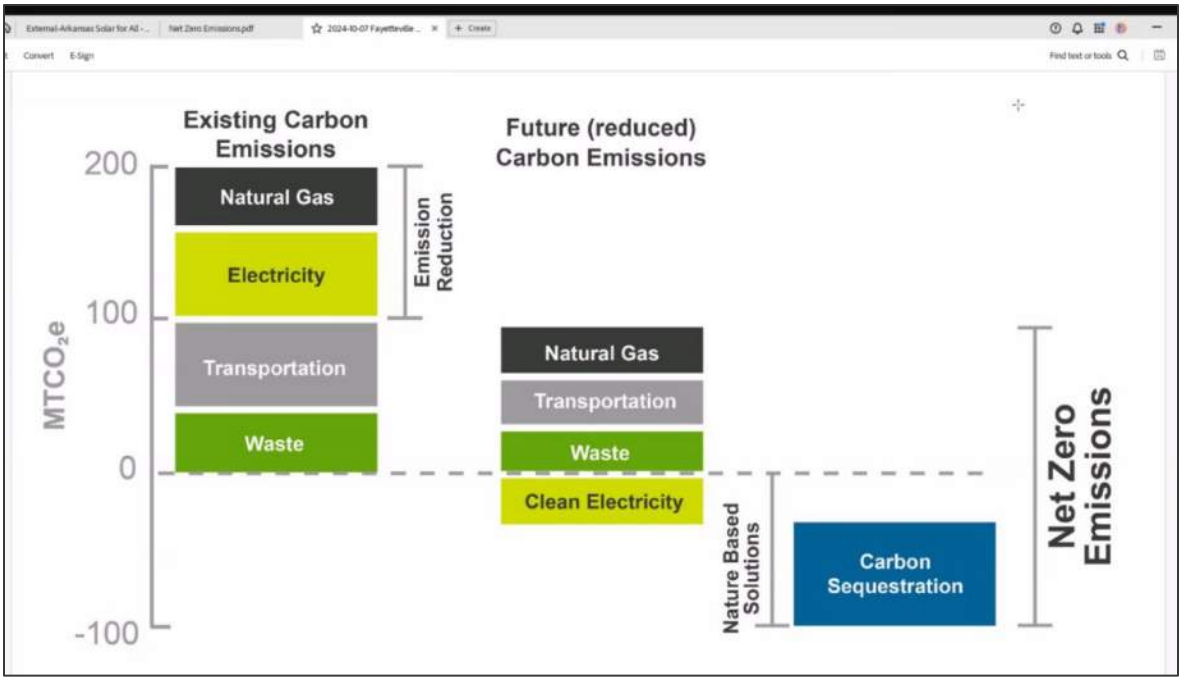


Image shared by Peter Nierengarten with the City of Fayetteville

Please share ideas on how to measure progress on advancing regional measures.

Summary:

> Stakeholders discussed various strategies to track and improve sustainability efforts. They emphasized the importance of monitoring grid modernization, using tools like Replica software for transportation metrics, and tracking solid waste per capita. Regional task forces are working on recycling and disposal initiatives, with data feeding into broader plans. Funding opportunities, such as NEVI stations, were noted as impactful. Suggestions included tracking per capita waste, recycling and composting rates, green space, public transit ridership, and renewable energy consumption. The focus on biomass and bioenergy was highlighted, with proposals for a regional facility to aggregate waste and produce biochar, which could also incorporate dewatered sludge for construction use. This comprehensive approach aims to reduce emissions and promote sustainability.

Verbatim Responses:

- Luke Aitken - Tracking progress toward Grid Modernization such as the rates of high voltage transmission line upgrades made or installations of smart meters preformed

could help measure the regions progress toward accommodating increased clean energy production.

- Tom Adler - The Replica software you gave us has VMT. That would be a great report card to see how the cities are doing on the transportation side
- Leif Olson – For solid waste I think it's going to be difficult because everybody kind of does their own thing and some cities really keep track of their diversion rates or amount of trash going to the landfill. So I don't know, it seems like for that one it's going to be difficult unless you just do a really simple calculation such as cubic, you know, cubic yards or tonnage or whatever that goes to the landfill per capita on a per person basis and try to back off from that so you can keep up with the with the population growth. I don't know, it seems really simplistic, but I don't trying to think through the solid waste one is difficult.
- Wendy Bland – We have two different regional task force or stakeholder groups working right now through the Northwest Arkansas Council. One is focused on disposal, you know, initiatives and the other is on the recycling initiatives. And so we all, we have various committees, especially on the recycling one that are working on different measures to, you know, increase recycling and, and diversion. And so that may be something where we could feed that data back into your plan to, you know, to show how that's working and, and improving in this area.
- Jason Willey - Other funding opportunity projects will also impact planning and outcomes, i.e. NEVI stations built in the region
- Turner Tomlinson - Per capita dump tonnage, to tack tons of waste produced per capita and see if that can be managed down.
    - Recycling and composting rates, to see those going up.
    - Green space per capita and/or acres of conservation land per capita?
    - Public transit ridership numbers.
    - % of energy consumed from renewable sources overall
    - Maybe measuring regional recycling businesses as a % of overall regional GDP, to see the economy shifting toward more recycling
- Leif Olson- per capita water usage reductions
- Eric Boles- I think that I would recommend focusing on waste per capita because the waste number is much easier to track than the recycling. The recycling data is much more divided, split up. It's hard It's hard to track. At least I know that's true on the University of Arkansas campus. But in addition, like when looking at the euro, you know, I have the last 20 years of kind of wasting recycling data on campus and like our recycling numbers are have gone down, which sounds like a bad thing, but it's kind of just because we we're in a different world now. We don't use nearly as much paper as we once did in papers very heavy. So if you start looking at the data, we don't use paper and we don't use glass on campus anymore. And those are both

really heavy items. It's not nearly as many books on campus as there once was, you know, where digital documents. And so I think sometimes we get hung up on the recycling per capita. You might or, or even a food waste is another example where on campus we've switched from trays to plates. So we actually have a lot less food waste in our dining halls, which might show a decline in composting, but it's actually a good thing for sustainability. So I kind of, I like focusing on the waste per capita number, waste per capita, easier metric to follow. And and I think it's more neatly aligned with that what we're actually trying to do.

- Wendy Bland: Each of those haulers (Cards and Republic) [take their material to Missouri] both of the districts have policies and rules that require all of the haulers to report their tonnage to us. And so we already collect that data.
- Richard Ims- we're advocating for as far as biomass goes in the area. Eric mentioned it earlier, a Beck's system, which is an industry term, probably not that familiar with most people, but bioenergy, carbon capture and storage system. So this would be a regional facility that would aggregate biomass. So that would food, urban waste, wood waste or terrible natos that come through or after ice storms it we would also aggregate food waste there as well and also our excess poultry litter. We, we've got about 300,000 tons per year that's goes unaccounted for. A lot of it gets shipped out of course of our region each year, but our 1900 chicken houses in the area generate over 3 million tons per year, about 10% of that's unaccounted for. So that would be part of this. Then we would you could Colo anaerobic digester at this facility, but primarily a pyrolysis reactor that can turn all of that into to carbon biochar carbonized material that then sequesters permanently the CO2 and it can collect, it can get carbon credits from that which prices are going way up for that and then provide a agricultural amendment for area gardeners, farmers and for the for the entire region probably produce to go outside the region as well. So it's cascading benefits for this BECCS that we'd be aggregating it's bioenergy, carbon capture and storage system and it has biochar would be really a byproduct because the pyrolysis reactor actually produces enough thermal energy. It's a negative, it's negative emissions technology by the way. It burns off, recirculates the gas, the syngas, and that can be tapped and be used for powering turbines or equipment. It's an or sell back to the grid in the form of electricity. So 0 emissions technology. So it's comprehensive and many cascading benefits and anybody can reach out to us carbon chicken to learn more about that. But that's what we're advocating for as well.
    - Richard- pyrolysizing biosolids and making it biochar it then has a construction use in cement and asphalt- they will test biosolids
    - Tim Conklin to Richard Ims: Richard, have others use like dewatered sludge from municipal treatment plants as part of that process or just curious?

- Response: Yeah, we can. We're just talking to Peter about this. So that I know a lot of our biosolids will get sent to the land, but we're going to beat some of that and seeing what efficacy that has to be used in. It may not be primarily used in an agricultural application, but the amazing thing about pyrolysizing the biosolids is making it a biochar is that now it has construction uses, believe it or not, biochar is being used in things like cement and asphalt and steel. Imagine our of our urban areas that get by storm water problems because this all of the concrete can't absorb all of the water from a gully washer coming through. But adding biochar in there actually helps to absorb storm water. So it's not as devastating. So yeah, we're going to test bio solids as well.

Meeting Follow Up

Stakeholder feedback was received by email after the meeting. A follow-up email was sent from NWARPC to the full committee, including those unable to join, providing meeting slides and a recording. An ongoing Idea Box via Microsoft Forms was also available to the Stakeholder Committee.

Comments collected via email are as follows.

- Tom Adler:
  - Here is one for the energy side – basically pairing solar with battery.
    - Link: Community Lighthouse Project
    - They are getting quadruple bottom line on this project:
    - Renewable energy for the day to day – less carbon
    - Reserve power when the grid goes dark – public safety & health and no food waste
    - Not having to replace above ground power electric infrastructure after every storm -lower lifecycle cost
  - Now trees can be planted in the right of way where the above ground poles used to be. – carbon sequestration
    - Link: 2022-02-19_WSJ_America's backup plan_original.pub
  - And one for the landfill side:
    - If we adopted construction waste recycling ordinances region wide, it might drive the economics for an entity to get into the construction waste recycling business.
      - Link: 8.25.095 Construction and demolition debris recycling | Chula Vista Municipal Code

Tom Adler responded additionally through the ongoing Microsoft Forms Idea Box:

Comments on proposed measures.

The proposed measures are a good first step. Can we build in the ability to pivot as we learn which measures are the most beneficial or where we need new measures?

Ideas on measuring progress.

Having a public presentation or some annual news on our progress invites the whole community into the effort. Maybe we do a festival on earth day to get some fanfare? VMT could be a metric for transportation as well as the percent sustainable power consumption on everyone's utility bill might be a good way to communicate broadly.

What does a net zero region or community look like in 2050?

1/2 cent sales tax funded transit (light rail spine with BRT feeders). Residents are given a free annual transit pass because the sales tax funding it. This in turn bumps up the ridership because the service is high quality (15 minute headways). Now we no longer need 6-lane roads and the walking experience is better, allowing folks to walk to retail, which increases the sales tax.

What future projects or plans will support proposed measures?

The Plan Bentonville future land use plan is "transit ready".

What future projects or plans will support proposed measures?

The light rail study will be beneficial if it has a hub at XNA.

Open Comment.

If a city could provide green power it would be an economic incentive to relocate business to NWA. The SEC has mandated that companies disclose climate related information. Having 100% green power goes a long way to help companies provide this disclosure.

Stakeholder Committee Meeting #4 (CAP)

To share the final plan and measures developed for the Northwest Arkansas Energy and Environment Innovation Plan, a virtual stakeholder committee meeting was held on February 12, 2024, from 1:30 p.m. to 3 p.m. via Zoom.

The final meeting was attended by 35 committee members. Representatives from NWARPC and the consultant team facilitated the meeting which included a welcome and thank you to stakeholders' participation in the process. The meeting agenda is below.

- Overview of the public engagement activities
- Present the draft NWA Energy & Environment Innovation (EEI) Comprehensive Action Plan (CAP)
- Review final measures
- Next steps

Stakeholder Committee Meeting #4 Attendees

- Aaron Pinedo, Arkansas Department of Transportation
- Holly Wren, Beaver Water District
- Lane Crider, Beaver Water District
- Becky Roark, Beaver Watershed Alliance
- Madison Kienzle, Benton County
- Wendy Bland, Benton County Recycling
- Robyn Reed, Boston Mountain Solid Waste District
- Taylor Osburn, Boston Mountain Solid Waste District
- Richard Ims, Carbon Chicken
- Ben Rhoads, City of Bella Vista
- Dan Weese, City of Bentonville
- Travis Matlock, City of Bentonville
- Lorene Burns, City of Centerton
- Leif Olson, City of Fayetteville
- Matt Mihalevich, City of Fayetteville
- Alison Jumper, City of Fayetteville
- Joshua Robertson, City of Fort Smith
- Lance Jobe, City of Rogers
- John McCurdy, City of Rogers
- Tristan Hill, City of Springdale
- Jacqueline Perez-Pharr, City of Springdale
- Chris Herrera, City of Springdale

- Julie Williams, Fayetteville Public Schools
- Keaton Smith, First Horizon
- Leif Kindberg, Illinois River Watershed Partnership
- Grady Spann, NWA Land Trust
- Jason Willey, State of Arkansas
- Richard McMullen, State of Arkansas
- Eric Boles, University of Arkansas
- Graham Thompson, Watershed Conservation Resource Center
- Shannon Weathers
- Dianne Morrison Lloyd
- Charles Spakes
- Lydia Wilkerson
- Orlo Stitt
- Cristina Scarlat, NWA Regional Planning Commission
- Luke Aitken, NWA Regional Planning Commission
- Nicole Gibbs, NWA Regional Planning Commission
- Tim Conklin, NWA Regional Planning Commission
- Nick Steinke, Olsson
- Eric Fuselier, Olsson
- Katrina Wille, Olsson
- Lauren Hildreth, Olsson
- Stacey Roach, Olsson

To view the entire ***CAP Stakeholder Meeting Presentation #4***, see presentation slides as follows.

NWA Regional Planning Commission

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

COMPREHENSIVE ACTION PLAN (CAP)
STAKEHOLDER MEETING #4
FEBRUARY 12, 2025 | 1:30PM - 3:00PM
ZOOM VIRTUAL MEETING

HOUSEKEEPING

- Please keep yourself muted throughout the meeting.
- This meeting will be recorded.
- If you have technical issues during the meeting, email Lauren Hildreth at *lhildreth@olsson.com*.
- **Nicole Gibbs** will provide the meeting presentation slides in a follow-up email.
- If you have questions during the meeting, please use the chat function.

2

PRESENTERS

Tim Conklin, AICP
Executive Director
NWARPC

Nicole Gibbs, AICP
Regional Planner
NWARPC

Eric Fuselier, PWS, ENV SP
Project Manager
Olsson

Lauren Hildreth
Public Engagement
Senior Coordinator
Olsson

3

RUN OF SHOW

- Overview
- Public Engagement Review
- Review Goals and Targets
- Final CAP Measures
- Regional GIS Tool
- Next Steps

4

THE PROCESS AND PLAN PHASES

1

PRIORITY ACTION PLAN
SEPT 2023 – MAY 2024
- Reviewed existing regional action plans
- Engaged the public and stakeholders
- Prepared at least three Priority Actions for inclusion in state-wide plan

We're finishing this phase right now!

2

COMPREHENSIVE ACTION PLAN
APRIL 2024 – FEB 2025
- Engage the public and stakeholders
- Prepare at least three additional Comprehensive Actions for inclusion in the state-wide plan

3

STATUS UPDATES
BEGINNING IN 2027
- Required to report on progress made
- Project updates will be made available to the public

6

ARKANSAS INVESTMENT PRIORITIES

7

Comprehensive Climate Action Plan *Required Elements*

- Due two years from the date of award for states and metro areas (summer/fall 2025) and at close of grant for tribes and territories
- Covers GHG reduction measures across **all significant sources/sinks and sectors**
- Establishes near-term **and long-term** GHG emission reduction targets
- Adds additional required analyses to support robust implementation

8

METROPOLITAN STATISTICAL AREA (MSA)

LEGEND

- Project Area
- County Boundaries
- LIDAC

9

CHALLENGES WE'RE FACING IN NWA

TRANSPORTATION

- NWA's **limited transportation choices and land use development patterns** contributes to traffic congestion, air pollution, greenhouse gas (GHG) emissions, and inequitable access to opportunities.
- Existing transportation **infrastructure struggles to accommodate population growth and evolving mobility needs**, which hinders economic development and affects public health.

10

CHALLENGES WE'RE FACING IN NWA

STORMWATER MANAGEMENT

- **Increased impervious surfaces** as a result of development exacerbate stormwater runoff, leading to **increased flooding, erosion, and pollution of our waterways**.
- Existing infrastructure is sometimes inadequate to handle the intensity and frequency of modern storms which results in **property damage, compromised water quality, and threats to public safety**.

11

CHALLENGES WE'RE FACING IN NWA

WASTE MANAGEMENT

- Our current waste management system relies heavily on landfills that are nearing capacity as the region's population continues to grow rapidly.
- Waste diversion rates remain low, and opportunities for waste reduction, reuse, and recycling are not fully realized.
- The lack of a comprehensive and accessible recycling and composting infrastructure limits community participation and hinders progress toward a circular economy.

12

CHALLENGES WE'RE FACING IN NWA

OUTDOOR RECREATION

- The NWA region enjoys valuable natural resources that support a range of outdoor recreational activities, including mountain biking, hiking, hunting, and fishing.
- These resources are under increasing pressure from development, pollution, and overuse. Unplanned and sprawling development patterns can lead to habitat fragmentation and erosion.
- Balancing growth with the need to protect valuable ecosystems and ensure equitable access is crucial for the long-term health of our environment and our community.

13

PUBLIC OUTREACH
PHASE 2

ONLINE
- Public survey
- Social media

IN-PERSON
- Two public open houses
- Community events

MEETINGS
- 4 stakeholder meetings
- 2 focus group meetings
- Reporting to TAC and RPC/Policy Committee

15

PUBLIC SURVEY: 182 RESPONSES

EVs and infrastructure had mixed support with respondents split on likelihood to purchase an EV themselves and only 60% value a municipal-led effort to increase EV infrastructure/charging

Clean energy, carbon emissions reduction, and water consumption reduction for city and county governments had a majority support, with notable opposition by up to 12%

Energy and waste reduction efforts were highly supported by respondents specifically through incentives for reducing residential energy consumption, improved building energy codes, food waste diversion, and construction waste diversion

Respondents prioritized carbon sequestration through planting natives with high carbon sequestration benefits and restoring degraded habitats in public spaces, rights-of-way, and with private landowners

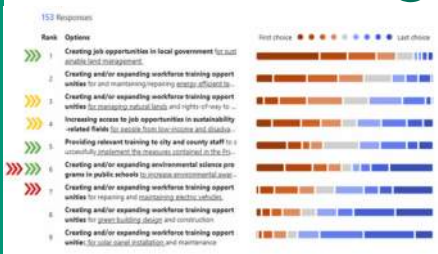
Expanding infrastructure and updating building codes that support transportation choice beyond a personal vehicle was of high importance to most respondents

High support for increasing regional access for low-income and disadvantaged communities to affordable housing, healthy food outlets, and affordable medical care

16

Rank the following actions for city and county governments from most to least important.

Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.



17

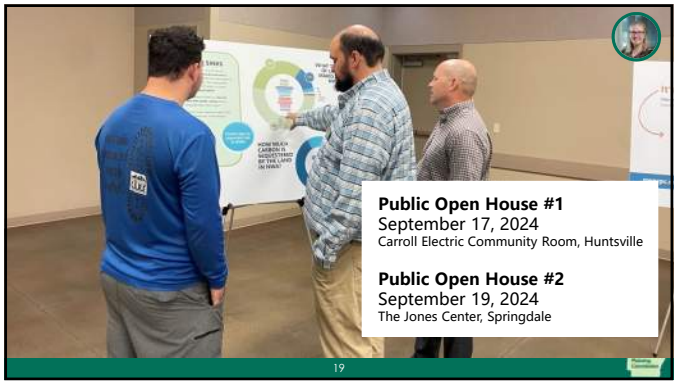
COMMUNITY EVENTS

- **July 18, 2024** - Sustainability and Resilience Planning in NWA public event at Fayetteville Public Library with Peter Nierengarten, Tim Conklin, and Eric Fuselier
- **September 16, 2024** - Arkansas Coalition of Marshallese FB Live Event with Philmar Mendoza-Kabua (interpreter) and Eric Fuselier
- **September 26, 2024** - Downtown Springdale Alliance Live at Turnbow Park event
- **September 27, 2024** - Railyard Live at Downtown Rogers
- **September 22, 2024** - NWA Bike-a-Palooza- Bentonville cycling event

FEEDBACK

- Major employers could play a larger role in public transportation, as they contribute to transportation demand during peak commute hours
- Desire for cities and employers shifting toward renewable energy in municipal buildings and corporate campuses, fleet management/electrification, water conservation, and waste management/reduction programs such as composting
- More frequent bus service in Springdale and late night or 24-hour transit service to serve the large workforce in Springdale
- Expanding recycling services in the area and improving connectivity from schools to neighborhoods and parks

18



FOCUS GROUP MEETINGS

Corporate Meeting – December 6, 2024

- NWARPC NWA EEI Plan
- Corporate Sustainability Plans

Attendees from
- University of Arkansas
- JB Hunt
- Walmart
- NWA Council

LIDAC Meeting – December 5, 2024

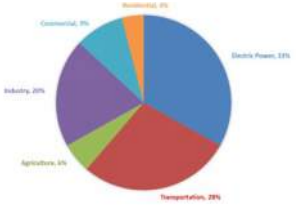
- Transportation: Regional transit, EVs, and e-bikes
- Building low and zero-emission elements building and zoning codes
- Workforce training
- Resource sharing
- Opportunity gaps and considerations when implementing measures

Attendees from
- Canopy NWA
- Arkansas United
- Fayetteville Strong
- Marshallese Education Initiative
- UAMS
- NWACC
- Samaritan Community Center
- Trailblazers
- Razorback Transit
- Welcome Health

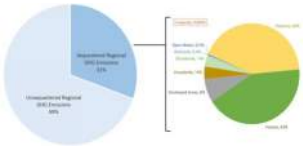
20

NWA Greenhouse Gas (GHG) Emissions and Sinks Inventory

2020 NWA Regional GHG Emissions Inventory



Carbon Sequestration of Land Cover Types in NWA



22

THE ROAD TO NET ZERO

- Aspirational goal of reaching net zero by 2050.
- Voluntary targets are aligned with state and regional goals.
- Will require significant investments in clean energy technologies, energy-efficiency measures, and sustainable land use practices.

23

Decennial GHG Targets (MT CO2)

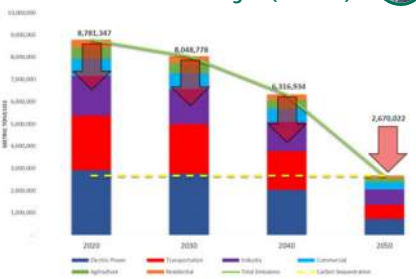
SECTOR	2020	2030	2040	2050
Electric Power	2,911,316	2,765,750	2,037,921	727,829
% reduction from 2020		5%	30%	75%
Transportation	2,470,208	2,223,187	1,729,146	617,552
% reduction from 2020		10%	30%	75%
Industry	1,764,434	1,587,991	1,323,326	705,774
% reduction from 2020		10%	25%	60%
Agriculture	488,507	439,656	366,380	195,403
% reduction from 2020		10%	25%	60%
Commercial	793,995	714,596	595,496	317,598
% reduction from 2020		10%	25%	60%
Residential	352,887	317,598	264,665	105,866
% reduction from 2020		10%	25%	70%
Total Emissions	8,781,347	8,048,778	6,316,934	**2,670,022**
Total % Reduction		8%	28%	70%
Carbon Sequestration	2,677,944	2,677,944	2,677,944	**2,677,944**
Total % Reduction	30%	33%	42%	100%
Net Emissions	6,103,403	5,370,834	3,638,990	**-7,922**
Net % Reduction	30%	39%	55%	100%

THE ROAD TO NET ZERO

- Achieving **net-zero** GHG emissions will require a two-pronged approach:
  1) Significantly reducing emissions, and
  2) Enhancing natural carbon sequestration.
- Majority of GHG emission reductions will need to occur in the **Electric Power**, **Transportation**, and **Industrial sectors.**

24

Decennial GHG Targets (MT CO2)



CAP MEASURES

ENERGY SECTOR

Develop and implement a regional/statewide renewable energy innovation program by:

- Installing renewable energy and energy storage systems on municipal/government facilities.
- Developing distributed and community-scale renewable energy generation and storage, including in LIDAC and rural communities.
- Developing and implementing programs that support smart-grid and/or behind-the-meter technologies.

33%
ENERGY

27

CAP MEASURES

TRANSPORTATION SECTOR

Measure #1: Expand infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.

Measure #2: Updating/adopting building and zoning codes and policies/long-range plans to encourage walkable, bikeable, and transit-oriented development.

28%
TRANSPORTATION

28

CAP MEASURES

TRANSPORTATION SECTOR

Measure #3: Incentivize more efficient and lower/no emission modes of transportation by:

- Developing and implementing low/no emission ridesharing and e-bike programs, with priority given to LIDACs.
- Upgrading vehicle fleets by replacing internal combustion engine vehicles with low/no emission vehicles.
- Incentivizing eligible agencies, businesses, and individual automobile owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIDACs.
- Expanding supporting infrastructure for electric vehicles (EVs), including bus fleets.

28%
TRANSPORTATION

29

CAP MEASURES

INDUSTRIAL SECTOR

Reduce GHG emissions in the industrial sector by developing and implementing:

- Programs to support or incentivize implementation of energy efficiency measures in industry, including energy audits, strategic energy management, equipment upgrades, and waste heat utilization.
- Programs to support or incentivize GHG reductions in industrial energy use and industrial processes, including use of low/no carbon fuels, electrification, renewable energy, and process improvements.

20%
INDUSTRIAL

30

CAP MEASURES

BUILDINGS SECTOR

13%

BUILDINGS

Develop a residential/commercial energy efficiency and innovation program by:

- Establishing an incentive program for implementation of end-use energy efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting.
- Providing incentives for adoption and implementation of up-to-date building energy codes.
- Developing voluntary programs and policies that promote low and zero-emission options and vehicle charging, with a focus on buildings in rural and LIDAC areas; multi-family residential buildings; and commercial buildings.

31

CAP MEASURES

AGRICULTURE SECTOR

6%

AGRICULTURAL

Incentivize agricultural practices to reduce carbon emissions and create carbon capture, including:

- The implementation/construction of anaerobic digester facilities to divert organic agricultural waste that is currently being landfilled and/or land applied and convert it into fuel or into agricultural and environmentally beneficial products.
- The implementation/construction of biochar pyrolysis facilities to convert organic waste into agricultural and environmentally beneficial products.
- The implementation of renewable energy-powered equipment and infrastructure.

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CAP MEASURES

WASTE & WASTEWATER

WASTE

Develop and implement a waste minimization and management program that reduces carbon emissions by:

- Providing incentives for community composting programs.
- Supporting development of a biochar pyrolysis facility and/or gasification facility.
- Providing incentives for anaerobic digester facilities to be implemented/constructed at wastewater treatment facilities and to divert organic waste that is currently being landfilled and/or land applied into compost and into other agricultural and environmentally beneficial products or at waste.
- Providing incentives or a voucher system to improve waste management for rural populations.
- Developing a regional Materials Recovery Facility (MRF) with end-market transparency.

33

CAP MEASURES

CARBON REMOVAL

CARBON REMOVAL

Develop and implement a program(s) to improve or increase carbon sequestration on the landscape through nature-based solutions and natural infrastructure by:

- Planting native tree and plant species that provide optimal carbon sequestration benefits in publicly owned parks, trails, and rights-of-way and on privately owned lands.
- Restoring degraded prairies, forests, riparian buffers, streams, and wetlands in parks, trails, rights-of-ways and private lands.
- Identifying lands with high carbon sequestration value, or for the development of new parks or recreation areas and create programs for the protection and restoration of these lands through fee-simple acquisition and/or conservation easements.
- Developing conservation plans for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value.

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NATURE-BASED SOLUTIONS GIS MAPPING TOOL

ECOSYSTEM SERVICES SCORE

Features that support adaptation to:
- Heavy Precipitation
- Drought
- Extreme Heat

Examples:
- Tree Canopy
- Wetlands
- Stormwater Infiltration
- Riparian Buffers
- Surface Water Reservoirs

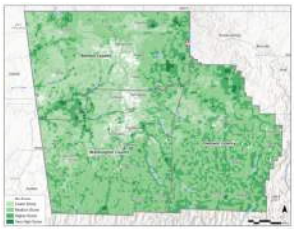
36

NATURE-BASED SOLUTIONS GIS MAPPING TOOL

ECOSYSTEM RESILIENCE SCORE

Features that support an adaptative landscape:
- Biodiversity
- Topographic Diversity
- Wildlife habitat
- Habitat Connectivity

Examples:
- Species data
- Unique or special habitat
- Ecologically sensitive waterbodies
- Proximity to natural waterways



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NATURE-BASED SOLUTIONS GIS MAPPING TOOL

CARBON SEQUESTRATION SCORE

Features that pull carbon from the atmosphere and sequester it:
- Wetlands
- Prairies
- Forests
- Ponds/Reservoirs

38

NATURE-BASED SOLUTIONS GIS MAPPING TOOL

The individual scores were combined into a composite **Nature-based Solutions Score**.

SUBSCORES	Ecosystem Services	X
	Ecosystem Resilience	Y
	Carbon Sequestration	Z
COMPOSITE SCORE	Nature-based Solutions Score	X + Y + Z

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NATURE-BASED SOLUTIONS GIS MAPPING TOOL

This analysis identifies potential opportunities for continuing to create an **NWA GREEN NETWORK** of interconnected green corridors and trails that follow major streams and rivers, linking natural areas and open spaces throughout the region to facilitate a **shift to active transportation modes, enhance carbon removal, mitigate flooding, and improve water quality in the region.**

40

NATURE-BASED SOLUTIONS GIS MAPPING TOOL

This platform empowers policymakers, planners, and community members to understand the location, distribution, and condition of NWAs natural infrastructure.

Users should leverage this tool to:
- **Inform land-use planning decisions:** visualize the ecological value of individual parcels to identify areas best suited for conservation, restoration, or development.
- **Evaluate the environmental impact of proposed projects:** assess how proposed projects might affect ecosystem services, ecological resilience, and social equity for more informed decision-making.
- **Prioritize investments in green infrastructure:** guide investments in parks, trails, and other projects to maximize their impact on sustainability and community well-being.
- **Engage community members:** serve as a resource for education and engagement, fostering a shared understanding of natural assets and promoting collaborative stewardship.

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NEXT STEPS

EVENT/DELIVERABLE	DATE/DUE DATE
Plan Presented at NWARPC TAC	February 20, 2025
Plan Published for Public Comment	March 3, 2025 – March 17, 2025
Comprehensive Plan Supplement to ADEE	February 28, 2025
NWARPC Adoption of NWA EEI CAP	March 26, 2025
Status Report Supplements (Quarterly Updates)	March 1, 2027

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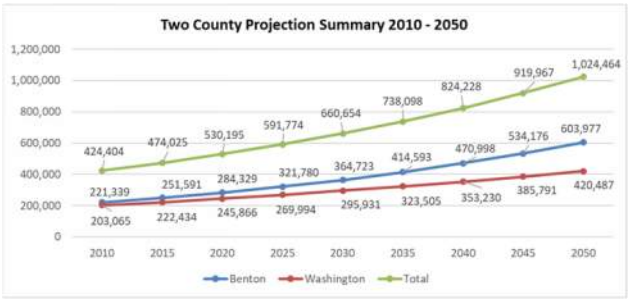
BIG PICTURE: 1 million population in NWA by 2050



Arkansas Economic Development Institute, 2024

FORWARD 2050 — Connecting Northwest Arkansas through Transportation Choice

45

FORWARD 2050 — Regional Transportation Survey & Focus Group Findings

Key Themes

- Valued attributes of living in Northwest Arkansas are the natural area and the feeling of real community.
- Desired characteristics for traveling in Northwest Arkansas include safe, effective, efficient, and comfortable.
- Residents are open to public transit that supports their regional travel patterns.

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FORWARD 2050

Plan Principles

- Aspirational, collaborative, comprehensive, and regional
- Respects and integrates local plans
- Protects and enhances NWA's quality of life

Plan Themes

- Predictable and fiscally responsible development patterns
- A connected multimodal region
- A safe and resilient natural and built environment
- Healthy, inclusive communities and thriving regional economy

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FORWARD 2050 — Priorities and Strategies

FORWARD 2050

wsp

Transit Alternatives Study

Examine three high-capacity transit alternatives:

1. Bus Rapid Transit along 71B Corridor
2. Light Rail (corridor TBD)
3. Commuter Rail along A&M Line

Scenario Planning for 1 Million by 2050

Develop three regional growth pattern scenarios:

1. Impacts of continued suburban development patterns
2. Planned growth, guided by local and regional plans
3. High-capacity transit-supportive growth pattern

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NWA Regional Planning Commission

THANK YOU!

Stakeholder Meeting #4 Engagement

The final stakeholder meeting aimed to inform the committee of final measures, seeking little feedback beyond general discussion. The meeting was opened for discussion following the presentation.

The group's discussion centered on how stakeholders can act on plan measures, population growth considerations, ecosystem services, and regional readiness for future funding. The status of regional programs, including the CPRG, was discussed due to the freeze of federal funds, leading stakeholders to share status updates for other projects, such as Richard Ims' Conservation Innovation Grant. Stakeholders requested clear communication and information sharing from other regional leaders on project and funding status.

Partnership recommendations for moving forward on certain measures were discussed. In Northwest Arkansas, there isn't one central city leading efforts; everything done at the local level involves multiple entities, making partnerships a necessity. The Northwest Arkansas Council was mentioned as an industry and regional leader for large-scale initiatives, with the NWA Regional Planning Commission (NWARPC) available to facilitate partnerships.

The Fayetteville Housing Task Force is discussing how the region currently regulates by parcel for green space, tree preservation, and stormwater management, or ecosystem services, as it relates to housing solutions. The GIS mapping tool developed as part of the CAP was based on a parcel-level scale but can be zoomed out to view at various scales. There is also a scorecard layer that helps users assess both existing conditions and potential ecosystem services benefits. NWARPC discussed the population forecast for the region, noting that no single city will be able to accommodate all projects, and that each city can learn from the others while preparing for growth. Looking at individual parcels is part of a larger puzzle that makes up the region. Efforts like Rogers' Unified Development Code and Bentonville's recent Plan Bentonville adoption were referenced.

Meeting Follow Up

Stakeholder feedback was received by email after the meeting. A follow-up email was sent from NWARPC to the full committee, including those unable to join, providing meeting slides and a recording. An ongoing Idea Box via Microsoft Forms was also available to the Stakeholder Committee.

Following the final Stakeholder Committee Meeting, NWARPC shared a follow-up and thank you email to all committee members, providing meeting slides, a recording, and final plan draft. This email included a reminder of next steps and what to expect through the final stages of plan development and submission. A public comment period was available through NWARPC's plan adoption process.

6. FOCUS GROUP MEETINGS

Corporate Focus Group Meeting

A virtual focus group meeting was held on Friday, December 6, from 9:30 AM to 11:00 AM for key regional corporations with significant impact and influence. They were asked to share their sustainability and environmental plans, allowing the group to understand how corporate initiatives overlap with the NWAEEI plan, support comprehensive regional efforts, and identify gaps. Attendees were identified by the NWARPC and invited via email to attend. Attendees included representatives from three Fortune 500 companies, state university, regional policy guidance nonprofit, NWARPC, and Olsson. For a complete list of meeting attendees, see ***Corporate Focus Group Meeting Attendees***.

The agenda included an introduction from NWARPC, presentations of corporate sustainability plans, and the meeting agenda below.

- Introduction and NWARPC Awareness Building
- Corporate Sustainability Plans
- NWARPC NWAEEI Plan
- General discussion
- Closing

Corporate Focus Group Meeting Attendees

- Bradley Neal, Director of Corporate Facilities Management, JB Hunt
- Eric Boles, Sustainability Director, University of Arkansas
- Mike Malone, Vice Chancellor for Economic Development, University of Arkansas
- Greg Walker, Transportation Manager, Tyson
- Lian Wong, Senior Cloud Engineer and Bike Ambassador, Walmart
- Rob Smith, Policy Director, Northwest Arkansas Council
- Tim Conklin, NWARPC
- Nicole Gibbs, NWARPC
- Luke Aitken, NWARPC
- Tim Reavis, NWARPC
- Nick Steinke, Olsson
- Stacey Roach, Olsson
- Eric Fuselier, Olsson
- Lauren Hildreth, Olsson

To view the entire ***Corporate Focus Group Meeting Presentation,*** see presentation slides as follows.

NWA Regional Planning Commission

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

COMPREHENSIVE ACTION PLAN (CAP)
CORPORATE FOCUS GROUP
DECEMBER 6, 2024 | 9:30AM - 11:00AM
ZOOM VIRTUAL MEETING

PRESENTERS

Tim Conklin, AICP
Executive Director
NWARPC

Nicole Gibbs, AICP
Regional Planner
NWARPC

Nick Steinke, PE, CPEA, SFP
Industry Expert
Olsson

Eric Fuselier, PWS, ENV SP
Project Manager
Olsson

2

RUN OF SHOW

- **NWA EEI Plan Background & Overview** (15 minutes)
- **Corporate Sustainability Plans** (45 minutes)
- **NWA EEI Plan CAP Measures** (10 minutes)
- **Discussion** (20 minutes)

3

Northwest Arkansas Regional Planning Commission

THE METROPOLITAN PLANNING ORGANIZATION FOR NORTHWEST ARKANSAS

We work with Planning Partners

CITY LEADERS t STAKEHOLDERS t RESIDENTS

to lead Community Planning

TRANSPORTATION CHOICE t ENVIRONMENTAL INNOVATION t RESPONSIBLE GROWTH

for a **Safe, Connected,** and **Resilient** region

4

Northwest Arkansas Regional Planning Commission

THE METROPOLITAN PLANNING ORGANIZATION FOR NORTHWEST ARKANSAS

VISION AND SHARED GOALS

CONVENING AND COLLABORATION

FUNDING AND IMPLEMENTATION

DID YOU KNOW?

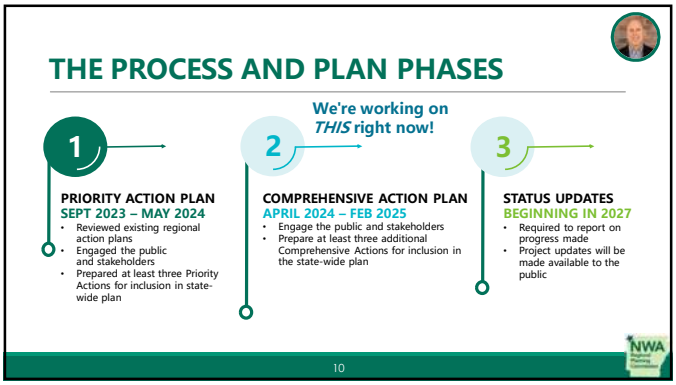
The NWARPC has plans that cover bike and pedestrian infrastructure, Vision Zero, transit connectivity, open space protection, congestion management, and more. Find them online at ***www.nwarpc.org***.

6


ENERGY & ENVIRONMENT INNOVATION PLAN
PURPOSE, COORDINATION, & ACTIVITIES


EEI PLAN BACKGROUND
Arkansas Department of Energy & Environment (ADEE) received $3M Planning Grant from EPA's Carbon Pollution Reduction Grant (CPRG)
Goal: Develop Arkansas Energy & Environment Innovation Plan for carbon reduction/sequestration strategies
Partnerships: Collaborating with three largest metropolitan areas (Little Rock, Northwest Arkansas, Ft. Smith) for regional-level planning
Northwest Arkansas
2024


ARKANSAS INVESTMENT PRIORITIES
Facilitating Statewide Economic Growth and Competitiveness
Keeping Communities Safe
Preparing the Infrastructure Workforce
Creating a Portfolio of Reliable, Efficient, and Secure Energy Options
Preservation and Promotion of The Natural State
METROPLAN
City of Fort Smith ARKANSAS
NWA


THE PROCESS AND PLAN PHASES
We're working on THIS right now!
1
PRIORITY ACTION PLAN
SEPT 2023 – MAY 2024
Reviewed existing regional action plans
Engaged the public and stakeholders
Prepared at least three Priority Actions for inclusion in state-wide plan
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COMPREHENSIVE ACTION PLAN
APRIL 2024 – FEB 2025
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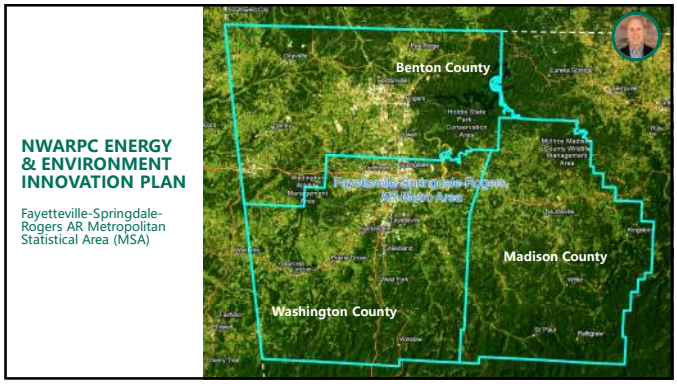
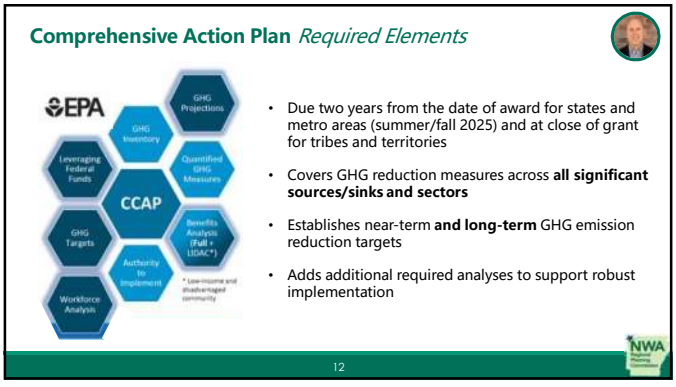
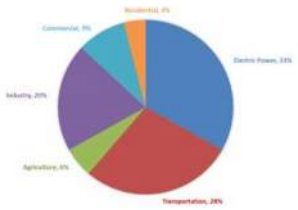
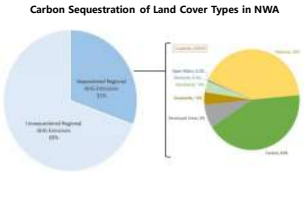
STATUS UPDATES
BEGINNING IN 2027
Required to report on progress made
Project updates will be made available to the public
10
NWA


NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN
Fayetteville-Springdale-Rogers AR Metropolitan Statistical Area (MSA)
Benton County
Madison County
Washington County


Comprehensive Action Plan Required Elements
EPA
GHG Projections
GHG Inventory
Quantified GHG Measures
Leveraging Federal Funds
CCAP
Benefits Analysis (Full + LIDAC*)
GHG Targets
Authority to Implement
Workforce Analysis
* Low-income and disadvantaged community
Due two years from the date of award for states and metro areas (summer/fall 2025) and at close of grant for tribes and territories
Covers GHG reduction measures across all significant sources/sinks and sectors
Establishes near-term and long-term GHG emission reduction targets
Adds additional required analyses to support robust implementation
12
NWA

NWA Greenhouse Gas (GHG) Emissions and Sinks Inventory





14

THE ROAD TO NET ZERO

- Aspirational goal of reaching net zero by 2050 in alignment with federal goals (EPA and USDOT)
- Majority of GHG emission reductions will need to occur in the **Electric Power**, **Transportation**, and **Industrial sectors**
- Assumes carbon sequestration remains constant

15

Decennial GHG Targets (MT CO2)

SECTOR	2020	2030	2040	2050
Electric Power	2,911,316	2,765,750	2,037,921	727,829
% reduction from 2020		5%	30%	75%
Transportation	2,470,208	2,223,187	1,729,146	617,552
% reduction from 2020		10%	30%	75%
Industry	1,764,434	1,587,991	1,323,326	705,774
% reduction from 2020		10%	25%	60%
Agriculture	488,507	439,656	366,380	195,401
% reduction from 2020		10%	25%	60%
Commercial	793,999	714,596	595,496	317,598
% reduction from 2020		10%	25%	60%
Residential	352,887	317,598	264,665	105,866
% reduction from 2020		10%	25%	70%
Total Emissions	8,781,347	8,048,778	6,316,934	**2,670,022**
Total % Reduction		8%	28%	70%
Carbon Sequestration	2,677,944	2,677,944	2,677,944	**2,677,944**
Total % Reduction	30%	33%	42%	100%
Net Emissions	6,103,403	5,370,834	3,638,990	**-7,922**
Net % Reduction	30%	39%	55%	100%

THE ROAD TO NET ZERO

- Aspirational goal of reaching net zero by 2050 in alignment with federal goals (EPA and USDOT)
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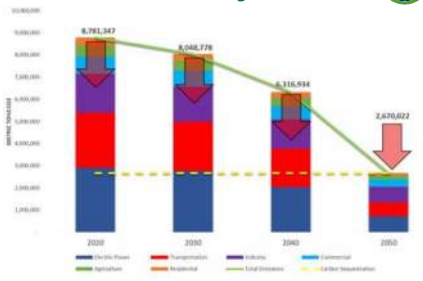
16

Decennial GHG Targets (MT CO2)



PRESENTATIONS

- JB Hunt
- Walmart
- University of Arkansas

19

CAP MEASURES

ENERGY SECTOR

Develop and implement a regional/statewide renewable energy innovation program by:

- Installing renewable energy and energy storage systems on municipal/government facilities.
- Developing distributed and community-scale renewable energy generation and storage, including in LIDAC and rural communities.
- Developing and implementing programs that support smart-grid and/or behind-the-meter technologies.

33%
ENERGY

21

CAP MEASURES

TRANSPORTATION SECTOR

Measure #1: Expand infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.

Measure #2: Updating/adopting building and zoning codes and policies/long-range plans to encourage walkable, bikeable, and transit-oriented development.

28%
TRANSPORTATION

22

CAP MEASURES

TRANSPORTATION SECTOR

Measure #3: Incentivize more efficient and lower/no emission modes of transportation by:

- Developing and implementing low/no emission ridesharing and e-bike programs, with priority given to LIDAC communities.
- Upgrading vehicle fleets by replacing internal combustion engine vehicles with low/no emission vehicles.
- Incentivizing eligible agencies, businesses, and individual automobile owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIDAC communities.
- Expanding supporting infrastructure for electric vehicles (EVs), including bus fleets.

28%
TRANSPORTATION

23

CAP MEASURES

INDUSTRIAL SECTOR

Reduce GHG emissions in the industrial sector by developing and implementing:

- Programs to support or incentivize implementation of energy efficiency measures in industry, including energy audits, strategic energy management, equipment upgrades, and waste heat utilization.
- Programs to support or incentivize GHG reductions in industrial energy use and industrial processes, including use of low/no carbon fuels, electrification, renewable energy, and process improvements.

20%
INDUSTRIAL

24

CAP MEASURES

BUILDINGS SECTOR

13%

BUILDINGS

Develop a residential/commercial energy efficiency and innovation program by:

- Establishing an incentive program for implementation of end-use energy efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting.
- Providing incentives for adoption and implementation of up-to-date building energy codes.
- Developing voluntary programs and policies that promote low and zero-emission options and vehicle charging, with a focus on buildings in rural and LIDAC areas; multi-family residential buildings; and commercial buildings.

25

CAP MEASURES

AGRICULTURE SECTOR

6%

AGRICULTURAL

Incentivize agricultural practices to reduce carbon emissions and create carbon capture, including:

- The implementation/construction of anaerobic digester facilities to divert organic agricultural waste that is currently being landfilled and/or land applied to tap methane.
- The implementation/construction of biochar pyrolysis facilities to convert organic waste into agricultural and environmentally beneficial products.

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CAP MEASURES

WASTE & WASTEWATER

WASTE

Develop and implement a waste minimization and management program that reduces carbon emissions by:

- Providing incentives for community composting programs.
- Supporting development of a biochar pyrolysis facility and/or gasification facility.
- Providing incentives for anaerobic digester facilities to be implemented/constructed at wastewater treatment facilities and to divert organic waste that is currently being landfilled and/or land applied into compost and into other agricultural and environmentally beneficial products or at waste.
- Providing incentives or a voucher system to improve waste management for rural populations.
- Developing a regional Materials Recovery Facility (MRF) with end-market transparency.

27

CAP MEASURES

CARBON REMOVAL

CARBON REMOVAL

Develop and implement a program(s) to improve or increase carbon sequestration on the landscape through nature-based solutions and natural infrastructure by:

- Planting native tree and plant species that provide optimal carbon sequestration benefits in publicly owned parks, trails, and rights-of-way and on privately owned lands.
- Restoring degraded prairies, forests, riparian buffers, streams, and wetlands in parks, trails, rights-of-ways and private lands.
- Identifying lands with high carbon sequestration value, or for the development of new parks or recreation areas and create programs for the protection and restoration of these lands through fee-simple acquisition and/or conservation easements.
- Developing conservation plans for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value.

28

What does a net zero region or community look like in 2050?

30

DISCUSSION (20 MINUTES)

- Ongoing/future **projects/programs/plans** that will support these measures?
- **Gaps** in measures?
- Ideas on how to **measure progress** on advancing regional measures?

31

PREVIOUS STAKEHOLDER FEEDBACK

PLANS/PROGRAMS ONGOING

- NWA Complete Streets Guide
- E-bike Rebate/Voucher programs
- Bike/Scooter Share programs
- Fayetteville Climate Action Plan
- UofA Climate Action Plan
- Corporate Sustainability Plans
- AR EV Infrastructure Deployment Plan
- Rogers Solar Program
- $15M NWARPC Funding Program (annually awarded)

PROJECTS ONGOING

- **CPRG $36.25M** NWA Green Network Projects/Programs
- **SS4A $25M** Fayetteville HIN Projects
- **SS4A $5.2M** Springdale Dean's Trail Project
- **RAISE $11.6M** Siloam Springs Main Street Project
- Solar Projects (Fayetteville, Rogers, BWD, JB Hunt)
- EV Charging Projects (JB Hunt, ORT CFI Award)
- Natural Area Restoration/preservation projects
- Highway 112 Complete Street; Connected Communities
- Carbon Chicken Project
- Biochar Facility

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PREVIOUS STAKEHOLDER FEEDBACK

REGIONAL ACTION ITEMS

- Solar projects (public + private)
- Fleet electrification
- Clean energy/fuels
- Code amendments
  - *Buildings*
  - *Complete Streets/Development Patterns*
- Waste Diversion (C&D, Food, Mattresses, Recyclables)
  - *MRF*
  - *Food waste biodigester*
- Tree planting
- Preservation/restoration of natural spaces
- HOV, HOT, ride-share
- Regional high-capacity transit
- Local food production
- Conservation measures (water/energy)
- Infrastructure upgrades
- Transportation efficiencies (SMART/PROTECT)
- Workforce training

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NEXT STEPS

EVENT/DELIVERABLE	DATE/DUE DATE
Stakeholder Meeting #4	February 2025
Comprehensive Plan Supplement to ADEE	February 28, 2025
NWARPC Adoption of NWA EEI CAP	Spring 2025
Status Report Supplements	March 1, 2027

CLIMATE POLLUTION REDUCTION GRANTS

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THANK YOU!

NWA Regional Planning Commission

Contact NWARPC:
1311 Clayton Street,
Springdale, AR 72762
Phone: 479-751-7125

Corporate Focus Group Meeting Summary

During the meeting, Eric Boles emphasized the need for genuine efforts in achieving net-zero goals, cautioning against superficial changes. He also raised concerns about carbon neutrality claims and considerations of urban sprawl.

Bradley Neal from JB Hunt discussed their acquisition of 60 acres and plans for new infrastructure, including vertical parking, all-electric buildings, and a solar farm. He mentioned a department focused on transitioning to electric vehicles.

Lian Wong from Walmart highlighted their new home office campus, set for completion in 2025-2026, which will feature bike paths, electric bikes, and underground pathways. Walmart aims to reduce emissions by 10% and is transitioning servers to the cloud. Eric Boles confirmed that 12 of Walmart's buildings are LEED Platinum certified. Lian also inquired about funding for solar farm projects, noting current allocations to the Green Network initiative.

Eric Boles and Mike Malone from the University of Arkansas shared their sustainability goals, including achieving carbon neutrality by 2040 and producing 80% of energy from solar. They also discussed challenges in material usage and sustainability metrics.

Rob Smith from the NWA Council discussed waste and recycling audits, a food waste diversion program, and a mattress recycling event. He mentioned a pilot glass recycling program and efforts to reduce contamination in recycling from 60% to below 30% through targeted campaigns.

Corporate Focus Group Meeting Engagement

Comments from participants throughout the meeting were documented from the chat or using the transcript and can be seen below.

General Comments

- Eric Boles: Discussed the importance of considering "additionality" and intent when aiming for net-zero goals, emphasizing that improvements should not merely come from boundary changes or claims.
    - Discussed carbon footprint and sequestration, questioning the ability to claim carbon neutrality and the potential for urban sprawl leading to larger footprints.
- Lian Wong: Questioned if funding could be used for solar farm projects, noting current funding is allocated for the Green Network initiative in Northwest Arkansas.

Corporate Sustainability Plans and Conversation Notes

JB Hunt- Bradley Neal

- Bradley said JB Hunt Acquired 60 acres between north and south properties.
- Building new vertical parking, all-electric buildings, and a solar farm in Gentry.
- Nick asked Bradley about the transportation network's transition to electric vehicles (EVs).
- Bradley noted that there's a department focused on vehicle plans but was not an expert on this topic- can connect

Walmart- Lian Wong

- Walmart's new home office campus, under construction since 2020, will be completed in 2025-2026. Key features include:
- Bike-friendly campus with bike paths, electric bikes for associates, and underground pathways.
- Aiming for a 10% reduction in emissions and promoting bike commuting.
- Fitness center and enhanced stormwater detention plans.
- Transitioning physical servers to the cloud to reduce energy consumption.
- Eric Boles: Asked Walmart and JB Hunt if new buildings are meeting green building standards (e.g., LEED certification).
    - Luke A answered: Confirmed 12 buildings at Walmart are LEED Platinum, though not all buildings may be Platinum, some may only meet standard LEED certifications.
- Walmart Links:
    - https://corporate.walmart.com/about/newhomeoffice
    - https://corporate.walmart.com/purpose/sustainability/planet/waste/community-recycling-unit#:~:text=The%20Community%20Recycling%20Unit%20accepts,Exclusions%20apply
    - https://corporate.walmart.com/news/2022/06/20/walmart-uses-innovative-onboard-technology-to-go-the-extra-mile-for-drivers

University of Arkansas (UofA) - Eric Boles and Mike Malone

- Shared the UofA Sustainability Report, noting the university has achieved Gold status as a bicycle-friendly campus (Bicycle Campus USA).
    - Campus operations
        - 5500 faculty and staff
        - 32k students
        - 10mil sqft of buildings

- UofA's sustainability goals include:
    - Achieving carbon neutrality by 2040.
    - Focus on renewable energy, waste management, and biodiversity.
    - Aiming for 80% of energy consumption from campus-produced solar.
- The campus has its own combined heat and power plant.
- Challenges and Future Goals
    - Eric Boles: shared concerns about how material usage affects sustainability metrics (e.g., reduced paper use on campus).
- UofA: Works with the CPRG (Campus Planning and Resource Group) on sustainability metrics and tracking.
    - Map of campus natural areas and zoning codes
- Tim asked if Eric includes razorback transit ridership in carbon footprint
    - Apartment shuttles- represent 5% of total trips

NWA Council- Rob Smith

- NWA Council is leading waste and recycling audits across solid waste districts in NWA.
    - Contact for food waste diversion programs
    - Hosted a mattress recycling event at Sam's Furniture, which collected 440 mattresses.
    - The region discards around 30,000 mattresses annually.
- Epic Recycling: A pilot glass recycling program in Little Rock for area bars and restaurants.
- Conducting a recycling study to create a five-year roadmap for NWA
    - Recycling and Waste Diversion
    - It was funded for four months, with 50 bars/restaurants invited, and 19 participating.
    - Contamination in recycling
        - NWA Council reports a 60% contamination rate in recycling efforts, with plans to reduce this to below 30% through a targeted marketing campaign.

LIDAC Focus Group Meeting

Emphasizing the importance of stakeholder and public engagement in the project, engaging with low-income and disadvantaged communities (LIDACs) was a top priority for NWARPC and to meet requirements of the Climate Pollution Reduction Grants (CPRG) Program. According to the Environmental Protection Agency, it's essential for planning grant recipients to meaningfully involve affected LIDACs in developing planning grant deliverables.

Participation by regional organizations serving LIDACs was crucial in ensuring insight into the CAP portion of the Northwest Arkansas Energy and Environment Innovation Plan. A virtual focus group meeting was held on December 5, 2024 from 1:30 p.m. to 3 p.m. via Zoom to build awareness and gather feedback on the plan's proposed measures, ensuring they effectively meet the needs and provide opportunities for communities in Northwest Arkansas

The invitation list was identified by the NWARPC with support from Olsson and invited via email to attend. Ten different organizations were represented from public, non-profit, and private sectors. The meeting was led by the consultant team with representatives from the NWARPC. The meeting format included a welcome and brief introduction of the project team, followed by an overview of the NWARPC, CPRG project, and breakout room discussions. The agenda below was shared with participants prior to the meeting.

- Awareness of NWARPC Programs and Opportunities
- Regional Transit and E-bikes
- Workforce Development and Training
- Opportunity gaps

LIDAC Focus Group Meeting Attendees

- Mireya Reith, Arkansas United
- Mahdi Faizy, Canopy NWA
- Delani Bartlette, Fayetteville Strong
- Romaldo Kabua, Marshallese Education Initiative
- Benetick Kabua Maddison, Marshallese Education Initiative
- Megan Bolinder, Northwest Arkansas Community College
- Holly Sparks Hill, Samaritan Community Center
- Paxton Roberts, Trailblazers
- Shani Worrell, UAMS
- Beck Rodriguez, UAMS
- Rosalinda Medrano, UAMS
- Katie McCraney, UAMS
- Adam Waddell, Razorback Transit
- Monika Fischer, Welcome Health NWA
- Tim Conklin, NWARPC
- Nicole Gibbs, NWARPC
- Luke Aitken, NWARPC
- Taylor Plummer, Olsson
- Stacey Roach, Olsson
- Eric Fuselier, Olsson
- Lauren Hildreth, Olsson

To view the entire ***CAP LIDAC Focus Group Meeting Presentation***, see slides as follows.

NWA Regional Planning Commission

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

COMPREHENSIVE ACTION PLAN (CAP)
LIDAC FOCUS GROUP
DECEMBER 5, 2024 | 1:30PM - 3:00PM
ZOOM VIRTUAL MEETING

PRESENTERS

Tim Conklin, AICP
Executive Director
NWARPC

Nicole Gibbs, AICP
Regional Planner
NWARPC

Eric Fuselier, PWS, ENV SP
Project Manager
Olsson

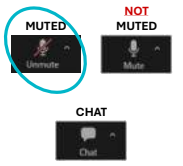
Lauren Hildreth
Public Engagement
Senior Coordinator
Olsson

RUN OF SHOW

- **NWA Regional Planning Commission Introduction** (10 minutes)
- **NWA Energy and Environment Innovation (EEI) Plan Overview** (30 minutes)
- **Key Topics and Group Discussion** (40 minutes)
- **Closing** (10 minutes)

HOUSEKEEPING

- Please keep yourself muted throughout the meeting
- This meeting will be recorded
- If you have technical issues during the meeting, email **Stacey Roach** at ***sroach@olsson.com***
- **Lauren Hildreth** will provide the meeting presentation slides in a follow-up email
- If you have questions during the meeting, please utilize the chat function



Northwest Arkansas Regional Planning Commission

THE METROPOLITAN PLANNING ORGANIZATION FOR NORTHWEST ARKANSAS

We work with Planning Partners

CITY LEADERS t STAKEHOLDERS t RESIDENTS

to lead Community Planning

TRANSPORTATION CHOICE t ENVIRONMENTAL INNOVATION t RESPONSIBLE GROWTH

for a **Safe, Connected,** and **Resilient** region

5

Northwest Arkansas Regional Planning Commission

THE METROPOLITAN PLANNING ORGANIZATION FOR NORTHWEST ARKANSAS

VISION AND SHARED GOALS

CONVENING AND COLLABORATION

FUNDING AND IMPLEMENTATION

DID YOU KNOW?

The NWARPC has plans that cover bike and pedestrian infrastructure, Vision Zero, transit connectivity, open space protection, congestion management, and more. Find them online at ***www.nwarpc.org***.

ENERGY & ENVIRONMENT INNOVATION PLAN

PURPOSE, COORDINATION, & ACTIVITIES

EEI PLAN BACKGROUND

- Arkansas Department of Energy & Environment (ADEE) received $3M Planning Grant from EPA's Carbon Pollution Reduction Grant (CPRG)
- **Goal:** Develop **Arkansas Energy & Environment Innovation Plan** for carbon reduction/sequestration strategies
- **Partnerships:** Collaborating with three largest metropolitan areas (Little Rock, Northwest Arkansas, Ft. Smith) for regional-level planning

Source: www.fhwa.dot.gov/innovation/everydaycounts/edc_7/integrating_ghg.cfm

ARKANSAS INVESTMENT PRIORITIES

Facilitating Statewide Economic Growth and Competitiveness
Growing and expanding the economy with Arkansas by increasing access to economic opportunities for communities, advancing transportation and commerce, and maintaining a resilient supply chain.

Keeping Communities Safe
Improving public and transportation safety provisions through promoting road and highway safety education and training programs, strengthening cybersecurity infrastructure, and making safety improvements to roads and bridges.

Preparing the Infrastructure Workforce
Scaling up the workforce needed for project delivery, promoting access to quality jobs, and developing a pipeline of talent across the state.

Creating a Portfolio of Reliable, Efficient, and Secure Energy Options
Expanding affordable and efficient energy options available to Arkansas through resources development while maintaining a strong energy workforce and secure electric power grid that can withstand emergencies and severe weather.

Preservation and Promotion of The Natural State
Celebrating the State's natural resources to develop, create, and sustain outdoor recreation, business, and employment opportunities through ecology initiatives, environmental resiliency projects, and proper water management practices.

THE PROCESS AND PLAN PHASES

We're working on *THIS* right now!

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SEPT 2023 – MAY 2024
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BEGINNING IN 2027
- Required to report on progress made
- Project updates will be made available to the public

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

Fayetteville-Springdale-Rogers AR Metropolitan Statistical Area (MSA)

CPRG PLANNING GRANTS

- **EPA awarded $250 million in formula grants to states, tribes, and local governments under its Climate Pollution Reduction Grants (CPRG) Program.**
- **Grant recipients are using funds to develop plans for reduction of greenhouse gas (GHG) and other pollutant emissions within their covered jurisdiction.**

CPRG IMPLEMENTATION GRANTS

- In 2024, EPA awarded $4.6 billion in competitive grants **for measures developed under the CPRG planning grant**.
- EPA awarded only **25 individual grants** between $2 million and $500 million, with funding tiers allowing comparably sized projects to compete against one another.
- The Arkansas Tri-Region Coalition was notified of the **$99.99 million CPRG Implementation Grant award** in July 2024 to fund energy and environment innovation projects in Central Arkansas, Northwest Arkansas, and the Arkansas River Valley, representing half the Natural State's population.

EPA CRPG AWARD

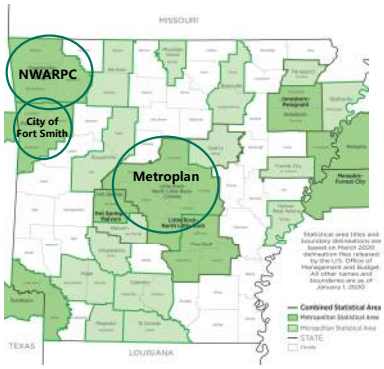
ENERGY & ENVIRONMENT INNOVATION FOR THE NATURAL STATE

TRI-REGION COALITION MEMBERS
- Metroplan (Lead)
- NWARPC
- City of Fort Smith

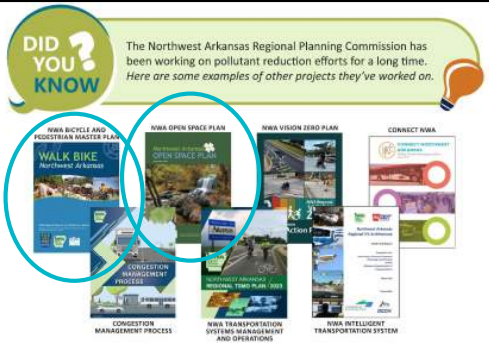
$99,999,999 MILLION
- Metroplan – $49,249,999 *(including grant administration)*
- NWA – $36,250,000
- Fort Smith – $14,500,000

NWA GREEN NETWORK

NWA Green Network = Carbon Removal + Active Transportation (Mode Shift + E-Bike Rebate)



- Three metro areas represent **over 50%** of the state's population
- Together, cover more low-income and disadvantaged communities (LIDAC)



NWA GREEN NETWORK = CARBON REMOVAL + ACTIVE TRANSPORTATION (MODE SHIFT + E-BIKE REBATE)

NWA GREEN NETWORK

- **18 Community-identified and Led Projects**
  - Restoration and preservation of natural cores and corridors
  - Active transportation connectivity and improved trail corridor focus
  - LIDAC-focused projects
- **E-bike Incentive Program – Trailblazers**
  - Mode-shift (replace car trips/decrease carbon emissions)
  - Point-of-sale vouchers (rather than after-purchase rebates)
  - LIDAC focus (reliable mobility to residents with greater need)
  - Buy local (stimulate local businesses and economies)
- **Workforce Training Program – WCRC/IRWP/BWA/AAEF**
  - Workforce development for sustainable landscaping
  - Promote restoration best practices
  - LIDAC-focused implementation

https://peopleforbikes.cdn.prismic.io/peopleforbikes/2eb4ef48-75b0-4f31-976e-fb1475f5a1b11_Electric+Bicycle+Incentive+Toolkit.pdf

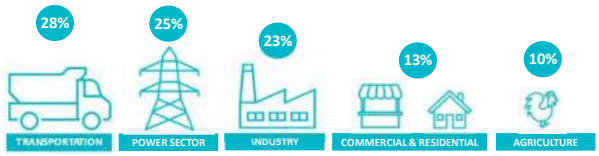
By 2030 NWA will...

- **Restore and preserve 2,158 acres** of high-quality natural open space
- **Restore 35,728 feet** of degraded stream channel
- **Permanently protect 916 acres** of restored green network lands
- **Construct 2.5 miles** of trails connecting in or connecting to low-income areas
- **Issue approximately 2,922** E-bike incentive vouchers
- **Implement** a workforce training program to build capacity in the area

NWA GREEN NETWORK PROJECTS

UNITED STATES GHG EMISSIONS

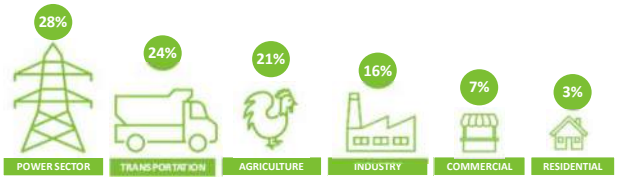
- The transportation sector is currently the largest contributor to GHG Emissions in the U.S.
- Carbon dioxide makes up 79% of U.S. GHG emissions followed by methane (12%), nitrous oxides (6%), and fluorinated gases (3%)



Source: www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

ARKANSAS GHG EMISSIONS

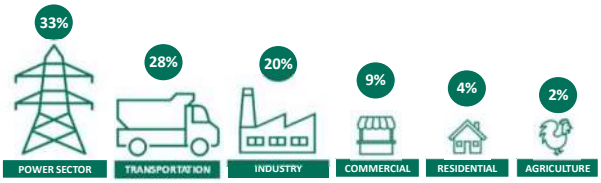
- The power sector is currently the largest contributor to GHG emissions in the state
- Carbon dioxide makes up 70% of Arkansas GHG emissions followed by methane (19%), nitrous oxides (10%), and fluorinated gases (3%)



Source: Arkansas Greenhouse Gas Emissions (CO_2e), 2020 obtained from U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks by State: 1990 - 2020

NORTHWEST ARKANSAS (NWA) GHG EMISSIONS

- The power sector is currently the largest contributor to GHG Emissions in NWA
- Agricultural emissions in NWA are approximated at 2%



Approximated using State data and adjusted per agricultural percentage, based upon urban/rural area in NWA compared to State.

PHASE 2 TASKS

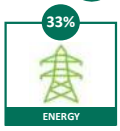
- MINIMUM OF THREE ADDITIONAL GHG REDUCTION MEASURES
- NATURE-BASED SOLUTIONS ENVIRONMENTAL INVENTORY
- CAP PROGRAM/POLICY/PROJECT EVALUATION
- CAP DOCUMENT PREPARATION

CAP MEASURES

ENERGY SECTOR

Develop and implement a regional/statewide renewable energy innovation program by:

- Installing renewable energy and energy storage systems on municipal/government facilities.
- Developing distributed and community-scale renewable energy generation and storage, including in LIDAC and rural communities.
- Developing and implementing programs that support smart-grid and/or behind-the-meter technologies.



CAP MEASURES

TRANSPORTATION SECTOR

Measure #1: Expand infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation supporting infrastructure.

Measure #2: Updating/adopting building and zoning codes and policies/long-range plans to encourage walkable, bikeable, and transit-oriented development.

CAP MEASURES

TRANSPORTATION SECTOR

Measure #3: Incentivize more efficient and lower/no emission modes of transportation by:

- Developing and implementing low/no emission ridesharing and e-bike programs, with priority given to LIDAC communities.
- Upgrading vehicle fleets by replacing internal combustion engine vehicles with low/no emission vehicles.
- Incentivizing eligible agencies, businesses, and individual automobile owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIDAC communities.
- Expanding supporting infrastructure for electric vehicles (EVs), including bus fleets.

CAP MEASURES

INDUSTRIAL SECTOR

Reduce GHG emissions in the industrial sector by developing and implementing:

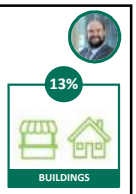
- Programs to support or incentivize implementation of energy efficiency measures in industry, including energy audits, strategic energy management, equipment upgrades, and waste heat utilization.
- Programs to support or incentivize GHG reductions in industrial energy use and industrial processes, including use of low/no carbon fuels, electrification, renewable energy, and process improvements.

CAP MEASURES

BUILDINGS SECTOR

Develop a residential/commercial energy efficiency and innovation program by:

- Establishing an incentive program for implementation of end-use energy efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting.
- Providing incentives for adoption and implementation of up-to-date building energy codes.
- Developing voluntary programs and policies that promote low and zero-emission options and vehicle charging, with a focus on buildings in rural and LIDAC areas; multi-family residential buildings; and commercial buildings.

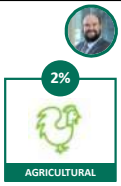


CAP MEASURES

AGRICULTURE SECTOR

Incentivize agricultural practices to reduce carbon emissions and create carbon capture, including:

- The implementation/construction of anaerobic digester facilities to divert organic agricultural waste that is currently being landfilled and/or land applied to tap methane.
- The implementation/construction of biochar pyrolysis facilities to convert organic waste into agricultural and environmentally beneficial products.



CAP MEASURES

WASTE & WASTEWATER

Develop and implement a waste minimization and management program that reduces carbon emissions by:

- Providing incentives for community composting programs.
- Supporting development of a biochar pyrolysis facility and/or gasification facility.
- Providing incentives for anaerobic digester facilities to be implemented/constructed at wastewater treatment facilities and to divert organic waste that is currently being landfilled and/or land applied into compost and into other agricultural and environmentally beneficial products or at waste.
- Providing incentives or a voucher system to improve waste management for rural populations.
- Developing a regional Materials Recovery Facility (MRF) with end-market transparency.

CAP MEASURES

CARBON REMOVAL

Develop and implement a program(s) to improve or increase carbon sequestration on the landscape through nature-based solutions and natural infrastructure by:

- Planting native tree and plant species that provide optimal carbon sequestration benefits in publicly owned parks, trails, and rights-of-way and on privately owned lands.
- Restoring degraded prairies, forests, riparian buffers, streams, and wetlands in parks, trails, rights-of-ways and private lands.
- Identifying lands with high carbon sequestration value, or for the development of new parks or recreation areas and create programs for the protection and restoration of these lands through fee-simple acquisition and/or conservation easements.
- Developing conservation plans for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value.

DISCUSSION TOPICS

- **Transportation:** Regional transit, electric vehicles, and e-bikes with incentives and priority to LIDAC population
- **Building:** Promotion of low and zero-emission elements focusing on rural and LIDAC areas; building and zoning codes for transportation-choice development
- **Workforce Training:** and jobs: sustainability-related fields, solar, maintaining/repairing energy efficient technology and appliances, maintaining/repairing EVs, managing natural lands, green building design and construction
- **Resource Sharing:** Connecting low-income and disadvantaged communities to information and resources to address environmental impacts.
- Actions to ensure that low-income and vulnerable populations in the region do not experience disproportionately higher environmental and economic burdens.
- Opportunity gaps and considerations when implementing measures.

GROUP DISCUSSION (30 MINUTES)

- SELF-SELECT BREAKOUT ROOM
- SELECT A SCRIBE AND SPOKESPERSON
- DISCUSS AS A GROUP AND TAKE NOTES

ROOM 1- TRANSPORTATION & BUILDING/DESIGN

ROOM 2- WORKFORCE TRAINING & LIDAC RESOURCES

INSTRUCTIONS

- Open Google Slides (link available in the Chat)
- Click "More" on Zoom task bar
- Click "Join Breakout Room"
- Select room based on interest area

NWA ENERGY & ENVIRONMENT **COMPREHENSIVE** ACTION PLAN

COMING SPRING 2025

SHARE FEEDBACK

- Public survey – now through 12/13/24
  https://forms.office.com/r/Kigcn7e6sS
- Share on socials from NWA Regional Planning Commission

NEXT STEPS

- Continue drafting the final NWA Energy & Environment Innovation (EEI) Comprehensive Action Plan (CAP)
- Submit supplement to ADEE by February 28, 2025
- Bring to the NWA Regional Planning Commission Board for adoption

LIDAC Focus Group Meeting Summary

During the meeting, participants split into two breakout rooms to discuss various topics related to transportation, building and zoning, and workforce training, with a focus on low-income and disadvantaged communities (LIDACs). Both groups underscored the need to ensure that low-income and vulnerable populations do not experience disproportionately higher environmental and economic burdens.

Group A concentrated on transportation and building. They discussed regional transit, electric vehicles, and e-bikes, emphasizing incentives and priorities for LIDAC populations. Key points included the need for more transit stops, educational materials in multiple languages, and safe infrastructure for biking. In terms of buildings, they highlighted the promotion of low and zero-emission elements, especially in rural and LIDAC areas. Discussions included the importance of transportation-choice development, energy efficiency in multi-family housing, and secure bike parking.

Group B focused on workforce training and resource sharing. They emphasized the need for training in sustainability-related fields, such as solar energy, EV maintenance, and green building design. The group discussed the importance of training programs for Hispanic and Marshallese communities and the need for industry-aligned curriculum development. Additionally, they addressed the importance of connecting LIDACs to information and resources to mitigate environmental impacts. Key initiatives included the "Trusted Messengers" program, vocational training for refugees, and improving connectivity between communities.

LIDAC Focus Group Meeting Engagement

The group split into two breakout rooms for deeper discussion and reviewed the topics below.

- Regional transit
- Electric vehicles
- E-bikes
- Rural and LIDAC areas
- Building and zoning codes for transportation-choice development
- Environmental and economic impacts on LIDAC and vulnerable communities
- Opportunity gaps and considerations

Group A Notes

Transportation: Regional transit, electric vehicles, and e-bikes with incentives and priority to LIDAC population.

- UAMS
    - Rosa - community health workers; regional transit is an important need; provide landing page and educational materials in Marshallese and Spanish; would like to see more stops, engage community members to provide input;
    - Shani - moving to e-bikes might be a challenge if they are not already on bike, trails do not allow access to places where they want/need to go; may not solve for transportation access issues; connect first mile and last mile to ORT
    - Romaldo - community members live in multi-generational household, limited on space and not room for bikes
- Fayetteville Strong- DeLani
    - Building of trail infrastructure seems more for recreation than transportation; sometimes dangerous, would like protected bike lanes in commercial/residential arterial streets (MLK/I-49); identify high-injury areas, prioritize safe infrastructure; transit is inconvenient (routes, wait times)
- Trailblazers- Paxton
    - Focus on infrastructure AND programs at the city level; reduce barriers to using the infrastructure and programs; e-bike voucher program needs education; e-bikes allow access to more places that could be difficult to get to on a non-e bike or walking, can feel more comfortable using e-bike on roadways; adult first-ride program at Trailblazers to introduce biking, e-bikes can be a next step; relying on cities to build safe connections

Building: Promotion of low and zero-emission elements focusing on rural and LIDAC areas; building and zoning codes for transportation-choice development.

- Fayetteville Strong- DeLani
    - Likes “transportation choice” development, important to implement those policies/codes if they are developed; low income residents are renters, target building efficiencies to landlords; smart cities looking to repeal parking minimums, replace with safe, secure bike parking; free e-bike rentals for low-income takes the burden off individual e-bike owners
- UAMS
    - Rosa - understand how renters connect with landlords
    - Romaldo - find ways to create efficiency in multi-family housing, shared spaces and amenities
- NWARPC- Luke
    - Energy boxes; Long term bike parking, covered, rather than having to store bikes inside living areas that may be limited on space

Actions to ensure that low-income and vulnerable populations in the region do not experience disproportionately higher environmental and economic burdens.

- UAMS
    - Shani - consider who will actually benefit, not just who is less burdened.

Group B Notes

Workforce training and jobs: sustainability-related fields, solar, maintaining/repairing energy efficient technology and appliances, maintaining/repairing EVs, managing natural lands, green building design and construction.

- NWACC- Megan
    - Technician training- construction advisory board with industry partners weigh in on curriculum- can assist with thinking about green building design, e-bike tech class, and additional training opportunities.
    - NWACC can move pretty quickly and being a community college can respond to regional needs and trends
    - Currently NWACC doesn't offer many courses beyond English, but there are courses for non-native or as second language, but is not specific to training in technical areas
- UAMS- Beck
    - Continue to hear about the need for training in Hispanic and Marshallese community
    - Maintaining and repairing EVs and e-bikes
    - Training for how to use the technology as well- riding bikes and using evs
    - What does a training for managing natural lands look like? Who will lead these trainings particularly in minority communities and other languages- expanding access to the workforce
    - What does the cycle look like from industry trends and needs, EEI plans and measures, and then offering trainings in the community

Resource Sharing: Connecting low-income and disadvantaged communities to information and resources to address environmental impacts.

- Training programs and communication beyond English- partnering in the community to connect people to training opportunities
- How best does NWARPC reach communities?
- UAMS- Beck
    - Has a task force that works with Hispanic and Marshallese populations use the greenway or other resources
    - “Trusted Messengers” program- cultural and language leaders to help share information and resources, UAMS trains the messengers so they can go out into the community, can help test and share feedback on new ideas and programs before distributing, helps bridge into communities- lots of partnerships
    - Developing a trust social media channel
- Canopy- Mahdi
    - Help refugees get connected to vocational and skilled jobs, helping to match skills and experience from overseas to jobs in NWA, need resource sharing and certification programs to ensure they have the right skill for the job,
    - Training colleagues on how to use e-bikes, information about the vouchers and utilizing, how to use transit and combination of transit and e-bikes (how-to info)
    - Connectivity to trails and using the systems
    - Canopy clients face transportation challenges, would be able to work but may not have individual transportation, last mile is biggest hurdle (house to bus stop, bus stop to work)
    - Pathway to self-sufficiency
    - Training on how to do repairs to e-bikes (bikes in general) and EVs
    - Complying with city regulations when it comes to waste management
    - Connectivity
    - Need improved connectivity options between Bentonville and rogers- Megan has trail/bikeway plan for connection

Actions to ensure that low-income and vulnerable populations in the region do not experience disproportionately higher environmental and economic burdens.

- UAMS- Beck
    - Thinking about how our parks and amenities are serving the greater community, but especially LIDAC populations and neighborhoods- thinking about NW park and regional sports park on Hudson in Rogers have lost amenities for users beyond the specific sport

- Mahdi- Canopy- many of the people they serve are living in home and multi-family homes that are less energy efficient, they are then bearing higher costs because less investment in efficiency

7. PUBLIC OPEN HOUSES (CAP)

To assist with creating the Comprehensive Action Plan segment of the Northwest Arkansas Energy and Environment Innovation Plan, two public open houses were held to present information and gather input on preferred measures via the public survey.

- **Public Open House #1** was held on September 17,2024 (Carroll Electric Community Room, Huntsville, AR) from 4:00 p.m. to 7:00 p.m.; and
- **Public Open House #2** was held on September 19, 2024 (The Jones Center, Springdale, AR) from 4:00 p.m. to 7:00 p.m.

The public was invited to attend the open house events via email, website information, flyers, and boosted social media posts. Attendees also included representatives from public, non-profit, and private sectors. NWARPC staff and the consultant team facilitated both open houses and related discussions with attendees, as well as worked together to develop the content for the open houses. The public open house content included eight stations with display boards/posters, sign-in sheets, and handouts including prompts to complete the survey. The posters included the following content:

- Welcome / please sign in
- NWARPC Regional Plan Phases
- Environmental Protection Agency’s Climate Pollution Reduction Grants (EPA CPRG)
- Award of an EPA CPRG to the Arkansas Department of Energy and Environment (ADEE)
- Award of funding from ADEE to NWARPC to develop a Priority Action Plan supplement
- Greenhouse gas (GHG) emissions across major sectors in Arkansas
- NWARPC’s previous planning efforts and plans
- Invitation to participate in the public survey in English/Spanish/Marshallese while following along with the following topic posters:
    - Reliable Low and Zero-Emissions Energy
    - Efficiency and Waste Minimization
    - Electrification
    - Workforce and Technical Assistance
    - Carbon Sequestration
- Thank you / next steps.

To view the ***CAP Public Open House Posters***, see graphics as follows.

NWARPC Energy & Environment Innovation Plan

WELCOME!

Please sign in

Northwest Arkansas Regional Planning Commission (NWARPC)

Regional Plan Phases

PRIORITY ACTION PLAN

SEPT. 2023 - NOV. 2023

- Reviewed existing regional action plans
- Engaged with the public and stakeholders
- Prepared regional Priority Actions for inclusion in state-wide plan

COMPREHENSIVE ACTION PLAN

MAR. 2024 - FEB. 2025

- Engage with the public and stakeholders
- Prepare the regional Comprehensive Action Plan — including additional measures, targets, and recommendations — for inclusion in the state-wide plan

STATUS UPDATES

BEGINNING IN 2027

- Will report on progress
- Will make project updates available to the public

GOOD NEWS!

In addition to these ongoing Planning initiatives, Northwest Arkansas is receiving **$36.25 MILLION** of the $99,999,999 million Climate Pollution Reduction Grant (CPRG) Implementation Grant awarded by the Environmental Protection Agency (EPA) to the Arkansas Tri-Region Coalition. NWARPC coordinated with regional partners to identify and develop 18 "Green Network" projects across ten (10) cities, and two (2) regional-serving programs to protect and restore natural cores and corridors and increase access to connected active transportation networks. This is a **HUGE WIN** for resiliency and sustainability efforts throughout our region. **Let's celebrate!**

What is this all about?

The U.S. Environmental Protection Agency created the **Climate Polution Reduction Grant (CPRG)** program.

Arkansas Department of Energy and Environment (ADEE) applied for a CPRG Planning Grant, and:

- The EPA awarded a $3 million ***PLANNING*** grant to ADEE to create an Arkansas Energy and Environment Innovation Plan.
- With the Energy and Environment Innovation Plan in place, state and local governments are then eligible for CPRG Implementation Grants *(which is what our state and region won!).*

PURPOSE OF THE *PLANNING* GRANT

To ensure and plan for targeted investment in energy infrastructure and technologies that **reduce pollutants, create high-quality jobs,** and **spur economic growth** in our region and across the state

OUR ASK OF YOU

Take the survey so we can understand what kinds of **pollutant reduction projects, programs, or policies** should be prioritized in the state and region-specific comprehensive plans.

THIS is what we need your help with!

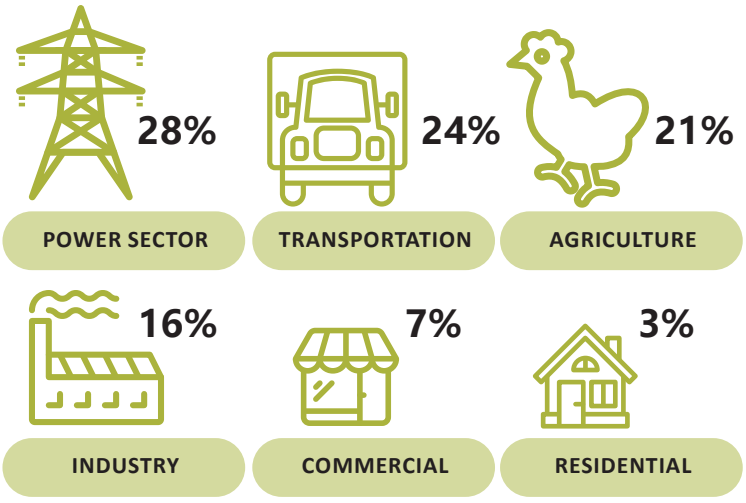
Then, the Northwest Arkansas Regional Planning Commission (NWARPC) was...

- Awarded funding to create a NWA regional plan to be included in state-wide plan *(see the next poster for NWARPC's regional planning process)*
- Planning Partners:

DID YOU KNOW

STATEWIDE GREENHOUSE GAS EMISSIONS

- The **power sector** is currently the largest contributor to greenhouse gas emissions in Arkansas.
- Carbon dioxide makes up 70% of Arkansas greenhouse gas emissions followed by methane (19%), nitrous oxides (10%), and fluorinated gases (3%).

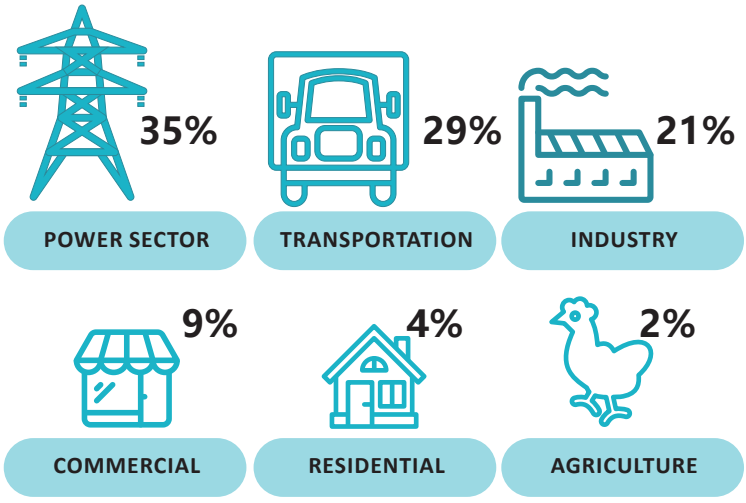


Arkansas Greenhouse Gas Emissions (CO_2e), 2020 obtained from U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks by State: 1990 - 2020

DID YOU KNOW

NORTHWEST ARKANSAS GREENHOUSE GAS EMISSIONS

- The **power sector** is currently the largest contributor to greenhouse gas emissions in Northwest Arkansas.
- The agriculture sector emits approximately 2% of the total greenhouse gas emissions in Northwest Arkansas.



Approximated using State data and adjusted per agricultural percentage, based upon urban/rural area in NWA compared to State

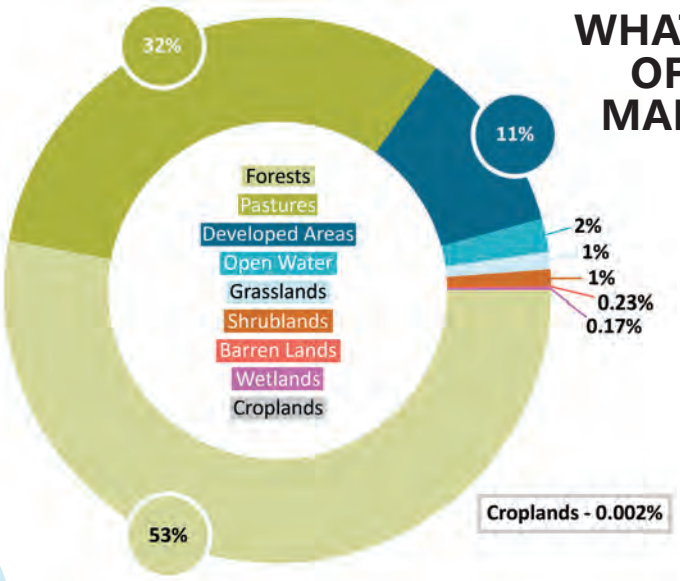
CARBON SINKS

- A "carbon sink" is any natural system that ***absorbs and stores more carbon*** from the atmosphere than it releases. This absorption and storage of carbon is called ***carbon sequestration***.
- In Northwest Arkansas, ***forests store 40% of the carbon*** that is sequestered in the region.
- Forests cover approximately 53% of the land area in Northwest Arkansas.

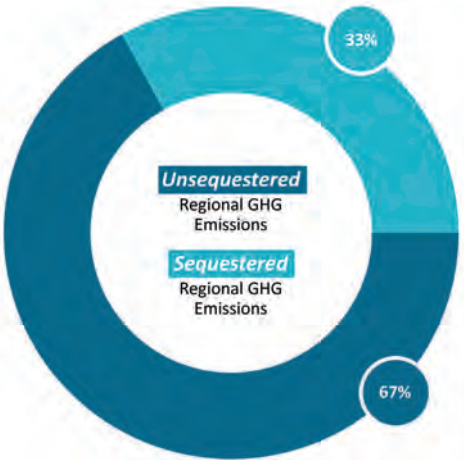
DID YOU KNOW?

Forests play an important role in NWA!

WHAT TYPE OF LAND MAKES UP NWA?



HOW MUCH CARBON IS SEQUESTERED BY THE LAND IN NWA?



DID YOU KNOW

The Northwest Arkansas Regional Planning Commission has been working on pollutant reduction efforts for a long time, including the plans shown below. As a major planning initiative, NWARPC is currently also working on the region's ***2050 Metropolitan Transportation Plan***, which will be informed by all the plans below, including the ***Northwest Arkansas Energy & Environment Innovation Plan***.

CONGESTION MANAGEMENT PROCESS

NWA TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS

NWA INTELLIGENT TRANSPORTATION SYSTEM

NWA ENERGY & ENVIRONMENT PRIORITY ACTION PLAN

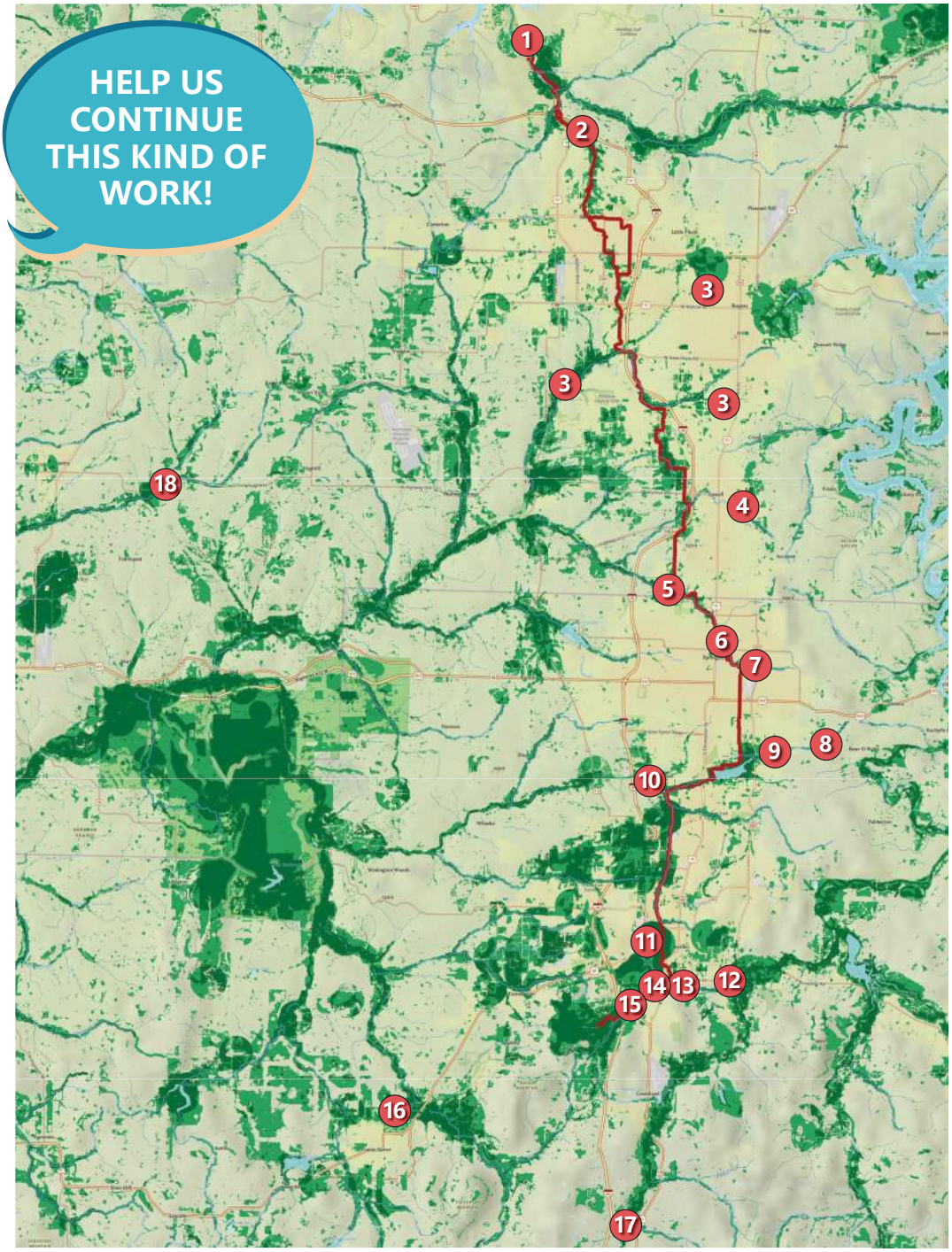
NWA ENERGY & ENVIRONMENT COMPREHENSIVE ACTION PLAN

DID YOU KNOW?

NWARPC coordinated with regional partners to identify and develop 18 "Green Network" projects across ten (10) cities, and two (2) supporting, regional-serving programs (workforce training program and e-bike incentive program) to protect and restore natural cores and corridors and increase access to connected active transportation networks. These 18 projects, shown on the map below, are being funded by the CPRG Implementation Grant awarded by the EPA to the Arkansas Tri-Region Coalition. **Visit our website to learn more: *nwarpc.org/energy-environment-innovation-plan***.

NWA GREEN NETWORK
CPRG IMPLEMENTATION GRANT PROJECTS

HELP US CONTINUE THIS KIND OF WORK!



NWA Green Network Projects Legend

1. Razorback Greenway Corridor Stream and Riparian Restoration
2. Razorback Greenway and Town Branch Corridor Forest and Riparian Restoration
3. Osage/Blossom Way Creeks Stream and Wetland Restoration, Preservation, and Trail Construction
4. Puppy Creek Stream and Wetland Restoration and Preservation
5. Spring Creek at Thunder Chicken Wetland, Stream, and Riparian Restoration and Preservation
6. Spring Creek at The Greenway Forest Stream and Riparian Restoration and Preservation
7. Spring Creek at Downtown Preservation
8. Willie George Park Wetland Restoration and Trail Construction
9. Lower Clear Creek Stream Restoration and Preservation
10. Johnson Park Riparian, Prairie, and Forest Restoration
11. University of Arkansas Oak Ridge Hillside Prairie and Forest Restoration and Trail Construction
12. River Commons Floodplain, Prairie, and Riparian Restoration, Preservation, and Trail Construction
13. Town Branch Corridor Stream and Riparian Restoration and Preservation
14. University of Arkansas Research and Tech Park Floodplain, Prairie, and Forest Restoration
15. University of Arkansas Oak Knoll Wetland, Prairie, Forest, Stream, and Riparian Restoration
16. Prairie Grove Battlefield State Park Wetland, Prairie, and Riparian Restoration
17. West Fork White River Wetland, Prairie, Stream, and Riparian Restoration and Preservation
18. Springtown Reforestation Projects

It's time to take the survey!

Take the survey by scanning the QR code below or pulling up the website listed below and pressing the "Take the Survey" button.

ENGLISH / SPANISH

MARSHALLESE

You can answer each question by following along with the upcoming poster.

nwarpc.org/energy-environment-innovation-plan

Survey Definitions

Learn more about some of the key terms used in the public survey. Ask the project team if you have any questions!

CARBON EMISSIONS

The release of carbon dioxide into the air, mostly from burning fossil fuels like coal and oil, contributing to global pollution and climate change

CLEAN ENERGY

Energy sources that produce little to no pollution or greenhouse gases, such as solar, wind, and hydroelectric power

BIOCHAR PYROLYSIS AND/ OR GASIFICATION

Pocesses that heat organic material without oxygen to create "biochar" and gas that can be used for energy, to improve soil health like compost, and store carbon

ACTIVE TRANSPORTATION

Traveling by walking, cycling, or other self-propelled wheels, which promotes health and reduces the use of vehicles

GREENHOUSE GASES

Gases in the earth's atmosphere, like carbon dioxide and methane, that trap heat and come from activities such as burning fossil fuels, deforestation, industrial processes, and agricultural practice

ANAEROBIC DIGESTER

A system that breaks down organic waste, such as food scraps or manure, without oxygen to produce biogas (mostly methane) and nutrient-rich compost, similar to pyrolysis and gasification

TRANSIT-ORIENTED DEVELOPMENT

A community planning strategy that creates walkable communities centered around public transportation to encourage the use of transit and reduce car dependence

CARBON NEUTRAL

Balancing the amount of carbon dioxide emitted with an equivalent amount of carbon offset or removal, such as investing in reforestation projects that absorb an equivalent amount of carbon dioxide

ECOSYSTEM SERVICES

Benefits that humans receive from natural environments, such as clean air and water, pollination of crops, natural disaster protection like flooding, and storing carbon

LOW/NO EMISSION VEHICLES

Vehicles or transportation options that produce little to no carbon emissions, generally electric and hybrid cars, that reduce environmental impact

CARBON FOOTPRINT

The total amount of carbon dioxide and other greenhouse gases produced by an individual, organization, or activity, typically measured in terms of equivalent tons of carbon dioxide

CARBON SEQUESTRATION

Process of capturing and storing carbon dioxide from the atmosphere to reduce its impact on the environment and climate change

BUILDING AND ZONING CODES

Regulations that set standards for the construction, design, and use of buildings and land to ensure safety and functionality, sometimes guided by a community vision or "master plan."

COMPOSTING

The process of breaking down organic waste, like food scraps and yard trimmings, into nutrient-rich soil through natural decomposition

LOW-INCOME AND DISADVANTAGED COMMUNITIES

Urban, rural, or suburban areas defined by factors such as lower income levels, limited access to resources and services, higher rates of poverty, and increased exposure to environmental and social challenges

NWA Regional Planning Commission

THANK YOU!

Share our Facebook and LinkedIn posts!

Take the survey!

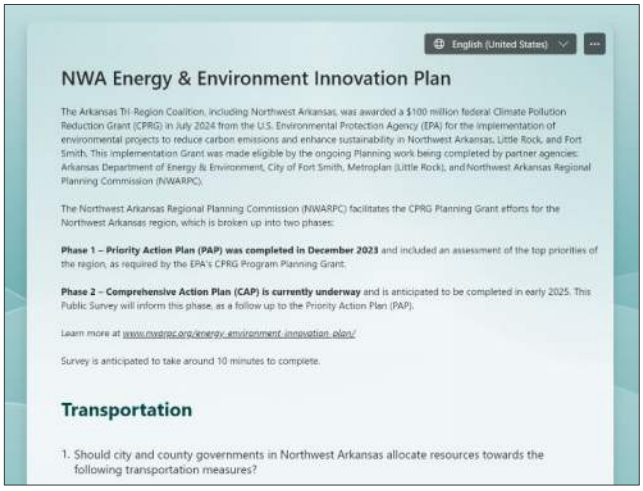
Have an idea? Fill out the idea box!

Watch your email for project updates!

8. PUBLIC SURVEY

Developing and using a public survey is crucial for successful use of CPRG funds as it ensures that the voices of the community, especially low-income and disadvantaged groups, are heard and considered in the planning process. Surveys provide valuable insights into the community's needs, concerns, and priorities, enabling the development of a more inclusive and effective Comprehensive Action Plan (CAP). Engaging the public through surveys fosters transparency, builds trust, and encourages community participation, which are essential for the success and sustainability of the project.

The survey was conducted from August 20, 2024, to December 13, 2024, for a total of 115 days. It was offered in three languages and received 182 total responses: 181 in English, one in Marshallese, and zero in Spanish. Marketing for the survey took place mainly through digital outlets on NWA Regional Planning Commission social media channels, website, and direct emails to stakeholders and partners. The survey was also shared during in-person events, which can be seen in the CAP Stakeholder and ***Public Engagement Summary Events Attended***.



Public Survey Summary

Demographics

The majority of respondents, 64%, are from Washington County, followed by 34% from Benton County, with a small representation from Madison County and other areas. In terms of race, 83% identify as White/Caucasian, while 8% preferred not to say, 4% individuals of two or more
races, and a small percent (<2%) from Asian, Black/African American, and American

Indian/Alaskan Native. 85% are not Hispanic, 8% prefer not to disclose, and 6% identify as Hispanic, Latino, or of other Spanish ancestry. Age distribution shows a notable portion of responses are from 65 and over (20%), with other age groups such as 25-34 (20%), 45-54 (19%), 35-44 (16%), 55-64 (10%), and 18-24 (8%) also well-represented. Gender demographics indicate a close split with 48% male and 44% female, alongside 7% who prefer not to say and 2% identifying as non-binary. Regarding annual household income, 30% earn between $75k-$125k, 29% earn $125k or above, 18% fall within the $40k-$75k range, 13% prefer not to disclose their income, and 10% earn between $0-$40k.

Transportation

There is overwhelming support for constructing a regional active transportation network, with 91% in favor. Similarly, 91% of respondents support providing opportunities for alternative modes of transportation, such as bicycles and public transit. Updating or adopting building and zoning codes to encourage walkable, bikeable, and transit-oriented development also received strong support (90% Yes).

A majority support increasing electric vehicle charging infrastructure (59% Yes), though a significant portion remains unsure (22%) or opposed (19%). When asked about the likelihood of purchasing an electric vehicle in the next 5-10 years, responses were mixed: 26% are very likely and 18% very unlikely, while the remaining respondents ranged somewhat likely to somewhat unlikely.

In terms of prioritizing transportation actions, expanding infrastructure for active transportation (sidewalks, bike lanes, transit stops) was deemed most important by 46% of respondents, followed by updating/adopting building and zoning codes. Establishing low/zero emission programs and expanding public electric vehicle infrastructure were considered of mid importance. Incentivizing the purchase of low/no emission vehicles and upgrading city and county vehicle fleets were considered lowest priorities.

These results indicate a strong community interest in enhancing active transportation infrastructure and promoting sustainable development, while opinions on electric vehicle adoption and related infrastructure are more varied.

Energy

The survey results indicate strong support for ambitious clean energy goals among respondents in Northwest Arkansas. A significant 80% of respondents agreed that Northwest Arkansas governments should strive to achieve 100% clean energy use and 84% believe the region should aim for carbon neutrality by 2050. When prioritizing energy efficiency solutions, retrofitting existing facilities and constructing new ones with improved energy standards emerged as the most critical, with 24% of respondents ranking it as the highest priority. Installing solar and energy storage systems at municipal buildings followed closely, while

working with utility companies and developing community-scale solar were considered of mid importance. Additionally, while there is some interest in expanding clean energy in the regional grid, initiatives aimed at smart utility grid and renewable gas capture and traffic signal optimization were viewed as lower priorities. Overall, there is a clear consensus on the importance of clean energy initiatives and carbon neutrality, with varying levels of support for specific energy efficiency measures.

Building Efficiency

The survey results demonstrate a strong consensus among respondents regarding the need for improved energy efficiency and reduced carbon footprints in public buildings. An overwhelming 92% support enhancing energy efficiency in public facilities, while 85% advocate for minimizing the carbon footprint of government construction and remodeling. When ranking specific building standard actions, establishing an incentive program for residential energy reduction was viewed as the highest priority (57% high priority), nearly tied as highest priority, providing incentives for updated building energy codes (53% high priority) was ranked next. Incentives for incorporating sustainable materials into new construction and remodels was regarded as a mid-level priority. In contrast, ranked as low priority were encouraging contractors to lower their carbon footprints and voluntary programs for promoting low and zero-emission (45% ranked as lowest importance). Overall, the findings reflect a strong commitment to energy efficiency, though opinions vary on the relative importance of specific initiatives.

Waste, Recycling, and Sustainable Materials

The survey results indicate strong support for waste reduction initiatives in Northwest Arkansas, with 94% of respondents agreeing that city and county governments should work to reduce landfill waste. Among the proposed measures, providing incentives and expanding access to community composting and food waste collection programs was ranked highest in importance (43% highest priority). Developing a construction and demolition recycling processing facility was considered of mid to high importance by 69% of respondents. Supporting the development of biochar pyrolysis and gasification facilities received mixed importance from mid to high. Incentives for anaerobic digester facilities and developing a regional materials recovery facility were nearly tied, seen as mid to low importance, while improving waste management for rural populations was ranked lowest in priority.

Carbon Removal

The survey results reveal a strong agreement among respondents regarding the significance of ecosystem services and carbon sequestration. A substantial majority (76%) strongly agree that parks providing ecosystem services are as important as those for active recreation, and 89% support enhancing carbon sequestration on public lands through the protection and restoration of natural areas. Additionally, 72% strongly believe certain lands should be reserved solely for their ecosystem services and carbon storage benefits, and 81% advocate for incentivizing

property owners to improve carbon sequestration. When prioritizing actions, restoring degraded habitats (60% high importance) and planting native trees (58% high importance) were viewed as the most critical initiatives, while incentivizing agricultural practices for carbon capture was ranked lowest (47% lowest importance).

Regional Resilience

The survey results indicate strong support for water conservation and sustainable practices in Northwest Arkansas. A significant majority (87%) believe that city and county governments should work to reduce water consumption, with the most important strategy being retrofitting water infrastructure with smart technologies to detect leaks (62% high importance), followed by educating residents on conservation (56% high importance). Additionally, 83% support increasing workforce training opportunities to implement sustainable practices, with creating job opportunities in sustainable land management in local governments ranked highly (64% high importance) and training for energy-efficient technology considered mid importance (62%). There is also broad support (66% strongly agree) for ensuring that low-income and vulnerable populations do not face disproportionately higher environmental and economic burdens. Key priorities for addressing these burdens include Increasing access to affordable housing, healthy food, and affordable medical care to low-income and disadvantaged communities (LIDAC) (54% highest) and developing strategies to reduce environmental impacts on disadvantaged communities (47% high importance). Preparing regional government resources to address impacts on LIDAC residents was ranked lowest priority.

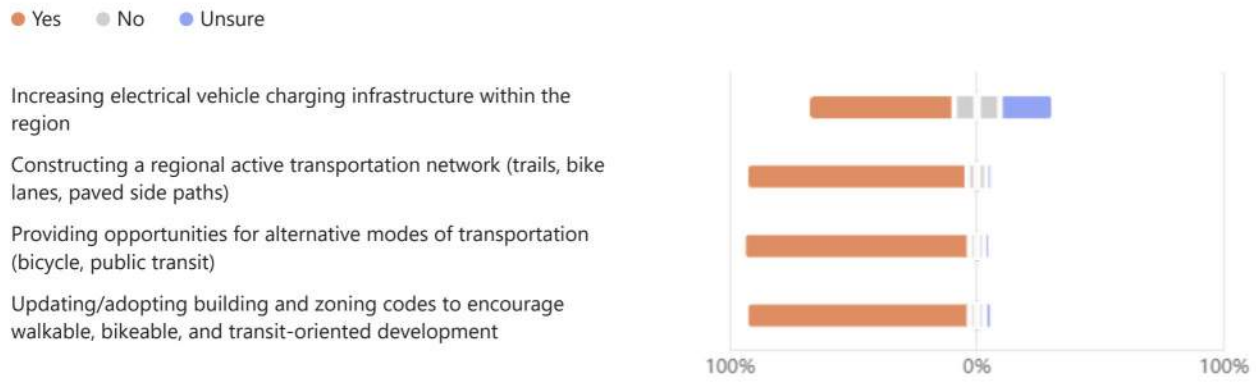
To view the ***CAP Public Survey Microsoft Forms Results*** *and* ***CAP Public Survey in Microsoft Forms***, see as follows.

Responses Overview

Closed

Responses	Average Time	Duration
181	61:02	180 Days

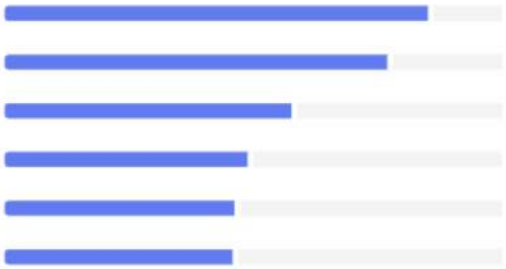
1. Should city and county governments in Northwest Arkansas allocate resources towards the following transportation measures?



2. How likely are you to buy an electric vehicle in the next 5-10 years?

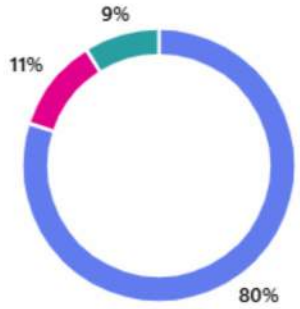
3. Rank the following transportation actions by the cities and counties from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

1	**Expanding infrastructure** such as sidewalks, bicycle facilities, transit stops, and other active...
2	**Updating/adopting building and zoning codes** to encourage walkable, bikeable, and transit-oriented...
3	**Establishing low/zero emission programs** such as rideshare and e-bikes, with priority given to low-...
4	**Expanding public electric vehicle infrastructure** for residents and bus fleets.
5	**Upgrading city and county vehicle fleets** by replacing internal combustion engine vehicles with...
6	**Incentivizing eligible agencies, businesses, and individual automobile owners** to purchase low/n...



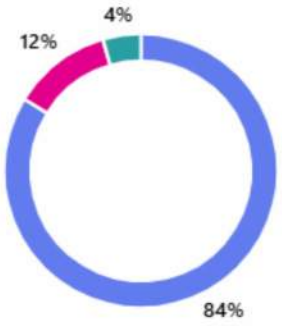
4. Should city and county governments in Northwest Arkansas strive to achieve 100% clean energy usage by 2050? **Clean energy refers to energy sources that do not emit greenhouse gases or carbon dioxide during use, such as solar, wind, hydro power, and geothermal.*

Yes	144
No	20
Unsure	16



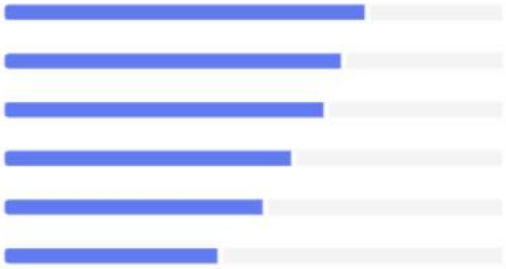
5. Should city and county government operations in Northwest Arkansas strive to be carbon neutral by 2050? **Carbon neutral means the city and county government has offset the amount of carbon dioxide they produce through projects that reduce, remove, or store carbon.*

Yes	150
No	21
Unsure	8



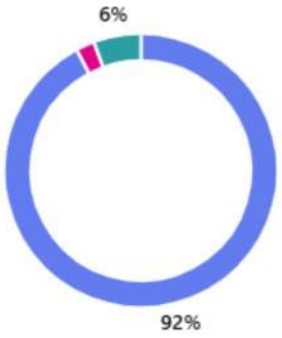
6. Rank the following energy efficiency solutions for city and county governments, from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

1. **Retrofitting existing facilities** to make them more energy efficient and construct new facilities with...
2. **Installing solar and energy storage systems** at municipal/government buildings to offset electricit...
3. **Working with utility companies** to expand the proportion of clean energy in the regional electricit...
4. **Developing community-scale solar** and alternative energy systems with priority given to low-income...
5. **Developing smart utility grid** and renewable gas capture technologies.
6. **Utilizing technology to reduce idling**, such as improving traffic signal timings.



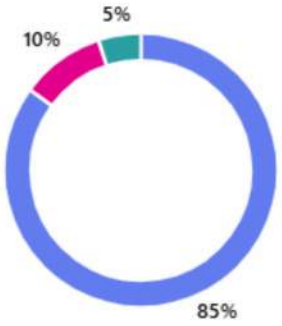
7. Should city and county governments in Northwest Arkansas improve energy efficiency in public buildings?

Yes	166
No	4
Unsure	10



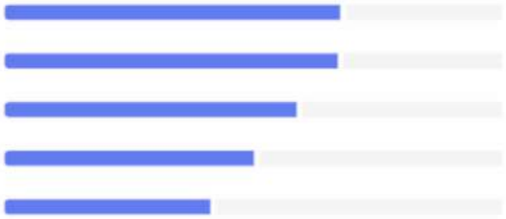
8. Should city and county governments in Northwest Arkansas commit to minimizing the carbon footprint involved in the construction and remodeling of government facilities and public spaces?

Yes	153
No	18
Unsure	9



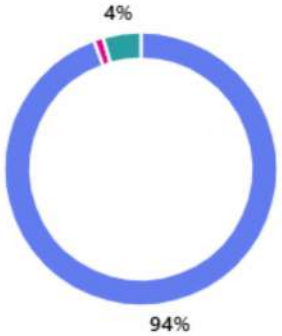
9. Rank the following building standard actions for city and county governments from most to least important.

1	**Establishing an incentive program for implementation of reducing residential energy**...
2	**Providing incentives for incorporating up-to-date building energy codes** that set efficiency standard...
3	**Providing incentives to incorporate sustainable materials** into new construction and remodels,...
4	**Providing incentives to construction contractors** to **reduce the carbon footprint of construction**...
5	**Developing voluntary programs that promote low and zero-emission options**, including vehicle...



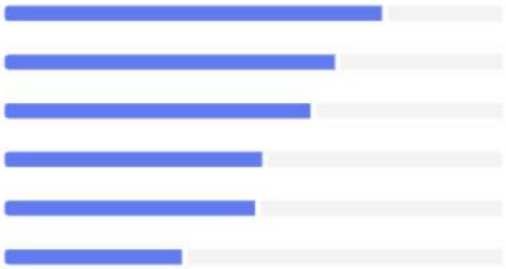
10. Should the city and county governments in Northwest Arkansas work to reduce the amount of waste going to the land fill?

Yes	170
No	2
Unsure	8



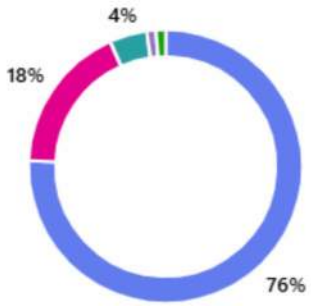
11. Rank the following waste, recycling, and sustainable materials measures for city and county governments from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

1	**Providing incentives and expanding access to community composting** and food waste collectio...
2	**Developing of a construction and demolition recycling processing facility** to reduce waste and...
3	**Supporting development of a biochar pyrolysis facility and/or gasification facility** to divert wast...
4	**Providing incentives for anaerobic digester facilities** to be implemented/constructed to divert...
5	**Developing a regional materials recovery facility (MRF)** that processes recyclable materials into...
6	**Providing incentives or a voucher system** to improve waste management for rural populations...



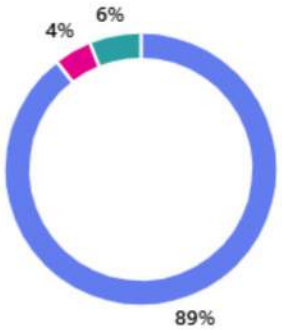
12. Having parks that provide ecosystem services (i.e., natural benefits that support healthy ecosystems) is just as important as having parks that provide active recreation opportunities.

Strongly agree	137
Somewhat agree	32
Neither agree nor disagree	8
Somewhat disagree	2
Strongly disagree	2



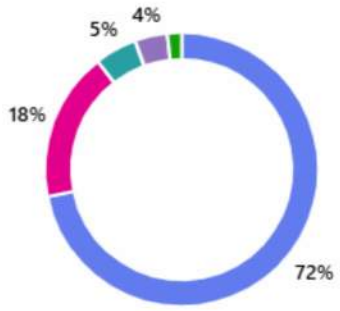
13. Should the city and county governments in Northwest Arkansas improve carbon sequestration, or storage, on lands they currently own or manage by protecting and restoring forests, prairies, wetlands, waterbodies, streams, riparian buffers, etc.?

Yes	161
No	8
Unsure	11



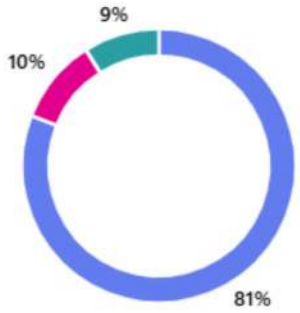
14. The city and county governments in Northwest Arkansas should set aside certain lands solely because of the ecosyste m services, or natural benefits, and carbon storage they provide.

Strongly agree	130
Somewhat agree	32
Neither agree nor disagree	9
Somewhat disagree	7
Strongly disagree	3



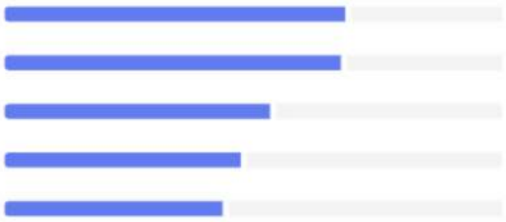
15. Do you think cities and counties in NWA should incentivize property owners to improve the carbon sequestration, or c arbon storing, that these areas provide?

Yes	145
No	18
Unsure	16



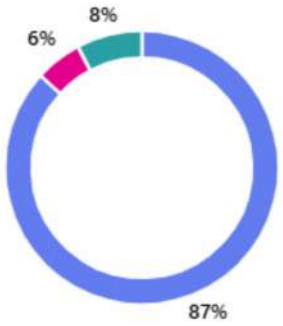
16. Rank the following actions for city and county governments for carbon sequestration, or carbon storing, and removal, f rom most to least important from the Priority Action Plan. *Drag and drop or use the arrows to prioritize your answers be ginning with 1 as your highest priority.*

1. **Restoring degraded prairies, forests, riparian buffers, streams, and wetlands** in parks, trails,...
2. **Planting native trees and plants** that provide high carbon sequestration benefits in publicly owned...
3. **Identifying lands with a high carbon sequestration value** or potential for new parks or...
4. **Developing conservation plans** for new parks and recreation areas that include measures to improve ...
5. **Incentivizing agriculture practices** to reduce carbon emissions and create carbon capture.



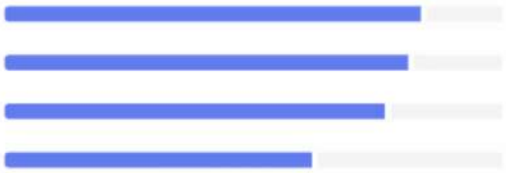
17. Should city and county governments work to reduce water consumption?

Yes	157
No	10
Unsure	14



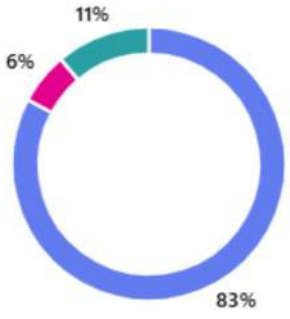
18. Rank the following water conservation strategies, from most to least important for developing a drought-resilient community. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

1	**Retrofitting municipal and county water infrastructure** with smart technologies that can...
2	**Educating and incentivizing water conservation** for residents, such as reducing summer watering a...
3	**Improving process and energy efficiency** of water/wastewater pumping and treatment.
4	**Incentivizing plumbing regulations** and water efficiency standards for new development, such as...



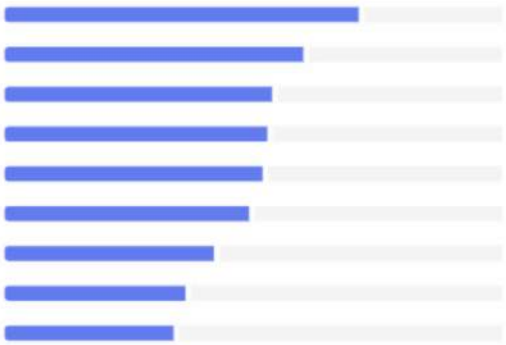
19. Should city and county governments in Northwest Arkansas focus on increasing opportunities for workforce training and development that would support the implementation of sustainable practices in the region?

Yes	149
No	11
Unsure	20



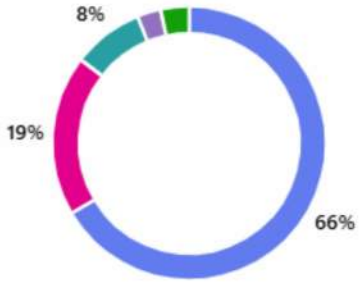
20. Rank the following actions for city and county governments from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

1	**Creating job opportunities in local government** for sustainable land management
2	**Creating and/or expanding workforce training opportunities** for and maintaining/repairing energ...
3	**Creating and/or expanding workforce training opportunities** for managing natural lands and...
4	**Increasing access to job opportunities in sustainability-related fields** for people from low-...
5	**Providing relevant training to city and county staff** to successfully implement the measures...
6	**Creating and/or expanding environmental science programs in public schools** to increase...
7	**Creating and/or expanding workforce training opportunities** for repairing and maintaining electri...
8	**Creating and/or expanding workforce training opportunities** for green building design and...
9	**Creating and/or expanding workforce training opportunities** for solar panel installation and...



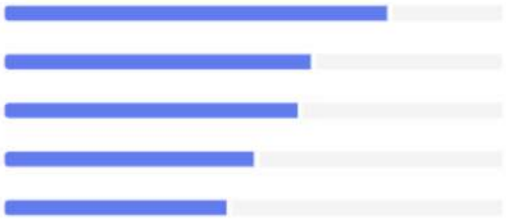
21. The city and county governments in Northwest Arkansas should try to ensure that low-income and vulnerable populations in the region do not experience disproportionately higher environmental and economic burdens.

Strongly agree	119
Agree	34
Neutral	15
Disagree	5
Strongly disagree	6



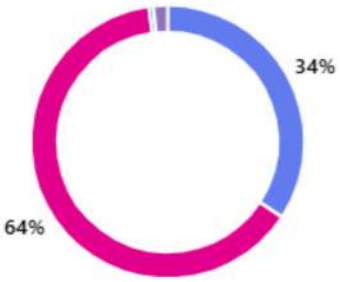
22. Rank the following actions for city and county governments from most to least important. *Drag and drop or use the arr ows to prioritize your answers beginning with 1 as your highest priority.*

1	**Increasing regional access** to affordable housing, healthy food outlets, and affordable medical care t...
2	**Developing environmental-resilient strategies** to reduce environmental impacts on low-income and...
3	**Engaging residents of diverse backgrounds** and experiences in community efforts to reduce impact...
4	**Connecting low-income and disadvantaged communities to information** and resources to...
5	**Preparing city and county resources** to address economic impacts, governance capacity, and social...



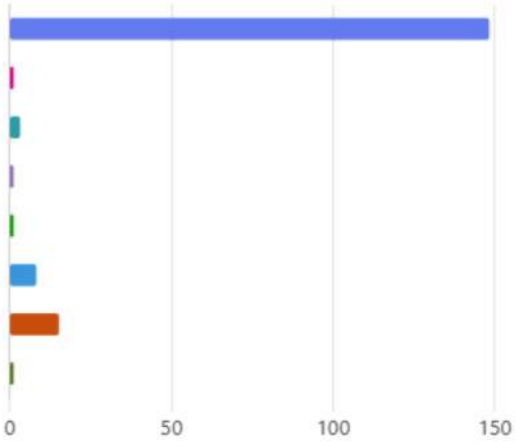
23. Select the county in which you reside.

Benton	62
Washington	115
Madison	1
I live outside of these counties	3



24. Which of the following best describes your race? (Check all that apply.)

White/Caucasian	148
Black/African American	1
Asian	3
Native Hawaiian and Other Pacific Islander	1
American Indian/Alaskan Native	1
Two or More Races	8
Prefer not to say	15
Other	1

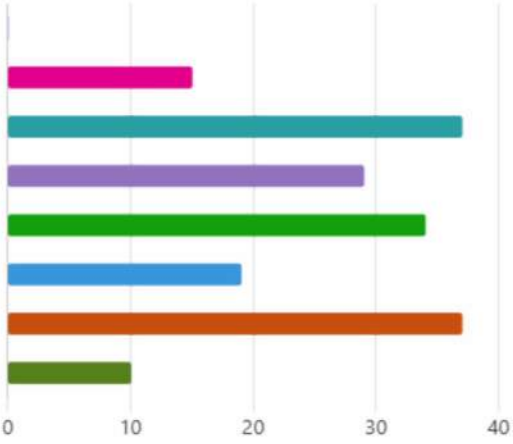


25. Are you of Hispanic, Latino, or other Spanish ancestry? (Choose one.)

Yes	10
No	154
Prefer not to say	15

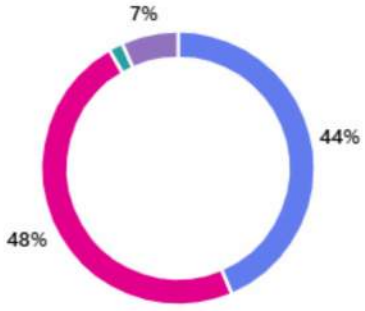
26. What is your age?

Under 18	0
18-24	15
25-34	37
35-44	29
45-54	34
55-64	19
65 and over	37
Prefer not to say	10



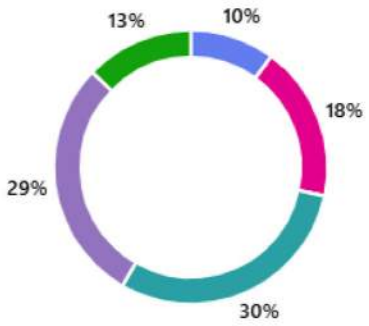
27. Select your gender.

Female	78
Male	86
Non-binary	3
Prefer not to say	12
Other	0



28. Select your combined annual household income (include the income of all members of your household that reside wit h you at least half of the time).

$0-$40,000	18
$40,001 to $75,000	33
$75,001 to $125,000	54
$125,001 and above	52
Prefer not to say	23



NWA Energy & Environment Innovation Plan

The Arkansas Tri-Region Coalition, including Northwest Arkansas, was awarded a $100 million federal Climate Pollution Reduction Grant (CPRG) in July 2024 from the U.S. Environmental Protection Agency (EPA) for the implementation of environmental projects to reduce carbon emissions and enhance sustainability in Northwest Arkansas, Little Rock, and Fort Smith. This Implementation Grant was made eligible by the ongoing Planning work being completed by partner agencies: Arkansas Department of Energy & Environment, City of Fort Smith, Metroplan (Little Rock), and Northwest Arkansas Regional Planning Commission (NWARPC).

The Northwest Arkansas Regional Planning Commission (NWARPC) facilitates the CPRG Planning Grant efforts for the Northwest Arkansas region, which is broken up into two phases:

Phase 1 – Priority Action Plan (PAP) was completed in December 2023 and included an assessment of the top priorities of the region, as required by the EPA's CPRG Program Planning Grant.

Phase 2 – Comprehensive Action Plan (CAP) is currently underway and is anticipated to be completed in early 2025. This Public Survey will inform this phase, as a follow up to the Priority Action Plan (PAP).

Learn more at *www.nwarpc.org/energy-environment-innovation-plan/*

Survey is anticipated to take around 10 minutes to complete.

Transportation

1. Should city and county governments in Northwest Arkansas allocate resources towards the following transportation measures?

	Yes	No	Unsure
Increasing electrical vehicle charging infrastructure wi thin the region	◯	◯	◯
Constructing a regional active transportation network (trails, bike lanes, paved side paths)	◯	◯	◯
Providing opportunities for alternative modes of transportation (bicycle, public transit)	◯	◯	◯
Updating/adopt ing building and zoning codes to encourage walkable, bikeable, and transit-oriented development	◯	◯	◯

2. How likely are you to buy an electric vehicle in the next 5-10 years?

- ◯ Very likely
- ◯ Somewhat likely
- ◯ Neither likely nor unlikely
- ◯ Somewhat unlikely
- ◯ Very unlikely

3. Rank the following transportation actions by the cities and counties from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

- **Expanding infrastructure** such as sidewalks, bicycle facilities, transit stops, and other active transportation-supporting infrastructure.
- **Upgrading city and county vehicle fleets** by replacing internal combustion engine vehicles with low/zero emission vehicles, such as electric and hybrid vehicles.
- **Establishing low/zero emission programs** such as rideshare and e-bikes, with priority given to low-income and disadvantaged communities.
- **Incentivizing eligible agencies, businesses, and individual automobile owners** to purchase low/no emission vehicles, such as electric and hybrid vehicles, with priority given to low-income and disadvantaged communities.
- **Updating/adopting building and zoning codes** to encourage walkable, bikeable, and transit-oriented development.
- **Expanding public electric vehicle infrastructure** for residents and bus fleets.

Energy

4. Should city and county governments in Northwest Arkansas strive to achieve 100% clean energy usage by 2050? **Clean energy refers to energy sources that do not emit greenhouse gases or carbon dioxide during use, such as solar, wind, hydropower, and geothermal.*

   ◯ Yes

   ◯ No

   ◯ Unsure

5. Should city and county government operations in Northwest Arkansas strive to be carbon neutral by 2050? **Carbon neutral means the city and county government has offset the amount of carbon dioxide they produce through projects that reduce, remove, or store carbon.*

   ◯ Yes

   ◯ No

   ◯ Unsure

6. Rank the following energy efficiency solutions for city and county governments, from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

- **Installing solar and energy storage systems** at municipal/government buildings to offset electricity usage.
- **Retrofitting existing facilities** to make them more energy efficient and construct new facilities with improved energy efficiency and building standards.
- **Developing smart utility grid** and renewable gas capture technologies.
- **Working with utility companies** to expand the proportion of clean energy in the regional electricity grid.
- **Developing community-scale solar** and alternative energy systems with priority given to low-income and disadvantaged communities
- **Utilizing technology to reduce idling**, such as improving traffic signal timings.

Building Efficiency

7. Should city and county governments in Northwest Arkansas improve energy efficiency in public buildings?

- ◯ Yes
- ◯ No
- ◯ Unsure

8. Should city and county governments in Northwest Arkansas commit to minimizing the carbon footprint involved in the construction and remodeling of government facilities and public spaces?

- ◯ Yes
- ◯ No
- ◯ Unsure

9. Rank the following building standard actions for city and county governments from most to least important.

- **Establishing an incentive program for implementation of reducing residential energy usage** and encouraging certified energy efficient appliances, heating and cooling equipment, and lighting.
- **Providing incentives for incorporating up-to-date building energy codes** that set efficiency standards for new and renovated buildings, reducing energy use and emissions.
- **Developing voluntary programs that promote low and zero-emission options**, including vehicle charging, with a focus on buildings in rural and low-income and disadvantaged areas; multifamily residential buildings; and commercial buildings.
- **Providing incentives to incorporate sustainable materials** into new construction and remodels, including locally sourced materials, materials with low carbon footprint, and biochar.
- **Providing incentives to construction contractors** to **reduce the carbon footprint of construction activities**, such as by using electrical equipment and machinery, turning off gas and diesel powered engines when not in use, or minimizing soil disturbance.

Waste, Recycling, and Sustainable Materials

10. Should the city and county governments in Northwest Arkansas work to reduce the amount of waste going to the landfill?

- ◯ Yes
- ◯ No
- ◯ Unsure

11. Rank the following waste, recycling, and sustainable materials measures for city and county governments from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

- **Providing incentives and expanding access to community composting** and food waste collection programs.
- **Supporting development of a biochar pyrolysis facility and/or gasification facility** to divert waste currently being landfilled. **Biochar pyrolysis and gasification are both processes that use heat to convert organic materials into charcoal that can be used for soil improvement, in construction material, or for stormwater treatment.*
- **Developing of a construction and demolition recycling processing facility** to reduce waste and upcycle materials.
- **Providing incentives for anaerobic digester facilities** to be implemented/constructed to divert organic waste that is currently being landfilled and/ or land applied. **This creates compost and other agricultural and environmentally beneficial products that reduce greenhouse gas emissions from landfills and pollution in waterways.*
- **Providing incentives or a voucher system** to improve waste management for rural populations including recycling.
- **Developing a regional materials recovery facility (MRF)** that processes recyclable materials into sellable raw material for new products, such as upcycled plastic.

Carbon Removal

12. Having parks that provide ecosystem services (i.e., natural benefits that support healthy ecosystems) is just as important as having parks that provide active recreation opportunities.

- ◯ Strongly agree
- ◯ Somewhat agree
- ◯ Neither agree nor disagree
- ◯ Somewhat disagree
- ◯ Strongly disagree

13. Should the city and county governments in Northwest Arkansas improve carbon sequestration, or storage, on lands they currently own or manage by protecting and restoring forests, prairies, wetlands, waterbodies, streams, riparian buffers, etc.?

- ◯ Yes
- ◯ No
- ◯ Unsure

14. The city and county governments in Northwest Arkansas should set aside certain lands solely because of the ecosystem services, or natural benefits, and carbon storage they provide.

- ◯ Strongly agree
- ◯ Somewhat agree
- ◯ Neither agree nor disagree
- ◯ Somewhat disagree
- ◯ Strongly disagree

15. Do you think cities and counties in NWA should incentivize property owners to improve the carbon sequestration, or carbon storing, that these areas provide?

- ◯ Yes
- ◯ No
- ◯ Unsure

16. Rank the following actions for city and county governments for carbon sequestration, or carbon storing, and removal, from most to least important from the Priority Action Plan. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

- **Planting native trees and plants** that provide high carbon sequestration benefits in publicly owned parks, trails, rights-of-way, and privately owned lands.
- **Restoring degraded prairies, forests, riparian buffers, streams, and wetlands** in parks, trails, rights-of-way, and with private landowners.
- **Identifying lands with a high carbon sequestration value** or potential for new parks or recreation areas with programs to protect and restore these lands.
- **Developing conservation plans** for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value.
- **Incentivizing agriculture practices** to reduce carbon emissions and create carbon capture.

Regional Resilience

17. Should city and county governments work to reduce water consumption?

- ◯ Yes
- ◯ No
- ◯ Unsure

18. Rank the following water conservation strategies, from most to least important for developing a drought-resilient community. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

- **Educating and incentivizing water conservation** for residents, such as reducing summer watering and planting drought-tolerant landscaping.
- **Incentivizing plumbing regulations** and water efficiency standards for new development, such as low-flow fixtures.
- **Retrofitting municipal and county water infrastructure** with smart technologies that can identify areas with leakage for repair.
- **Improving process and energy efficiency** of water/wastewater pumping and treatment.

19. Should city and county governments in Northwest Arkansas focus on increasing opportunities for workforce training and development that would support the implementation of sustainable practices in the region?

- ◯ Yes
- ◯ No
- ◯ Unsure

20. Rank the following actions for city and county governments from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

- **Creating job opportunities in local government** for sustainable land management
- **Creating and/or expanding workforce training opportunities** for and maintaining/repairing energy efficient technology and appliances
- **Creating and/or expanding workforce training opportunities** for repairing and maintaining electric vehicles
- **Creating and/or expanding workforce training opportunities** for managing natural lands and rights-of-way to improve carbon sequestration
- **Providing relevant training to city and county staff** to successfully implement the measures contained in the Priority Acton Plan and Comprehensive Action Plan
- **Increasing access to job opportunities in sustainability-related fields** for people from low-income and disadvantaged communities
- **Creating and/or expanding workforce training opportunitie**s for solar panel installation and maintenance
- **Creating and/or expanding workforce training opportunities** for green building design and construction
- **Creating and/or expanding environmental science programs in public schools** to increase environmental awareness

21. The city and county governments in Northwest Arkansas should try to ensure that low-income and vulnerable populations in the region do not experience disproportionately higher environmental and economic burdens.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

22. Rank the following actions for city and county governments from most to least important. *Drag and drop or use the arrows to prioritize your answers beginning with 1 as your highest priority.*

- **Engaging residents of diverse backgrounds** and experiences in community efforts to reduce impacts on the environment.
- **Connecting low-income and disadvantaged communities to information** and resources to address environmental impacts.
- **Developing environmental-resilient strategies** to reduce environmental impacts on low-income and disadvantaged communities.
- **Preparing city and county resources** to address economic impacts, governance capacity, and social support structures to address impacts on the environment.
- **Increasing regional access** to affordable housing, healthy food outlets, and affordable medical care to low-income and disadvantaged communities.

Demographics

Entering demographic information about yourself ensures we achieve diverse participation in this survey. Your information will NOT be shared. Your response is optional and anonymous.

23. Select the county in which you reside.

- ◯ Benton
- ◯ Washington
- ◯ Madison
- ◯ I live outside of these counties

24. Which of the following best describes your race? (Check all that apply.)

- ◯ White/Caucasian
- ◯ Black/African American
- ◯ Asian
- ◯ Native Hawaiian and Other Pacific Islander
- ◯ American Indian/Alaskan Native
- ◯ Two or More Races
- ◯ Prefer not to say
- ◯ Other

25. Are you of Hispanic, Latino, or other Spanish ancestry? (Choose one.)

- ◯ Yes
- ◯ No
- ◯ Prefer not to say

26. What is your age?

- ◯ Under 18
- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65 and over
- ◯ Prefer not to say

27. Select your gender.

- ◯ Female
- ◯ Male
- ◯ Non-binary
- ◯ Prefer not to say
- ◯ Other

28. Select your combined annual household income (include the income of all members of your household that reside with you at least half of the time).

- ◯ $0-$40,000
- ◯ $40,001 to $75,000
- ◯ $75,001 to $125,000
- ◯ $125,001 and above
- ◯ Prefer not to say

STAKEHOLDER AND PUBLIC ENGAGEMENT SUMMARY

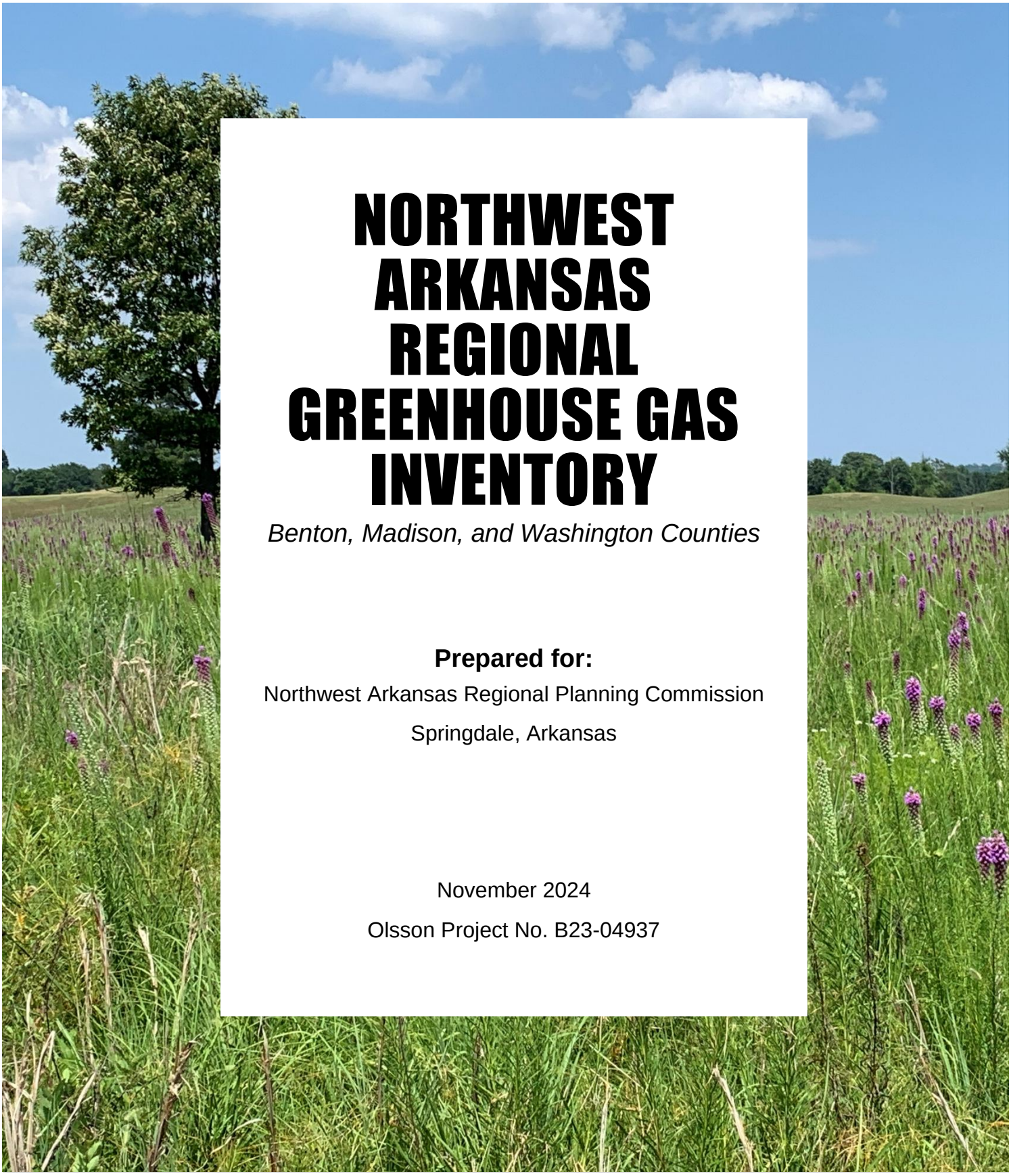
Northwest Arkansas Regional Planning Commission

February 2025

Olsson Project No. B23-04937

Appendix C

Northwest Arkansas Greenhouse Gas Emissions Inventory



NORTHWEST ARKANSAS REGIONAL GREENHOUSE GAS INVENTORY

Benton, Madison, and Washington Counties

Prepared for:

Northwest Arkansas Regional Planning Commission

Springdale, Arkansas

November 2024

Olsson Project No. B23-04937

olsson®

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1. OVERVIEW

Greenhouse gas (GHG) emissions include carbon dioxide (CO_2), nitrous oxide (NO_2), methane (CH_4), and fluorinated gases (F-gases). GHG emissions data is often collected and reported at various administrative levels, including national, regional, and sometimes state or local levels. The Northwest Arkansas (NWA) region includes Benton, Madison, and Washington counties. It is understood that there are inevitable uncertainties with the estimation process, but it is also recognized that this regional inventory has been reinforced and compared with data from multiple reliable sources.

The NWA regional GHG emissions inventory utilized data from the U.S. Environmental Protection Agency's (EPA) National Emissions Inventory (NEI) and the National Land Cover Database's (NLCD) land use data, to create an inventory based on the comparison of Arkansas statewide data from the EPA's GHG Inventory Data Explorer. A regional inventory for the year 2020 was chosen because it is the most recent year for which NEI data, the primary data source, is available.

Sequestration of carbon in the vegetation and soil of the region was also collected and calculated. This consideration of carbon sinks provides a fuller picture of the region's carbon fluxes and will help guide the NWA Regional Planning Commission as it implements the Comprehensive Action Plan.

2. Data Sources and Methodology

Below is a summary of the data sources and methodology used to approximate the GHG emissions and carbon sinks in NWA.

2.1 Regional GHG Emission Sources

The following data sources were used in the regional GHG emissions inventory:

EPA GHG Inventory (state-level data)

The EPA is tasked to produce the official GHG Inventory for the U.S., which is a comprehensive report detailing the country's emissions of GHGs. This inventory can be broken down into statewide reports; one was compiled for the state of Arkansas. This inventory is an essential tool for understanding the sources and trends of GHG emissions in the U.S. The inventory includes emissions from various sectors, such as the electric power industry, transportation, industrial processes (industry), agriculture, commercial, and residential. This 2020 state-level data was used to compare and approximate regional emissions.

The electric power industry includes fossil fuel combustion, incineration of waste, and other electricity generation categories. Transportation includes fossil fuel combustion and the use of F-gases. Industry includes fossil fuel combustion, natural gas and petroleum systems, chemical industry, mineral industry, metal industry, coal mining, production and use of F-gases, and other industrial categories. Agriculture includes crop cultivation, livestock, and fuel combustion. Commercial includes fossil fuel combustion, landfill and waste services, and the use of F-gases. Residential includes fossil fuel combustion and the use of F-gases (EPA 2020a).

EPA NEI (county-level transportation data)

The NEI is a comprehensive database maintained by the EPA that can be extracted down to the county level. The NEI compiles information on the emissions of air pollutants from various sources, including industrial facilities, power plants, transportation, and other activities contributing to air pollution. The data is collected from a variety of sources, including emissions inventories submitted by industries, fuel usage data, and other relevant information. The NEI provides data on the types and amounts of pollutants released into the air and serves as a critical tool for air quality management and regulatory decision-making. For the basis of this analysis, 2020 county-level transportation data was used to approximate regional emissions. Figure 1 gives a comparison of the transportation GHG emissions data collected through NEI versus the estimated overall GHG emissions per person in NWA (EPA 2020b).

Google Environmental Insights Explorer (EIE; city-level data)

Google's EIE is a tool that provides data and insights related to GHG emissions. EIE allows users to effectively measure, visualize, and explore city-level emissions sources and data. This tool provided useful data on the City of Fayetteville, which is the largest city within the NWA region, located in Washington County. It should be noted that agricultural emissions data was not included in this inventory because of the city’s urban landscape. This 2020 city-level data was used to compare and approximate regional emissions.

City of Fayetteville

Additionally, the City of Fayetteville provided valuable emissions inventory data for the years 2010 through 2022 that was used to compare and approximate regional emissions. It should be noted that agricultural emissions data was not included in this inventory because of the city’s urban landscape.

The NEI transportation data used for NWA's transportation sector initially included industrial and agricultural equipment. Olsson refined this sector to exclude these categories, leading to a slight decrease in reported emissions for the transportation sector from the regional GHG inventory conducted for the Priority Action Plan. As a result, because the sector percentages for NWA were

based on the EPA's GHG Inventory Data Explorer percentages for the state of Arkansas, all numbers for other economic sectors have been slightly adjusted to reflect this change.

Additionally, the agricultural sector was adjusted based on state data from the EPA's GHG Inventory Data Explorer. Agricultural sector emissions from each state are broken up into three categories: crop cultivation, livestock, and fuel combustion. It was found that the NLCD land use data that was obtained for carbon sequestration purposes (see Section 2.2 below) proved useful in correlating reported statewide emissions from crop cultivation with the regional cultivated crops land use category and reported statewide emissions from livestock to the regional Pasture/Hay land use category. It was then found that, of the total emissions in Arkansas from the agricultural sector, about 76 percent of emissions could be connected to croplands and about 24 percent of emissions connected to pastures. This state-level information, along with data previously collected, was then used to calculate an emissions rate per acre for croplands and pastures. The emissions rate was further used with NWA's acreage for the croplands and pastures land use categories to calculate a refined approximate emissions total for NWA's agricultural sector. The refined total for the agricultural sector in NWA is 488,507 metric tons of GHG emissions. Prior to this refinement, the total was 170,359 metric tons of GHG emissions but only included agricultural equipment from NEI's transportation data. While previously at 2 percent, the agricultural sector now accounts for 6 percent of NWA's overall GHG emissions.

Emissions and sequestration are reported in metric tons to comply with the EPA and Climate Pollution Reduction Grant (CPRG) standards. This assures uniformity in reporting and aligns with international measurement practices, facilitating accurate comparisons and assessments. Metric ton is a standardized measurement used globally, providing a consistent basis for GHG accounting. A metric ton equals 1,000 kilograms or approximately 2,204.62 pounds. By using metric tons, organizations can adhere to EPA and CPRG guidelines, which mandate this unit for clarity and precision in environmental reporting. Overall, using the metric ton as the standardized measure highlights the significance of standardized reporting in addressing climate change and demonstrates a commitment to aligning local practices with broader environmental goals.

2.2 Regional Carbon Sinks

NLCD is a comprehensive dataset maintained by the Multiresolution Land Characteristics (MRLC) Consortium that provides detailed information about land cover and land use across the U.S. The NLCD is valuable because it offers consistent and up-to-date land cover information at high spatial resolution; it is typically updated every five years. The total land area in acreage for each land cover category was calculated for the NWA region. The results are shown in Table 1 and Figure 1 below.

Table 1. Area of Land Cover Categories in Northwest Arkansas.

Land Cover Category	National Land Cover Database Classification	Acres in Northwest Arkansas		Percentage of Total Area	
Grasslands	Grassland/Herbaceous	17,749	18,102	1.06	
	Emergent Herbaceous Wetlands that intersect Natural Resources Conservation Service (NRCS)-mapped nonhydric and predominantly nonhydric soils	353			
Pastures	Pasture/Hay	540,677		31.6	
Forests	Deciduous Forest	851,443	912,959	49.8	53.3
	Evergreen Forest	12,227		0.7	
	Mixed Forest	47,210		2.8	
	Woody Wetlands that intersect NRCS-mapped nonhydric and predominantly nonhydric soils	2,079		0.1	
Shrublands	Shrub/Scrub	16,453		0.96	
Wetlands	Woody Wetlands that intersect NRCS-mapped hydric and predominantly hydric soils	493	533	0.03	0.03
	Emergent Herbaceous Wetlands that intersect NRCS-mapped hydric and predominantly hydric soils	40		0.002	
Open Water	Open Water	29,148		1.7	
Barren Lands	Barren Land (Rock/Sand/Clay)	3,912		0.23	
Croplands	Cultivated Crops	32.47		0.002	
Developed Areas	Developed, Open Space	94,163	189,220	5.5	11.1
	Developed, Low Intensity	48,673		2.8	
	Developed, Medium Intensity	35,004		2.0	
	Developed, High Intensity	11,380		0.7	

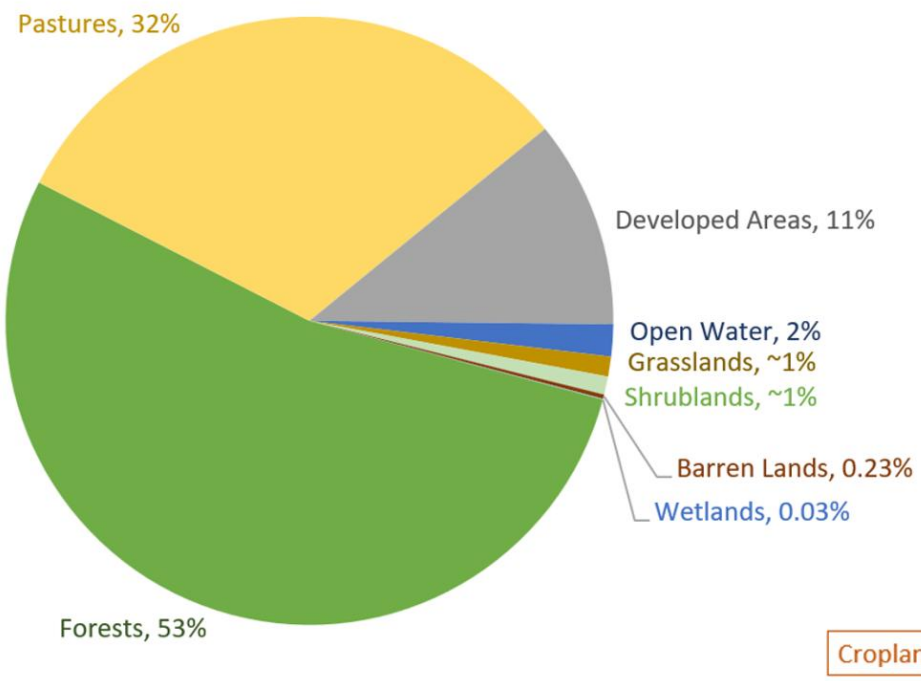

Figure 1. Percentage of Aerial Coverage of Land Cover Categories in Northwest Arkansas.

Carbon sequestration refers to the process by which forests, grasslands, and other vegetation capture and store atmospheric CO_2 through photosynthesis. This process effectively removes CO_2 from the atmosphere and stores it in biomass (trunks, branches, leaves, and roots) and soil. Including carbon sequestration in GHG accounting provides a more accurate and comprehensive picture of a region's net emissions, reflecting both sources of emissions and natural carbon sinks. Using the NLCD data for the region, sequestration rates in metric tons of CO_2 per acre per year were applied to the acreage of each land cover category to estimate the total carbon sequestration each category provides in the region.

Grasslands

Dominated by nonwoody herbaceous vegetation such as grasses and forbs, the fibrous root systems of most prairie vegetation species can extend several meters below the surface, often making up between 60-80 percent of the biomass carbon in these ecosystems (Ontl and Janowiak 2017). Roots of prairie species contribute carbon to the soil through exudates (Panchal et al. 2022) and through decomposition following root senescence. Because of the high quantity of belowground biomass associated with many prairie vegetation species, a significant amount of carbon is sequestered each year into the soils beneath prairies. A study conducted in eastern Missouri estimated the carbon sequestration rate of tallgrass prairie ecosystems to be 5.96 metric tons (MT) CO_2/acre annually (West & Haake 2014).

Wetlands with less than 60 percent hydric components are considered by Natural Resources Conservation Service (NRCS) to be non-hydric or predominantly nonhydric. Therefore, land cover that was classified as Emergent Herbaceous Wetlands by NLCD, but that intersected NRCS-mapped nonhydric and predominantly nonhydric soils, were not included in the calculations for carbon sequestration provided by wetlands but instead were included in the calculations for carbon sequestration provided by grasslands. Because these land covers have nonhydric or predominantly nonhydric soils, it was assumed that these land covers are only likely to be seasonally or temporarily saturated/inundated and are unlikely to accumulate peat. Therefore, these wetlands are not sequestering carbon at rates much different from upland grasslands rates, so the sequestration rate for grasslands was applied to this land cover subcategory.

Pastures

Pastures are dominated by nonnative forage and turf grasses used primarily for hay production to feed livestock. Because of repeated haying and foraging by livestock, the nonnative forage and turf grasses in these managed landscapes often have shallow roots that sequester less carbon in their belowground biomass and in the soil than the deeper roots found in many prairie species. According to Silveira et. al. (2024), pastures in the southeastern U.S. can sequester up to 2.08 MT CO_2/acre annually.

Forests

Forest trees contain large amounts of aboveground woody biomass and can sequester significant amounts of carbon in their trunks and branches (Nowak 1993; Nowak and Crane 2000 and 2002). Global Forest Watch is an online platform that provides data and tools for monitoring forests, including county-level data on carbon sequestration provided by forests based on the sequestration rates for different climate domains and forest types calculated by Harris et. al. (2011). According to Global Forest Watch (2024), 1,126,000 MT CO_2/year is sequestered by forests within the planning area, at a rate of 1.24 MT CO_2/acre annually.

Similar to land cover classified by NLCD as Emergent Herbaceous Wetlands, land cover classified as Woody Wetlands by NLCD that intersected NRCS-mapped nonhydric and predominantly nonhydric soils were not included in the calculations of carbon sequestration provided by wetlands, but instead were included in the calculations for carbon sequestration provided by forests. Because they have nonhydric or predominantly nonhydric soils, it was assumed that these land covers are only likely to be seasonally or temporarily saturated/inundated and are unlikely to accumulate peat. Therefore, these woody wetlands are not sequestering carbon at rates much differently from upland forests, so the sequestration rate for forests was applied to this land cover subcategory.

Shrublands

Shrublands are often transitional zones between grasslands and forests or can represent an intermediate stage in the ecological succession of a grassland to a forest. These areas generally consist of grasslands interspersed with shrubs. As these areas evolve into forests and the grassland species are gradually shaded out, the land cover change results in a reduction of carbon sequestration in these areas. This is because carbon storage shifts from being predominantly in the soil to being concentrated in the woody biomass of the trees. Research indicates that, on average, shrublands contain approximately 2 percent of the carbon budget found in forests (Chojnacky & Milton 2008). Consequently, it was assumed that the carbon sequestration rate in the aboveground woody biomass of shrublands is 3 percent of the sequestration rate of the region's forests. This value was then added to the carbon sequestration rate of grasslands to establish a specific shrubland carbon sequestration rate.

Wetlands

Woody and emergent herbaceous wetlands data was overlaid with NRCS hydric soils data from the Web Soil Survey. Soils with hydric components over 60 percent (hydric rating of 60 or above) are considered by NRCS to be "hydric" or "predominantly hydric," while soils with hydric components below 60 percent are considered "nonhydric" or "predominantly nonhydric." It was assumed that soils classified as hydric or predominantly hydric are more likely to be saturated or inundated throughout the year and are thus more likely to accumulate peat than soils classified as nonhydric or predominantly nonhydric. Therefore. the sequestration rate for peat-accumulating wetlands with woody biomass in the mid-South (13.4 MT CO_2/acre) reported by Mack et. al. (2017) was applied to areas with land cover classified by NLCD as Woody Wetlands that intersected soils mapped by NRCS as hydric or predominantly hydric. The sequestration rate for peat-accumulating herbaceous wetlands (2.3 MT CO_2/acre) reported by Mack et al. (2017) was applied to areas with land cover classified by NLCD as Emergent Herbaceous Wetlands.

Open Water

Though they occupy a smaller proportion of the landscape as compared to other carbon-storing habitats such as forests, open water features such as lakes and ponds are important carbon sinks (Mendonça et al. 2017; Taylor et al. 2019). Carbon typically enters ponds and reservoirs as inflows of organic material or dissolved inorganic carbon in surface water or through atmospheric exchange of carbon dioxide occurring at the air-water interface. Carbon obtained through photosynthesis can also enter a lake's water column through respiration by aquatic plants and algae (Balmer and Downing 2011). No studies conducted in Arkansas or in the central U.S. were found. However, Stackpoole et al. (2014) estimated that ponds and reservoirs in the eastern U.S, sequester approximately 0.046 MT CO_2/acre annually.

Barren Lands

The land use category consists of areas of bedrock, gravel pits, or other accumulations of earthen material. Because these areas contain little to no vegetation, carbon sequestration was assumed to be absent in areas covered by this category.

Croplands

Croplands represent very little of the land use of NWA. Olsson took the average of the results of three studies (Norman et. al. 2016; Amuri et. al. 2008; and Morrison & Brye 2021) conducted in cropland systems in eastern Arkansas to arrive at a carbon sequestration rate of 0.86 MT CO_2/acre annually for this land use category.

Developed Areas

NLCD divides the Developed Areas category into four subcategories based on the percentage of impervious surfaces versus vegetation cover (Dewitz 2021).

> **Developed, Open Space**: These are areas with a mixture of some constructed materials, but mostly vegetation. Vegetation accounts for 80-99 percent of total land cover of these areas, mostly in the form of trees and lawn grasses. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
>
> **Developed, Low Intensity**: These are areas with a mixture of constructed materials and vegetation, with vegetation accounting for 50 percent to 79 percent of total cover, mostly in the form of lawn grasses. These areas most commonly include single-family housing units.
>
> **Developed, Medium Intensity:** These are areas with a mixture of constructed materials and vegetation, with vegetation accounting for 20 percent to 49 percent of the total cover, mostly in the form of lawn grasses. These areas most commonly include single-family housing units.
>
> **Developed High Intensity:** These are highly developed areas where vegetation accounts for less than 20 percent of the total cover. These are areas where people reside or work in high numbers and include apartment complexes, row houses, and commercial/industrial complexes.

To determine the acreage of vegetated cover providing carbon sequestration for each land use category, the mean value of the percentage range of vegetated cover for each of the above subcategories was multiplied by the total acreage of land within the planning area occupied by that subcategory.

The percentage of land covered by forests and pastures within the Developed, Open Space land use subcategory is broadly representative of the percentage of land covered by forests (54 percent) and pastures (32 percent) in the planning area. Therefore, the vegetated land cover in the Developed, Open Space subcategory was further divided based on these percentages. The carbon sequestration rates for forests and pastures were then applied to these corresponding percentages to determine the amount of carbon sequestered annually for the Developed, Open Space land cover subcategory. For all other developed subcategories, only the sequestration rate for pastures was applied because lawn grasses are the dominant land cover for the vegetated areas in these subcategories.

The sequestration rates for each land cover category are listed in Table 2 below.

Table 2. Carbon Sequestration Rates by Land Cover Type.

Land Cover Category	National Land Cover Database Classification	Sequestration Rate (metric tons carbon dioxide/acre/year)
Grasslands	Herbaceous	5.96
	Emergent Herbaceous Wetlands that intersect NRCS-mapped nonhydric and predominantly nonhydric soils	
Pastures	Hay/Pasture/Lawn	2.08
Forests	Deciduous Forest	1.24
	Evergreen Forest	
	Mixed Forest	
	Woody Wetlands that intersect NRCS-mapped nonhydric and predominantly nonhydric soils	
Shrublands	Shrub/Scrub	5.98
Wetlands	Woody Wetlands that intersect NRCS-mapped hydric and predominantly hydric soils	13.40
	Emergent Herbaceous Wetlands that intersect NRCS-mapped hydric and predominantly hydric soils	2.30
Open Water	Open Water	0.05
Barren Lands	Barren Land	0
Croplands	Cultivated Crops	0.86
Developed Areas	Developed, Open Space	1.24 (54%)
		2.08 (32%)
	Developed, Low Intensity	2.08
	Developed, Medium Intensity	2.08
	Developed, High Intensity	2.08

To determine the acreage of vegetated cover providing carbon sequestration for each of the above land use categories, the acreage of each land use category within the planning area was multiplied by the sequestration rate for that category. The results for each land use category are shown in Figure 2 below.

3. RESULTS

The NWA GHG emissions regional inventory approximated a total of 8,781,347 metric tons of CO_2 for the year 2020. This approximated amount was broken up into the following sectors: electric power, transportation, agriculture, industry, commercial, and residential. The GHG emission inventory was derived from the EPA's NEI transportation data for the NWA region consisting of Benton, Madison, and Washington counties. City-level emissions data from Google's EIE and the City of Fayetteville and land cover data from NLCD informed adjustments made to the remaining sectors from the state-level emissions data from the EPA's GHG Inventory database. The percentage of emissions broken down by sector are shown in Figure 2 and are discussed below.

The *electric power sector* accounts for approximately 33 percent or 2,911,316 metric tons of the region's GHG emissions. This percentage includes emissions from electricity production used by other end-use sectors. In 2021, 60 percent of the country's electricity came from burning fossil fuels, mostly coal and natural gas (EIA 2022). This sector was slightly adjusted based on assumptions made for the agricultural sector.

The *transportation sector* accounts for approximately 28 percent or 2,470,208 metric tons of the region's GHG emissions. GHG emissions from this sector are mainly derived from burning fossil fuels for cars, trucks, and trains. More than 94 percent of the fuel used for transportation is petroleum based, which includes primarily gasoline and diesel (IPCC 2022). This sector was slightly adjusted based on assumptions made for the agricultural sector.

The *industry sector* accounts for approximately 20 percent or 1,764,434 metric tons of the region's GHG emissions. Emissions from industry primarily come from burning fossil fuels for energy and GHG emissions from certain chemical reactions necessary to produce goods from raw materials. This sector was slightly adjusted based on assumptions made for the agricultural sector.

The *commercial sector* accounts for approximately 9 percent or 793,995 metric tons of the region's GHG emissions, while the *residential sector* accounts for approximately 4 percent or 352,887 metric tons of the region's GHG emissions. Emissions from the commercial and residential sector include fossil fuels burned for heat, the use of gases for refrigeration and cooling

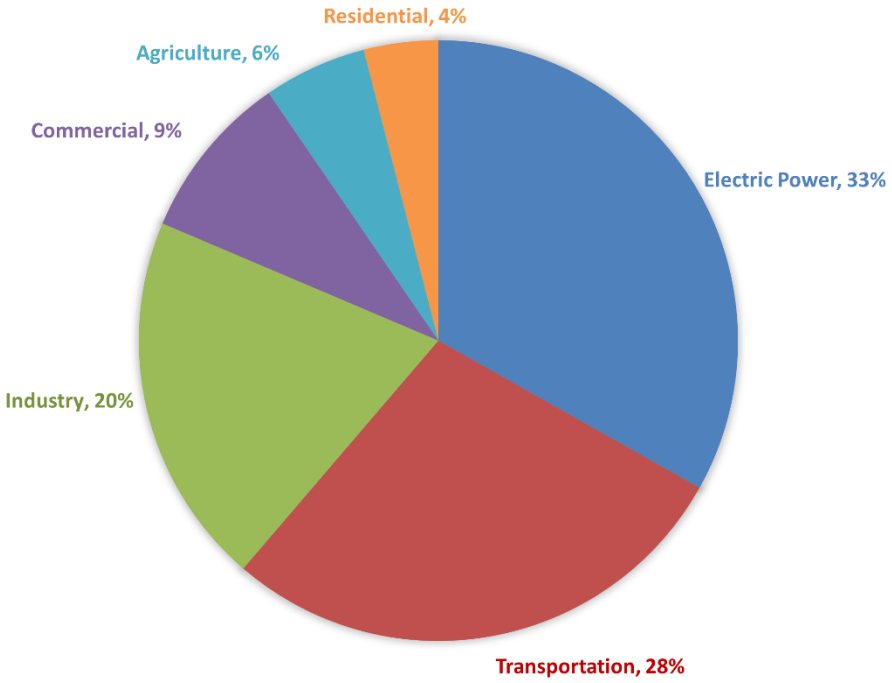

Figure 2. Percentage Greenhouse Gas Emissions in Northwest Arkansas by Sector.

in buildings, and nonbuilding-specific emissions such as the handling of waste. These sectors were also slightly adjusted based on assumptions made for the agricultural sector.

The *agricultural sector* accounts for approximately 6 percent or 488,507 metric tons of GHG emissions. Sources of agricultural GHG emissions include livestock, agricultural soils, and crop production. Approximately 89 percent of NWA is considered rural, and 11 percent is urban. In comparison, about 99 percent of Arkansas is rural and 1 percent is urban. Because NWA has a larger proportion of urban landscape compared to the state of Arkansas, with 36 percent (540,709 acres) of the rural land cover in NWA categorized as either cropland or pasture, estimated GHG emissions for the agricultural sector were reduced from the 21 percent of overall GHG emissions reported for the agricultural sector for the state of Arkansas to 2 percent for NWA. The remaining percentage points were then reallocated to the other sectors.

In addition, it was found that approximately 2,677,944 metric tons of CO_2 were sequestered in NWA in 2020. Most of the carbon is sequestered in the biomass and soils of forests (42 percent) and pastures (42 percent). The carbon sequestered by these land cover categories in NWA account for approximately 8 percent of total carbon sequestration in the state of Arkansas. The estimated carbon sequestration provided by each land cover category is listed in Table 3, and the percentages of the total carbon sequestration for each land cover category are shown in Figure 3 below.

Table 3. Carbon Sequestration in Northwest Arkansas by Land Cover Type in 2020.

Land Cover Category	Estimated Metric Tons of CO_2 Sequestered in 2020
Grasslands	107,886
Pastures	1,124,608
Forests	1,132,069
Shrublands	98,388
Wetlands	6,698
Open Water	1,457
Barren Lands	-
Croplands	28
Developed Areas	206,810
Total	**2,677,944**

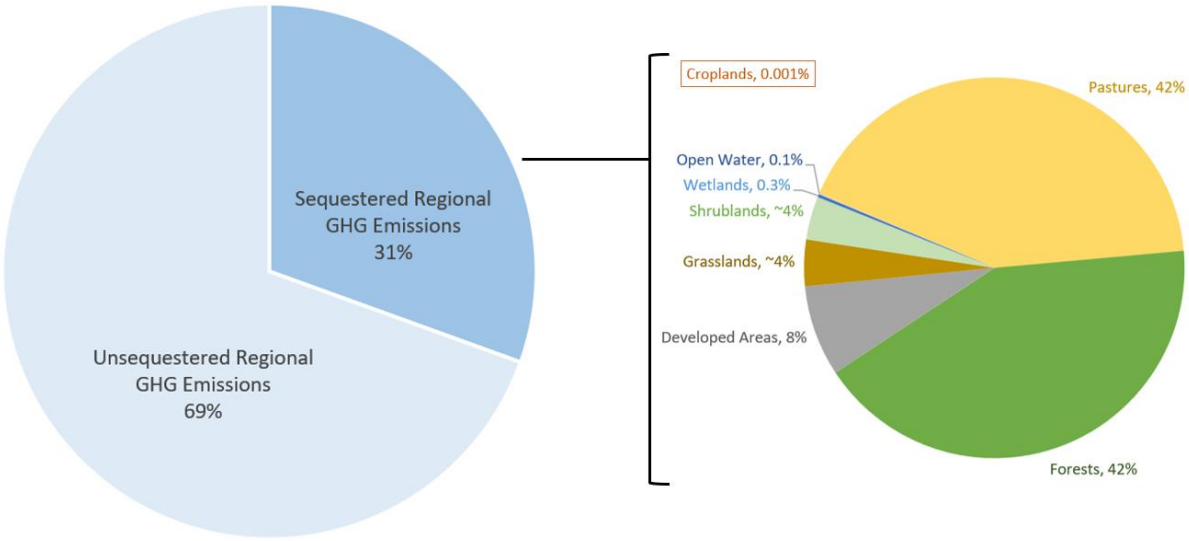

Figure 3. Percentages of Carbon Sequestration in Northwest Arkansas by Land Cover Category.

4. DISCUSSION

Though grasslands and wetlands typically provide much greater carbon storage potential than other land categories, these land categories cover significantly less area in NWA than forests and pastures, and therefore, provide less carbon sequestration than forests and pastures. However, carbon sequestration provided by pastures could be significantly improved if pastures are

converted to grasslands by replacing the nonnative forage grasses with native vegetation and removing foraging livestock. Existing carbon storage in grasslands and wetlands in NWA was not considered in this analysis; however, preservation of these land covers should be an important consideration because disturbance of these areas would release much of the carbon currently being stored back into the atmosphere.

Approximately 31 percent of the total GHGs emitted from sources in NWA were offset through carbon sequestration in the soil and vegetation of the various land cover categories in NWA discussed above. The difference in sequestered carbon and GHG emissions in NWA results in net GHG emissions in the region of 6,101,591 metric tons based on 2020 data. Therefore, preservation and improvement of existing significant carbon sinks in NWA coupled with a reduction of GHG emissions is a feasible pathway to reaching net zero emissions by 2050.

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NORTHWEST ARKANSAS REGIONAL GREENHOUSE GAS INVENTORY

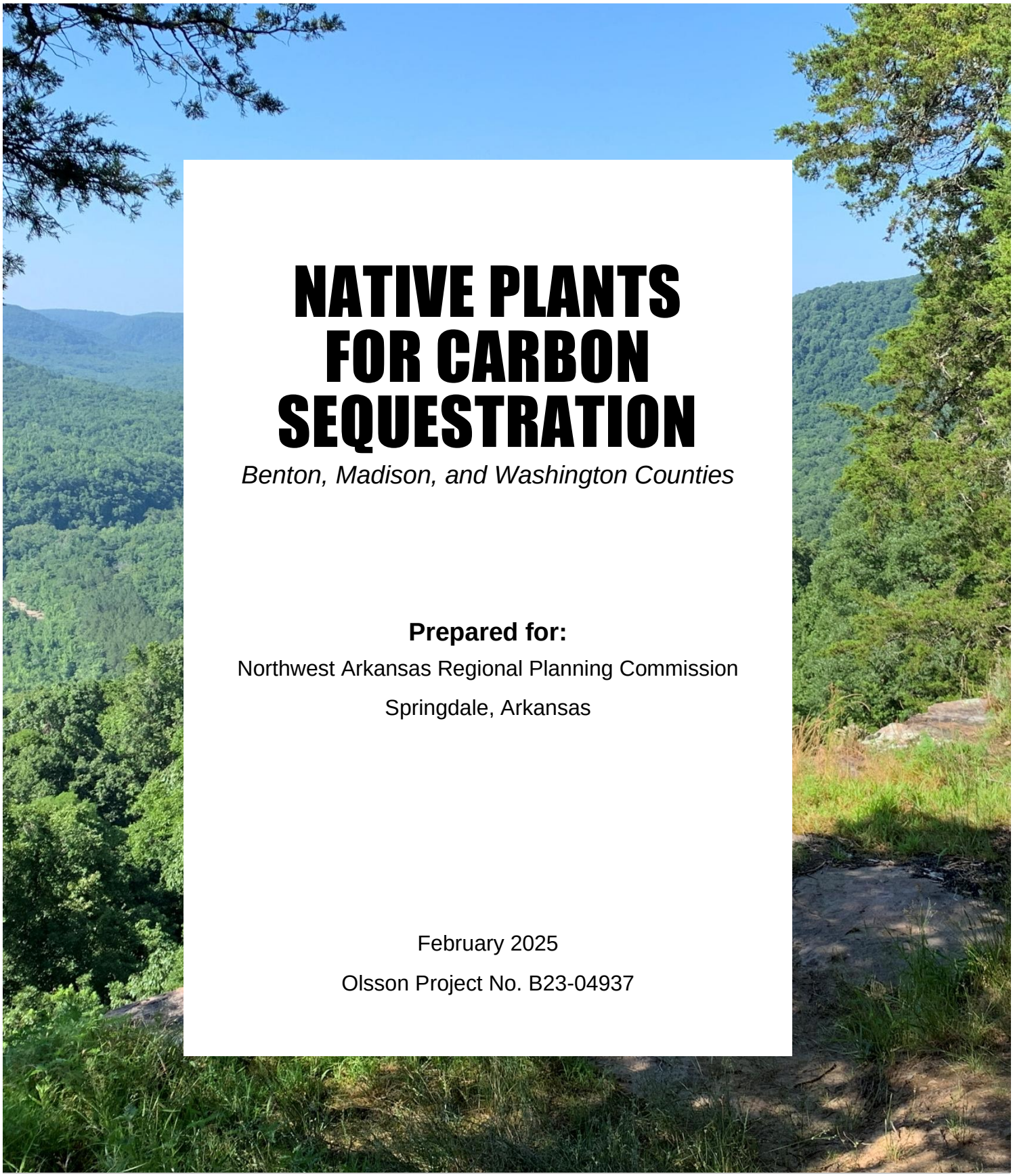
Benton, Madison, and Washington Counties

November 2024

Olsson Project No. B23-04937

Appendix D

Native Plants for Carbon Sequestration



NATIVE PLANTS FOR CARBON SEQUESTRATION

Benton, Madison, and Washington Counties

Prepared for:

Northwest Arkansas Regional Planning Commission

Springdale, Arkansas

February 2025

Olsson Project No. B23-04937

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1. INTRODUCTION

Nature-based carbon removal methods are most readily scalable of CO_2 removal methods. Reaching net zero will require both minimizing emissions and enhancing carbon removal in the region's ecosystems. Minimizing emissions from ecosystems must include the following:

- Protect existing ecosystems and their carbon stores by reducing ecological loss and degradation.
- Increase ecosystem resilience to minimize emissions released as a result of disturbances like natural hazards (Wiedinmyer and Hurteau 2010).

Enhancing natural carbon removal can be accomplished through the restoration, management, and creation of new ecosystems. Though afforestation is crucial, other ecosystems like wetlands and prairies are vital and deserve attention as well (Zickfeld and Canadell 2023; Seddon et al. 2020).

It should be emphasized that nature-based carbon removal methods are long-term investments, not quick fixes to reach net-zero goals. They require substantial land, water, and time to achieve carbon saturation. Ecosystem carbon accumulation takes time – trees planted today will sequester carbon for decades. Other ecosystems, like prairies and wetlands, continuously sequester carbon and won't saturate within relevant timescales if left undisturbed (Field and Mach 2017; Oxford Net Zero 2024).

Though older trees store more carbon, their sequestration capacity declines with age, and carbon can be rapidly lost as a result of disturbances. Carbon removal methods with short storage times or high disturbance risks (e.g. from development or natural hazards) are unsuitable for offsetting GHG emissions (Zickfeld and Canadell 2023).

Creating ecosystems with low resilience leads to unstable carbon stores. Therefore, carbon removal efforts should focus on creating natural systems that are ecologically resilient to environmental stressors and other natural hazards (e.g., drought, pests). These efforts include planting diverse, stress-tolerant native species instead of monocultures or nonnative species (Oxford Net Zero 2024).

2. SPECIES LISTS

Below are lists of native woody and herbaceous species that are native to Benton, Madison, and Washington Counties and that provide optimal carbon sequestration. These lists are not exhaustive, and the optimal species for a particular location may vary depending on specific site conditions, such as soil type, moisture levels, and sunlight exposure. Consulting with local experts, such as a forester or a native plant specialist, is highly recommended for site-specific recommendations.

2.1 Woody Species

Plants with large amounts of woody biomass are ideal for aboveground carbon sequestration and storage (Nowak 1993; Nowak and Crane 2000, 2002; McPherson et al. 2005). For trees, this includes native species with more than one of the following characteristics:

- Naturally long-lived so that carbon will be stored for a longer period
- Producing large quantities of woody biomass so that more carbon will be stored than would be in a species that produces less woody biomass (Nowak 1993; Nowak and Crane 2000, 2002; McPherson et al. 2005)
- Fast growth rate so that more carbon can be sequestered in a shorter amount of time than a slower-growing species (Enquist 2002)
- Large crowns and/or large leaf sizes so that photosynthetic activity and removal of carbon from the atmosphere would be optimized

A list of tree species that meet one or more of the above criteria and that are native to Benton, Madison, and Washington Counties are listed in Table 1 below.

Table 1. Native Tree Species for Optimal Carbon Removal

Scientific Name	Common Name	Scientific Name	Common Name
Acer negundo	boxelder	*Quercus falcata*	southern red oak
Acer rubrum	red maple	*Quercus imbricaria*	shingle oak
Acer saccharinum	silver maple	*Quercus macrocarpa*	bur oak
Acer saccharum	sugar maple	*Quercus marilandica*	blackjack oak
Betula nigra	river birch	*Quercus michauxii*	swamp chestnut oak
Carya cordiformis	bitternut hickory	*Quercus muehlenbergii*	chinquapin oak

Carya glabra	pignut Hickory
Carya illinoinensis	pecan
Carya ovata	shagbark hickory
Carya texana	black hickory
Carya tomentosa	mockernut hickory
Fagus grandifolia	beech
Juglans nigra	black walnut
Liquidambar styraciflua	sweetgum
Liriodendron tulipifera	tulip poplar
Nyssa sylvatica	black gum
Pinus echinata	shortleaf pine
Platanus occidentalis	American sycamore
Quercus alba	white oak
Quercus nigra	water oak
Quercus palustris	pin oak
Quercus phellos	willow oak
Quercus rubra	northern red oak
Quercus shumardii	Shumard oak
Quercus stellata	post oak
Quercus velutina	black oak
Salix nigra	black willow
Taxodium distichum	bald cypress
Ulmus americana	American elm
Ulmus rubra	slippery elm
Ulmus serotina	September elm

2.2 Herbaceous Species

Prairies are landscapes dominated by nonwoody herbaceous vegetation; grasslands contain approximately 12 percent of the world's terrestrial carbon stocks mostly occurring as belowground biomass. The fibrous root systems of most prairie vegetation species can extend several meters below the surface, often making up between 60-80 percent of the biomass carbon in these ecosystems (Ontl and Janowiak 2017). The soils beneath upland prairies can sequester more carbon than what is found in both the aboveground biomass and belowground soils of upland forests, combined. Soil carbon in prairie ecosystems appears to be related to plant biodiversity and the species richness of these landscapes (Chen et al. 2018; Yang et al. 2019; Pastore et al. 2021).

Herbaceous species that provide optimal carbon sequestration and storage include the following characteristics:

- Long-lived perennial species can store carbon for a longer period and can sequester more carbon over time than short-lived species,
- Fibrous root systems will sequester a greater amount of carbon into the soil than species with tap root systems.
- Deep root systems will sequester carbon deeper into the soil than shorter root systems.

2.2.1 Grasses

Warm-season grasses can sequester a significantly greater amount of carbon into their belowground biomass than cool-season grasses because of their higher rates of photosynthesis and efficient water use (Fornara and Tilman 2008; Spiesman et al. 2018). A list of perennial warm season grass species that are native to Benton, Madison, and Washington Counties are listed in Table 2 below.

Table 2. Warm Season Perennial Grass Species Native to Northwest Arkansas

Scientific Name	Common Name	Scientific Name	Common Name
Agrostis perennans	upland bentgrass	*Panicum capillare*	witchgrass
Andropogon gerardii	big bluestem	*Panicum flexile*	wiry panicgrass
Andropogon glomeratus	bushy bluestem	*Panicum philadelphicum*	Philadelphia panicgrass
Andropogon gyrans	Elliott's bluestem	*Panicum rigidulum*	redtop panicgrass
Andropogon ternarius	splitbeard bluestem	*Panicum virgatum*	switchgrass
Andropogon virginicus	broomsedge bluestem	*Paspalum boscianum*	bull crown grass
Aristida purpurascens	arrowfeather threeawn	*Paspalum distichum*	knotgrass
Bothriochloa laguroides	silver beard grass	*Paspalum floridanum*	Florida paspalum
Bouteloua curtipendula	sideoats grama	*Paspalum laeve*	field paspalum
Chasmanthium sessiliflorum	longleaf woodoats	*Paspalum pubiflorum*	four-rowed bead grass
Chloris verticillata	windmillgrass	*Paspalum setaceum*	hairy beadgrass
Coelorachis cylindrica	Carolina jointgrass	*Saccharum alopecuroides*	silver plumegrass
Digitaria cognata	fall witch grass	*Schedonnardus paniculatus*	tumblegrass
Eragrostis hirsuta	bigtop lovegrass	*Schizachyrium scoparium*	little bluestem
Eragrostis intermedia	plains lovegrass	*Setaria parviflora*	bristlegrass
Eragrostis spectabilis	purple love grass	*Sorghastrum nutans*	Indiangrass
Gymnopogon ambiguus	bearded skeletongrass	*Spartina pectinata*	prairie cordgrass

Leptochloa fusca	bearded sprangletop
Muhlenbergia capillaris	hairawn muhly
Muhlenbergia schreberi	nimblewill
Muhlenbergia sobolifera	rock muhly
Muhlenbergia sylvatica	woodland muhly
Panicum anceps	beaked panicgrass
Panicum brachyanthum	prairie panicgrass

Sporobolus clandestinus	rough dropseed
Sporobolus compositus	tall dropseed
Sporobolus cryptandrus	sand dropseed
Tridens flavus	purpletop
Tridens strictus	longspike tridens
Tripsacum dactyloides	eastern gamagrass

2.2.2 Legumes

Growing warm-season grasses in combination with legumes that sequester atmospheric nitrogen have been shown to increase the rate of capture and storage of carbon into the soil (Yang et al. 2019). A list of legume species that are native to Benton, Madison, and Washington Counties are listed in Table 3 below.

Table 3. Legume Species Native to Northwest Arkansas

Scientific Name	Common Name
Acaciella angustissima	prairie acacia
Amphicarpaea bracteata	American hog-peanut
Apios americana	American groundnut
Astragalus canadensis	Canadian milkvetch
Astragalus crassicarpus	ground plum
Astragalus distortus	Ozark milkvetch
Astragalus nuttallianus	smallflower milkvetch
Chamaecrista fasciculata	partridge pea

Scientific Name	Common Name
Desmodium paniculatum	panicled-leaf tick-trefoil
Desmodium perplexum	perplexed tick-trefoil
Desmodium rotundifolium	round-leaved trailing tick-trefoil
Desmodium sessilifolium	sessileleaf tick-trefoil
Galactia volubilis	downy milkpea
Lathyrus venosus	veiny pea
Orbexilum pedunculatum	Sampson's snakeroot
Phaseolus polystachios	thicket bean

Chamaecrista nictitans	sensitive partridge pea
Clitoria mariana	butterfly pea
Dalea candida	white prairie clover
Dalea purpurea	purple prairie clover
Desmanthus illinoensis	Illinois bundleflower
Desmodium canescens	hoary ticktrefoil
Desmodium ciliare	hairy small-leaved tick-trefoil
Desmodium cuspidatum	large-bracted tick-trefoil
Desmodium illinoense	Illinois tick-trefoil
Desmodium laevigatum	smooth tick-trefoil
Desmodium marilandicum	smooth small-leaved tick-trefoil
Desmodium nuttallii	Nuttall's tick-trefoil
Desmodium obtusum	stiff tick-trefoil
Rhynchosia latifolia	prairie snoutbean
Senna marilandica	wild senna
Senna obtusifolia	American sicklepod
Strophostyles helvola	annual sand bean
Strophostyles leiosperma	slickseed fuzzybean
Strophostyles umbellata	pink fuzzybean
Stylosanthes biflora	pencil flower
Tephrosia virginiana	goat's rue
Trifolium carolinianum	Carolina clover
Trifolium reflexum	buffalo clover
Vicia caroliniana	wood vetch
Vicia minutiflora	smallflower vetch
Wisteria frutescens	American wisteria

3. CONCLUSION

To optimize carbon sequestration in environmental restoration, conservation, or preservation projects where carbon removal is the primary focus, planting or conserving species that provide optimal carbon sequestration should be prioritized. In doing so, Northwest Arkansas can improve its carbon removal efforts and contribute to a healthier environment for residents.

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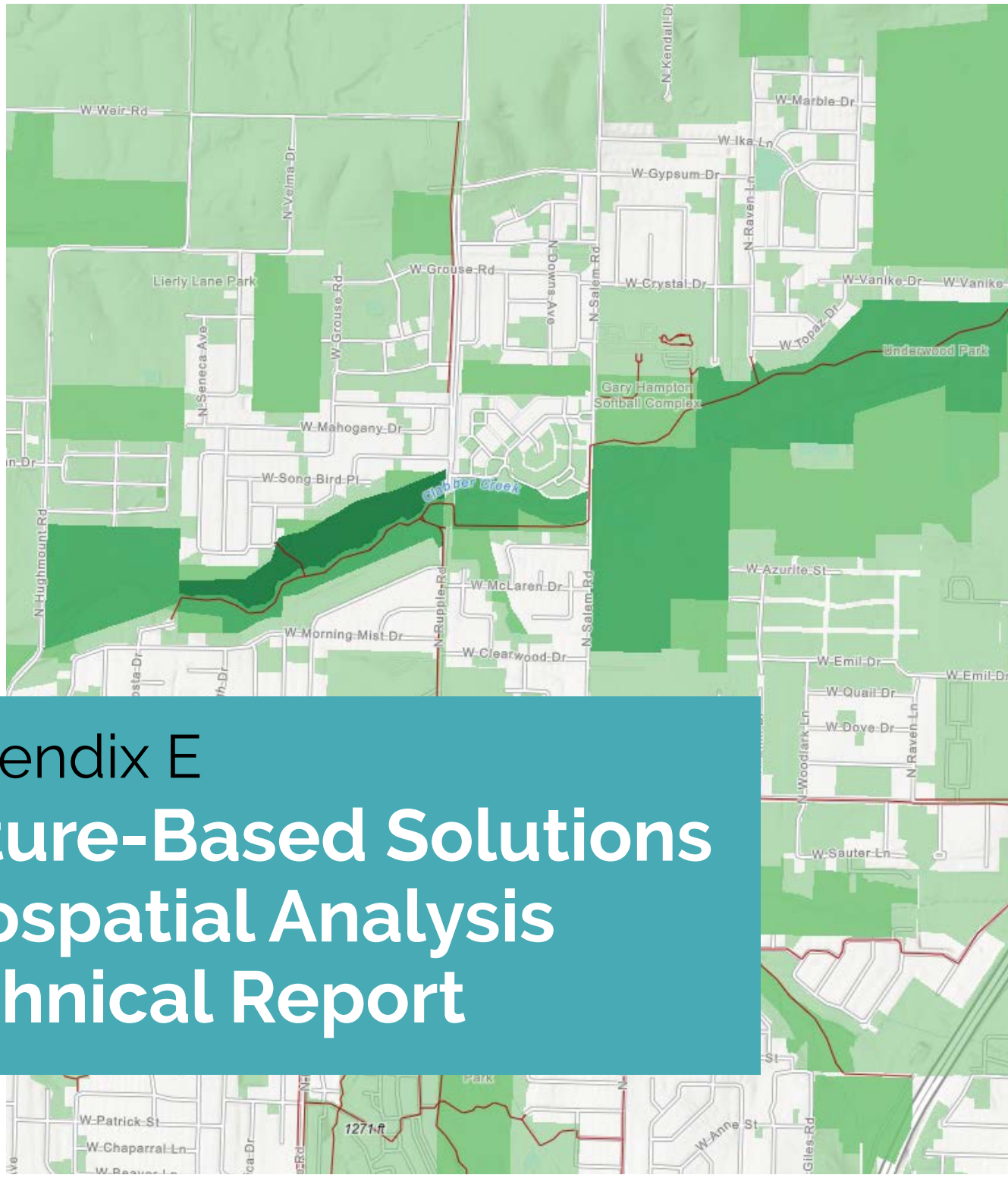
NATIVE PLANTS FOR CARBON SEQUESTRATION

Northwest Arkansas Regional Planning Commission

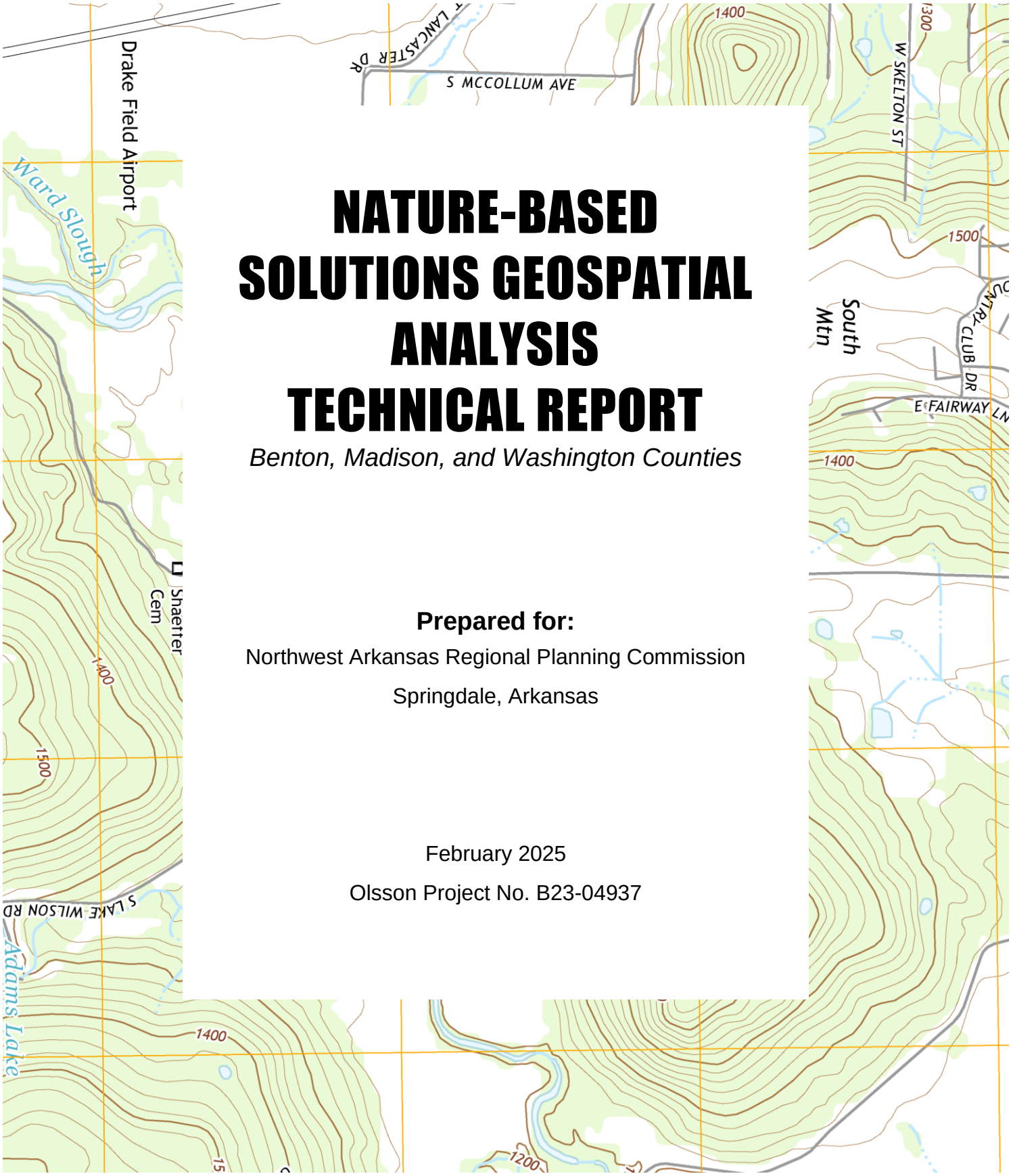
February 2025

Olsson Project No. B23-04937



Appendix E

Nature-Based Solutions Geospatial Analysis Technical Report



NATURE-BASED SOLUTIONS GEOSPATIAL ANALYSIS TECHNICAL REPORT

Benton, Madison, and Washington Counties

Prepared for:

Northwest Arkansas Regional Planning Commission

Springdale, Arkansas

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1.0 INTRODUCTION

Natural infrastructure, comprising a diverse array of natural features such as wetlands, forests, and riparian areas, plays a vital role in the well-being of Northwest Arkansas. These ecosystems provide a range of critical services, including flood protection, water purification, and urban cooling during the hot summer months. However, the extent and condition of natural infrastructure within the region is increasingly threatened by population growth and urban sprawl.

The Northwest Arkansas Regional Planning Commission (NWARPC) strives to improve environmental quality in the region to ensure a bright future for its residents. As part of this effort NWARPC contracted with Olsson to conduct a geospatial analysis to better understand the distribution, condition, and vulnerability of natural infrastructure across Northwest Arkansas. By mapping and analyzing these crucial assets, we can gain valuable insights into how to best protect, restore, and enhance these invaluable natural resources for the benefit of both people and the environment.

2.0 NATURE-BASED SOLUTIONS

Northwest Arkansas faces a growing number of environmental challenges, including flash flooding, streambank erosion, water pollution, and declining air quality. These stressors not only affect the region's natural ecosystems but also pose significant threats to human well-being and quality of life. Though traditional approaches to environmental management often rely on engineered solutions, this section will explore the potential of nature-based solutions to address these challenges. By harnessing the power of natural processes, such as wetland restoration or reforestation, we can create more resilient and sustainable ecosystems while simultaneously enhancing human well-being. This approach offers a promising pathway for Northwest Arkansas to achieve its environmental and socioeconomic goals.

2.1 Environmental Challenges in Northwest Arkansas

Environmental stressors and extreme weather can have both direct and indirect impacts on the residents and natural resources of Northwest Arkansas; many of the direct impacts to the region’s natural resources will have an indirect impact on residents’ well-being and quality of life.

Heavy Precipitation

When precipitation falls from the sky, it must go somewhere. Under natural conditions, most precipitation infiltrates the soil, where it can be taken up by plants or can recharge groundwater supplies. Different factors contribute to the ability of the soil to absorb stormwater, including soil texture, soil saturation, storm intensity, land cover, and ground slope. Stormwater that is unable to infiltrate the soil must move laterally on the ground surface as runoff.

Impervious surfaces such as roads, buildings, and parking lots are examples of land covers that prevent stormwater from soaking into the ground. As watersheds are urbanized, much of the vegetation is replaced by these impervious surfaces and stormwater runoff increases and arrives at local streams much more quickly, resulting in an increased likelihood of more frequent and severe flooding. The quantity and speed of stormwater runoff is lower in natural areas where more of the stormwater can soak into the soil (Paul and Meyer 2001).

A certain amount of stormwater runoff can be managed by the region's gray infrastructure, which includes curbs, gutters, drains, pipes, and culverts that are designed to move stormwater away from the built environment. However, excessive amounts of stormwater runoff from heavy precipitation events can exceed the capacity of gray infrastructure, resulting in flash flooding and negative impacts to the residents of Northwest Arkansas (Boyett and Lee 2022; Early 2021; Smith 2022).

Impacts from heavy precipitation and stormwater runoff to the natural resources of the region include an increase in stream bank erosion, damage to riparian zones, and landslides (University of Arkansas 2018; Kusler 2006), resulting in a loss of land, habitat, and existing carbon stocks. Lakes, wetlands, and other waterbodies in the region would also see an increase in sedimentation and nutrient loading from runoff originating from agricultural fields and construction sites, which will negatively affect water quality (AGFC 2015; ASWM 2015; Kusler 2006).

Drought

During droughts, the region experiences greater fluctuations in the availability of both surface and groundwater. These droughts could limit access to water for wildlife and livestock and affect the availability and quality of the drinking water supplies in the region (University of Arkansas 2018).

Reduced groundwater recharge during droughts (Kusler 2006) would result in the water table dropping below the beds of intermittent streams for longer periods during the dry season, causing these streams to go dry for longer periods of time. Perennial streams would also likely see lower

flow levels during the dry season and may also go completely dry during periods of extreme drought (National Research Council 1995; Mitsch and Gosselink 2015). Aquatic ecosystems would undergo substantial impacts during droughts (Meyer et al. 1999; AGFC 2015).

Wetlands are also expected to be negatively affected by droughts that would result in a reduction of water coverage and changes to surface hydrology (Christie and Kusler 2009). Seasonal wetlands and ephemeral ponds, which rely on hydrological contributions from precipitation during the wet seasons, and herbaceous wetlands would especially be at risk for impacts such as a contraction in their size and hydrological duration and a deterioration of the quality of habitat they provide to wildlife (AGFC 2015; ASWM 2015).

A dryer landscape will also affect terrestrial vegetation, including vegetation found in riparian buffers along the edges of waterbodies. As trees and other vegetation shed their leaves or perish during drought, the risk for wildfires will increase. A reduction in canopy coverage would also exacerbate the urban heat island effect because less shade will be provided (University of Arkansas 2018). Mesic forests would be especially at risk to changes in species composition; many tree species typically associated with these habitats would be expected to decrease (Brandt et al. 2014) and be replaced by more drought-tolerant species (AGFC 2015).

Warmer Temperatures

Warmer temperatures will result in an increase in the evapotranspiration rate of water from the soil, plants, and other surfaces, resulting in dryer conditions (Kunkel et al. 2013; Carter et al. 2014), reduced stream flows, and altered hydrology (Meyer et al. 1999; AGFC 2015; Kusler 2006), further exacerbating the effects of drought and risk of wildfires (University of Arkansas 2018).

Warmer temperatures are also expected to affect residents of Northwest Arkansas by increasing energy costs associated with cooling homes and buildings and increasing the susceptibility of residents to heat-related illnesses (University of Arkansas 2018). Warmer temperatures will increase tick and mosquito populations, which may put residents at greater risk for diseases transmitted by these vectors (University of Arkansas 2018).

Warmer air temperatures would contribute to a rise in water temperatures and reduced levels of dissolved oxygen, affecting aquatic ecosystems (AGFC 2015; ASWM 2015). Temperature increases will cause northerly, and upslope shifts in the ranges for many plant and animal species that have a narrow tolerance for changes in air and water temperatures. Under natural, unfragmented conditions, many species can migrate unhindered with the rising temperatures.

Today, these migrations are often obstructed by dams, traffic, neighborhoods, or other impediments. These restrictions could potentially have a devastating impact on rare and endangered species that are sensitive to small temperature changes if there are no alternative habitats nearby for them to migrate to (Kusler 2006).

Impacts on terrestrial ecosystems from warmer temperatures include a decrease in biodiversity resulting from stress to vegetation and limited food and water resources for wildlife, which is further exacerbated by the fragmentation of natural areas from urban development (University of Arkansas 2018). Extreme heat during the summer months is expected to result in a decrease in basal area and canopy cover of urban trees, creating favorable conditions for the spread of invasive species from subtropical regions and increasing pest outbreaks (AGFC 2015), and further decreasing the biodiversity of native species.

2.2 The Role of Nature-based Solutions

Nature-based solutions are actions that use natural processes and features to address societal, economic, and environmental challenges through the protection, restoration, and sustainable management of natural and modified ecosystems, simultaneously benefiting people and nature (IUCN 2023).

By protecting, restoring, and sustainably managing ecosystems, nature-based solutions offer a win-win approach. They address environmental challenges while simultaneously improving human lives and safeguarding the natural world.

Nature-based solutions also recognize the interconnectedness of humans and the natural world. By integrating nature into urban areas, nature-based solutions can harness the natural functions of ecosystems to provide essential services for people, such as clean air and water, while also conserving biodiversity (FEMA 2025, Chol et al. 2023).

Benefits of nature-based solutions include cleaner air, cooler cities, and healthy ecosystems. Nature-based solutions can be a cost-effective way to protect people and property, reduce vulnerabilities to risks from disasters and environmental stressors, while also improving sustainability and resilience by enhancing human well-being and biodiversity.

A joint report by the International Federation of Red Cross and Red Crescent Societies (IFRC) and the World Wide Fund for Nature (WWF) found that nature-based solutions could reduce the

intensity of environmental stressors and weather-related hazards by 26 percent (IFRC and WWF 2022).

Often the following two-pronged approach is recommended for protecting and improving environmental quality with nature-based solutions:

1. **Adaptation**: Adapting to environmental stressors and extreme weather,
2. **Mitigation**: Reducing and stabilizing the levels of greenhouse gases (GHGs) and their co-pollutants in the atmosphere.

Adaptation

Healthy ecosystems provide important ecosystem services that can help society adapt to extreme weather events and environmental challenges. Nature-based solutions for adaptation focus on benefits that humans derive from biodiversity and ecosystem services and how these benefits can be used for managing risk from environmental impacts. Nature-based solutions for adaptation include conservation measures and the restoration of ecosystems to reduce the vulnerability of people and the ecosystem. These measures can be implemented on their own or in combination with gray infrastructure (such as low-impact development principles or ecologically friendly landscaping practices).

Mitigation

Nature-based solutions for mitigation include measures that decrease GHG emissions from deforestation, soil disturbance, and land use and measures that sequester and store carbon dioxide (CO_2) from the atmosphere. These actions include protecting high-value natural areas from degradation, restoring natural areas that have already been degraded, and managing urban and rural natural areas sustainably. Mitigation strategies are essential for rapidly cutting GHG emissions and removing CO_2 from the atmosphere to protect environmental quality in Northwest Arkansas.

2.3 Natural Infrastructure for Nature-based Solutions

Many of the natural resources in Northwest Arkansas provide opportunities for nature-based solutions that can help buffer the impacts to residents from the environmental stressors described above. Though extreme weather can also affect the region’s natural resources, these impacts can be reduced and buffered through the fostering of healthy ecosystems.

In this analysis, the natural resources in Northwest Arkansas were assessed through the lenses of adaptation (ecosystem services and ecosystem resilience) and mitigation (carbon sequestration and storage). Below, the landscape features in the region that comprise the natural infrastructure for nature-based solutions are discussed as they relate to these two categories.

2.3.1 Ecosystem Services

Ecosystem services refer to the benefits that the natural environment provides to humans. The landscape features discussed below provide ecosystem services for adaptation to the impacts from flooding, drought, and extreme heat.

Wetlands, Ponds, and Reservoirs

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions (Mitsch and Gosselink 2015). In Northwest Arkansas, wetlands can be found in prairies, in forests, and along the edges of waterbodies such as streams, lakes, and ponds.

Wetlands play an important role in the landscape by acting as natural sponges, capturing and absorbing stormwater runoff. This allows stormwater to remain on the landscape for more time before it is gradually released downstream after peak flows have passed. Wetlands help reduce the frequency and intensity of floods by absorbing and storing significant amounts of stormwater during heavy precipitation events (EPA 1993; National Research Council 1995; Mitsch and Gosselink 2015). The cumulative presence of wetlands, ponds, and reservoirs within a watershed can reduce flood flows during heavy precipitation events (Davies 2016).

Wetland vegetation also helps slow the speed of flood waters and spread it out over the floodplain. This velocity dissipation combined with the capture and storage of stormwater lowers flood heights and reduces erosion (National Research Council 1995; Mitsch and Gosselink 2015). Wetlands located within and downstream of urban areas where impervious surfaces such as pavement and buildings increase the rate and volume of stormwater runoff are particularly valuable in reducing flash flooding (EPA 2002).

Like wetlands, ponds and reservoirs also contribute to the storage of stormwater runoff as surface water. Storing stormwater on the landscape, even temporarily, allows more time for this water to infiltrate the soil and to recharge groundwater supplies and reduce the effects of drought on the landscape (Mitsch and Gosselink 2015). Surface water that is retained on the landscape in wetlands, ponds, and reservoirs also provides locations where people and wildlife can seek relief

from extreme heat by submerging themselves to cool off. Groundwater recharge helps to sustain perennial and intermittent stream flows during dry periods and supports subterranean aquatic ecosystems (National Research Council 1995; Mitsch and Gosselink 2015).

These waterbodies provide additional benefits for water quality when stormwater runoff is slowed down or contained, providing more time for the sediment to settle out of the water column, which reduces turbidity levels of downstream aquatic ecosystems. Turbidity levels that are too high can be detrimental to aquatic ecosystems by reducing the amount of sunlight that can penetrate the water column, making it difficult for aquatic plants and algae to carry out photosynthesis and grow. This reduction in photosynthetic activity results in a reduction in dissolved oxygen levels in the water, and when dissolved oxygen levels are too low, it becomes difficult for aquatic organisms to breath. High turbidity can also lead to fine sediment particles lodging in the gills of fish, which can make it difficult for these organisms to breath (EPA 2021).

The water storage provided by wetlands, reservoirs, and ponds also has the beneficial effect of reducing the intensity of stream flows that would normally result from heavy precipitation events, and thus reduces property damage and risks to human life from flooding and streambank erosion and other damage to riparian zones (National Research Council 1995; Mitsch and Gosselink 2015). A reduction in erosion of streambanks helps to reduce turbidity in aquatic ecosystems and reduces the amount of sediment entering local reservoirs, such as Beaver Lake.

Stormwater runoff often carries contaminants that can be harmful to water quality and can affect our drinking water sources. Wetlands act as natural filters by breaking down organic contaminants found in stormwater runoff and improving the water quality of nearby rivers, streams, and reservoirs by eliminating many pollutants before they reach these waterbodies. Through cycles of wetting and drying, combined with the action of bacteria and plants that live in these habitats, wetlands can sequester, alter, and/or assimilate contaminants such as excess nutrients, heavy metals, pesticides, and petroleum products (National Research Council 1995; Mitsch and Gosselink 2015). Wetlands also improve local drinking water sources and reduce the costs of water treatment.

Riparian Buffers

Riparian buffers consist of the natural vegetation found along the edge of a stream, lake, or reservoir. These features reduce the effects of heavy precipitation and flooding by helping to slow down and disperse stormwater runoff, thereby improving soil infiltration and reducing the intensity

of stream flows from heavy precipitation events. The roots from riparian vegetation not only helps to facilitate soil infiltration of stormwater, they also provide soil stabilization of streambanks, increasing the streambanks' resistance to erosion (National Research Council 2002; Mayer et al. 2006).

Pervious Surfaces

As discussed above, when stormwater is allowed to infiltrate the soil, less runoff is created. Thus, pervious surfaces are beneficial for reducing the impacts of runoff from heavy precipitation (USGS 2018).

Tree Canopy

Tree canopy also helps reduce impacts from high temperatures by providing shade, which reduces ground surface temperatures. This shade supports local cooling (Shashua-Bar and Hoffman 2000; EPA 2014) and helps to mitigate the effects of extreme heat and reduces energy use (Akbari et al. 1997; Akbari 2002; Donovan and Butry 2009; EPA 2013; Hsieh et al. 2018). In addition, urban trees absorb stormwater, helping to reduce stormwater runoff and flash flooding (Bartens et al. 2009; EPA 2013). Lower ground surface temperatures also reduce the evapotranspiration rate of soil moisture and surface water, buffering the impacts from drought.

2.3.2 Ecosystem Resilience

For natural infrastructure to provide optimal ecosystem services, the ecological integrity of these areas should at a minimum be maintained but also improved where possible to assure that the landscape can support a diversity of native plant and wildlife species. Managing these natural areas to be resilient to environmental stressors and extreme weather will allow residents to reap the greatest benefits of the ecosystem services that these areas provide. The landscape characteristics discussed below provide ecosystem resilience for adaptation to environmental stressors caused by flooding, drought, and extreme heat.

Biodiversity

Ecologically resilient sites are those that can continue to support biological diversity, productivity, and ecological function as they encounter environmental stressors and extreme weather (Anderson et al. 2019). As an ecosystem experiences internal or external stressors, species that may fill a particular niche in that ecosystem can become locally extinct. However, ecosystems that are biologically diverse are more likely to contain species that possess traits that replace the

ecological niche provided by the locally extinct species, conferring resilience to that ecosystem and enabling it to adapt to a changing environment. Such species buffer the ecosystem against the loss of other species from environmental stressors and extreme weather (Yachi and Loreau 1999). These species can reduce the recovery time of the ecosystem and allow a species once locally extinct to reappear so its original niche in that ecosystem is restored. Thus, biodiversity and the conservation of biodiverse ecosystems play a critical role in maintaining ecosystem resilience (Vasiliev 2022).

Topographic Diversity

Ecologically resilient sites are those that contain topographic diversity (Beier et al. 2015; Anderson and Ferree 2010). Diverse landscapes can consist of topographic variability, variety in soil types, or a complex network of wetlands and uplands. This diversity creates microclimates and provides a variety of habitat options for resident species (Anderson et al. 2019).

Sites with high microclimate diversity provide temperature and moisture options that can buffer their resident species from the effects of extreme weather and allow plants and animals to persist locally, even while the regional climate becomes unsuitable. Thus, sites with a high diversity in microclimates have the effect of slowing down the rate of change in the species composition of the region (Anderson et al. 2019).

Habitat Connectivity

Wildlife corridors and habitat connectivity are also essential for maintaining regional biodiversity and ecosystem resilience so that plant and animal populations can take advantage of microclimate options without their movements being restricted by human development (Naiman et al. 1993; Anderson et al. 2019).

When habitat connectivity is present, plant and animal populations can move gradually in response to environmental stressors. For example, a population may move upslope toward higher elevations in response to temperature changes or downslope in response to moisture changes (Anderson et al. 2019). Urban development fragments natural infrastructure, making ecosystems less resilient and causing the populations of many local species to struggle, especially in riparian zones.

2.3.3 Carbon Sequestration and Storage

Carbon sequestration refers to the processes by which carbon is removed from the atmosphere and stored in liquid or solid form. As a mitigation measure, it’s estimated that nature-based

solutions can account for up to 37 percent of the carbon sequestration needed to keep average global temperatures from increasing 2 degrees Celsius (C) by 2030 (IPBES 2019) and 20 percent of the carbon sequestration needed to keep average global temperatures from increasing 2 degrees C by 2050 (Griscom et al. 2017).

Plants sequester carbon into their biomass through photosynthesis. By absorbing CO_2 from the atmosphere through their leaves, plants use water (H_2O) taken up from the soil through their roots and energy from sunlight to create glucose ($C_6H_{12}O_6$). This glucose is then used by the plant to carry out its physiological processes, resulting in the storage of carbon from the atmosphere in the plant's biomass. Herbaceous biomass such as leaves or nonwoody stems only stores carbon temporarily, typically for one growing season. Woody biomass such as tree trunks, roots, and branches can store carbon for the lifetime of the plant.

Different factors can determine how well a plant can sequester carbon, how much carbon it's able to store, and for how long. Tree species with the following characteristics provide optimal carbon sequestration and storage in their aboveground biomass:

1. Species that are naturally long-lived store carbon for a longer period than short-lived species.
2. Species that produce greater quantities of woody biomass can store a greater amount of carbon than species that produce smaller amounts of woody biomass (Nowak 1993; Nowak and Crane 2000 and 2002; McPherson et al. 2005).
3. Species with a fast growth rate can sequester more carbon in a shorter amount of time than slower-growing species (Enquist 2002).
4. Species with large crowns and large leaf sizes have greater photosynthetic capacity and can remove more carbon from the atmosphere than species with small crowns and small leaf sizes.

Some herbaceous species can sequester and store a significant amount of carbon in their belowground biomass. Species with the following characteristics provide optimal carbon sequestration and storage belowground in their root systems:

1. Long-lived perennial species store carbon for a longer period than annuals, biennials, or short-lived perennials.
2. Species with deep fibrous root systems produce more belowground biomass and store a greater amount of carbon belowground than species with tap root systems.

Examples of short root systems include those found in species with annual or biannual life cycles and species with rhizomatous or tuberous root systems.

3. Warm-season grasses have higher rates of photosynthesis and use water more efficiently and so can sequester a significantly greater amount of carbon into their belowground biomass than can cool-season grasses. (Fornara and Tilman 2008; Spiesman et al. 2018).
4. Warm-season grasses growing in combination with legumes that sequester atmospheric nitrogen have been shown to increase the rate of capture and storage of carbon into the soil (Yang et al. 2019).

The habitat types discussed below contain species with many of the characteristics discussed above or possess other characteristics that provide optimal carbon sequestration and storage benefits. Because of the variation in these characteristics across the landscape, some habitats can sequester carbon better than others or store more carbon than others. The carbon sequestration processes described for each of the below habitats are illustrated in **Figure 1**.

<u>Upland Forests</u>

Forest communities that contain plants with large amounts of woody biomass, such as trees, are ideal for aboveground carbon sequestration and storage (Nowak 1993; Nowak and Crane 2000 and 2002; McPherson et al. 2005). However, there is a limit to how much carbon upland forests

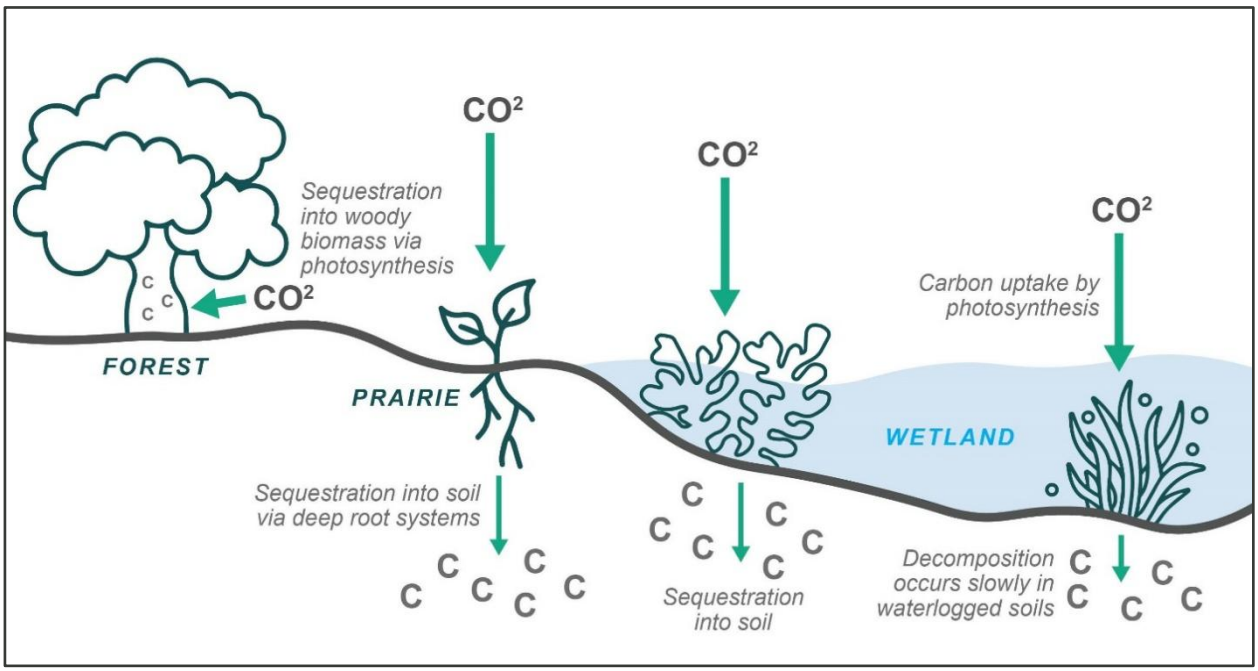

Figure 1. How Carbon is Sequestered and Stored in Different Landscapes.

can store because of the limits to both the lifespan and sizes to which the trees can grow (Zhu et al. 2018; Forrester 2020). Furthermore, because of the space constraints in urban settings, urban trees are better suited to be used as adaptation measures that help urban residents cope with extreme weather, rather than as mitigation measures that aim to remove atmospheric carbon. As a mitigation measure, carbon sequestration and storage in forests is more effective when implemented on large spatial areas where the trees can be maintained for a long period of time (Pataki et al. 2021). Therefore, the protection of existing forests and other high carbon-storing ecosystems is a more effective mitigation measure than planting new trees in small numbers (Forrester 2020).

Upland Prairies

Once covering an estimated seven to ten million acres across the southeastern U.S., prairies have suffered a loss exceeding 99 percent of their original distribution (Southeastern Grasslands Initiative 2023). Dominated by nonwoody herbaceous vegetation such as warm season grasses grasses, prairies contain approximately 12 percent of the world's terrestrial carbon stocks mostly occurring as belowground biomass. The fibrous root systems of most prairie vegetation species can extend several meters below the surface, often making up between 60-80 percent of the biomass carbon in these ecosystems (Ontl and Janowiak 2017). Roots of prairie species contribute carbon to the soil through exudates (Panchal et al. 2022) and through decomposition following root senescence. The turnover rate of carbon in the soil is much slower than in aboveground vegetation. Because of this slow turnover rate and the high quantity of biomass associated with prairie vegetation species, the soils beneath upland prairies can store significantly more carbon than what is found in both the aboveground biomass and belowground soils of upland forests combined (Prentice et al. 2001).

Soil carbon storage in prairie ecosystems appears to be related to plant biodiversity and species richness of these landscapes (Chen et al. 2018; Yang et al. 2019; Pastore et al. 2021) and increases significantly beneath plant communities consisting of C_4 grasses and legumes (Yang et al. 2019). Many nonnative forage and turf grasses have shallow roots and don't sequester or store very much carbon in their belowground biomass or in the soil. Therefore, restoring pastures dominated by these nonnative grasses, especially pastures containing relict nabkha mounds, to prairie ecosystems offers an effective mitigation measure for removing GHGs and co-pollutants from the atmosphere.

Though carbon sequestration in prairie soils occurs more slowly than in the aboveground biomass of forests, the quantity of carbon that can be stored in prairie soils is far greater (Prentice et al. 2001). Therefore, the protection of existing carbon stocks beneath prairie remnants can be an effective mitigation measure. See **Figure 2** for a comparison of carbon stored aboveground in biomass and belowground in the soil of upland prairies and other habitats.

Wetlands

Wetlands act as a carbon sink by first removing carbon from the atmosphere through photosynthesis. During their lifetime, wetland plants sequester and store carbon in aboveground woody biomass and contribute carbon to the soil through exudates the same way plant species in uplands do. However, after the plants complete their life cycle and collapse, they contribute carbon as litterfall to the surface of the soil.

Wetlands that are inundated for most of or the entire year have soils that remain saturated with water. The anoxic conditions created by these saturated and inundated soils in wetlands predominantly support anaerobic bacteria, which decompose organic material at a much slower rate than aerobic bacteria. In fact, the rate at which new organic material is deposited to these soils exceeds the rate at which the anaerobic bacteria can decompose this material. The result is an accumulation of carbon as organic material, creating a carbon sink (Mitsch and Gosselink 2015; Richardson and Vepraskas 2001).

However, when these saturated or inundated soils are disturbed, drained, or otherwise exposed to oxygen, anaerobic bacteria die off and aerobic bacteria communities begin to predominate, and the decomposition of organic matter happens at a much quicker rate than the rate at which new organic material can be accumulated by the processes described above.

Many wetlands are only inundated or saturated during the wet season, or temporarily after a precipitation event. As soon as the soils in these wetlands are no longer saturated, decomposition by aerobic bacteria continues and much of the carbon contained in any organic material present is released back into the atmosphere. Therefore, only wetlands with soils that remain inundated or saturated throughout the year provide significant carbon storage.

Like upland prairie soils, the process of sequestering carbon in wetland soils is much slower than sequestering carbon in aboveground woody biomass. However, the soils of wetlands that remain saturated throughout the growing season can store significantly more carbon than what is found in both upland forests and upland prairies (Prentice et al. 2001). Therefore, the protection of

existing carbon stocks in wetlands that are inundated or saturated throughout the year can be an effective mitigation measure. See **Figure 2** for a comparison of carbon stored aboveground in biomass and belowground in the soil of wetlands and other habitats.

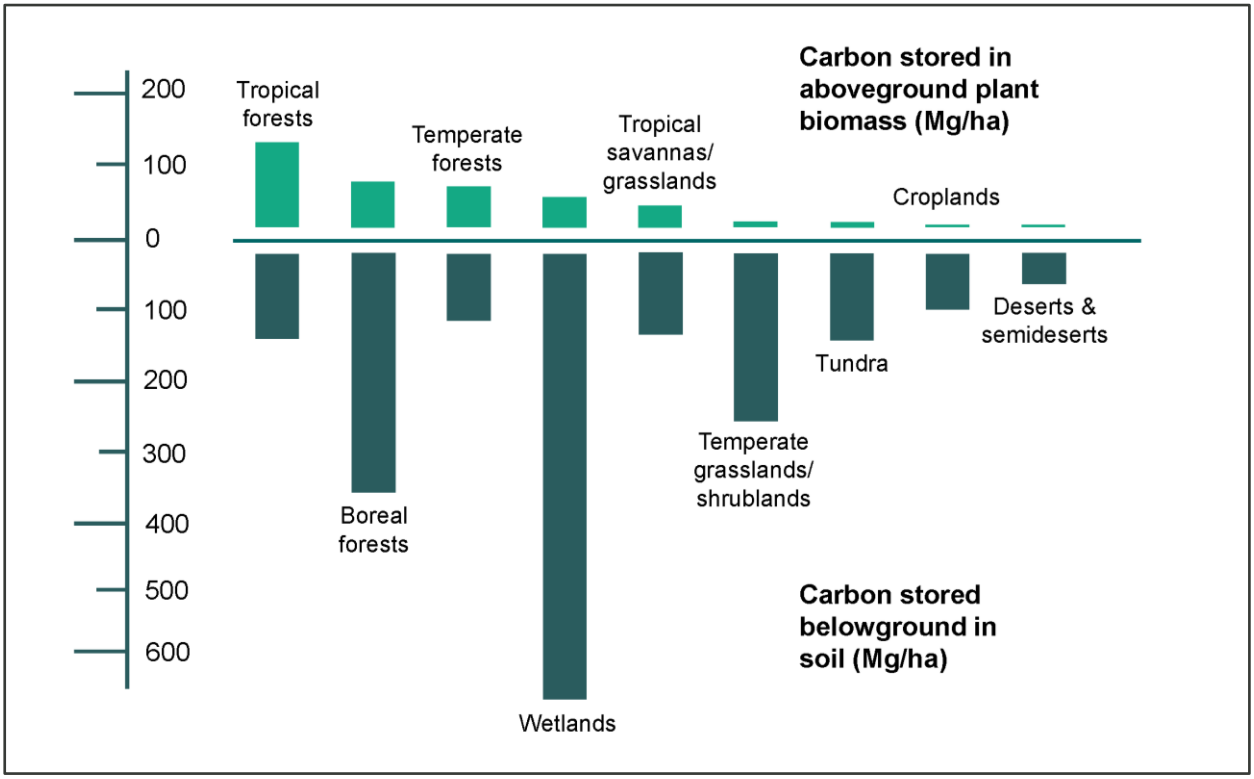

Figure 2. Megagrams per Hectare of Carbon Stored Aboveground and Belowground in Different Landscapes (Prentice et al. 2001).

Lakes and Ponds

The organic carbon burial rate of ponds and small reservoirs has been shown to be significant when compared with other habitats such as forests, prairies, and wetlands. Though they occupy a smaller proportion of the landscape as compared to other carbon-storing habitats, the high burial rates for organic carbon make these features important carbon sinks that are both easy to create and can serve multiple functions on the landscape (Mendonça et al. 2017; Taylor et al. 2019; Holgerson et al. 2023). Carbon typically enters ponds and reservoirs as inflows of organic material or dissolved inorganic carbon in surface water or through atmospheric exchange of CO_2 occurring at the air-water interface. Carbon obtained through photosynthesis can also enter a lake's water column through respiration by aquatic plants and algae. Eutrophic water bodies containing an overabundance of nitrogen and phosphorus have been shown to have a net influx of atmospheric carbon during summer months because of high levels of photosynthetic algae (Balmer and Downing 2011).

2.4 The Importance of Social Equity

Natural disasters and extreme weather do not affect all communities equally. Existing vulnerabilities, historical patterns of inequity, and socioeconomic disparities can result in some communities experiencing disproportionate impacts from these events (EPA 2023). These impacts have increasingly severe social and economic consequences, particularly in low- and lower-middle-income communities that have lower adaptive capacity to the impacts of natural disasters.

Social equity is the idea that all people should have equal access to resources and opportunities (EPA 2023), and natural ecosystems can be used to provide nature-based solutions for social equity. One of the potential impacts from heavy precipitation to underserved and vulnerable populations in Northwest Arkansas is the flooding of properties located within the Federal Emergency Management Agency (FEMA)-mapped flood hazard zones, resulting in displacement of residents, loss of property, injury, and loss of life (University of Arkansas 2018).

Should limited water supplies because of drought lead to increases in the cost of food and drinking water, low-income populations would feel the greatest impact. A rising cost of living attributable to natural disasters and extreme weather would also reduce the spending power of the local population and negatively affect the local economy because people would have less disposable income to spend at local businesses, which could potentially affect employment opportunities in the region.

The urban heat island effect would be exacerbated by the mortality of heat-sensitive urban tree species, resulting in a reduction of canopy coverage that would put vulnerable populations such as low-income and homeless residents at greater risk of heat-related and insect-borne illnesses. Energy used to cool homes would likely increase as more people remain indoors or choose to use automobiles for transportation instead of walking and biking (University of Arkansas 2018). This increased demand for energy and fuel sources would likely result in an increase in energy and fuel prices, affecting the pocketbooks of low-income populations the most.

3.0 METHODS & MATERIALS

An analysis of each parcel of land within the region was conducted using public and private geospatial datasets. A total of 299,058 land parcels were analyzed in this study, and each parcel

was assigned a subscore based on the presence of indicators of nature-based solutions across the following three categories:

1. Ecosystem Services
2. Ecosystem Resilience
3. Carbon Sequestration and Storage

Each land parcel was given a Nature-based Solutions composite score equal to the sum of each of the subscores.

SUBSCORES	Ecosystem Services	X
	Ecosystem Resilience	Y
	Carbon Sequestration and Storage	Z
COMPOSITE SCORE	Nature-based Solutions Score	X + Y + Z

In addition to the Nature-based Solutions score, each parcel was also given a Social Equity score based on factors discussed below.

3.1 Overview of Geographic Information Systems (GIS) Datasets Used

A combination of GIS datasets publicly available online, and private datasets developed by project stakeholders and by Olsson staff were used in the analysis of each land parcel within Northwest Arkansas. **Table 1** below provides an overview of each of the datasets that were used in this study.

Table 1. Overview of Geographic Information Systems (GIS) Datasets.

Dataset	Feature Type	Source	Last Updated	Details
2022 303(d) list in Category 1b (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes streams within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 1b because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.
2022 303(d) list in Category 4a (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes streams within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 4a because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.
2022 303(d) list in Category 4a Lake (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes lakes within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 4a because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.
2022 303(d) list in Category 4b (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes streams within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 4b because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.
2022 303(d) list in Category 5 (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes streams within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 5 because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.

Dataset	Feature Type	Source	Last Updated	Details
2022 303(d) list in Category 5 Alt (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes streams within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 5 Alt because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.
2022 303(d) list in Category 5 Lake (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes lakes within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 5 because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.
2022 303(d) list in Category 5 Alt Lake (Draft)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2022	This dataset includes lakes within Benton, Washington, and Madison counties that have been determined by the Arkansas Department of Energy & Environment to be eligible for inclusion on the state's 2022 draft 303(d) list in Category 5 Alt because of certain contaminants as indicated by Regulation No. 2 adopted by the Arkansas Pollution Control and Ecology Commission.
Biodiversity	Polygon	Arkansas Natural Heritage Commission & Olsson	2024	This dataset contains land parcels that have each been scored based on biodiversity data provided by the Arkansas Natural Heritage Commission.
Ecologically Sensitive Waterbodies (Springs & Seeps)	Polygon	Arkansas Department of Energy & Environment – Division of Environmental Quality	2024	This dataset includes springs and seeps of Arkansas that have been designated as ecologically sensitive springs and seeps as identified by the Arkansas Department of Energy & Environment's Division of Environmental Quality.
Ecologically Sensitive Waterbodies (Streams)	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2024	This dataset includes springs and seeps of Arkansas that have been designated as ecologically sensitive streams as identified by the Arkansas Department of Energy & Environment's Division of Environmental Quality.
Extraordinary Resource Waters	Polyline	Arkansas Department of Energy & Environment – Division of Environmental Quality	2024	This dataset includes springs and seeps of Arkansas that have been designated as Extraordinary Resource Waters as identified by the Arkansas Department of Energy & Environment's Division of Environmental Quality.

Dataset	Feature Type	Source	Last Updated	Details
Landsat Land Surface Temperatures	Raster	U.S. Geological Survey Landsat	2022	This dataset was created using Landsat 9 data downloaded from Climate Engine, and it records locations within Benton, Washington, and Madison counties where the surface temperature during the summer months exceeds the mean temperature during that period. This dataset further records how many degrees in Celsius each location exceeds the mean temperature for that location.
Hydric Soils	Polygon	Natural Resources Conservation Service's Web Soil Survey	2024	This dataset records the location of soils with hydric components as defined by the National Technical Committee for Hydric Soils (NTCHS).
Low-moderate Income	Polygon	U.S. Census Bureau	2020	This dataset was created from 2020 U.S. Census data and contains polygon features recording the locations of residential areas containing greater than 50 percent of households with low-moderate income.
National Flood Hazard Layer Floodway	Polygon	Federal Emergency Management Agency (FEMA)	2024	This dataset records the locations of areas mapped by FEMA as being within the FEMA-mapped flood hazard zones.
National Hydrography Dataset (NHD)	Polyline	U.S. Geological Survey NHDPlus High Resolution layer	2019	This dataset records the water drainage network of the U.S, with features such as rivers, streams, lakes, and ponds.
National Land Cover Dataset	Polygon	Multiresolution Land Characteristics (MRLC) Consortium	2021	This dataset records the location and boundaries of a wide variety of land cover categories.
National Wetlands Inventory	Polygon	U.S. Fish & Wildlife Service National Wetlands Inventory	2024	This dataset records the locations of U.S. wetlands, classifying them based on the Cowardin classification system.
Natural Area Boundaries	Polygon	Arkansas Natural Heritage Commission	2024	This dataset records the locations of natural areas in Benton, Madison, and Washington counties that are managed by the Arkansas Natural Heritage Commission or the Nature Conservancy.
Northwest Arkansas Land Trust (NWALT) Preserves	Polygon	Northwest Arkansas Land Trust	2024	This dataset records the locations of parcels in Benton, Washington, and Madison counties that are owned by the Northwest Arkansas Land Trust.

Dataset	Feature Type	Source	Last Updated	Details
Public Land Boundary	Polygon	Arkansas GIS Office, Arkansas Natural Heritage Commission	2024	This dataset records the locations of publicly accessible open space in Benton, Washington, and Madison counties such as city parks, county parks, state parks, natural areas, wildlife management areas, national forests, private parks, and private preserves.
Prairie Mounds	Polygon	Arkansas Natural Heritage Commission	2024	This dataset records the location of relict nabkha mounds in Benton, Madison, and Washington counties.
Resilient and Connective Network	Polygon	The Nature Conservancy Resilient and Connected Landscapes	2016	This dataset records the locations mapped by The Nature Conservancy as the Resilient and Connected Network, which is a connected network of sites that maximize site resilience, biodiversity, connectivity, and climate flow.
Resilient Site	Polygon	The Nature Conservancy Resilient and Connected Landscapes	2016	This dataset records Resilience Sites mapped by The Nature Conservancy. A site's Resilience Score estimates its capacity to maintain species diversity and ecological function as the climate changes and was determined by evaluating and quantifying physical characteristics that foster resilience, including topography, slope, elevation range, geology, and soil.
Special or Unique Habitat	Polygon	Arkansas Natural Heritage Commission, U.S. Geological Survey, Fayetteville Natural Heritage Association	2024	This dataset contains land parcels that have each been scored based on special or unique habitat data such as clifflines, canebrakes, glades, prairie remnants, shale barrens, springs, and wet savannas within Benton, Madison, and Washington counties provided by the Arkansas Natural Heritage Commission.
Springs	Point	Arkansas Natural Heritage Commission	2024	This dataset records the locations of springs identified by the Arkansas Natural Heritage Commission.
Trails	Polyline	University of Arkansas & NWA Trail Blazers	2024	This dataset records the locations of both paved off-street trails and soft-surface trails within Benton, Madison, and Washington counties.

3.2 Indicators of Ecosystem Services

A scoring matrix was developed to assign an Ecosystem Services subscore to each of the land parcels located within Northwest Arkansas. This subscore was based on the presence of indicators of ecosystem services that would provide opportunities for nature-based solutions for adaptation to the following:

- Heavy precipitation
- Drought
- Extreme heat

The ecosystem services indicators and their corresponding GIS datasets are listed in **Table 2**. Each land parcel was assigned an Ecosystem Services subscore based on the sum of the indicators identified on that parcel during the analysis.

Table 2. Ecosystem Services Scoring Matrix.

Indicator	Dataset(s) Used	Score	Logic Query
Ephemeral Drainage	National Hydrography Dataset	1	Does the land parcel have a natural drainage that only conveys stormwater?
Floodway	National Flood Hazard Dataset	1	Does the land parcel intersect a Federal Emergency Management Agency (FEMA) flood zones A, AE, or AO?
Reservoir	National Wetlands Inventory	1	Does the land parcel intersect a pond or lake mapped by the National Wetlands Inventory?
Riparian Buffer	National Hydrography Dataset & National Land Cover Dataset	1	Does the land parcel intersect a forested riparian buffer?
Stormwater Infiltration	National Land Cover Dataset	1	Is the land parcel covered by 20 percent or less impervious surface?
Tree Canopy	National Land Cover Dataset	1	Is the land parcel covered by greater than 50 percent tree canopy?
Wetland	National Wetlands Inventory	2	Does the land parcel intersect a wetland mapped by the National Wetlands Inventory?

Ephemeral Drainages

Ephemeral drainages are prime locations for the construction of ponds that collect stormwater. Ponds provide stormwater control during heavy precipitation and surface water storage during droughts. Ponds are also a source of groundwater recharge, which helps sustain creek flows during dry periods. Because of their potential for opportunities for nature-based solutions to improve adaptation to both heavy precipitation and drought, the presence of one or more

ephemeral drainages on a land parcel contributes one point toward its Ecosystem Services subscore.

Floodways

Parcels of land within FEMA-mapped flood hazard zones are prime locations for the consideration of stormwater and flood mitigation projects that can help slow down and disperse stormwater during the heavy precipitation events, improving the infiltration of stormwater into the soil. Because of their ability to provide opportunities for nature-based solutions for adaptation to heavy precipitation, the presence of a FEMA-mapped flood hazard zone on a land parcel contributes one point toward its Ecosystem Services subscore.

Reservoirs

Parcels of land containing lakes and ponds provide stormwater control during heavy precipitation events and surface water storage during droughts. Lakes and ponds are also a source of groundwater recharge, which helps sustain creek flows during dry periods. Because of their ability to provide opportunities for nature-based solutions for adaptation to heavy precipitation and drought, the presence of one or more lakes or ponds on a land parcel contributes one point toward its Ecosystem Services subscore.

Riparian Buffers

Parcels of land with riparian buffers help improve water quality, control flooding and erosion, and increase the infiltration of stormwater into the soil. Because of their ability to provide opportunities for nature-based solutions for adaptation to heavy precipitation, the presence of a riparian buffer on a land parcel contributes one point toward its Ecosystem Services subscore.

Stormwater Infiltration

Parcels of land with little to no impervious surfaces allow stormwater to soak into the soil, reducing runoff while recharging groundwater and helping to sustain creek flows during dry periods. Because of their ability to provide opportunities for nature-based solutions for adaptation to heavy precipitation and drought, pervious surfaces that cover greater than 90 percent of a land parcel contribute.one point toward its Ecosystem Services subscore.

Tree Canopy

Parcels of land containing tree canopy are valuable for the shade they provide, which helps reduce ground surface temperatures and surface water temperatures, helps reduce energy usage for cooling homes and buildings, and provides relief from heat for both humans and wildlife.

Because of its ability to provide opportunities for nature-based solutions for adaptation to extreme heat, tree canopy that covers greater than 50 percent of a land parcel contributes one point toward its Ecosystem Services subscore.

Wetlands

Parcels of land containing wetlands contribute to stormwater and flood control during heavy precipitation events, provide surface water storage during droughts, are a source of groundwater recharge, and help sustain creek flows during dry periods. Because of their unique ability to provide a wide range of ecosystem services and opportunities for nature-based solutions for adaptation to both heavy precipitation and drought, the presence of one or more wetlands on a land parcel contributes two points toward its Ecosystem Services subscore.

3.3 Indicators of Ecosystem Resilience

A scoring matrix was developed to assign an Ecosystem Resilience subscore to each of the land parcels located within Northwest Arkansas. This subscore was based on the presence of indicators of ecosystem resilience that would provide opportunities for nature-based solutions for adaptation, including the following:

- Biodiversity
- Topographic diversity
- Wildlife habitat
- Habitat connectivity

The ecosystem resilience indicators and their corresponding GIS datasets are listed in **Table 3**. Each land parcel was assigned an Ecosystem Resilience subscore based on the sum of the indicators identified on that parcel during the analysis.

Table 3. Ecosystem Resilience Scoring Matrix.

Indicator	Dataset(s) Used	Score	Logic Query
Biodiversity	Biodiversity	1+	Have any species of conservation concern ever been recorded on the land parcel?
Ecologically Resilient Site	Resilient Site & Resilient and Connective Network	2	Does the land parcel contain an ecologically “resilient site” or part of the “resilient and connective network “as identified by The Nature Conservancy's Resilient and Connected Landscapes project?

Indicator	Dataset(s) Used	Score	Logic Query
Ecologically Sensitive Waterbody	Ecologically Sensitive Waterbodies (Streams) & Ecologically Sensitive Waterbodies (Springs & Seeps), Extraordinary Resource Waters, Springs	1	Does the land parcel intersect an ecologically sensitive waterbody?
Habitat Connectivity	National Land Cover Dataset	1	Does the land parcel intersect land that isn't classified by the National Land Cover Dataset as Developed?
Impaired Waterbody	2022 Impaired Streams 303(d) list in Category 1b (Draft), 2022 Impaired Streams 303(d) list in Category 4a (Draft), 2022 Impaired Streams 303(d) list in Category 4b (Draft), 2022 Impaired Streams 303(d) list in Category 5 (Draft), 2022 Impaired Streams 303(d) list in Category 5 Alt (Draft), 2022 Impaired Streams 303(d) list in Category 4a Lake (Draft), 2022 Impaired Streams 303(d) list in Category 5 Lake (Draft), & 2022 Impaired Streams 303(d) list in Category 5 Alt Lake (Draft)	1	Is the parcel adjacent to an impaired stream or waterbody?
Proximity to Natural Waterway	National Hydrography Dataset	1	Does an intermittent or perennial stream flow through the parcel or within 25 feet of the parcel's boundaries?
Unique or Special Habitat	Unique or Special Habitat	1+	Does the land parcel contain unique or special habitat?
Wetland Habitat	National Wetlands Inventory	1	Does the land parcel intersect a wetland mapped by the National Wetlands Inventory?

Biodiversity

The presence of species of conservation concern indicates that a land parcel has unique attributes and habitat that supports ecosystem resilience. A land parcel's biodiversity score is based on the total number of different species of conservation concern that have been confirmed on that parcel.

Ecologically Resilient Sites

The Nature Conservancy's Resilient and Connected Landscapes project has previously mapped resilient lands and significant habitat corridors across the U.S. These are areas that have high ecological resilience to environmental stressors and extreme weather because of their exceptional biodiversity and topographic diversity, both of which help species adapt to environmental stressors and extreme weather. Land parcels that have been mapped by The

Nature Conservancy's Resilient and Connected Landscapes project received two points because of their exceptional value for ecological resilience to environmental stressors and extreme weather.

Ecologically Sensitive Waterbodies

The presence of an Ecologically Sensitive Waterbody, as identified by the ADEE's Division of Environmental Quality, indicates that a land parcel has unique habitat that supports ecosystem resilience. The presence of an Ecologically Sensitive Waterbody within or adjacent to a land parcel contributes one point toward its Ecosystem Resilience subscore.

Habitat Connectivity

Parcels of land that provide habitat connectivity support ecosystem resilience. Wildlife corridors connect the various habitats in the different parts of the region and provide ways for species to migrate while minimizing interactions with humans. The presence of part of the Enduring Green Network within a land parcel contributes one point toward its Ecosystem Resilience subscore.

Impaired Streams

Parcels of land that contain or are adjacent to streams that are impaired because of one or more contaminants are prime locations for the consideration of water quality improvement projects to restore these aquatic habitats. Restoration of these aquatic habitats can improve biodiversity so that these streams can function as habitat and wildlife corridors and be more ecologically resilient. Because of its potential to improve ecosystem resilience, the presence of an impaired stream within or adjacent to a land parcel contributes one point toward its Ecosystem Resilience subscore.

Proximity to Natural Waterways

Natural waterways such as streams and rivers provide important habitat to species that are uniquely adapted to aquatic environments. Natural waterways also connect terrestrial habitats, providing corridors for wildlife to travel along as they adapt to environmental stressors and human pressures from growth and development in the region. As both habitats and wildlife corridors, natural waterways help support ecosystem resilience. Therefore, the presence of a natural waterway within or adjacent to a land parcel contributes one point toward its Ecosystem Resilience subscore.

Unique or Special Habitat

The presence of Unique or Special Habitat indicates that a land parcel improves biodiversity within the region and supports ecosystem resilience. A land parcel received one point for each type of unique or special habitat that exists on the parcel.

Wetland Habitat

Typically valued for their biodiversity and multiple ecological functions, wetlands provide important habitat to species that are uniquely adapted to these environments, helping to improve biodiversity within the region and support ecosystem resilience. The presence of a wetland within a land parcel contributes one point toward its Ecosystem Resilience subscore.

3.4 Indicators of Carbon Sequestration and Storage

A scoring matrix was developed to assign a Carbon Sequestration and Storage subscore to each of the land parcels located within Northwest Arkansas. This subscore was based on the presence of indicators of carbon sequestration and storage that would provide opportunities for nature-based solutions for mitigation through the following:

- Aboveground woody biomass
- Belowground soil carbon

The carbon sequestration and storage indicators and their corresponding GIS datasets are listed in **Table 4**. Each land parcel was assigned a Carbon Sequestration and Storage subscore based on the sum of the indicators identified on that parcel during the analysis.

Table 4. Carbon Sequestration and Storage Scoring Matrix.

Indicator	Dataset(s) Used	Score	Logic Query
Carbon-storing Forested Wetland	National Wetlands Inventory & Hydric Soils	5	Does the land parcel intersect a wetland mapped by the NWI that has a Cowardin classification of palustrine forested (PFO), is greater than 1 acre in size, and intersects a mapped soil unit that has a hydric rating greater than or equal to 60 percent?
Carbon-storing Shrub Wetland	National Wetlands Inventory & Hydric Soils	4	Does the land parcel intersect a wetland mapped by the NWI that has a Cowardin classification of palustrine scrub-shrub (PSS), is greater than 1 acre in size, and intersects a mapped soil unit that has a hydric rating greater than or equal to 60 percent?
Carbon-storing Herbaceous Wetland	National Wetlands Inventory & Hydric Soils	3	Does the land parcel intersect a wetland mapped by the NWI that has a Coward classification of palustrine emergent (PEM), is greater than 1 acre in size, and intersects a mapped soil unit that has a hydric rating greater than or equal to 60 percent?

Indicator	Dataset(s) Used	Score	Logic Query
Carbon-storing Reservoir	National Wetlands Inventory	2	Does parcel intersect a wetland mapped by the National Wetlands Inventory that categorized as “Freshwater Pond” or “Lake”, and is greater than 1 acre in size?
Carbon-storing Upland Prairie	National Land Cover Dataset & Prairie Mounds	2	Does the parcel intersect an area mapped as either a “Grassland” or as “Herbaceous” by the National Land Cover Dataset, or has the parcel otherwise been determined by knowledgeable local experts to contain predominantly prairie vegetation?
Carbon-storing Upland Forest	National Land Cover Dataset	1	Does the parcel have greater than 50% tree canopy, excluding carbon storing forested wetlands?

Carbon-storing Wetlands

As discussed above, wetlands with soils that remain saturated or inundated for most of the growing season can sequester and store significantly more carbon in their soils than any other type of terrestrial landscape. Therefore, carbon-storing wetlands are much more valuable than upland ecosystems when it comes to providing better carbon sequestration and storage.

Wetland ecosystems are also much less common on the landscape than upland ecosystems, and most have already been filled or drained by development and agriculture over the past few hundred years. For these reasons, the few carbon-storing wetlands that remain in Northwest Arkansas were ranked the highest as carbon-storing ecosystems in this analysis.

Forested wetlands have the added benefit of being able to sequester and store significant amounts of carbon in their aboveground woody biomass and are therefore the most valuable type of carbon-storing wetland ecosystem. Therefore, the presence of one or more carbon-storing forested wetlands on a land parcel contributes five points toward its Carbon Sequestration and Storage subscore.

Scrub-shrub wetlands also sequester and store additional carbon in their aboveground woody biomass. Though these wetland types store more carbon than a wetland dominated by nonwoody herbaceous vegetation, they store less carbon compared to forested wetlands because of the smaller size of the aboveground woody biomass found in the shrubby vegetation. Therefore, the presence of one or more carbon-storing scrub-shrub wetlands on a land parcel contributes four points toward its Carbon Sequestration and Storage subscore. This is fewer than the number of points that a carbon-storing forested wetland contributes to a land parcel's Carbon Sequestration and Storage subscore, but greater than what carbon-storing herbaceous wetlands contribute.

Wetlands dominated by nonwoody herbaceous species store little to no carbon in their aboveground biomass. Though these wetland types store more carbon overall than an upland ecosystem when the belowground soil carbon is considered, they store less carbon compared to forested and scrub-shrub wetlands because of their lack of woody aboveground biomass. Therefore, the presence of one or more carbon-storing herbaceous wetlands on a land parcel contributes three points toward its Carbon Sequestration and Storage subscore. This is fewer than the number of points that carbon-storing wetlands containing woody species contribute to a land parcel's overall Carbon Sequestration and Storage subscore but greater than what non-wetland carbon-storing ecosystems contribute.

Carbon-storing Reservoirs

Ponds and lakes can store carbon in their soils in quantities that are similar to wetlands, but the rate at which ponds sequester carbon from the atmosphere is much lower than wetlands because they have a limnetic zone with little to no vegetation that contributes litterfall to the pond's benthic zone. Therefore, the presence of one or more ponds on a land parcel contributes two points toward its Carbon Sequestration and Storage subscore. This is fewer than the number of points that carbon-storing wetlands contribute but greater than what upland forests with little to no soil carbon contribute.

Carbon-storing Upland Prairies

With little to no aboveground carbon stored in woody biomass and less belowground carbon stored in the soil than carbon-storing wetlands, upland prairies can still store more carbon in their soils than any other type of upland ecosystem, including upland forests. Therefore, the presence of one or more upland prairies on a land parcel contributes two points toward its Carbon Sequestration and Storage subscore. This is fewer than the number of points that carbon-storing wetlands contribute but higher than what upland forests contribute.

Carbon-storing Forests

Upland forests sequester and store carbon in their woody biomass, mostly aboveground. Although these habitats don't store as much belowground carbon in their roots and soils as carbon-storing wetlands or upland prairies do, upland forests can still provide more carbon sequestration and storage than most other types of terrestrial landscapes, especially when compared to nonnative forage and turf grasses. However, because trees are limited in how tall they can grow and how long they can live, forested ecosystems are much more limited in the

quantity and longevity of the carbon storage they provide when compared to carbon-storing wetlands and upland prairies.

Despite providing less carbon storage, forested areas can sequester carbon into their woody biomass at a much quicker rate than wetlands and prairies can sequester carbon into their soil. Therefore, the presence of one or more upland forests on a land parcel contributes one point toward its Carbon Sequestration and Storage subscore. This is fewer than the number of points that carbon-storing wetlands, ponds, and upland prairies contribute to a land parcel's Carbon Sequestration & Storage subscore but greater than parcels that provide little to no carbon sequestration and storage.

3.5 Social Equity Factors

A scoring matrix was developed to assign a Social Equity score to each of the land parcels located within Northwest Arkansas. This score was based on factors that should be taken into consideration to assure an equitable distribution of benefits from nature-based solutions. These factors include the following:

- Socioeconomics
- Access to community resources
- Urban heat

A land parcel's Social Equity score is not included in the Nature-based Solutions composite score because these factors do not reveal the presence of natural infrastructure that provides nature-based solutions on the parcel, but rather are factors that reveal potential benefits provided by the natural infrastructure of a parcel, or whether there are any deficiencies in natural infrastructure that could be addressed through the implementation of nature-based solutions. The social equity indicators and their corresponding GIS datasets are listed in **Table 5**. Each land parcel was assigned a Social Equity score based on the sum of the indicators identified on that parcel during the analysis.

Table 5. Social Equity Scoring Matrix.

Factor	Dataset(s) Used	Score	Logic Query
Heat Island	Landsat Land Surface Temperatures	1	Does the land parcel intersect a heat island?
Low-moderate Income	Low-moderate Income	1	Is the land parcel located within a census block that has greater than 50 percent low-moderate income households?
Proximity to Active Transportation Network	Trails	1	Is the land parcel within 1 mile of a trail?
Proximity to Open Space	Public Land Boundary, Natural Area Boundaries, and Northwest Arkansas Land Trust Preserves	1	Is the land parcel more than 1 mile away from a park or open space that is accessible to the public?

Heat Islands

Heat islands are urbanized areas that experience higher temperatures than outlying areas. Structures such as roads and buildings absorb and reemit the sun's heat; temperatures near these structures differ from outlying areas, mostly at night. These heat islands lead to increased energy costs for the buildings in these areas and can disproportionately affect those with low or limited income. Heat islands are prime locations for the consideration of tree plantings to reduce temperatures in these areas. Therefore, the presence of a mapped heat island on a land parcel contributes one point toward its Social Equity score.

Low-moderate Income

Socioeconomic disparities can result in some communities, such as those with low or limited income, experiencing disproportionate impacts from natural disasters and extreme weather. Therefore, land parcels that were within a census block consisting of households with low to moderate levels of income were given one point toward their Social Equity score.

Proximity to Active Transportation Network

A land parcel that is near the Active Transportation Network may be an ideal location for a new park or open space that provides ecosystem services that benefit disadvantaged communities. Therefore, land parcels that were within 1 mile of the active transportation network were given one point toward their Social Equity score.

Proximity to Open Space

A land parcel that is greater than a 1 mile from existing parks and open space may be an ideal location for the dedication of a new park or open space that provides ecosystem services that benefit disadvantaged communities. Therefore, land parcels that were greater than 1 mile from existing parks or open space were given one point toward their Social Equity score.

4.0 RESULTS

In total, 299,058 land parcels comprising approximately 1,709,171 acres were analyzed for the presence of indicators that would provide opportunities for nature-based solutions for adaptation and mitigation strategies to environmental stressors and for social equity factors.

These land parcels were categorized into four size classes based on their acreage to differentiate between benefits provided by larger parcels from those provided by smaller parcels. The size classes and number of land parcels within each class are listed below in **Table 6**.

Table 6. Number of Land Parcels per Size Class.

Size	Number of Land Parcels
<1 acre	211,837
1-5 acres	37,118
5-40 acres	38,146
>40 acres	11,957
Total	**299,058**

Land parcel subscores and the composite score were ranked into categories ranging from Lower through Very High based on natural breaks in the distribution of the sub- and composite scores. Parcels of land that scored a zero were not included in the ranking system. The results of the geospatial analysis for each of the three subscores are discussed below, followed by a discussion of the results of the Nature-based Solutions composite score and the Social Equity score.

4.1 Ecosystem Services Subscore Results

A total of 149,304 land parcels were assigned an Ecosystem Services subscore based on indicators identified on each parcel during this analysis. The higher the subscore a land parcel received, the greater number of indicators of ecosystem services the parcel was found to have.

Figure 3 below shows the distribution of the land parcels throughout the region that received an Ecosystem Services subscore.

Approximately 50 percent of the total number of land parcels within Northwest Arkansas did not receive a subscore for any indicators of ecosystem resilience. Of the land parcels that did receive an Ecosystem Services subscore, a total of 75,995 land parcels ranked as having a Lower value (score of 1); another 42,872 ranked as having a Medium value (score of 2). A total of 25,083 land parcels, totaling approximately 681,790 acres, ranked as having a Higher value (scores of 3 or 4) for Ecosystem Services; another 5,354 parcels, totaling approximately 357,631 acres, ranked as having a Very High value (scores of 5 to 8). The number of land parcels for each Ecosystem Services subscore are shown in **Table 7** below. The number of land parcels that received a score for each indicator of ecosystem services are shown in **Table 8**.

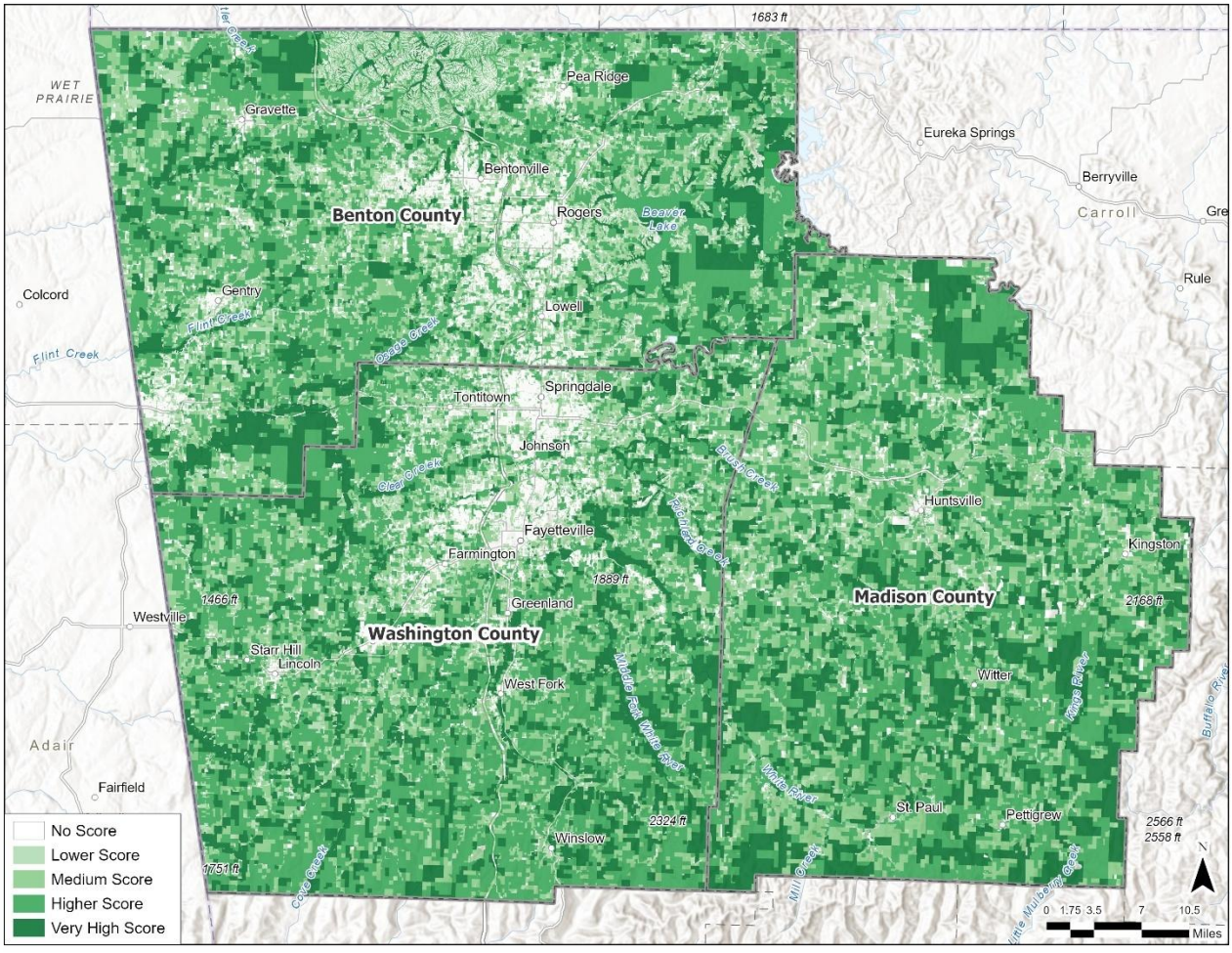

Figure 3. Distribution of Ranked Ecosystem Services Subscores.

Table 7. Number of Land Parcels per Ecosystem Services Subscore.

Rank	Subscore	Number of Land Parcels					Percentage of Ranked Land Parcels	Percentile of Ranked Land Parcels
		Size Class						
		< 1 acre	1 - 5 acres	5 - 40 acres	> 40 acres	Total		
UNRANKED	0	134,027	12,412	3,253	62	**149,754**	-	-
LOWER	1	54,029	12,778	8,647	541	**75,995**	50.9	0
MEDIUM	2	19,873	8,160	12,389	2,450	**42,872**	28.7	14
HIGHER	3	2,830	2,763	8,830	3,765	**18,188**	12.2	29
	4	736	748	3,123	2,288	**6,895**	4.6	43
VERY HIGH	5	198	197	1,381	1,661	**3,437**	2.3	57
	6	94	50	412	801	**1,357**	0.9	72
	7	43	9	97	331	**480**	0.3	86
	8	7	1	14	58	**80**	0.1	100

Table 8. Number of Land Parcels per Ecosystem Services Indicator.

Indicator	Number of Land Parcels				
	Size Class				
	< 1 acre	1 - 5 acres	5 - 40 acres	> 40 acres	Total
Ephemeral Streams	8,273	4,527	10,933	6,126	**29,859**
Floodway	9,924	3,673	4,707	1,876	**20,180**
Lake/Pond	5,072	2,748	10,357	5,672	**23,849**
Riparian Buffer	3,220	3,064	8,915	5,803	**21,002**
Stormwater Infiltration	39,905	13,167	24,773	10,817	**88,662**
Streambank Erosion Risk	39,508	13,490	18,496	7,163	**78,657**
Tree Canopy	609	533	2,197	2,162	**5,501**
Wetland	8,273	4,527	10,933	6,126	**29,859**

Overall, approximately 50 percent of land parcels in Northwest Arkansas, totaling 1,566,626 acres, currently provide some form of ecosystem services that will help the region adapt to extreme weather (see **Figure 4**), primarily in the form of tree canopy and soil infiltration of stormwater. The percentage of land parcels scoring for each indicator of ecosystem services is shown in **Table 9** below.

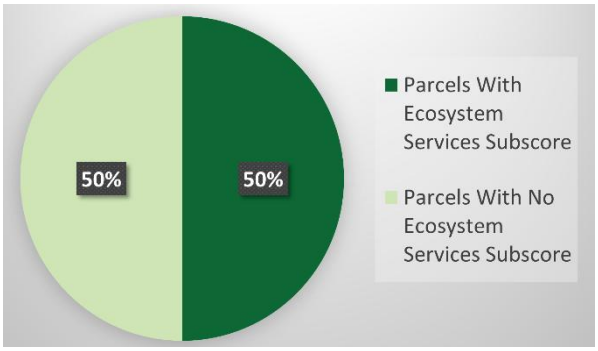

Figure 4. Percentage of Total Land Parcels with Ecosystems Services Indicators.

Table 9. Percentage of Total Land Parcels per Ecosystem Services Indicator.

Indicator	Percentage
Ephemeral Streams	11
Floodway	8
Lake/Pond	9
Riparian Buffer	8
Stormwater Infiltration	33
Wetland	2
Tree Canopy	20

4.2 Ecosystem Resilience Subscore Results

A total of 196,707 land parcels were assigned an Ecosystem Resilience subscore based on indicators identified on that parcel during this analysis. The higher the subscore a land parcel received, the greater number of indicators of ecosystem resilience the parcel was found to have. **Figure 5** below shows the distribution of the land parcels throughout the region that received an Ecosystem Resilience subscore.

Approximately 34 percent of the total number of land parcels within Northwest Arkansas did not receive a subscore for any indicators of ecosystem resilience. Of the land parcels that did receive an Ecosystem Resilience subscore, a total of 101,387 parcels ranked as having a Lower value for Ecosystem Resilience (scores of 1 or 2); another 88,503 ranked as having a Medium value (scores of 3 or 4). A total of 6,623 land parcels, totaling approximately 351,653 acres, ranked as having a Higher value for Ecosystem Resilience (scores of 5 to 8); 194 other parcels of approximately 17,487 acres ranked as having a Very High value (scores of 9 to 25). The number of land parcels for each Ecosystem Resilience subscore are shown in **Table 10** below. The number of land parcels that received a score for each indicator of ecosystem resilience are shown in **Table 11**.

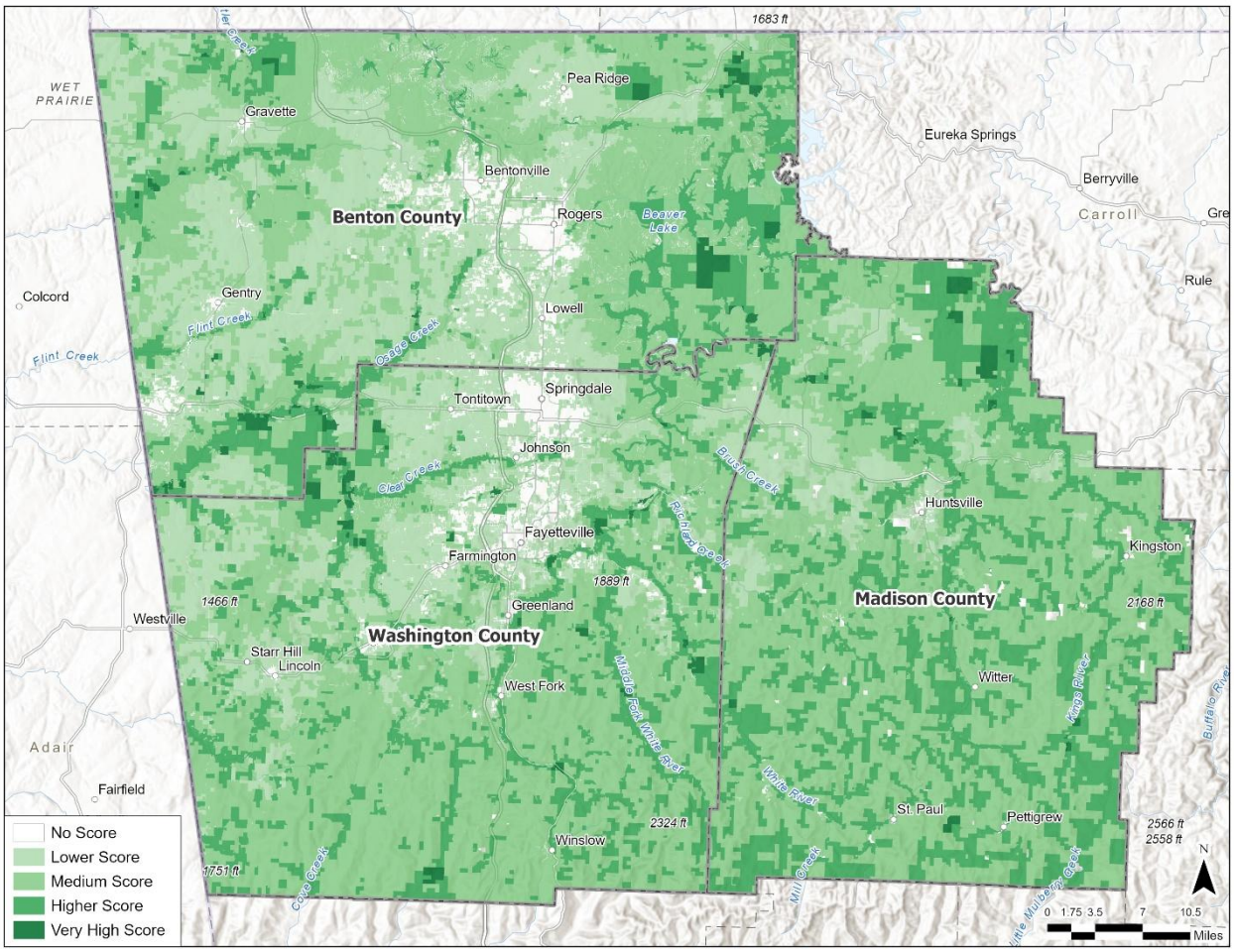

Figure 5. Distribution of Ranked Ecosystem Resilience Subscores.

Table 10. Number of Land Parcels per Ecosystem Resilience Subscore.

Rank	Sub-score	Number of Land Parcels					Percentage of Ranked Land Parcels	Percentile of Ranked Land Parcels
		Size Class						
		< 1 acre	1-5 acres	5 - 40 acres	> 40 acres	Total		
UNRANKED	0	99,311	2,656	377	7	**102,351**	-	-
LOWER	1	58,505	15,656	9,371	768	**84,300**	42.856	0
	2	7,388	3,548	5,092	1,059	**17,087**	8.687	4
MEDIUM	3	42,788	12,402	14,560	4,008	**73,758**	37.496	8
	4	3,165	2,192	6,025	3,363	**14,745**	7.496	13
HIGHER	5	434	489	1,882	1,842	**4,647**	2.362	17
	6	149	113	535	515	**1,312**	0.667	21
	7	57	34	181	209	**481**	0.2	25
	8	21	16	63	83	**183**	0.09	29
VERY HIGH	9	9	9	24	36	**78**	0.04	33
	10	2	2	18	19	**41**	0.02	38
	11	1	1	8	23	**33**	0.02	42

Rank	Sub-score	Number of Land Parcels					Percentage of Ranked Land Parcels	Percentile of Ranked Land Parcels
		Size Class						
		< 1 acre	1-5 acres	5 - 40 acres	> 40 acres	Total		
	12	2	-	5	11	**18**	0.01	46
	13	1	-	1	6	**8**	0.004	50
	14	2	-	1	2	**5**	0.003	54
	15	-	-	2	3	**5**	0.003	58
	16	1	-	1	1	**3**	0.002	63
	17	-	-	-	-	**-**	0	63
	18	-	-	-	-	**-**	0	63
	19	-	-	-	-	**-**	0	63
	20	1	-	-	-	**1**	0.001	79
	21	-	-	-	1	**1**	0.001	83
	22	-	-	-	-	**-**	0	83
	23	-	-	-	-	**-**	0	83
	24	-	-	-	-	**-**	0	83
	25	-	-	-	1	**1**	0.0005	100

Table 11. Number of Land Parcels per Ecosystem Resilience Indicator.

Indicator	Number of Land Parcels				
	Size Class				
	< 1 acre	1 - 5 acres	5 - 40 acres	> 40 acres	Total
Biodiversity	469	314	798	553	**2,134**
Ecologically Resilient Site	48,636	14,930	22,225	9,582	**95,373**
Unique or Special Habitat	916	1,199	3,292	1,979	**7,386**
Ecologically Sensitive Waterbodies	1,697	732	1,022	453	**3,904**
Wetland Habitat	609	533	2,197	2,162	**5,501**
Habitat Connectivity	105,779	34,046	37,628	11,891	**189,344**
Proximity to Natural Waterway	10,727	5,406	11,767	6,646	**34,546**
Impaired Stream	498	273	750	443	**1,964**

Overall, approximately 66 percent of land parcels within Northwest Arkansas, totaling 1,626,554 acres, currently provide some form of ecosystem resilience that will help the region adapt to environmental stressors (see **Figure 6**), primarily in the form of habitat connectivity. The percentage of land parcels scoring for each indicator of ecosystem resilience are shown in **Table 12** below.

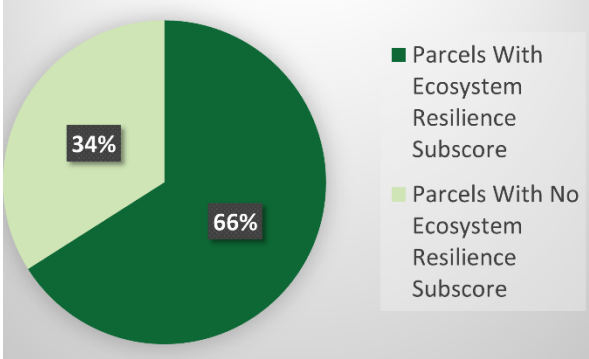

Figure 6. Percentage of Total Land Parcels with Ecosystem Resilience Indicators.

Table 12. Percentage of Total Land Parcels per Ecosystem Resilience Indicator.

Indicator	Percentage
Biodiversity	0.7
Ecologically Resilient Site	31.9
Unique or Special Habitat	2.5
Ecologically Sensitive Waterbodies	1.3
Wetland Habitat	1.8
Habitat Connectivity	63.3
Proximity to Natural Waterway	11.6
Impaired Stream*	0.7

* Impaired streams are not in themselves an indicator of ecosystem resilience but are prime locations for the consideration of water quality improvement projects to restore these aquatic habitats and improve biodiversity so that these streams can become more ecologically resilient.

4.3 Carbon Sequestration and Storage Subscore Results

A total of 87,098 land parcels were assigned a Carbon Sequestration and Storage subscore based on indicators identified on that parcel during this analysis. The higher the subscore a land parcel received, the greater number of indicators of sequestration and storage the parcel was found to have. **Figure 7** below shows the distribution of the land parcels throughout the region that received a Carbon Sequestration and Storage subscore.

Approximately 71 percent of the total number of land parcels within Northwest Arkansas did not receive a subscore for any indicators of carbon sequestration and storage. Of the land parcels that did receive a Carbon Sequestration and Storage subscore, a total of 77,426 land parcels ranked as having a Lower value for Carbon Sequestration and Storage (score of 1); another 9,229 ranked as having a Medium value (scores of 2 or 3). A total of 282 land parcels, totaling approximately 10,346 acres ranked, as having a Higher value for Carbon Sequestration and Storage (scores of 4 or 5), and another 161 parcels, totaling approximately 6,194 acres, ranked as having a Very High value (scores of 6 to 9). The number of land parcels for each Carbon Sequestration and Storage subscore is shown in **Table 13** below. The number of land parcels that received a score for each indicator of carbon sequestration and storage is shown in **Table 14**.

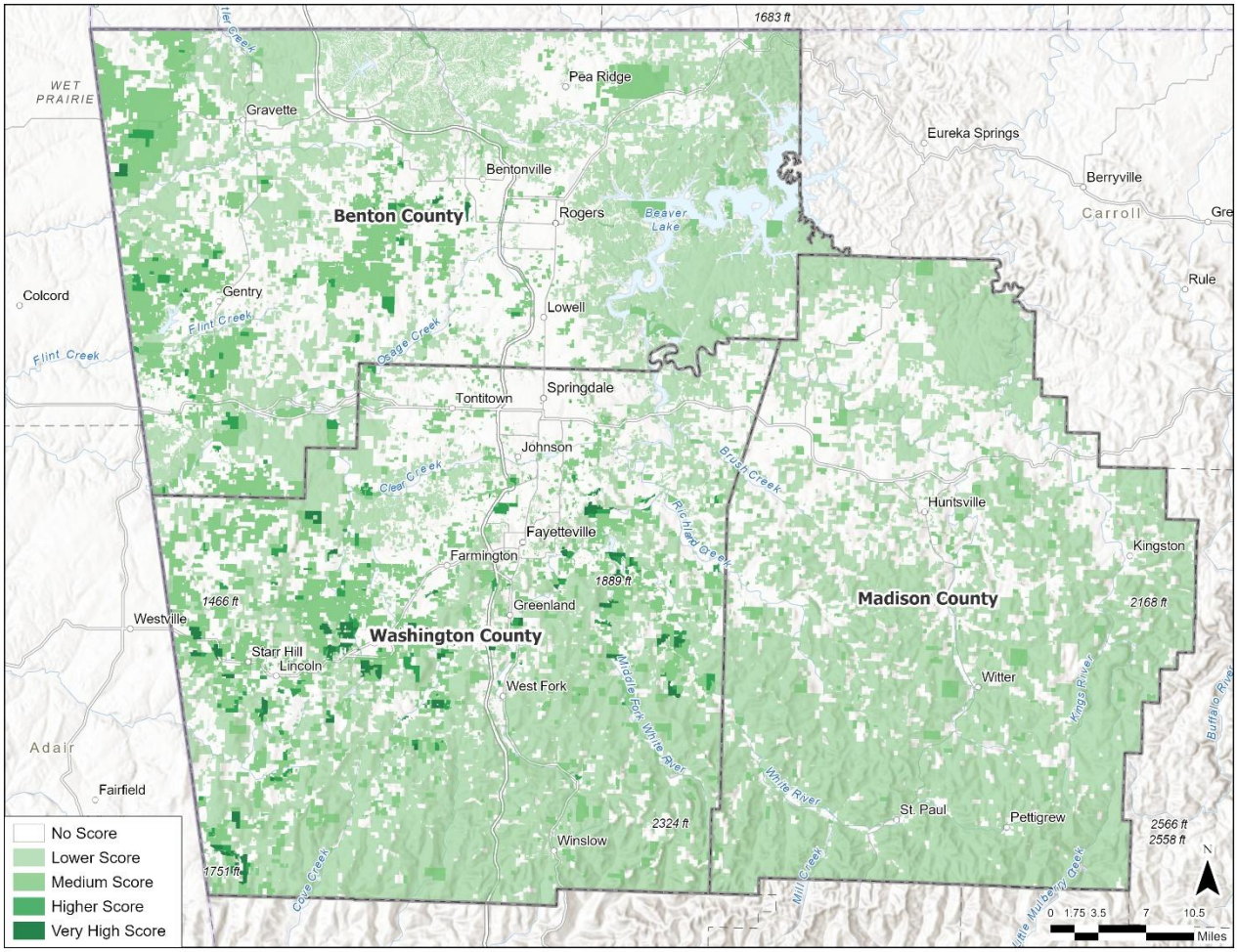

Figure 7. Distribution of Ranked Carbon Sequestration and Storage Subscores.

Table 13. Number of Land Parcels per Carbon Sequestration and Storage Subscore.

Rank	Sub-Score	Number of Land Parcels					Percentage of Ranked Land Parcels	Percentile of Ranked Land Parcels
		Size Class						
		< 1 acre	1 - 5 acres	5 - 40 acres	> 40 acres	Total		
UNRANKED	0	169,157	22,540	16,765	3,498	**211,960**	-	-
LOWER	1	39,248	13,309	18,015	6,854	**77,426**	88.895	0.0
MEDIUM	2	3,112	1,057	2,745	1,163	**8,077**	9.273	12.5
	3	240	175	449	288	**1,152**	1.323	25.0
HIGHER	4	11	8	60	65	**144**	0.165	37.5
	5	42	21	50	25	**138**	0.158	50.0
VERY HIGH	6	16	7	35	21	**79**	0.091	62.5
	7	8	1	27	36	**72**	0.083	75.0
	8	2	-	-	6	**8**	0.009	87.5
	9	1	-	-	1	**2**	0.002	100.0

Table 14. Number of Land Parcels per Carbon Sequestration and Storage Indicator.

Indicator	Number of Land Parcels				
	Size Class				
	<1 acre	1-5 acres	5-40 acres	>40 acres	Total
Carbon-storing Forest	39,506	13,490	18,496	7,162	**78,654**
Carbon-storing Pond	198	79	339	310	**926**
Carbon-storing Prairie	3,182	1,167	2,998	1,327	**8,674**
Carbon-storing Wetland: Herbaceous	2	-	7	7	**16**
Carbon-storing Wetland: Shrub	4	3	20	13	**40**
Carbon-storing Wetland: Forested	67	28	94	71	**260**

Overall, approximately 29 percent of land parcels, totaling 1,062,813 acres, currently provide some form of carbon sequestration and storage (see **Figure 8**), primarily upland forests. Land parcels with carbon-storing herbaceous and shrub wetlands make up the smallest number of carbon-storing landscapes in Northwest Arkansas. The percentage of land parcels scoring for each indicator of carbon sequestration and storage is shown in **Table 15** below.

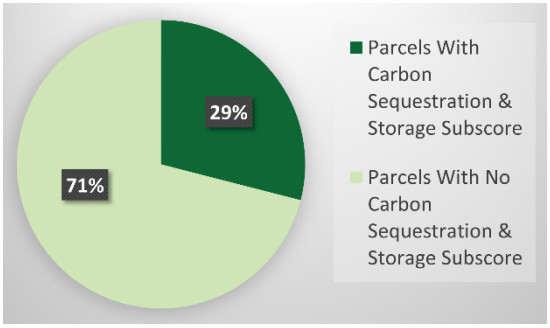

Figure 8. Percentage of Total Land Parcels with Carbon Sequestration and Storage Indicators.

Table 15. Percentage of Total Land Parcels per Carbon Sequestration and Storage Indicator.

Indicator	Percentage
Carbon-storing Forest	26.30
Carbon-storing Pond	0.31
Carbon-storing Prairie	2.90
Carbon-storing Wetland: Herbaceous	0.01
Carbon-storing Wetland: Shrub	0.01
Carbon-storing Wetland: Forested	0.09

4.4 Nature-based Solutions Composite Score Results

A total of 294,895 land parcels were given a Nature-based Solutions composite score equal to the sum of each of the three subscores. The higher the Nature-based Solutions composite score a land parcel received, the greater the number of features for adapting to and mitigating environmental stressors and extreme weather the parcel was found to have, and the more valuable the parcel is for the implementation of nature-based solutions. **Figure 9** below shows the distribution of the land parcels throughout Northwest Arkansas that received a Nature-based Solutions composite score.

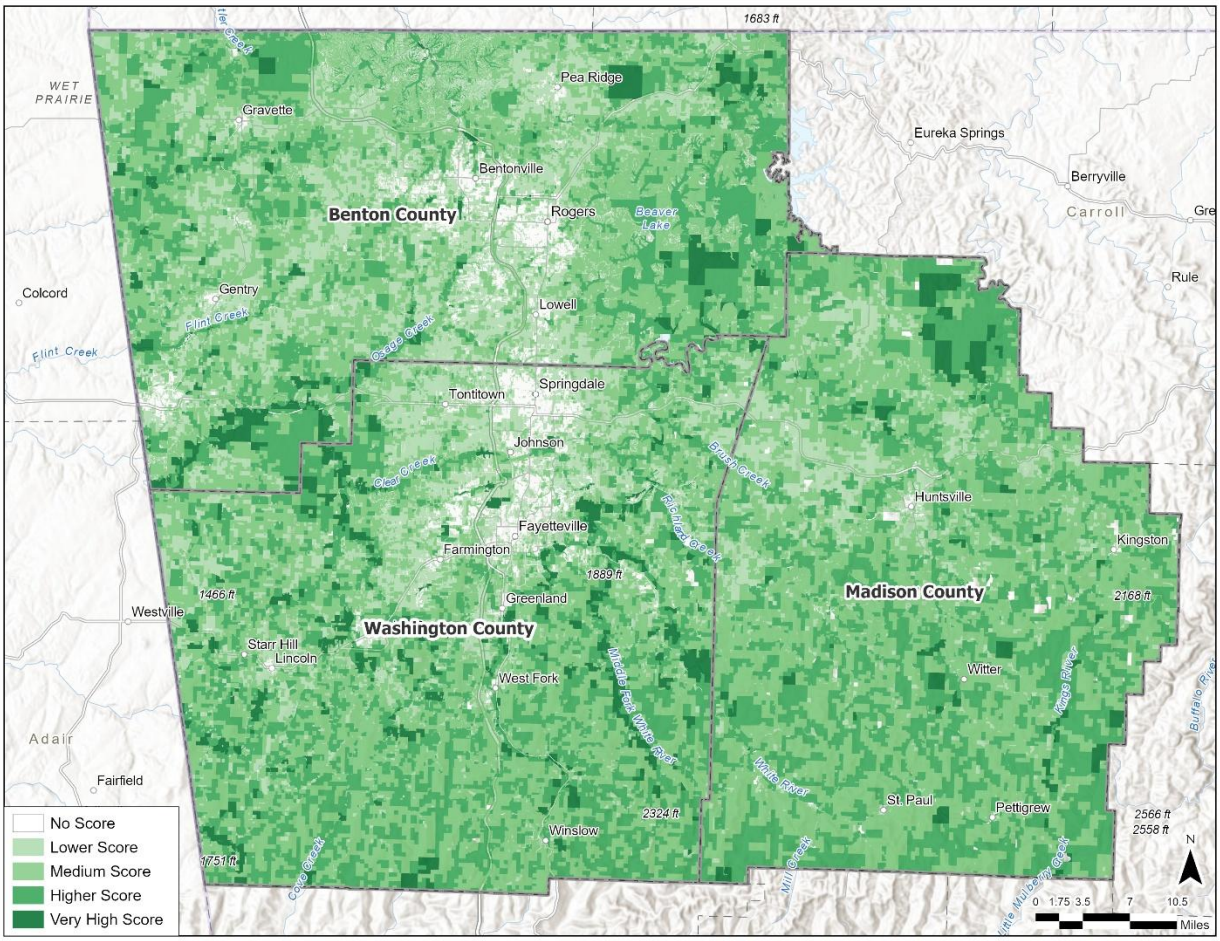

Figure 9. Distribution of Ranked Nature-based Solution Scores.

A total of 128,992 land parcels ranked as having Lower value for Nature-based Solutions (scores of 1 to 4); another 71,357 ranked as having Medium value (scores of 5 to 8). A total of 9,225 land parcels ranked as having Higher value for Nature-based Solutions (scores of 9 to 13); another 845 parcels ranked as having Very High value (scores of 14 to 32). Land parcels ranked as Higher total approximately 482,839 acres, or 28.25 percent of the acreage of the region. Land parcels that ranked Very High total approximately 71,269 acres, or 4.17 percent of the acreage of the region. The number of land parcels for each Nature-based Solutions composite score is shown in **Table 16** below.

Table 16. Number of Land Parcels per Nature-based Solutions Composite Score.

Rank	Composite Score	Number of Land Parcels					Percentage of Ranked Land Parcels	Percentile of Ranked Land Parcels
		Size Class						
		< 1 acre	1 - 5 acres	5 - 40 acres	> 40 acres	Total		
UNRANKED	0	86,515	1,895	223	6	**88,639**	-	-
LOWER	1	41,605	7,351	1,575	20	**50,551**	24.0240	0.0
	2	18,919	5,037	2,881	106	**26,943**	12.8045	3.2
	3	22,661	5,635	3,854	302	**32,452**	15.4226	6.4
	4	9,598	4,216	4,657	575	**19,046**	9.0515	9.6
MEDIUM	5	16,607	5,201	5,536	780	**28,124**	13.3657	12.9
	6	12,371	4,549	7,317	1,886	**26,123**	12.4148	16.1
	7	1,960	1,729	5,007	2,027	**10,723**	5.0960	19.3
	8	808	794	3,034	1,751	**6,387**	3.0354	22.5
HIGHER	9	318	330	1,672	1,291	**3,611**	1.7161	25.8
	10	154	151	885	928	**2,118**	1.0066	29.0
	11	103	115	700	851	**1,769**	0.8407	32.2
	12	86	55	404	602	**1,147**	0.5451	35.4
	13	37	27	166	350	**580**	0.2756	38.7
VERY HIGH	14	18	18	95	156	**287**	0.1364	41.9
	15	22	6	59	119	**206**	0.0979	45.1
	16	15	4	33	68	**120**	0.0570	48.3
	17	12	4	17	46	**79**	0.0375	51.6
	18	9	1	12	29	**51**	0.0242	54.8
	19	8	-	11	29	**48**	0.0228	58.0
	20	3	-	4	16	**23**	0.0109	61.2
	21	4	-	1	10	**15**	0.0071	64.5
	22	2	-	2	4	**8**	0.0038	67.7
	23	-	-	1	3	**4**	0.0019	70.9
	24	1	-	-	-	**1**	0.0005	74.1
	25	-	-	-	-	**-**	-	74.1
	26	-	-	-	-	**-**	-	74.1
	27	-	-	-	-	**-**	-	74.1
	28	-	-	-	-	**-**	-	74.1
	29	1	-	-	1	**2**	0.0010	90.3
	30	-	-	-	-	**-**	-	90.3
	31	-	-	-	-	**-**	-	90.3
	32	-	-	-	1	**1**	0.0005	100.0

Overall, approximately 70 percent of land parcels, totaling 1,631,757 acres, currently have the ability to provide nature-based solutions for adapting to and mitigating environmental stressors and extreme weather in one form or another (see **Figure 10**); most of these parcels are less than 1 acre in size. The percentage of land parcels scoring for Nature-based Solutions in each size class is shown in **Table 17** below.

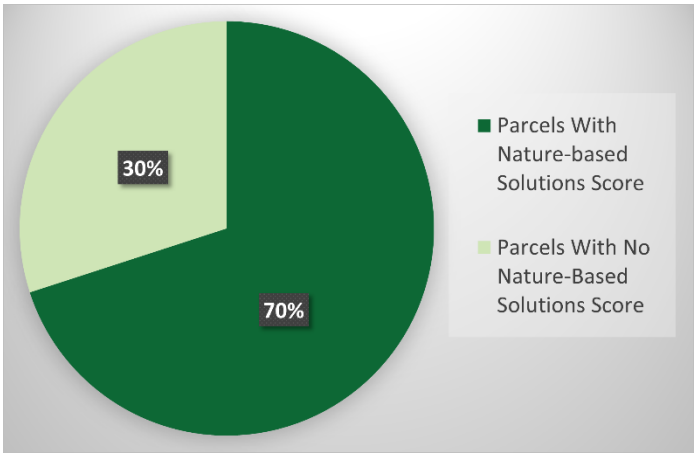

Figure 10. Percentage of Total Land Parcels with Nature-based Solutions Score.

Table 17. Percentage of Total Land Parcels Scoring for Nature-based Solutions per Size Class.

Size Class	Percentage
<1 acre	71
1-5 acres	12
5-40 acres	13
>40 acres	4

4.5 Social Equity Score Results

A total of 257,085 land parcels were assigned a Social Equity score based on factors discussed above that were identified on that parcel during this analysis. The higher the score a land parcel received, the more factors are present on that parcel for consideration of social equity when nature-based solutions are implemented. **Figure 11** below shows the distribution of the land parcels throughout Northwest Arkansas that received a Social Equity score.

Approximately 16 percent of land parcels within Northwest Arkansas are located in a mapped heat island, and 12 percent are in communities with low-moderate income households. Approximately 28 percent of land parcels are currently located more than a 1.0-mile walk from a public park or open space. The number of land parcels for each Social Equity score are shown in **Table 18** below. The number of land parcels that received a score for each Social Equity factor are shown in **Table 19**.

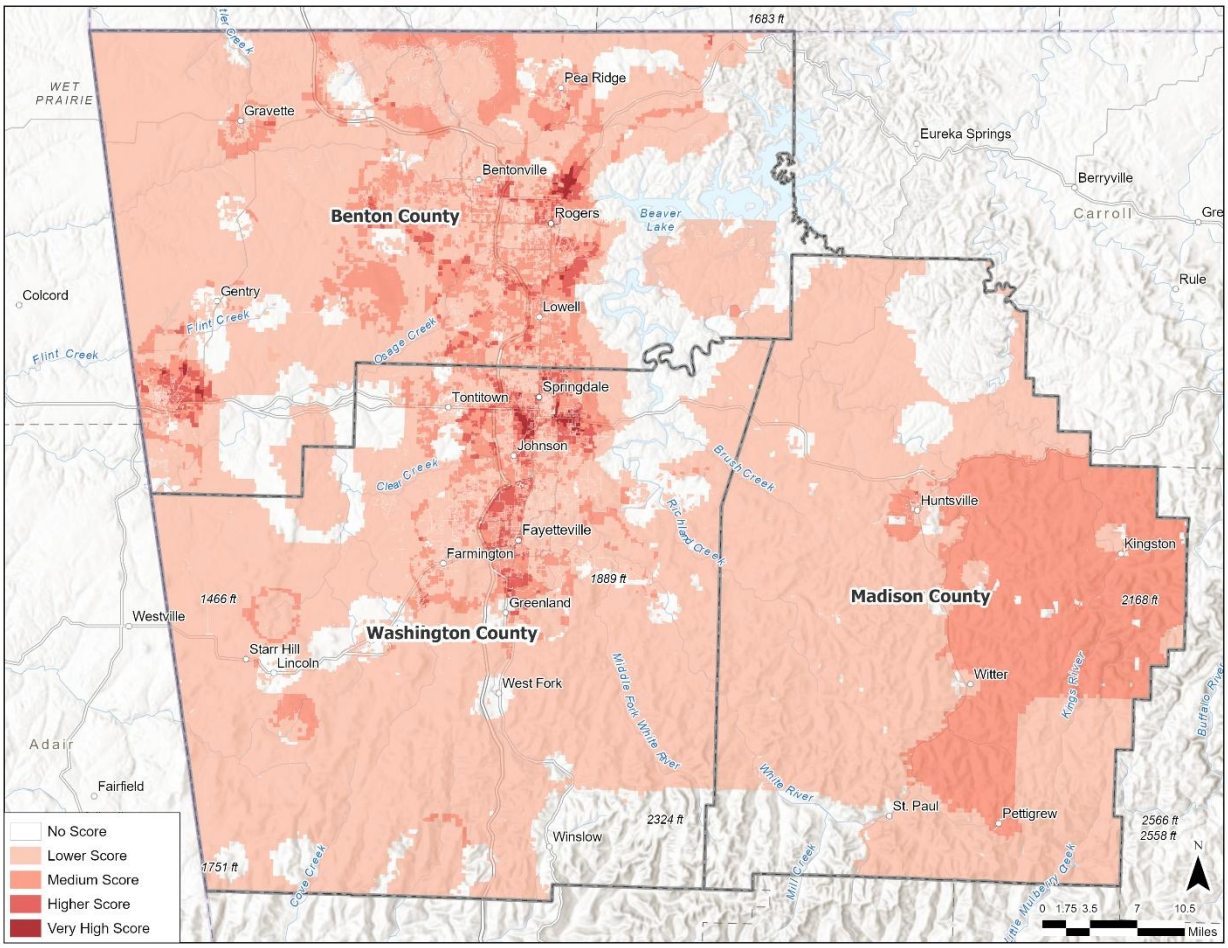

Figure 11. Distribution of Ranked Social Equity Scores.

Table 18. Number of Land Parcels per Social Equity Score.

Score	Number of Land Parcels				
	Size Class				
	< 1 acre	1 - 5 acres	5 - 40 acres	> 40 acres	Total
0	24,988	7,975	7,197	1,813	**41,973**
1	116,542	21,988	24,685	8,111	**171,326**
2	60,626	6,177	5,653	1,945	**74,401**
3	8,784	911	549	80	**10,324**
4	897	67	62	8	**1,034**

Table 19. Number of Parcels per Social Equity Indicator.

Factor	Number of Land Parcels					Percentage of Total Land Parcels
	Size Class					
	< 1 acre	1 - 5 acres	5 - 40 acres	> 40 acres	Total	
Lack of Proximity to Open Space	35,536	15,262	23,457	8,725	**82,980**	**28**
Low-moderate Income	26,515	2,984	3,707	2,141	**35,347**	**12**
Proximity to Active Transportation Network*	164,777	15,431	8,142	1,060	**189,410**	**63**
Heat Island	40,906	3,666	2,580	347	**47,499**	**16**

* Land parcels near the active transportation network are prime locations for the consideration of establishing new open space that could provide refuge during the day from extreme temperatures for those who may lack indoor air conditioning.

5.0 CONCLUSION

To support sustainability and resilience in Northwest Arkansas, it is important to understand the characteristics of the natural landscape within the region that provides natural infrastructure for the implementation of nature-based solutions for protecting and improving environmental quality. Identifying lands of ecological value can better inform future policies, programs, and actions undertaken within the region to assure the continuance of a high quality of life for its residents.

This study has identified land parcels that provide valuable ecosystem services, ecosystem resilience, and carbon sequestration and storage; it has also identified parcels where special considerations should be made regarding social equity as the region implements the measures included in the NW Arkansas Energy & Environment Innovation Plan to improve the overall sustainability and resilience of the region.

With the wealth of natural resources in the region, Northwest Arkansas is in a strong position to take proactive steps to implement nature-based solutions to protect environmental quality and preserve quality of life in the region.

Parcels of land that ranked High or Very High for providing opportunities for nature-based solutions should be considered for preservation or conservation efforts to protect and improve these areas so they can continue to contribute to the region's resilience to environmental stressors. Some of these areas serve as biodiversity hotspots that help to buffer the ecological stressors placed on other natural areas within the region, providing habitat for wildlife while simultaneously providing carbon sequestration and storage and ecosystem services that buffer

the impacts from extreme weather. An effort to conserve a diversity of landscapes in the region, from uplands to wetlands and hilltops to valleys, would provide further improvement to the ecological resilience to environmental stressors. These and other natural areas could continue to provide the ecosystem services that benefit both humans and wildlife.

Parcels of land that connect High or Very High ranked natural areas should also be considered for preservation or conservation, because these habitat linkages allow species to migrate in response to environmental stressors while simultaneously providing carbon sequestration and ecosystem services. Allowing wildlife populations to use these habitat linkages improves their ability to meet their biological needs in the face of environmental stressors and human pressures, will keep the ecosystems within the region healthy, and will thus optimize the ecosystem services provided to residents.

Addressing social equity in Northwest Arkansas can include considering the implementation of nature-based solutions in areas occupied by disadvantaged communities that are located in flood-prone areas or that are in mapped heat islands.

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