Arkansas Energy and Environment Innovation Plan
Priority Action Plan

Prepared by Arkansas Department of Energy and Environment

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
AD	Anaerobic digester
BAU	Business-as-usual
CEJST	Climate and Economic Justice Screening Tool
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalents
CPRG	Climate Pollution Reduction Grant
DAF	Dissolved air flotation
E&E	Arkansas Department of Energy and Environment
f-gases	Fluorinated gases
GHG	Greenhouse gas
HFCs	Hydrofluorocarbons
LFG	Landfill gas
LIRC	Low-income and rural community
LULUCF	Land-Use, Land-Use Change, and Forestry
MMT	Million metric tons
MSA	Metropolitan Statistical Area
N_2O	Nitrous oxide
NF_3	Nitrogen trifluoride
NMOC	Non-methane organic compounds
NWARPC	Northwest Arkansas Planning Commission
PAP	Priority Action Plan
PFCs	Perfluorocarbons
RNG	Renewable natural gas
SDI	States Deployment Initiative
SF6	Sulfur hexafluoride
SIT	State Inventory Tool
EPA	United States Environmental Protection Agency

Introduction

With this report, the 2023-24 Arkansas Energy and Environment Innovation (EEI) plan, Arkansas Department of Energy and Environment (E&E) prepared an emissions inventory and priority assessment of energy and environmental solutions that will help Arkansas remain forward-looking and will serve as guidance for future investments. The EEI plan is also the primary deliverable priority action plan (PAP), as required under EPA's Climate Pollution Reduction Grant (CPRG).

For preparation of this PAP, E&E partnered with City of Fort Smith, Metroplan, and Northwest Arkansas Regional Planning Commission (NWARPC), with the intent to support investment in policies, practices, and technologies that reduce pollutant emissions, create high-quality jobs, spur economic growth, and enhance the quality of life for all Arkansans. E&E and partners look forward to the numerous economic, public health, and environmental benefits associated with the additional clean energy infrastructure investments in the state made possible through implementation of the measures included in this Energy and Environment Innovation PAP and Arkansas's forthcoming Comprehensive Action Plan (CAP).

This project has been funded by the United States Environmental Protection Agency (EPA) under assistance agreement 02F35201 to E&E. The contents of this document do not necessarily reflect the views and policies of EPA, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document. The measures contained herein should be construed as broadly available to any entity in the state eligible for receiving funding under the EPA's CPRG implementation grants and other funding streams, as applicable.

This PAP is organized into the following sections:

1. Emissions Inventory
2. Priority Measures Outline
3. Low-Income and Disadvantaged Community Analysis
4. Review of Authority
5. Coordination and Outreach
6. Funding Intersections
7. Appendices (Priority measures detailed, procedural documentation, etc.)

1. GHG Emissions Inventory

E&E has developed a statewide inventory of major sources of greenhouse gas (GHG) emissions within Arkansas. This inventory was prepared using the state-level GHG inventories prepared by the EPA.[1]

The Arkansas inventory includes the following sectors and gases:

Sectors	***Greenhouse Gases (across all sectors)***
Transportation Electricity generation and/or use Natural and working lands Industry Agriculture Commercial and residential buildings Waste and materials management Wastewater	carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases (F-gases) including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3)

Table 1 details GHG emissions in million metric tons (MMT) of carbon dioxide equivalents (CO_2e) for all economic sectors. Table 2 details emissions of specific GHGs across all sectors.

Table 1. Arkansas GHG emissions in MMT CO_2e by Sector[2]

Sector/Source	**2005**	**2021**
Transportation	**21.3**	**20.5**
CO_2 from Fossil Fuel Combustion	20.1	19.9
Substitution of Ozone Depleting Substances	0.8	0.4
Mobile Combustion	0.3	0.1
Non-Energy Use of Fuels	0.2	0.1
Electric Power Industry	**26.1**	**29.1**
CO_2 from Fossil Fuel Combustion	25.6	28.5
Stationary Combustion	0.3	0.4
Incineration of Waste	0.0	NO
Electrical Equipment	0.2	0.0

[1] https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals
[2] Data were obtained from EPA's State-level GHG inventories file State-GHG_Trends_Emissions__Sinks_Economic_Sector_08312023.xlsx, which was accessed on December 19, 2023. This data set is available at <https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals>.
NO = Not occurring
Symbols:
"-" indicates that the value has not be estimated at this time or is not applicable to the State
"+" indicates that the value does not exceed 0.005 MMT CO_2E

Other Process Uses of Carbonates	0.1	0.1
Industry	**15.4**	**13.0**
CO_2 from Fossil Fuel Combustion	6.8	6.4
Natural Gas Systems	4.4	3.5
Non-Energy Use of Fuels	0.2	0.2
Petroleum Systems	0.1	0.1
Coal Mining	+	NO
Iron and Steel Production	1.7	0.4
Cement Production	0.7	0.5
Substitution of Ozone Depleting Substances	0.1	0.4
Petrochemical Production	NO	NO
Lime Production	0.2	0.2
Ammonia Production	NO	0.3
Nitric Acid Production	NO	0.1
Abandoned Oil and Gas Wells	0.0	0.0
Wastewater Treatment	0.3	0.3
Urea Consumption for Non-Agricultural Purposes	0.0	0.0
Mobile Combustion	0.1	0.1
Abandoned Underground Coal Mines	NO	NO
Adipic Acid Production	NO	NO
Carbon Dioxide Consumption	0.0	0.0
Electronics Industry	NO	NO
N_2O from Product Uses	0.0	0.0
Stationary Combustion	0.1	0.1
Other Process Uses of Carbonates	0.1	0.1
Fluorochemical Production	NO	NO
Aluminum Production	NO	NO
Soda Ash Production	NO	NO
Ferroalloy Production	0.1	NO
Titanium Dioxide Production	NO	NO
Caprolactam, Glyoxal, and Glyoxylic Acid Production	NO	NO
Glass Production	0.0	0.0
Magnesium Production and Processing	NO	NO
Zinc Production	NO	NO
Phosphoric Acid Production	NO	NO
Lead Production	NO	NO
Landfills (Industrial)	0.3	0.3
Carbide Production and Consumption	+	+
Agriculture	**21.3**	**16.5**
N_2O from Agricultural Soil Management[1,2]	5.1	5.5
Enteric Fermentation	3.4	3.1
Manure Management	0.5	0.4
CO_2 from Fossil Fuel Combustion	2.9	1.0
Rice Cultivation	8.8	6.3

Urea Fertilization	0.2	0.2
Liming	0.1	NO
Mobile Combustion	0.1	0.0
Field Burning of Agricultural Residues[1,2]	0.1	0.0
Stationary Combustion	+	+
Commercial	**3.7**	**6.2**
CO_2 from Fossil Fuel Combustion	2.1	3.5
Landfills (Municipal)	1.0	1.6
Substitution of Ozone Depleting Substances	0.2	0.8
Wastewater Treatment	0.3	0.3
Composting	0.0	0.0
Stationary Combustion	0.0	0.0
Anaerobic Digestion at Biogas Facilities	NO	NO
Residential	**2.3**	**2.7**
CO_2 from Fossil Fuel Combustion	2.2	2.1
Substitution of Ozone Depleting Substances	0.1	0.6
Stationary Combustion	0.1	0.1
Total Emissions (Sources)	**90.2**	**88.0**
Land-Use, Land-Use Change, and Forestry (LULUCF) Sector Net Total	**(40.8)**	**(34.1)**
Net Emissions (Sources and Sinks)	**49.4**	**53.9**

Table 2. Arkansas GHG emissions in MMT CO_2e by Gas[3]

Gas/Source	2005	2021
CO_2	**63.5**	**63.8**
Fossil Fuel Combustion	59.6	61.3
Electric Power Sector	25.6	28.5
Transportation	20.1	19.9
Industrial	9.7	7.4
Residential	2.2	2.1
Commercial	2.1	3.5
Non-Energy Use of Fuels	0.4	0.3
Natural Gas Systems	0.3	0.4
Cement Production	0.7	0.5

[3] Data were obtained from EPA's State-level GHG inventories file State-GHG_Trends_Emissions__Sinks_By_Gas_08312023.xlsx, which was accessed on December 19, 2023. This data set is available at <https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals>.

NO = Not occurring
Symbols:
"-" indicates that the value has not be estimated at this time or is not applicable to the State
"+" indicates that the value does not exceed 0.005 MMT CO_2E

Lime Production	0.2	0.2
Other Process Uses of Carbonates	0.1	0.2
Glass Production	0.0	0.0
Soda Ash Production	NO	NO
Carbon Dioxide Consumption	0.0	0.0
Incineration of Waste	0.0	NO
Titanium Dioxide Production	NO	NO
Aluminum Production	NO	NO
Iron and Steel Production & Metallurgical Coke Production	1.7	0.4
Ferroalloy Production	0.1	NO
Ammonia Production	NO	0.3
Urea Consumption for Non-Agricultural Purposes	0.0	0.0
Phosphoric Acid Production	NO	NO
Petrochemical Production	NO	NO
Carbide Production and Consumption	+	+
Lead Production	NO	NO
Zinc Production	NO	NO
Petroleum Systems	0.0	0.0
Abandoned Oil and Gas Wells	+	+
Magnesium Production and Processing	NO	NO
Coal Mining	+	NO
Liming	0.1	NO
Urea Fertilization	0.2	0.2
Substitution of Ozone Depleting Substances	+	+
International Bunker Fuels[4]	0.2	0.1
Wood Biomass, Ethanol, and Biodiesel Consumption[5]	7.7	6.4
CH_4	**19.0**	**15.4**
Stationary Combustion	0.1	0.1
Mobile Combustion	0.0	+
Coal Mining	+	NO
Abandoned Underground Coal Mines	NO	NO
Natural Gas Systems	4.2	3.1
Petroleum Systems	0.1	0.1
Abandoned Oil and Gas Wells	0.0	+
Petrochemical Production	NO	NO
Carbide Production and Consumption	NO	NO
Iron and Steel Production & Metallurgical Coke Production	+	NO
Ferroalloy Production	+	NO

[4] Emissions from international bunker fuels are not included in totals.
[5] Wood biomass, ethanol, and biodiesel consumption emissions are not included in the sum of Energy sector totals. Net carbon fluxes from changes in biogenic carbon reservoirs are accounted for in LULUCF estimates.

Enteric Fermentation	3.4	3.1
Manure Management	0.4	0.2
Rice Cultivation	8.8	6.3
Field Burning of Agricultural Residues	0.1	0.0
Landfills	1.3	1.9
Wastewater Treatment	0.5	0.4
Composting	0.0	0.0
Anaerobic Digestion at Biogas Facilities	NO	NO
Incineration of Waste	+	NO
International Bunker Fuels[6]	+	+
N_2O	**6.3**	**6.6**
Stationary Combustion	0.4	0.5
Mobile Combustion	0.4	0.2
Adipic Acid Production	NO	NO
Nitric Acid Production	NO	0.1
Manure Management	0.2	0.2
Agricultural Soil Management	5.1	5.5
Field Burning of Agricultural Residues	0.0	0.0
Wastewater Treatment	0.2	0.2
N_2O from Product Uses	0.0	0.0
Caprolactam, Glyoxal, and Glyoxylic Acid Production	NO	NO
Incineration of Waste	+	NO
Composting	0.0	0.0
Electronics Industry	NO	NO
Natural Gas Systems	+	+
Petroleum Systems	+	+
International Bunker Fuels[7]	+	+
HFCs, PFCs, SF_6 and NF_3	**1.3**	**2.157**
HFCs	**1.2**	**2.1**
Substitution of Ozone Depleting Substances	1.2	2.1
Fluorochemical Production	NO	NO
Electronics Industry	NO	NO
Magnesium Production	NO	NO
PFCs	**+**	**+**
Aluminum Production	NO	NO
Electronics Industry	NO	NO

[6] Emissions from international bunker fuels are not included in totals.
[7] Emissions from international bunker fuels are not included in totals.

Electrical Equipment	NO	NO
Substitution of Ozone Depleting Substances[8]	+	+
SF_6	**0.2**	**0.0**
Electrical Equipment	0.2	0.0
Electronics Industry	NO	NO
Magnesium Production	NO	NO
NF_3	**NO**	**NO**
Electronics Industry	NO	NO
Total (Sources) Emissions[9]	**90.2**	**88.0**
LULUCF Emissions[10]	**1.4**	**1.5**
LULUCF CH_4 Emissions	1.3	1.3
LULUCF N_2O Emissions	0.1	0.1
LULUCF Carbon Stock Change[11]	(42.2)	(35.522)
LULUCF Sector Net Total[12]	**(40.8)**	**(34.1)**
Net Emissions (Sources and Sinks)[13]	**49.4**	**53.9**

Carbon dioxide makes up 70% of Arkansas GHG emissions followed by methane (19%), nitrous oxides (10%), and fluorinated gases (3%)

The highest emission contributing sectors in Arkansas are the Electric Power and the Transportation sectors, followed by Industry and Agriculture, while the Commercial and Residential Buildings sectors contribute significantly less to the total emissions noted for the state.

While Commercial and Residential Building contributions are much lower than the aforementioned sectors, funding and support in these sectors remain important to Arkansas citizens, as expressed in surveys and Idea Box submittals, likely because supporting programs would create impacts closer to home. Thus, priority measures are also identified for weatherization and energy efficiency purposes that have dual impacts of environmental sustainability and general wellbeing of Arkansas citizens.

Generally, measures promoting sustainable transportation options, and those that encourage energy efficiency, building weatherization, process electrification, on-site renewable generation, hydrogen fueling, large-scale renewable projects, and innovative energy production solutions could be expected to have significant impact on the state's emissions profile. Agricultural

[8] Small amounts of PFC emissions also result from this source.
[9] Total emissions presented without LULUCF.
[10] LULUCF emissions of CH_4 and N_2O are reported separately from gross emissions totals.
[11] LULUCF Carbon Stock Change is the net C stock change from the following categories: Forest Land Remaining Forest Land, Land Converted to Forest Land, Cropland Remaining Cropland, Land Converted to Cropland, Grassland Remaining Grassland, Land Converted to Grassland, Wetlands Remaining Wetlands, Land Converted to Wetlands, Settlements Remaining Settlements, and Land Converted to Settlements.
[12] The LULUCF Sector Net Total is the net sum of all CH_4 and N_2O emissions to the atmosphere plus net carbon stock changes.
[13] Net emissions include LULUCF.

innovations would also have a more significant impact in Arkansas than in other states, as emissions from this sector are higher compared to other states, due to higher prevalence of agricultural and farming activities.

2. Priority Measures Outline

The measures in this PAP have been identified as "priority measures" for the purposes of pursuing funding through CPRG implementation grants. This is not an exhaustive list of Arkansas's priorities. Instead, the selected priority measures included in this PAP meet the following criteria:

- The measure is implementation ready, meaning that the design work for the policy, program, or project is sufficiently complete that a full scope of work and budget can be included in a CPRG implementation grant application.

- The measure can be completed in the near term, meaning that all funds will be expended, and the project completed, within the five-year performance period for the CPRG implementation grants.

- The measure advances one or more of the following investment priorities for Arkansas, as identified by Governor Sanders:
    1. Facilitating statewide and economic growth and competitiveness;
    2. Keeping communities safe;
    3. Preparing the infrastructure workforce;
    4. Preservation and promotion of the Natural State (Arkansas); and
    5. Creating a portfolio of reliable, efficient, and secure energy options.

Prioritized measures are listed in this section, and are detailed further in Appendices A - K of this PAP. Measures included in these Appendices have been identified by E&E as being state priority measures under this PAP.

E&E recognizes that there are already many impactful energy efficiency, land management, and emissions-reduction programs either ongoing or that have been active in Arkansas in recent years. One significant measure for the Arkansas PAP is to supplement these ground-ready programs with additional funding. For purposes of CPRG implementation funds, the additional funding would be tailored to focus on those areas (or beneficiaries of the program) identified as low-income and rural communities (LIRC) by EPA's Climate and Economic Justice Screening Tool (CEJST), those projects and programs that have the highest impact on GHG and co-pollutant reductions, and which are best equipped to meet CPRG programmatic requirements and goals. Leverage of CPRG funding would complement funding already in play with these programs, and would allow for an addition of specific needs-based program elements, such as a set-aside "maintenance fund" to support upkeep of existing EV charging infrastructure, or hiring a student research assistant to focus on agricultural carbon capture and storage studies.

The following are examples of Arkansas-based programs E&E has identified as being well-suited for inclusion in the PAP for additional support through a CPRG implementation grant (or other funding source) pass-through or direct funding program:

Arkansas Department of Energy & Environment

- Arkansas Energy Performance Contracting (AEPC)
  https://www.adeq.state.ar.us/energy/initiatives/performance.aspx

- Aids organizations in paying for efficiency upgrades to equipment (lighting, chillers, boilers, water systems, and renewable generation)
- Offered to state agencies, higher education, municipalities, counties, and school districts
- Guaranteed over $400 million in energy savings for public sector

- Electric Vehicle Supply Equipment (EVSE) Reimbursement Rebate Program https://www.adeq.state.ar.us/energy/opportunities/
  - Provides rebates for installation of Level 2 EV charging stations
  - Open to government, private, and non-profit entities
  - First come, first serve
- DC Fast Charge Financial Assistance Program https://www.adeq.state.ar.us/energy/opportunities/
  - Provides funding assistance for installation of ~3 150 kW DC Fast Charge stations
- Go RED! Funding (EPA State Clean Diesel Grant Program) https://www.adeq.state.ar.us/air/planning/gored/
  - Funds used to help reduce emissions from diesel engines in Arkansas
  - For public and private entities and non-profit organizations in Arkansas
  - Emissions may be reduced by employing exhaust controls, engine upgrades, idling reduction technologies, engine replacements, or vehicle/equipment replacements
- Weatherization Assistance Program https://www.adeq.state.ar.us/energy/assistance/wap.aspx
  - Annual grant funds for community action and non-profit agencies to provide services to low-income families in Arkansas
  - Arkansas Weatherization Program (AWP) helps reduce energy usage in energy inefficient homes
- Electric Vehicle Supply Equipment Program https://www.adeq.state.ar.us/air/grants.aspx
  - Funding assistance for installation of new EV charging stations

Arkansas Department of Agriculture

- Wetland & Riparian Zones Tax Credit Program https://www.agriculture.arkansas.gov/natural-resources/divisions/water-management/wetlands-riparian-zone-tax-credit-program/
  - State income tax credit taken by taxpayers who contribute to conservation efforts through approved projects
  - Promotes increased biological and ecological integrity through voluntary restoration
- Groundwater Conservation Tax Credit Program https://www.agriculture.arkansas.gov/natural-resources/divisions/water-management/tax-credits/
  - Encourage water users to invest in the construction of impoundments to use available surface water to reduce dependence on groundwater, convert from groundwater use to surface water use, and level the land to reduce agricultural irrigation water use
  - Tax credits: impoundment – 50% of project cost for at least 20 acres of land; conversion – 25% of total cost; leveling – 25% of project cost
- Arkansas Urban and Community Forestry Grants: https://www.agriculture.arkansas.gov/grants/
  - Funds community projects that develop, improve, and/or promote urban and community trees and forests

Additional examples of useful measures that promote goals of the CPRG include weatherization programs, sustainable and resilient land-use programs (buffer/riparian expansion, wetlands creation, rain garden installation, agricultural equipment/process upgrades, etc.).

It is important to note that while priority measures described in this plan may reference a specific application, these measures may also be applied more broadly for further reaching benefits across the state. Even with limited application of these measures to the described areas, the benefits will be experienced by surrounding communities as resources, infrastructure improvements, ease of travel, and the establishment of new programs become available and given the potential to expand through receiving initial bolstering by implementation grants and related funding.

Measures are presented as overarching concepts with individual components. These components may be applicable as a whole or as standalone efforts to support an overall transition one small change at a time. Measures may reflect a degree of overlap to ensure that the importance of these actions is recognizable both in planning and application and that these components may be regrouped as needed to meet particular municipal, county, regional, and statewide needs for the optimal potential to resolve scalable problems with a non-prescriptive solution approach. Eligible entities applying for implementation grants are encouraged to culminate applications that best suit their scale and in consideration of cohorts within a coalition if applicable.

Figure 1: Arkansas Investment Priorities

For each priority measure in this PAP, Table 3 provides additional details about the following:

- An estimate of the cumulative GHG emission reductions from 2025 through 2035;
- An estimate of the cumulative GHG emission reductions from 2025 through 2050;
- A list of key implementing entities (not exhaustive); and
- Indication of measures' alignment(s) with numbered priorities as identified by Governor Sanders (Figure 1).

For identified priority measures, E&E and partners provide further discussion of the impacts on LIRC, authority to implement the measures, additional benefits, projected costs, community impacts, and other planning considerations in the measures' Appendices, A – K.

Table 3: Priority Action Measures for Arkansas

Priority Measure	Priority Measure Components	Cumulative GHG emission reductions (MMT CO_2e)*		Implementing Lead Entity Level	Governor's Priority Alignment	Priority Measure Appendix
		2025–2035	2025–2050			
Anaerobic Digester Implementation		.005	.011 [14]	Municipalities, Counties, MSAs, State	1, 3, 5	A
Landfill Gas Expansion		0.216	.540 [15]	Municipalities, Counties, MSAs, State	1, 3, 5	B
EV Charging and Hydrogen Fueling Corridor and Innovations at Industrial Operations		0.025	0.037 [16]	State	1, 3, 5	C
Customer Renewable Partnership Support Program		.210	.525 [17]	State	1, 3, 4, 5	D
Public Property Innovation and Resiliency Support		0.190	0.475 [18]	State	3, 4	E
Agricultural and Wastewater Pump Repair and Energy Efficiency Program		1.34	3.35 [19]	Municipalities, Counties, MSAs, State	3, 4	F
Agricultural Emissions and Carbon Sequestration Research Support		---	--- [20]	Municipalities, Counties, MSAs, State	3, 4	G

[14] Estimate assumes 75 tons reduced per unit per year applied at six facilities operating from 2025 through 2035 and 2050 respectively.

[15] Estimate assumes 2,702 tons of reduced carbon emissions per unit at each of eight potential facilities operating from 2025 through 2035 and 2050 respectively.

[16] Estimate calculated using EPA Diesel Emissions Quantifier tool. Estimate assumes replacement of up to 56 existing long haul trucks, with reported average of 13,318 gallons of diesel per year and 62,751 miles, with EV and hydrogen-fuel long haul trucks with a lifetime of 15 years, or 1,000,000 miles. Program should encourage replacement of these vehicles with like vehicles at end of lifetime. Additional emission reductions are anticipated from personal-use vehicle refueling and recharging.

[17] Estimate assumes 175 tons of CO2 reduced per acre of solar panels, average solar farm assumption of 15 acres, and implementation of 8 solar farms minimum operating from 2025 through 2035 and 2050 respectively.

[18] Estimate assumes minimum of 30% energy use improvement at each of the buildings listed in Table 9, or a reduction of 35,806,157 kBtu in energy use and conservative reduction of 0.00005311 tCO2e per kBtu reduced with implementation from 2025 through 2035 and 2050 respectively through continued maintenance and upgrades. More reductions may occur if additional locations are identified post-submittal of this plan.

[19] Estimate only includes anticipated benefits from well timer program at this time. Estimate assumes up to 134,000 tons CO2 reduced per year of reduced operations at well pumps, with timers in place from 2025 through 2035 and 2050 respectively.

[20] Research is a support effort for sustainable implementation. Emission reductions achieved through implementation may be reflected in other measure values or in resulting activities.

Foodware Reuse Education and Support Program		0.001	0.002 [21]	Municipalities, Counties, MSAs, State	3, 4	H
Public Education and Workforce	Partner with Peak Innovation Center and UAFS for education	3.366	8.414 [22]	Municipalities, Counties, MSAs	2, 3, 4	I
	Conduct public education events	21.425	53.562 [23]	Municipalities, Counties, MSAs	2, 4	I
	Offer apprenticeships and internships for workforce development	---	--- [24]	Municipalities, Counties, MSAs	3, 4, 5	I
Energy Sector	Installing renewable energy and energy storage systems on municipal and government facilities	0.080	0.020 [25]	Municipalities, Counties, MSAs	3, 4, 5	K
	Developing distributed and community-scale renewable energy generation and storage, including in LIRC and rural communities	0.4	1.0 [26]	Municipalities, Counties, MSAs	3, 4, 5	K
	Developing and implementing programs that support smart-grid and behind-the meter technologies	---	--- [27]	Municipalities, Counties, MSAs, State	3, 4, 5	K
Solar and Net-Zero Buildings	Large scale city solar plant	7.0	175.032 [28]	Municipalities	2, 3, 4, 5	I
	Upgrade municipal facilities for energy efficiency	2.352	5.879 [29]	Municipalities	3, 4	I
	Low income solar and	0.0550	0.137 [30]	Municipalities,	3, 4, 5	I

[21] Estimate assumes replacement of up 90 to-go containers used per individual per year for up to 10,0000 individuals and up to 9.87 tons CO2 reduced per 1,000 participating individuals per year.
[22] Estimate assumes 2.86 tons CO2 reduced per individual educated per year with education provided to approximately 117,000 individuals in Arkansas with some college education or associates degree (https://www.census.gov/quickfacts/AR) with measure implementation from 2025 through 2035 and 2050 respectively.
[23] Estimate assumes 2.86 tons CO2 reduced per individual educated with 25% reach of nearly 3 million citizens living in identified LIRC communities across the state with measure implementation from 2025 through 2035 and 2050 respectively.
[24] Workforce development is a support effort for sustainable implementation. Emission reductions achieved through implementation reflected in other measure values or in resulting activities.
[25] Estimate assumes 0.000423 tons CO2 reductions per kWh produced at up to 300 municipal buildings with up to 35 kWh capacity for a conservative 175 days per year. Estimate assumes solar panel lifetime of 25-30 years, thus operating from 2025 through 2035 and 2050 respectively.
[26] Estimate assumes 1,250 tons CO2 reduced per year at up to four 1MW-producing locations in each of the eight MSAs operating from 2025 through 2035 and 2050 respectively.
[27] Support program development and implementation is a support effort for sustainable implementation. Emission reductions achieved through implementation reflected in other measure values or in resulting activities.
[28] Estimate assumes implementation of 100 MW solar production over 500 acres in support of each of the eight MSAs with assumption that up to 175-198 tons CO2 is reduced per acre, operating from 2025 through 2035 and 2050 respectively.
[29] Estimate assumes 32% emission reduction through energy efficiency at applicable buildings in Fort Smith, AR, with implementation from 2025 through 2035 and 2050 respectively. Increased emission reductions can be achieved through larger scale implementation.
[30] Estimate assumes 1 ton of emission reductions per household weatherized and adoption at approximately 5,500 low-income residences with the assumption that weatherization measures will be maintained from 2025 through 2035 and 2050 respectively.

	weatherization programs			Counties, MSAs		
	City parks and parking lot solar awnings and canopies	1.082e10^{-5}	2.707e10^{-5} [31]	Municipalities	3, 4, 5	I
Net Zero (Carbon) Buildings	Rooftop solar with focus on residential and commercial buildings	27.982	69.956 [32]	Municipalities, Counties, MSAs, State	3, 4, 5	J
	Energy conservation measures (enhancing insulation, transition to LED lights, etc.)			Municipalities, Counties, MSAs, State	3, 4, 5	J
	Building controls and automation (optimized lighting schedules, refined HVAC set points, etc.)			Municipalities, Counties, MSAs, State	3, 4, 5	J
	Building controls upgrades (construction practices aligned with sustainability goals)			Municipalities, Counties, MSAs, State	3, 4, 5	J
Buildings Sector	Establishing an incentive program for implementation of end-use energy efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting	5.846	14.616 [33]	Municipalities, Counties, MSAs, State	3, 4, 5	K
	Providing incentives for adoption and implementation of up-to-date building energy codes	0.060	0.150 [34]	Municipalities, Counties, MSAs	3, 4, 5	K
	Developing voluntary programs and policies that promote low and zero-emission options and vehicle charging, with a focus on buildings in rural and LIRC areas; multi-family residential buildings; and commercial buildings	17.280	44.5 [35]	Municipalities, Counties, MSAs, State	3, 4, 5	K

[31] Estimate assumes 0.000423 tons CO2 reduced per kWh produced at up to four 40-panel awning install locations per MSA operating from 2025 through 2035 and 2050 respectively.

[32] Estimate assumes 349,780 tons CO2 reduced per year with equal application of up to 542 MW of rooftop and on-site solar installation in each of the MSAs with operation from 2025 through 2035 and 2050 respectively. For other components under this measures, E&E notes that emission reductions will significantly vary due to differing building size, location, condition, age, and current efficiency measures in place. E&E assumes that each participating location may see up to 30-40% emission reductions at each location from combines building controls and automation and sustainable construction practices. Commercial and Residential sectors are responsible for 8.9 MMT CO2e of Arkansas emissions.

[33] Estimate assumes 100,000 households participating in energy efficiency program with 30% decrease in energy of average household use of 1,133 kWh per month, or 13,596 kWh per year, and 0.86 pounds CO2 emissions per kWh produced. Implementation from 2025 through 2035 and 2050 respectively.

[34] Estimate assumes weatherization of approximately 6,000 homes throughout Arkansas with approximately 1 ton of emission reductions per home per year of maintained weatherization from 2025 through 2035 and 2050 respectively.

[35] Estimate assumes adoption of low and zero-emission options by up to 800,000 drivers currently operating ICE vehicles the average 13,500 miles per year, resulting in an annual emissions reduction of 1.728 MMT per year of averaging driving practices. Estimate further assumes after lifetime of replacement transportation mode that drivers will continue using similar vehicles to meet emission reductions through 2050.

Carbon Removal Measures	Watershed management expansion	0.001	.002 [36]	Municipalities, Counties, MSAs, State	3, 4	I
	Land conservation easements			Municipalities, Counties, MSAs, State	3, 4	I
	Expanded trail system			Municipalities, Counties, MSAs, State	2, 3, 4	I
	Dam hydroelectric power upgrades and expansion	1.627	4.067 [37]	Municipalities, Counties, MSAs	3, 4	I
	Port operation enhancements for energy efficiency	0.002	0.004 [38]	Municipalities, Counties, MSAs	1, 3, 4, 5	I
Carbon Removal Sector	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	0.728	1.814 [39]	Municipalities, Counties, MSAs, State	3, 4	K
	Restoring degraded prairies, forests, riparian buffers, streams, and wetlands in parks, trails, rights-of-ways and private lands	0.750	1.875 [40]	Municipalities, Counties, MSAs, State	3, 4	K
	Identifying lands with high carbon sequestration value and create programs for the protection and restoration of these lands through fee-simple acquisition, conservation easements, or	---	--- [41]	Municipalities, Counties, MSAs, State	3, 4	K

[36] Estimate assumes 1 ton carbon sequestration per acre per year with an expansion of watershed management, land conservation, and natural trail space, up to 10 additional acres per MSA area from 2025 through 2035 and through 2050 respectively. This project, if pursued, should coincide with other similar acts rather than limiting the scope of complimenting projects.

[37] Estimate assumes expansion of current sites only, as reservoir and construction of new sites may increase emissions in first decade of implementation and continuously if capacity is inadequate. Further, estimate assumes 10% increase in Arkansas production, or 349.1 million kilowatt hour increase, and 466 gCO_2-eq/kWh emission reduction utilizing hydropower in place of gas, implementation from 2025 through 2035 and through 2050 respectively. Per EIA.gov, Arkansas produced 3,491 million kilowatt hours of hydroelectric power in 2022. The following hydroelectric generation sites have capacities over 30 megawatts and may be candidates for expansion: Carpenter Dam (Garland Co.), Norfork (Baxter Co.), Bull Shoals (Marion/Baxter Co.), Blakely Mountain (Garland Co.), Greers Ferry (Cleburne Co.), Dardanelle (Pope/Yell County), Beaver (Carroll Co.), DeGray (Clark Co.), Ozark (Franklin Co.), Murray (Pulaski Co.), Ellis (Crawford/Sebastian Co.), Whillock (Conway Co.), and Dam 2 (Desha Co.).

[38] Estimate assumes average port energy consumption of 1,516 kWh per day and 0.86 pounds of CO2 emitted per kWh produced per EIA.gov. With ten percent (10%) reductions through energy efficiency application at each of the seven ports throughout Arkansas, a potential reduction of approximately 387,338 kWh reduced per year through 10% energy use reductions at these locations.

[39] Estimate assumes implementation on 40,000 acres of 54,400 acres of forest, wetland, fish and wildlife habitat, and outdoor recreation resulting in increased carbon sequestration of up to 2 tons per acre per year or 0.073 MMT annually. Implementation from 2025 through 2035 and 2050 respectively.

[40] Estimate assumes restoration of up to 75,000 acres throughout Arkansas with an improved sequestration rate of 1 ton per acre per year. Implementation from 2025 through 2035 and 2050 respectively.

[41] Identification and protection of existing high carbon sequestration-value lands is a support effort. Emission reductions may be achieved through expansion of high carbon sequestration land protection pending the identification findings.

	other means. Consider co-benefits.					
	Developing conservation plans for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value	0.003	0.007 [42]	Municipalities, Counties, MSAs, State	3, 4	K
	Incentivizing agricultural practices to reduce carbon emissions and create carbon capture	30.0	75.0 [43]	Municipalities, Counties, MSAs	3, 4	K
Public Clean Transportation Refinements and Choice	Public transit expansion through 24/7 availability and service/service area expansion	2.198	5.496 [44]	Municipalities, Counties, MSAs	1, 3, 4	I
	EV transit bus expansion, complimented by CNG if needed	0.0135	0.0162 [45]	Municipalities, Counties, MSAs	1, 3, 4	I
	Light rail transportation connection	0.001	0.002 [46]	Municipalities, Counties, MSAs	1, 3, 4	I
	Smart intersections	$8.8e10^{-4}$	0.002 [47]	Municipalities, Counties, MSAs	1, 3, 4, 5	I
	Public EV charging infrastructure	0.179	0.446 [48]	Municipalities, Counties, MSAs, State	1, 3, 4	I
	Complete streets with expanded E-bike Programs	0.036	0.090 [49]	Municipalities, MSAs, State	1, 3, 4	I
Clean Transportation	Encourage mode shifting	2.082	5.204 [50]	Municipalities,	1, 2, 3	J

[42] Estimate assumes 33.24 tons CO2e per average urban park added year with average size of 1.73 acres with up to eight additional urban parks in high carbon sequestration value.

[43] Estimate assumes no-till farming application at up to 10 million of the approximate 13.8 million acres of farmland in Arkansas with a 0.3 ton carbon reduction per participating acre per year, as established by the Soil Science Society of America. Implementation from 2025 through 2035 and 2050 respectively.

[44] Estimate assumes public transit availability in seven of Arkansas MSAs with existing transit and use by up to 3% of each respective population, or approximately 60,300 citizens, replacing up to 70% of 13,500 miles on average traveled per vehicle, or 9,450 miles, and approximately 350 grams CO2 emission reductions per mile associated with assumed driver-to-transit adoptee. (Does not consider transit emissions.)

[45] Estimate assumes replacement of sixteen existing diesel-fueled buses averaging 43,000 miles per year with sixteen all-electric buses using EPA DEQ tool. Estimated 1,350 tons CO2 annual reduction for 12 year lifetime of transit buses.

[46] Estimate assumes… replacement of up to 300,000 miles of annual vehicle miles per year and approximately 350 grams CO2 per vehicle mile with 80% reduction per mile via train use. Implementation from 2025 through 2035 and 2050 respectively.

[47] Estimate assumes 6.5% emission reductions in estimated 11 tons CO2 emissions from idling in Arkansas with the introduction of smart intersections throughout Arkansas with implementation from 2025 through 2035 and 2050 respectively.

[48] Estimate assumes infrastructure will support replacement of up to 8,000 gas-fueled vehicles (traveling average 13,500 miles per year, emitting approximate 350 grams CO2 per mile) with electric-powered vehicles (with equal travel, emitting approximately 200 grams CO2 per mile) with implementation from 2025 through 2035 and 2050 respectively.

[49] Estimate assumes replacement of up to 20 miles daily commute travel (up to 260 days per year) with e-bike use for up to 1,800 commuters with 350 grams CO2 reduced per mile with implementation from 2025 through 2035 and 2050 respectively.

[50] Estimate assumes replacement of up to 483,160 gasoline vehicle miles traveled per year and up to 208,157.8 tons reduced per year. Implementation from 2025 through 2035 and 2050 respectively. Additional benefits anticipated through energy efficiency and other components.

Choices and Green Corridors				MSAs		
	Regional greenways development			Municipalities, MSAs	1, 3, 4	J
	Complete street design			Municipalities, MSAs	1, 3, 4	J
	Green infrastructure incorporation			Municipalities, MSAs	3, 4	J
	Transit electrification and optimization			Municipalities, MSAs	3, 4, 5	J
	Energy efficient street lighting			Municipalities, MSAs	3, 4, 5	J
Transportation Sector	Active (i.e. walk, bike, etc) transportation infrastructure	0.176	0.44 [51]	Municipalities, Counties, MSAs, State	3, 4	K
	Low/no emission ridesharing and e-bike program, with priority given to LIRC communities	0.020	0.051 [52]	Municipalities, MSAs	3, 4	K
	Adoption of building and zoning code updates to encourage [enable] walkable, bikeable, and transit-oriented development	---	--- [53]	Municipalities, MSAs	3, 4, 5	K
	Fleet upgrades replacing ICE vehicles with low/no emission vehicles	0.019	0.322 [54]	Municipalities, Counties, MSAs, State	1, 3, 4	K
	Incentivize eligible agencies, businesses, and individual auto owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIRC communities			Municipalities, Counties, MSAs, State	3, 4	K
	Expand supporting infrastructure for EVs, including buses			Municipalities, Counties, MSAs, State	1, 3, 4	K
Efficient and Electric Vehicles	Short-term emission reduction (technologies and practices)	0.001	0.003 [55]	Municipalities, Counties, MSAs, State	1, 3, 4	J

[51] Estimate assumes adoption by up to 1,000 citizens with a total reduction of 44,008,140 vehicle-miles traveled or approximately 17,600 metric tons of CO2 annually. Implementation from 2025 through 2035 and 2050 respectively.

[52] Estimate assumes distribution of up to 4,700 e-bike rebates incentivizing up to 2,040 tons CO2 annually with implementation from 2025 through 2035 and 2050 respectively. Additionally assumes replacement of approximately 24,500 vehicle miles traveled annual through bike and ridesharing and up to 9 tons CO2 reduced through this program. Assumes maintenance and replacement as needed to maintain use of e-bikes.

[53] Updates to existing building and zoning codes are considered a support effort for sustainable implementation. Emission reductions achieved through implementation may be reflected in other measure values or in resulting activities.

[54] Estimate assumes low and no emission travel replacement of up to 52,810,043 vehicle miles travelled annually by non-EV vehicles by 2025 and increasing EV vehicle utilization up to the replacement of 382,872,811 vehicle miles traveled annually by 2030 and extended through 2050.

[55] Estimate assumes 50% of fleet replacement with EV equivalent in Metroplan area approximately 111 tons reduced per year with implementation from 2025 through 2035 and 2050 respectively. Increased emission reductions may be achieved with larger scale implementation.

	Long-term electrification strategy (EV readiness)			Municipalities, Counties, MSAs, State	1, 3, 4	J
	Regional EV charger placement strategy (optimal, equitable, prepare for fleet upgrades)			Municipalities, Counties, MSAs, State	1, 3, 4	J
Waste Management and Recycling	City-owned and operated Materials Recovery Facility (MRF)	0.526	1.314 [56]	Municipalities, MSAs	3, 4	I
	Expanded recycling and vegetative composting	0.380	0.950 [57]	Municipalities, Counties, MSAs	3, 4	I
	Upgrades and expansion of Biomass Gasification	0.108	0.339 [58]	Municipalities, Counties, MSAs	3, 4, 5	I
Waste Management and Recycling	Gasification (conversion of waste materials to energy or heat)	0.4	1.0 [59]	Municipalities, Counties, MSAs	3, 4, 5	J
	Composting program (reduce organic waste disposal and produce nutrient rich soil conditioner)			Municipalities, Counties, MSAs	1, 3, 4	J
	Improved recycling (expansion of in-place programs)*			Municipalities, Counties, MSAs	3, 4	J
	Landfill gas to energy (LFG to RNG)*			Municipalities, Counties, MSAs	3, 4, 5	J
Waste, Recycling, and Sustainable Materials Sector	Providing incentives for community composting programs	0.022	0.054 [60]	Municipalities, Counties, MSAs	3, 4	K
	Supporting development of a biochar pyrolysis facility and/or gasification facility.	2.213	6.362 [61]	Municipalities, Counties, MSAs	3, 4	K

[56] Estimate assumes daily throughput of up to 100 tons materials (average throughput of large MRF is 245 tons per day) and up to 1.44 tons CO2 reduced per ton of disposed materials recycled with implementation from 2025 through 2035 and 2050 respectively. Increased emission reductions may be achieved with larger scale implementation.

[57] Estimate assumes combined reductions from expanded recycling and composting with following considerations with implementation from 2025 through 2035 and 2050 respectively: 1) 469 MT of CO2 produced per 1 MMT of organic waste decomposed, conservative estimate of 50% emission reductions through composting rather than disposal, and annual throughput expansion of 50 tons and 2) daily throughput of up to 50 tons materials and up to 1.44 tons CO2 reduced per ton of disposed materials recycled.

[58] Estimate assumes additional production of 100 scfm at current site with consideration of 40 million cubic feet salable landfill gas sold per month using Landfill Gas Energy Benefits Calculator to get total annual reduction of 0.0154 MMT CO2e. Facility increase assumed to begin in 2028 and operated at same capacity through 2035 and 2050 respectively.

[59] Estimate assumes up to 40,000 tons of emissions reduced per year with implementation from 2025 through 2035 and 2050 respectively. Increased emission reductions may be achieved with larger scale implementation.

[60] Estimate assumes 469 MT of CO2 produced per 1 MMT of organic waste decomposed, conservative estimate of 50% emission reductions through composting rather than disposal, and access to community composting to 1.5 million Arkansas citizens with an estimated 2,0341,165.66 metric tons of waste per year diverted and up to 4,352 tons CO2 emissions reduced.

[61] Estimate assumes construction of facility with 1,800 scfm capacity and 0.2765 MMT CO2e annual emissions reduced using the national average and facility supporting 100 tons annual biochar production with up to 0.94 tons CO2 reduced per ton with construction of facilities by 2027.

	Providing incentives for anaerobic digester facilities to be divert organic waste that is currently being landfilled and/or land applied into compost implemented/constructed to and other agricultural and environmentally beneficial products	0.006	0.015 [62]	Municipalities, Counties, MSAs	1, 3, 5	K
	Providing incentives or a voucher system to improve waste management for rural populations	---	--- [63]	Municipalities, Counties, MSAs	3, 4	K
	Developing a regional MRF with end-market transparency	0.788	1.971 [64]	Municipalities, Counties, MSAs	3, 4	K

*When possible, measures are considered on a statewide basis or at the largest scale applicable to consider the larger potential impact. Measure estimates related to Appendices I – K assume equal application in the eight MSAs of Arkansas.

**Implementation grants applied for under measures proposed in Appendices I – K are presumed to be led by the associated partner and/or lead agency of a coalition in which the partner is participating.

[62] Estimate assumes 75 tons CO2 reduced per unit per year with sites located in up to 8 of the MSA area operating from 2025 through 2035 and 2050 respectively. Recommended areas listed in Appendix A do not overlap with MSAs throughout the state.

[63] Incentives and voucher system for waste management are support efforts for sustainable implementation. Emission reductions achieved through implementation may be reflected in other measure values or in resulting activities, such as priority measures related to waste-to-energy.

[64] Estimate assumes daily throughput of up to 150 tons materials (average throughput of large MRF is 245 tons per day) and up to 1.44 tons CO2 reduced per ton of disposed materials recycled with implementation from 2025 through 2035 and 2050 respectively. Increased emission reductions may be achieved with larger scale implementation.

3. LIRC Analysis

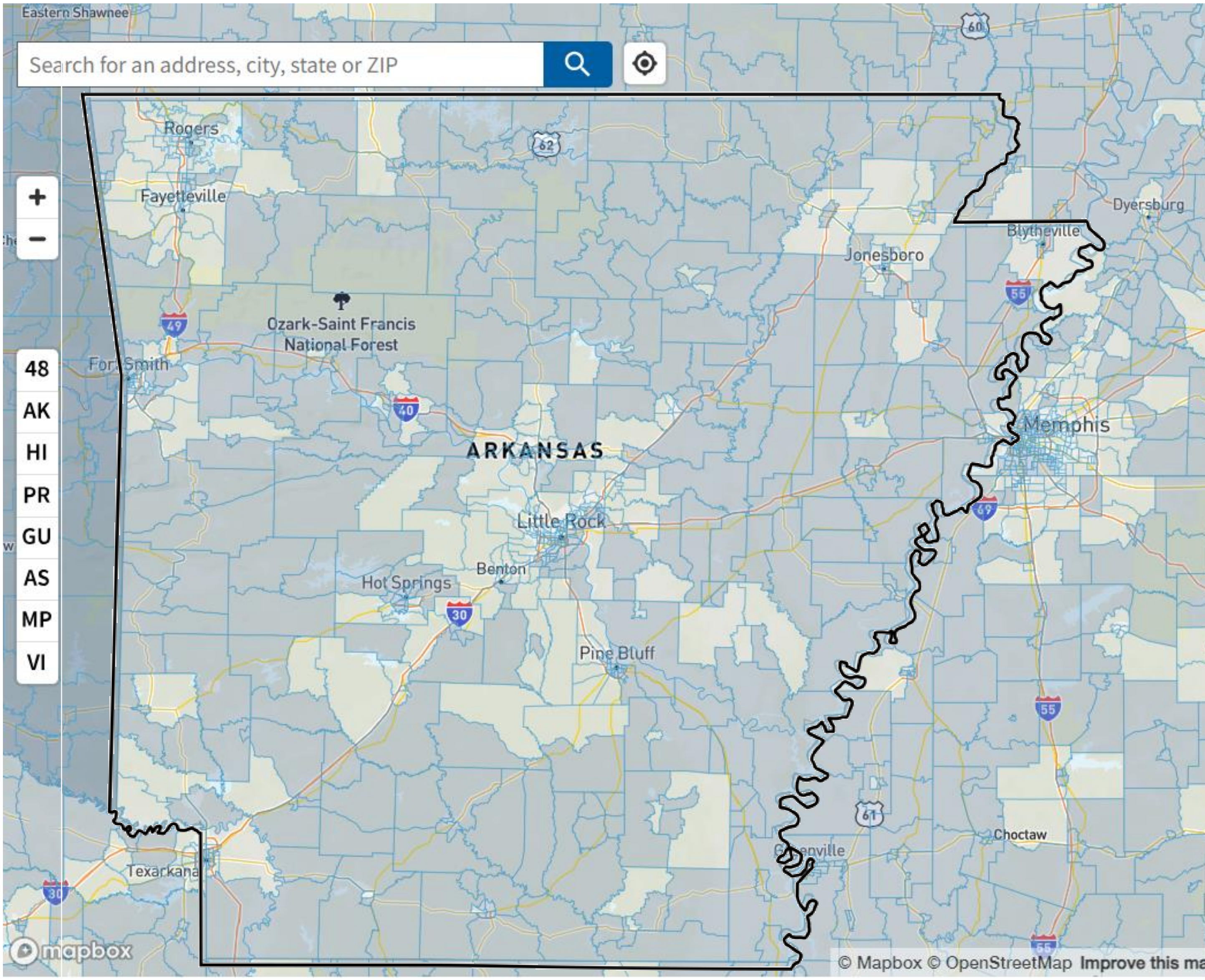
The implementation of the measures included in this PAP are anticipated to provide significant benefits to LIRCs. This section identifies how Arkansas meaningfully engaged with LIRCs in the development of this PAP, and how Arkansas will continue to engage into the future. Measure-specific LIRC analyses are included in the measures' appendices.

Of the 686 census tracts identified in Arkansas by EPA's Climate and Economic Justice Screening Tool (CEJST), EPA identified 412 (Appendix L), or 60%, of the tracts as meeting one (1) or more disadvantaged community criteria. Criteria include:

- Are at or above the 90th percentile for expected agriculture loss rate OR expected building loss rate OR expected population loss rate OR projected future flood risk OR projected future wildfire risk AND are at or above the 65th percentile for low income;
- Are at or above the 90th percentile for energy cost OR PM 2.5 in the air AND are at or above the 65th percentile for low income;
- Are at or above the 90th percentile for asthma OR diabetes OR heart disease OR low life expectancy AND are at or above the 65th percentile for low income;
- Experienced historic underinvestment OR at or above the 90th percentile for housing cost OR lack of green space OR lack of indoor plumbing OR lead paint AND are at or above the 65th percentile for low income;
- Have at least one abandoned mine OR Formerly Used Defense Sites (FUDS) OR are at or above the 90th percentile for proximity to hazardous waste facilities OR proximity to Superfund (National Priorities List (NPL)) sites OR proximity to Risk Management Plan (RMP) facilities AND are at or above the 65th percentile for low income;
- Are at or above the 90th percentile for diesel particulate matter exposure OR transportation barriers OR traffic proximity and volume AND are at or above the 65th percentile for low income;
- Are at or above the 90th percentile for underground storage tanks and releases OR wastewater discharge AND are at or above the 65th percentile for low income; and/or
- Are at or above the 90th percentile for linguistic isolation OR low median income OR poverty OR unemployment AND fewer than 10% of people ages 25 or older have a high school education (i.e. graduated with a high school diploma).

Additionally, many census tracts in the state fall just below LIRC thresholds for expected agriculture loss rate, projected future flood risk, or projected future wildfire risk, scoring 85th percentile or higher. Based on this information, regional changes in weather patterns could have widespread detrimental effects on the state's economy and wellbeing of citizens.

Figure 2: Climate and Economic Justice Screening Tool, Arkansas



Identification of and Engagement with LIRCs

E&E identified LIRCs in Arkansas using the CEJST. E&E created an engagement plan for seeking feedback on community priorities during development of this PAP. See Coordination and Outreach section of this PAP for a record of outreach activities, and a summary of input received during the engagement process. Strategies for engagement with LIRCs are summarized below:

- Online resources:
  - State CPRG webpage: https://www.adeq.state.ar.us/air/planning/eei/;
  - Email list;
  - Social media;
  - Portal for submitting ideas: https://forms.office.com/IdeaBox;
- Community meetings held "after hours" across the state, with options for in-person,

livestream, and video conference participation;

- Targeted outreach to known community-based organizations, trade schools, colleges, and universities;
- Push cards and flyers;
- Attendance at known community events to disseminate information about how to provide input; and
- Public review of the draft plan.

Impact of PAP Implementation on LIRCs

Anticipated benefits associated with measure implementation are summarized in the measures' appendices, as well as specific methods and assumptions for quantitative assessment of benefits.

4. Review of Authority

E&E has reviewed existing statutory and regulatory authority to implement each priority measure included in this PAP. Generally, E&E's Division of Environmental Quality is authorized under Ark Code Ann. § 8-4-311 to encourage voluntary cooperation by the people, municipalities, counties, industries, and others in preserving and restoring the purity of the air within the state, to represent the state in all matters pertaining to plans, procedures, or negotiations for interstate compacts in relation to air pollution control; and to cooperate with and receive moneys from the United States Government or any other source for the study and control of air pollution.

Delivery of measures presented within this PAP are consistent with these powers provided to the agency by the Arkansas General Assembly. Measures adopted under this PAP will abate air pollution within the state's jurisdiction and are considered voluntary for entities applying for implementation funding. Nothing in state statute prohibits implementation of such programs.

Additional findings are reported in the measures' Appendices, A - K.

5. Coordination and Outreach

E&E conducted extensive intergovernmental coordination and outreach in the development of this PAP. This section describes the framework E&E used to support robust and meaningful engagement strategies to ensure comprehensive stakeholder representation and overcome obstacles to engagement, including linguistic, cultural, institutional, geographic, and other barriers.

Identification of Stakeholders

E&E identified stakeholders that are representative of the entities, groups, and individuals who may be impacted by implementation of this PAP. Stakeholders included, without limitation:

- Other state agencies;
- Trade schools, colleges, and universities around the state;
- Metropolitan planning organizations;
- Economic development organizations;
- Environmental advocates;
- Industrial associations;
- Energy associations;
- Automotive associations;
- Utilities;
- Agricultural associations;
- Waste management organizations;
- Industrial organizations;
- Consumer advocates;
- Local elected officials;
- Community-based organizations;
- Chambers of commerce;
- Other interested organizations; and
- Residents of Arkansas.

To identify stakeholders, E&E contacted local elected officials, community organizations, and advocacy organizations known to be interested in clean energy infrastructure and practices. PAP planning staff coordinated with E&E's Enterprise Services Division to reach out to small business and trade organizations. E&E also included sector-specific stakeholders and associations (transportation, electricity/energy, agricultural, waste, and buildings).

Interagency and Intergovernmental Coordination

E&E leadership and PAP planning staff communicated with the following government-based entities to identify which were interested in coordinating in the deliverable development process, solicit input for developing action priorities in their areas of expertise, and to include interested parties in public outreach and input sessions.

- Arkansas Governor's Office
- Arkansas Department of Parks, Heritage, and Tourism (ADPHT)
- Arkansas Community Action Agencies Association
- Arkansas Department of Agriculture (ADA)
    - Forestry Division
- Arkansas Department of Transportation (ARDOT)
- Arkansas Department of Finance and Administration (DF&A)
- Division of Building Authority (DBA)
- Arkansas Municipal Power Association (AMPA)
- Arkansas Association of Counties
- Arkansas Municipal League
- Metroplan
- Northwest Arkansas Regional Planning Commission
- University of Arkansas at Pine Bluff
- University of Arkansas at Little Rock
- University of Arkansas at Fayetteville
- Northeastern Arkansas College
- Southeastern Arkansas College
- Pulaski Technical College
- County Judges, City Boards, and other local elected officials across the state

With planning funding awarded by EPA, E&E issued subawards to the three largest metropolitan planning organizations[65] in the state for assistance with PAP outreach and deliverables development. These partners' contributions to the state priority action list of measures can be found in Appendices I – K, and measures included in these Appendices have been identified by E&E as being state priority measures under this PAP.

E&E leadership and supporting PAP staff coordinated with regional planning organizations, other Arkansas agencies, and other states' agencies in the development of this PAP. Regular update meetings were held to seek input, assist with identifying priorities within each sector, and outlining the PAP.

Strategies to Overcome Linguistic, Cultural, Institutional, Geographic, and Other Barriers to Participation

E&E and its partners have worked diligently to ensure that communities across the state were provided opportunity to participate in the identification of priority measures regardless of barriers.

[65] City of Fort Smith, Northwest Arkansas Regional Planning Commission, and Metroplan

Efforts included:

- Translation options on the Idea Box submittal page;
- Translation of materials upon request to the Department;
- Workshops and public meetings conducted by E&E and partners in various locations and with in-person, after hours, and virtual attendance options;
- Notices of anticipated meetings and updates sent to a wide array of stakeholders, including county judges; and
- Shared recordings of E&E-led workshops and meetings via the Department YouTube page.

Outreach and Coordination Documentation

In addition to E&E outreach and coordination efforts, partners in northwest, west, and central Arkansas held multiple community outreach and feedback meetings, hosted virtual information sharing sessions, and coordinated with local entities interested in contributing to the EEI plan. Information for partners' outreach efforts are outlined in corresponding EEI supplemental PAP Appendices, I – K.

Table 4 provides a log of interagency and intergovernmental coordination and stakeholder and public engagement efforts associated with development of this PAP.[66]

Table 4: Outreach and Coordination Log

Date	Topic	Organizations Involved	Method	Location
4/18/2023	States Deployment Initiative (SDI): Budget & Workplan discussion (states)	State EPAs, SDI	Virtual	
5/17/2023	EEI Plan – Regional Partnership with MPOs	E&E, City of Fort Smith, Metroplan, NWARPC	Virtual	
5/23/2023	Coordination with NWAR MPO	E&E, NWARPC	Virtual	
5/23/2023	Coordination with Fort Smith MPO	E&E, City of Fort Smith	Virtual	
6/23/2023	EEI Plan – Regional Partnership with	E&E, City of Fort Smith, Metroplan, NWARPC	In-person	Fort Smith, AR

[66] Outreach materials and resources are available at https://www.adeq.state.ar.us/air/planning/eei/resources/

	MPOs – coordination meeting			
7/18/2023	Coordination with Fort Smith MPO (MOA)	E&E, City of Fort Smith	Virtual	
7/19/2023	Coordination with Enterprise Services	E&E Office of Air and Enterprise Services Division	In-person and virtual	North Little Rock, AR
7/20/2023	Coordination with Metroplan MPO (MOA)	E&E, Metroplan	Virtual	
7/31/2023	AR and OK discussion	E&E, OK DEQ	Virtual	
8/1/2023	Coordination with Clean Air Task Force	E&E, CATF	Virtual	
8/9/2023	Coordination with LA, OK	E&E, OK DEQ, LA DOA	Virtual	
8/18/2023	Coordination for Transportation workshop and public meeting	E&E, City of Fort Smith, Metroplan, NWARPC	Virtual	
8/21/2023	Supplemental Plan update	E&E, NWARPC	Virtual	
8/24/2023	SDI: Industry meeting	SDI, State EPAs	Virtual	
8/31/2023	SDI: Buildings meeting	SDI, State EPAs	Virtual	
9/5/2023	SDI: Power sector meeting	SDI, State EPAs	Virtual	
9/6/2023	SDI: Transportation meeting	SDI, State EPAs	Virtual	
9/7/2023	SDI: Natural/ Working Lands meeting	SDI, State EPAs	Virtual	
9/7/2023 and 9/13/2023	Transportation Workshop planning	E&E, City of Fort Smith, Metroplan, NWARPC	Virtual	
9/13/2023	CATF coordination meeting	E&E, CATF	Virtual	
9/14/2023	Entergy project meeting	E&E, Entergy	In-person	North Little Rock, AR
9/21/2023	Transportation Workshop and public outreach	E&E, City of Fort Smith, Metroplan, NWARPC, public	In-person and virtual	Little Rock, AR
9/26/2023	CPRG NOFO discussion	Convener’s Network, State EPAs	Virtual	

9/27/2023, 10/2/2023, 11/6/2023, 11/8/2023	Electricity Workshop planning	E&E, Arkansas energy providers, University of AR at Pine Bluff, Clean Air Task Force, Arkansas Association for Advanced Energy, U.S. Business Council for Sustainable Development	Virtual	
10/4/2023, 10/10/2023, 11/9/2023	Industrial Workshop planning	E&E, Arkansas steel industry, Northeastern Arkansas College, Clean Air Task Force, U.S. Business Council for Sustainable Development	Virtual	
10/24-27/2023	SDI Workshop and Meeting	State EPAs, Convener's Network	In-person	Santa Fe, NM
10/30/2023	Partners Update Meeting	E&E, City of Fort Smith, Metroplan, NWARPC	In-person and virtual	Little Rock, AR
11/2/2023	NWAR EEI Regional Plan update	E&E, NWARPC	Virtual	
11/13/2023	EEI Regional Plans update	E&E, City of Fort Smith, Metroplan, NWARPC	Virtual	
11/14/2023	Electricity Workshop	E&E, Arkansas energy providers, University of AR at Pine Bluff, Clean Air Task Force, Arkansas Association for Advanced Energy, U.S. Business Council for Sustainable Development	In-person and virtual	Pine Bluff, AR
11/14/2023	Public Outreach & Feedback Meeting	E&E	In-person and virtual; 5pm-8pm	Pine Bluff, AR
11/16/2023	LR Airport EE	E&E, Little Rock Airport managers	Virtual	
11/28/2023	Industry Workshop	E&E, Arkansas steel industry, Northeastern Arkansas College, Clean Air Task Force, U.S. Business Council for Sustainable Development	In-person and virtual	Osceola, AR
11/28/2023	Public Outreach & Feedback Meeting	E&E	In-person and virtual; 5pm-8pm	Osceola, AR
11/30/2023	Coordination with AR Dept of Building Admin	E&E, DBA	Virtual	
11/30/2023	EEI Regional Plans update	E&E, City of Fort Smith, Metroplan, NWARPC	Virtual	
12/13/2023	NWAR EEI Regional Plan update	E&E, NWARPC	Virtual	
12/21/2023	Coordination	E&E, Fort Smith	Virtual	

	with Fort Smith – key deliverables			
1/3/2024, 1/10/2024	Natural and Working Lands Workshop	E&E	Virtual	
1/11/2023	Green Network Coalition discussion	E&E, NWARPC, public and private entities	Virtual, in-person	Springdale, AR
1/11/2024	Electricity project outreach	E&E, Entergy	Virtual	

E&E staff also attended EPA, SDI, and Convener's Network CPRG training webinars and information sessions between June and December 2023. Additionally, E&E staff engaged regularly with public stakeholders (individuals and groups) through email, phone calls, and video-conferencing.

Public Input

E&E received over 100 responses to the Idea Box, linked at https://forms.office.com/g/jGypB90WmN, launched on the EEI webpage early in the process of plan development. Many responses were multifaceted and contained support for a variety of measures spanning over several sectors.

A support counter was developed to rank measure and project interest submitted through the form by December 15, 2023. Approximately 52 unique and applicable concepts were identified through submissions with 122 total points of support. The highest degree of support was focused within Transportation, Residential and Commercial Buildings, and Energy sectors, with the highest ranked priority of public transit expansion and implementation with sustainable key features and around the clock service. Citizens also heavily supported weatherization and energy efficiency in residential and commercial areas for money and energy savings at the citizen and community level.

6. Funding Intersections

Several recent funding opportunities through the federal government align with the measures and programs identified in this PAP. E&E has prepared a preliminary list of possible funding to implement these prioritized measures:

Recent Federal Funding Initiatives

- Inflation Reduction Act of 2022 (IRA): Signed into law August 16, 2022
- Infrastructure Investment and Jobs Act (IIJA): Signed into law November 15, 2021
  - The IIJA provides $1.2 trillion in funding for infrastructure projects over the next eight years. The act includes funding for roads, bridges, public transit, airports, water systems, and broadband internet.
- Clean Air, Clean Water, and Climate Change Infrastructure Act of 2021 (CACWCC): Signed into law on December 15, 2021
  - This act provides $555 billion in funding for clean energy and climate change initiatives. The act includes funding for electric vehicles, renewable energy, and energy efficiency.

Tables 5 and 6 detail funding opportunities offered by the U.S. Department of Transportation and the U.S. Department of Energy that complement the goals of the priority measures included in this PAP.

Table 5: U.S. Department of Transportation Funding Opportunities

Program Name	**Project Category**	**Program Total Funds**
Advanced Transportation Technologies & Innovative Mobility	Roads, Bridges and Major Projects	$300,000,000
Airport Infrastructure Grants	Airports and Federal Aviation Administration Facilities	$15,000,000,000
Airport Terminal Program	Airports and Federal Aviation Administration Facilities	$5,000,000,000
All Stations Accessibility Program	Public Transportation	$1,750,000,000
Bus and Bus Facilities Competitive Grants	Public Transportation	$1,966,392,169
Bus and Bus Facilities Formula Grants	Public Transportation	$3,161,294,400
Capital Investment Grants	Public Transportation	$8,000,000,000
Carbon Reduction Program	Resilience	$6,419,999,998
Charging & Fueling Infrastructure Grants (Corridor Charging)	Electric Vehicles, Buses and Ferries	$1,250,000,000
Charging and Fueling Infrastructure Grants (Community Charging)	Electric Vehicles, Buses and Ferries	$1,250,000,000
Congestion Mitigation & Air Quality Improvement Program	Roads, Bridges and Major Projects	$13,200,000,000
Congestion Relief Program	Roads, Bridges and Major Projects	$250,000,000
Infrastructure and Safety Improvement Grants	Passenger and Freight Rail	$5,000,000,000
Disadvantaged Business Enterprises	Roads, Bridges and Major Projects	$50,000,000
Enhanced Mobility of Seniors and Individuals with Disabilities	Public Transportation	$2,193,105,343
Federal Lands Access Program	Roads, Bridges and Major Projects	$1,487,875,000
Federal-State Partnership for Intercity Passenger Rail Grants	Passenger and Freight Rail	$36,000,000,000
Formula Grants for Rural Areas	Public Transportation	$4,109,463,374
Intelligent Transportation Systems Program	Roads, Bridges and Major Projects	$250,000,000
Local and Regional Project Assistance Grants (RAISE)	Roads, Bridges and Major Projects	$7,500,000,000
Low or No Emission (Bus) Grants (includes $375 million Bus and Bus Facilities Competitive Grants set aside)	Electric Vehicles, Buses and Ferries	$5,624,550,890

Low or No Emission Vehicle Component Assessment Program	Electric Vehicles, Buses and Ferries	$26,169,974
Metropolitan Planning	Roads, Bridges and Major Projects	$2,280,000,000
National Culvert Removal, Replacement, & Restoration Grant	Roads, Bridges and Major Projects	$1,000,000,000
National Electric Vehicle Infrastructure Formula Program	Electric Vehicles, Buses and Ferries	$5,000,000,000
National Rural Transportation Assistance Program	Public Transportation	$13,743,783
Nationally Significant Freight & Highway Projects (INFRA)	Roads, Bridges and Major Projects	$7,250,000,000
Natural Gas Distribution Infrastructure Safety and Modernization Grants	Safety	$1,000,000,000
Port Infrastructure Development Program Grants	Ports and Waterways	$2,250,000,000
Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) - Discretionary	Resilience	$1,400,000,000
Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) - Formula	Resilience	$7,299,999,998
Public Transportation Technical Assistance and Workforce Development	Public Transportation	$61,978,167
Rail Vehicle Replacement Grants	Public Transportation	$1,500,000,000
Reconnecting Communities Pilot Program	Roads, Bridges and Major Projects	$1,000,000,000
Reduction of Truck Emissions at Port Facilities	Ports and Waterways	$400,000,000
Rural Transportation Assistance Program	Public Transportation	$91,552,911
Safe Streets and Roads for All	Safety	$5,000,000,000
Nationally Significant Freight and Highway Projects - State Incentives Pilot Program Set-aside	Roads, Bridges and Major Projects	$750,000,000
Strengthening Mobility and Revolutionizing Transportation (SMART) Grants	Public Transportation	$500,000,000
Technical Assistance and Workforce Development Grants	Other	$27,545,852
Transit Cooperative Research Program	Public Transportation	$34,432,315
University Transportation Centers Program	Other	$500,000,000
Urbanized Area Formula Grants	Public Transportation	$33,390,947,107
Wildlife Crossings Pilot Program	Safety	$350,000,000

Table 6: U.S. Department of Energy Funding Opportunities

Program Name	**Program Total Funds**
Advanced Energy Manufacturing and Recycling Grant Program	$750,000,000
Advanced Industrial Facilities Deployment Program	$5,812,000,000
Advanced Reactor Demonstration Program	$2,477,000,000
Advanced Solar Energy Manufacturing Initiative	$20,000,000
Advanced Technology Vehicles Manufacturing Loan Program	$3,000,000,000
Battery Manufacturing and Recycling Grants	$3,000,000,000
Battery Material Processing Grants	$3,000,000,000
Battery and Critical Mineral Recycling - Battery Recycling RD&D, Retailers as Collection Points, and State and Local Government	$125,000,000
Building, Training, and Assessment Centers	$10,000,000
Carbon Capture Demonstration Projects Program	$2,537,000,000
Carbon Capture Large-Scale Pilot Projects	$937,000,000
Carbon Capture Technology Program, Front-End Engineering and Design	$100,000,000
Carbon Dioxide Transportation Infrastructure Finance and Innovation	$2,100,000,000
Carbon Storage Validation and Testing	$2,500,000,000
Carbon Utilization Program	$310,140,781
Career Skills Training	$10,000,000
Civil Nuclear Credit Program	$6,000,000,000
Clean Energy Demonstration Program on Current and Former Mine Land	$500,000,000
Clean Energy Financing	$3,600,000,000
Clean Hydrogen Electrolysis Program	$1,000,000,000
Clean Hydrogen Manufacturing Recycling Research, Development, and Demonstration Program	$500,000,000
Commercial Direct Air Capture Technologies Prize Competitions	$100,000,000
Cost-effective Codes Implementation for Efficiency and Resilience	$225,000,000
Critical Material Innovation, Efficiency, and Alternatives	$600,000,000
Domestic Manufacturing Conversion Grants	$2,000,000,000
Effective and Efficient Environmental Reviews	$115,000,000
Electric Drive Vehicle Battery Recycling and Second-Life Applications Program	$200,000,000
Energy Auditor Training Grant Program	$40,000,000
Energy Efficiency Materials Pilot Program	$50,000,000
Energy Efficiency Revolving Loan Fund Capitalization Grant Program	$250,000,000
Energy Efficiency and Conservation Block Grant Program	$550,000,000
Energy Efficient Transformer Rebates	$10,000,000

Energy Improvement in Rural and Remote Areas	$1,000,000,000
Energy Infrastructure Reinvestment Financing	$5,000,000,000
Energy Storage Demonstration and Pilot Grants	$355,000,000
Enhanced Geothermal Systems Demonstrations	$84,000,000
Extended Product System Rebates	$10,000,000
Grants for Energy Efficiency Improvements and Renewable Improvements at Public School Facilities	$500,000,000
Home Efficiency Rebates	$4,300,000,000
Home Electrification and Appliance Rebate	$4,500,000,000
Hydroelectric Efficiency Improvement Incentives	$75,000,000
Hydroelectric Production Incentives	$125,000,000
Hydropower Research, Development, and Demonstration	$36,000,000
Industrial Emissions Demonstration Projects	$500,000,000
Lithium-Ion Battery Recycling Prize Competition	$10,000,000
Long Duration Demonstration Initiative	$150,000,000
Maintaining and Enhancing Hydroelectricity Incentives	$553,600,000
Orphaned Well Site Plugging, Remediation, and Restoration	$30,000,000
Power marketing administration transmission borrowing authority	$10,000,000,000
Preventing Outages and Enhancing the Resilience of the Electric Grid / Hazard Hardening	$5,000,000,000
Program Upgrading Our Electric Grid and Ensuring Reliability and Resiliency	$5,000,000,000
Pumped Storage Hydropower Wind and Solar Integration and System Reliability Initiative	$10,000,000
Rare Earth Elements Demonstration Facility	$140,000,000
Rare Earth Mineral Security	$127,000,000
Smart Grid Investment Matching Grant Program	$3,000,000,000
Solar Energy Research and Development	$40,000,000
Solar Energy Technology Recycling Research, Development, and Demonstration Program	$20,000,000
State Energy Program	$500,000,000
State Manufacturing Leadership	$50,000,000
State-Based Home Efficiency Contractor Training Grants	$200,000,000
Technical Assistance for the Adoption of Building Energy Codes	$1,000,000,000
Transmission Facilitation Program	$2,500,000,000
Transmission Facility Financing	$2,000,000,000
Transmission Siting and Economic Development Grants Program	$760,000,000
Weatherization Assistance Program	$3,500,000,000
Wind Energy Technology Manufacturing Recycling Research, Development, and Demonstration Program	$40,000,000
Wind Energy Technology Program	$60,000,000

Appendix A. Agricultural Waste-to-Energy: Anaerobic Digesters

Arkansas is home to an expansive agricultural economy, including large-scale crop production and animal processing facilities. Economic benefits of agriculture to the state are great; and the sector does contribute to approximately 16% of emissions in the state. At end of growing season, residual materials from crops are generally burned to prepare for the next growing season. This activity can release particulate matter, nitrogen oxides, carbon monoxide, and organic compounds. Biomass waste produced by animal processing facilities is typically applied to land as fertilizer or disposed of in landfills permitted to accept the waste. The decomposition of this biomass results in methane and carbon dioxide to the atmosphere, as well as odor issues and other accompanying disruptors to quality of life in the surrounding areas.

As an alternative to current approaches, anaerobic digesters (ADs) may be implemented to divert resulting waste from agricultural activities and provide the opportunity to collect generated methane gas to be used as renewable natural gas (RNG). Increased production of RNG in the state would provide an increased degree of in-state energy stability and could be used to power vehicles, generate electricity, and support local communities by creating revenue for the public entity. Additionally, through accompanying programs, ADs may also divert household biomass wastes that would otherwise be disposed of through trash services.

Partnering with local processing plants and farmers, municipalities, counties, and MSAs across Arkansas have the unique potential to divert waste application and disposal to create sustainable energy in the form of RNG while reducing emissions. An estimated 26,000 tons of waste could be diverted from land application with the potential to produce 5.2 MMCF of RNG per year per AD implemented; effectively, this is equivalent reductions to approximately 75 tons of sequestered carbon annually for the lifetime of the ADs.

If six or more facilities were located around the state, this would result in a cumulative reduction of 600 tons of CO_2 per year of utilization. Arkansas has a strong poultry processing industry with large facilities located in Springdale, Russellville, Berryville, Batesville, Pine Bluff, and Hope capable of supplying their generated biomass waste stream to the local municipal public works for AD feedstock to operate RNG plants. Other sources of feedstock could be food waste which decreases the volume going to the landfill, waste water sludge, or other waste that are now being land applied.

Potential Waste Biomass Methane Abatement Measures:

Arkansas is committed to reducing the methane emissions of organic waste and biomass decomposition through a multifaceted approach that includes waste diversion programs, compost, and methane abatement solutions (e.g., anaerobic digestion) where appropriate. Methane emissions originate from varied organic materials across waste streams, which can include, but are not limited to, agricultural livestock operations, wastewater and sewage, food waste, and biomass sources (yard waste). As a part of the overall strategy, waste diversion programs that prevent the landfilling of compostable and recyclable waste will be critical for Arkansas to achieve meaningful methane reductions statewide and meet reduction target timelines. For remaining biomass and organic waste, funding for methane abatement strategies such as anaerobic digestion will significantly offset emissions and provide meaningful environmental co-benefits and economic independence to rural, agricultural communities. Arkansas has created a rigorous evaluation criterion for methane abatement strategies that produce renewable natural gas to implement strategies that are good for both the local economy and environment, as outlined in Appendices A and B.

Arkansas has identified an opportunity for a methane abatement grant fund that will meaningfully impact the timeline and implementation of proper food waste diversion programs and methane abatement strategies such as anaerobic digestion. Arkansas aims to target project money toward fast-tracking the implementation of technologies that meet rigorous evaluation criteria and have properly implemented pollution and odor control according to Arkansas's permitting processes. The grant could be administered by either Arkansas Department of Energy and Environment, Arkansas Department of Agriculture, or a 3rd-party administrator. Competitive applications would receive funds on a first-come, first-served basis.

Intersection with Other Funding Availability

This measure (and the measure described in Appendix B) intends to serve as a complementary source of funding to those streams that already exist to aid in methane abatement and anaerobic digestion installation. Federal funding sources such as USDA REAP, USDA NRCS EQIP, and ARRA Section 1603 all exist to fund installation of anaerobic digestion, while this measure intends to fund installation of pollution and odor controls, as well as permitting and grant staff capacity. Identified as hurdles to implementation of methane abatement technology and installation, community concerns around odor, pollution, and water runoff issues can be a primary prohibitor in large-scale implementation of methane abatement strategies.

Anticipated Benefits of Anaerobic Digester Implementation

This measure has the potential to sequester methane production throughout the state, reduce unnecessary disposal, and contribute to RNG production, which will further provide subsequent economic benefits and increased energy reliability in powering processes, vehicles, and other RNG-dependent mechanisms. Implementation of ADs requires a great deal of planning, construction, maintenance and transport, which will provide work for a variety of professions along the way and ensure continued utilization and upkeep of the ADs. Local producers of appropriate materials may also avoid disposal costs, providing incentive for the process and removing the disincentive of pay-to-dispose from Arkansas farmers.

Rural communities would directly benefit from waste diversion programs and implementation of compost programs. Additionally, depending on targeted scale of implementation or incentives, anaerobic digestion can serve as a vehicle for energy independence on livestock agriculture operations. Larger operations will benefit from increased production and the opportunity to sell renewable natural gas back to the grid for a profit. Qualitative benefits for regionalized or localized operations of anaerobic digesters can include increased diversion of food wastes and livestock biproducts, as well as increased production of compost to benefit rural communities. As outlined by the EPA's CEJST tool, LIRC that fit their definition are distributed across urban, suburban, and exurban zip codes, therefore, a state could emphasize both rural benefits from anaerobic digestions, as well as potential food waste diversion from more urban/suburban zip codes for larger regionalized operations (as described in Appendix B, for instance).

The poultry processing facility locations listed above are found in Benton, Washington, Pope, Carroll, Independence, Jefferson, and Hempstead Counties. Sixty-two of the census tracts located in these counties are identified as LIRC. ADs are not limited to operating from biomass produced in the immediate area, and there are opportunities to reduce biomass disposal from other locations in addition to the immediate area.

As an example, poultry companies in northwest Arkansas are well situated to make use of an AD that would reduce land application of dissolved air flotation (DAF) sludges. Estimates from stakeholders researching such a project report that an appropriately-sized AD could process up to an equivalent of one-third of the broiler litter produced in the Illinois River watershed. Historically, this is a largely rural watershed that has been affected by agricultural runoff from poultry operations and land application of litter from both Oklahoma and Arkansas.[67] But the area is also the fastest-growing in the state, boasting a 24.22% growth rate between 2010 and 2020 and home to the 15th-fastest growing city in the U.S. [68] There are several LIRC communities in this area of the state, with 17.3% of residents identifying as Hispanic or Latino, 3.5% identifying as Asian, 2.5% identifying as Black/African-American, 1.7% identifying as Pacific Islander, and 1.3% identifying as Native American.[69] An AD project in this area of the state would produce many cobenefits to water quality, waste reduction, and high-quality job creation.

In addition to the DAF sludge and broiler litter, the digester could also be used to reduce food waste that is primarily disposed of in the local landfill. Technology to capture ammonia and phosphorus from the digestate could be employed with the AD, while other nutrients could be removed and the remaining water from the digestate recycled back into the digester, effectively eliminating all land application. In addition to plant nutrients, the AD would produce renewable natural gas and food grade liquefied carbon dioxide.

To enhance benefits of an AD project, infrastructure and transportation improvements could also be implemented as part of a larger program. Improvement of rural roads leading to the digester site would ensure efficient transportation to and from the AD.[70]

A project like this would also benefit from infrastructure upgrades to support the local use of

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[67] Illinois River Watershed Partnership Annual Report 2020, https://static1.squarespace.com/static/60340fef633126034cdb3b02/t/6226533d8a814c77c45019cc/1646678850458/2020+-+2021+Annual+Report.pdf

[68] https://realestate.usnews.com/places/rankings/fastest-growing-places

[69] https://censusreporter.org/profiles/31000US22220-fayetteville-springdale-rogers-ar-metro-area/

[70] Based on discussions with Benton County Road Department, stakeholders presented E&E with an estimate for Logan Cave Road improvements, with a total cost of approximately $1.5 million. In addition, SW Galey Hollow Road, which enters the proposed siting area from the north, is also in need of some improvements, and could be expected to cost in the range of $1.5 – 2 million.

digester produced transportation fuel. Development of a transportation fueling system for Class 8 heavy trucks specifically designed to use compressed natural gas (CNG) (in this instance, a type of RNG) could be incorporated into a project of this magnitude. In theory, several trucks would be dedicated to delivery of raw materials to the digester daily and several others would be dedicated to hauling plant nutrient products from the digester. Assuming those trucks use the new Cummins CNG engine technology and are designed specifically for use of CNG, the RNG fueling system could be constructed on the plant site for its use and could include public access for any others that want to use the more economical and cleaner fuel. Alternatively, the fueling system could be constructed on another publicly available site that may be more accessible to large trucks, buses, and similar vehicles than the plant site. The cost for a small to moderate RNG fast fueling system is between $500,000 and $800,000.

Additionally, riparian restoration projects could be incorporated into a larger ecosystem project, building on the water quality benefits gained through reduced litter spreading, while enhancing carbon sinks. For instance, there are areas of concern on Osage Creek that would benefit from restoration efforts. Over the past two years, the creek has dumped a large amount of stone and gravel in the channel where the creek once ran, and has eroded away approximately 40 feet of bank. A report given at a recent Illinois River Watershed Partnership meeting indicated that the lower third of the Osage Creek, a likely location for an AD project, is the section with the greatest stream bank erosion and other damage. An AD project strategically located could undertake restoration of the stream bank, and remove the rock and gravel that has accumulated in the channel to alleviate some pressure on that ecosystem and water quality. Estimates for the cost of this part of an AD project are in excess of $100,000.

The digester has several features such as a better carbon intensity score than either solar or wind energy. CNG is both cleaner and more economical than diesel. The patented phosphorus removal technology would allow the digester to remove a large amount of the phosphorus from the watershed, and could eliminate many odors that often stimulate community complaints regarding sludge and litter spreading.

Authority to Implement Anaerobic Digester Implementation Measure

E&E is unaware of any statute that would limit or prevent the implementation of ADs. Implementation applicants selected for funding should seek local site approvals, required permits, and any other necessary means to proceed with implementing this measure.

Appendix B. Landfill Waste-to-Energy

Many landfills throughout Arkansas are publicly owned and operated and are potentially a prime source of energy due to resulting landfill gas (LFG) produced during the decomposition of organic materials. LFG contains an average of fifty percent (50%) methane. Facilities that do not produce adequate emissions to require flaring are releasing methane and other emissions; facilities subject to flaring requirements, while emitting less methane and non-methane organic compounds (NMOC) due to a ninety-nine percent (99%) efficiency of flares, are still emitting CO_2, water, and other volatile compounds. Instead, LFG may be collected and used to generate electricity or RNG for fuel use, resulting in increased energy security, particularly in rural areas where these sites are generally located.

An average generator facility constructed at this scale is capable of producing 586 MW annually, which results in an estimated 2,702 tons of sequestered carbon annually. By 2030, if eight of these facilities were implemented, the total amount of energy produced could be 25,800 MW, equivalent to 120,000 tons of sequestered carbon.

As an example, the City of Siloam Springs has expressed interest in pursuing local implementation of this measure. The city estimates that, by diverting waste from the landfill and instead processing it through a LFG gasification plant, the city can reduce both methane and carbon dioxide emissions by approximately 85,800 metric tons each. Further reductions could be achieved by eliminating the need to transport waste long distances, as waste is currently transported from Northwest Arkansas to a location in Kansas for disposal with a round trip of approximately 500 miles. By reducing the amount of transportation required for disposal, many trips may be reduced to as few as 22 miles, which has the potential to reduce carbon dioxide emissions by 46.6 metric tons per day. The reduction in trip length could apply to several surrounding solid waste management companies, which are currently diverting their waste these long distances, by shifting their waste transport to the local plant instead.

Anticipated Benefits of Landfill Gas Expansion Measures

Conversion of LFG to RNG both reduces methane emissions and increases diverse energy availability to nearby communities and industry. For the implementation of a facility, a gas capacity study and infrastructure planning; design, engineering, and permitting; contractor and construction; and facility startup, operation, and maintenance would be required. These factors will increase job security and job availability in the immediate areas of implementation as well as outwardly when planning and labor must be sourced from elsewhere.

While further analysis of specific locations is necessary to understand direct impacts, landfills are commonly found in more rural areas of Arkansas and are likely to provide service to nearby communities classified by EPA as being LIRC. In general, it is expected that a diversified energy profile in one area assists other areas of the state in that energy resources can be reallocated to higher demand areas.

There are over 300 permitted landfills in Arkansas, 43 of which fall into Class 1 and Class 4 categories; of these facilities, at least one is located in more than half of the counties of the state. While not all landfill locations may be suitable for implementation of this measure due to size, closure dates, location limitations, and other factors, it is important to note that the distribution of these facilities is far-reaching, and possess the potential for landfill gas to be generated, transported, and used locally for improved energy availability. Site selectivity will be a major tool to ensure the most benefit for the most people.

Figure 3: Locations of Class 1 and Class 4 Landfills in Arkansas

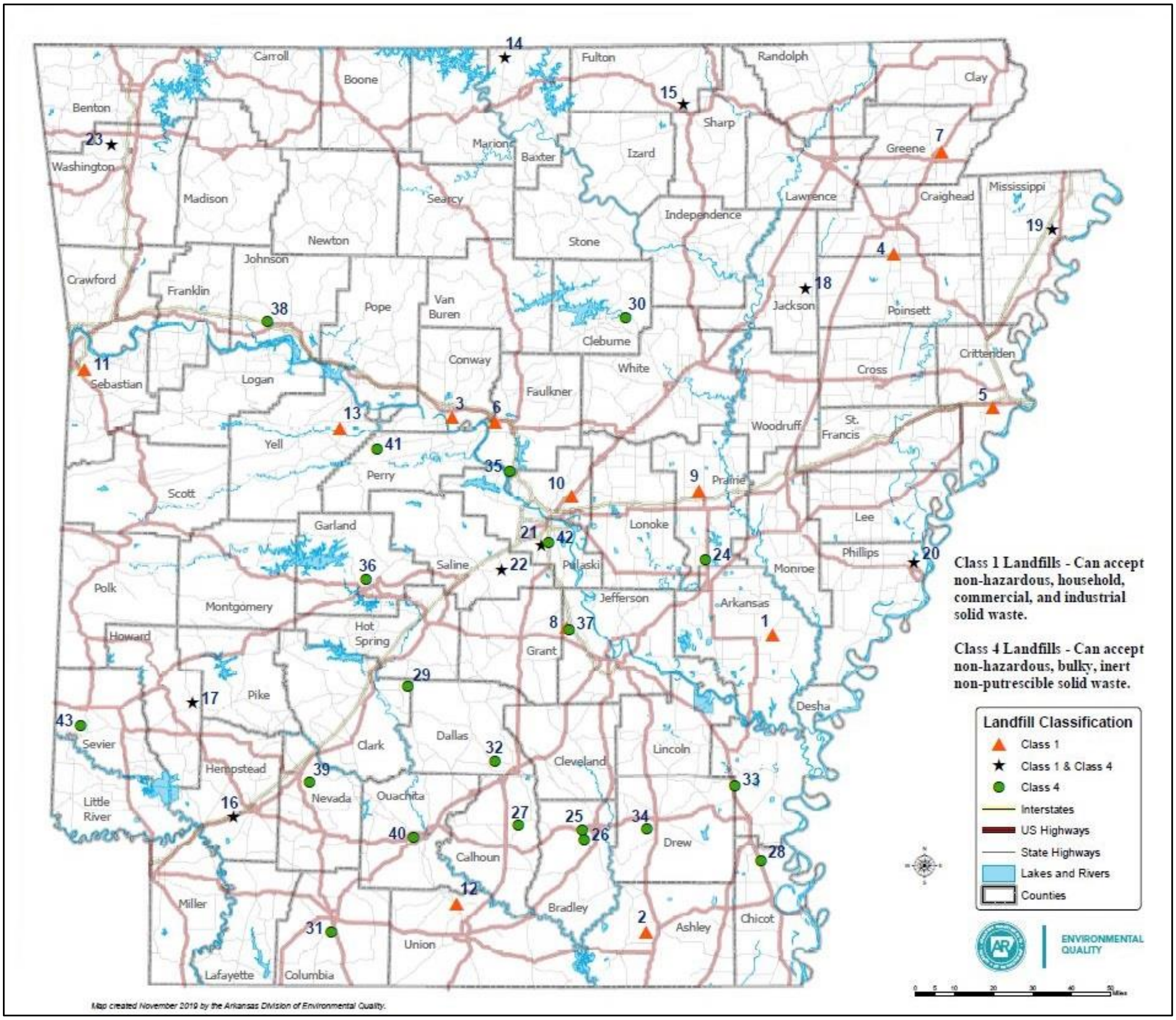


Table 7: Class 1 and Class 4 Active Permitted Facilities in Arkansas

Class 1	Class 1 and Class 4	Class 4
EMS Class 1 Landfill	NABORS Landfill	City of Stuttgart
Ashley County	Cherokee Sanitary Landfill Company	City of Warren
City of Morrilton	City of Hope	Bradley County Regional
Craighead County SWDA	Upper Southwest Arkansas	Calhoun County
Crittenden County	Jackson County	Chicot County SLF
City of Conway Sanitary Landfill	Mississippi County Landfill	Clark County Landfill
North East Arkansas Regional	Helena - West Helena Regional Landfill	Cleburne County
Jefferson County WMA	Little Rock Municipal Landfill	Columbia County Landfill
Rolling Meadows Landfill, Inc.	BFI Waste Systems of Arkansas, LLC	Dallas County SW Authority
Two Pine Landfill -WMA	Eco-Vista, LLC Tontitown	Desha County Landfill
City of Fort Smith Sanitary Landfill		Drew County Landfill
WCA - Union County		Alternative Waste Management, LLC
Ozark Ridge Landfill, Inc. (WMA)		Garland County
		Cannon Landfill, LLC
		Johnson County Solid Waste
		Nevada County Landfill
		City of Camden
		Perry County Landfill
		Central Arkansas Recycling & Disposal Services
		Sevier County Landfill

In relation to the above example, much of Siloam Springs is considered a LIRC area. The tract that the gasification plant could be located in is ranked in the 73rd percentile for low-income households, and ranked in the 75th percentile for $PM_{2.5}$ exposure. The area is in the 88th percentile for low life expectancy. A plant of this type would positively impact residents of Siloam Springs by reducing the financial burden of waste disposal. The main benefit, however, is that the City of Siloam Springs owns and manages its own electric department. The energy produced by the gasification plant would directly benefit residents by reducing electric bills. Additionally, the gasification plant would create an estimated 20-40 high quality jobs earning above minimum wage.

Authority to Implement Landfill Gas Expansion Measure

E&E is unaware of any statute that would limit or prevent he implementation of the Landfill Waste-to-Energy Measure. Implementation applicants selected for funding should seek local site approvals, required permits, and any other necessary means to proceed with implementing this measure.

Appendix C. Hydrogen Fueling Corridor and Industrial Innovations

In recent years, hydrogen has emerged as part of the energy diversification necessary to secure an independent U.S. energy future. Its versatility, high energy density, and ability to be produced by a wide range of energy sources makes it an attractive option for decarbonizing sectors such as transportation, power generation, and industrial processes. It is a vital aspect of our long-term strategy to advance energy innovation in a way that enhances our energy security and reduces emissions.

In order to meet this challenge, E&E and the Oklahoma Department of Environmental Quality (OK DEQ) (hereinafter referred to collectively as "the coalition") propose to designate Highway 412 as a Hydrogen Corridor. The coalition recommends a hydrogen fueling station in Tulsa, OK near the intersection of Interstate 44 and Highway 412 and a second station near Springdale, AR at the intersection of Interstate 49 and Highway 412. In addition to the two hydrogen (H2) refueling stations, the coalition will support the number of H2-fueled heavy-duty fleet vehicles through a combination of vehicle purchase incentives, H2 refueling infrastructure, and collaborative efforts among coalition project partners. These incentives will catalyze the transition from current economics to a marketplace where H2-powered vehicles can be offered at a sustainable cost to fleet operators. This represents a major step toward making H2 a viable and competitive solution for reducing transportation emissions in region.

Other states along I-40 are pursuing similar projects. This proposed measure would complement other concurrent projects by compounding the benefits and the likelihood of swift fleet turnover to alternative-fuel vehicles if several projects were implemented within a short timeframe. With current infrastructure and energy funding that is available to states through federal sources, the timing is right for a project of this magnitude. These projects also allow EPA to direct funding toward a sector that is under their regulation, but one that is not adequately or quickly remedied by phased-in fuel and engine standards. Introducing and encouraging voluntary alternative fuel usage by the transportation sector by developing necessary fueling infrastructure is a logical solution, and one that would produce great benefits to the whole of the American economy and air quality. Air quality benefits resulting from heavy-, medium-, and light duty vehicles using hydrogen along this corridor would be widespread and would positively affect many LIRC communities in several states. The measures proposed in this application have the potential to create transformative impacts that lead to further significant additional GHG emission reductions.

There is a growing support for alternative fuel fleet upgrades. Northwest Arkansas has several Fortune 500 companies that are global leaders in logistics and high-tech manufacturing and serve as incubators for startup businesses in their respective industries and support the renewable energy supply chain. Several of these companies have already invested in heavy-duty hydrogen fueled vehicles.

Arkansas and Oklahoma have a rich history of supporting the U.S. energy sector, powering homes and businesses while growing local economies and improving livelihoods. That background, along with maintaining a growing portfolio of diverse clean energy assets, forms a compelling proposal under this coalition.

Authority to Implement Hydrogen Corridor and Industrial Innovations

E&E is unaware of any statute that would limit or prevent the implementation of a Hydrogen Fueling Corridor and Industrial Innovations Program. Participation in this fueling corridor is voluntary and subject to location needs as identified in the infrastructure planning. Implementation applicants selected for funding should seek local site approvals, required permits, and any other necessary means to proceed with implementing this measure.

Appendix D. Customer Renewable Partnership Support Program

Investing in diverse energy sources ensures the continuous availability to Arkansas citizens. By supporting large-scale renewable projects, the state can better ensure coverage regardless of supply chain, infrastructure disruptions, and other issues that may arise. E&E anticipates there would be widespread benefits from the creation of an Arkansas Customer Renewable Partnership Support program.

The primary goals of the program would be to identify innovative utility-scale renewable projects located within Arkansas offering widespread impact that would lead to a direct and quantifiable reduction in GHG emissions, and reduce the cost of these new renewable resources for Arkansas ratepayers. As an additional benefit, utility-scale renewables could potentially exceed 30 years of operations, with an impact on a generational scale given the nature of utility scale renewables.

To be eligible, a qualifying project would have to directly result in a reduction of GHG emissions, and emphasis during project selection will be placed on the scale of impact. Because of the long lead time for these types of projects, eligible projects would only include those that have been approved by the Arkansas Public Service Commission (APSC) in the 2023 to 2028 timeframe. As a guard against uncertainties in large-scale energy projects, a program like this would be designed so that if no projects qualified by the end of 2028 (or the implementing state agency was unsatisfied with the candidate projects), on January 1, 2029, the funds allocated to this program would automatically revert to another EPA-approved CPRG initiative in Arkansas.

Background

Each of the investor-owned utilities and the electric cooperatives in Arkansas have deployed renewable generation and have issued Requests for Proposals (RFPs) soliciting new renewable generation, largely in the 2023 to 2029 timeframe. Entergy Arkansas, LLC (an Entergy Corporation subsidiary) issued an RFP in 2022 seeking 1,000 MW of new renewables and announced that it had preliminarily selected 5 projects in April 2023.[71] Southwestern Electric Power Company (an American Electric Power subsidiary) has an open RFP seeking new wind, solar, battery, and gas resources, with final selection occurring in July 2024.[72] The Arkansas Electric Cooperative Corporation finalized its 2023 RFP in December 2023, which sought

[71] https://cdn.entergy-arkansas.com/userfiles/content/RFP/Energy_Capacity_RFP/2022/2022-RFP-Selections-Notification.pdf?_gl=1*uktzi0*_gcl_au*MTEyODUyMDE5NC4xNzA0MjkxMjQ5*_ga*Njg3MDE2Nzk5LjE2MzczNTExMDQ.*_ga_DYMNYBY5CD*MTcwNTA3MjU5My43Ny4wLjE3MDUwNzI1OTMuNjAuMC4w*_ga_8YKL3FLBBC*MTcwNTA3MjU5My43Ny4wLjE3MDUwNzI1OTMuNjAuMC4w*_ga_H0JW6TJK3Y*MTcwNTA3MjU5My4zNS4wLjE3MDUwNzI1OTMuMC4wLjA.&_ga=2.217444894.98935215.1705072594-687016799.1637351104

[72] https://www.swepco.com/business/b2b/energy-rfps/2024-Energy-RFP

proposals for new renewables among other resource types.[73] Oklahoma Gas and Electric, which serves areas of western Arkansas including the Fort Smith metropolitan area, issued a 2022 RFP seeking solar resources coming online in the 2023 to 2027 timeline; selections were made in 2023.[74] These RFPs come amid a recent surge in Arkansas for new utility renewable investment. It is anticipated that these utilities and others will evaluate additional RFPs for new renewable generation over the next few years.

Anticipated Benefits of a Customer Renewable Partnership Support Program

Utility-scale renewables offer a unique opportunity for achieving many of the CPRG goals when they result in direct reduced greenhouse gas emissions. The Solar Energy Industries Association believes that "developing utility-scale solar power is one of the fastest ways to reduce carbon emissions…"[75] These investments lower Scope 2 emissions for customers and, when done in an economic manner, create new and sustainable jobs. E&E anticipates that CPRG and other funds could be leveraged for innovating renewable development within Arkansas, benefiting all Arkansans through reduced emissions and avoided costs.[76] Applying CPRG or other federal funds towards the revenue requirement of selected resources would offset costs that Arkansas ratepayers would otherwise pay and would provide an incentive for utilities evaluating such investments (and the latest technologies utilized in such investments), pairing a large scale of impact with cost effectiveness.

The Customer Renewable Partnership Support Program is intended to be implemented across the state. Locations are undetermined at this time due to the expected program design, but it is assumed that emission reduction and reduced billing for consumers will impact many communities, including LIRC-identified tracts, if this measure is implemented.

Example Program Design

A state department or division would oversee and be responsible for managing funds and coordinating activities and deliverables under any grant agreement for CPRG or other federal funding source supporting the program.

The Customer Renewable Initiative program would solicit unique renewable projects that are directly tied to a reduction in GHG emissions. To qualify, projects would have to meet the following criteria:

1. Projects must be at least 100 MW in nameplate capacity.
2. Projects must be approved by the APSC no later than December 31, 2028, with an anticipated in-service date no later than December 31, 2033. Utilities that are not regulated

[73] https://www.acespower.com/wp-content/uploads/2023/08/AECC-2023-RFP-for-SPP-Capacity.pdf
[74] https://www.oge.com/wps/wcm/connect/6a608c41-2c75-4486-af8a-83b6ee169476/OGE+2022+Solar+RFP+Bidder+Tech+Conference.pdf?MOD=AJPERES&CVID=ofe0FGB
[75] https://www.seia.org/initiatives/utility-scale-solar-power
[76] The U.S. Department of Energy recognizes that "cost reduction is essential to increasing solar development." https://www.energy.gov/eere/solar/solar-energy-technologies-office-updated-2030-goals-utility-scale-photovoltaics

by the APSC, such as municipalities, are also encouraged to apply with respect to any approved projects they may have with in-service dates no later than December 31, 2033 and would need to show their own governing body's approval to be considered.

3. Projects must be able to show a direct and provable connection between the new renewable resource and quantifiable GHG emissions reductions to the satisfaction of the state entity implementing the program. This could be met through a variety of direct and concrete engineering, transmission, distribution, legal, or other connections between the candidate renewable facility (or facilities) and the reduction of GHG emissions, such as the full or partial replacement of a retiring coal- or gas-fired-electric generation unit with a renewable resource.[77] Speculative connections would not qualify.
4. The environmental attributes of the project (whether quantified in Renewable Energy Credits or another mechanism) must be applied to the utility's customer base within Arkansas. Facilities that sell or convey the environmental attributes from this project to individuals outside Arkansas would not be eligible.

The program would use a weighted ranking system to determine which qualifying projects to select for funding based on the following factors:

- Quantifiable amount of emissions reduction;
- Scale/impact of facility;
- Location of the facility, including any that are located in areas considered low-income or disadvantaged communities based on the most current CEJST tool;
- The degree to which low-income or customers in disadvantaged communities have access to the quantifiable environmental attributes of the project; and
- Cost-effectiveness of the project.

To estimate the quantity and impact of emission reductions, applicants could utilize EPA's AVERT and CoBRA tools or other methodologies approved by the state entity implementing the program. To determine the location and attributes of impacted disadvantaged communities, the CEJST mapping tool would be utilized. Projects with the greatest impact would receive the highest scores, and the state entity implementing the program would select projects that score the highest for grant awards.

Grant awards for successful projects would be applied to the revenue requirement of the eligible renewable resource. Examples of the types of expenses that are typically included in a revenue requirement calculation are construction and development costs, permitting costs, and maintenance costs. No grant funds in the program would directly injure to the benefit of a participating utility, regardless of whether it is an investor-owned utility or a non-profit entity, and no grant funds would be used to help regulated entities to comply with EPA or state environmental regulatory requirements. Instead, grant funds would be applied to the portion of the cost of the selected project(s) that utility or municipal utility ratepayers would pay in absence of this program, reducing the cost of the new renewable generation resource for utility ratepayers. Participating utilities would be expected to ensure proper accounting for funds awarded to projects, including

[77] For a conceptual example of such a connection, see http://apps.apsc.arkansas.gov/pdf/21/21-023-U_6_1.pdf.

ensuring the auditability of all awarded grant funds. For selected projects, the state entity implementing the project would require awardees to provide quarterly reports on construction progress, expenditures, and proposed timelines/milestones.

Authority to Implement a Customer Renewable Partnership Program

E&E is unaware of any statute that would limit or prevent the implementation of the Customer Renewable Partnership Program. Implementation applicants selected for funding should seek local site approvals, required permits, and any other necessary means to proceed with implementing this measure.

The APSC has jurisdiction over regulated utilities in Arkansas and would have the primary approval authority for any renewable project that may qualify (see Ark. Code Ann. § 23-18-502 & -510). Non-regulated municipal and other utilities would have to submit evidence of approval of the facility from their governing board and city oversight committees (city council, etc.). The state entity implementing the program would only make a selection from projects that have obtained all necessary approvals from the above authorities, which would streamlines several processes and ensure cohesiveness across governmental units.

Appendix E. Public Property Innovation and Resiliency Support

Public buildings are often among the oldest buildings that still in operation in many communities across the nation, especially in rural and historically underserved areas within states like Arkansas. Many structures are in need of modernization and other efficiency upgrades that are too costly for state and local governments to shoulder without assistance. Grant funding is immensely helpful in this arena, allowing for improvements that directly benefit citizens living nearby and those enjoying the services provided from within that structure, while preserving the culture and history of the community by extending the useful life of a generational structure.

E&E proposes a statewide program to increase energy efficiency in school buildings as well as city, state, and local buildings located in areas with elevated noise pollution. Windows are responsible for nearly 10 percent of a building's energy use, most of which can be attributed to the heating and cooling energy lost through poorly insulated single-pane windows, which are currently used in the majority of buildings worldwide. If 100,000 storm windows were replaced it would save 35 million cubic feet of natural gas every year and reduce carbon dioxide air emissions by 4 million pounds. Noise pollution has become a growing concern in urban areas, as well as residential neighborhoods near busy streets, airports, or railways. An environment with reduced noise allows for improved focus and concentration, which can be particularly beneficial for those who work from home or for children in schools.
Potential eligible programs could include any of (or a combination of) those listed below:

- Windows
    - Soundproof windows not only eliminate unwanted noise but also provide better insulation, preventing heat loss during colder months and minimizing heat gain in hotter climates.
    - Triple-glazed windows consist of three layers of glass with a vacuum or gas-filled space in between, which provides excellent insulation against noise transmission from the outside.
    - "Low-E" and low solar heat gain coatings reflect heat back into the building, reducing wintertime heating costs. Low solar, or "spectrally selective" coatings, reflect heat-causing sunlight back outside reducing summertime cooling costs.
- Insulation and Soundproofing
    - High-quality insulation materials not only reduce noise transmission but also improve energy efficiency by 15% by minimizing heat transfer between indoor and outdoor spaces. This helps maintain a consistent temperature, reducing the need for excessive heating or cooling.
    - Sealing gaps and cracks in windows, doors, and walls can significantly reduce noise infiltration and ensure better insulation.
- Insulated Doors
    - The use of insulated doors can help achieve up to 30% energy savings, preventing unnecessary heat gain or loss.

- Acoustic insulation: Insulated doors with sound-absorbing materials can significantly reduce noise transmission, creating a quieter living environment.
- Thermal insulation: Insulated doors provide better insulation against heat transfer, reducing energy consumption and maintaining optimal indoor temperatures.
- Enhanced durability: Insulated doors are typically built with sturdy materials to withstand harsh weather conditions and provide long-lasting performance.

Anticipated Benefits of Public Property Innovation and Resiliency Support

Possible goals under this program could include any of (or a combination of) those listed below:

- Expansion of existing PACE program benefits to include projects not meeting minimum funding levels
- Process electrification, using alternative fuels to power buildings/equipment, and using alternative energy sources (such as solar, wind, hydrogen, geothermal, etc.)
- Increased energy efficiency upgrades (to structures, windows, equipment, lighting, automated building energy-use software/programming, etc.)
- Installing renewable energy and energy storage systems on municipal and government facilities
- Weatherization upgrades

More specifically, measures under this program could include:

- Developing distributed and community-scale renewable energy generation and storage, including in LIRC and rural communities (municipal energy providers, for instance);
- Developing and implementing programs that support smart-grid and behind-the meter technologies;
- City and municipal solar t development and installation ;
- State, Local, and Municipal building solar development and efficiency measures (heat pumps, timed lighting systems, etc.);
- Low income weatherization programs;
- Energy conservation measures (enhancing insulation, transition to LED lights, etc.)
- Building controls and automation (optimized lighting schedules, refined HVAC set points, etc.)
- Energy efficient upgrades to aging municipally-operated systems related to wastewater and water treatment
- Establishing an incentive program for implementation of end-use energy efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting; and
- Developing voluntary programs and policies that promote low and zero-emission transportation options and vehicle charging, with a focus on buildings in rural and LIRC areas.

Arkansas Department of Transformation and Shared Services' (TSS) Division of Building Authority (DBA) in collaboration with the Arkansas Department of Health (ADH) prepared a preliminary assessment of specific projects to determine the costs and expected emissions reductions if measures were applied to public structures in the state ranking low in energy efficiency. Tables 8-11 illustrate the emissions and energy benefits to be expected from incorporating efficiency measures for these structures.

Table 8: TSS DBA Proposed Energy Projects

BUILDING	DESCRIPTION	ESTIMATED COST
ROCKEFELLER	Fan Coil Replacement & Controls Upgrade & Exterior Window Replacement	$12,500,000.00
COMMERCE	Lighing upgrades, chiller & cooling tower replacement, BAS replacement, Make-up Air units, retro-commissiooning, generator replacement, replace vav's, replace air handlers, water conservation, envelope and windows	$6,500,000.00
BG HENDRIX	Replace air handlers, vavs, chillers, tower, pumps, expansion tanks, water heater, controls, elevator upgrades, envelope & windows.	$2,750,000.00
900	Replace controls	$500,000.00
1515	Replace chiller, tower, pumps, BAS and make-up air unit + retro-commissioning.	$750,000.00
ASCL	Replace chillers, pumps, and AHU4	$1,000,000.00
1509	Replace chiller, tower, pumps, air handlers, BAS and retro-commissioning.	$700,000.00
MAC	Exterior improvements including glass replacement	$5,000,000.00
MAC	Elevator upgrades	$3,000,000.00
MAC	Replacement of air handlers, air terminal devices, replace chillers 3A & 3B with heat recovery.	$10,000,000.00
MSM	Replace 2 chillers, make-up air unit, air handlers in south penthouse, BAS and retro-commissioning.	$1,750,000.00
NRC	Replace 1 chiller, air handler #2, BAS (all controls throughout building) and retro-commissioning.	$1,500,000.00
PSC	Replace windows, chiller, replace vav controllers, and retrocommissioning	$1,200,000.00
	TOTAL	**$34,650,000.00**

Table 9: TSS DBA Building Portfolio Emissions Report

BUILDING	GROSS SQUARE FEET	2008 SITE EUI (kBtu/ft²)	CURRENT SITE EUI (kBtu/ft²)	2008 SOURCE EUI (kBtu/ft²)	CURRENT SOURCE EUI (kBtu/ft²)	2008 TOTAL GHG EMMISSIONS INTENSITY (kgCO2e/ft²)	CURRENT TOTAL GHG EMMISSIONS INTENSITY (kgCO2e/ft²)	CHANGE	% CHANGE	CURRENT TOTAL GHG EMISSIONS
JUSTICE	152,676	81.6	49.2	212.9	130.7	10.2	4.90	-5.3	-52%	748,112.40
DFA	52,056	70.3	60.7	162.8	141.4	7.8	5.40	-2.4	-30.80%	281,102.40
1515	56,516	109.3	54.3	219.5	111.2	10.6	4.40	-6.2	-58.50%	248,670.40
MAC	290,401	153.1	77.2	391.2	177.8	18.8	6.90	-11.9	-63.30%	2,003,766.90
NRC	77,166	439.2	228.6	797.5	464.8	38.9	8.60	-20.3	-52.20%	663,627.60
PSC	51,685	164.1	98.1	311.1	196.3	15.1	7.90	-7.2	-47.70%	408,311.50
ASCL	90,506	189.2	153.8	390.5	328.5	18.9	12.90	-6	-31.7	1,167,527.40
BG HENDRIX	67,040	78.8	69.6	192.3	154.9	14.4	7.70	-6.7	-46.50%	516,208.00
MSM	186,433	96.2	52.2	237.6	138.4	11.4	5.20	-6.2	-54.40%	969,451.60
SHOP	14,160	94.1	29.6	182.3	60.3	8.9	2.40	-6.5	-73%	33,984.00
501	147,512	83.5	82.2	180.1	155.4	8.7	6.30	-2.4	-27.60%	929,325.60
900	129,519	58.6	27	164.1	75.7	8.1	2.80	-5.3	-65.40%	362,653.20
COMMERCE	318,046	48.3	50.7	135.2	142.1	4.8	5.20	0.4	8.30%	1,653,839.20
	1,633,716									9,986,580.20

Table 10: ADH Energy Metrics Report

Metric	Jun 2008 (Energy Baseline)	Jul 2018 (Energy Current)	Change
ENERGY STAR Score (1-100)	Not Available	Not Available	N/A
Source EUI (kBtu/ft²)	637.8	528.6	-109.20 (-17.10%)
Site EUI (kBtu/ft²)	311.7	263.1	-48.60 (-15.60%)
Energy Cost ($)	891,633.33	552,207.38	-339425.95 (-38.10%)
Total (Location-Based) GHG Emissions Intensity (kgCO2e/ft²)	30.9	22.8	-8.10 (-26.20%)
Water Use (All Water Sources) (kgal)	28,880.1	Not Available	N/A
Total Waste (Disposed and Diverted) (Tons)	Not Available	Not Available	N/A

Table 11: ADH Energy Efficiency Projects Assessment

ITEM/DISCUSSION	ESTIMATED COST
Modernize Central Plant Chilled Water Piping Reconfiguration of existing plant piping and installation of new, variable-speed pumps to establish separate primary and secondary piping loops. Provides thorough control of water flow, pump energy consumption, and building temperatures throughout the facility, and result in energy cost savings by maximizing pump and chiller operation and establishing efficient chiller loading. Estimate of approximately 30-50% improvement in system efficiency.	$1,700,000
Conversion of Steam Plant to Direct-Heating Hot Water/Domestic Water Project will eliminate steam production and use in the facility and provide high efficiency heating water boilers and domestic hot water heaters. New controls will be installed to vary flows with demand, and energy savings will result from the elimination of highly inefficient steam plant operations. Additional savings will accrue due to the reduction in facility manpower requirements with the removal of steam boilers. Existing steam plant is about 19% efficient. New equipment will be selected in the 75-90% efficiency range.	$2,450,000
Roofing Renovation and Sealing of Main Building exterior Replacement and necessary abatement of 75,000 square feet of roof area at the ADH main building. Work includes all removal and patching of all now-unnecessary penetrations above the old lab areas. Power-wash and waterproof entire exterior of the buildings. Seal all existing window frames to stop air infiltration into buildings and reduce conditioned-air losses.	$4,500,000
Air Handling Unit and Fancoil Unit Replacement/Upgrades Replacement of thirteen 1966-vintage air handling units and approximately 200 fancoil heating/cooling units located in the five-story building. Includes installation of new DDC controls, two-way control valves, and electronic flow controls at all units to improve comfort, reliability, and energy efficiency on all floors. Resulting efficiency gains likely around 40%.	$3,400,000
Elevator Replacement/Upgrades Replacement/upgrade of ten original existing elevators ranging in age from 47-58 years old. New digital controls and speed-controlled motors will improve operating efficiencies by 40-60%	$4,700,000

Authority to Implement Public Property Innovation and Resiliency Support

E&E is unaware of any statute that would limit or prevent the implementation of a program promoting Public Property Innovation and Resiliency Support. Implementation applicants selected for funding should seek local site approvals, required permits, and any other necessary means to proceed with implementing this measure.

Appendix F. Agricultural and Wastewater Pump Repair and Energy Efficiency Program

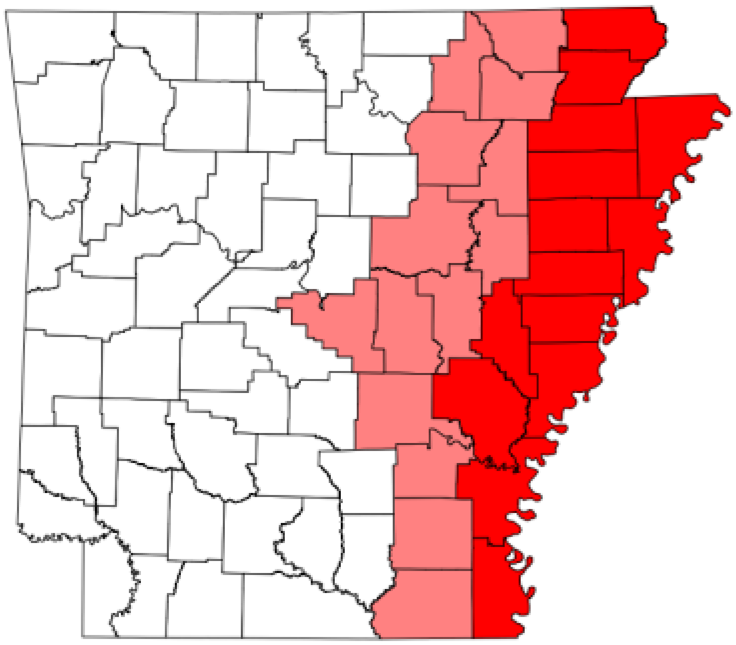
Water pumping is an energy-consuming activity, but simple measures like installing well timers can make a difference in both the energy used to transport water and the emissions related to that energy consumption. In Arkansas, most of these pumps are in use in rural (LIRC) areas of the state, so programs that increase efficiency or effectiveness of water-pumping have direct air quality benefits for surrounding communities.

Expansion of the Arkansas Well Timer Program would present a unique opportunity to reduce irrigation pumping time in rice production by 20%. Implementing automatic shutoff equipment, such as timers, removes the need for manual shutoff. With shutoff equipment installed, wells stop pumping when the field is watered and rather than being reliant on operator schedules. Preventing this over-pumping will reduce the amount of diesel burned and electricity demand in the Arkansas Delta, and reducing emissions of several pollutants in a rural and historically underserved area of the state. Referring back to Tables 1 and 2, emissions from rice cultivation in Arkansas accounted for 38% of the agriculture sector's total MMT CO_2e in 2021, and 41% of total methane emissions for the state the same year. While agriculture is not a significant sector in many states' emission inventories, for Arkansas agriculture produces more CO_2e than the industry sector. A program addressing inefficiencies in rice cultivation could have significant impact on overall emissions and would produce immediate air quality benefits for rural LIRC communities in the state. Co-benefits of such a program include water conservation. As in many states, water availability is an increasing concern for state analysts in Arkansas, as groundwater reserves become more limited.

To be eligible for the program, producers would need to be involved in rice cultivation, and use diesel or electric wells for irrigation. Once producers sign up for the program, a vendor would install the requested number of timers and would bill the program administrator in bulk. This would help to maximize producer involvement in the program by ensuring there is no out of pocket cost. At the time of this writing, the existing Well Timer program has been implemented on approximately 40,000 acres in the Arkansas Delta through private investment.

Anticipated Benefits of Agricultural and Wastewater Pump Repair and Energy Efficiency Program

The Arkansas Delta area is located in the eastern portion of state and fully encompasses fifteen counties: Arkansas, Chicot, Clay, Craighead, Crittenden, Cross, Desha, Greene, Lee, Mississippi, Monroe, Phillips, Poinsett, and St. Francis. Of the 113 census tracts within these counties, 86 are identified as LIRC (76%). Reducing operating time of pumps within this area will decrease exposure to emissions and reduce water use, providing a co-benefit of water security, in these communities.



In the instance of well timer installation program, the following scenario gives an estimate for energy and air quality benefits to be expected:

For electric well-pumps:

$58.69 average irrigation cost/acre (rice) (2003-2012)
$0.051 average electrical cost per KWH (2003-2012)
1151 KWH/acre x .00075 metric tons CO_2/KWH = .86 tons/acre
605k acres x .86 = 520,000 tons /year for rice acres
20% savings = 104,000 CO_2 MMT yearly

Diesel:

$88.38 average irrigation cost/acre (Rice) (2003-2012)
$2.89 average diesel (2003-2012)
30.58 gallons/acre x 22.44lbs CO_2/gallon
686.22 lbs/acre = .31 metric tons/acre/year
495k acres x .31 tons = 153,000 metric tons produced yearly
20% savings = 30,000 tons CO_2 yearly

This estimate is based upon a 55/45 split between producers using electric/diesel wells in Arkansas.

Authority to Implement an Agricultural and Wastewater Pump Efficiency Program

E&E is unaware of any statute that would limit or prevent the implementation of an Agricultural and Wastewater Pump Efficiency Program. Participation by cultivators is voluntary, as this program would operate on the basis of replacement by third party and billing to the managing program entity for coverage of costs of eligible projects.

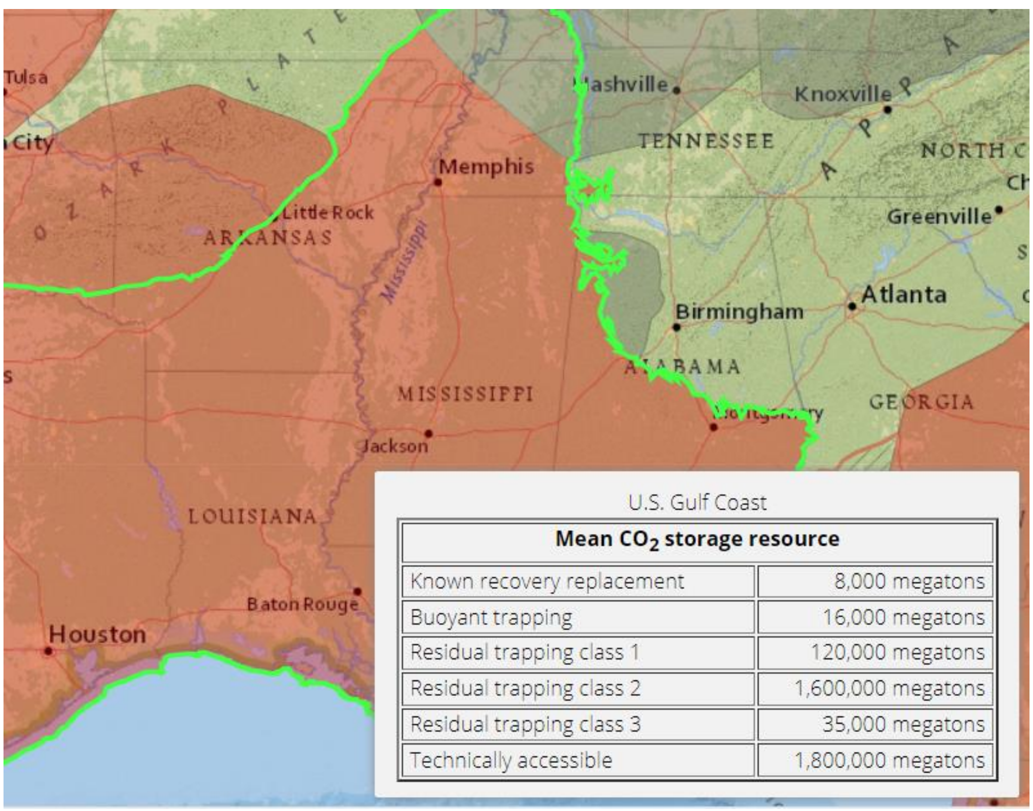
Implementation applicants selected for funding should seek local site approvals, required permits, and any other necessary means to proceed with implementing this measure.

Appendix G. Agricultural Emissions Research and Carbon Sequestration Support

Given agriculture is the largest industry in Arkansas, programs benefiting the reduction of agricultural emissions are much more impactful in Arkansas than in other parts of the country. The state also boasts a very robust agricultural research and pilot studies community supported by the University of Arkansas system.

Arkansas has considerable potential for carbon sequestration, both through injection and through natural "passive" carbon sinks like forests and greenspaces. Regarding carbon capture and storage (CCS), Arkansas is part of two major basins of interest, the Arkoma Basin and the U.S. Gulf Coast. The U.S. Gulf Coast has the highest ranking potential for CCS in the entire county, with 1.8 million megatons of "technically accessible" carbon storage potential, and over one-third of Arkansas, including the Arkansas Delta region, is included in that basin. Additionally, a large portion of Arkansas is in the Arkoma Basin, which also has significant storage potential in comparison to other parts of the country. See Figures 4 and 5 for detailed overlays.

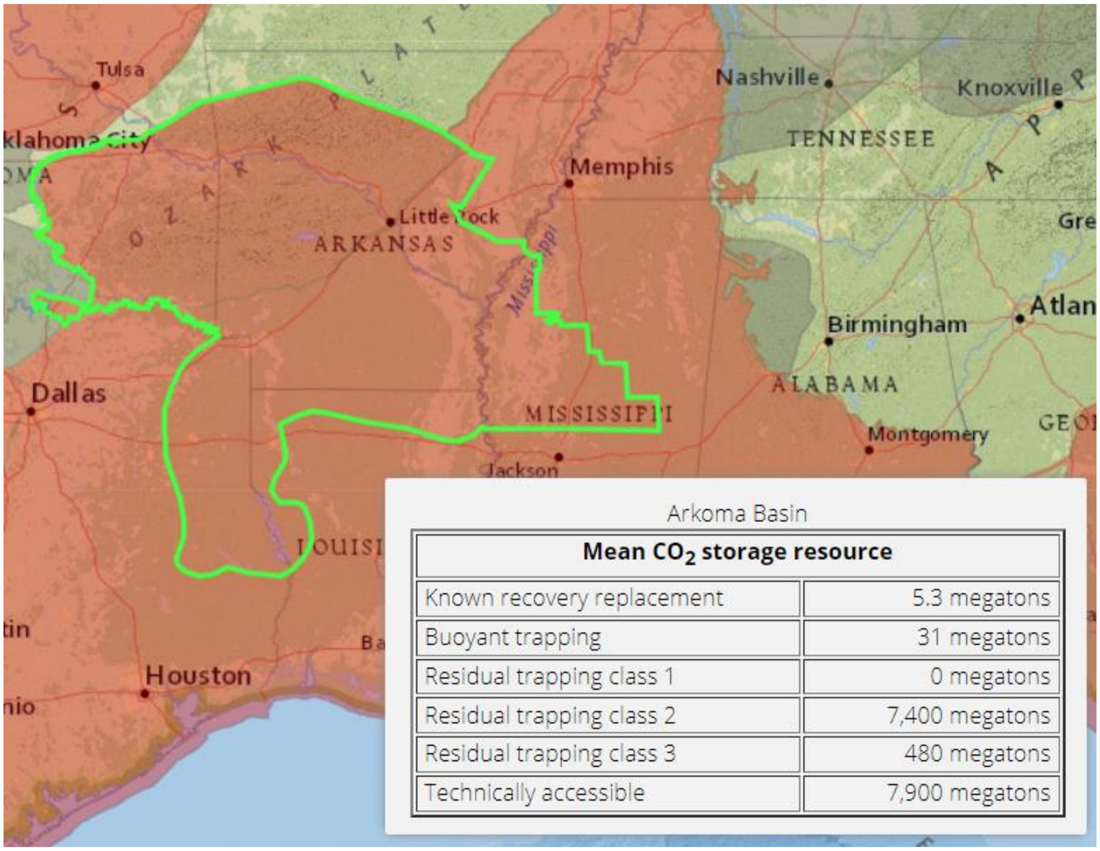
Figure 4: United States Geological Survey Geologic CO_2 Sequestration Potential for U.S. Gulf Coast: Arkansas[78]



Mean CO_2 storage resource	
Known recovery replacement	8,000 megatons
Buoyant trapping	16,000 megatons
Residual trapping class 1	120,000 megatons
Residual trapping class 2	1,600,000 megatons
Residual trapping class 3	35,000 megatons
Technically accessible	1,800,000 megatons

[78] https://co2public.er.usgs.gov/viewer/

Figure 5: United States Geological Survey Geologic CO_2 Sequestration Potential for Arkoma Basin: Arkansas[79]

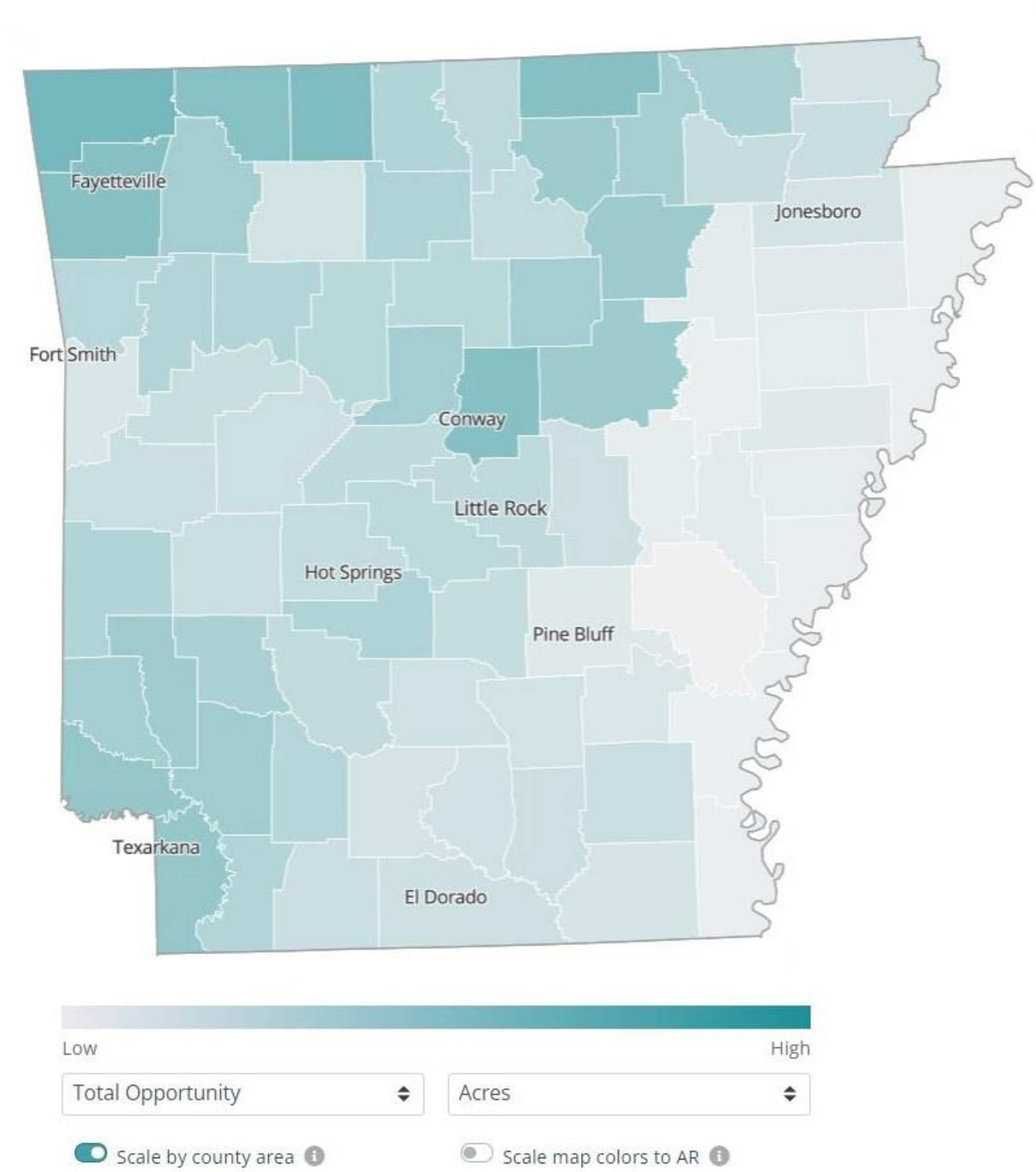


Passive carbon sequestration achieved through landscape and forest management presents another large opportunity for Arkansas. Figure 6 shows the potential for various areas of the state to undergo forest restoration, and identifies over 5 million acres of suitable land for a measure like this. Reforesting these areas with approximately 3.1 billion trees could capture 20.88 million tonnes of CO_2 per year, equivalent to removing 4.51 million cars from the road.[80]

[79] *Ibid.*

[80] https://www.reforestationhub.org/state/arkansas

Figure 6: Landscape Potential for Reforestation in Arkansas[81]



Anticipated Benefits of Agricultural Emissions Research

Providing financial support to established crop and soil scientists in the state so that studies may be conducted to determine the best methods for reducing emissions from agriculture and using the state's diverse landscape to capture carbon would be incredibly beneficial in Arkansas. As with previous projects led by U of A researchers, pilot programs resulting from the studies would also

[81] Ibid.

inform other states' pursuit of best management practices, delivering those benefits to even larger populations.

Because much of Arkansas's farming is in the southern Delta, LIRC benefits as described under Appendix F could also be expected for this measure.

Authority to Implement Agricultural Emissions Research

E&E is unaware of any statute that would limit or prevent the implementation of a program promoting Agricultural Emissions Research. Implementation applicants selected for funding should seek local site approvals, required permits, and any other necessary means to proceed with implementing this measure.

Appendix H. Foodware Reuse Education and Support Program

Voluntary utilization of reusable foodware in lieu of single-use plastic is a valuable and transformative measure that can be implemented easily across the food industry. Reuse systems drastically decrease waste and pollution, especially from single-use plastic. Disposable packaging and foodware are among the most littered items. Once in the environment, plastics and compostable products release GHGs as they degrade. The avoided manufacture, transportation, use, and disposal of single-use products is associated with reduced health impacts from exposure to pollutants. Additionally, reuse is an innovative and replicable initiative that can be scaled up within jurisdictions and transferred to other jurisdictions, creating a transformative impact by accelerating broader adoption of reuse.

Similar to electric vehicle adoption relying on a network of convenient charging stations, broad adoption of reuse requires that receiving and returning reusable items be easy and convenient for users. Cities are an ideal context to create complete reusable foodware ecosystems that achieve this scale and ease of use. The technical capabilities exist for reusable packaging systems, and modern-day examples of refillable beverage container systems operating at scale exist. When reuse systems are implemented at scale, returning containers is convenient, becomes normative social behavior, and reduces cost for businesses.

Life-cycle assessments (LCAs), academic studies, startup programs, pilots and ongoing reuse operations have repeatedly shown that reusable foodware can result in 2 to 10 times less lifecycle GHG emissions than disposable alternatives such as lined paper, plastic, bagasse and PLA, even when including washing and logistics. Cost-effective GHG reductions as reusable foodware and packaging programs are estimated to deliver CO_2e reductions at a cost of $1,000 to $2,000 per metric ton on a five-year time horizon when implemented at sufficient scale.

To bolster this industry’s growth, a state entity could develop an incentive program to encourage new facilities that produce reusable products. This could be administered as a statewide program (which might expand out to sync up waste and reuse streams between multiple private/public entities), or a state agency could sub-grant out to local/municipal entities that could administer the measure on a smaller scale, to attract industry to specific areas in the state with greater need for employment.

Anticipated Benefits of Foodware Reuse Measure

These co-benefits of reuse have particular significance for vulnerable communities, which may be most affected by the health consequences of manufacturing, disposal, and pollution.

Reuse systems have economic benefits, from the avoided costs and productivity losses associated with pollution-related illnesses, hospital visits, and premature deaths to expanded local economic opportunity and job creation and economic savings from reduced volumes of waste and litter needing to be managed. Reuse creates an estimated 200 to 330 jobs per 10,000 tons of single-use waste avoided.

Economic benefits to low-income and disadvantaged communities include high-quality jobs in washing facilities and logistics. Additionally, decreased reliance on global disposables supply chain results in increased stability of foodware costs, which is particularly important to small business owners.

If the foodware reuse measures were implemented in Arkansas's top ten largest cities as of 2022 (listed below) are located in Pulaski, Washington, Sebastian, Benton, Craighead, Faulkner, and Jefferson County.

- Little Rock
- Fayetteville
- Fort Smith
- Springdale
- Jonesboro
- Rogers
- Conway
- North Little Rock
- Bentonville
- Pine Bluff

Authority to Implement Foodware Reuse Measure

E&E is unaware of any statute that would limit or prevent the implementation of foodware reuse education and support, as this is a voluntary action. The foodware reuse measure will be implemented as a voluntary, grant-funded project managed by an eligible entity and aimed toward implementation in high population densities due to potential impact, but should be open to participation from all eligible

Implementation applicants should secure approvals, participants, and any operation and site approvals as deemed necessary.

Appendix I. Energy and Environment Priority Action Plan Supplement, prepared by City of Fort Smith

City of Fort Smith ARKANSAS

Energy & Environment Innovation Priority Action Plan Supplement

December 2023

Fortsmithar.gov

Table of Contents

Introduction

CITY OF FORT SMITH PRIORITY ACTION PLAN SUPPLEMENT

The Energy and Environment Innovation (EEI) Priority Action Plan (PAP) Supplement for the City of Fort Smith was collaboratively crafted by City Administration, with instrumental support from the Western Arkansas Planning & Development District (WAPDD). Valuable input from the Fort Smith Climate Lobby and The River Valley Green Energy and Education Program (RV-GEEP) further enriched the planning process.

In September 2023, the City of Fort Smith formalized a Memorandum of Agreement (MOA) with the Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ), for regional Climate Pollution Reduction Grant (CPRG) planning. The designated Fort Smith Metropolitan Statistical Area (MSA) encompasses five counties, including three in Arkansas and two in Oklahoma, with Fort Smith anchoring this vital region. Boasting a population exceeding 300,000 citizens, this area includes key cities like Van Buren, Ozark, Poteau, and Sallisaw, all strategically positioned under the umbrella of Fort Smith in the western part of Arkansas.

GROWTH

Fort Smith has garnered prestigious recognition as the chosen location by the Department of Air Force for the Foreign Military Sales Pilot Training Center at Ebbing Air National Guard Base, marking a significant milestone in the city's trajectory. The establishment of this center solidifies Fort Smith's role as an international hub for aviation excellence, with Singapore maintaining a permanent mission for F-16 and F-35 training. Notably, Poland, Finland, and Switzerland will also partake in F-35 training in Fort Smith, establishing the city as a global center for military aviation instruction.

This strategic initiative is not merely a short-term undertaking; it represents a generational project with far-reaching implications for Fort Smith's growth and prosperity. The anticipated influx of up to 1,500 military staff and their families from diverse countries is poised to create a vibrant and diverse community within Fort Smith. This population growth is not only a testament to the city's appeal but also an opportunity for cultural exchange and community enrichment.

Introduction

CITY OF FORT SMITH PRIORITY ACTION PLAN SUPPLEMENT

Economically, this initiative is a game-changer, injecting close to $1 billion in economic activity into Fort Smith and the broader River Valley region. The positive ripple effects are multifaceted, encompassing increased job opportunities, a stimulated local economy, and heightened community vibrancy. Fort Smith's designation as a hub for international military training not only underscores its strategic significance but also positions the city for sustained economic and demographic growth. In essence, this undertaking is not just about aviation training; it symbolizes Fort Smith's ascent as a global player with enduring positive impacts on its population, economy, and community fabric. Along with the extension of I-49, the Fort Smith MSA is on course to grow substantially in the coming years, and therefore sustainability priorities have increased.

PUBLIC ENGAGEMENT

The City of Fort Smith fostered community involvement by conducting six public meetings dedicated to engaging citizens in discussions about the priorities for energy and environment innovation measures. Recognizing the importance of community input, these public forums served as a platform for open dialogue, allowing residents to share their perspectives, insights, and suggestions on the crucial topics of energy and environmental sustainability. Through these inclusive gatherings, the City sought to ensure that the priorities set forth in its innovation measures align with the aspirations and concerns of its diverse citizenry. By encouraging active participation and valuing community input, Fort Smith aims to cultivate a shared vision that reflects the collective aspirations for a more sustainable and resilient future.

The City actively engaged in a comprehensive state-wide survey, gathering valuable data for priority measures. Input from public meetings and the survey played a pivotal role in guiding the City toward crafting potential measures that resonate with the community's aspirations. This inclusive approach ensures that the City's initiatives are not only informed by objective data but are also shaped by the collective ownership and vision of the community. By actively involving residents and aligning priorities with public input, the City underscores its commitment to transparent and community-driven decision-making, fostering a sense of shared responsibility and pride in the initiatives designed for the betterment of the community.

Measure One

Public Clean Transportation Refinements & Choices

MEASURE SYNOPSIS

Cities can help drive the adoption of aggressive policies and increase political pressure for policy action at higher levels (state, national, utilities, other cities, and international city platforms). Local commitments to 100% (or nearly 100%) vehicle electrification for both government fleets and privately owned vehicles can galvanize strong policy action and send essential market signals. Cities can aim to commit to reaching 100% new EV purchases up to five years earlier than statewide and national targets, meaning cities can aim for 100% by 2030 for buses, light-duty fleets, and taxis and by 2035 for heavy equipment trucks.

Cities play a pivotal role in steering the global transportation paradigm toward sustainability, with a specific focus on promoting environmentally friendly choices in public transportation. By adopting aggressive policies and leveraging their influence, cities can not only instigate change locally but also exert pressure on higher levels of governance, including state, national, utility, inter-city, and international platforms.

A strategic emphasis on public transportation is key to achieving significant reductions in greenhouse gas emissions. Local commitments to 100% (or nearly 100%) vehicle electrification for both government fleets and privately owned vehicles serve as powerful catalysts for policy action and market transformation. This commitment not only addresses the environmental impact of private vehicles but also emphasizes the critical role of public transportation in the broader context of sustainable urban mobility.

Cities, as pioneers of change, can set ambitious targets to expedite the transition to electric vehicles (EVs) in public transportation. By committing to achieving 100% new EV purchases up to five years earlier than statewide and national goals, cities can lead the charge toward a cleaner, more efficient future. This forward-thinking approach translates to a tangible timeline, with cities aiming for 100% electrification in buses, light-duty fleets, and taxis by 2030, and extending this commitment to heavy equipment trucks by 2035.

Public Clean Transportation Refinements & Choices (continued)

In promoting widespread adoption of electric public transportation, cities not only contribute significantly to local emission reductions but also serve as exemplars for broader societal change. The impact of such commitments resonates beyond city limits, influencing transportation choices regionally and inspiring a global shift towards sustainable and eco-friendly mobility options. By championing public transportation electrification, cities position themselves as leaders in the pursuit of a greener, more resilient urban transportation landscape.

City projects and planning concepts include:

- Public Transit Expansion, 24/7, service expanded into MSA
- EV Transit Bus Expansion, CNG possibilities
- Light Rail Transportation connecting Fort Smith MSA
- Smart Intersections
- Public EV Charging Infrastructure
- Complete Streets with expanded E-Bike LIRC Programs

MEASURE RATIONALE

Fort Smith Transit provides transportation to the public within the City limits. Fixed-route services consist of a bus network that runs through main roads, the downtown area, and several residential areas within the city. All fixed-route buses are equipped with lifts for mobility devices. There are currently 7 new CNG buses and 13 bi-fuel buses (CNG/unleaded) with each bus running 200 miles a day. The City of Fort Smith plans to expand the fixed routes to service Low Income and Rural Communities (LIRC) and highly populated urban areas within the entire MSA.

Fort Smith Transit directly benefits from Section 5307 Urbanized Formula Funds, leveraging sufficient accrued federal funds to cover the majority, or 85%, of the costs associated with procuring electric vehicles. Securing a grant to serve as a matching contribution not only supports the City's electric bus acquisition efforts but also proves advantageous for the grant provider, enabling them to facilitate a

Public Clean Transportation Refinements & Choices (continued)

substantial purchase with a comparatively smaller funding allocation. Presently, the department is actively pursuing the addition of electric buses to its existing fleet. However, challenges arise as electric vehicles are not currently featured on Arkansas Department of Transportation (ARDOT) state bid list. Despite multiple transit agencies expressing interest in electric vehicles, the process has temporarily stalled pending the appointment of a new division head in early January, following a recent change in administration of the public transit division.

In addition, the City intends to increase hours of operation to 24/7 that would provide an enhanced service to the community for citizens that work over night and would connect communities in all counties of our MSA. This expanded public transportation service choice would service additional LICAC areas in the MSA with a population of over 11,000 citizens.

While the impact of GHG reduction or equity benefits is measurable, the pursuit of policies that accelerate charging infrastructure development is one of the most impactful first steps needed to uptake EVs across all vehicle classes. The City of Fort Smith will put forth efforts to reduce the barriers in creating a robust infrastructure network that is foundational for all citizens and businesses, ultimately leading to transportation electrification across the entire MSA. Additionally, it will enable consumer confidence and support public and private sector fleet transition to EVs.

A municipality can accelerate electric vehicle adoption by establishing a comprehensive plan to increase the availability of charging infrastructure, or electric vehicle supply equipment (EVSE). Local government agencies should develop charging infrastructure plans with charging locations optimized to address all vehicle types and population segments. The City plans to provide a public EV Charging infrastructure that will positively impact LIRC areas and further encourage all citizens to purchase EV vehicles in the near future. Planning for and building out a network of charging infrastructure is critical for a just and equitable transition to transportation electrification. Equitable charging means ensuring EV charging infrastructure is installed in a way that addresses a spectrum of needs. Examples include planning for, requiring, and/or

Public Clean Transportation Refinements & Choices (continued)

installing charging infrastructure at workplaces and businesses, in the public right-of-way, at multi-unit dwellings, and across neighborhoods. The City plans to work with local business leaders and the public to begin planning the City EV charging infrastructure.

In 2022 and 2023, the City of Fort Smith enacted projects and programs to enhance complete and green streets. In 2023, the Streets and Traffic Control Department is proposing 2.72 miles of new sidewalk construction and 0.95 miles of sidewalk repairs. In 2022, the City enacted the Slow Streets Project and Ride4Smilies Bike Share.

The City intends to expand the Ride4Smilies Bike Share Program but lacks the funding to facilitate infrastructure upgrades that allow safe and extended means for EV Bike transportation. The planned expansion of this program would positively impact over 20,000 citizens within the City based on Census tracts that are overburdened and underserved areas. It has the added benefit of transpiration choice that would reduce the need for low-cost vehicle purchases with high GHG emissions. During our public and stakeholder outreach period, over 50% of public input strongly recommended the City enhance and enrich the Complete and Green Streets in our MSA with community connectivity.

The City of Fort Smith Traffic Control is continuously researching and installing the latest technology in traffic signal control and communications. The City is currently constructing a Traffic Management Center (TMC) to help monitor traffic patterns and analyze data that affect overall traffic flow. This TMC will allow access to real-time traffic data and adjust traffic signal timing more efficiently. This will result in fewer traffic delays throughout the City. Traffic Control also raises awareness of the City's pedestrian traffic with additional signage, crosswalks, and Rectangular Rapid Flashing Beacons (RRFBs).

Ongoing and upcoming Traffic Control improvements will help Fort Smith move closer to Vision Zero; the goal to achieve zero roadway fatalities and serious injuries by the year 2050. In addition, the City is seeking additional funding for Smart Intersections to reduce vehicle idling time and quick routes to decrease overall driving time.

Measure One

Public Clean Transportation Refinements & Choices (continued)

WORKFORCE NEEDS

Climate adaptation is now a well-documented need in the transportation sector, and there are strong conceptual frameworks for the adaptation process. Since climate adaptation is an emerging field, the pathways for developing the skills and competencies for adaptation careers are not well established. The increased value placed on adaptation-related expertise by state departments of transportation and regional transportation agencies, as well as the emergence of new educational and training opportunities in climate adaptation available in higher education and professional organizations, is indicative of the potential for rapid growth in this area.

Engineering, design, and implementation services will be required if an implementation grant is pursued for one or more of the concepts listed. Additional staffing within the City will be required to maintain the expanded public services and to properly maintain newly implemented programs

AUTHORITY TO IMPLEMENT

In the pursuit of an implementation or planning grant to support this initiative, the City of Fort Smith is empowered to enact impactful measures through ordinance and/or resolution, sanctioned by the City Board of Directors. This strategic approach, backed by substantial and accessible funding, ensures that the city exercises its authority effectively to bring about meaningful progress in the implementation of this measure. The program design prioritizes granting authority to the eligible municipality or coalition, empowering them to directly implement one or more components of this initiative.

Fort Smith City Administration has the capability and sanction to work with county representatives and tribal leaders in the MSA to implement measures within this plan. This approach ensures that the municipal body and collaborating MSA entities exercise authoritative control over the program.

Public Clean Transportation Refinements & Choices (continued)

POTENTIAL FOR EMISSIONS REDUCTION

Reducing reliance on private automobiles and encouraging public transportation options overall will reduce GHG emissions. Initial experience in US cities has shown that between 5%-25% of bike share trips replace a motor vehicle trip (either personal vehicle or taxi). Based on recent reporting, the City of Fort Smith Ride 4 Smiles bike share program, over 1,300 users took advantage of bikes (some of which were e-bikes) for 8,152 total miles since inception in May 2022. Based on the program survey, 36% of users indicated that bike trips replaced a personal vehicle trips. Therefore, approximately 1,700 miles of personal vehicle trips are eliminated annually within the current program.

Electric buses have the advantage of not producing any pollutant emissions directly from their operation, and their emissions are entirely "upstream" related to the fuel production of electricity. National averages show significant GHG from public transit with .32 pounds CO_2 less per passenger mile compared to private auto. Expanding the public transit with EV buses will further decrease the GHG in the City of Fort Smith MSA including tribal areas.

Smart Intersections lessen carbon emissions by reducing the amount of time vehicles idle at red lights, a significant source of greenhouse emissions that generates up to 30 million tons of carbon dioxide each year, according to the U.S. Department of Energy.

Measure Two

Waste Management & Recycling

MEASURE SYNOPSIS

Over the past 10-20 years, the City has prioritized waste management as a crucial strategy for environmental protection. Waste management plays a vital role in reducing pollution, preserving resources, and safeguarding ecosystems. As the City of Fort Smith continues to expand, there is a growing demand for landfill and recycling services to accommodate the public and sustain a green initiative in the MSA.

This proposed measure includes the following concepts:

- City-owned and operated Materials Recovery Facility
- Expanded recycling and vegetative composting
- Upgrades and expansion of Biomass Gasification

MEASURE RATIONALE

The City of Fort Smith Department of Solid Waste Services' landfill is a regional landfill that accepts debris from select counties in Arkansas and Oklahoma. Every year, on average, the landfill accepts 240,000 tons for disposal in an environmentally friendly manner.

The City of Fort Smith Landfill accepts debris from the following counties:

Arkansas: Sebastian, Crawford, Franklin, Logan, Scott, and Washington

Oklahoma: LeFlore and Sequoyah

The municipality also offers a comprehensive recycling program, encompassing both pickup services for a wide array of recyclable items and drop-off services tailored for E-Waste, White Goods, and Glass. Fort Smith's strategic vision extends to the establishment and management of a municipally operated Materials Recovery Facility (MRF). This facility, under city administration, would play a pivotal role in the meticulous sorting, separation, and storage of plastics, thereby facilitating the integration of new recyclable products and materials into an expanded recycling initiative. The implementation of the MRF is

Waste Management & Recycling (continued)

poised to optimize resource utilization, mitigate emissions, and concurrently stimulate job creation and economic prosperity across the MSA. The operational processes within the City MRF are anticipated to yield substantial improvements in recycling rates, particularly through the efficient segregation of plastics from the heterogeneous waste stream, mitigating contaminants and diverting a noteworthy volume of plastics from landfill disposal. Furthermore, the adoption of recycling practices within the city-operated MRF is anticipated to curtail greenhouse gas emissions linked to the production of specific materials, specifically virgin polymer.

The City of Fort Smith recently solidified an agreement, by Board of Directors approved Resolution, with Sloan Vazquez McAfee (SVM) for waste management consulting services in order to complete a strategic master planning document for the Solid Waste Services. This agreement will provide a waste composition study that will provide the material makeup of the recycling program to assist in the feasibility study and development plan of a MRF and/or future RFPs for recyclable processing. It will include a rate study for refuse collection for two different models; pay-as-you throw versus all-inclusive current system. SVM will work with SCS engineers to ensure landfill rates are inclusive of the findings. SVM will also develop a departmental 20-year strategic plan that develops a roadmap for the Department's operations; this differs from SCS's plan in that SCS provides a site planning strategic document.

The City collects landfill gases (LFG) and then turns the biogas into a renewable fuel, compressed natural gas (CNG) fuel. The LFG is made up of roughly 50% methane and 50% carbon dioxide, but there are trace amounts of water, nitrogen, oxygen, and hydrogen. The methane is collected and treated for pipeline injection while excess gas is flared or burned. The City’s partnership with Morrow Renewables generates approximately $1 million in annual revenue that the city uses to sustain the landfill operations, fund future expansion, and replace associated equipment.

The City intends to upgrade, improve, and expand the current Biomass Gasification process. The expansion will ensure the City is able to continue its efforts on methane capture at the landfill as the City continues to grow.

Waste Management & Recycling (continued)

WORKFORCE NEEDS

The measure for expanded waste management and recycling will require multiple skillsets and specializations to operate a City-owned MRF. It will require engineering, design, procurement, and construction services to bring a fully operational MRF to the City of Fort Smith Landfill. The opportunities for expanded workforce will benefit the River Valley, providing diverse jobs within waste management.

AUTHORITY TO IMPLEMENT

Financial viability is a critical challenge for a City owned and operated MRF. Establishing and operating the facility involves high initial investment and upfront costs for infrastructure development and equipment installation. Moreover, the operational costs of running an MRF can also be influenced by various factors such as maintenance costs for machinery used, labor expenses, energy consumption, etc. These expenses can be substantial, and if not managed efficiently, they can impact the facility's financial viability and performance.

In the pursuing an implementation or planning grant to support this initiative, the City of Fort Smith is empowered to enact impactful measures through ordinance and/or resolution, sanctioned by the City Board of Directors. This strategic approach, backed by substantial and accessible funding, ensures that the city exercises its authority effectively to bring about meaningful progress in the implementation of this measure. The program design prioritizes granting authority to the eligible municipality or coalition, empowering them to implement one or more components of this initiative directly.

Fort Smith City Administration has the capability and sanction to work with county representatives and tribal leaders in the MSA to implement measures within this plan. This approach ensures that the municipal body and collaborating MSA entities exercise authoritative control over the program

Waste Management & Recycling (continued)

POTENTIAL FOR EMISSIONS REDUCTION

Municipal Solid Waste (MSW) poses a notable environmental concern due to its predominantly degradable composition, leading to a substantial increase in GHG emissions. The presence of readily biodegradable organics in MSW significantly contributes to the release of GHG. Notably, municipal solid waste landfills stand as the third-largest source of human-related methane emissions in the U.S., accounting for approximately 14% of methane emissions in 2021. Of particular concern is the substantial contribution of wasted food, responsible for a staggering 58% of landfill methane emissions.

To address this environmental challenge, the City of Fort Smith is strategically positioned to make a significant impact through the implementation of a City-operated Material Recovery Facility (MRF) and a robust Composting Program. These initiatives hold immense potential for the removal of greenhouse gases within the River Valley region. By diverting organic waste away from landfills and into composting programs, the City aims to curtail the release of methane and other GHG associated with decomposing organic matter. Additionally, a well-operated MRF can enhance recycling efficiency, further reducing the overall environmental footprint of MSW.

This comprehensive approach aligns with the city's commitment to environmental sustainability and positions Fort Smith as a proactive contributor to the reduction of GHG emissions. Through the effective management of MSW, the City not only addresses immediate environmental concerns but also sets the stage for a greener and more sustainable future in the River Valley.

Measure Three

Carbon Removal Measures

MEASURE SYNOPSIS

Reducing emissions that result from local government activities is critical to meeting state and federal obligations for reducing greenhouse gas. In the short to medium term, there will still be some emissions that are very challenging to reduce or avoid. The City of Fort Smith proposes concepts and initiatives in this measure to face and overcome these challenges and produce better results for long-term outcomes.

Proposed concepts and initiatives for this measure:

- Watershed management expansion
- Land conservation easements
- Expanded trail system
- Dam Hydroelectric Power upgrades and expansion
- Port operation enhancements for energy efficiency

MEASURE RATIONALE

The Water Utilities Department’s Environmental Quality program is comprised of three distinct sections: Analytical Laboratory, Environmental Monitoring, and Watershed Management. The Watershed Management division, a cornerstone since its integration, is tasked with the strategic oversight of critical watershed areas, aligning with municipal priorities to safeguard water resources and maintain ecological balance. This tripartite structure underscores the department's municipal commitment to environmental stewardship and the delivery of high-quality water services to our community.

Established in 1987, the Environmental Quality program stands as a cornerstone in our commitment to safeguarding public health and the environment through the application of environmental forensic practices. At its inception, the program's primary objective was to guarantee adherence to environmental regulations, conduct responsible environmental management, and advocate for these principles among our citizens. Over the years, the program has evolved to encompass critical facets such as Watershed Management and Environmental Monitoring. The Watershed Management section, initiated in 1990 in

Carbon Removal Measures (continued)

tandem with the Lee Creek Project, holds responsibility for overseeing both the Lee Creek Watershed and the Frog Bayou Watershed. This program, rooted in environmental stewardship, continues to play a pivotal role in upholding the highest standards of environmental quality and ensuring the well-being of our community..

The City of Fort Smith remains dedicated to enhancing the quality of life for its residents by prioritizing initiatives that not only preserve the environment but also contribute to the overall well-being of the community. The ongoing efforts to acquire land easements for watershed management around River Valley water sources are integral to this commitment. Expanding the Watershed Management Program is envisioned not just as a conservation measure but as an investment in the long-term protection of water sources, ensuring a sustainable and high-quality water supply for current and future generations. By safeguarding these areas, the City aims to create an environment where residents can enjoy clean water resources, fostering a healthier and more vibrant community.

Recognizing the direct impact of land conservation on residents' quality of life, the City Administration places a significant focus on land conservation easements. The fact that this initiative ranked as the top priority in public surveys and engagements underscores the alignment of community values with the preservation of natural areas. These easements play a vital role in protecting woodlands and other natural landscapes, contributing to the overall aesthetic appeal of the region and providing residents with access to green spaces for recreation and relaxation.

Moreover, the emphasis on avoiding excess greenhouse gas emissions associated with low-density residential development through land conservation aligns with the City's commitment to environmental sustainability. By prioritizing smart growth and limiting the conversion of farmland and woodlands to low-density residential use, the City aims to create a more energy-efficient and ecologically balanced urban environment. This holistic approach not only contributes to a higher quality of life for residents but also positions Fort Smith as a community that values sustainability, resilience, and the well-being of its citizens.

Carbon Removal Measures (continued)

The Fort Smith Parks & Recreation Department developed a trails and greenway master plan in order to facilitate the actual construction of as many trails and greenways in Fort Smith as possible. There are currently 21 miles of paved trails within the City of Fort Smith. The City intends to continue its efforts in providing additional trails within the City, but also trails that connect to surrounding counties. Greenways protect important habitats and provide corridors for people and wildlife. They also help improve air and water quality. For example, communities with trails provide enjoyable and safe options for transportation, which reduces air pollution.

The Lee Creek water treatment plant is equipped with a hydro generator that can produce up to 1500 kW of electricity. Repairs and expansion costs have increased and funding can be difficult for the municipality to allocate for operation. Hydropower provides benefits beyond electricity generation by providing flood control, irrigation support, and clean drinking water. Hydropower is affordable. Hydropower provides low-cost electricity and durability over time compared to other sources of energy. The City is inclined to further research the benefits, cost, and expansion at Lee Creek with the addition of Lake Fort Smith.

The Port of Fort Smith is located at the confluence of the Poteau and Arkansas Rivers, the Port of Fort Smith is a 28- acre facility with access to rivers (Poteau and Arkansas), roads (Interstates 40 and 540 and highways 71 and 64) and rail (UP, BNSF and KCS). Predominant cargo handled at the Port is steel, including coiled plate, coiled wire rod, and bars. To reach efficient, sustainable, and coordinated port performance the practitioner and local governments need to dedicate resources and funding for upgrades.

The City intends to collaborate with the Port Authority and Five Rivers Distributions to prioritize energy efficiency measures and sustainable practices for potential port upgrades and expansion initiatives. Recognizing the inherent efficiency of maritime transportation, the focus is on maximizing the potential of barge transport, which can significantly outperform traditional truck-based logistics. A single barge has the capacity to transport volumes equivalent to approximately 60 trucks, depending on the nature of the

Carbon Removal Measures (continued)

cargo. This transition aligns with the City's commitment to energy-efficient and environmentally conscious operations.

The envisioned clean energy transformation of the Port of Fort Smith involves upgrading operational machinery to incorporate state-of-the-art technologies that enhance energy efficiency. Furthermore, the implementation of small-grade port shore power represents a tangible step towards achieving additional energy gains. This initiative not only promotes sustainable practices but also contributes to the reduction of carbon emissions associated with port operations.

Beyond the environmental benefits, these enhancements to the port infrastructure are anticipated to yield significant economic advantages. Job creation is a direct outcome, as the implementation of energy-efficient technologies and the expansion of distribution capabilities will require skilled and diverse personnel. Moreover, the increased efficiency in distribution and transportation is expected to stimulate commerce in the River Valley region, fostering economic growth and prosperity. The commitment to energy efficiency not only positions the City as an environmental steward but also as a driver of sustainable economic development in the local community.

WORKFORCE NEEDS

In the existing workforce structure of the City, there are designated roles such as Land Acquisition, Project Management, and Environmental positions, which can be strategically leveraged to support carbon removal initiatives if the necessary funding and opportunities are made available. These specialized positions play a crucial role in coordinating and executing measures aimed at carbon removal, aligning with the city's commitment to environmental sustainability.

Additionally, the successful implementation of carbon removal measures may necessitate the engagement of consulting services and other contractual arrangements, particularly in areas like port and hydro-electrical infrastructure. These external services would bring expertise and efficiency to the

Carbon Removal Measures (continued)

implementation process, ensuring that the measures are not only environmentally effective but also economically viable. As these carbon removal efforts progress, a positive byproduct will be the creation of diverse job opportunities. The establishment and maintenance of carbon removal infrastructure, including ports and hydro-electrical measures, will give rise to a range of employment opportunities spanning various skill sets.

This infusion of new jobs into the local economy has the potential to significantly benefit the job market in the River Valley region. The diversified employment landscape resulting from these carbon removal initiatives can contribute to economic growth and resilience, fostering a more sustainable and prosperous future for the community.

AUTHORITY TO IMPLEMENT

In the pursuit of an implementation or planning grant to support this initiative, the City of Fort Smith is empowered to enact impactful measures through ordinance and/or resolution, sanctioned by the City Board of Directors. This strategic approach, backed by substantial and accessible funding, ensures that the city exercises its authority effectively to bring about meaningful progress in the implementation of this measure. The program design prioritizes granting authority to the eligible municipality or coalition, empowering them to directly implement one or more components of this initiative.

Fort Smith City Administration has the capability and sanction to work with county representatives and tribal leaders in the MSA to implement measures within this plan. This approach ensures that the municipal body and collaborating MSA entities exercise authoritative control over the program.

POTENTIAL FOR EMISSIONS REDUCTION

The concepts encompassed within this measure are strategically designed to yield both immediate and long-term reductions in greenhouse gas emissions. One key facet involves the preservation of natural-based areas, which serves a dual purpose. Firstly, these preserved areas act as carbon sinks, effectively

Carbon Removal Measures (continued)

sequestering carbon dioxide from the atmosphere and contributing to the reduction of overall greenhouse gas emissions. Secondly, by championing the conservation of natural spaces, the community is not only enhancing its environmental resilience but also encouraging collective efforts toward sustained emission reduction. This approach goes beyond a singular focus on emissions, extending to the broader goal of cultivating a community that values and prioritizes environmental stewardship. As a result, the intersection of greenhouse gas reduction strategies and the preservation of natural areas fosters a higher quality of life for residents, creating a healthier and more sustainable living environment in Fort Smith.

Measure Four

Solar & Net-Zero Buildings

MEASURE SYNOPSIS

In 2021, the City of Fort Smith initiated efforts for municipal net-zero buildings. This included a Energy Benchmark Study on City facilities and an Energy Master Plan that was adopted by the City Board of Directors in 2023. Net-zero-carbon buildings are more efficient, cheaper to run, and increase resilience to extreme weather events and the reliability of electricity supply in cities with unreliable or overloaded power grids. In addition, a municipal focus on net-zero building and introduction to solar, could encourage and incentivize residential and commercial solar and energy efficiency.

The building sector measure would include:

- Large scale City solar plant
- Upgrade Municipal facilities for energy efficiency
- Low Income Solar & Weatherization Programs
- City Parks and Parking Lot Solar Awnings/Canopies

MEASURE RATIONALE

The City of Fort Smith is presently working to bring a solar plant to the River Valley region. Large, off-site projects tend to offer scale and help make a measurable difference towards locallydefined renewable energy goals. Decreased emissions and cleaner air is the main goal for a City solar plant, but this local solar project endeavor is to achieve broader community benefits and align with other priorities. These include saving money, creating local jobs, expanding renewable access to low-income residents, and advancing local resilience.

The City Energy Master Plan was executed to significantly reduce cost and improve energy efficiency in municipal facilities. Energy costs are an enormous expense for our municipality and is a large line item in the City budget. In addition, our facilities are a major contributor to the MSA carbon footprint, especially the water and waste water treatment plants, convention center, and Parrot Island Water Park. The plan outlines goals to improve the City's focus on energy efficiency, reduce energy expenditures, boost the local economy (through upgrade projects), and enhance community relations.

Solar & Net-Zero Buildings (continued)

The City of Fort Smith is actively working with OG&E and CLEAResult to implement our master plan through the SAGE Program. The program provides technical and financial assistance for efficiency upgrades. Whether the City retrofits an existing building or incorporates energy efficiency technologies into new construction, the program will identify and implement cost-effective projects that allow the City to use energy more efficiently. The program offers incentive-based credits based on energy efficiency grades, but these funds can be limited and small making it difficult to afford needed upgrades and replacements to meet our efficiency goals. The main goal within the master plan is to reduce energy use by 10% by the end of 2026.

In addition to the Energy Master Plan and SAGE Program, the City is actively seeking resources and planning ventures for all facilities to reach net-zero and powered by solar energy. Attention to operation and maintenance provides the most rapid means of reducing consumption and costs in most buildings. Once each facility is at a certain grade of efficiency, the City will work to provide solar at each site for net-zero goal achievement.

The City is currently working to draft a program that will provide funding, support, and/or incentives for solar power, winterization, and weatherization of residential homes for LIRC areas within the MSA. There are current federally funded programs, such as Solar for All, that provide avenues for LIRC homeowners to receive solar panels. It can be difficult for homeowners to apply and feel comfortable seeking support from these programs. The City intends to adopt a program that assists and ultimately provides residential solar and weatherization directly through the City or through partnerships with reputable vendors and agencies.

Recent concepts and ideas have motivated the City to incorporate solar awnings and canopies at local parks and public recreational areas along with adding solar awnings in public parking lots that hosts public events such as the local farmers market and annual festivals. These small solar projects will provide energy in our parks and public areas and encourage community adoption of future solar projects in the MSA.

Solar & Net-Zero Buildings (continued)

WORKFORCE NEEDS

The City would require specialized consulting and planning services for proper planning and implementation of concepts and projects in this measure. Needs for this measure would be large and diverse. Partnerships with industry organizations and specialists will be crucial in providing valuable feedback and direction to ensure the apprenticeship process, mentor training, and end-to-end materials are as inclusive and equitable as possible.

This measure will create numerous green energy jobs and bring opportunities for local education programs within our schools and local university. Solar workforce research and development at the U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) supports efforts to prepare and sustain this skilled and diverse clean energy workforce. Workforce development initiatives funded by SETO include online and in-person training and education programs, work-based learning opportunities such as internships and apprenticeships, collegiate competitions, certification programs, and support services such as career counseling, mentorship, and job readiness. These programs and services, along with others, will be utilized to support the City's Solar & Net-Zero Buildings initiative.

AUTHORITY TO IMPLEMENT

In the pursuit of an implementation or planning grant to support this initiative, the City of Fort Smith is empowered to enact impactful measures through ordinance and/or resolution, sanctioned by the City Board of Directors. This strategic approach, backed by substantial and accessible funding, ensures that the city exercises its authority effectively to bring about meaningful progress in the implementation of this measure. The program design prioritizes granting authority to the eligible municipality or coalition, empowering them to directly implement one or more components of this initiative.

Fort Smith City Administration has the capability and sanction to work with county representatives and tribal leaders in the MSA to implement measures within this plan. This approach ensures that the municipal body and collaborating MSA entities exercise authoritative control over the program

Solar & Net-Zero Buildings (continued)

POTENTIAL FOR EMISSIONS REDUCTION

A municipality embarking on initiatives related to solar and net-zero buildings is poised to significantly reduce greenhouse gas emissions, marking a pivotal step towards environmental sustainability. The integration of solar energy systems into municipal infrastructure directly contributes to a reduction in reliance on conventional, fossil-fuel-based power sources. This shift towards renewable energy inherently curtails carbon emissions associated with traditional energy production. Simultaneously, the pursuit of net-zero buildings, characterized by energy-efficient design and sustainable practices, ensures minimal energy consumption and waste generation. The combined impact of solar adoption and net-zero building strategies results in a substantial decrease in the municipality's overall carbon footprint. By actively investing in and promoting these initiatives, the municipality not only embraces cleaner and greener energy solutions but also becomes a proactive contributor to the global effort to mitigate climate change and enhance environmental quality.

The Solar for All initiative, as outlined in the Federal Program, emphasizes the role of solar energy in significantly curbing greenhouse gas emissions and mitigating air pollutants. Of particular relevance to municipal considerations, the program is dedicated to delivering the advantages of greenhouse gas and air pollution reduction projects to American communities, with a specific focus on low-income and disadvantaged communities. The municipal perspective aligns seamlessly with the priority action plan measures outlined in the CPRG NOFO and other IRA grants. In pursuit of the goal of Solar & Net-Zero Buildings and a concerted effort to diminish the carbon footprint throughout the Fort Smith MSA, the City is proactively seeking competitive grant funding and alternative financial resources to advance these environmentally impactful objectives.

Measure Five

Education & Workforce

MEASURE SYNOPSIS

The Municipal Education & Workforce initiative focuses on fostering knowledge and skill development in the areas of green energy, low-income solar, and weatherization. Through targeted educational programs, the initiative aims to empower individuals with the expertise needed to actively participate in the burgeoning green energy sector. Specifically designed to be inclusive, the program emphasizes low-income solar solutions, ensuring equitable access to renewable energy resources. Additionally, the initiative provides comprehensive training in weatherization techniques, equipping participants with the know-how to enhance energy efficiency in homes and buildings. By addressing both educational and workforce needs, this initiative strives to create a skilled and diverse workforce capable of driving sustainable practices and making a positive impact on the community's environmental and economic resilience.

The City Education & Workforce measure initiatives are as follows;

- Partner with Peak Innovation Center and UAFS for education
- Offer apprenticeships and internships for workforce development
- Conduct public education events for LIRC

MEASURE RATIONALE

The City of Fort Smith is embarking on a transformative collaboration with the University of Fort Smith, PEAK Innovation, and Fort Smith Public Schools to spearhead initiatives in energy efficiency, green energy adoption, carbon emission reductions, and education in the field of sustainable energy. This pioneering partnership seeks to leverage the collective expertise of these institutions, pooling resources to implement innovative programs that advance environmental sustainability. The University of Fort Smith will play a crucial role in providing cutting-edge research and academic insight, while PEAK Innovation will contribute technological expertise and incubate sustainable energy solutions. Simultaneously, Fort Smith Public Schools will facilitate educational initiatives, fostering a curriculum that prepares the next generation for careers in sustainable energy. Through this concerted effort, the collaboration aims to not

Education & Workforce (continued)

only make Fort Smith a regional leader in sustainable practices but also to create a robust foundation for job education, ensuring the community's active participation in building a greener and more resilient future.

The City of Fort Smith is committed to fostering workforce development and skill-building within the community by introducing comprehensive apprenticeship and internship programs aligned with the Priority Action Plan. These initiatives will provide invaluable hands-on experience and training opportunities for individuals seeking to engage with each measure outlined in the plan, from energy efficiency and green energy initiatives to carbon emission reduction strategies. By offering apprenticeships and internships, the City aims to cultivate a skilled workforce equipped with the practical knowledge and expertise necessary to contribute actively to the successful implementation of the Priority Action Plan. This proactive approach not only supports individual career growth but also bolsters the overall capacity of the community to address pressing challenges and drive sustainable change.

The City of Fort Smith, in collaboration with the Arkansas Advanced Energy Foundation, is poised to launch a comprehensive initiative aimed at enhancing public education and workforce development within our community and schools. This strategic partnership will facilitate the implementation of educational programs that focus on advanced energy, covering topics such as energy efficiency, renewable resources, and sustainable practices. Through workshops, seminars, and community outreach, the initiative seeks to raise awareness and impart essential knowledge about advanced energy solutions. Moreover, with a dedicated focus on schools, the program aims to integrate advanced energy education into the curriculum, ensuring that students are well-versed in the principles of sustainable energy from an early age. By empowering both the public and future workforce with a deep understanding of advanced energy, this collaborative effort aims to fortify Fort Smith's position as a hub for innovation and environmentally conscious practices.

Education & Workforce (continued)

WORKFORCE NEEDS

The initiation of an energy efficiency education and workforce program within a municipality necessitates a thoughtful consideration of workforce needs to ensure its success. This comprehensive program requires skilled professionals in various domains, including energy management, green technologies, and sustainable practices. Trained educators are imperative to impart knowledge and expertise, while specialists in energy efficiency auditing and implementation play a crucial role in executing practical measures.

Workforce development initiatives should encompass training for technicians capable of installing and maintaining energy-efficient systems, as well as professionals adept at conducting energy assessments and providing tailored solutions. Furthermore, outreach coordinators and community engagement specialists are vital for connecting with residents and local businesses, fostering understanding, and encouraging participation. By addressing these multifaceted workforce needs, a municipality can lay the groundwork for a successful energy efficiency program that not only enhances sustainability but also cultivates a skilled and empowered workforce capable of driving positive change within the community.

AUTHORITY TO IMPLEMENT

In the pursuit for an implementation or planning grant to support this initiative, the City of Fort Smith is empowered to enact impactful measures through ordinance and/or resolution, sanctioned by the City Board of Directors. This strategic approach, backed by substantial and accessible funding, ensures that the city exercises its authority effectively to bring about meaningful progress in the implementation of this measure. The program design prioritizes granting authority to the eligible municipality or coalition, empowering them to directly implement one or more components of this initiative.

Fort Smith City Administration has the capability and sanction to work with county representatives and tribal leaders in the MSA to implement measures within this plan. This approach ensures that the municipal body and collaborating MSA entities, exercises authoritative control over the program.

Measure Five

Education & Workforce

<u>POTENTIAL FOR EMISSIONS REDUCTION</u>

Public education holds immense potential for emissions reduction within our community by fostering awareness, instilling eco-conscious practices, and inspiring collective action. Through targeted educational campaigns and initiatives, residents can gain a deeper understanding of the environmental impact of their daily choices. This heightened awareness often translates into more sustainable behaviors, such as energy conservation, waste reduction, and the adoption of eco-friendly practices.

By equipping individuals with the knowledge to make informed decisions, public education becomes a catalyst for positive change, influencing a widespread shift towards lower-emission lifestyles. Moreover, informed citizens are more likely to support and advocate for community-wide initiatives, policies, and investments that prioritize emissions reduction, creating a ripple effect that extends beyond individual actions.

In essence, public education becomes a potent tool in shaping a community culture that values sustainability and actively contributes to mitigating the overall environmental footprint.

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Appendix J. Central Arkansas Energy and Environment Innovation Priority Action Plan Supplement, prepared by Metroplan

Central Arkansas Energy and Environment Innovation Priority Action Plan Supplement

December 2023

Clean Transportation Choices & Green Corridors

Efficient and Electric Vehicles

Waste Management & Recycling

Net-Zero Buildings

METROPLAN

SMART PLANNING MAKES SMART PLACES.

Introduction

Partnership with Arkansas Department of Energy and Environment

Central Arkansas' regional Energy and Environment Innovation (EEI) Priority Action Plan (PAP) Supplement was developed by Metroplan, Central Arkansas' Metropolitan Planning Organization (MPO), and Little Rock Sustainability Office staff (Central Arkansas EEI Planning Team) with the input of many partners. Metroplan entered into a Memorandum of Agreement (MOA) with the Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ), in September 2023 for regional Climate Pollution Reduction Grant (CPRG) planning in the 6-county Little Rock-North Little Rock-Conway Metropolitan Statistical Area (Central Arkansas MSA). Metroplan's Central Arkansas Transportation Study (CARTS) area encompasses Faulkner, Lonoke, Pulaski, and Saline Counties.

In accordance with the MOA, Central Arkansas' Priority Action Plan Supplement includes a minimum of three measures, such as a policy, pass-through funding program design, or project concept paper. Each measure includes the following:

- Anticipated workforce needs to implement measure
- Review of authority or barriers to implementing measure (laws, ordinances, rules, etc.)
- Information necessary for DEQ to perform the following analyses:
    - GHG and Co-pollutant emission reductions or sequestration
    - LIRC Benefits Analysis

Public and Stakeholder Engagement

The Central Arkansas EEI Planning Team focused its first two months of planning on conducting meaningful engagement with stakeholders and the public, with an emphasis on outreach to low income and rural communities throughout the region. Activities included:

- Community Input Survey
    - Online public survey developed and hosted by Metroplan with input from state and regional partners
    - Launched September 5, 2023
    - 880 statewide responses, 317 from Central Arkansas MSA (as of 11/21/23)
- Transportation Sector Workshop in North Little Rock (9/21/23, 50 participants)
- Metroplan Board & Stakeholder Workshop (10/25/23, 27 participants)
- Presentations to LR Sustainability Commission, Sierra Club, Central Arkansas Planning and Development District (CAPDD), WTS Arkansas
  Television interviews on THV11 The Vine and PBS Arkansas Week

- Tabling at North Pulaski County Community Festival, UA Little Rock Sustainability Day, and Little Rock Cornbread Festival
- Press releases advertising Community Input Survey and Transportation Sector Workshop Email newsletters to 112 contacts regionwide
- Distributed information through neighborhood associations
- Social media posts

Partners

Central Arkansas' planning process has been supported and augmented by a diverse group of partners engaged through one-on-one meetings, workshops, and regular email communication. Partners include:

- Arkansas Department of Energy and Environment
- Arkansas Department of Transportation
- Metroplan (MPO) Board of Directors - 28 mayors and 5 county judges
- Rock Region METRO (transit provider)
- Bill and Hillary Clinton National Airport
- Little Rock Port Authority
- Little Rock Sustainability Commission
- Little Rock Department of Public Works
- Central Arkansas Water
- Central Arkansas Planning and Development District
- Entergy Arkansas (investor-owned utility)
- Entegrity Energy Partners (Little Rock-based sustainability consulting/development firm)
- North Little Rock Electric (municipal utility)
- Arkansas Advanced Energy Association
- Arkansas Apprenticeship Alliance
- Southern Bancorp (local CDFI)
- Little Rock Regional Recycling
- Little Rock Regional Chamber

Greenhouse Gas (GHG) Emissions Estimation

The following estimation is an approximation of GHG emissions for Central Arkansas' 6-county MSA based on available state and national data. GHG emissions include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (NO_2). All units were converted into metric tons of carbon dioxide equivalents (CO_2e).

The "Estimation of Central Arkansas Emissions by Sector" (Chart 1) visualizes sector-specific emissions in Central Arkansas. Because Central Arkansas imports most of its energy and is home to only one power generation facility, the natural gas-fired Oswald Generating Station in Wrightsville, the energy sector represents a smaller estimated share of local emissions as compared to the State's Inventory. Energy used in buildings and local water and wastewater processes are included. Therefore, the Residential, Commercial, and Industrial sectors included in this visualization express only natural gas combustion in buildings and the related process/fugitive emissions.

Chart 1.

Estimation of Central Arkansas Emissions by Sector

Energy	2493337	
Residential	1455859.88	
Commercial	2256239.54	
Industrial	1057400.58	
Transportation	4901620	
Agriculture and Land Use	2303345	
Estimated Total	14467802	MT CO_2e

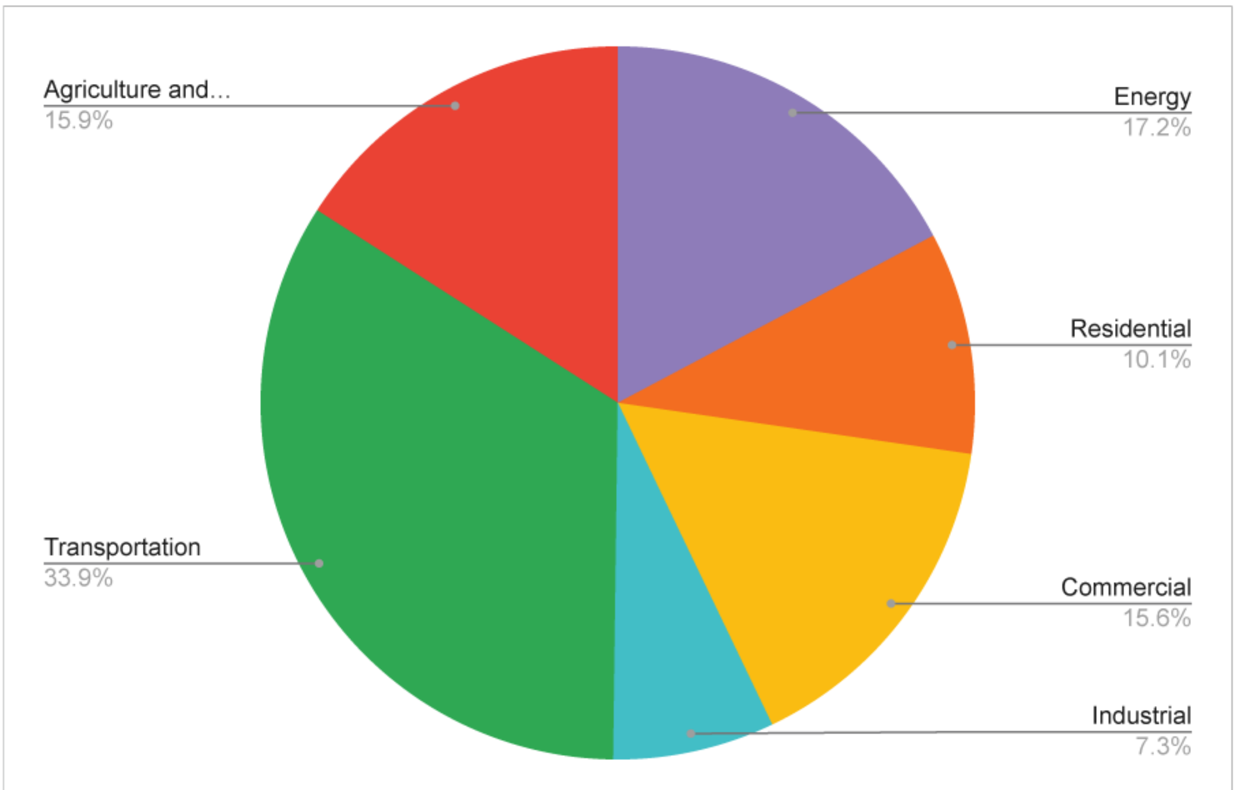


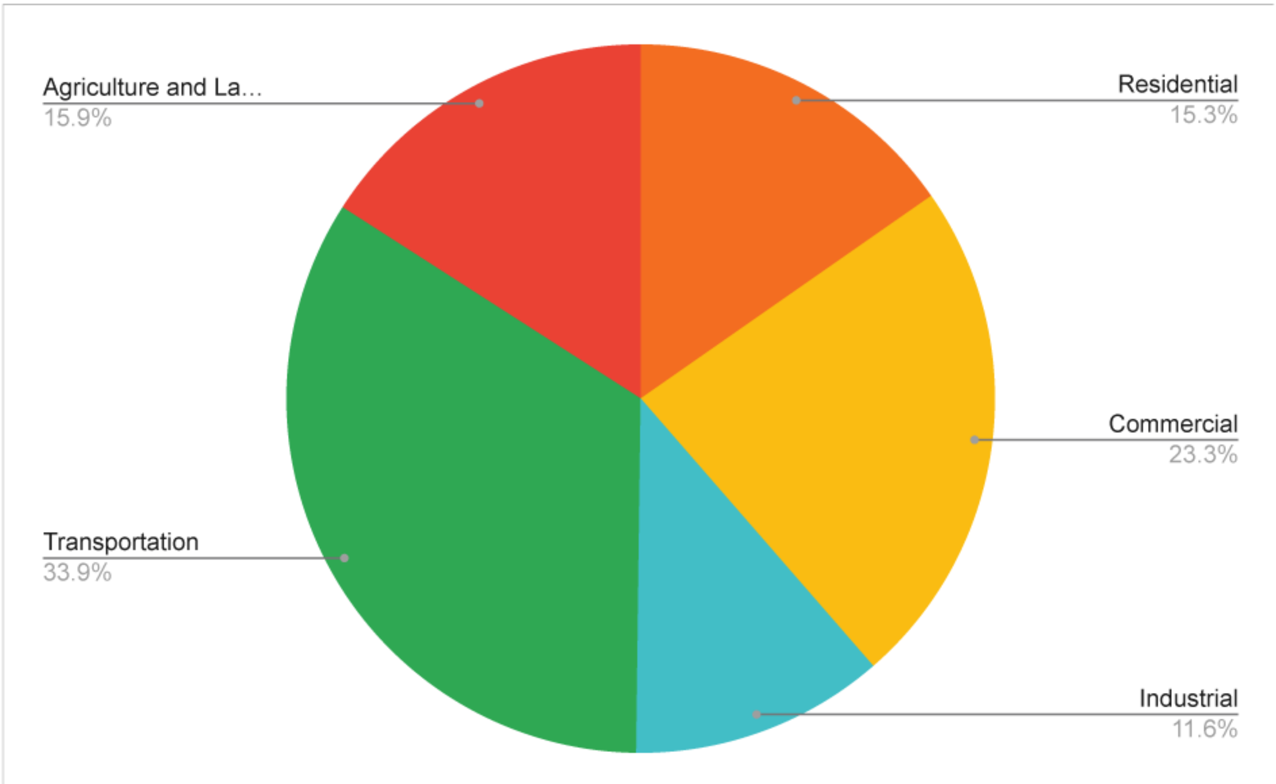
Chart 2, "Estimation of Central Arkansas Emissions by End Use," visualizes the activities and end users that consume the energy expressed in Chart 1. Transportation activities are estimated to cause the highest portion of emissions (33.9%), followed by Commercial activities (23.3%), which includes the operation of commercial businesses and landfills. The Oswald Generating Station emissions are incorporated below in the Industrial sector.

Chart 2.

Estimation of Central Arkansas Emissions by End-Use

Residential	2214166
Commercial	3371330
Industrial	1677341
Transportation	4,901,620.00
Agriculture and Land Use	2303345

Estimated Total 14467802 MT CO2e

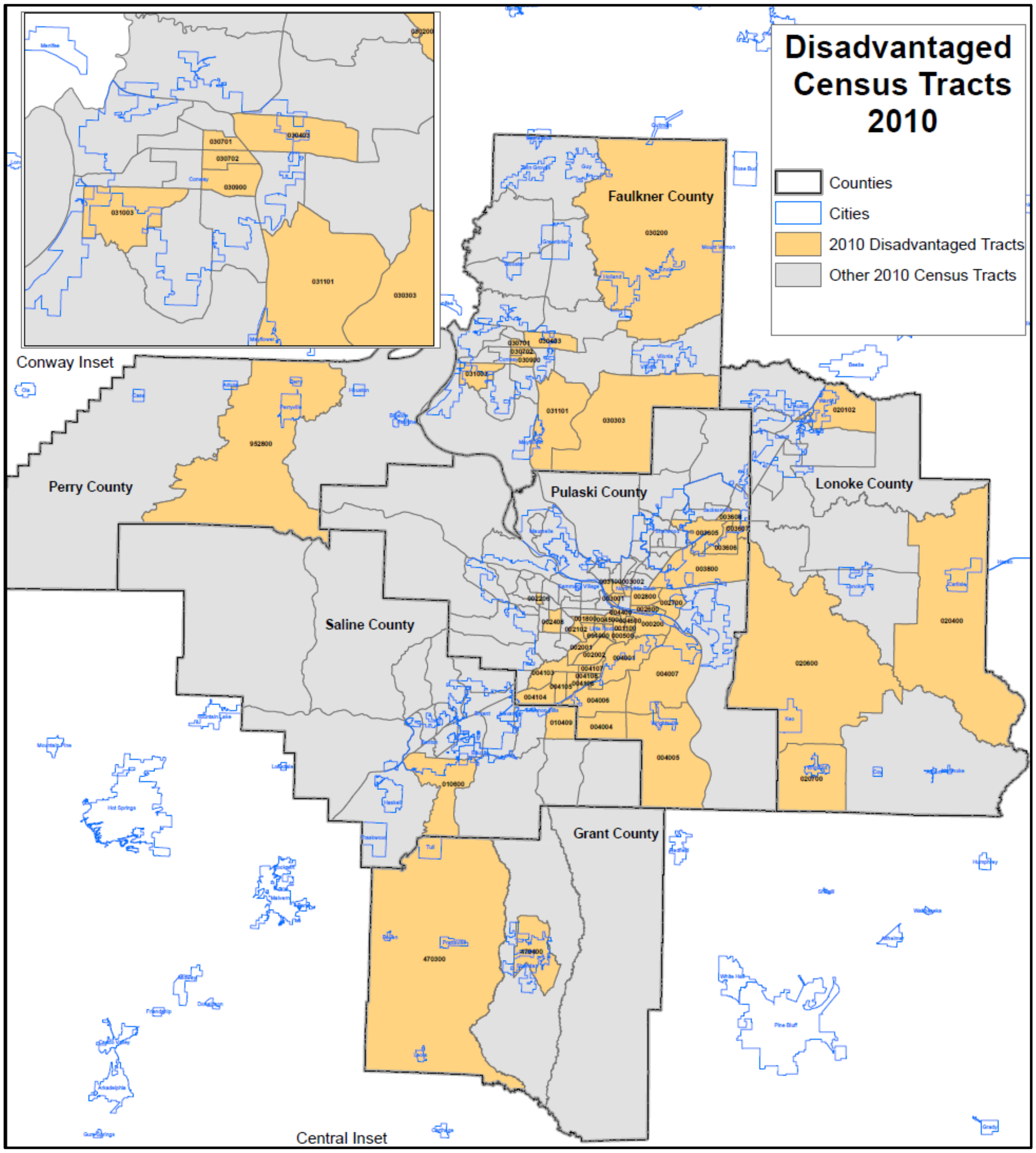


Forestry and other land use in Central Arkansas is a net sink and offsets roughly 27% of these greenhouse gas emissions. The net sink is not shown in the above charts. For more information on these emissions estimates, please see the data sources and calculation methods in the appendix.

Low-Income and Rural Community (LIRC) Analysis

For the first time in our nation's history, the federal government has made it a goal that 40 percent of the overall benefits of certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. The Central Arkansas EEI PAP Supplement is designed to advance the goals of Justice40 set forth in Executive Order 14008. For the purposes of this plan, "low-income and disadvantaged community (LIDAC)" and "low-income and rural community (LIRC)" are used interchangeably.

EPA's Climate and Economic Justice screening tool shows that significant portions of the Central Arkansas MSA are underserved and overburdened by pollution. Further analysis showed that 30 percent of residents in the 6-county MSA reside in LIRC areas (2010 Census tract population data).



Workforce Analysis

Unemployment in Arkansas is at an historic all-time low of 3.1 percent and labor force participation is 58 percent. A September 2023 report by the U.S. Chamber of Commerce on the worker shortfall across America ranked Arkansas among 16 states with the “most severe” shortages, with only 44 available workers for every 100 open jobs. Given the existing shortage, the emergence of new “green economy” industries, and the evolution of traditional trades towards digital technology and energy efficiency, it is crucial to attract and prepare current businesses, new enterprises, and workers to implement the measures in this Priority Action Plan supplement.

The Central Arkansas EEI Planning Team worked with the Arkansas Advanced Energy Association (AAEA) and the Arkansas Apprenticeship Alliance (ARKAA) to assess workforce needs and training opportunities for the measures included in this plan supplement, which are outlined in each section of the plan. AAEA is an industry organization dedicated to growing Arkansas's economy through expanded utilization of advanced energy technologies, including energy efficiency, demand response, solar, wind, hydro, nuclear, electric vehicles, alternative fuels, and smart grid. ARKAA is a nonprofit working to grow Arkansas' skilled talent pipeline in emerging industries using the apprenticeship model. ARKAA's association with national training vendors, other federal grantees, and industry apprenticeship intermediaries has allowed ARKAA to learn best practices from across the nation and establish relationships that will facilitate national scaling in the near future. In 2022, ARKAA was recognized as an Apprenticeship Ambassador by the Department of Labor (DOL).

ARKAA has been awarded numerous grants from federal agencies, regional authorities, and private foundations. This includes being a sub-recipient of Arkansas Division of Workforce Services' Arkansas Expanding Apprenticeship (AREA) and Apprenticeship Pathways Initiative grants and Arkansas Department of Education's Closing the Skills Gap grant. ARKAA has been the direct recipient of multiple grants from Walton Family Foundation, the Delta Regional Authority, and most recently the Workforce Opportunity for Rural Communities (WORC) Initiative grant by the USDOL. These grants have allowed ARKAA to create a track record of successful programs as an industry intermediary for RAP (Registered Apprenticeship Program), as well as expand RAP's scope over the past three years.

ARKAA has employed an Energy and Environment Sector Director, April Ambrose, to serve as an industry navigator/subject matter expert guiding the development of workforce strategies to grow advanced energy, sustainability, and related jobs in Arkansas using apprenticeship as the main vehicle. The Sector Director's mission is to develop an equitable pipeline of clean economy career education and skill development: For diverse students and adults to gain equitable, quality, family-sustaining jobs; For employers to access a diverse, qualified workforce pool; For public and private partners to streamline offerings and leverage funding together; and to reduce our collective impact on climate change and human health.

Low-income and rural individuals and families will benefit from ARKAA's approach to workforce development. ARKAA has developed a DEIA initiative to provide further outreach to under-served populations, with the goal of having 65% of all apprentices being from under-served populations by the end of 2023. Its goal from the beginning has been to use the apprenticeship model as an equitable opportunity for historically marginalized people and to create career paths that start wherever diverse candidates are. Under the apprenticeship model, employers hire first and then train on the job. There is no need for a family to sacrifice while a member goes into educational debt to receive required job training, with no promise of future employment. According to ARKAA, a few once a year half-day staff trainings in key sectors and the apprenticeship model could help achieve most of the workforce goals and training necessary to meet the needs outlined in this plan.

The planning team also met with Southern Bancorp, the only Community Development Financial Institution (CDFI) headquartered in Arkansas, to discuss low-interest financing opportunities for local businesses to expand operations in order to meet the needs outlined in this plan. Southern Bancorp has expressed interest in using its private capital to accelerate "green" economic development in the region.

Reference: The Worker Shortfall (Lance Turner Editor's Note), *Arkansas Business*, November 20, 2023. Accessed November 29, 2023 at https://www.arkansasbusiness.com/article/146913/the-worker-shortfall-lance-turner-editors-note#:~:text=A%20report%20a%20couple%20of,100%20open%20jobs%20in%20September

Plan Structure

Each Section of this Central Arkansas EEI Priority Action Plan Supplement outlines:

- **Priority Action** measure with proposed implementation projects under each.
- **Rationale** for including each measure:
  - *Community Interest* based on public and stakeholder input.
  - *Benefits to Low-Income and Rural Communities (LIRC).*
  - *Additional Rationale* for each individual project: *Why* it is important to the Central Arkansas plan, its specific *Environmental Impact*, and its implementation readiness considering the project's *Funding Needs and Opportunities*.
- **Workforce Needs** to realize the measure.
- **Implementation Authority & Barriers:** Which organizations can make the decision to implement and what might keep them from doing so.
- **Emissions Reduction or Sequestration** of GHGs and co-pollutants achieved by implementing one of the proposed projects.

The Appendix includes sources for Central Arkansas' regional GHG estimate and emission reduction/sequestration forecasts, as well as a matrix demonstrating each measure's alignment with existing federal, state, regional, and local plans.

1. Clean Transportation Choices & Green Corridors

1.1. The Clean Transportation Choices & Green Corridors (CGT) priority action involves establishing regional greenways, electrifying and optimizing transit systems, creating complete streets, integrating green infrastructure, transitioning to energy-efficient street lighting, and promoting mode shifting. The CGT initiatives collectively aim to transform transportation infrastructure, promote sustainable mobility, and mitigate environmental impacts while enhancing the overall quality of life within Central Arkansas.

Proposed measure for inclusion in the Arkansas EEI Priority Action Plan

Provide financial incentives and technical assistance for a regional/statewide Clean Green Transportation program to implement the following projects:

A. *Mode Shifting: Encourage a shift from single-occupancy vehicles to more energy efficient modes of transportation such as ride-sharing, public transit, biking, or walking, thereby reducing traffic congestion and carbon footprint.*
B. *Regional Greenways: Develop interconnected networks of pedestrian and bicycle pathways, fostering alternative and eco-friendly commuting options while enhancing community accessibility and recreational opportunities.*
C. *Complete Streets: Design streets for all users, including pedestrians, cyclists, and public transportation, ensuring safety, accessibility, and sustainability in urban planning.*
D. *Green Infrastructure: Incorporate natural elements like vegetation, permeable surfaces, and sustainable drainage systems into urban landscapes to sequester carbon and mitigate the impacts of extreme weather such as urban heat islands and flooding.*
E. *Transit Electrification and Optimization: Transition public transportation to electric vehicles to reduce carbon emissions and enhance efficiency. Optimize land use, transit routes, and schedules for improved accessibility and convenience.*
F. *Energy Efficient Street Lighting: Upgrade street lighting systems to energy-efficient LED technology, reducing energy consumption and contributing to lower greenhouse gas emissions.*

1.2. Rationale

The Clean Transportation Choices & Green Corridors (CGT) priority action was chosen for its effectiveness in reducing GHG emissions, its speed of implementation, and high level of support indicated through community and stakeholder engagement. The CGT action also aligns with stated federal, state, and local environmental goals and potential funding opportunities at various levels of government and through partnerships with private entities.

Community Interest

Trees and Natural Areas ranked as the highest priority (4.6 out of 5 stars) by Central Arkansas residents in the Community Input Survey. Stakeholders ranked it the #5 most important measure during the Metroplan board and stakeholder workshop session.

Green Infrastructure & Streets and Sustainable Landscaping ranked in the 88th percentile of priority scoring by Central Arkansas residents in the Community Input Survey. Stakeholders ranked it the #1 most important measure during the Metroplan board and stakeholder workshop session.

Transportation Choice and Connected Communities ranked in the 83rd percentile of priority scoring by Central Arkansas residents in the Community Input Survey. Stakeholders ranked it the #2 most important measure during the Metroplan board and stakeholder workshop session.

LIRC Benefits

In locations with limited transit access and coverage, access to a motor vehicle carries strong implications for one's ability to reach employment, access healthy foods, and reach basic services. More than 6,700 (8.2%) households in Little Rock do not have access to a motor vehicle, and an additional 34,800 (42.5%) households have only one vehicle available. A diverse multimodal transportation system reduces reliance on cars and provides more equitable access to services. The benefits of the CGT measure to LIRC communities include:

- Transportation equity: Increased non-motorized and transit access to job opportunities, essential services, and recreation
- Reduced air pollution
- Improved health outcomes
- Lower transportation costs
- Improved safety; fewer roadway fatalities and serious injuries
- Improved neighborhood aesthetics
- Infrastructure resilience to extreme weather (flooding, heat islands, tornadoes)
- Energy cost savings
- Reduced commute times
- Apprenticeship/employment opportunities

Additional Rationale by Project

A. Mode Shifting
   - *Why:* Reduces traffic congestion, carbon emissions, and promotes healthier lifestyles through active transportation, transit, and ride-sharing.
   - *Environmental Impact:* Decreases greenhouse gas emissions from transportation, contributing to air quality improvements.
   - *Funding Needs & Opportunities:*
     i. Public awareness/education campaigns.
     ii. Funding for free transit passes.
     iii. Incentives for ride-sharing or biking sponsored by employers or municipalities. For example, the City of Denver, Colorado instituted an e-bike rebate program, and the City of Fort Smith, Arkansas started a Ride 4 SMILIES bike share program offering geared and electric-assist bikes for affordable rental rates at 8 stations across Fort Smith. Both programs include incentives within their structures targeted to LIRC communities. For instance, the Denver program allows additional rebate amounts for qualified low-income individuals, while the Fort Smith program has education and bike locations in targeted areas, as well as reduced rates for qualified low-income riders.

iv. Energy Efficiency and Conservation Block Grant (EECBG): $1,961,110 formula grant to Arkansas to establish a competitive sub-granting program for local governments to expand EV infrastructure and micromobility, promote clean energy workforce development, and conduct energy audits and retrofits in residential and commercial buildings, plus an additional $886,780 to cities and counties in the Central Arkansas MSA for formula funding to local governments.

B. <u>Regional Greenways</u>
  - *Why:* Shared-use bike-ped paths, separated from the roadway, offer safer, more accessible pathways for non-motorized travel, reducing traffic congestion, promoting physical activity, and connecting communities.
  - *Environmental Impact:* Reduces vehicle miles traveled (VMT) with carbon-emitting vehicles, preserves natural habitats, and fosters biodiversity.
  - *Funding Needs & Opportunities:*
    i. Grants and partnerships with environmental organizations, parks departments, and private donors could fund greenway development.
    ii. $55 million in federal USDOT Surface Transportation Block Grant (STBG) and Carbon Reduction Program (CRP) funding has already been committed by the Metroplan Board of Directors to planning and building the Central Arkansas Regional Greenway system.
    iii. Additional grant funding to expedite project delivery, right-of-way acquisition, and add green infrastructure elements to the project.

C. <u>Complete Streets</u>
  - *Why:* Prioritizes safety and accessibility for all road users, promoting active transportation and reducing accidents.
  - *Environmental Impact:* Encourages active transportation modes, reducing VMT and greenhouse gas emissions from cars.
  - *Funding Needs & Opportunities:*
    i. Grants for state and local transportation departments.
    ii. Partnerships with local businesses for streetscape improvements.

D. <u>Green Infrastructure</u>
  - *Why:* Mitigates environmental impacts by managing stormwater, reducing heat islands, and enhancing urban resilience.
  - *Environmental Impact:* Decreases water pollution, mitigates flooding, and enhances biodiversity in urban areas. Reduces GHG by reducing energy to pump water and sequestering carbon.
  - *Funding Needs & Opportunities:*
    i. Stormwater management grants.

ii. Partner with environmental organizations.
iii. Continue City of Little Rock's Urban Heat Island study.
iv. Incentivize private development to integrate green infrastructure.

E. Transit Electrification and Optimization
  - *Why:* Reduces carbon emissions, air pollution, and dependence on fossil fuels while improving public transportation access and efficiency.
  - *Environmental Impact:* Significant reduction in greenhouse gas emissions and improved air quality in urban areas.
  - *Funding Needs & Opportunities:*
    i. Federal grants for transit electrification projects.
    ii. Partnerships with private sector companies investing in transit-oriented development.

F. Energy Efficient Street Lighting
  - *Why:* Reduces energy consumption and saves costs in the long term.
  - *Environmental Impact:* Decreases energy use and light pollution, contributing to lower GHG emissions and a more sustainable environment.
  - *Funding Needs & Opportunities:*
    i. Energy efficiency grants.
    ii. Energy Performance Contracting assistance through the Arkansas Energy Office.
    iii. Partnerships with utility companies offering incentives for LED conversion.

1.3. Workforce Needs

The successful implementation of the Clean Transportation Choices & Green Corridors (CGT) priority action in Central Arkansas necessitates a skilled and diverse workforce equipped with expertise in sustainable urban planning, renewable energy systems, electric fleet maintenance, green infrastructure development, and community engagement.

There is currently very little training available in Central Arkansas for the installation and maintenance of green infrastructure. One-time maintenance staff training events and use of the Arkansas Apprenticeship Alliance (ARKAA) apprenticeship model could assist in providing training on native/adapted trail/landscaping maintenance to ensure environmental mitigation and carbon sequestration goals are achieved.

Collaborations with local educational institutions, trade unions, and job training centers will also be crucial in providing the necessary skills and knowledge for both existing professionals seeking to transition into sustainable fields and for emerging talents eager to contribute to the region's future sustainability.

1.4. Implementation Authority & Barriers

The successful implementation of the CGT priority action requires a collaborative approach among various stakeholders, including local government bodies, city planners, transportation authorities, environmental agencies, community organizations, and private sector partners. Supportive policies and financial incentives (grants, rebates, low-interest loans) will reduce barriers to adoption. Alignment with existing policy frameworks is essential to ensure the authority and legitimacy needed to execute these transformative measures. Moreover, fostering public-private partnerships and community involvement will strengthen the authority and collective effort needed to drive meaningful change.

Authority

- State agencies
- City and county governments
- Transit agencies

Barriers

- Fiscal constraints
- Conflicting priorities within governmental departments
- Public resistance/lack of understanding of long-term benefits
- Regulatory complexities/bureaucratic hurdles
- Lack of trained workforce
- Supply chain limitations for U.S.-made materials and vehicles

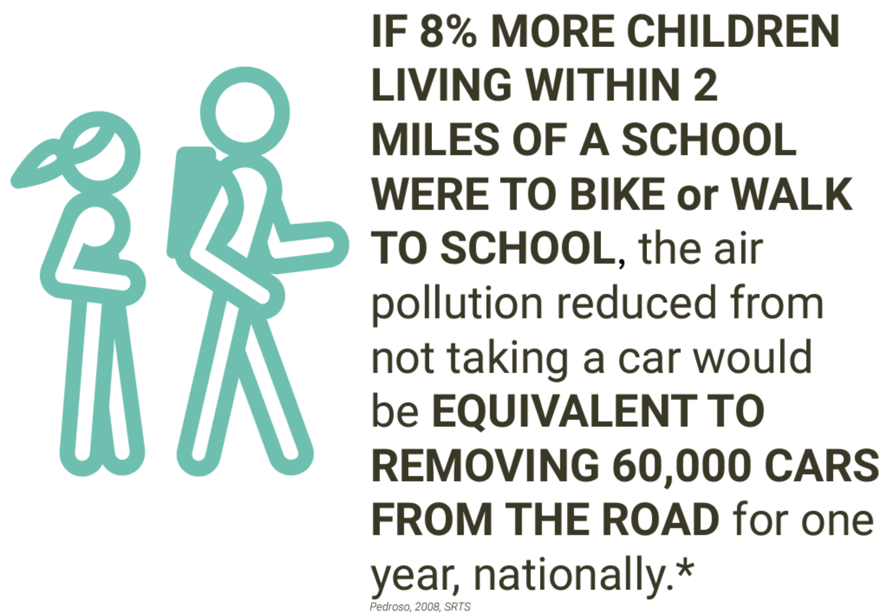
1.5. Emissions Reduction or Sequestration

Transit electrification and optimization could significantly cut emissions by replacing traditional fossil fuel-powered vehicles with electric ones, potentially reducing transportation-related emissions by a notable percentage. Similarly, encouraging mode shifting towards more sustainable options like biking, walking, transit, and ride-sharing could further contribute to reducing carbon emissions from individual commuting. For example, if improved bicycle facilities incentivized an increase in ridership over a ten year term and improved modeshare by 1.5% in low to medium density, 2.1% in medium-high density, and 4.4% in high density population areas, Central Arkansas could see the reduction of gasoline vehicle miles traveled (VMTs) by 2,415,800 which avoids

1,040,789 MT CO2e by 2030. This calculation was performed in ICLEI ClearPath using the Improved Biking Infrastructure calculator combined with Metroplan statistical data.

The adoption of energy-efficient street lighting and green infrastructure would also have an impact by reducing energy consumption and mitigating urban heat effects, indirectly influencing GHG emissions.

The overall impact would depend on various factors including the scale of implementation, community participation, technological advancements, funding availability, and the effectiveness of policies and regulations put in place to support these initiatives.



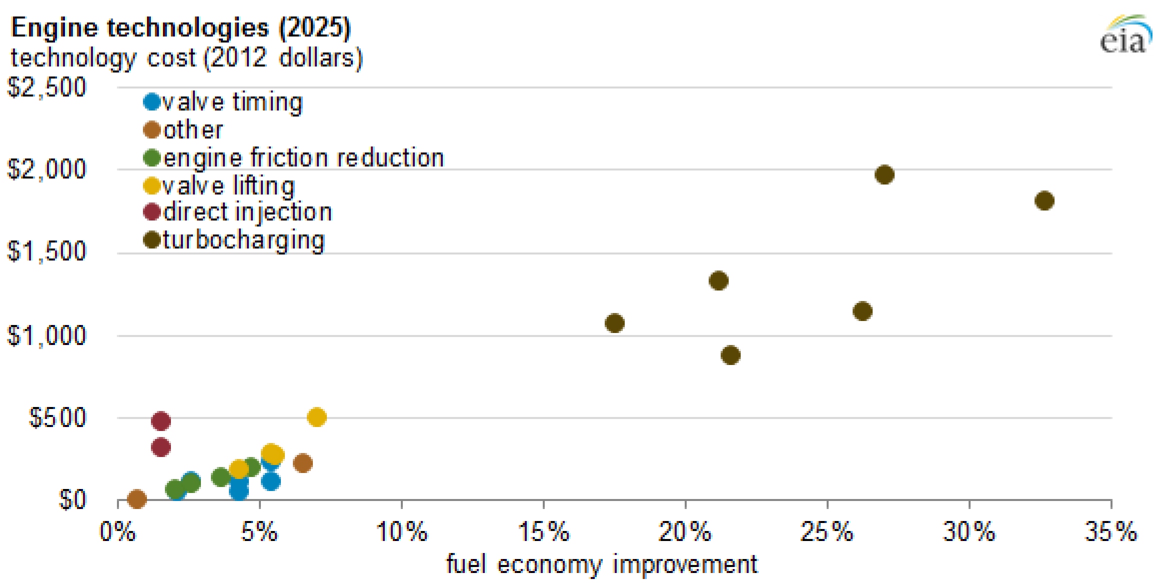
2. Efficient and Electric Vehicles

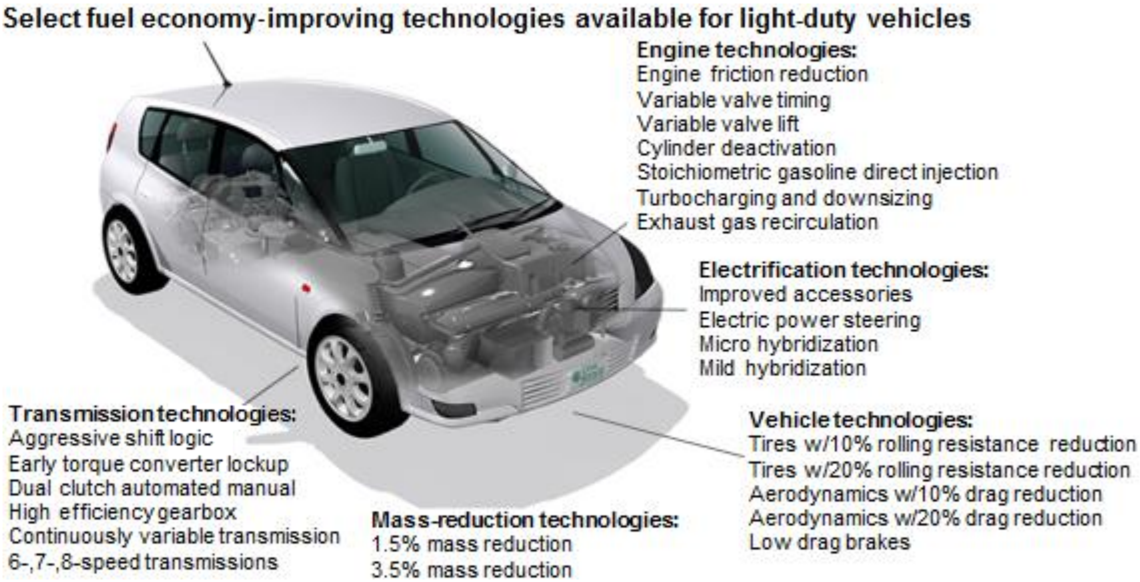
2.1. The Efficient and Electric Vehicles (EEV) priority action involves deploying short-term emission reduction technology, implementing a long-term electrification plan, and devising a regional strategy for optimal placement of electric vehicle chargers. These strategies collectively aim to provide immediate and long-term solutions for reducing emissions, promoting electrification, and strategically placing EV charging infrastructure to benefit the community while fostering a sustainable and equitable transportation ecosystem.

Proposed measure for inclusion in the Arkansas EEI Priority Action Plan

Provide financial incentives and technical assistance for a regional/statewide Efficient and Electric Vehicles program to implement the following projects:

A. *<u>Short-Term Emission Reduction</u>: Implement fleet emission reduction technologies with a focus on diesel vehicles, encourage emissions-reducing individual driver behavior changes, and provide technical assistance to local governments to utilize telematics data for fleet usage and efficiency analysis, and promote efficient transportation technologies and practices.*
B. *<u>Long-Term Electrification Strategy</u>: Provide EV readiness planning to local partners, including life-cycle cost analysis to guide a transition to electric vehicles. Examples: Cash for Clunkers - trade in current vehicles for an EV or other transportation mode. Rebates for fleet conversion and replacement of inefficient vehicles with more efficient ICE (internal combustion engine) vehicles, hybrid, or BEVs (battery electric vehicles).*
C. *<u>Regional EV Charger Placement Strategy</u>: Strategically position EV Charging Stations based on factors like air quality, community development, and demand, aiming for optimal accessibility and equitable distribution across Central Arkansas. Assist fleet owners transitions to EVs to install chargers to meet the needs of their new fleet.*





2.2. Rationale

The initiatives in the Efficient and Electric Vehicles (EEV) priority action not only confront the urgent challenge of curbing transportation emissions but also align with community priorities, environmental objectives, and diverse funding avenues across governmental and private sectors.

Community Interest

The Efficient and Electric Vehicles (EEV) action ranked in the 47th percentile of priority scoring by Central Arkansas residents in the Community Input Survey. Stakeholders ranked it the #4 most important measure during the Metroplan board and stakeholder workshop session.

While interest in electric vehicles varies, its potential impact on reducing GHG emissions is sufficiently significant to warrant its inclusion in the PAP. Instead of wholesale replacement, however, stakeholders expressed a preference for a gradual approach to electrification as vehicles reach the end of their useful life and power generation becomes cleaner. A regional action plan can help guide this gradual transition while recommending immediate efficiency improvements to existing fleets.

LIRC Benefits

Recognizing the higher upfront costs associated with electric and hybrid vehicles, this measure aims to explore avenues for financial incentives, subsidies, or innovative financing options to mitigate the initial expense barrier, ensuring equitable access to cleaner transportation choices for all communities, including those with lower incomes.

Additionally, strategic placement of charging infrastructure in these areas fosters accessibility, providing equitable opportunities for low-income residents to transition towards cleaner transportation alternatives. By prioritizing access to efficient vehicles and infrastructure, these initiatives work towards leveling the transportation playing field, enhancing economic mobility, and creating a more sustainable and healthier environment for all. The benefits of the EEV measure to LIRC communities include:

- Health benefits due to improved air quality
- Clean, efficient transportation options
- Long-term lower transportation costs due to fuel and maintenance savings
- Apprenticeship/employment opportunities

Additional Rationale by Project

A. Short-Term Emission Reduction
    - *Why:* Implementing these technologies and practices offers immediate emission reductions, promoting a more sustainable transportation landscape.
    - *Environmental Impact:* Reduces carbon emissions and air pollutants, improving air quality and mitigating the environmental impact of transportation.
    - *Funding Needs & Opportunities:*
        i. Grants, subsidies, and incentives to offset initial investment.
        ii. Arkansas Volkswagen Settlement Programs: Alternative fuel bus program (ABC Transportation Program), an alternative fuels funding assistance program for repower/replacement of heavy-duty and medium-duty diesel local freight and drayage trucks and diesel buses (Clean Fuels Program), a rebate for light duty electric vehicle charging infrastructure (EVSE Program), and a funding assistance program for Arkansas state agencies (SAFER) to repower/replace medium and heavy-duty diesel local freight and drayage trucks and diesel buses.
        iii. Public education and outreach.

B. Long-Term Electrification Strategy
    - *Why:* Embracing long-term electrification aligns with future-focused sustainable transportation solutions, reducing reliance on fossil fuels.
    - *Environmental Impact:* Shifts transportation toward cleaner energy sources, significantly reducing greenhouse gas emissions and air pollutants.
    - *Funding Needs & Opportunities:*
        i. Incentive programs for qualified individuals to purchase hybrids and/or EVs (model programs exist at city, regional, state, and national levels).
        ii. Energy Efficiency and Conservation Block Grant (EECBG): $1,961,110 formula grant to Arkansas to establish a competitive sub-granting program for local governments to expand EV infrastructure and micromobility, promote clean energy workforce development, and conduct energy audits and retrofits in

residential and commercial buildings, plus an additional $886,780 to cities and counties in the Central Arkansas MSA for formula funding to local governments.

iii. Public education and outreach.

C. Regional EV Charger Placement Strategy

- *Why:* Strategically placing EV charging stations ensures convenient, equitable access, encouraging electric vehicle adoption and reducing range anxiety.
- *Environmental Impact:* Facilitates the shift to electric vehicles, reducing emissions and promoting cleaner transportation options.
- *Funding Needs & Opportunities:*
  i. Public-private partnerships.
  ii. Incentives for private charging infrastructure installation.
  iii. Public education and outreach.
  iv. Government grants, including NEVI, CFI, and Arkansas Volkswagen Settlement EVSE Program.

2.3. Workforce Needs

As these initiatives drive forward to decarbonize transportation, the demand for a skilled workforce proficient in innovative technologies and sustainable practices becomes imperative. Workforce development programs geared towards training in electric vehicle technology, emission reduction methodologies, and sustainable transportation practices are essential. Collaborations with vocational institutions, trade schools, and industry partners can equip individuals with the necessary expertise to support the implementation and maintenance of advanced transportation systems.

Currently there is no standardized training program or credentials for EV maintenance in Arkansas. EVs require less maintenance, but they still require specialized knowledge of electric systems, combined with some standard vehicle maintenance. Dealers must have qualified maintenance staff in order to sell the vehicles, but the curriculum is not standardized, so they are claiming qualification with minimal manufacturer training.

There is a need for standardized curricula for different manufacturers and users, i.e. school/municipal maintenance teams, dealer maintenance, first responders, etc. with customized training to address different types of vehicles. Bus maintenance training for public transit and school bus mechanics is particularly needed. The national credentials that exist via ASE (National Institute for Automotive Service Excellence) require significant training in gas/diesel vehicles first. Vehicle maintenance for EVs (school/government/corporate fleets, dealers for consumers) is an apprenticeable role.

Charger installation is mostly done by electricians, but requires some training. EV charger installation is not an apprenticeable role as it only takes a few hours for an existing electrician to learn how to install them. However, this professional development curricula needs to be developed and training rolled out across the state. A state operation and maintenance plan must be developed for EV chargers across the state to ensure they function appropriately. There is already an organization seeking to create a call center (with those call techs and maintenance techs trained via the apprenticeship model) to address those deficiencies. Other one-time professional development opportunities include sales training and first responder training for lithium battery discharge.

2.4. Implementation Authority & Barriers

Authority

- State agencies
- Transit agencies
- Counties and cities
- Public fleet owners
- Private fleet owners

Barriers

- Fiscal constraints for fleet conversion
- Personal budget limitations for new vehicle purchase
- Public resistance/lack of understanding of long-term benefits
- Lack of trained workforce
- Supply chain limitations for U.S.-made materials and vehicles

2.5. Emissions Reduction or Sequestration

By significantly increasing electric car ownership and adopting fuel-saving technologies in trucks, we can make substantial strides in reducing carbon emissions from transportation. Transitioning to electric vehicles and implementing technologies that improve fuel efficiency can lead to significant reductions in greenhouse gas emissions associated with conventional transportation. While initial costs may be a factor, the long-term benefits in terms of emission reductions and potential fuel cost savings demonstrate the potential for impactful and sustainable transportation solutions. The City of Little Rock has a goal to convert its Fleet to 50% Electric Vehicles by 2030. If realized, the amount of light-duty gasoline engine emissions would be reduced by 12%. This calculation was created using ICLEI ClearPath's Fuel Switching Calculator and ran against the City of Little Rock's 2021 Local Government Operations Inventory.

Additionally, the strategic placement of EV charging infrastructure can encourage the adoption of electric vehicles, leading to further reductions in GHG emissions associated with traditional combustion engine vehicles. Realizing substantial GHG reductions by 2030 will likely depend on the scale and efficiency of adoption, technological advancements, supportive policies, and community engagement.

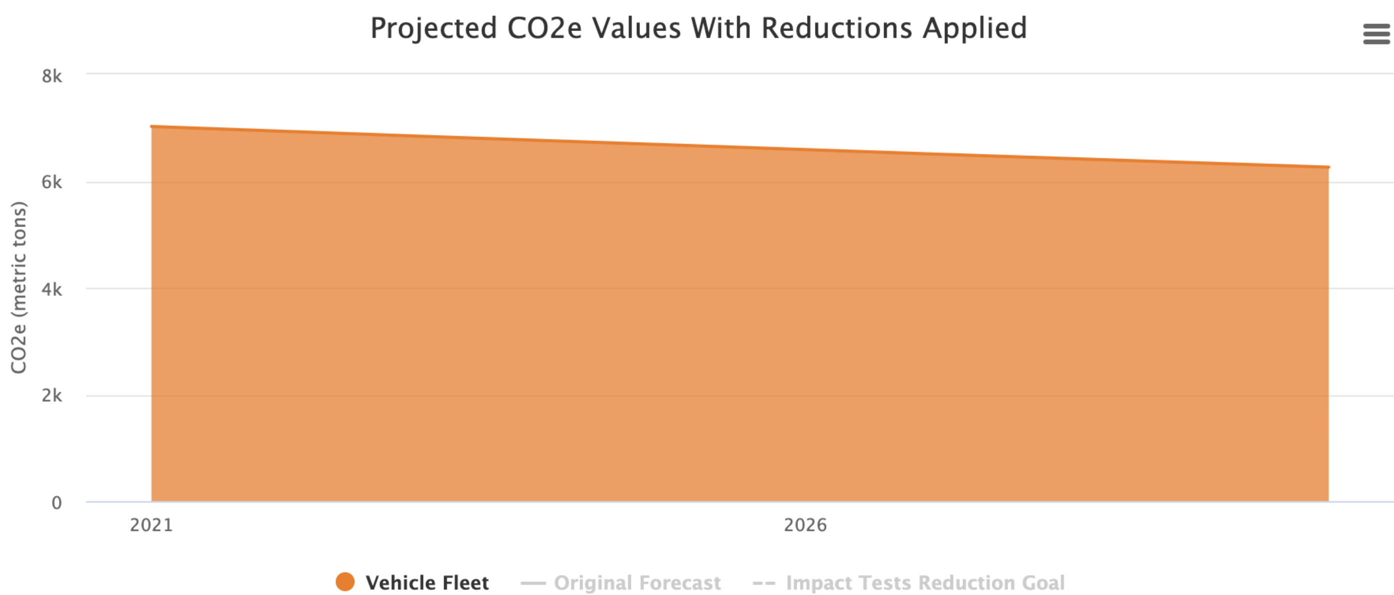
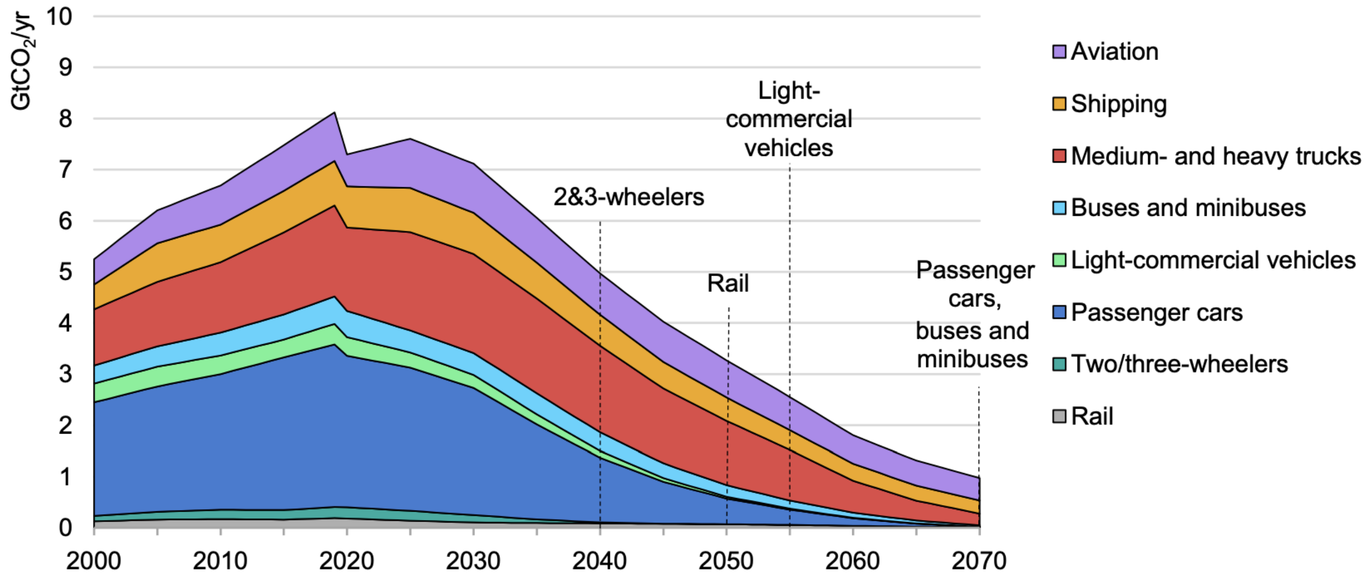


Figure 3.16 Global CO_2 emissions in transport by mode in the Sustainable Development Scenario, 2000-70



Notes: Dotted lines indicate the year in which various transport modes have largely stopped consuming fossil fuels and hence no longer contribute to direct emissions of CO_2 from fossil fuel combustion. Residual emissions in transport are compensated by negative emissions technologies, such as BECCS and DAC, in the power and other energy transformation sectors.

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3. Net-Zero [Carbon] Buildings

3.1. The Net-Zero Buildings (NZB) priority action encompasses installing rooftop solar primarily in public and commercial buildings, implementing energy conservation measures such as insulation and LED conversions, integrating building controls like lighting schedules and HVAC set points, and upgrading Building Codes to align with energy efficiency standards.

Proposed measure for inclusion in the Arkansas EEI Priority Action Plan

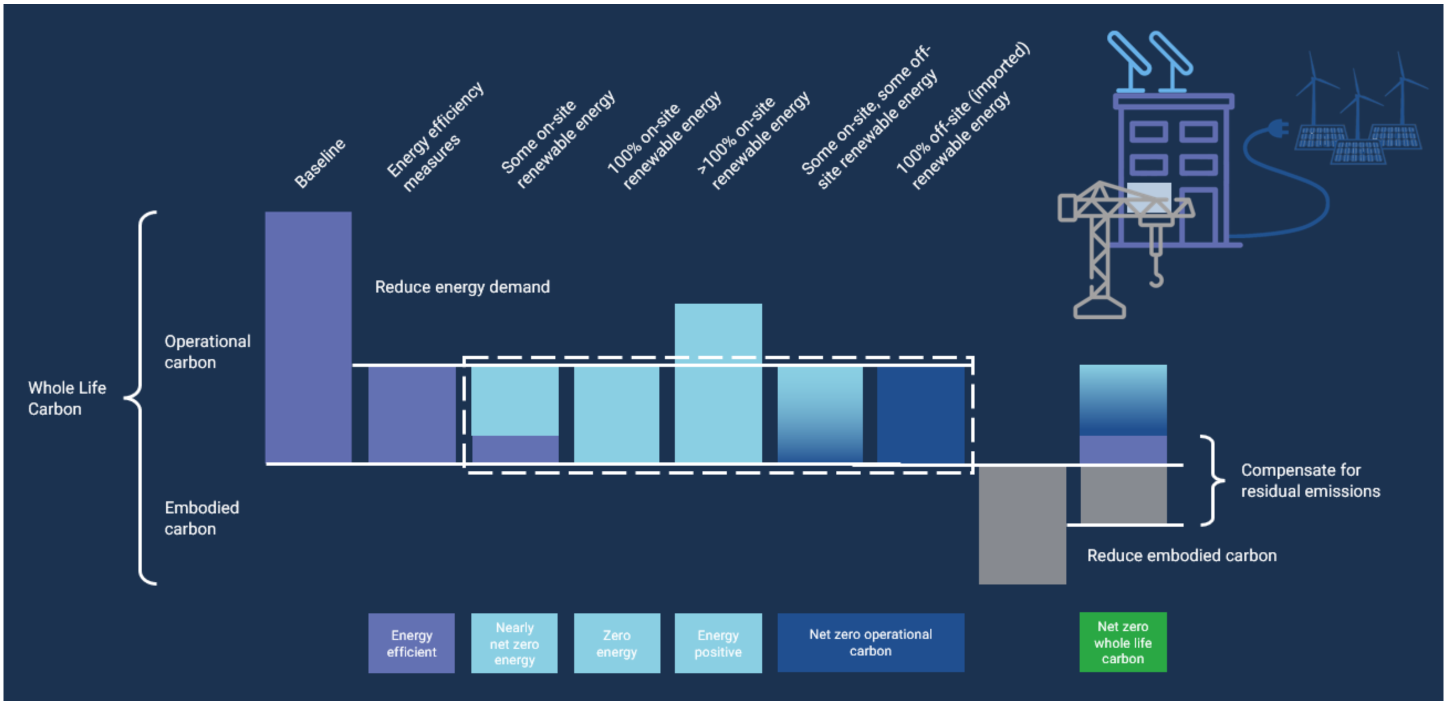
Provide financial incentives and technical assistance for a regional/statewide Net-Zero Buildings program to implement the following projects:

A. <u>Rooftop Solar, Focus on Public and Commercial Buildings</u>: Implementation of rooftop solar systems primarily in public and commercial buildings aims to reduce dependence on conventional energy sources, facilitating a transition toward renewable energy. This initiative seeks to lower carbon footprints in these sectors, promoting sustainability and potentially offering cost-saving opportunities through reduced reliance on grid-based electricity.

B. <u>Energy Conservation Measures</u>: Incorporating energy conservation measures, such as enhancing insulation and transitioning to LED lighting, aims to bolster overall building efficiency. By minimizing energy waste and optimizing usage, these measures contribute to reduced energy consumption and operational costs, aligning with sustainable practices while potentially enhancing indoor comfort and lowering utility expenses.

C. <u>Building Controls and Automation</u>: The integration of sophisticated building controls, encompassing optimized lighting schedules and refined HVAC set points, is designed to streamline energy utilization within structures. This approach aims to curtail unnecessary energy usage, thereby reducing environmental impact through lowered emissions. Simultaneously, it promotes a balance between energy efficiency, occupant comfort, and potential long-term cost savings.

D. <u>Building Code Upgrades</u>: Upgrading building codes to meet modern efficiency standards serves to align construction practices with contemporary sustainability goals. These upgrades advocate for the implementation of energy-efficient building designs and materials, aiming to reduce overall energy consumption in new constructions and renovations. By setting higher efficiency benchmarks, these codes foster safer and more sustainable buildings while encouraging the adoption of innovative construction practices.



3.2. Rationale

The Net-Zero Building (NZB) priority action was chosen for its effectiveness in reducing GHG emissions, its speed of implementation, and high level of support indicated through community and stakeholder engagement. The NZB action also aligns with stated federal, state, and local environmental goals and potential funding opportunities at various levels of government and through partnerships with private entities.

Community Interest

Energy Efficiency and Green Buildings ranked in the 72nd percentile of priority scoring by Central Arkansas residents in the Community Input Survey. Stakeholders ranked it the #7 most important measure during the Metroplan board and stakeholder workshop session.

Solar Power ranked in the 64th percentile of priority scoring by Central Arkansas residents in the Community Input Survey. Stakeholders ranked it the #3 most important measure during the Metroplan board and stakeholder workshop session.

LIRC Benefits

The Net-Zero Buildings initiatives hold substantial promise for Low-Income and Rural Communities (LIRC), aiming to alleviate energy burdens and enhance living conditions. By implementing energy-efficient measures such as insulation and building controls, these initiatives seek to mitigate energy costs, potentially alleviating financial strain on residents in low-income areas. Additionally, the integration of rooftop solar, particularly in public and commercial buildings, not only contributes to reduced energy expenses but also offers opportunities for community empowerment through access to renewable energy sources.

Furthermore, these initiatives prioritize improvements in indoor comfort and air quality, which are particularly beneficial for communities facing challenges related to substandard housing conditions. By focusing on Net-Zero Buildings, these measures aspire to not only mitigate environmental impact but also address socio-economic disparities, fostering a more sustainable and equitable future for all. The benefits of the NZB measure to LIRC communities include:

- Energy cost savings
- Improved air quality
- Higher indoor comfort level due to well-insulated homes
- Apprenticeship/employment opportunities

Additional Rationale by Project

A. <u>Rooftop Solar in Public and Commercial Buildings</u>
    - *Why:* Deploying rooftop solar systems helps reduce reliance on traditional energy sources, promoting renewable energy adoption and reducing carbon emissions.
    - *Environmental Impact:* Solar installations contribute to cleaner energy production, mitigating greenhouse gas emissions and reducing the carbon footprint of buildings.
    - *Funding Needs & Opportunities:*
        i. Grants, incentives, and financing programs to offset initial investment for solar installations.
        ii. Energy Performance Contracting assistance through the Arkansas Energy Office.

B. <u>Energy Conservation Measures (Insulation, LED Conversion)</u>
    - *Why:* Implementing energy conservation measures enhances building efficiency, reducing energy consumption and associated environmental impacts.
    - *Environmental Impact:* Improved insulation and LED lighting reduce energy waste, lowering carbon emissions and promoting energy efficiency.
    - *Funding Needs & Opportunities:*
        i. Grants or incentives to offset initial investment for energy-efficient upgrades.

ii. Energy Performance Contracting assistance through the Arkansas Energy Office.

C. <u>Building Controls (Lighting Schedules, HVAC Set Points)</u>
   - *Why:* Integrating building controls optimizes energy usage, reducing waste and improving overall building efficiency.
   - *Environmental Impact:* Efficient use of lighting and HVAC systems lowers energy consumption, contributing to reduced carbon emissions.
   - *Funding Needs & Opportunities:*
      i. Grants or incentives to offset initial investment for energy-efficient upgrades.
      ii. Energy Performance Contracting assistance through the Arkansas Energy Office.

D. <u>Building Code Upgrades</u>
   - *Why:* Upgrading building codes aligns with modern energy efficiency standards, ensuring new construction meets higher efficiency requirements.
   - *Environmental Impact:* Improved codes promote sustainable building practices, leading to reduced energy consumption and lower environmental impact.
   - *Funding Needs & Opportunities:*
      i. Incentives or tax credits for code compliance to offset higher construction costs.

3.3. Workforce Needs

As these initiatives reform building practices to mitigate emissions, the demand for skilled professionals adept in sustainable construction and energy-efficient technologies becomes pivotal. Workforce development programs aimed at training individuals in green building practices, renewable energy systems installation, and building automation technology are essential. Collaborations with technical institutions and vocational training centers can equip the workforce with the necessary expertise to support the implementation and maintenance of sustainable building practices. Additionally, fostering diversity and inclusivity within this workforce ensures a broad spectrum of skills, enriching the effectiveness and adaptability of these transformative initiatives.

Rooftop Solar

Currently, Arkansas is experiencing an electrician shortage from the confluence of the growth of our current construction and solar markets. Electricians are required for solar installation, EV charger installation, and related maintenance. Additionally, electricians hired to install solar are being paid higher wage rates, which further diminishes their availability for other construction and maintenance.

ARKAA can currently offer approximately $3,000/apprentice for training reimbursed through the employers, though some programs cost up to $12k. Additionally, ARKAA can only provide reimbursement to employers for training programs that are not already subsidized by the Arkansas Office of Skills Development (OSD). One of the biggest needs in the industry is electricians, but these trainers are already subsidized by OSD. Additional grant funding could assist in providing training incentives for the development of new electricians for solar and EV deployment.

Since Arkansas' current electrician licensure pathway includes a 4-year electrician apprenticeship, the state will need to ensure that all electrician training schools are providing adequate training for these new industries, or provide additional training beyond that initial 4-year apprenticeship.

Energy Conservation Measures

Energy Auditors are a key need within this industry and must be trained differently between residential, commercial and industrial applications. This role is apprenticeable. Some economic development studies have shown that there is more potential here than there is in energy generation.

There is great need in this area for employment, training, and credential alignment. ARKAA has been working with the Arkansas Energy Office on workforce related to residential energy audits, but there needs to be additional focus on developing commercial and industrial energy auditors. One approach could be training on top of existing trades, and another could be training energy auditors as a stand-alone career.

There are some credentials, but they don't perfectly match the industry. For example, there are no specific credentials for ASHRAE Level 1/Level 2 audits, but that is mostly what the industry uses.

HVAC

Standards and curricula for the HVAC training should be standardized across the state. Training is needed on equipment of all sizes: commercial, industrial, boilers, chillers, campus hot/cold water loops, etc. No commercial HVAC training currently exists at Arkansas colleges. Contractors are asking for training on energy efficiency to learn how to quote appropriate systems. Additional training is needed on new technologies, like heat pumps and VRFs.

Building Controls

The installation of building controls used to be performed by plumbers. However, now that role more closely resembles the work of an IT professional or electrician. Accordingly, the entire industry needs to collaborate to develop a systemic training program.

There is no building controls training program in the state. What limited opportunities do exist are related to industrial motor controls or residential HVAC controls. There needs to be a path for building controls that is tangentially related to both of the above. Not all building controls are related to HVAC or industrial uses. Modern controls could be for building security, window tint/coverings, lighting, solar, etc. Most are currently getting training from manufacturers, but that knowledge doesn't always transfer between brands and skills learned are difficult to communicate without industry recognized credentials.

ARKAA is developing a 2.5-year Instrumentation and Controls Apprenticeships for a few companies, but that is too long to be tacked on to a 3 year HVAC apprenticeship. There is likely significant overlap. One of these apprenticeships is run through the UA (plumbers and pipefitters union) so that workers can keep the benefits associated with union membership.

Building Code Upgrades

Green Building Specialists are needed to verify net-zero achievement. There are a variety of building certification programs on the market (i.e. LEED, WELL, Energy Star, Living Building, Net Zero, etc.) and apprenticeships are being developed to facilitate this training and help people get appropriate credentials. However, there are no training programs in the state currently. However, some of the soft skills could be provided by Arkansas institutions, like project management. Entegrity is launching the first apprenticeship to provide LEED credentials in the country.

3.4. Implementation Authority & Barriers

Authority

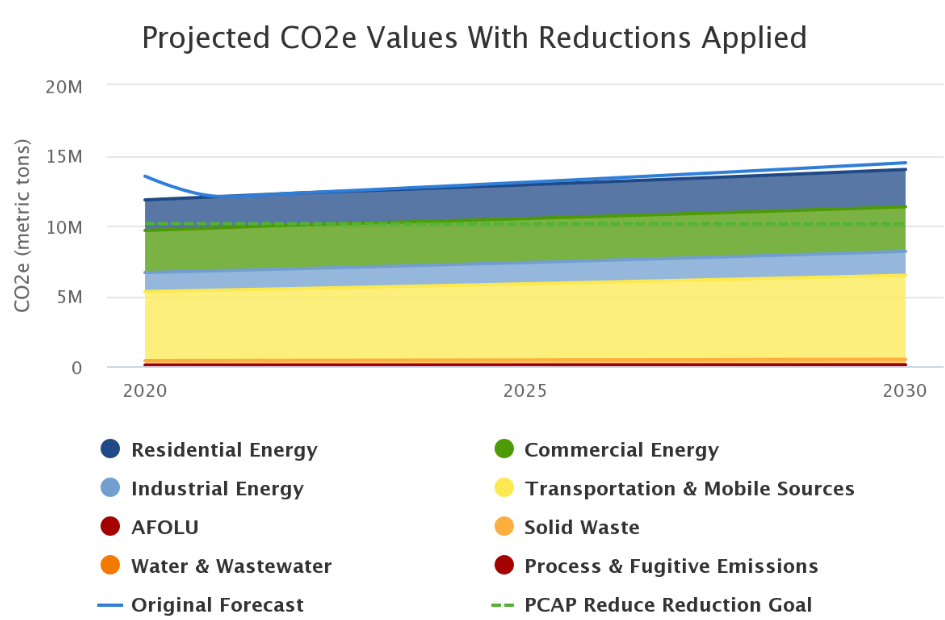
- State legislature
- State agencies
- Counties and cities
- Public and nonprofit organizations
- Private developers/landlords
- Homeowners

Barriers

- Limited budget for appliance conversion/higher building standards

- Regulatory hurdles
- Public resistance/lack of understanding of long-term benefits
- Lack of trained workforce
- Supply chain limitations for U.S.-made materials
- Net-metering changes to state law: Act 278 (2023) changed the current 1:1 rate structure. Under the upcoming compensation policy (starting Sept. 2024), net energy billing, or banking of site-generated electricity within a billing cycle to offset future consumption, will not be allowed any more. A system owner can consume electricity generated by their PV systems in real time and export any generation in excess of on-site consumption to the utility grid and be compensated (credited) by the dollar values based on the avoided costs, which are much lower than the typical retail prices charged to electric ratepayers. This lower compensation rate changes the cost-benefit calculation for solar customers and reduces the incentive to install solar panels.

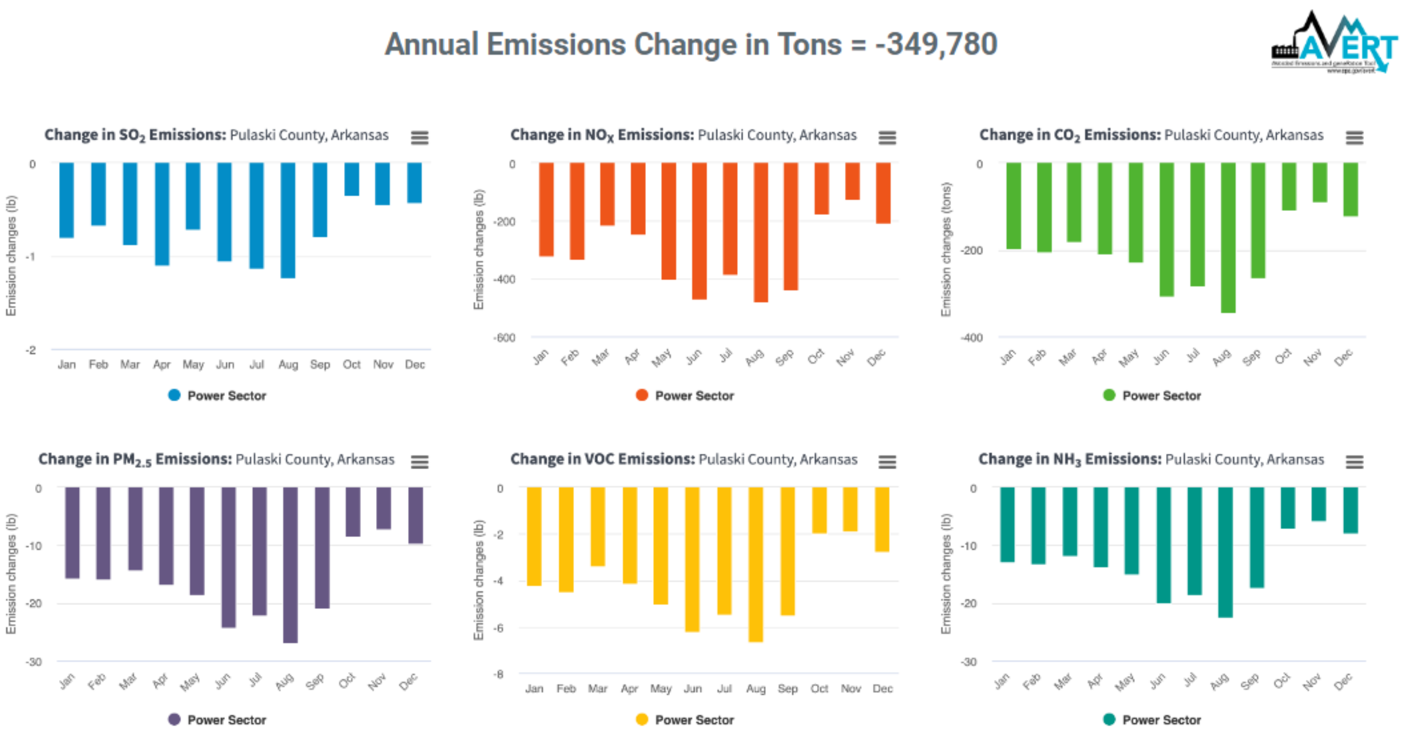
3.5. Emissions Reduction or Sequestration



If adopted on a significant scale by 2030, the implementation of building emission reduction measures, including retrofitting with insulation and widespread adoption of distributed solar photovoltaics, holds promising potential to significantly curtail greenhouse gas emissions. Similar initiatives globally have showcased substantial emission reductions and cost savings.

Retrofitting buildings with insulation, estimated to reduce energy needs for heating and cooling, has the potential to avoid significant emissions while generating considerable savings in operational costs. If 5% of existing commercial buildings in Central Arkansas were retrofitted with energy conservations measures that achieve 20% energy savings and new building construction abiding by the Draft 2021 Arkansas Energy Code requirements achieves 37% energy savings (as compared to the 2014 Arkansas Energy Code), then 479,152 MT CO_2e can be avoided by 2030. This measure was modeled using ICLEI's ClearPath software and includes MSA population growth rates. Adopting high impact actions for energy efficiency in the commercial sector can reduce sector emissions by 13%.

Similarly, the increased adoption of distributed solar photovoltaics in the commercial sector could substantially reduce operation and maintenance costs associated with traditional fossil fuel-based electricity generation, contributing to considerable emissions reductions as well. If 542 MW of rooftop and on-site solar systems are installed, Pulaski County can achieve 349,780 tons of avoided annual emissions and pollutants (as modeled by the AVERT Tool below).



Emissions reduction estimates for Pulaski County, Arkansas.

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https://forms.ashrae.org/Forms/C_PDFdownload_BuildingPerformanceStandards

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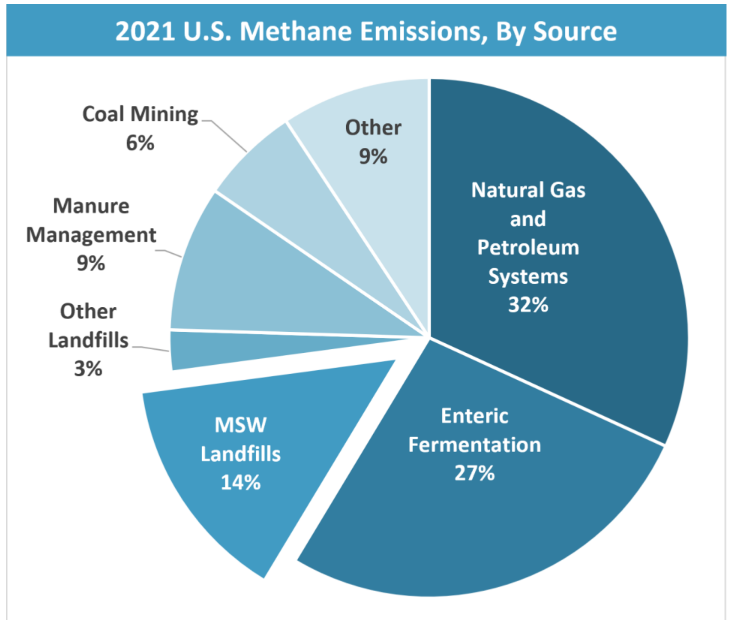
https://www.uaex.uada.edu/environment-nature/energy/solar/net-metering.aspx https://www.adeq.state.ar.us/energy/initiatives/performance.aspx

4. Waste Management & Recycling

4.1. The Waste Management and Recycling (WMR) priority action encompasses gasification (Waste to Energy), improved recycling and composting programs, and the utilization of landfill gas to produce energy.



Proposed measure for inclusion in the Arkansas EEI Priority Action Plan

Provide financial incentives and technical assistance for a regional/statewide Net-Zero Buildings program to implement the following projects:

A. *Gasification (Waste to Energy): Involves the conversion of waste materials into usable energy sources such as electricity or heat, significantly reducing the volume of waste that would typically end up in landfills. It serves as a method of harnessing energy from waste while contributing to sustainable energy production and aligning with goals for reducing landfill waste and contributing greenhouse gas emissions.*
B. *Composting Program: Focuses on converting organic waste into nutrient-rich soil conditioner, reducing the amount of organic waste deposited in landfills. This process not only supports soil health by enriching it with organic matter but also promotes sustainability by diverting waste from landfills, aligning with initiatives aimed at enhancing environmental and soil health.*
C. *Improved Recycling: Involves the collection and processing of materials for reuse, effectively reducing the consumption of raw materials and minimizing landfill waste. These programs play a vital role in waste reduction efforts, emphasizing resource conservation and supporting environmental sustainability by promoting a circular economy.*
D. *Landfill Gas to Energy: Utilizing gasses emitted from landfills for energy production serves as a method to reduce methane emissions, a potent greenhouse gas, while harnessing renewable energy sources. Converting landfill gasses into energy contributes to waste reduction efforts, aligning with objectives to mitigate GHG emissions and meet renewable energy targets.*

4.2. Rationale

Each of these initiatives not only responds to the urgent demand for innovation in landfill emissions management but also resonates with community needs, environmental objectives, and diverse funding avenues across governmental and private sectors.

Community Interest

Recycling is well-established in Central Arkansas and enjoys a high level of community buy-in that could be expanded upon to increase its emission reduction impact. Curbside recycling service is available to Pulaski County and Conway residents, and recycling dropoff is available region wide.

Waste Management and Recycling ranked in the 83rd percentile of priority scoring by Central Arkansas residents in the Community Input Survey. Stakeholders ranked it the 9th most important measure during the Metroplan board and stakeholder workshop session.

LIRC Benefits

- Alternative energy source
- Improved air quality
- Reduced public health burden of poorly managed waste
- Lower energy costs
- Improved local soil quality
- Apprenticeship/employment opportunities

Additional Rationale by Project

A. <u>Gasification (Waste to Energy)</u>
    - *Why:* Gasification converts waste into usable energy, reducing reliance on non-renewable energy sources and minimizing landfill waste.
    - *Environmental Impact:* Reduces landfill waste volume, mitigating environmental pollution and emissions.
    - *Funding Needs:*
        i. Grants for initial investment in technology and infrastructure for waste-to-energy facilities.

B. <u>Composting Program</u>
    - *Why:* Composting transforms organic waste into nutrient-rich soil, reducing landfill organic waste and enhancing soil health.
    - *Environmental Impact:* Reduces methane emissions from organic waste in landfills, enriches soil quality, and promotes natural fertilizer use.
    - *Funding Needs:*

        i. Grants for investment in composting infrastructure.
        ii. Educational programs on composting practices.

C. <u>Improved Recycling</u>
    - *Why:* Recycling programs aim to reuse materials, reducing raw material consumption and landfill waste.
    - *Environmental Impact:* Reduces the need for virgin materials, conserving natural resources and decreasing pollution associated with material extraction.
    - *Funding Needs:*
        i. Grants for investment in recycling infrastructure.
        ii. Public awareness campaigns on proper recycling practices.

D. <u>Landfill Gas to Energy</u>
    - *Why:* Utilizes landfill gasses for energy, reducing methane emissions and creating renewable energy sources.
    - *Environmental Impact:* Mitigates greenhouse gas emissions, reduces reliance on fossil fuels, and promotes cleaner energy generation.
    - *Funding Needs:*
        i. Grants for gas collection and energy generation infrastructure at landfill sites.

4.3. Workforce Needs

As these waste management and recycling initiatives gain momentum, the need for a skilled workforce proficient in sustainable waste management practices becomes increasingly critical. Workforce development programs are needed geared toward training individuals in waste-to-energy technologies, composting techniques, recycling methodologies, and landfill gas utilization. Collaborations with educational institutions and vocational training centers will be vital to equip the workforce with the necessary expertise to support the implementation and management of these initiatives effectively. Moreover, ensuring inclusivity and diversity within this workforce not only fosters innovation but also enhances the adaptability and efficiency of these transformative waste management practices.The apprenticeship model could be used for some of this training.

4.4. Implementation Authority & Barriers

Authority
- State agencies
- Solid Waste/Recycling Districts
- Counties and cities
- Private industry

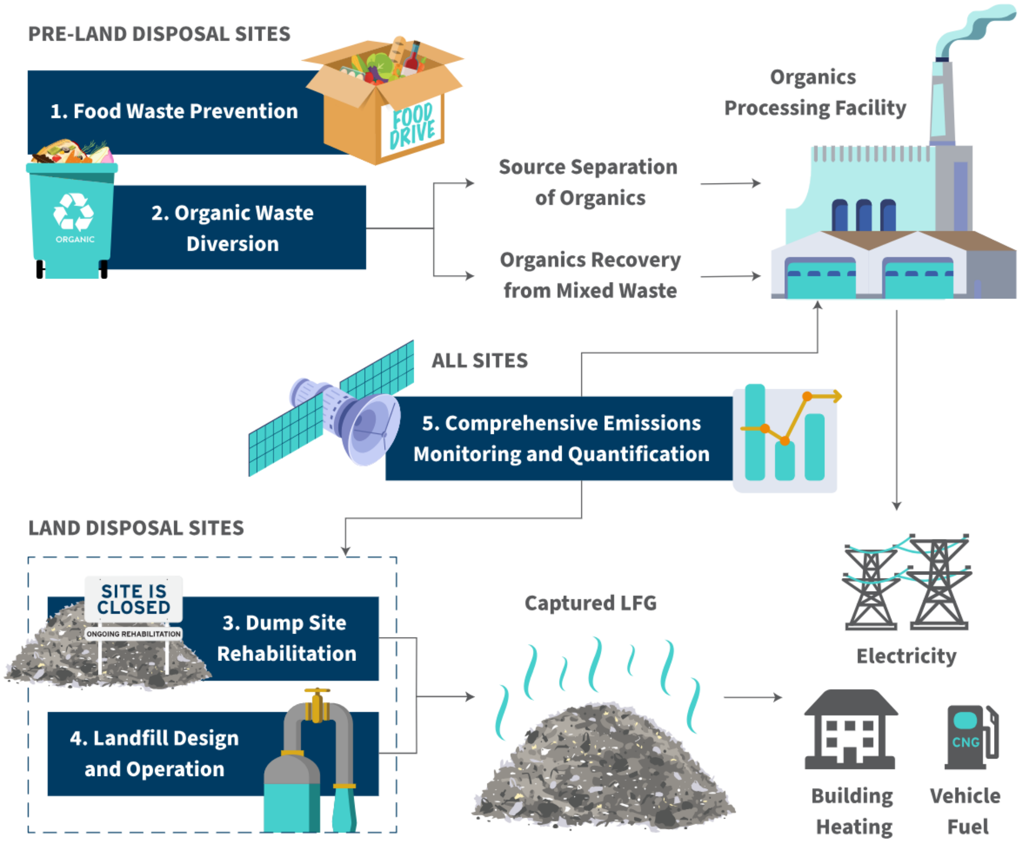
Barriers

- High upfront investment
- Technological limitations
- Regulatory hurdles
- Public resistance/lack of understanding of long-term benefits
- Lack of trained workforce
- Supply chain limitations

4.5. Emissions Reduction or Sequestration

Widespread adoption of effective waste management and recycling initiatives by 2030 could result in substantial reductions in greenhouse gas emissions. For instance, initiatives such as gasification (Waste to Energy), composting, recycling programs, and landfill gas utilization have demonstrated the potential to significantly mitigate methane emissions, a potent greenhouse gas, from decomposing waste in landfills. If we look at state examples like the Landfill Gas to Energy facility in Northwest Arkansas operated by WM, we find that these systems have the potential to reduce an estimated 40,000 tons annually. In Central Arkansas, we see the City of Little Rock setting recycling participation goals and hope to increase recycling rates by 20% over the next few years. By diverting 10% of recyclable and compostable materials and decreasing overall wet tons of solid waste (cardboard, paper products, and food scraps) entering the 4 landfills in Central Arkansas, we can make an impact on the massive amount of methane emissions attributed to these items in the waste stream. EPA's publication "Quantifying Methane Emissions from Landfilled Food Waste" outlines the complexity of calculating avoided emissions from these materials, but insists diversion of food waste (which accounts for roughly 58% of landfill methane emissions) is a necessary tactic to reducing harmful emissions from conventional landfill operations.

Additionally, these measures could contribute to the reduction of carbon dioxide emissions by reducing the need for energy derived from fossil fuels through waste-to-energy projects and promoting resource conservation via recycling and composting. The cumulative impact could be substantial in curbing greenhouse gas emissions, contributing positively to overall environmental mitigation efforts.



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Conclusion

The Central Arkansas Energy and Environment Initiative (EEI) Priority Action Plan (PAP) Supplement presents a robust and integrated strategy to address critical environmental challenges, reduce greenhouse gas emissions, and foster sustainable development across various sectors. The plan encapsulates a holistic vision for the region, covering Clean Green Transportation (CGT), Efficient and Electric Vehicles (EEV), Net-Zero Buildings (NZB), and Waste Management and Recycling (WMR) priorities, each tailored to align with community needs, environmental goals, and the imperative for a skilled and inclusive workforce.

Community-Centric Approach

The Central Arkansas EEI PAP Supplement reflects a comprehensive understanding of the region's needs, as evidenced by its community-centric approach. The alignment of each priority with community interests, as highlighted in the Community Input Survey and stakeholder workshops, ensures that the proposed initiatives resonate with the diverse perspectives and preferences of Central Arkansas residents.

A noteworthy aspect of the plan is its explicit attention to Low-Income and Rural Communities (LIRC). By integrating LIRC benefits into each priority area, such as health improvements, economic opportunities, and equitable access to sustainable solutions, the plan aims to address socio-economic disparities and ensure that the benefits of environmental initiatives reach all segments of the population.

Workforce Development Imperative

Recognizing that successful implementation hinges on a skilled workforce, the PAP Supplement places a strong emphasis on workforce development. Through partnerships with educational institutions, vocational training centers, and apprenticeship programs, the plan envisions a workforce adept in innovative technologies, sustainable practices, and green job opportunities, thereby fostering local talent and expertise.

Challenges and Opportunities

While the plan identifies barriers such as financial constraints, technological limitations, regulatory hurdles, public resistance, and workforce gaps, it also presents these challenges as opportunities for collaboration, innovation, and strategic planning. Overcoming these obstacles will require concerted efforts from government agencies, private sectors, educational institutions, and the community.

Emissions Reduction and Sustainable Future

The PAP Supplement envisions a future where Central Arkansas significantly reduces its carbon footprint and achieves substantial emissions reductions by 2030. Through the adoption of sustainable transportation, electric vehicles, net-zero buildings, and advanced waste management practices, the plan strives to create a more sustainable, resilient, and environmentally conscious region. This plan recommends that Central Arkansas measure its progress towards GHG reduction by creating a protocol to inventory regional GHG emissions every 4 years.

The Central Arkansas EEI PAP Supplement demonstrates a forward-thinking and community-driven approach to environmental sustainability. By addressing the unique challenges of the region, considering the needs of LIRC communities, and fostering a skilled and inclusive workforce, the plan sets the stage for a more resilient and environmentally friendly future for Central Arkansas. The success of this initiative will not only contribute to mitigating the impacts of climate change but also position the region as a model for sustainable development and innovation.

Appendix

Sources for Regional Greenhouse Gas Estimation

1. NEI - EPA National Emissions Inventory
2. SLOPE - National Renewable Energy Laboratory State and Local Planning for Energy
3. SIT - EPA State Inventory Tool
4. eGRID - Emissions & Generation Resource Integrated Database

Tools for Reduction Calculations

5. EPA Quantified Climate Action Measures Directory
6. ESIST - EPA Energy Savings and Impacts Scenario Tool
7. GLIMPSE - EPA 2050 Modeling Tool (tech and policy impact on renewables, ev, and ee)
8. AVERT - AVoided Emissions and geneRation Tool
9. COBRA - Co-Benefits Risk Analysis Health Impacts Screening and Mapping Tool
10. SLOPE - National Renewable Energy Laboratory State and Local Planning for Energy
11. Energy Policy Simulator (Arkansas)
12. Non-CO2 Projections and Mitigation Assessment Model
13. TEAM - EPA Travel Efficiency Assessment Method
14. EPA Green Vehicle Guide
15. EPA DEQ - Diesel Emission Quantifier
16. National Port Strategy Assessment and Port Emissions Inventory Guidance
17. MOVES - EPA's MOtor Vehicle Emission Simulator
18. Fuel Economy (.gov)
19. ALU - Ag and Land Use GHG Inventory Software
20. ICLEI - ClearPath
21. ICLEI - LEARN Tool (Land Emissions And Removals Navigator)

**Notes on emission calculations, investment dollars, and net savings*

All emission reductions are calculated at the global scale.

Net first cost to implement – the difference between the implementation cost of a solution and the implementation cost of the conventional technology/practice it replaces during the full period of analysis (e.g., the cost of installing a certain number of solar panels around the world compared with the cost of installing conventional energy technologies and practices between 2020 and 2050).

Net lifetime operating cost / savings – the cost to operate the conventional technology or practice over its lifetime minus the lifetime operational costs of the solution for all implementation units installed during the analysis period.

Alignment with Existing Plans

Federal	**EPA Strategic Plan** The FY 2022-FY 2026 Strategic Plan communicates the roadmap for accomplishing EPA's environmental priorities over the next four years. This plan deepens EPA's commitment to protecting human health and the environment for all people, with an emphasis on historically overburdened and underserved communities. https://www.epa.gov/planandbudget/strategicplan
State	**We Move Arkansas—Transportation 2040** (ARDOT, 2017) Arkansas' Long Range Intermodal Transportation Plan. **Full Steam Ahead** (ARDOT, 2023) 2023-2028 strategic plan to deliver a modern transportation system to enhance safety and quality of life. **Arkansas Bicycle and Pedestrian Transportation Plan** (ARDOT, 2017) Identifies strategies to improve safety of and access to bicycling for transportation and recreation. **Carbon Reduction Strategy** (ARDOT, 2023) Documents projects and strategies to reduce CO2 emissions from on-road highway sources. **Complete Streets Policy** (ARDOT, under development) Will outline ARDOT's commitment to planning, designing, and funding the construction of safe places for people to bike, walk, and use transit as part of the transportation system. **Arkansas Energy Efficiency Resource Standard** (APSC, 2010) Establishes specific, long-term targets for energy savings that utilities or non-utility program administrators must meet through customer EE programs. http://www.apscservices.info/pdf/08/08-144-U_153_1.pdf **NAAQS State Implementation Plan** (AR Dept. of E&E, 2023) The State Implementation Plan (SIP) is a collection of regulations and

	documents used by a state, territory, or local air district to implement, maintain, and enforce the National Ambient Air Quality Standards, or NAAQS, and to fulfill other requirements of the Clean Air Act. https://www.adeq.state.ar.us/air/planning/sip/
Regional/Local	**CARTS Multimodal Infrastructure Guidelines** (Metroplan, 2022) Establishes an approach to street design that prioritizes all modes and offers the opportunity to implement design decisions with consistency, providing predictability in costs and regional uniformity in function and style. **Central Arkansas Regional Greenways Plan** (Metroplan, 2023) Details six regionally significant active transportation corridors connecting the region, a 222-mile system of separated pathways to increase mobility for non-motorized travelers. **Central Arkansas Transforming Mobility** (DRAFT, Metroplan, 2023) The Central Arkansas Transportation Study (CARTS) long-range metropolitan transportation plan through 2050. Identifies core regional transportation policies, transportation goals, forecasts available revenue, and prioritizes projects. **Central Arkansas Safety Action Plan** (Metroplan, under development) **R.I.D.E. 2020** (Rock Region METRO, 2020) A comprehensive budget-neutral operational analysis to improve transit service in Central Arkansas. **Annual Service Enhancements** (Rock Region METRO, 2023) https://rrmetro.org/annual-service-enhancements/ **Little Rock Sustainability Goals** (City of Little Rock, 2023) https://www.littlerock.gov/city-administration/city-departments/public-works/sustainability/ **Little Rock Complete Streets: Bicycle Plan** (City of Little Rock, 2022) https://www.littlerock.gov/media/16896/lrcompletestreets_3722.pdf **Little Rock Parks Master Plan** (City of Little Rock, 2001) https://www.littlerock.gov/residents/parks-and-recreation/more-information/contact/master-plan-map/

	Achieving Strategic Sustainability at the Little Rock Port Authority (2017) https://ualr.edu/publicaffairs/files/2016/06/LRPA-Sustainability-Strategy-Final-2017-Spring.pdf **Clinton National Airport Sustainability Management Plan** (2023) **Central Arkansas Water "Net Zero by 2050" Climate Action Plan Draft** (2021) **University of Arkansas at Little Rock Sustainability Report** (2022-2023)

Metroplan Members

Faulkner County
- Conway
- Greenbrier
- Guy
- Mayflower
- Vilonia
- Wooster

Grant County
- Sheridan

Lonoke County
- Austin
- Cabot
- England
- Keo
- Lonoke
- Ward

Pulaski County
- Alexander
- Cammack Village
- Jacksonville
- Little Rock
- Maumelle
- North Little Rock
- Sherwood
- Wrightsville

Saline County
- Alexander
- Bauxite
- Benton
- Bryant
- Haskell
- Shannon Hills
- Traskwood

Transportation Members
- Arkansas Department of Transportation
- Rock Region METRO
- Little Rock Port Authority

- Bill and Hillary Clinton National Airport

Appendix K. Northwest Arkansas Priority Action Plan Supplement, prepared by Northwest Arkansas Regional Planning Commission

NORTHWEST ARKANSAS PRIORITY ACTION PLAN SUPPLEMENT

Prepared for:

Northwest Arkansas Regional Planning Commission

Springdale, Arkansas

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

Benton, Washington, and Madison Counties

December 2023

Rev. 1 January 2024
Rev. 2 February 2024

Olsson Project No. 023-04937

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APPENDICES

1. INTRODUCTION

The Arkansas Department of Energy and Environment (ADEE) allocated funding from the Climate Pollution Reduction Grant (CPRG) planning grant and entered a Memorandum of Understanding (MOA) with Northwest Arkansas Regional Planning Commission (NWARPC) for NWARPC to develop a Priority Action Plan (PAP) Supplement. According to the MOA, this PAP Supplement is to include proposed carbon reduction measures and supporting information that the ADEE will use as they develop a statewide PAP for submittal to Environmental Protection Agency (EPA) by March 1, 2024. The PAP provides the basis for eligible entities to pursue CPRG implementation grant funding from the EPA, with implementation grant applications due to the EPA by April 1, 2024. Implementation grants are only awarded for projects that support the measures included in the PAP.

NWARPC hired Olsson to provide support in the development of the PAP Supplement. Olsson's support included: project management; a review of regional documents and plans related to decarbonization; conducting a Low Income and Rural Community (LIRC) assessment; conducting a greenhouse gas (GHG) approximation; developing a community engagement plan; conducting stakeholder and public engagement; and evaluating measures for inclusion in the PAP Supplement. Based upon these activities, NWARPC has developed the following measures for the ADEE's consideration in the PAP. Supporting information is included in appendices for the GHG regional approximation, the LIRC analysis, and stakeholder and public engagement. The order in which these measures are listed is based on the perceived feasibility and regional interest in implementing these measures. For the purposes of this plan, "low-income and disadvantaged community (LIDAC)" and "low-income and rural community (LIRC)" are used interchangeably.

2. MEASURE #1: TRANSPORTATION SECTOR

The proposed measure for inclusion in the Arkansas PAP is as follows:

> Reduce automobile trips and incentivize more efficient and lower/no emission modes of transportation 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 LIRC communities.
- Updating/adopting building and zoning codes to encourage walkable, bikeable, and transit-oriented development.
- 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 LIRC communities.
- Expanding supporting infrastructure for electric vehicles (EVs), including bus fleets.

Rationale for Measure

Approximately 24% of the greenhouse gas emissions in Northwest Arkansas (NWA) come from the transportation sector. Expanding opportunities for alternate transportation mode choices and promoting the electrification of vehicles and bicycles provides greater options for Arkansans, many of whom will choose a cleaner mode for travel. The public engagement survey shows that transportation and energy sectors were rated the highest. Specific initiatives that community members and stakeholders mentioned through the series of engagement meetings were things like incentive programs (including high-occupancy vehicle lanes), the electrification of vehicle fleets for cities and the University of Arkansas, development codes, and infrastructure improvements such as charging stations and bus stops. Additional information from the public and stakeholder engagement activities is summarized in Appendix C. While the survey touched on a significant breadth of transportation sector components that the NWA community is interested in, the identified regional need boiled down to transportation *choice*. By increasing the availability of viable alternate modes of transportation, expanding EV infrastructure, and eliminating cost barriers to low/no emissions vehicles (from light- to heavy-duty), residents and visitors have greater access to clean mobility options.

Investments in equitable transportation infrastructure is a key pillar of both the Infrastructure Investment and Jobs Act (IIJA) as well as the Inflation Reduction Act (IRA). Multiple grant programs through the Department of Transportation, such as the Reconnecting Communities Pilot (RCP) Program and Neighborhood Access and Equity (NAE) Grant program, provide funding to support equitable access to community facilities and anchor institutions and safer roads and streets that can incentivize the use of alternative modes of transportation. Further, federal grant and tax credit programs can aid in the transition of commercial vehicles, heavy-duty, and school bus fleets to low or no emission vehicles. These, coupled with the Federal Highway Administration's electric vehicle (EV) charging infrastructure programs, can aid in the adoption and transition to low or no emission vehicles. However, opportunities exist for the development of a ridesharing and e-bike rebate program targeted at LIRC communities.

<u>Anticipated Workforce Needs</u>

Implementation of these transportation measures requires a skilled workforce that has expertise in planning, engineering, design, and development. Workers skilled in project management will be essential for successful deployment of transportation programs that may come out of CPRG funding opportunities. Additionally, experts in program and policy fields will play a significant role in strategies regarding incentive programs or other promotional efforts for the adoption of EVs. Field services will be required for construction and installation of many of these systems, including electricians that may be required to have specific certifications to meet federal requirements for components like charging stations. Finally, the workforce will need to include workers to fulfill any compliance or regulation protocols for implemented components. Discretionary grant programs established through the IIJA and the IRA dedicate merit review criteria to workforce development activities connected with the proposed scope of work. Local and state agencies should consider formalizing relationships with local and regional institutions of higher education, as well the secondary education system, to expand youth and registered apprenticeships in the construction trades to meet the merit scoring criteria and advance regional workforce development targets.

<u>Review of Authority to Implement</u>

A transportation program could extend incentives to a number of different entities. If an implementation grant is pursued for this measure, it is anticipated the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. The program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of the measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. Public-private partnerships could be an available mechanism to implement this measure as well. The State of Arkansas has appointed the Arkansas Council on Future Mobility that was charged with identifying barriers to the implementation of EVs (and advanced mobility), making policy and program recommendations, developing investment priorities, and identifying future tasks and goals for education, workforce training, and economic development (Department of Energy, 2023).

Strategic alignment with this council's recommendations and initiatives will ensure, as appropriate, state regulations and priorities do not hinder or prohibit implementation.

<u>GHG and Co-Pollutant Emissions Reduction or Sequestration</u>

There is substantial room to reduce overall emissions given that approximately 24% of NWA's regional greenhouse gas emissions come from the transportation sector. According to the Google Environmental Insights Explorer Tool, the City of Fayetteville (the region's most populous municipality) experienced approximately 758,000,000 vehicle-miles traveled annually (Google, 2020) in a city with 99,285 population (U.S. Census Bureau, 2022) in 2022, or an average of 7,635 miles per person per year. If only 1,000 of Fayetteville's residents, or about 1% of the total population, stopped driving gas-powered vehicles, it could impact approximately 7,635,000 vehicle-miles traveled annually. If extrapolated over the entire populations of Benton, Washington, and Madison Counties (combined population of 576,403 in 2022), at 1% conversion, this could relate to a reduction of 44,008,140 vehicle-miles traveled or approximately 17,600 metric tons of CO2 annually.

Specific to e-bike incentive programs, following the City of Denver's successful e-bike program (Alvarez, 2023) the NWA region could experience similar reductions. At $4.7 million per year, such a program could result in over 4,700 e-bike rebates and a reduction of 2,040 metric tons of CO2 per year. If such a program were implemented over a five-year period to 2030, NWA could see a reduction of over 30,000 metric tons of CO2 by 2030.

Bike sharing programs have also been shown to reduce personal vehicle usage. Based on the Ride 4 Smilies bike share program in Fort Smith, 1,302 users took advantage of bikes (some of which were e-bikes) for 8,152 total miles since inception in May 2022, or a period of 20 months (Tableau Public, 2023). This program, which costs approximately $140,000 per year, is focused on low-income residents and underserved communities. Based on the program survey, 36% of users indicated that bike trips replaced a personal vehicle trip (Tableau Public, 2023). It may therefore be expected that approximately 1,760 miles of personal vehicle trips are eliminated in this program per year. Because the NWA region has more mature bicycle infrastructure, if it is assumed that 50% of bike share users replace a personal vehicle trip, and assuming a ten-fold increase in number of bikes available at an annual cost of $1.4 million, it could be assumed that approximately 24,500 vehicle miles traveled annual would be eliminated, resulting in annual savings of approximately nine metric tons of CO2 per year. If such a program were implemented over a five-year period to 2030, NWA could see a reduction in over 45 metric tons of CO2 by 2030.

The adoption rate of battery electric vehicles (EVs) in the NWA area is currently at approximately 4% of all new vehicles purchased. As EV adoption increases, annual vehicle miles traveled with zero emission transportation will increase reducing the total miles traveled by combustion engine vehicles. With the EV consumer personal vehicle market constantly changing, it is difficult to say how much incentive beyond the existing federal incentive is sufficient to bring new EV adopters. However, if we assume 10% EV adoption in new car sales by 2025, approximately 52,810,043 vehicle miles traveled annually would be with zero emission vehicles, resulting in approximately 19,000 metric tons of CO2 reductions by 2025. If EV adoption grew to 35% in 2030 approximately 382,872,811 vehicle miles traveled annually would be with zero emission vehicles, resulting in approximately 138,000 metric tons of CO2 reductions by 2030. The regional approximation of GHG emissions is included in Appendix A.

<u>LIRC Benefits</u>

A transportation innovation program would be structured in a manner that prioritizes incentives for LIRC and rural populations. For instance, cash incentive programs can be tailored to allow greater rebates for qualified individuals based on income. As noted through the stakeholder and public engagement process as part of CPRG planning activities, not all populations value decarbonization efforts the same way. For example, some individuals may want to own and drive a personal EV while others would benefit more from greater public transportation, biking, and walking access. A LIRC analysis was conducted in accordance with EPA guidance and is included in Appendix B.

3. MEASURE #2: WASTE, RECYCLING, AND SUSTAINABLE MATERIALS SECTOR

The proposed measure for inclusion in the Arkansas PAP is as follows:

> 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 to divert organic waste that is currently being landfilled and/or land applied into compost and other agricultural and environmentally beneficial products.
- Providing incentives or a voucher system to improve waste management for rural populations.
- Developing a regional Materials Recovery Facility (MRF) with end-market transparency.

Rationale for Measure

Since 1979, the Waste Management Eco Vista landfill located in Tontitown has been the only landfill serving the waste disposal needs of NWA. However, there has been significant growth in this region over the years, with NWA now ranking as the 15th fastest growing region in the United States (Sparkman, 2023). And as the 100th largest metro in the country (Northwest Arkansas Council, 2023), the waste management needs of NWA have increased considerably, and the existing landfill is approaching its capacity. In addition to household and commercial waste, waste from construction and demolition in the region will continue to increase as the region grows. Public and private entities are currently pursuing, or have expressed interest in pursuing, the development of waste minimization and management facilities that can simultaneously reduce carbon emissions in the region. This specific carbon reduction area is ripe for program development with regional and/or state implementation and leadership. Additional information from the public and stakeholder engagement is summarized in Appendix C.

Few federal funding programs exist to support the identified implementation measures. However, the EPA's Solid Waste Infrastructure for Recycling Infrastructure Grant program is a prospective funding opportunity to support the development or update of plans to advance post-consumer materials management, development, strengthen, and/or implement comprehensive data collection efforts, and support the state-led implementation of plans that advance post-consumer materials management.

Anticipated Workforce Needs

The waste, recycling, and sustainable materials industry requires a diverse range of skills and expertise to design, develop, and operate these facilities. Professionals with backgrounds in engineering, project management, environmental science, and with other technical expertise will be in high demand. Organizations that oversee program implementation will also have procurement and oversight responsibilities. In addition, field services will be needed to construct and install these systems. Overall, implementation of this measure is anticipated to result in an increase in demand for workers, and associated need for workforce development, which should have a positive impact on the economy in NWA.

Review of Authority to Implement

A waste minimization and management innovation program could extend incentives to a number of different entities. If an implementation grant is pursued for this measure, it is anticipated the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. This program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. Voluntary use and public perception of innovative waste management programs could be a barrier to implementing this measure in certain instances and for certain projects.

GHG and Co-Pollutant Emissions Reduction or Sequestration

There is the potential for significant impact in reducing GHG emissions in the region through the implementation of a waste minimization and management program, the removal and sequestration of carbon into compost, and/or with carbon negative processes such as biochar pyrolysis. With significant amounts of waste produced from construction and demolition in this rapidly growing region, there will be an ample source of materials to convert into biochar for the foreseeable future. A significant reduction of methane emissions from the local landfill could be accomplished by diverting food waste and other organic material to composting programs and anaerobic digester facilities. Improving the capture of recyclable materials through a Materials Recovery Facility would also have an indirect impact on carbon emissions in the industrial sector by reducing the carbon footprint associated with the extraction, distribution, and manufacture of raw materials by replacing a portion of these with recycled materials.

Solid waste originating in Fayetteville alone generated more than 93,000 metric tons of CO2 in 2022 (City of Fayetteville, 2023). Recently in May 2023, Waste Management (WM) opened a renewable natural gas (RNG) facility at the Eco Vista Landfill in Tontitown. This landfill gas-to-energy facility utilizes the carbon emissions generated from the decomposition of organic material in the landfill, recovering and distributing approximately 750,000 metric million British thermal units (mmBtu) per year of this RNG, the equivalent of more than 5.1 million gallons of diesel, and enough to serve the equivalent of 25,000 households annually or 650 heavy-duty vehicles (Gatling, 2023). With the need for regional alternatives to the Eco Vista Landfill, additional RNG facilities associated with landfills and wastewater treatment facilities in the region may provide an opportunity to reduce carbon emissions while simultaneously providing an alternative fuel source that can partially replace the use of fossil fuels. The regional approximation of GHG emissions is included in Appendix A.

<u>LIRC Benefits</u>

A waste minimization and management innovation program would be structured in a manner that prioritizes incentives for LIRC and rural populations. Improving access to waste collection services for rural communities and job creation in low-income communities are examples of how this program could benefit LIRC. This program would be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes with its incentive programs. A LIRC analysis was conducted in accordance with EPA guidance and is included in Appendix B.

4. MEASURE #3: CARBON REMOVAL SECTOR

The proposed measure for inclusion in the Arkansas PAP is as follows:

> 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 and create programs for the protection and restoration of these lands through fee-simple acquisition, conservation easements, or other means. Consider co-benefits.
> - 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.

Rationale for Measure

As the 15th fastest growing region in the United States (Sparkman, 2023), development in NWA is happening at an astonishing pace. Historically, the region was dominated by native prairies and forests. However, much of the original forest has been logged or cleared, and the native prairies have either been developed or converted to pastures. A program to improve or increase carbon sequestration through land conservation and acquisition could mitigate much the loss of carbon storage in the region due to this rapidly occurring development. Support is present in NWA for this type of program, made evident by the results of the public survey and stakeholder engagement. Additional information from the public and stakeholder engagement is summarized in Appendix C.

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 can store, due to the limits to both the lifespan and sizes to which trees are able to grow (Zhu et. al., 2018; Forrester, 2020). Furthermore, due to the space constraints in urban settings, urban trees are better suited for climate adaptation measures that help city residents cope with climate change, such as urban heat islands and flooding, than for climate and pollution mitigation measures that aim to reduce carbon emissions. As a nature-based climate mitigation measure, carbon sequestration and storage of 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) than in space-constrained urban settings. Therefore, the protection of existing forests and other high carbon storing ecosystems is a more effective solution for a nature-based solutions approach to climate mitigation (Forrester, 2020).

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 species richness of these landscapes (Chen et. al., 2018; Yang et. al., 2019; Pastore et. al., 2021). Restoring prairie ecosystems offers an effective nature-based solution for addressing climate change.

Land conservation and acquisition could also provide co-benefits such as improving access to parks and open space for LIRC communities where such amenities are currently lacking. Additionally, preserved and restored lands could improve connectivity within the active transportation network in NWA, improving mobility choice for those who lack vehicular transportation. Where these efforts are implemented along riparian areas, co-benefits could also include improvements to stormwater management such as flood control, and a reduction in contaminants entering the Illinois River, Beaver Lake, and their tributaries.

Anticipated Workforce Needs

A carbon removal program would require a diverse range of skills and expertise to design, develop, and operate this program. Professionals with backgrounds in natural resources, land management, project management, environmental science, and other technical expertise would be in high demand. Organizations that oversee program implementation will also have procurement and oversight responsibilities. In addition, field services will be needed to implement this program. Overall, implementation of this measure is anticipated to result in an increase in demand for workers, and associated need for workforce development, which should have a positive impact on the economy in NWA.

Review of Authority to Implement

A land conservation and acquisition program could extend incentives to a number of different entities. If an implementation grant is pursued for this measure, it is anticipated the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. This program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. The availability of land for purchase or acquisition could be a barrier to implementing this measure in certain instances and for certain projects.

GHG and Co-Pollutant Emissions Reduction or Sequestration

A study published in 2017 in the Proceedings of the National Academy of Sciences estimated that nature-based solutions can account for up to 37% of the carbon sequestration need to keep average global temperatures from increasing 2°C by 2030, (IPBES 2019), and up to 20% of the carbon sequestration needed to keep average global temperatures from increasing 2°C by 2050 (Griscom et. Al., 2017). If we assume that 20% of the carbon emissions of the region could be offset by carbon removal through conservation and restoration efforts, a land acquisition and conservation program could be combined with other carbon emission reduction strategies to result in an overall reduction of regional GHG emissions. Land acquisition and conservation programs can also be combined with mobility strategies to decrease vehicle miles traveled by incorporating lands utilized for carbon removal into regional active transportation networks. The regional approximation of GHG emissions is included in Appendix A.

During restoration activities, priority would also be given to using plant material that provides optimal carbon sequestration and storage. For trees, this includes native species with more than one of the following characteristics: 1. species that are naturally long-lived so that carbon will be stored for a longer period of time, 2. species that produce large quantities of woody biomass so that more carbon will be stored than would be in species which produce less woody biomass, 3. species with a fast growth-rate so that more carbon can be sequestered in a shorter amount of time than would be in slower-growing species, and 4. species with large crowns and/or large leaf sizes so that photosynthetic activity and removal of carbon from the atmosphere would be optimized. For herbaceous species used during restoration activities priority would be given to species with both of the following characteristics: 1. Perennial species that are naturally long-lived so that carbon will be stored for a longer period of time than in short-lived species, and 2. species that have deep fibrous root systems so that more a greater amount of carbon can be sequestered into the soil due to having higher root biomass than species without fibrous root systems, and so that carbon can be sequestered deeper into the soil than species with shorter root systems.

LIRC Benefits

A land conservation and acquisition program would be structured in a manner that prioritizes incentives for LIRC and rural populations. With the majority of LIRC census tracts located in rural parts of NWA where opportunities for carbon removal from conservation efforts are more abundant, co-benefits of a land conservation and acquisition program could include improving access for LIRC to parks and open space where such amenities are currently lacking. Lands acquired for conservation or restoration could improve connectivity for the regional active transportation network and provide access to this network for residents of LIRC, as well as access to parks or opens space for those who lack vehicular transportation. Co-benefits of implementing land conservation and acquisitions along riparian areas could include improvements to stormwater management and flood reduction for LIRC and rural populations living downstream of these improvements. This program would be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes with its incentive programs. A LIRC analysis was conducted in accordance with EPA guidance and is included in Appendix B.

5. MEASURE #4: BUILDINGS SECTOR

The proposed measure for inclusion in the Arkansas PAP is as follows:

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 LIRC areas; multi-family residential buildings; and commercial buildings.

<u>Rationale for Measure</u>

Approximately 13% of the greenhouse gas emissions in NWA come from the commercial and residential building sector (which exclude emissions from electricity generation). These emissions are primarily generated from natural gas heating. Energy efficiency measures could include replacing old appliances with newer, higher efficiency appliances; installing higher efficiency lighting; replacing windows and sealing to reduce or eliminate leaks; and improving insulation. There are existing energy efficiency programs, for example those provided by Black Hills Energy, that could be expanded upon or extended further, with CPRG implementation grant funding. Such programs reduce energy use, thereby reducing emissions and cost. Public survey data for NWA indicated an interest in and support for energy efficiency. Additional information from the public and stakeholder engagement activities is summarized in Appendix C. Updating building energy codes could help to drive the effectiveness of an energy efficiency program.

At times, electrification of heating may be desired and cost-effective for residential and commercial buildings, especially if paired with an incentive program. Further, developing programs and policies that promote EV charging infrastructure in residential and commercial buildings will help support a faster transition to EVs for those who desire access to such infrastructure.

The IIJA established multiple programs, including the Cost-effective Codes Implementation for Efficiency and Resilience grant program, the Energy Efficiency and Conservation Block Grant Program (EECBGP), and the Building Resilient Infrastructure Communities (BRIC) grant program, to advance building code updates and other building efficiency policies within a particular region, state, or local jurisdiction. Through the IRA, the $1 billion Assistance for Latest and Zero Building Energy Code Adoption program was created to adopt codes for residential buildings that meet or exceed the 2021 International Energy Conservation Code (IECC) and/or adopt a building energy code for commercial buildings that meet or exceed ANSI/ASHRAE/IES standards. To support the LIRC households, the Department of Energy administers the Weatherization Assistance Program (WAP) and various home energy rebate programs to assist with energy efficient home retrofits. To advance energy efficiency building code updates, the region should look to develop a robust partnership with the state and community-based organizations to apply for future funding rounds.

Anticipated Workforce Needs

The building energy efficiency industry requires a diverse range of skills and expertise to assess, design, develop, construct, and operate energy efficiency buildings. Professionals with backgrounds in engineering, building design and construction, project management, HVAC, and technical expertise are in high demand. Organizations that oversee program implementation will also have procurement and oversight responsibilities. In addition, qualified construction/renovation professionals and technicians will be needed to make these changes. Overall, implementation of this measure is anticipated to result in an increased demand for workers, and associated need for workforce development and training, which should have a positive impact on the economy in NWA. The state should evaluate existing career and technical college building trade programs (e.g., HVAC, plumbing, electrical, construction technology) for coursework and training on energy efficient construction methods and materials. These institutions should be encouraged to adopt industry-recognized certificates or credentials in energy efficient technologies and methods.

Review of Authority to Implement

A building efficiency energy innovation program could extend incentives to a number of different entities. If an implementation grant is pursued for this measure, it is anticipated the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. This program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. Public-private partnerships could be an available mechanism to implement this measure as well, including with Black Hills Energy, who already has an established energy efficiency program (Black Hills Energy, 2023).

GHG and Co-Pollutant Emissions Reduction or Sequestration

As noted previously, approximately 13% of the greenhouse gas emissions in NWA come from the commercial and residential building sector. These emissions are primarily generated from natural gas heating. If 20% of current building emissions could be reduced by energy efficiency measures, and another 20% could be reduced by electrification, the impact could be an overall reduction of regional GHG emissions of 5% (International Energy Agency, 2023). The GHG emissions reduction is largely dependent upon the amount of funding that is available for implementation of the components contained within this measure.

In addition to GHG reductions, other co-pollutant emission reductions would be realized for criteria and hazardous air pollutants, including a resultant positive impact from reduced ozone and particulate matter less than or equal to 2.5 microns in diameter (PM2.5) emissions, and the associated health impacts of those emissions. The regional approximation of GHG emissions is included in Appendix A.

LIRC Benefits

A building energy innovation program would be structured in a manner that prioritizes incentives for LIRC and rural populations. Public survey data for NWA indicated an interest in and support for building energy efficiency measures. Energy efficiency measures not only reduce GHG emissions, but they also have a positive impact on LIRC communities on a fixed and/or limited income. Further, such measures can help people feel safer and more comfortable in their housing and may result in positive health impacts. This program would be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes with its incentive programs. A LIRC analysis was conducted in accordance with EPA guidance and is included in Appendix B.

6. MEASURE #5: ENERGY SECTOR

The proposed measure for inclusion in the Arkansas PAP is as follows:

> 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 LIRC and rural communities.
> - Developing and implementing programs that support smart-grid and/or behind-the-meter technologies.

<u>Rationale for Measure</u>

Approximately 35% of the greenhouse gas emissions in NWA come from the energy sector. While decarbonation at all local utilities may not be feasible through the CRPG implementation grant program, there are public and private entities pursuing, or that are interested in pursuing, the installation of renewable energy and energy storage systems. This includes interest from the public, including in rural and LIRC communities. During stakeholder engagement for the CPRG planning process, a number of local governments, regional organizations, and the University of Arkansas described ongoing, planned, or potential activities that could gain a critical path forward with grant funding, such as CPRG. Additional information from the public and stakeholder engagement activities is summarized in Appendix C. Utility portfolios in NWA consist primarily of fossil fuels and as such there is an opportunity for government entities and public-private partnerships to drive decarbonization efforts in the energy sector.

Both the Infrastructure Investment and Jobs Act and the Inflation Reduction Act provide substantial funding for green energy project deployment. Programs such as the EPA's Solar for All and the Department of Energy's Grid Innovation Program provide grant support for developing and advancing clean energy generation and storage projects on both public facilities as well as homes in LIRC communities. Further, the Inflation Reduction Act's direct pay provisions provide government entities with the ability to benefit from some clean energy tax credits. Government entities that elect to utilize the direct pay provision can treat the credit as a payment of tax with any overpayment resulting in a refund. Grant programs, coupled with the Inflation Reduction Act's direct pay provisions, allow green and renewable energy projects more feasibility without pursuing traditional debt financing mechanisms.

Anticipated Workforce Needs

The renewable energy industry requires a diverse range of skills and expertise to design, develop, and operate these clean energy systems. Professionals with backgrounds in engineering, project management, environmental science, and technical expertise are in high demand. Organizations that oversee program implementation will also have procurement and oversight responsibilities. In addition, field services will be needed to construct and install, operate, and maintain these systems.

Overall, implementation of this measure is anticipated to result in an increased demand for workers, and associated need for workforce development and training, which should have a positive impact on the economy in NWA. There are 54 programs across the IIJA and IRA with provisions for green workforce development that include recruiting, training, and hiring workers. Further, the Inflation Reduction Act includes tax credits and other rebate programs to support energy-related workforce development activities. Through the Inflation Reduction Act's direct pay provision, the Department of the Treasury can provide tiered tax credits to public entities that include workforce development activities in their renewable energy projects such as registered apprenticeships and meeting prevailing wage requirements. Additional federal funding proposals should consider partnering with local and regional institutions of higher education to advance on-the-job-training activities, such as registered apprenticeship, to take advantage of these tiered tax credits and advance both clean energy goals and workforce training targets.

Review of Authority to Implement

An energy innovation program could extend incentives to a number of different entities. If an implementation grant is pursued for this measure, it is anticipated the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. This program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. Public-private partnerships could be an available mechanism to implement this measure as well. The State of

Arkansas has regulations that impact generation, distribution and net metering that would need to be evaluated and that could be a barrier to implementing this measure in certain instances and for certain projects.

GHG and Co-Pollutant Emissions Reduction or Sequestration

As noted previously, utility portfolios in NWA consist largely of fossil fuels. As such, given that approximately 35% of the regional inventory is from the energy sector, there is the potential for implementation of a regional energy innovation program to have a significant impact in reducing GHG emissions. Distributed power generation, while somewhat limited by State regulation, could significantly reduce the region's GHG emissions. As an example, Google's Environmental Insights tool estimates that Fayetteville's buildings consume 943,000 tons of carbon dioxide equivalent (tCO2e) per year, Fayetteville's rooftop solar potential is 490,000 tCO2e per year (Google, 2020). While it may not be feasible or cost-effective to cover all rooftops with solar, such an analysis demonstrates the large potential upside with the comprehensive implementation of a program such as the one envisioned by this measure.

If 33% of current energy use could be replaced by zero carbon energy sources, the impact would be an overall reduction of regional GHG emissions of 10%. The GHG emissions reduction is largely dependent upon the amount of funding that is available for implementation of the components contained within this measure. As an example of the potential, the City of Fayetteville was able to increase clean energy usage from 16% to 72% by the installation of solar power arrays near its two wastewater treatment facilities. In addition to GHG reductions, other co-pollutant emission reductions would be realized for criteria and hazardous air pollutants, including a resultant positive impact from reduced ozone and PM2.5 emissions, and the associated health impacts of those emissions. The regional approximation of GHG emissions is included in Appendix A.

LIRC Benefits

An energy innovation program would be structured in a manner that prioritizes incentives for LIRC and rural populations. As noted through the stakeholder and public engagement process as part of CPRG planning activities, not all populations value decarbonization efforts the same way. For example, people in multi-family housing may evaluate the pros and cons of renewable installation differently for their building than someone in a rural community. But both population sub-groups would likely appreciate such a project if lower cost, low or nor carbon energy can be provided in a reliable manner. This program would be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes with its incentive programs. Generally, a reduction in GHG emissions from the energy sector can result in a reduction in local co-pollutant emissions, thereby having a positive (or reduced negative) impact on health outcomes, with a particular benefit to LIRC communities who typically suffer the most in the localized area. If localized renewable power generation can result in lower costs for customers, this typically has a positive impact in LIRC populations on fixed incomes. A LIRC analysis was conducted in accordance with EPA guidance and is included in Appendix B.

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APPENDIX A
GREENHOUSE GAS APPROXIMATION SUMMARY

GHG Approximation Summary for Northwest Arkansas (NWA)
November 2023

Overview

Greenhouse gas (GHG) emissions include carbon dioxide (CO_2), nitrous oxide (NO_2) and methane. GHG emissions data is often collected and reported at various administrative levels, including national, regional, and sometimes state or local levels. The region of Northwest Arkansas (NWA) includes Benton, Madison, and Washington Counties. Transparent communication is essential for building trust in the accuracy of the NWA regional GHG emission estimates. It is understood that there are inevitable uncertainties with the estimation process, but it is also recognized that these NWA approximations have been reinforced and compared with data from multiple reliable sources.

This summary describes the results of an analysis of the data pulled from the U.S. Environmental Protection Agency's (EPA) National Emissions Inventory (NEI). With that, approximations were based on the comparisons of Arkansas statewide data from the EPA's Greenhouse Gas Inventory Data Explorer, in addition to city-level data from Google's Environmental Insights Explorer (EIE) and directly from the City of Fayetteville.

Data Sources and Methodology

<u>EPA Greenhouse Gas Inventory (state-level data)</u>

The EPA is also subject to produce the United States' official Greenhouse Gas Inventory, which is a comprehensive report detailing the country's emissions of GHGs. This inventory can be broken down into statewide reports, which was done for the state of Arkansas. This inventory is an essential tool for understanding the sources and trends of GHG emissions in the United States. 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 fluorinated gases. Industry includes fossil fuel combustion, natural gas and petroleum systems, chemical industry, mineral industry, metal industry, coal mining, production and use of fluorinated 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 fluorinated gases. Residential includes fossil fuel combustion and the use of fluorinated gases.

<u>EPA NEI (county-level transportation data)</u>

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.

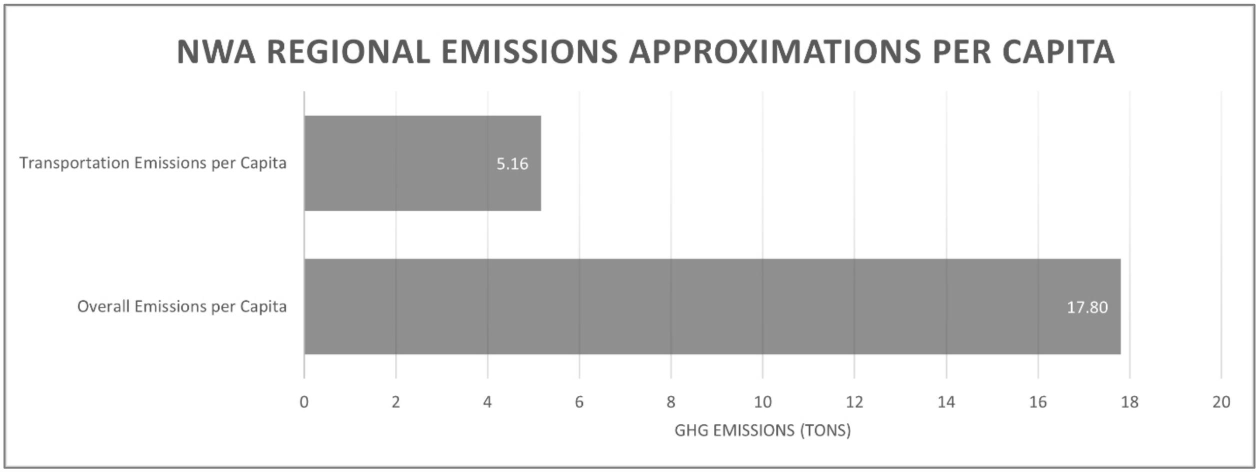

Figure 1. NWA Regional emissions approximations per capita.

Google EIE (city-level data)

Google's Environmental Insights Explorer (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 given 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 given the city's urban landscape.

Results

GHG emission approximations were made based on NEI transportation data for the NWA region consisting of Benton, Madison, and Washington Counties. Assumptions were then made to approximate for the remaining sectors based on state-level emissions data from the EPA's Greenhouse Gas Inventory database and city-level emissions data from Google's EIE and the City of Fayetteville.

Approximately 9,731,972 tons of GHG emissions were estimated for NWA. This approximated amount was broken up into sectors including the electric power industry, transportation, agriculture, industry, commercial, and residential. For a visual breakdown including tons of GHG emissions and percentages per sector, see Figure 2.

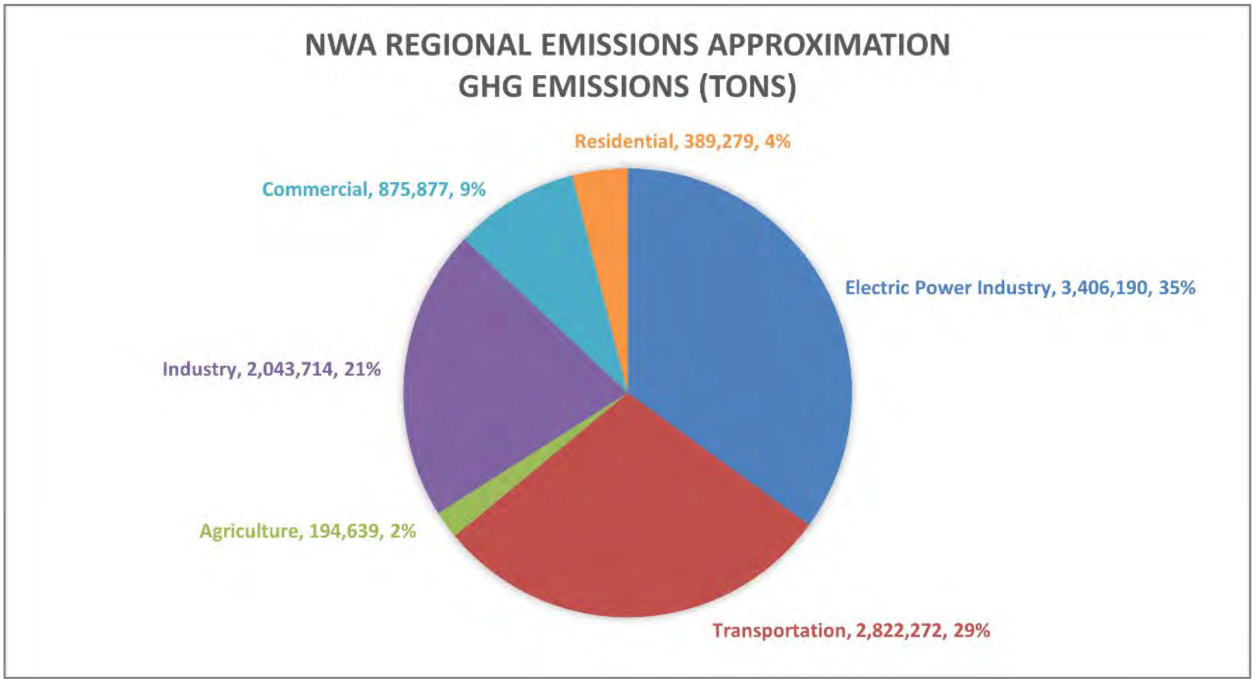

Figure 2. Northwest Arkansas Regional GHG Emissions Approximation

The *agricultural sector* accounts for approximately two percent or 194,639 tons of GHG emissions. Agricultural emissions are accumulated from livestock, agricultural soils, and crop production. Approximately 90 percent of NWA is rural and 10 percent is urban. In comparison, about 99 percent of Arkansas is rural and one percent is urban. Since the NWA agriculture emissions data was estimated based on state-level data, this needed to be adjusted. NWA has a larger urban landscape compared to the state of Arkansas, so emissions from the agricultural sector needed to reflect that. Assumptions were made that the agriculture sector emissions should be reduced by 90%, from 21 to two percent. The remaining percentage points were re-allocated to the other sectors.

The *electric power industry sector* accounts for approximately 35 percent or 3,406,190 tons of the region's GHG emissions. This 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 29 percent or 2,822,272 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 21 percent or 2,043,714 tons of the region's GHG emissions. Emissions from industry primarily come from burning fossil fuels for energy, as well as 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 875,877 tons of the region's GHG emissions, while the *residential sector* accounts for approximately 4 percent or 389,279 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 in buildings, and non-building specific emissions such as the handling of waste. These sectors were also slightly adjusted based on assumptions made for the agricultural sector.

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APPENDIX B
LIDAC/LIRC SUMMARY

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Low Income/Disadvantaged Communities (LIDAC)
Summary for Northwest Arkansas (NWA)
October 2023

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.

The CEJST 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.

Additionally, the EPA's EJScreen Tool 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.

LIDAC Summary: NWA

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.

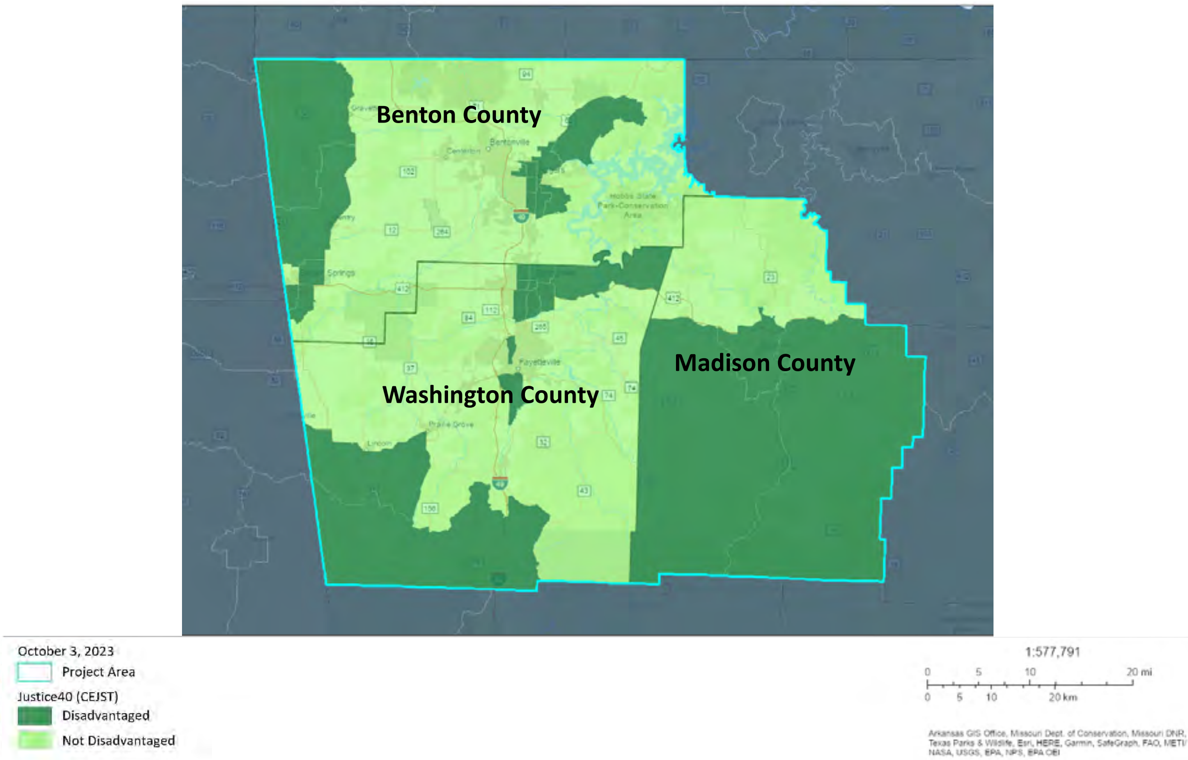


Figure 1. Map of the LIDAC communities within Northwest Arkansas (NWA) inclusive of Benton, Washington, and Madison and Counties.

APPENDIX C
STAKEHOLDER AND PUBLIC ENGAGEMENT SUMMARY

INTRODUCTION

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

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

> *In the context of climate action planning, a meaningful engagement process ensures that the full range of the potential impacts (both benefits and disbenefits) of greenhouse gas emission reduction measures 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; and,*
> - *Continue engagement with residents, leaders, and representatives of LIDACs into the future.*
>
> *Engagement strategies can cover multiple communities and should be inclusive of 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 Priority Action Plan and Comprehensive Action Plan development, 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 the LIDAC identification and analysis task was complete. This appendix summarizes those efforts. Note that this appendix only summarizes the engagement efforts undertaken for the Priority Action Plan phase of the project.

PUBLIC ENGAGEMENT PLAN

As the first deliverable for the engagement process, a public engagement plan (PEP) for the Priority Action Plan process was developed by Olsson to guide public and stakeholder participation efforts. The PEP was continuously updated throughout the Priority Action Plan process and will continue to be revised throughout the Comprehensive Action Plan and Status Report phases of the larger project.

The PEP included general guidelines for the engagement process, which public engagement spectrums were being utilized, and a detailed schedule of engagement tactics and coordination tasks.

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

Public Engagement Plan

NORTHWEST ARKANSAS ENERGY AND ENVIRONMENT INNOVATION ACTION PLAN

Northwest Arkansas Regional Planning Commission (NWARPC)

Last revised on November 16, 2023

“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

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

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.

PEP Snapshot

NWARPC PROJECT CONTACTS

Tim Conklin

Nicole Gibbs

PUBLIC ENGAGEMENT SPECTRUM LEVELS

Inform, Consult, and Involve

Phase One: Priority Action Plan (PAP)

PUBLIC ENGAGEMENT SPECTRUM LEVEL(S)

Inform, Consult, and Involve

PHASE ONE SUMMARY

- The established Stakeholder Committee will serve in an advisory capacity to NWARPC in the development of the Priority Action Plan.
- Multiple engagement tactics will be used to complete the above-mentioned activities, including a virtual stakeholder meeting, in-person public open house meetings, and initial development of a project webpage, social media, email blasts, and public survey.

GENERAL TIMEFRAME

September 2023 through December 2023

SCHEDULE OF ENGAGEMENT TACTICS (ET) AND COORDINATION TASKS (CT)

COMPLETE?	TYPE	TASK + DESCRIPTION	LEAD PARTY	DATE
X	ET	**Public Survey Launch.** NWARPC will create a survey to gather public input about the communities' priorities related to the reduction of climate pollution. Results will be used to inform the PAP.	NWARPC	9/12/23
X	CT	**Stakeholder Identification.** NWARPC will create the first draft of the stakeholder committee member list. Olsson will review and provide comments. NWARPC will finalize the member list and gather individual contact information for each stakeholder. NWARPC will be responsible for communicating with the Stakeholder Committee.	NWARPC	9/29/23
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	Olsson	10/4/23

		#1. The purpose of this prep meeting is to gather NWARPC feedback on the program for Stakeholder Committee Meeting #1.		
X	CT	**LIDAC Assessment.** Olsson will conduct a LIDAC assessment consistent with guidance provided publicly by the EPA. The results of the LIDAC assessment will be documented.	Olsson	10/6/23
X	CT	**Project Webpage Draft Content.** Olsson will coordinate with NWARPC to prepare initial material for the project webpage to be posted by 10/13/23. Information will include project description and purpose, open house meeting information and a link to the survey and idea box.	Olsson	10/6/23
X	CT	**Marketing and Outreach Materials.** Olsson will develop content for three social media posts by the NWARPC account, three email blasts, and one press release to advertise the public open houses, survey, and pop-up events.	Olsson	10/6/23
X	ET	**Stakeholder Committee Meeting #1.** Olsson will host a two-hour 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 educate stakeholders on the purpose of the project, the timeline, anticipated outcomes, and previous recommendations from existing regional plans. If deemed necessary, separate breakout sessions will be included with distinct technical topics. Olsson will prepare the program for the meeting and exercise(s) to get feedback on prior recommendations and their alignment with future implementation funding. This meeting will be recorded.	Olsson	10/12/23, 11 a.m. – 1 p.m. via Zoom

X	CT	**Prep Meeting for Public Open House Meeting #1.** Prior to Public Open House Meeting #1, Olsson will meet virtually with NWARPC and lead a meeting to discuss the draft plan for Public Open House Meeting #1. The purpose of this prep meeting is to gather NWARPC feedback on the program for Public Open House Meeting #1.	Olsson	10/12/23, 3 p.m.
X	CT	**Prepare Public Meeting Materials.** Olsson will work with NWARPC to develop content for the open houses, including up to eight (8) stations with display boards or posters, sign in sheets, comment forms, and handouts.	Olsson	10/17/23
X	ET	**LIDAC Outreach.** Based on community analysis, targeted outreach to LIDACs will include posters advertising the open house meetings and survey, social media posts, and emails in English, Spanish, and Marshallese in the LIDAC communities.	Olsson / NWARPC lead translations	10/18/23
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 PAP.	Olsson	10/18/23
X	CT	**Public Open House Outreach #2.** Repost social media and consider sending reminder emails.	NWARPC	10/23/23 *(morning before afternoon open house)*
X	CT	**Public Open House Outreach #3 (Final).** Repost social media and consider sending reminder emails.	NWARPC	10/26/23 *(morning before afternoon open house)*
X	ET	**In-Person Public Open House Meetings.** NWARPC will host two in-person public open house meetings to introduce the project, prioritized recommendations established by the Stakeholder	NWARPC leading / Olsson assisting	• Carroll Electric Community Room in Huntsville –

		Committee, and direct the public to the online public survey. Olsson will attend with three to four (3-4) staff people if available.		10/23; 4-7 p.m. • Jones Center in Springdale – 10/26; 4-7 p.m.
X	CT	**Survey Closes.** NWARPC will close the survey and provide the results to Olsson to incorporate into Stakeholder Meeting #2.	NWARPC	10/30/23
X	ET	**Stakeholder Committee Meeting #2.** Olsson will host a two-hour virtual Zoom Stakeholder Committee Meeting #2, staffed with four Olsson team members. NWARPC will be responsible for staffing the meeting, as well. The purpose of the meeting is to share a draft of the prioritized PAP supplement measures and will include commenting exercises to gather feedback on the draft measures. Olsson will prepare the program for the meeting and feedback exercise(s). This meeting will be recorded.	Olsson	11/2/23, 11 a.m. – 1 p.m. via Zoom
X	CT	**Engagement Summary (Complete for Phase One - PAP).** Olsson will finalize the complete engagement summary for the PAP phase.	Olsson	11/16/23
	CT	**NWAPRC Board Meeting.** Olsson will attend with one staff person to help present the final PAP.	NWARPC / Olsson	12/6/23, 1:30 p.m.

Phase Two: Comprehensive Action Plan (CAP)

GENERAL TIMEFRAME

To be prepared upon notice-to-proceed for phase two.

Phase Three: Status Report (SR)

GENERAL TIMEFRAME

To be prepared upon notice-to-proceed for phase three.

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 priority action items. The NWARPC worked to ensure representation from a variety of sectors. Email invitations were extended to the identified stakeholders to join the committee. The table below and on the following page details the makeup of the stakeholder committee.

CATEGORY	ORGANIZATION
Project Partners	ADEQ
Project Partners	Metroplan
Project Partners	Fort Smith
Project Partners	Arkansas Department of Transportation (ARDOT)
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
Transportation	ORT
Transportation	Razorback Transit
Transportation	XNA
Education/Health	University of Arkansas Sustainability Officer
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
Employers	Walmart
Employers	JB Hunt
Employers	Georges
Employers	Tyson
Employers	Simmons Food
Employers	McKee Foods
Employers	Arvest
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 Mtn 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

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. Events were also attended by the project team to further spread the word about the project.

Project Webpage

NWARPC hosted and regularly updated a project webpage on their website, in which materials were available in English, Spanish, and Marshallese.

Events Attended

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

- September 28, 2023 - Smart Growth for Source Water Protection Forum #6
- September 30, 2023 - NWA Drive Electric Event
- October 6, 2023 - Square 2 Square Bicycle Ride

Email Outreach

The following emails were sent to NWARPC contact lists:

- October 2, 2023 - Stakeholder Committee - Energy and Environment Innovation (EEI) Plan - Request for Stakeholder Committee
- October 3, 2023 - TAC/RPC Info Email - Energy and Environment Innovation (EEI) Plan Launch!
- October 13, 2023 - Stakeholder Committee - Follow-up
- October 13, 2023 - Public Email Blast - Arkansas Energy and Environment Innovation (EEI) Plan - We want to hear from you!
- October 23, 2023 - Public Email Blast - Follow-up

Press Releases

A press release was distributed on October 13, 2023, and was released by the Arkansas Times, Northwest Arkansas Democrat Gazette, KNWA FOX24, and AXIOS NW Arkansas. The release read as follows:

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

NWARPC ASKS FOR PUBLIC'S INPUT ON ENERGY AND ENVIRONMENT INNOVATION PLAN

SPRINGDALE, AR *October 11, 2023 – The Northwest Arkansas Regional Planning Commission (NWARPC) is asking for the public's input on the Arkansas Energy and Environment Innovation (EEI) Plan to reduce pollutant emissions in the region.*

Two public open houses are scheduled to share information about the planning process and gather the public's input on priority actions items. The open houses will be Monday, October 23 from 4:00-7:00 p.m. at the Carroll Electric Community Room, 5056 Hwy 214B in Huntsville and Thursday, October 26 from 4:00-7:00 p.m. at the Jones Center (Room 226), 922 E. Emma Ave., in Springdale. Both open houses are drop-in events.

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 Arkansas EEI Plan 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 and Environment (ADEE), City of Fort Smith and Metroplan to develop the EEI Plan. The EEI Plan will enable Arkansas state and local government agencies to compete for federal grant funding for energy infrastructure and investments in technology. The EEI Plan development process is funded through a $3 million grant to ADEE from the U.S. Environmental Protection Agency.

This initial phase of the planning process will result in recommendations for the Priority Action Plan to be included with other recommendations from across the state in 2024. The Priority Action Plan is the first phase of the EEI Plan. A second phase will develop recommendations for the Comprehensive Action Plan, anticipated in 2025. Together, the Priority Action Plan and Comprehensive Action Plan will make up the EEI Plan. Opportunities for future public input will be available throughout the entire planning process.

Those unable to attend the open houses can access event materials at www.nwarpc.org/energy-environment-innovation-plan beginning Monday, October 23.

For more information, contact Tim Conklin at tconklin@nwarpc.org, 479-751-7125.

SURVEY
Help us understand your community's priorities.

IDEA BOX
Submit your specific project or program design concept.

Facebook Outreach

NWARPC boosted three Facebook posts, as follows:

- October 18, 2023 - Facebook Post (English/Spanish/Marshallese)
- October 20, 2023 - Huntsville Open House
- October 23, 2023 - Springdale Open House
- October 24, 2023 - PILS Facebook Live Marshallese Community Event with Eric Fuselier (https://www.facebook.com/profile.php?id=61550332464692)

Poster/Flyer Outreach

NWARPC boosted three Facebook posts, as follows:

- October 18, 2023 - Facebook Post for Survey and Idea Box (English/Spanish/Marshallese)
  - This post ran from October 18 to November 2, 2023, and received 158 engagements and reached 3,672 people.
- October 20, 2023 - Huntsville Open House
  - This post ran from October 20 to October 24, 2023, and received 10 engagements and reached 424 people.
- October 23, 2023 - Springdale Open House
  - This post ran from October 23 to October 26, 2023, and received 30 engagements and reached 296 people.

NWARPC also posted a non-boosted post on October 24, 2023 for the PILS Facebook Live Marshallese Community Event with Eric Fuselier (https://www.facebook.com/profile.php?id=61550332464692).

STAKEHOLDER COMMITTEE MEETING #1 SUMMARY

To assist in the creation of the Priority Action Plan portion of the Northwest Arkansas Energy and Environment Innovation Plan, a virtual stakeholder committee meeting was held on October 12, 2023, from 11:00 a.m. to 1:00 p.m. via Zoom to educate and connect stakeholders with specific interests and influence on the project and to gather input on topics and measures.

Stakeholders were identified by the NWARPC, as previously described in ***Stakeholder Committee***, and invited via email to attend. Attendees included representatives from many public, non-profit, and private sectors. For a complete list of meeting attendees, see ***Stakeholder Committee Meeting #1 Attendees***. 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 presentation of the project, including an overview of the:

- Environmental Protection Agency's Climate Pollution Reduction Grants (EPA CPRG),
- Award of an EPA CPRG to the Arkansas Department of Energy and Environment (ADEE),
- Agreement between ADEE and NWARPC to develop a regional Priority Action Plan and Comprehensive Action Plan for Northwest Arkansas,
- Planned stakeholder and public engagement process,
- Notice of Funding Opportunity for implementation grants,
- Example greenhouse gas reduction measures, and
- Next steps.

Stakeholder Committee Meeting #1 Attendees

- Josh Beam, Benton County Road Department
- Wendy Bland, Benton County Solid Waste District
- Eric Boles, University of Arkansas Sustainability Department
- Andy Brewer, Olsson
- Frank Broadstreet, JB Hunt
- Chris Brown, City of Fayetteville
- John Coleman, Entegrity Partners
- Tim Conklin, Northwest Arkansas Regional Planning Commission
- Lane Crider, Beaver Water District
- Sunny Farmahan, Arkansas Department of Transportation
- Eric Fuselier, Olsson
- Joel Gardner, Ozark Regional Transit
- Nicole Gibbs, Northwest Arkansas Regional Planning Commission
- Bradley Hardin, Southwest Electric Power Company

- Chris Herrera, City of Springdale
- Brandi Holt, Huntsville City Government
- Dan Holtmeyer, NWA Council
- Glen Hooks, Audubon Delta
- Lance Jobe, City of Rogers
- Madison Kienzle, Benton County
- Leif Kindberg, Illinois River Watershed Partnership
- Travis Matlock, City of Bentonville Utilities
- John McCurdy, City of Rogers
- Chris McNamara, City of Fayetteville
- John Mulford, Fayetteville School District
- Dina Nash, Citizen’s Climate Lobby
- Peter Nierengarten, City of Fayetteville
- Justin Northcutt, Ozarks Electric Cooperative
- Leif Olson, City of Fayetteville
- Stephanie Orman, City of Bentonville
- Taylor Osburn, Benton County Solid Waste
- Tyler Overstreet, City of Bentonville
- Jacqueline Perez, City of Springdale
- Aaron Pinedo, Arkansas Department of Transportation
- Taylor Plummer, Olsson
- Jodi Reynolds, Waste Management Ecovista Tontitown Landfill
- Stacey Roach, Olsson
- Becky Roark, Beaver Watershed Alliance
- Joshua Robertson, City of Fort Smith
- Bridget Russell, Washington County
- Janet Schwanhausser, Bentonville School District
- Nick Steinke, Olsson
- Orlo Stitt, Stitt Group
- Graham Thompson, Watershed Conservation Resource Center
- Jennifer Turner, City of Rogers
- Paul Wallace, Bentonville School District
- Katrina Wille, Olsson
- Jason Willey, Arkansas Department of Energy & the Environment
- Lydia Wilkerson, Benton County Solid Waste District

Stakeholder poll question exercises were interspersed throughout the presentation. Stakeholders were able to participate in the polls via QR codes linked to Mentimeter. The following is a summary of the poll questions asked and their respective results.

Poll Question #1

If you are aware of any other local or regional projects/plans related to energy and emission reduction, please tell us the name or provide a link.

- Fayetteville in process of developing an updated climate action plan
- UofA Climate Action Plan
- UofA Transportation Plan
- Audubon Delta and Arkansas Advanced Energy Association are launching a project aimed at improving electric transmission capacity in NWA. That's critical to adding more clean energy in the region.
- Rogers, AR solar farm. Not sure on info
- Jon that I am familiar with.
- Orlo Stitt
- https://www.orlando.gov/Initiatives/2018-Community-Action-Plan
- J.B. Hunt is working toward a 5MW solar array in Gentry.
- Holistically Green Living is about to train builders, appraisers, bankers, realtors, etc. in sustainable building.
- City of Rogers is installing solar arrays to serve municipal facilities.
- Holistically Green Living conducted a 90-minute program at the Fay. library last month.
- Large scale solar services agreement
- Bike share and e-scooter share
- Countless other projects. Refer to sustainability.Uark.edu
- J.B. Hunt will be installing a few electric car charging stations at a new office space in the upcoming months.

Poll Question #2

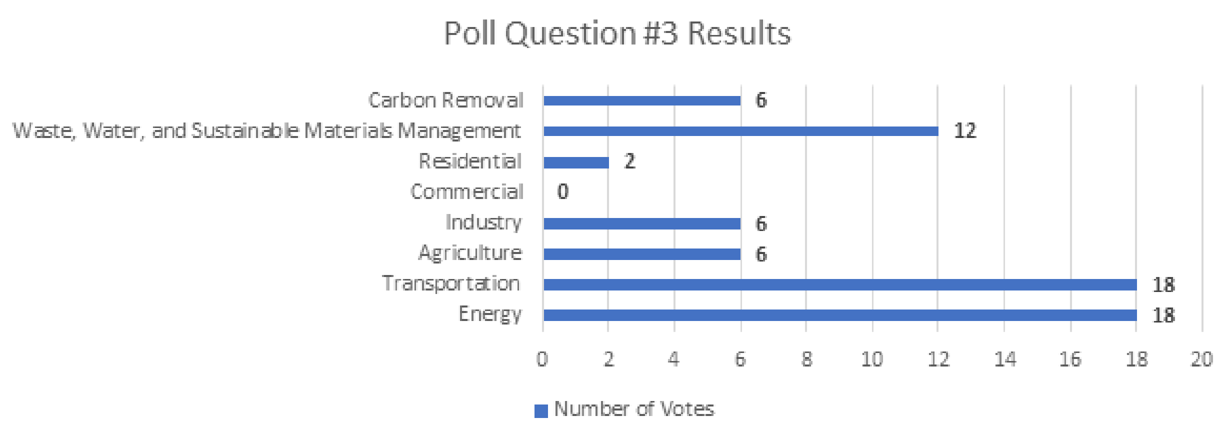
Has your agency/community implemented any projects/plans targeting reduction of energy consumption or greenhouse gas emissions? If so, what?

- Yes we've done this
- Stream restoration projects in Rogers establish riparian zones
- Also the already mentioned roundabout and bike projects"
- We are working toward our plan to reduction energy consumption by County facilities prior to using our EECBG.

- Fayetteville's Climate Action Plan
- The Arkansas Electric Vehicle Infrastructure Deployment Plan. Though it does not target reducing greenhouse has emissions directly.
- https://climate.colorado.gov/denver-80x50-climate-action-plan#:~:text=This%20climate%20action%20plan%20from,(from%20a%202005%20baseline)
- Yes Fayetteville has implemented 10 MW of solar with battery storage at our two wastewater treatment plants.
- Carbon dioxide reduction has been the primary mission of The Stitt group for 45 years. (www.thestittgroup.com)
- 5 MW Solar Array
- City of Little Rock has recently issued a solar RFP aimed at moving to clean energy for its municipal power use. Perhaps worth visiting with Brittany Nichols and James Owen at the city for more info
- There are ongoing projects to preserve native prairie, riparian areas, forest canopy and other vegetation which sequester and hold carbon. These proven solutions need to be expanded in our region.
- Rogers is executing a major solar program which will cover all (I believe) city power needs

Poll Question #3

Which sector(s) should be prioritized for a successful implementation grant application? Choose your top three.



Poll Question #4

What is the most feasible or most implementable Priority Action for your organization?

- Construction and Demolition Waste
- Divert/reduce waste from landfill through a larger scale reuse program
- Would definitely be interested in implementing potentially several of these action points
- Community solar
- Solar and other carbon-based energy and fuels reduction projects
- Electrification of the UA's fleet vehicles, bus fleet, and lawn care tools
- Solar energy production, infrastructure, and equipment acquisition support for heavy duty ZEVs.
- Reduce NWA transmission load pocket issue so Flint Creek coal plant can be shut down
- Electrification of city fleets; development code amendments; bus stop improvements
- For our agency: Waste diversion/reduction; increasing recycling; increasing composting; C&D diversion; partner with ag industry to increase composting; large scale reuse; energy storage on govt facilities
- NWA community tree planting
- Holistically Green Living will maybe need to partner with a governmental entity on sustainable building training for new workers and builders already in existence. The U of A/NWTI project might fit.
- Fleet transition, solar, residential solar for low income, eV charging, recycling initiatives especially regionally
- Programs to reuse waste, including construction and demolition waste. For example, a Re-Source Park.
- Electrification of public and private river ports
- HOV lane on I-49
- Bus Rapid Transit along 71B corridor
- Solar Power is the vaccine to combat climate change distraction. Expanded solar power generation for homes, commercial, agriculture etc. is the future—AR government has not been favorable
- Programs to reuse waste (composting, etc.)
- Solsmart for communities to streamline permitting
- Regional development code template
- Regional recycling sort facility
- Complete streets policies

At the end of the meeting, stakeholders were asked to complete the following "next steps:"

- Help share the public outreach materials (to be shared by NWARPC)
- Take the public survey via the NWARPC project webpage
- Fill out the idea box via the NWARPC project webpage
- Mark their calendar for Stakeholder Meeting #2 on November 2, 2023, from 11:00 a.m. to 1:00 p.m.

To view the entire PowerPoint from the meeting, see ***Stakeholder Committee Meeting #1 Presentation Slides*** as follows.

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

NWA Regional Planning Commission

STAKEHOLDER MEETING #1
OCTOBER 12, 2023 / 11AM-1PM
ZOOM

1

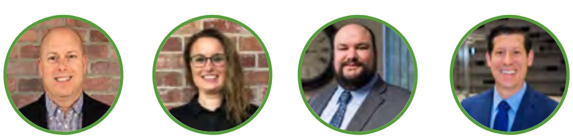
HOUSEKEEPING

- Please keep yourself muted throughout the meeting
- This meeting will be recorded
- If you have technical difficulties during the meeting, email Stacey at sroach@olsson.com
- Nicole will provide the meeting presentation slides, the poll results, and public outreach marketing materials in a follow-up email
- We will be using ***Mentimeter*** during today's meeting; you can participate using your phone, or by opening a web browser
- Mute button:
- Chat button:

2

2

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

3

3

4

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.

5

5

AR E&E'S CPRG GOALS

Enable access to and enhance Arkansas's competitiveness for federal funding for energy infrastructure

Support investment in technologies that reduce pollutant emissions, create high-quality jobs, and spur economic growth in the state

01 IIJA/IRA GRANTS

02 IRA TAX CREDITS

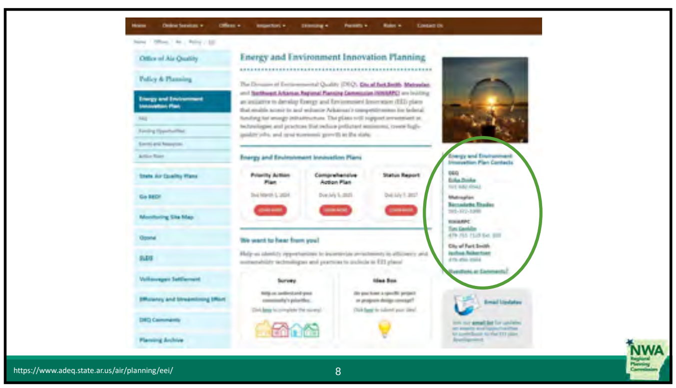
03 OTHER MEASURES

HALO hydrogen hub — LOUISIANA • OKLAHOMA • ARKANSAS
ARKANSAS CLEAN CITIES COALITION
PERFORMANCE CONTRACTING ENERGY $AVING
ENERGY EFFICIENCY ARKANSAS
RIPE — RURAL INVESTMENT TO PROTECT OUR ENVIRONMENT

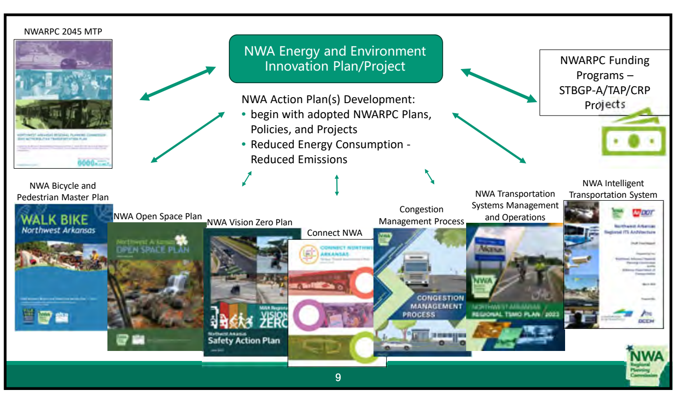
6


ENERGY & ENVIRONMENT INNOVATION PLAN
• Arkansas Department of Energy and Environment's Division of Air Quality (DEQ) - $3 million planning grant through the EPA's Carbon Pollution Reduction Grant (CPRG)
• Create an Arkansas Energy and Environment Innovation Plan to identify key carbon reduction/sequestration strategies across various sectors in the state
• The Arkansas Energy and Environment Innovation Plan will make state and local governments eligible for CPRG implementation grants, which will likely be due on or around **April 1, 2024 (AWARD ALL FUNDING IN FIRST YEAR)**
• The EPA CPRG program will grant a total of $4.6 billion nationwide in competitive implementation grants, with individual grants ranging from $2 million to $500 million
• DEQ has approached NWARPC to partner on the **Fayetteville-Springdale-Rogers Metropolitan Statistical Area (Benton, Madison, and Washington County)** - Energy and Environment Innovation Plan
• NWARPC received $440,000 suballocation to do regional planning for carbon reduction/sequestration – 4-year project
https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants
7
NWA Regional Planning Commission

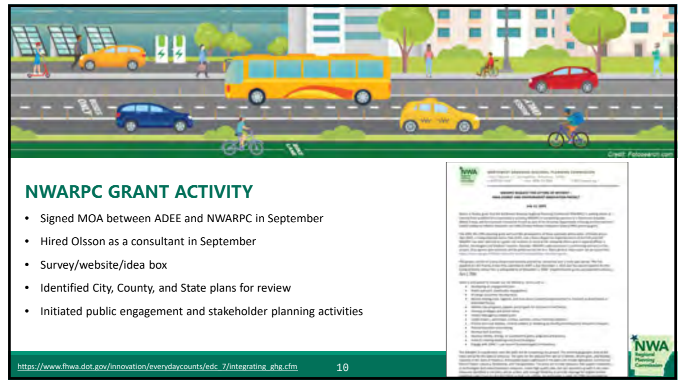
7


Energy and Environment Innovation Planning
Energy and Environment Innovation Plans
We want to hear from you!
Survey
Idea Box
https://www.adeq.state.ar.us/air/planning/eei/
8
NWA Regional Planning Commission

8


NWARPC 2045 MTP
NWA Energy and Environment Innovation Plan/Project
NWA Action Plan(s) Development:
• begin with adopted NWARPC Plans, Policies, and Projects
• Reduced Energy Consumption - Reduced Emissions
NWARPC Funding Programs – STBGP-A/TAP/CRP Projects
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
WALK BIKE Northwest Arkansas
Safety Action Plan
9
NWA Regional Planning Commission

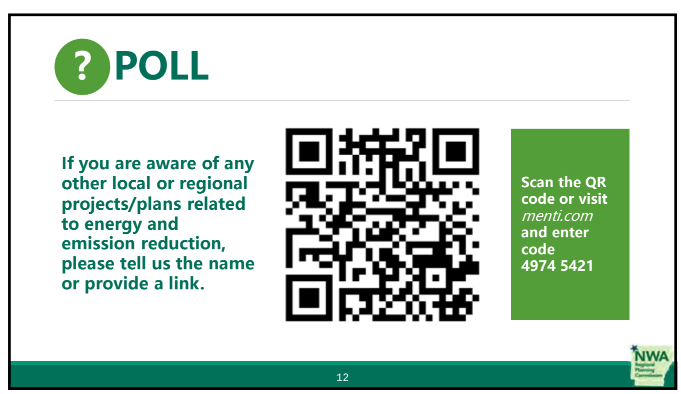
9


NWARPC GRANT ACTIVITY
• Signed MOA between ADEE and NWARPC in September
• Hired Olsson as a consultant in September
• Survey/website/idea box
• Identified City, County, and State plans for review
• Initiated public engagement and stakeholder planning activities
https://www.fhwa.dot.gov/innovation/everydaycounts/edc_7/integrating_ghg.cfm
10
NWA Regional Planning Commission

10


QUESTIONS?
SEND THEM IN THE CHAT
NWA Regional Planning Commission

11


? POLL
If you are aware of any other local or regional projects/plans related to energy and emission reduction, please tell us the name or provide a link.
Scan the QR code or visit *menti.com* and enter code 4974 5421
12
NWA Regional Planning Commission

12

? POLL

Has your agency/community implemented any projects/plans targeting reduction of energy consumption or greenhouse gas emissions? If so, what?

Scan the QR code or visit *menti.com* and enter code 2169 1653

13

13

14

NOTICE OF FUNDING OPPORTUNITY (NOFO)

IMPLEMENTATION GRANTS

- EPA intends to award approximately 30 to 115 grants ranging from $2 million to $500 million.
- Applications for grants must seek funding to implement measures that are included in the PCAP developed with funding from a CPRG planning grant.
- There are funding tiers based upon grant ranges, and applications will be evaluated against other applications within the same tier.
- A group of eligible applications applying as a coalition may not submit multiple applications for the same set of GHG reduction measures using different lead applicants.
- An eligible application may submit one application as the individual applicant and one application as the lead applicant for a coalition.
- Grants are intended to support measures for which dedicated funding or financing from other sources (e.g., BIL, IRA) is unavailable, or that leverage other sources of public and private funding to the fullest extent possible, prior to seeking CPRG funding.

15

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SCORING

SUMMARY/APPROACH - 45 POINTS (18%)

- Description of GHG Reduction Measures **(20 points)**
- Demonstration of Funding Need **(10 points)**
- Transformative Impact **(15 points)**

16

16

SCORING

GHG REDUCTION - 60 POINTS (12%)

- Magnitude of GHG Reductions from 2025 through 2030 **(20 points)**
- Magnitude of GHG Reductions from 2025 through 2050 **(10 points)**
- Cost Effectiveness of GHG Reductions **(15 points)**
- Documentation of GHG Reduction Assumptions **(15 points)**

17

17

SCORING

OUTPUTS/OUTCOMES - 30 POINTS (12%)

- Expected Outputs and Outcomes **(10 points)**
- Performance Measures and Plan **(10 points)**
- Authorities, Implementation Timeline, and Milestones **(10 points)**

18

18

SCORING

LIDAC - 35 POINTS (14%)

- Community Benefits **(25 points)**
- Community Engagement **(10 points)**

JOBS - 5 POINTS (2%)

19

19

SCORING

CAPABILITY/PAST PERFORMANCE - 30 POINTS (12%)

- Past Performance **(10 points)**
- Reporting Requirements **(10 points)**
- Staff Expertise **(10 points)**

20

20

SCORING

BUDGET - 45 POINTS (18%)

- Budget Detail **(20 points)**
- Expenditure of Awarded Funds **(15 points)**
- Reasonableness of Costs **(10 points)**

21

21

SCORING OVERVIEW (250 POINTS TOTAL)

- **SUMMARY/APPROACH - 45 POINTS (18%)**
- **GHG REDUCTION - 60 POINTS (12%)**
- **OUTPUTS/OUTCOMES - 30 POINTS (12%)**
- **LIDAC - 35 POINTS (14%)**
- **JOBS - 5 POINTS (2%)**
- **CAPABILITY/PAST PERFORMANCE - 30 POINTS (12%)**
- **BUDGET - 45 POINTS (18%)**

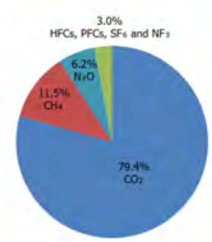
22

22

Overview of U.S. Greenhouse Gas Emissions

https://www.epa.gov/ghgemissions/overview-greenhouse-gases

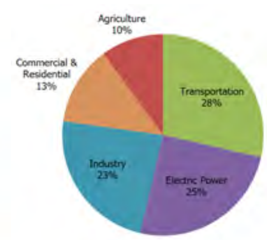
Carbon dioxide CO2
Methane CH4
Nitrous oxide (N2O)
Fluorinated gases



Carbon Dioxide 79.4 %

Total U.S. Greenhouse Gas Emissions by Economic Sector in 2021

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



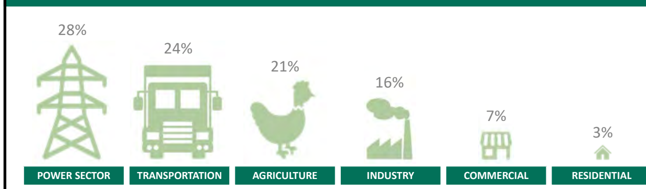
Transportation 28%

23

23

ARKANSAS GREENHOUSE GAS 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%)**



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

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POLL

Which sector(s) should be prioritized for a successful implementation grant application? Choose your top three.

Scan the QR code or visit *menti.com* and enter code 67 58 81 9

26

26

27

EXAMPLE GHG REDUCTION MEASURES

28%

POWER SECTOR

ELECTRIC POWER SECTOR

- Renewable portfolio standards and/or clean electricity standards;
- Energy efficiency portfolio standards;
- Emission trading systems (e.g., cap-and-trade programs) and carbon pricing measures;
- GHG performance standards for electric generating units;

28

28

EXAMPLE GHG REDUCTION MEASURES

28%

POWER SECTOR

ELECTRIC POWER SECTOR

- Installation of renewable energy and energy storage systems on municipal facilities;
- Programs to support smart-grid and/or behind-the-meter technologies to reduce power losses, reduce peak demand, and enable consumer participation in distributed generation;
- Policies and measures to streamline permitting for renewable energy projects;

29

29

EXAMPLE GHG REDUCTION MEASURES

28%

POWER SECTOR

ELECTRIC POWER SECTOR

- Targeted incentives for installation of renewable energy and energy storage systems on commercial and residential buildings, such as net metering, tax credits, rebates, and streamlined interconnection standards;
- Development of distributed or community-scale renewable energy generation, microgrids, or vehicle-to-grid infrastructure in disadvantaged communities, including remote and rural regions.

30

30

EXAMPLE GHG REDUCTION MEASURES

24%

TRANSPORTATION

TRANSPORTATION SECTOR

- Programs to increase the share of electric light-, medium-, and heavy-duty vehicles, and to expand electric vehicle charging infrastructure;
- Transportation pricing programs that reduce vehicle miles traveled (VMT), such as parking pricing and congestion and road pricing;
- New or expanded transportation infrastructure projects to facilitate public transit, micro-mobility, car sharing, bicycle, and pedestrian modes;

31

31

EXAMPLE GHG REDUCTION MEASURES

24%

TRANSPORTATION

TRANSPORTATION SECTOR

- Policies to support transportation management incentive programs to reduce vehicle trips or travel and expand transit use, such as van-pool programs, ridesharing, transit fare subsidies, and bicycle facilities;
- Incentive programs to purchase zero-emission vehicles and equipment to replace older heavy-duty diesel vehicles and equipment;
- Electrification requirements for municipal vehicle, transit, or equipment fleets;

32

32

EXAMPLE GHG REDUCTION MEASURES

24%

TRANSPORTATION

TRANSPORTATION SECTOR

- Update building and zoning codes to encourage walkable, bikeable, and transit-oriented development;
- Encourage mode shift from private vehicles to walking, biking, and public transportation (e.g., complete streets, bike share programs, bike storage facilities, low-speed electric bicycle subsidies, public transit subsidies).

33

33

EXAMPLE GHG REDUCTION MEASURES

21%

AGRICULTURE

AGRICULTURAL SECTOR

- 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.

34

34

EXAMPLE GHG REDUCTION MEASURES

16%

INDUSTRY

INDUSTRIAL SECTOR

- 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;

35

35

EXAMPLE GHG REDUCTION MEASURES

16%

INDUSTRY

INDUSTRIAL SECTOR

- 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.

36

36

EXAMPLE GHG REDUCTION MEASURES

7% COMMERCIAL

3% RESIDENTIAL

BUILDINGS

- Adoption and implementation of the most up-to-date building energy codes or stretch codes for new commercial and residential buildings;
- Implementation of a clean heat standard;
- Incentive programs for implementation of end-use energy efficiency measures in existing government-owned, commercial, and residential buildings;

37

37

EXAMPLE GHG REDUCTION MEASURES

7% COMMERCIAL

3% RESIDENTIAL

BUILDINGS

- Incentive programs for the purchase of certified energy-efficient appliances, heating and cooling equipment, lighting, and building products to replace inefficient products;
- Programs and policies to promote electrification of government-owned, commercial, and residential buildings;
- Programs and policies to accelerate the incorporation of efficient electric technologies and electric vehicle charging at new single-family, multi-unit, or affordable residential buildings and commercial buildings, including building codes related to electric vehicle charging;

38

38

EXAMPLE GHG REDUCTION MEASURES

7% COMMERCIAL

3% RESIDENTIAL

BUILDINGS

- Implementation of a building energy performance management program for government-owned buildings;
- Implementation of a new benchmarking and building performance standards;
- Programs to promote recovery and destruction of high-global warming potential (GWP) hydrofluorocarbons (HFCs) used in existing appliances, air conditioning systems, and commercial chillers.

39

39

EXAMPLE GHG REDUCTION MEASURES

16% INDUSTRY

7% COMMERCIAL

3% RESIDENTIAL

WASTE, WATER, AND SUSTAINABLE MATERIALS MANAGEMENT

- Standards and incentives to reduce methane emissions from landfills and wastewater treatment facilities, including through collection for use or destruction;
- Programs and incentives to reduce or divert waste (including food and/or yard waste) through improved production practices, improved collection services, and increased reuse or recycling rates;
- Programs and incentives to reduce GHG emissions associated with plastics production, use, and waste management;

40

40

EXAMPLE GHG REDUCTION MEASURES

16% INDUSTRY

7% COMMERCIAL

3% RESIDENTIAL

WASTE, WATER, AND SUSTAINABLE MATERIALS MANAGEMENT

- Programs to expand composting and bio-digestion infrastructure to reduce GHG emissions and increase beneficial use of organic waste;
- Policies and programs to reduce construction and demolition waste through building reuse, deconstruction, and material diversion and reuse;
- Installation of renewable energy and energy efficiency measures at wastewater treatment facilities.

41

41

EXAMPLE GHG REDUCTION MEASURES

CARBON REMOVAL MEASURES

- Policies to promote improved forest management to enhance carbon stocks on forested land;
- Urban afforestation and green infrastructure programs and projects;
- Restoration of degraded lands (e.g., brownfields, mine reclamation) and forested lands to enhance carbon sequestration.

42

42

? POLL

What is the most feasible or most implementable Priority Action for your organization?

Scan the QR code or visit *menti.com* and enter code 4248 5796

43

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NEXT STEPS

Event/Deliverable	Date/Due Date
Public Engagement Meetings	October 23 & October 26
Stakeholder Meeting #2	November 2, 2023
NWARPC Priority Plan Supplement to ADEE	December 1, 2023
ADEE Priority Plan to EPA	March 1, 2024
CPRG Implementation Grant Applications	April 1, 2024
Comprehensive Plan Supplement	February 28, 2025
Status Report Supplements	March 1, 2027

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THANK YOU!

1. **Please share public outreach materials** — *Will be emailed to you*
2. **Take the survey**
3. **Fill out idea box**
4. **Mark your calendar for next meeting** — *November 2 11AM-1PM*

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PUBLIC OPEN HOUSES SUMMARY

To assist with the creation of the Priority Action Plan segment of the Northwest Arkansas Energy and Environment Innovation Plan, two public open houses were held to present information to the public and gather input on preferred measures via the public survey. Public Open House #1 was held on October 23, 2023 (Carroll Electric Community Room, Huntsville, AR) from 4:00 p.m. to 7:00 p.m.; and Public Open House #2 was held on October 26, 2023 (The Jones Center, Springdale, AR) from 4:00 p.m. to 7:00 p.m.

The public was invited to attend via email, website information, flyers, and boosted social media posts. Attendees included representatives from public, non-profit, and private sectors—refer to the ***Public Open House #1 Attendees*** and ***Public Open House #2 Attendees*** for a full list of attendance. Representatives from the NWARPC 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. 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, and Sequestration; and
- Thank you / next steps.

All open house materials were posted to the project website following the open houses. Marshallese and Spanish interpreters were available in Springdale to accommodate the unique local population's language needs. Public feedback was gathered via the state's public survey and idea box in English, Marshallese, and Spanish.

Public Open House #1 Attendees [October 23, 2023]

- Cameron Caja, Polaris High Performance Homes
- Kenneth Lovett, Citizen
- Steve Starrett, Halff Assoc.
- Travis Dotson, City of Huntsville
- Charlie Spakes, Utility Provider
- Larry Garrett, Madison Co.
- Nicole Gibbs, NWARPC
- Mariah Crews, Olsson
- Andy Brewer, Olsson
- Tim Conklin, NWARPC
- Brandi Holt, City of Huntsville
- Eric Fuselier, Olsson

Public Open House #2 Attendees [October 26, 2023]

- Tim Conklin, NWARPC
- Christopher Savage, Marek Industries
- Heather Ellzey, City of Fayetteville
- Jay Hoyt, First Christian Church of Bentonville
- Darryl Holliday, UADA
- Ronaldo Kabua, PILS
- Philmar Mendoza Kabua, PILS
- Andy Brewer, Olsson
- Don Lourie, ColvillaCompost.com
- Rob Smith, NWA Council
- Shannon Weathers, Emerald Solutions
- Eric Fuselier, Olsson
- Danny Forkner
- Tim Reavis, NWARPC
- Gary Wilson
- Peter Nierengarten, City of Fayetteville
- Orlo Stitt, The Stitt Group
- Mary Stitt, The Stitt Group
- Charlie Spakes, Utility Provider
- Robin Mizell, Black Hills Energy
- Michelle Pedro, ACOM

- Nicole Gibbs, NWARPC
- Valerie Miller, Olsson
- Stacey Roach, Olsson
- Mayor Stephanie Orman, Bentonville
- Gary Wilson, Bentonville

To view the posters from the open houses, see ***Public Open House Posters*** as follows.

NWARPC Energy & Environment Innovation Plan

WELCOME!

Please sign in

Northwest Arkansas Regional Planning Commission (NWARPC)

Regional Plan Phases

THIS is what we're working on right now!

1

PRIORITY ACTION PLAN

SEPT 2023 - NOV 2023

- Review existing regional action plans
- Public and stakeholder engagement
- Prepare at least three Priority Actions for inclusion in state-wide plan

2

COMPREHENSIVE ACTION PLAN

MARCH 2024 - FEB 2025

- Public and stakeholder engagement
- Prepare at least three additional Comprehensive Actions for inclusion in state-wide plan

3

STATUS UPDATES

BEGINNING IN 2027

- Required to report on progress made
- Project updates will be made available to the public

What is this all about?

OUR ASK OF YOU

Take the survey so we can understand what kinds of **pollutant reduction incentive programs or specific projects** you would like us to include both in the state and region-specific plans.

You'll learn more about the survey questions on the following posters.

U.S. Environmental Protection Agency's (EPA)

Climate Pollution Reduction Grant (CPRG)

Arkansas Department of Energy and Environment

- Awarded $3 million planning grant from EPA to create an Arkansas Energy and Environment Innovation Plan
- Plan will make state and local governments eligible for future CPRG Implementation Grants

THIS is what we need your help with!

Northwest Arkansas Regional Planning Commission

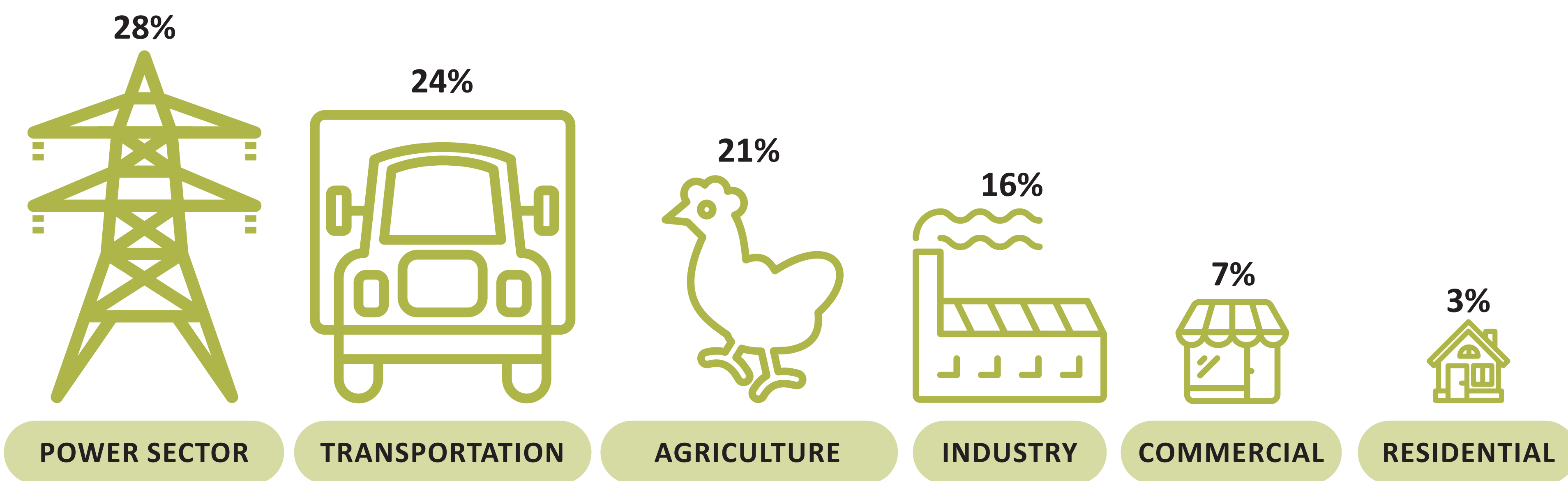
- Awarded funding for an NWA regional plan to be included in state-wide plan
- Partners: Arkansas Dept. of Energy & Environment, Metroplan, NWA Regional Planning Commission, and the City of Fort Smith

PURPOSE OF THE PLANNING GRANT

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

DID YOU KNOW?

- 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%)



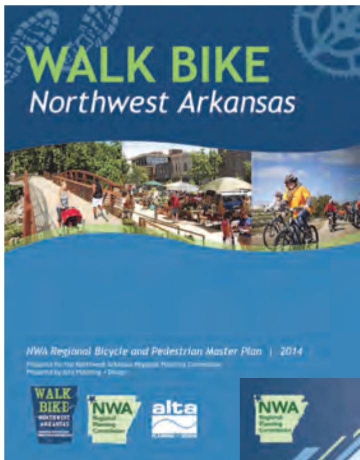
Arkansas Greenhouse Gas Emissions (CO2e), 2020 obtained from U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks by State: 1990 - 2020

DID YOU KNOW?

The Northwest Arkansas Regional Planning Commission has been working on pollutant reduction efforts for a long time.

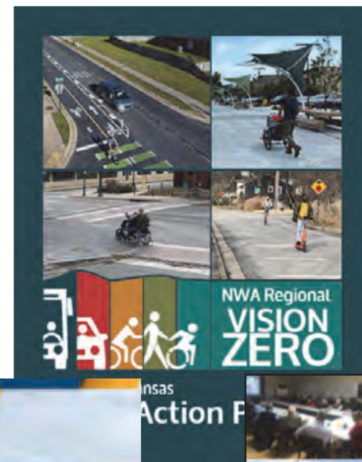
Here are some examples of other projects they've worked on.

NWA BICYCLE AND PEDESTRIAN MASTER PLAN



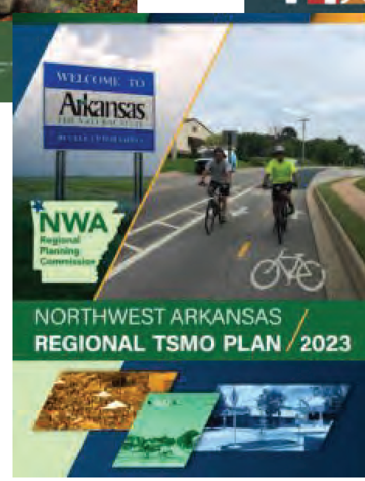
NWA OPEN SPACE PLAN

NWA VISION ZERO PLAN



CONNECT NWA

CONGESTION MANAGEMENT PROCESS



NWA TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS

NWA INTELLIGENT TRANSPORTATION SYSTEM

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 posters.

nwarpc.org/energy-environment-innovation-plan

Reliable Low and Zero-Emissions Energy

Reducing emissions from energy production.

SMALL-SCALE SOLAR

Example: Incentives for solar panels at individual residences and small businesses

MEDIUM-SCALE SOLAR

Example: Incentives and enabling policies for neighborhood/community-scale solar projects and solar panels at large businesses

LARGE-SCALE SOLAR

Example: Incentives for utility-scale solar energy production to supply the power grid

AGRICULTURE AND SOLAR FIELD DEMONSTRATIONS

Example: Incentives for demonstrations that use crop and grazing land for both agriculture and solar energy generation

LOW-GREENHOUSE GAS HYDROGEN

Example: Incentives for hydrogen-combustion capable turbines, pipeline infrastructure, hydrogen fueling stations, and facilities that produce hydrogen using renewables or carbon capture

ELECTRIC GRID UPGRADES NEEDED FOR LOW AND ZERO-EMISSIONS GENERATION SOURCES

Example: Assistance with electric grid interconnection costs for low and zero emissions power generation sources, such as renewables, nuclear, and hydrogen

BATTERY STORAGE

Example: Incentives for batteries to store electricity from renewable energy

Efficiency and Waste Minimization

Making the best use of our resources. Avoiding waste. Doing more with the same amount of (or less) energy and pollution.

MATERIALS MANAGEMENT & RECYCLING

Example: Incentives to demonstrate new processes that use or reuse materials more productively and sustainably over their entire life cycles

TRANSPORTATION CHOICE

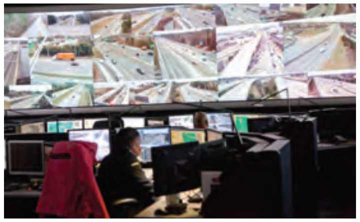
Example: Incentives for transportation infrastructure (roads, transit routes, sidewalks, paths, and trails) that help people more easily choose or transition between options such as walking, biking, transit, and micromobility (e-bikes, e-scooters)

CONNECTED COMMUNITIES

Example: Local policies and incentives that encourage more compact, walkable, and transit-oriented development

COMPLETE & GREEN STREETS

Example: Build/retrofit streets to enable safe use and support mobility of all users and to reduce stormwater runoff, improve water quality, and mitigate urban heat island effects



INTELLIGENT TRANSPORTATION SYSTEMS (ITS) & TRAFFIC MANAGEMENT CENTERS (TMCS)

Example: Incorporate technology (cameras, sensors) into traffic monitoring to reduce emissions by improving driving, parking, delivery, and traffic signal efficiency

AGRICULTURAL WASTE

Example: Incentives to treat or capture pollution in manure

LANDFILL AND DIGESTER GAS CAPTURE & REUSE

Example: Incentives for equipment needed to capture methane from landfills or farm digesters (big tanks that hold livestock waste) for use in electricity production, heating, and powering heavy-duty vehicles and equipment

COMPOSTING

Example: Grants to pilot community-wide compost pickup programs

ENERGY EFFICIENCY

Example: Incentives for projects that reduce the energy consumed by equipment, appliances, and technologies

Electrification

Running more things on electricity where it makes sense.

As the electricity sector reduces its emissions through installation and operation of low and zero-emission generation, other sectors can reduce their emissions by switching from traditional fuels to electricity.

PERSONAL ELECTRIC VEHICLES (EVS)

Example: Incentives to reduce upfront barriers to personal electric vehicle ownership (which can include battery, plug-in hybrid, and hydrogen fuel cell vehicles)

ELECTRIC FLEETS AND EQUIPMENT

Example: Incentives for replacement or retrofit of current bus, truck, train, barge, agricultural, and port equipment with all-electric or fuel cell equivalents

ELECTRIC VEHICLE SUPPORTING INFRASTRUCTURE

Example: Incentives for electric vehicle charging equipment and electrical upgrades necessary to install charging equipment

ELECTRIC APPLIANCES

Example: Incentives to retrofit existing residential and commercial buildings with all-electric appliances (e.g., replacement of gas furnaces with highly efficient electric heat pumps)

ZERO-ENERGY BUILDINGS

Example: Incentives for the construction of buildings that are air-tight, well insulated, and energy efficient

Workforce and Technical Assistance

Getting people ready to work new jobs in renewable energy and sustainability.

WORKFORCE DEVELOPMENT

Example: Incentives to technical colleges or similar institutions to create or expand renewable energy, energy efficiency, and electric vehicles technician training programs

TECHNICAL ASSISTANCE

Example: Provide information and training to public and private organizations to implement Energy & Environment Innovation measures (e.g., train water/wastewater engineers about greenhouse gas-reducing equipment and practices)

Sequestration

Capturing pollutants out of the air or before they are emitted.

CARBON CAPTURE & SEQUESTRATION (CCS)

Example: Incentives to install carbon capture equipment, for the development of carbon dioxide pipelines, and sequestration (storage) wells

<u>Definitions</u>

Carbon Capture - The trapping of carbon dioxide just after it has been emitted but before it can enter the atmosphere. The carbon dioxide is then compressed into a liquid and stored in tanks or distributed via pipelines to sequestration (storage) wells.

Carbon Sequestration - The long-term storage of captured carbon, often by being pumped into a storage well deep underground.

Note: CCS projects are often paired with large greenhouse gas (GHG)-emitting facilities such as energy, manufacturing, or fuel production facilities.

STREAMLINE PERMITTING FOR CARBON SEQUESTRATION WELLS

Example: Implement state-level permitting of sequestration wells to speed and streamline the permitting process

TREES & NATURAL AREAS - CONSERVATION, RESTORATION & EXPANSION

Example: Incentives to conserve natural lands and to plant trees and native plants along streets, highways, interstates, and between agricultural fields

SUSTAINABLE FARMING METHODS

Example: Incentives for farmers and ranchers to implement and document sustainability best practices that reduce energy use, fertilizer use, and/or sequester carbon

THANK YOU!

NWA Regional Planning Commission

Share our Facebook posts!

Take the survey!

Have an idea?

Watch your email for project updates!

STAKEHOLDER COMMITTEE MEETING #2 SUMMARY

To continue the development of the Priority Action Plan, a second stakeholder committee meeting was held on November 2, 2023, from 11:00 am to 1:00 p.m. via Zoom to share information with the stakeholders and gather their input.

Stakeholders were identified by the NWARPC, as previously described in ***Stakeholder Committee***, and invited via email to attend. Attendees again included representatives from many public, non-profit, and private sectors. For a complete list of meeting attendees, see the ***Stakeholder Committee Meeting #2 Attendees***. 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 presentation of the project and proposed measures, including:

- A recap of the previous stakeholder meeting,
- Greenhouse gas emissions for the United States and Arkansas, and an approximation of greenhouse gas emissions in Northwest Arkansas
- The path to proposed measures to reduce greenhouse gas emissions in Northwest Arkansas including a review of existing plans, feedback from in-person and online public and stakeholder engagement activities, and public survey,
- Proposed Priority Action Plan measures, and
- Next steps.

Stakeholder Committee Meeting #2 Attendees

- Aaron Pinedo, Arkansas Department of Transportation
- Alan Athey
- Andy Brewer, Olsson
- Anthony Hunter
- Aury Kangelos, Olsson
- Becky Roark, Beaver Watershed Alliance
- Bernadette Rhodes, Metroplan
- Brandi Holt, Huntsville City Government
- Casey Covington
- Casey Wilhelm
- Chris Brown, City of Fayetteville
- Chris Herrera, City of Springdale
- Chris McNamara, City of Fayetteville
- Cristina Scarlat, Northwest Arkansas Regional Planning Commission
- Dan Weese, City of Bentonville

- David Criswell (Trailblazers) (David Criswell)
- Dina Nash, Citizen's Climate Lobby
- Eric Boles, University of Arkansas Sustainability Department
- Eric Fuselier, Olsson
- Frank Broadstreet, JB Hunt
- Graham Thompson, Watershed Conservation Resource Center
- Jamie Vernon, Waste Management Ecovista Tontitown Landfill
- Jason Willey, Arkansas Department of Energy & the Environment
- Jennifer Turner, City of Rogers
- Jodi Reynolds, Waste Management Ecovista Tontitown Landfill
- John McCurdy, City of Rogers
- Joshua Robertson, City of Fort Smith
- Justin Northcutt, Ozarks Electric Cooperative
- Katrina Wille, Olsson
- Leif Kindberg, Illinois River Watershed Partnership
- Leif Olson, City of Fayetteville
- Markos Mylonas
- Meredith Bergstrom | WFF (Meredith Bergstrom)
- Michelle Queen, Olsson
- Mikayla Shaddon
- Nick Steinke, Olsson
- Nicole Gibbs, Northwest Arkansas Regional Planning Commission
- Orlo Stitt, Stitt Group
- Peter Nierengarten, City of Fayetteville
- Quinton Harris
- Rebecca Pinson
- Rob Smith, Northwest Arkansas Council
- Robin Mizell, Black Hills Energy
- Robyn Reed, Boston Mountain Solid Waste
- Stacey Roach, Olsson
- Tim Conklin, Northwest Arkansas Regional Planning Commission
- Trent Jones
- Wendy Bland, Benton County Solid Waste District

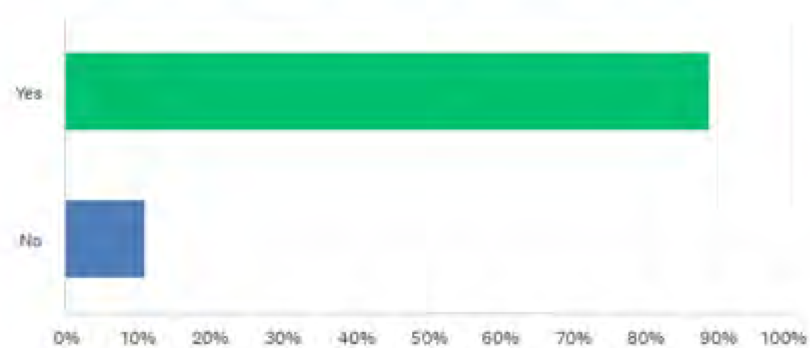
During the presentation of proposed Priority Action Plan measures, the project team welcomed discussion from the stakeholder committee to understand the measures their agency or organization would likely be able to support through implementation. The stakeholders also suggested refinement of some language to clarify the intent of the measure and discussed the possibility of combining measures to create a more compelling implementation grant application.

Following the discussion of proposed Priority Action Plan measures, stakeholders were asked to complete a survey that included their name, agency or organization, and their email address. Of the 20 participants that responded, 16 believed their agency or organization would be open to leading or being part of a coalition to lead any of the Priority Action Plan measures. The top two measures of interest to the stakeholders were, “Develop and implement a program to improve or increase carbon sequestration on city-owned lands and using a program of land conservation and acquisition,” (11 votes) and “Reduce automobile trips and incentivize more efficient and lower/no emission modes of transportation” (10 votes). All respondents said they would be interested in attending a future discussion about implementation grants. The meeting concluded with an overview of the next step actions and the stakeholders being thanked for their participation.

The following includes the survey questions and responses from the meeting.

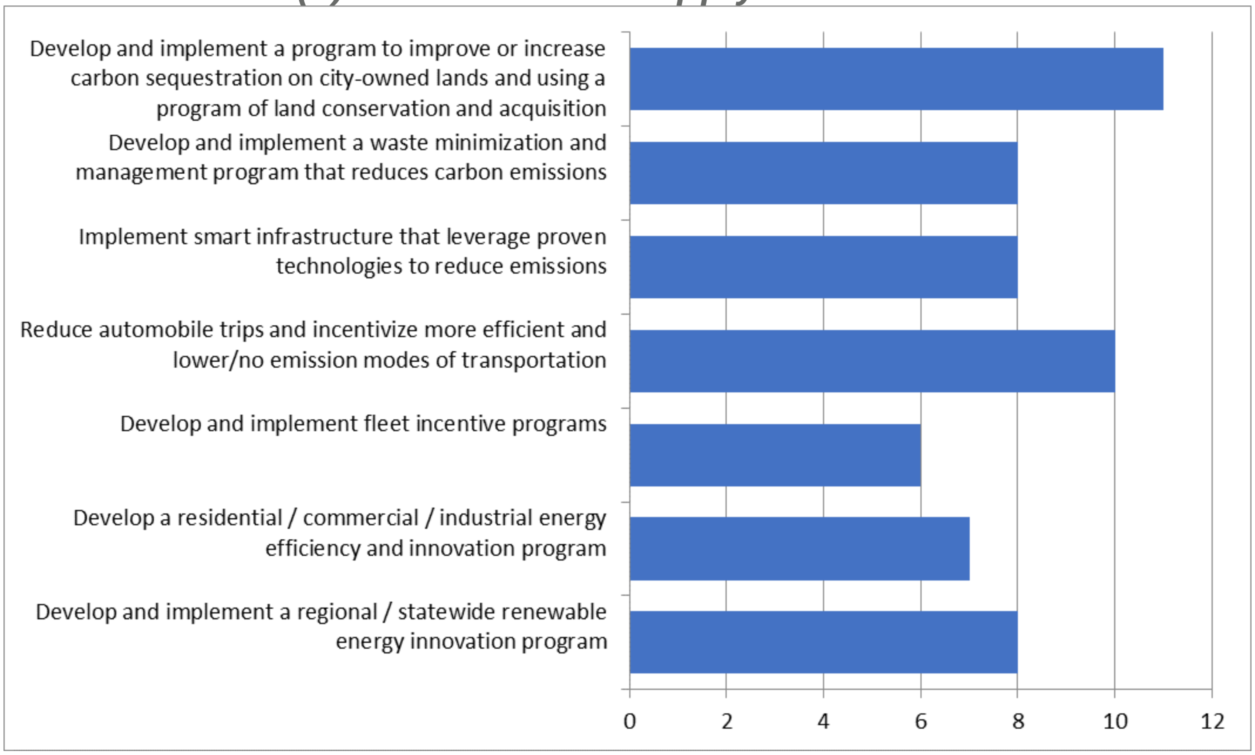
Survey Question

Do you believe your agency/organization would be open to leading or being part of a coalition to lead any of the Priority Action Plan measures?



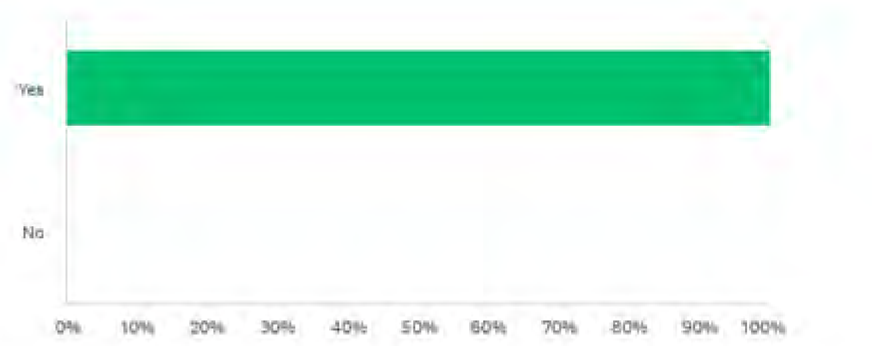
Survey Question

Which measure(s)? Check all that apply.



Survey Question

Would you be interested in attending a future discussion about implementation grants?



To view the entire PowerPoint from the meeting, see ***Stakeholder Committee Meeting #2 Presentation Slides*** as follows.

NWA Regional Planning Commission

NWARPC ENERGY & ENVIRONMENT INNOVATION PLAN

STAKEHOLDER MEETING #2

NOVEMBER 2, 2023 | 11:00 AM - 1:00 PM

ZOOM VIRTUAL MEETING

1

HOUSEKEEPING

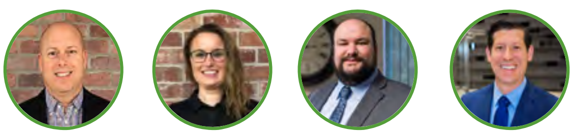
- Please keep yourself muted throughout the meeting
- This meeting will be recorded
- If you have technical issues during the meeting, email **Stacey Roach** at *sroach@olsson.com*
- **Nicole Gibbs** will provide the meeting presentation slides in a follow-up email
- If you have questions during the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

MUTED (Unmute) | NOT MUTED (Mute) | CHAT (Chat)

2

2

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

3

3

ENERGY & ENVIRONMENT INNOVATION PLAN

PURPOSE, COORDINATION, & ACTIVITIES

4

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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AR E&E'S CPRG GOALS

- Enable access to and enhance Arkansas's competitiveness for federal funding for energy infrastructure.
- Support investment in technologies that reduce pollutant emissions, create high-quality jobs, and spur economic growth in the state.

01 IIJA / IRA GRANTS

02 IRA TAX CREDITS

03 OTHER MEASURES

PERFORMANCE CONTRACTING ENERGY $AVING

ARKANSAS CLEAN CITIES COALITION

ENERGY EFFICIENCY ARKANSAS

RIPE Rural Investment to Protect our Environment

6

ENERGY & ENVIRONMENT INNOVATION PLAN

- Arkansas Department of Energy and Environment's Division of Air Quality (DEQ) - $3 million planning grant through the EPA's Carbon Pollution Reduction Grant (CPRG)
- Create an Arkansas Energy and Environment Innovation Plan to identify key carbon reduction/sequestration strategies across various sectors in the state
- The Arkansas Energy and Environment Innovation Plan will make state and local governments eligible for CPRG implementation grants, which will likely be due on or around **April 1, 2024** **(AWARD ALL FUNDING IN FIRST YEAR)**
- The EPA CPRG program will grant a total of $4.6 billion nationwide in competitive implementation grants, with individual grants ranging from $2 million to $500 million
- DEQ has approached NWARPC to partner on the **Fayetteville-Springdale-Rogers Metropolitan Statistical Area (Benton, Madison, & Washington County)** - Energy & Environment Innovation Plan
- NWARPC received $440,000 suballocation to do regional planning for carbon reduction/sequestration – 4-year project

Source: www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants

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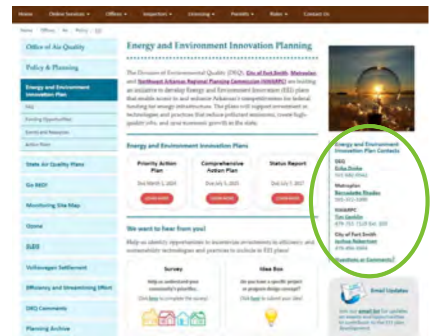

Source: www.adeq.state.ar.us/air/planning/eei/

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Credit: Pedbikeinfo.com

NWARPC GRANT ACTIVITY

- Signed MOA between ADEE and NWARPC in September
- Hired Olsson as a consultant in September
- Survey / Website / Idea Box
- Identified City, County, and State plans for review
- Initiated public engagement and stakeholder planning activities

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

9

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NOTICE OF FUNDING OPPORTUNITY (NOFO)

IMPLEMENTATION GRANTS

10

NOTICE OF FUNDING OPPORTUNITY (NOFO)

IMPLEMENTATION GRANTS

- EPA intends to award approximately 30 to 115 grants ranging from $2 million to $500 million.
- Applications for grants must seek funding to implement measures that are included in the PCAP developed with funding from a CPRG planning grant.
- There are funding tiers based upon grant ranges, and applications will be evaluated against other applications within the same tier.
- A group of eligible applications applying as a coalition may not submit multiple applications for the same set of GHG reduction measures using different lead applicants.
- An eligible application may submit one application as the individual applicant and one application as the lead applicant for a coalition.
- Grants are intended to support measures for which dedicated funding or financing from other sources (e.g., BIL, IRA) is unavailable, or that leverage other sources of public and private funding to the fullest extent possible, prior to seeking CPRG funding.

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SCORING OVERVIEW

TOTAL	**250 POINTS**
SUMMARY / APPROACH	45 POINTS (18%)
GHG REDUCTION	60 POINTS (24%)
OUTPUTS / OUTCOMES	30 POINTS (12%)
LIDAC	35 POINTS (14%)
JOBS	5 POINTS (2%)
CAPABILITY / PAST PERFORMANCE	30 POINTS (12%)
BUDGET	45 POINTS (18%)

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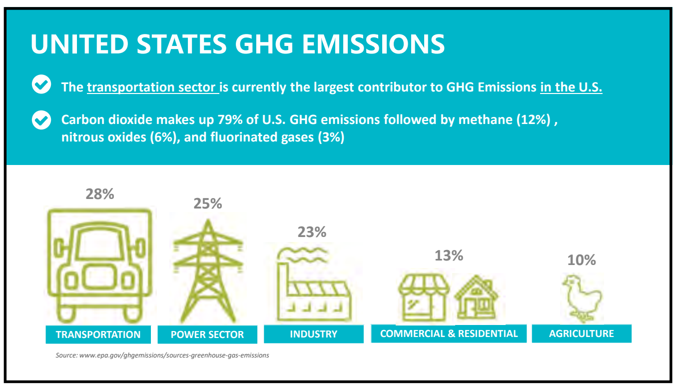

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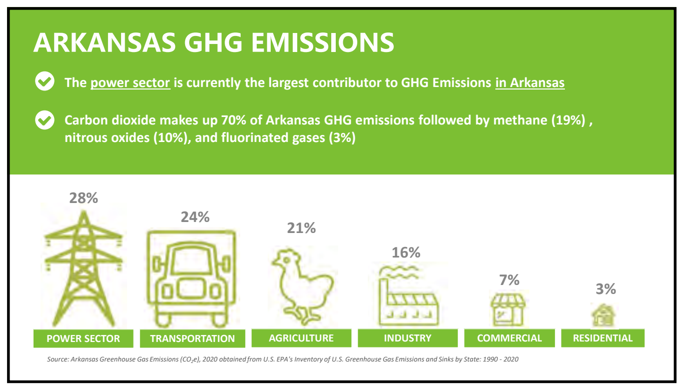

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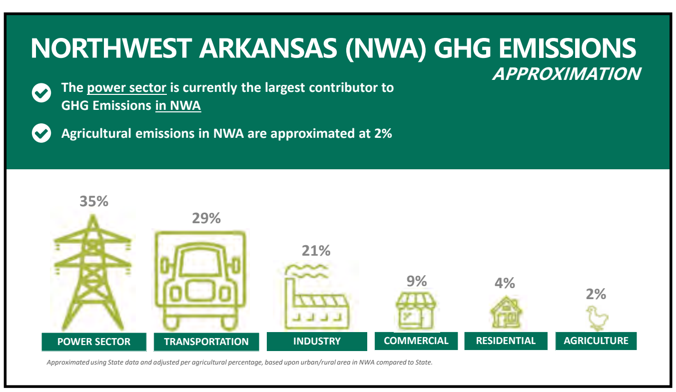

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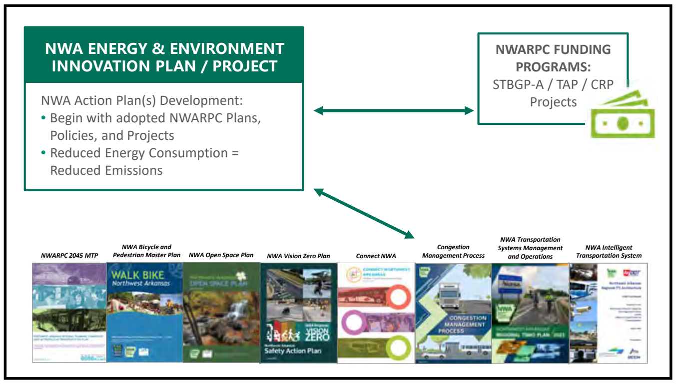

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PRIORITY ACTION PLAN MEASURES

35%

POWER SECTOR

ELECTRIC POWER SECTOR

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

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

25

25

PRIORITY ACTION PLAN MEASURES

13%

BUILDINGS

BUILDINGS

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

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

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26

PRIORITY ACTION PLAN MEASURES

29%

TRANSPORTATION

TRANSPORTATION SECTOR

Develop and implement fleet incentive programs that:

- Upgrade vehicle fleets by replacing internal combustion engine with low/no emission vehicles
- Incentivize eligible agencies and individual automobile owners to purchase low/no emission vehicles and associated infrastructure, with priority given to LIDAC communities
- Expand supporting infrastructure for electric vehicles

27

27

PRIORITY ACTION PLAN MEASURES

29%

TRANSPORTATION

TRANSPORTATION SECTOR

Reduce automobile trips and incentivize more efficient and lower/no emission modes of transportation 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
- Update/adopt building/zoning codes to encourage walkable, bikeable, and transit-oriented development.

28

28

PRIORITY ACTION PLAN MEASURES

29%

TRANSPORTATION

TRANSPORTATION SECTOR

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

- Upgrading traffic signal infrastructure and support proper use to minimize idling
- Implementation of driver notification systems on roads and parking structures to reduce unnecessary driving and idling

29

29

PRIORITY ACTION PLAN MEASURES

16%

INDUSTRY

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.
- Support development of biochar pyrolysis facility.
- Provide incentives for anaerobic digester facilities for landfills and wastewater treatment.
- Provide incentives for cardboard recycling.
- Provide incentives or a voucher system to improve waste management for rural populations.
- Materials Recovery Facility with end-market transparency.

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PRIORITY ACTION PLAN MEASURES

CARBON REMOVAL MEASURES

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

- Plant native tree and plant species that provide optimal carbon sequestration benefits in City-owned parks, trails, and rights-of-way.
- Restore degraded forests, prairies, and wetlands in parks, trails, and rights-of-ways.
- Identify and acquire lands with high carbon sequestration value for conservation, restoration, and for the development of new parks or recreation areas. Consider co-benefits.
- Develop 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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TAKE THE QUICK SURVEY

Scan the QR code or visit the website at:

www.surveymonkey.com/r/NWARPC-EEI

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NEXT STEPS

EVENT/DELIVERABLE	DATE/DUE DATE
Public Engagement Meetings	October 23 & October 26
Stakeholder Meeting #2	November 2, 2023
TAC Meeting	**November 16, 2023**
NWARPC Priority Plan Supplement to ADEE	December 1, 2023
ADEE Priority Plan to EPA	March 1, 2024
CPRG Implementation Grant Applications	April 1, 2024
Comprehensive Plan Supplement	February 28, 2025
Status Report Supplements	March 1, 2027

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NWA Regional Planning Commission

THANK YOU!

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NWA PRIORITY ACTION PLAN SUPPLEMENT

Northwest Arkansas Regional Planning Commission

December 2023

Olsson Project No. 023-04937

Appendix L. Low-income and Rural Communities (LIRC) in Arkansas, as Identified by EPA's Climate and Economic Justice Screening Tool (CEJST)

Communities Meeting Criteria	
Census tract 2010 ID	**County Name**
5001480300	Arkansas County
5001480400	Arkansas County
5001480500	Arkansas County
5001480700	Arkansas County
5001480800	Arkansas County
5003960100	Ashley County
5003960300	Ashley County
5003960400	Ashley County
5003960600	Ashley County
5003960700	Ashley County
5005950100	Baxter County
5005950400	Baxter County
5005950500	Baxter County
5005950600	Baxter County
5005950700	Baxter County
5005950800	Baxter County
5005950900	Baxter County
5007020201	Benton County
5007020205	Benton County
5007020206	Benton County
5007020301	Benton County
5007020302	Benton County
5007020402	Benton County
5007020404	Benton County
5007021001	Benton County
5007021002	Benton County
5007021101	Benton County
5007021102	Benton County
5007021202	Benton County
5007021404	Benton County

Communities Not Meeting Criteria	
Census tract 2010 ID	**County Name**
5001480100	Arkansas County
5001480200	Arkansas County
5001480600	Arkansas County
5003960200	Ashley County
5003960500	Ashley County
5005950200	Baxter County
5005950300	Baxter County
5007020101	Benton County
5007020102	Benton County
5007020203	Benton County
5007020304	Benton County
5007020305	Benton County
5007020401	Benton County
5007020405	Benton County
5007020501	Benton County
5007020503	Benton County
5007020504	Benton County
5007020603	Benton County
5007020604	Benton County
5007020605	Benton County
5007020606	Benton County
5007020701	Benton County
5007020703	Benton County
5007020704	Benton County
5007020801	Benton County
5007020803	Benton County
5007020805	Benton County
5007020806	Benton County
5007020901	Benton County
5007020902	Benton County

5009790200	Boone County	5007021201	Benton County
5009790300	Boone County	5007021301	Benton County
5009790501	Boone County	5007021304	Benton County
5009790502	Boone County	5007021305	Benton County
5009790600	Boone County	5007021306	Benton County
5011950100	Bradley County	5007021308	Benton County
5011950200	Bradley County	5007021310	Benton County
5011950300	Bradley County	5007021311	Benton County
5011950400	Bradley County	5007021405	Benton County
5011950500	Bradley County	5007021406	Benton County
5013480100	Calhoun County	5007021407	Benton County
5013480200	Calhoun County	5007021408	Benton County
5015950100	Carroll County	5007021409	Benton County
5015950200	Carroll County	5009790100	Boone County
5015950300	Carroll County	5009790400	Boone County
5015950400	Carroll County	5019953601	Clark County
5015950500	Carroll County	5019953602	Clark County
5017080100	Chicot County	5019953700	Clark County
5017080200	Chicot County	5019953800	Clark County
5017080300	Chicot County	5023480300	Cleburne County
5017080400	Chicot County	5023480502	Cleburne County
5019953900	Clark County	5025970100	Cleveland County
5021950100	Clay County	5027950400	Columbia County
5021950200	Clay County	5029950500	Conway County
5021950300	Clay County	5031000300	Craighead County
5021950400	Clay County	5031000501	Craighead County
5021950500	Clay County	5031000502	Craighead County
5021950600	Clay County	5031000700	Craighead County
5023480100	Cleburne County	5031000801	Craighead County
5023480201	Cleburne County	5031000802	Craighead County
5023480202	Cleburne County	5031001100	Craighead County
5023480400	Cleburne County	5033020204	Crawford County
5023480501	Cleburne County	5033020301	Crawford County
5025970200	Cleveland County	5033020600	Crawford County
5027950100	Columbia County	5035030202	Crittenden County
5027950200	Columbia County	5035030803	Crittenden County
5027950300	Columbia County	5035030804	Crittenden County
5027950500	Columbia County	5035030805	Crittenden County
5029950100	Conway County	5035030806	Crittenden County
5029950200	Conway County	5037950400	Cross County
5029950300	Conway County	5037950600	Cross County
5029950400	Conway County	5039970100	Dallas County
5029950600	Conway County	5043490100	Drew County

5031000101	Craighead County	5043490300	Drew County
5031000102	Craighead County	5045030101	Faulkner County
5031000200	Craighead County	5045030102	Faulkner County
5031000401	Craighead County	5045030103	Faulkner County
5031000402	Craighead County	5045030104	Faulkner County
5031000601	Craighead County	5045030301	Faulkner County
5031000602	Craighead County	5045030302	Faulkner County
5031000900	Craighead County	5045030401	Faulkner County
5031001000	Craighead County	5045030402	Faulkner County
5031001200	Craighead County	5045030404	Faulkner County
5033020100	Crawford County	5045030501	Faulkner County
5033020201	Crawford County	5045030502	Faulkner County
5033020203	Crawford County	5045030600	Faulkner County
5033020302	Crawford County	5045030800	Faulkner County
5033020401	Crawford County	5045031001	Faulkner County
5033020402	Crawford County	5045031005	Faulkner County
5033020501	Crawford County	5045031006	Faulkner County
5033020502	Crawford County	5045031102	Faulkner County
5035030101	Crittenden County	5051011100	Garland County
5035030102	Crittenden County	5051011200	Garland County
5035030201	Crittenden County	5051011601	Garland County
5035030301	Crittenden County	5051011602	Garland County
5035030302	Crittenden County	5051011900	Garland County
5035030501	Crittenden County	5051012002	Garland County
5035030502	Crittenden County	5053470100	Grant County
5035030600	Crittenden County	5053470200	Grant County
5035030701	Crittenden County	5055480200	Greene County
5035030702	Crittenden County	5055480300	Greene County
5035030703	Crittenden County	5055480400	Greene County
5035030807	Crittenden County	5055480600	Greene County
5035031000	Crittenden County	5055480801	Greene County
5035031100	Crittenden County	5055480802	Greene County
5035031200	Crittenden County	5057480200	Hempstead County
5037950100	Cross County	5059020100	Hot Spring County
5037950200	Cross County	5059020600	Hot Spring County
5037950300	Cross County	5063490200	Independence County
5037950500	Cross County	5063490500	Independence County
5039970200	Dallas County	5069000102	Jefferson County
5039970300	Dallas County	5069000301	Jefferson County
5041950100	Desha County	5069000302	Jefferson County
5041950200	Desha County	5069002000	Jefferson County
5041950300	Desha County	5069002103	Jefferson County
5041950400	Desha County	5069002104	Jefferson County

5041950500	Desha County
5043490200	Drew County
5043490400	Drew County
5043490500	Drew County
5045030200	Faulkner County
5045030303	Faulkner County
5045030403	Faulkner County
5045030701	Faulkner County
5045030702	Faulkner County
5045030900	Faulkner County
5045031003	Faulkner County
5045031101	Faulkner County
5047950100	Franklin County
5047950200	Franklin County
5047950300	Franklin County
5049550100	Fulton County
5049550200	Fulton County
5051010300	Garland County
5051010400	Garland County
5051010500	Garland County
5051010600	Garland County
5051010700	Garland County
5051010800	Garland County
5051010900	Garland County
5051011000	Garland County
5051011300	Garland County
5051011400	Garland County
5051011500	Garland County
5051011700	Garland County
5051011800	Garland County
5051012001	Garland County
5053470300	Grant County
5053470400	Grant County
5055480100	Greene County
5055480500	Greene County
5055480700	Greene County
5057480100	Hempstead County
5057480300	Hempstead County
5057480400	Hempstead County
5057480500	Hempstead County
5059020200	Hot Spring County
5059020300	Hot Spring County
5059020400	Hot Spring County

5069002400	Jefferson County
5071951900	Johnson County
5075470100	Lawrence County
5075470400	Lawrence County
5079960500	Lincoln County
5081030200	Little River County
5081030300	Little River County
5083950400	Logan County
5085020101	Lonoke County
5085020103	Lonoke County
5085020104	Lonoke County
5085020201	Lonoke County
5085020202	Lonoke County
5085020204	Lonoke County
5085020205	Lonoke County
5085020206	Lonoke County
5085020301	Lonoke County
5085020302	Lonoke County
5085020500	Lonoke County
5085020800	Lonoke County
5087960100	Madison County
5091020801	Miller County
5091020802	Miller County
5091020900	Miller County
5091980000	Miller County
5093010700	Mississippi County
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5071951800	Johnson County
5071952000	Johnson County
5071952100	Johnson County
5071952200	Johnson County
5073470100	Lafayette County

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5139951000	Union County
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5141460400	Van Buren County
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5149952402	Yell County
5149952500	Yell County

5149952600	Yell County

Appendix M. Quality Assurance Project Plan: Energy and Environment Innovation Plan Supporting Data Analyses and Management

QUALITY ASSURANCE PROJECT PLAN

Energy and Environment Innovation Plan Supporting Data Analyses and Management

Prepared by

Arkansas Department of Energy and Environment

5301 Northshore Drive

North Little Rock, AR 72118

Prepared for

United States Environmental Protection Agency Region 6

1201 Elm Street, Suite 500

Dallas, Texas 75270

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270

December 18, 2023

Ms. Demetria Kimbrough, MPH
Associate Director
Office of Air Quality
Arkansas Department of Energy & Environment –
Division Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

Dear Ms. Kimbrough:

The Arkansas Division of Environmental Quality (ADiEQ) Quality Assurance Project Plan (QAPP) for the Energy and Environment Innovation Plan Supporting Data Analyses and Management, Q-Trak No. 24-072. I am pleased to inform you that the QAPP has been reviewed and approved by Brenton Gildner, R6 Air QA Coordinator, Region 6, EPA. The QAPP has an expiration date of December 12, 2025.

Please send all QAPP's **sixty days prior to** the expiration of the recipient's approved QAPP, if there are any significant changes to operating procedures or regulations, please submit earlier than sixty-days. The recipient shall submit to the Project Officer a revised QAPP or certification that the QAPP is current and include a signed copy of the new approval page(s) for the QAPP.

Please find attached your digitally signed QAPP signature page(s), should you have any questions, please call me at (214) 665-8453.

Sincerely,

TERRIE WRIGHT
Digitally signed by TERRIE WRIGHT
Date: 2023.12.18 16:58:11 -06'00'

Terrie Wright
Project Officer
Air Grants Section

Enclosure(s)

cc: Grant File

1. Project Management (Group A)

1.1. Title and Approval Page

Quality Assurance Project Plan for
Energy and Environmental Innovation Plan
Data Analysis and Management
Grant No. 02F35201

Prepared by:
Arkansas Department of Energy and Environment
5301 Northshore Drive
North Little Rock, AR 72118

Prepared for:
US EPA Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270

APPROVALS:

Deputy Associate Director (Project Manager):	Date: December 7, 2023
Associate Director:	Date: December 8, 2023
Quality Assurance Coordinator:	Date: December 7, 2023
Quality Assurance Manager:	Date: December 8, 2023
USEPA Region 6 Grants Project Officer: TERRIE WRIGHT Digitally signed by TERRIE WRIGHT Date: 2023.12.12 06:34:11 -06'00'	Date:
USEPA Region 6 Quality Assurance Manager: MICHAEL GILDNER Digitally signed by MICHAEL GILDNER Date: 2023.12.12 06:41:04 -06'00'	Date:

QAPP Revision History

Revision No.	**Description**	**Author**	**Date**
0	Original Version	Tricia Treece	08/30/2023
1	1.1 Grant number added to Title and Approval page Exhibit 1.1. Updated to correct organization chart with recent changes 1.3 Table updated for EPA QAM and to remove table redundancy for Task Leader 1.4 Specify PM as assigned Deputy Associate Director 1.5.2. Task leader decision responsibilities clarified in text 2.1.2. Task list updated	Mikayla Shaddon	12/7/2023

1.2. Table of Contents[1]

[1] For grantees who are not familiar with using MS Word's TOC functions, please review the video at https://www.youtube.com/watch?v=0cN-JX6HP7c. Accessed on 6/23/2023.

List of Tables

List of Exhibits

Abbreviations

CAA	Clean Air Act
CFR	Code of Federal Regulations
CAP	Comprehensive Action Plan
CPRG	Climate Pollution Reduction Grant
DEQ	Division of Environmental Quality
E&E	Arkansas Department of Energy and Environment
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program (40 CFR Part 98)
ICR	Information Collection Request
OAR	EPA Office of Air and Radiation
OAQ	Office of Air Quality
PM	Project Manager
PO	EPA Project Officer for Grant
POP	Period of Performance

POR	EPA Project Officer's Representative
PWP	Project Work Plan
PAP	Priority Action Plan
QA	Quality Assurance
QAC	Quality Assurance Coordinator
QAM	Quality Assurance Manager
QAMD	Quality Assurance Manager Delegate
QAPP	Quality Assurance Project Plan
QC	Quality Control
SIT	State Inventory Tool (provided by the EPA)
TL	Task Leader

1.3. Distribution List

This section presents the primary staff who will be working on the project. This section presents specific staff members who will be identifying existing[2] data resources for evaluation and potential use under the project. This section also includes all other staff who will be serving in project-specific roles for implementing the Quality Assurance Project Plan. The listing in **Table 1.1** includes staff responsible for implementing independent internal quality management steps and staff serving in external oversight roles.

This QAPP and, as applicable, all major deliverables relying on existing data will be distributed to the staff presented in **Table 1.1.** Additionally, this QAPP will be provided to any unlisted staff who are assigned to perform work under this project. A secured copy of this QAPP will be maintained in the project files under the E&E Public Network Drive under the file path, *G:Quality Assurance Team\OAQ\Integrated Compliance Information System.*

Table 1.1 QAPP Distribution List

Name	**Organization**	**Role**
Terry Wright	US EPA, Region 6	EPA Project Officer (PO) or PO Representative (POR)
Brenton Gildner	US EPA, Region 6	EPA Quality Assurance Manager or Delegate
Demetria Kimbrough	E&E	E&E Sr. Approver, Associate Director
Heath Cobb	E&E	E&E Project Manager, Deputy Associate Director
Erika Droke	E&E	E&E Task 1 – 5 Leader, SIP/Planning Supervisor
Jonathan Westmoreland	E&E	E&E Quality Assurance Manager
Tanisha Harper	E&E	E&E Quality Assurance Coordinator, Office of Air Quality
Mikayla Shaddon	E&E	Epidemiologist
Kelly Jobe	E&E	Epidemiologist
Katrina Jones	E&E	Policy Development Coordinator
Vacant	E&E	Extra Help
Vacant	E&E	Extra Help

[2] The term "existing data" is defined by the EPA's *Environmental Information Quality Policy* (CIO 2105.3) as "… data that have been collected, derived, stored, or reported in the past or by other parties (for a different purpose and/or using different methods and quality criteria). Sometimes referred to as data from other sources." The term "secondary data" may also be used to describe "existing data" in historical EPA quality-related documents.

1.4. Project/Task Organization

The primary personnel responsible for implementation of this project are the E&E Project Manager (PM), Quality Assurance Manager (QAM), Quality Assurance Coordinator (QAC), and Task Leaders (TLs). Their duties are outlined briefly in this section. The project QAM is independent of the unit generating the data.

The E&E PM role will be fulfilled by the assigned E&E Office of Air Quality Deputy Associate Director for the duration of this project and will provide senior-level oversight as needed. The PM is responsible for E&E's technical and financial performance with respect to this QAPP as well as maintaining communications with the EPA to ensure mutual understanding of grant requirements, EPA expectations, and conformity with EPA quality procedures; managing oversight and conduct of project activities including allocation of resources to specific tasks; ensuring that quality procedures are incorporated into all aspects of the project; developing, conducting, and/or overseeing QA plans as necessary; ensuring that any corrective actions are implemented; operating project activities within the documented and approved Quality Assurance Project Plan; and ensuring that all products delivered to the EPA are of specified type, quantity, and quality.

The E&E PM will assign a TL for each technical task with instructions to complete a baseline emissions inventory for the sector(s) under the task and to develop sector-specific options for potential emissions reduction projects including estimates of the potential reductions under each option and estimates of uncertainties for each reduction option. **Table 1.1** presents the TLs for each technical task who will be responsible for day-to-day task-level activities, including planning, reporting, and controlling of technical and financial resources allocated to the task by the PM. Accordingly, each TL is primarily responsible for implementing the Quality Program and this Quality Assurance Project Plan on task-level assignments.

Task-level management system. For each of the major deliverables under each task, the assigned TL will review all QA-related plans and reports and is responsible for transmitting them to the QAC and QAM for review and approval. Each TL is responsible for ensuring that quality procedures are implemented at the task level and for maintaining the official, approved, task-level QAPP content. Each TL will discuss any concerns about quality or any proposed revisions to task-level QAPP content with the QC Coordinator to identify, resolve, or preclude problems or to amend task-level plans, if necessary. In addition, each TL will work with the E&E PM and the QAM to identify and implement quality improvements. The E&E PM is responsible for ensuring the consistency of similar or related QA measures across tasks, and the TLs are responsible for overseeing task-level work performed by technical staff and providing assurance that all required QA/QC procedures are being implemented.

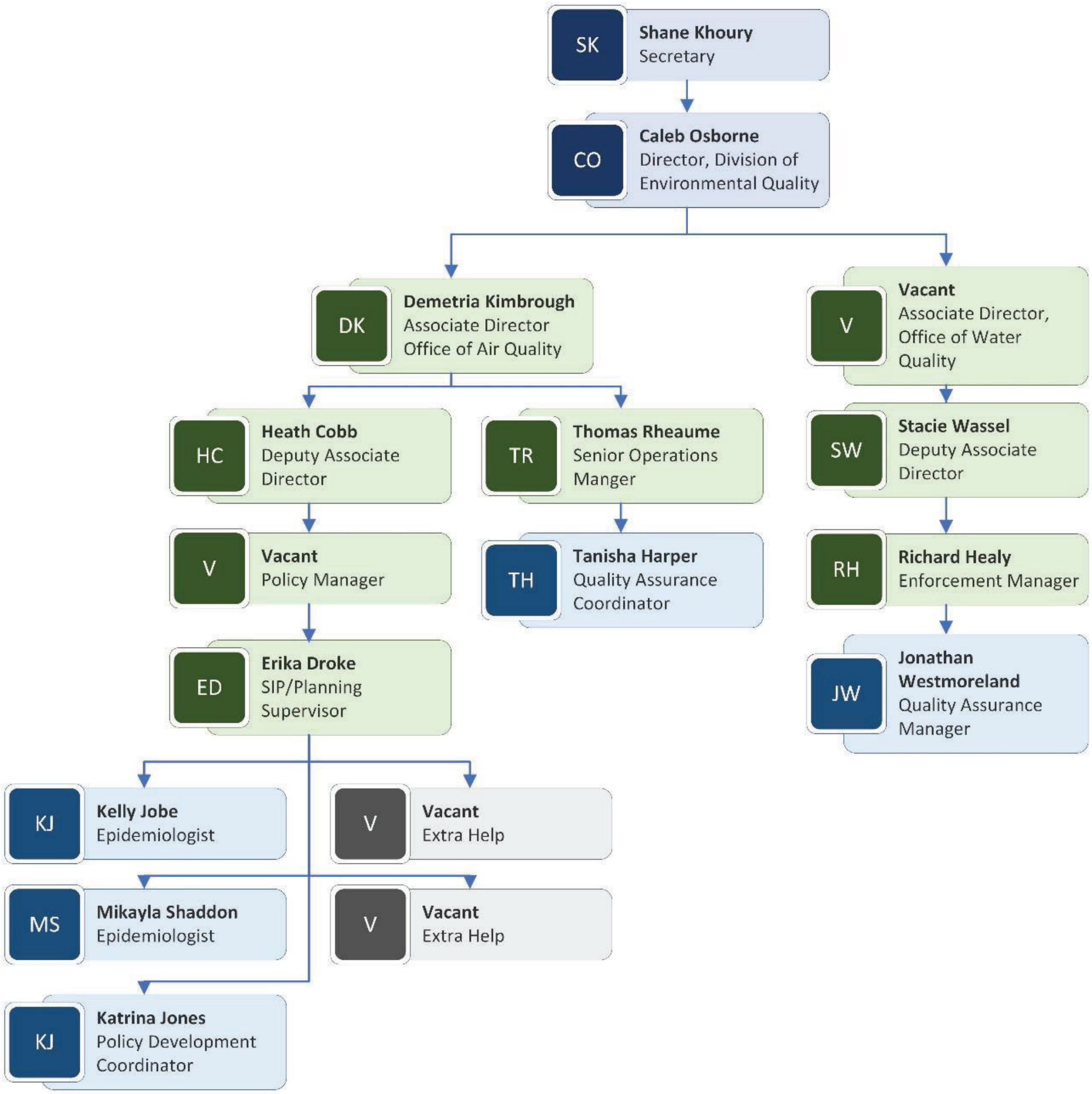
Project-level management system. Tasks are expected to proceed concurrently, in parallel. The PM will maintain close communications with each TL and ensure any difficulties encountered or proposed changes at the task level are reviewed for implications on other similar or related tasks. The PM is also responsible for communicating progress or difficulties encountered (across all tasks) to the EPA PO or POR, who provides EPA's primary oversight function for this project at EPA OAR/EPA R6 and is responsible for review and approval of this QAPP and any future revisions. The PM (with support from TLs and assigned E&E technical staff) will be responsible for consulting with the EPA PO or POR, on planning, scheduling, and implementing the QA/QC for all project deliverables and obtaining required EPA approvals.

The QAM is responsible for overseeing the program quality system, monitoring, and facilitating QA activities on tasks, and generally helping the E&E PM and TLs understand and comply with EPA QA requirements. The QAM is employed by E&E's Office of Water Quality Enforcement group, which is in a separate Office from E&E's Office of Air Quality. For each task under this project, the QAM is supported by the QAC, who will assist in the implementation of the quality system. At the request of the E&E PM, the QAM is responsible for conducting periodic independent audits of this project's QA program and will produce written documentation of the audit results and recommendations. The QAM will work closely with the PM and QAC to improve any deficiencies noted during these audits.

The QAC is responsible for assisting the PM and TLs in planning, documenting, and implementing the QA requirements for this project. Working with the PM, and in consultation with the QAM, the QAC will ensure that process- and project-specific QA documents are developed; that required or recommended protocols are followed; that data are reduced, validated, and reported according to specific criteria; and that QC assessments are performed. The QAC will report to the PM and the QAM, as needed, on quality issues.

Additionally, QC functions will be carried out by other technical staff and monitored by the PM, who will work with the QAM and QAC to oversee this plan and implement quality improvements. Other technical staff will include persons with expertise in industrial processes and air pollution engineering, technical reviewers, database specialists, quality auditors, and technical editors. The PM will ensure that technical staff do not review work in a QA capacity for which they were a primary or contributing author. **Exhibit 1.1** presents the organizational chart.

Exhibit 1.1 Project Organization[3]



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[3] Under CIO 2105-S-02.0, section 3, the organization chart must also identify any contractor relationships relevant to environmental information operations.

1.5. Problem Definition / Background

Under this project, E&E will identify, evaluate, and utilize existing data resources[4] to develop a statewide inventory of the major sources of greenhouse gas (GHG) emissions within Arkansas and use that inventory data to develop an Energy and Environment Innovation Plan. This QAPP focuses on the handling of environmental information under sector-specific tasks by technical staff charged with completing the following subtasks <u>in a future planning project implemented in accordance with this QAPP</u>:

1. Develop a comprehensive GHG inventory for the largest sources within each sector,
2. Develop options for reducing emissions within each sector,
3. Develop estimates or ranges of estimates for the reductions achievable under each option,
4. Develop uncertainty analyses for the emissions reduction estimate(s) or ranges under each option, and
5. Present the inventory, options listing, and associated analyses in a technical report for consideration by state policymakers with the authority to approve the deliverables under the CPRG planning grants.

The GHG inventory may utilize the EPA's State Inventory Tool (SIT),[5] state-level GHG inventories prepared by the EPA,[6] and data reported to the EPA's Greenhouse Gas Reporting Program (GHGRP)[7] together with any independent, sector-specific estimates prepared by the state. Any state estimates will be compared to corresponding federal estimates for validation. Significant differences will be evaluated and discussed in the inventory report with the underlying data and methodology used for the independent state estimates. The statewide inventory will include the following sectors and gases:

Sectors

1. Transportation
2. Electricity generation and/or use
3. Natural and working lands
4. Industry
5. Agriculture
6. Commercial and residential buildings
7. Waste and materials management
8. Wastewater

Greenhouse Gases (across all sectors)

carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases (F-gases) including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3)

1.5.1. Rationale for Selection of Sectors

For each sector included in the statewide inventory **Table 1.2** briefly describes why the sector was included in the inventory and the relative significance of the sector in terms of the magnitude of air emissions from existing inventories, the associated geographic distribution of the sources, and recent trends in readily available activity data for the source category.

[4] EPA, *Environmental Information Quality Policy*, CIO 2105.3, 03/07/2023 (p. 8) provides common examples of environmental information used to support the EPA's mission at https://www.epa.gov/system/files/documents/2023-04/environmental_information_quality_policy.pdf.
[5] https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool
[6] https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals
[7] https://www.epa.gov/ghgreporting/data-sets

Table 1.2 Rationale for Sector Selection

Sectors Included in Inventory	**Rationale for Including in GHG Inventory**
Transportation	Transportation activities were the largest source (29 percent) of total U.S. greenhouse gas emissions in 2021. From 1990 to 2021, transportation CO_2 emissions from fossil fuel combustion increased by 19 percent. Transportation activities occur across all states.
Electric power generation	The electric power sector accounted for 25 percent of total U.S. greenhouse gas emissions in 2021. Power generation and/or consumption occurs across all states.
Industry	The industrial sector accounted for 24 percent of U.S. greenhouse gas emissions in 2021. Since 1990, industrial sector emissions have declined by 11 percent. In 2021, total energy use in the industrial sector increased by 2 percent due to an increase in total industrial production and manufacturing output. EPA's GHGRP data provide additional insights into underlying trends in the industrial sector.
Natural and working lands[8]	Natural and working lands include fluxes of carbon from activities such as converting forests to agricultural use and practices that remove CO_2 from the atmosphere and store it in long-term carbon sinks like forests. In 2021, the net CO_2 removed from the atmosphere by natural and working lands was 12% of total U.S. greenhouse gas emissions. Between 1990 and 2021, total carbon sequestration in this sector decreased by 14%, primarily due to a decrease in the rate of net carbon accumulation in forests, as well as an increase in CO_2 emissions from urbanization.
Agriculture	Agriculture accounted for about 10 percent of U.S. greenhouse gas emissions in 2021, and agricultural soil management was the largest source of N_2O emissions. Enteric fermentation was the largest source of CH_4 emissions.
Commercial and residential buildings	In 2021, the commercial and residential sectors accounted for 7 and 6 percent of total U.S. greenhouse gas emissions, respectively. Emissions from the commercial and residential sectors have increased since 1990. Total residential and commercial greenhouse gas emissions, including direct and indirect emissions, in 2021 have increased by 2% since 1990. In 2021, an increase in heating degree days (0.5 percent) increased energy demand for heating in the residential and commercial sectors, however, a 1.8 percent decrease in cooling degree days compared to 2020 reduced demand for air conditioning in the residential and commercial sectors.
Waste and materials management	This sector includes landfills, composting, and anaerobic digestion. Landfills were the third largest source of anthropogenic methane emissions in 2021, and landfills accounted for 1.9 percent of total U.S. greenhouse gas emissions.
Wastewater	Wastewater treatment, both domestic and industrial, was the third largest anthropogenic source of N_2O emissions in 2021, accounting for 5.2 percent of national N_2O emissions and 0.3 percent of total U.S. greenhouse gas emissions. Emissions from wastewater treatment increased by 6.1 MMT CO_2e (41.6 percent) since 1990 as a result of growing U.S. population and protein consumption.

[8] Under international GHG inventory protocols this category is called "Land use, land-use change, and forestry."

1.5.2. Decisions to be Made

Existing EPA datasets and the SIT cover categories of GHG emissions by sector and by activity or segment (e.g., electric utility combustion of natural gas). The SIT provides many default values to facilitate developing statewide estimates that are consistent with the National Inventory of GHG Emissions.[9] Task Leaders will be charged with four primary decisions under each task of this project:

1. Determine (for each major activity estimate) if existing EPA data or the SIT default estimate for the sector/activity should be used for the statewide, baseline estimate, or should the state's estimate be derived from existing information available to the state (including other EPA datasets, state inventories, or GHGRP publications)?
2. Determine the best options for reducing emissions of air pollution and achieving the following objectives[10] under the Inflation Reduction Act:
   a. Reduce GHG emissions, create high-quality jobs, and lower energy costs for families.
   b. Accelerate work addressing environmental injustices and empowering community driven solutions in overburdened neighborhoods.
   c. Deliver cleaner air by reducing harmful air pollution in places where people live, work, play, and go to school.
3. Develop an estimate (or range) of reductions that could be achieved under each option.
4. Estimate the uncertainty of the emissions reduction estimate under each option.

1.5.3. Actions to be Taken, Action Limits, and Expected Outcomes

Existing state-level estimates prepared by the EPA or the SIT tool will be utilized with federal default values for each sector/activity relevant to GHG-emitting activities within the state. Actions will be limited to the GHG-emitting activities defined in the SIT or in the existing EPA estimates used by the state. Subsequently, the state may elect to prepare separate, independent estimates for the state's major sector/activities based on the state's existing data resources. If the state elects to incorporate these independent estimates in the inventory, the independent estimate will be compared to the SIT estimate or the EPA's state-level estimate by subject matter experts with the requisite knowledge of the source category, and the rationale for utilizing the state's independent estimate will be documented in the state's GHG inventory report along with the underlying data and calculation methodology. E&E expects that sectors that include major stationary sources under CAA Title V with longstanding requirements for submission of activity data and emissions estimates may be better represented in the GHG inventory based on existing data. For minor sources of GHGs, E&E expects that the SIT default estimates for the state will provide the better estimates.

When identifying the best options for reducing air pollution, each Task Leader will consider the activities affecting the largest numbers of families, business establishments, recreation areas, and schools.[11] Options may include measures for achieving potential reductions in areas with pollutant concentrations within 90% of the NAAQS and impacting residential, commercial, and school districts near the largest sources of air pollution. E&E expects that each task will produce up to three options for sector-specific emissions reduction projects for further consideration by management and policymakers.

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[9] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021
[10] CPRG Program Guidance, page 4. Available at https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants#CPRGProgramGuidance.
[11] Ibid.

1.5.4. Reason for Project

The baseline GHG inventory and options analyses developed under this project will be utilized by E&E for planning purposes to support Arkansas's development of the following three deliverables under the CPRG Program:

- Arkansas's **Priority Action Plan** (PAP), which is due on March 1, 2024. This plan will include near-term, implementation-ready, priority GHG reduction measures and is a prerequisite for any implementation grant.
- Arkansas's **Comprehensive Action Plan** (CAP), which is due in 2025. This plan will review all sectors that are significant GHG sources or sinks, and include both near- and long-term GHG emission reduction goals and strategies.
- Arkansas's **Status Report** on progress towards goal, which is due in 2027. This progress report will include updated analyses, plans, and next steps for key metrics.

This QAPP describes in detail the necessary QA and QC requirements and technical activities that will be implemented to ensure the baseline GHG inventory and the sector-specific emissions reduction options are reliable for the PCAP and CCAP. As necessary, revisions to the QA and QC requirements defined in this QAPP will be updated in the 2027 Status Report.

1.5.5. Relevant Clean Air Act Mandates and Authorizations

The inventory and options analyses produced under this project will support a grant application authorized under 42 U.S.C.A. § 7437 for *Greenhouse Gas Air Pollution Plans and Implementation Grants*. The inventory and options analyses will be used to evaluate opportunities for reducing GHG emissions from all major-emitting sources including both mobile source categories and stationary source categories. This project will include the fundamental research necessary to evaluate and plan new programs (and amendments to existing Clean Air Act [CAA] programs) for reducing emissions from fossil fuel combustion activities. Many sectors and activities that will be included in the GHG inventory (and subsequent emissions reductions options analyses) include major sources of criteria and toxic pollutants. Accordingly, the purpose of this project (to evaluate and plan for reductions in GHG emissions, including reductions from usage or production of fossil fuels) is also consistent with the following statutory mandates and authorizations under Clean Air Act Title I:

- ***§ 7403. Research, investigation, training, and other activities***
  (a) Research and development program for prevention and control of air pollution
  The Administrator shall establish a national research and development program for the prevention and control of air pollution ….
    (1) conduct, and promote the coordination and acceleration of, research, investigations … and studies related to the causes … extent, prevention, and control of air pollution;
    (2) encourage, cooperate with, and render technical services and provide financial assistance to air pollution control agencies and other appropriate public or private agencies, institutions, and organizations, and individuals in the conduct of such activities ….
  (b) Authorized activities of Administrator in establishing research and development program
  In carrying out the provisions of [paragraph (a)] the Administrator is authorized to–
    (1) collect and make available, through publications and other appropriate means, the results of and other information, including appropriate recommendations by him in connection therewith, pertaining to such research and other activities;….
    (2) make grants to air pollution control agencies … for purposes … in subsection (a)(1) ….

- ***§ 7404. Research related to fuels and vehicles***

(a) Research programs; grants; ….
The Administrator shall give special emphasis to research and development into new and improved methods, having industry-wide application, for the prevention and control of air pollution and control of air pollution resulting from the combustion of fuels… he shall–
(1) conduct and accelerate research programs directed toward development of improved , cost-effective techniques for–
(A) control of combustion byproducts of fuels, ….
(B) improving efficiency of fuels combustion so as to decrease atmospheric emissions ….

- ***§ 7405. Grants for support of air pollution planning and control programs***
  (a) Amounts; limitations; assurances of plan development capability.
  (1)(A) The Administrator may make grants to air pollution control agencies … in an amount up to three-fifths of the cost of implementing programs for the prevention and control of air pollution …. For the purpose of this section, "implementing" means any activity related to the planning, developing, establishing, carrying-out, improving, or maintaining of such programs….
  (C) With respect to any air quality control region or portion thereof for which there is an applicable implementation plan under section 7410 … grants under subparagraph (A) may be made only to air pollution control agencies which have substantial responsibilities for carrying out such applicable implementation plan.

1.5.6. Information Provided by the EPA under § 7403(b)(1)

Under authority of CAA § 7403(b)(1) the EPA has provided the following resources to states to ensure reliable air emissions inventories are produced to support plans for reducing emissions. :

- Agency-wide Quality Program Documents
- Quality Assurance-specific Directives
  - CIO 2105.3 – *Environmental Information Quality Policy*, April 10, 2023
  - CIO 2105-P-01.3 – *Environmental Information Quality Procedure*, March 7, 2023
  - CIO 2105-S-02.0 – EPA's Environmental Information QA Project Plan (QAPP) Standard
  - EPA Regional Sites for Quality Management Plans and Guidance:
    - Region 1
    - Region 2
    - Region 3
    - Region 4
    - Region 5
    - Region 6
    - Region 7
    - Region 8
    - Region 9
    - Region 10
- QA Guidance
  - EPA QA/G-4 – *Guidance on Systematic Planning Using Data Quality Objectives Process*
  - EPA QA/G-5 – *Guidance for Quality Assurance Project Plans*

E&E will utilize these resources, as applicable, to ensure evaluation of existing data and utilization of those data are consistent with the EPA's relevant directives and guidance.

1.6. Project / Task Description

An example schedule of deliverables for the technical tasks (Tasks 1-5) for GHG inventory QAPPs is presented in **Tables 2.1** through **2.5.** The work to be performed under this project by E&E involves preparing a statewide GHG emissions inventory for Arkansas. The organization of the work is based on the use of the EPA's SIT[12] under the following sector-specific tasks:

Task 1: State inventory of transportation-related GHG emissions.

Task 2: State inventory of electric power generation-related GHG emissions.

Task 3: State inventory of GHG emissions and sinks from natural working lands and forestry

Task 4: State inventory of GHG emissions from other major sectors.

Task 5: State inventory of GHG emissions from minor sectors.

For each sector-specific task, **Tables 2.1–2.5** provide planned activities and a schedule of deliverables for use by states preparing GHG inventories. The EPA's SIT, other resources, and answers to frequently asked questions are also located on the State and Tribal Greenhouse Gas Data and Resources webpage.[13]

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	**Schedule**
Task 1. Transportation Sector (Mobile Sources)	
1. Produce a profile of mobile source emissions using the EPA's state-level GHG data from https://www.epa.gov/system/files/other-files/2023-02/State-Level-GHG-data.zip. Use the EPA estimates as the baseline GHG inventory for the state. 2. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the options with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. A description of any benefits that the option will impart to communities with air toxics concerns. f. Evaluation of the option's impacts on soil, water, or other natural resources.	Within 120 days of QAPP approval by EPA or by federally authorized delegate. .

[12] https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool.

[13] https://www.epa.gov/ghgemissions/state-and-tribal-greenhouse-gas-data-and-resources.

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables	Schedule
Task 2. Electric Power Generation and Consumption	
1. Use the EPA's State Inventory and Projection Tool (SIT) at https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool. Utilize the [co2ffc-module.xlsm] for the electric power sector. Review the user's manual available using the "Consult User's Guide" button on the [Control] sheet. This tool produces GHG estimates through 2020 for the state selected on row 3 of the [Control] sheet. 2. Download the 2020 electric power data published under EIA Form 923 at https://www.eia.gov/electricity/data/eia923/. Use the [Page 1 Generation and Fuel Data] sheet, the [Page 7 File Layout] sheet (for fuel type code definitions), and the following columns on the [Page 1 Generation and Fuel Data] sheet to determine the total fuel consumption by power plants in Arkansas: a. Column G – "Plant State" b. Column O – "Reported Fuel Type Code" c. Column CP – "Total Fuel Consumption MMBtu" 3. For 2020, review SIT default entries for fuels labeled "electric power …" (reported in billion btu/year or Bbtu/yr) on the [Default State Energy Data Table] sheet. a. Based on the total heat input for each type of fuel reported under EIA 923, use the heating values for the corresponding fuels under 40 CFR Part 98 Subpart C, Table C-1 and the global warming potentials under Part 98 Subpart A Table A-1 to calculate total power sector emissions from the use of fossil fuels. Example calculations are included as **Attachment 1**. b. Compare the statewide values calculated with the EIA 923 fuel usage data to the fuel usage in the SIT's [Default State Energy Data Table] sheet. c. Document calculations and comparison of the SIT's Bbtu/yr values versus the state's calculation from EIA 923 data. d. In the GHG inventory, report the GHG emissions estimate from the [Electric Power] sheet and the comparison of the values calculated from the EIA 923 data. 4. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the option with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the option with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state, or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. A description of any benefits that the option will impart to communities with air toxics concerns. f. Evaluation of the option's impacts on soil, water, or other natural resources.	Within 120 days of QAPP approval by EPA or by federally authorized delegate.

Table 2.3 Technical Task Descriptions for Task 3.

<table>
<tr><th>Tasks and Deliverables</th><th>Schedule</th></tr>
<tr><td colspan="2">Task 3. Natural Working Lands and Forestry</td></tr>
<tr><td>1. Develop estimates for this sector using the following dataset: https://www.epa.gov/system/files/other-files/2023-02/State-Level-GHG-data.zip.]

2. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components:
a. The specific source categories and activities affected by the proposed option.
b. The quantity of GHG emissions reduced by the option with an associated uncertainty estimate.
c. The quantity of criteria emissions reduced or mitigated (such as by adsorption of PM2.5 on the surfaces of leaves) by the option with an associated uncertainty estimate.
d. A description of any benefits that the option will impart to communities.
e. Evaluation of the option's benefits on soil, water, or other natural resources.</td><td>Within 120 days of QAPP approval by EPA or by federally authorized delegate.</td></tr>
</table>

Table 2.4 Technical Task Descriptions for Task 4.

<table>
<tr><th>Tasks and Deliverables</th><th>Schedule</th></tr>
<tr><td colspan="2">Task 4. State Inventory of GHG Emissions for Other Major Sectors</td></tr>
<tr><td>1. Use the EPA's State Inventory and Projection Tool (SIT) at https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool to develop estimates for the following sectors:
<table>
<tr><th>GHGRP Values</th><th>SIT Modules</th></tr>
<tr><td>Non-biogenic CO_2 from combustion (excluding electric power)</td><td>[co2ffc-module.xlsm]
[solid-waste-module.xlsm, step 9]
[natural-gas-and-oil-module.xlsm, flaring]</td></tr>
<tr><td>CH_4 and N_2O emissions</td><td>[stationary-combustion-module.xlsm]
[coal-module.xlsm]
[natural-gas-and-oil-module.xlsm]
[solid-waste-module.xlsm]
[wastewater-module.xlsm](industrial only)</td></tr>
<tr><td>Non-biogenic CO_2, N_2O and F-gases</td><td>[ip-module.xlsm]</td></tr>
</table>

2. Use data published by the EPA's Greenhouse Gas Reporting Program (GHGRP) to develop a comparison of the estimates:
Download the most recent set of data summary spreadsheets for each reporting year published by the EPA's GHGRP as a zip file at https://www.epa.gov/ghgreporting/data-sets. Website also has detailed GHGRP emissions data for the power sector, fluorinated gas production, HCFC-22 production, HFC-23 destruction, adipic acid, lime manufacturing, silicon carbide production, and soda ash. These GHGRP data include the state where each</td><td>Within 120 days of QAPP approval by EPA or by federally authorized delegate.</td></tr>
</table>

Tasks and Deliverables	Schedule
Task 4. State Inventory of GHG Emissions for Other Major Sectors	

GHG source is located. Use these data to develop an inventory for each GHG-emitting sector in Arkansas for the selected reporting year:

a. *GHGRP non-biogenic CO_2 from combustion*. From the [2021] file published by the GHGRP, use the file for the selected reporting year. Use the data on the [Direct Emitters] sheet to develop a summary table similar to the table in **Attachment 2** with the following columns:
   i. State (from column E of GHGRP file)
   ii. Primary NAICS Code (from column K)
   iii. Primary NAICS Code Description (from https://www.census.gov/naics/?48967)
   iv. Statewide Total CO_2 by NAICS (sum ***column O*** by NAICS).
   v. Fraction of direct CO_2 emissions reported to GHGRP from Arkansas.
   vi. Category among SIT CO_2 combustion categories.
      1. Electric Power Generation
      2. Industrial
      3. Solid Waste (Step 9 - combustion)

b. *GHGRP methane emissions.* Develop another table similar to **Attachment 2**, but utilize the columns and categories for CH_4:
   i. Statewide Total CH_4 by NAICS (sum ***column P*** by NAICS Code).
   ii. Fraction of direct CH_4 emissions reported to GHGRP from Arkansas.
   iii. Category among SIT CH_4 categories.
      1. Electric Power Generation
      2. Industrial
      3. Solid Waste

c. *GHGRP N_2O emissions*. Develop a table similar to **Attachment 2**, but utilize the following columns and categories for N_2O:
   i. Statewide Total N_2O for NAICS (sum of ***column Q*** for each NAICS).
   ii. Fraction of direct N_2O emissions reported to GHGRP from Arkansas.
   iii. Category among SIT N_2O combustion categories.
      1. Electric Power Generation
      2. Industrial
      3. Solid Waste
   iv. Sort the sectors in the table in descending order by metric tons N_2O emitted in the selected year

d. *Other GHGs*. For other GHGs reported to GHGRP, develop table similar to Attachment 2, but utilize ***columns R through Z***, as appropriate, on [Direct Emitters] sheet for mass of emissions reported to the GHGRP from Arkansas.

3. In the inventory document, include a comparison of values calculated from the GHGRP data versus values calculated using the SIT. Evaluate the differences and discuss the types of industrial sources in the state that operate below the GHGRP applicability thresholds under 40 CFR Part 98 subpart A. Discuss the GHG sources in the state that are operating below GHGRP thresholds and provide estimates of the number of minor permits issued in the sectors where the SIT inventory has higher emissions than the GHGRP inventory.
4. In the GHG inventory report or in a separate report based on the inventory, include a listing of options for emission reductions from this sector that includes the following components:

Tasks and Deliverables	Schedule
Task 4. State Inventory of GHG Emissions for Other Major Sectors	
a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the option with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the option with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state, or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. A description of any benefits that the option will impart to communities with air toxics concerns under the option. f. Evaluation of the option's impacts on soil, water, or other natural resources.	

Table 2.5 Technical Task Descriptions for Task 5.

Tasks and Deliverables	Schedule
Task 5. Compile Statewide Inventory for Minor GHG Sources	
1. Develop estimates for the following sectors using the federal default values in the EPA's State Inventory and Projection Tool (SIT). 2. In the GHG inventory report or a separate report based on the inventory, include a listing of option for emission reductions from this sector that includes the following components: g. Specific source categories and activities affected by the proposed option. h. Quantity of GHG emissions reduced by option with uncertainty estimate. i. Quantity of criteria emissions reduced by option with uncertainty estimate. j. Quantity of toxic emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with associated uncertainty estimate. k. Description of any benefits the option will impart to communities with air toxics concerns under the option. l. Evaluation of the option's impacts on soil, water, or other natural resources.	Within 120 days of QAPP approval by EPA or by federally authorized delegate.

1.7. Quality Objectives / Criteria

The primary objectives for this project are to develop reliable inventories for each of the primary GHG-emitting sectors in Arkansas and to identify options for reducing emissions from those sectors. Accordingly, all quality objectives and criteria are aligned with these primary objectives. The quality system used for this project is the joint responsibility of the E&E PM, Task Leaders, and QAC. As discussed in Section 1.4, an organizationally independent QAM will maintain oversight of all required measures in this QAPP. QC functions will be carried out by technical staff and will be carefully monitored by the responsible Task Leaders, who will work with the QAM and QAC to identify and implement quality improvements. All activities performed under this project will conform to this QAPP.

1.7.1. Data Quality, Management, and Analyses

For this project, E&E will use a variety of QC techniques and criteria to ensure the quality of data and analyses. Data of known and documented quality are essential components for the success of the project, as these data will be used to inform the decision-making process for the Arkansas's PAP and CAP as discussed in Section 1.5.4 of this QAPP. The table in **Appendix A** lists by task the specific QC techniques and criteria that are part of this QAPP.

The data quality objectives and criteria for this project are accuracy, precision, bias, completeness, representativeness, and comparability. *Accuracy* is a measure of the overall agreement of a measurement to a known value. It includes a combination of random error (precision) and systematic error (bias). *Precision* is a measure of how reproducible a measurement is or how close a calculated estimate is to the actual value. *Bias* is a systematic error in the method of measurement or calculation. If the calculated value is consistently high or consistently low, the value is said to be biased. Our goal is to ensure that information and data generated and collected are as accurate, precise, and unbiased as possible within project constraints. It is not anticipated that this project will include primary data collection. Generally, existing data and tools provided by the EPA and other qualified sources will be used for project tasks. A subject matter specialist familiar with technical reporting standards (such as a permit writer or compliance engineer with knowledge of the state's facilities operating in the sector) will be used to QA all data utilized for developing the statewide GHG inventory. E&E will verify the accuracy of all data by checking for logical consistency among datasets. All existing environmental data shall meet the applicable criteria defined in CFR and associated guidance, such as the validation templates provided in the *EPA QA Handbook Volume II*.

Uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific project activity being evaluated.

When available, data originally gathered using published methods whose applicability, sensitivity, accuracy, and precision have been fully assessed, such as EPA reference methods, will be preferred and considered to be of acceptable quality. Project decisions may be adversely impacted if, for example, existing data were used in a manner inconsistent with the originator's purpose. Metadata can be described as the amount and quality of information known about one or more facets of the data or a dataset. It can be used to summarize basic information about the data (e.g., how, why, and when the existing data were collected), which can make working with specific data or datasets easier and provides the user with more confidence. Metadata are valuable when evaluating existing data, as well as when planning for collection primary data that may be required in the future. However, the effort needed to locate and obtain original source materials can be costly. Accordingly, a graded approach to planning will be applied and ongoing discussions with the EPA will be held to determine what magnitude and rigor of QA effort are appropriate and affordable for the project.

For the data analysis completed under this project, analytical methods will be reviewed to ensure the approach is appropriate and calculations are accurate. Spreadsheets will be used to store data and complete necessary analyses. Design of spreadsheets will be configured for the intended use. All data and methodologies specific to each analysis will be defined and documented. Tables and fields will be clearly and unambiguously named. Spreadsheets will be checked to ensure algorithms call data correctly and units of measure are internally consistent. Hand-entered or electronically transferred data will be checked to ensure the data are accurately transcribed and transferred.

The draft inventory will be evaluated for GHG-emitting-sector and geographic completeness. E&E will utilize the framework of sectors in the EPA's SIT tool or the EPA's state-level GHG inventories to ensure that the inventory prepared under this project includes all major GHG-emitting sectors. To ensure the inventory is geographically complete, the draft inventory will also be submitted for review by E&E staff within the state's regional offices or by stakeholders from the various regions of the state to ensure that all major-emitting activities in all regions of the state are included in the inventory.

Representativeness is a qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. E&E will use the most complete and accurate information available to compile representative data for this project.

Data c*omparability* is a qualitative term that expresses the measure of confidence that one dataset can be compared to another and can be combined for the decision(s) to be made. E&E will compare datasets when available from different sources to check for the quality of the data. This QA step will also ensure that any highly correlated datasets or indicators are identified. Supporting data, such as information on test methods used and complete test reports, are important to ensure the comparability of emissions data.

1.7.2. Document Preparation

All documents produced under this project will undergo internal QC review, as well as technical review and an editorial review, prior to submission to the EPA PO. QC will be performed by an engineer, scientist, or economist, as appropriate, with sufficient knowledge. The technical reviewer will review the document for accuracy and integrity of the technical methodologies, analyses, and conclusions.

An editorial review of all final documents will be performed. Editors will verify clarity, spelling, and grammatical correctness, and ensure documents are free of typographical errors. Editors will verify that references are cited correctly. This will include a comparison against the original documents.

The *QC Documentation Form* (**Appendix B**) will be used to track the approval process. The form must be completed and signed for all document deliverables. The signatures required include those of the Task Leader and technical and editorial reviewers. Completion of this form certifies that technical review, editorial review, and all required QC procedures have been completed to the satisfaction of the TL and QAC. Copies of these signed forms will be maintained in the project files.

1.8. Special Training / Certifications

All E&E staff assigned to work on this project shall have appropriate technical and QA training to properly perform their assignments. E&E staff serving in QAM or QAC roles under this project will have completed a training course on QA/QC activities similar to the course available at https://www.epa.gov/quality/training-courses-quality-assurance-and-quality-control-activities. The PM and all TLs under this project will have completed an online training course on air emissions inventory on the Air Knowledge website at https://airknowledge.gov/EMIS-SI.html.

If training is required for new staff or for particular segments of the GHG inventory, the PM in coordination with the associated TL will identify available training resources for the inventory segment and incorporate the required training into the project schedule.

1.9. Documents and Records

E&E will document in electronic form (and/or hard copy) QC activities for this project. The TL is responsible for ensuring that copies of all completed QC forms, along with other QA records (including this QAPP), will be maintained in the project files. Project files will be retained by E&E for a minimum of 2 years after closure of the period of performance. The types of documentation that will be prepared for this project include:

- Planning documentation (e.g., QAPP)
- Implementation documentation (i.e., Review/Approval Forms and QA records)
- Assessment documentation (i.e., QA audit reports).

Detailed documentation of QC activities for a specific task or subtask will be maintained using the *QC Documentation Form* shown in **Appendix B**. This form will document the completion of the QC techniques planned for use on this project as listed in the table in **Appendix A**. One or more completed versions of these forms, as necessary, will be maintained in the project files. The types of documents for which QC will be conducted and documented may include raw data, data from other sources such as data bases or literature, field logs, sample preparation and analysis logs, instrument printouts, model input and output files, and results of calibration and QC checks.

Technical reviews will be used along with other technical assessments (i.e., QC checks) and QA audits to corroborate the scientific defensibility of any data analyses. A technical review (i.e., internal senior review) is a documented critical review of a specific technical work product. It is conducted by subject matter experts who are collectively equivalent (or senior) in technical expertise to those who performed the work. Given the nature of the deliverables under this project, a technical review is an in-depth assessment of the assumptions, calculations, extrapolations, alternative interpretations, and conclusions in technical work products. Technical review of proposed methods and associated data will be documented in the *QC Documentation Form* shown in **Appendix B**. The form will include the reviewer's charge, comments, and corrective actions taken.

Additionally, E&E has developed and instituted document control mechanisms for the review, revision, and distribution of QAPPs. Each QAPP has a signed approval form, title page, table of contents, and a document control format that conforms to EPA's Environmental Information QAPP Standard; see header at top of the page. The distribution list for this QAPP was presented in **Table 1.1**. During the course of the project, any revision to the QAPP will be circulated to everyone on the distribution list, as well as to any additional staff supporting this project. Any revision to the QAPP will be documented in a QAPP addendum, approved by the same signatories to this QAPP, and circulated to everyone on the distribution list by the E&E PM.

At this time, E&E does not know if the project will collect or handle personally identifiable information (PII) subject to the Privacy Act of 1974. However, if during the course of this project technical staff determine that PII is required to support project objectives, E&E will meet all requirements of the Privacy Act of 1974. **Appendix C** indicates the status of the state's determination regarding applicability of the Privacy Act of 1974 under this project.

2. Existing Data Acquisition and Management Protocols (Group B)

2.1. Sampling Process Design

2.1.1. Need and Intended Use of Data Used

As indicated in **Tables 2.1–2.5**, a wide range of data for a diverse set of GHG-emitting activities is necessary to prepare a statewide inventory. Existing data resource may include sector-specific or facility-specific GHG emissions estimates, emissions factors, or activity data for use with emissions factors. The experimental design for this inventory project relies on the EPA's State Inventory Tool (SIT) together with independent estimates prepared by E&E. The SIT allows for expedited estimates for many sectors with default entries included in the tool. Existing data resources from previously completed inventories will be utilized to develop GHG emissions estimates that are comparable to the SIT estimates. Subsequently, the SIT estimates for each sector will be compared to any independent state estimate utilized for the statewide inventory.

2.1.2. Identification of Data Sources and Acquisition

In addition to the data integrated into the EPA's SIT tool, the following data sources will be utilized under each task to develop estimates for the major-emitting sectors in Arkansas

- Task 1: Activity data for electricity generators published by the U.S. Department of Energy (DOE) under EIA Form 923.
- Task 2: Data published by the EPA under the Greenhouse Gas Reporting Program.
- Task 3: The EPA's SIT tool is expected to be the primary source for this task.

2.2. Quality Control

All environmental information operations conducted for this project will involve existing, non-direct measurement data. All data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use. In addition to reviewing and assessing the data collected, all data entered into spreadsheets and all calculations completed for analyses will be reviewed by a senior technical reviewer. The reviewer will evaluate the approach to ensure the methods are appropriate and have been applied correctly to the analysis. The technical reviewer will also confirm all data were entered correctly and that calculations are complete and accurate. Calculations will be checked by repeating each calculation, independently, and comparing the results of the two calculations. Any data entry and calculation errors will be identified and corrected. Data tables prepared for the draft and final reports will be checked against the spreadsheets used to store the data and complete the analysis.

Where calculations are required to assess the data/datasets, calculations will be performed using computer spreadsheets and calculators to reduce typographical or translation errors–mathematical/statistical calculations are performed using spreadsheets or software programs with predefined formulas and functions. E&E will ensure that any manipulations performed on the data/dataset were done correctly. Such calculations could involve statistical checks to look for data outliers. One approach, for example, that may be used to identify outliers or unusual data points is sorting a datasheet for one or more data variables. This approach is a simple but effective way to highlight unusually high or low values. Graphing data using boxplots, histograms, and scatterplots is another method used to identify gaps in the data (missing data), outliers, or unusual data points. Another approach is the use of Z-scores, which can quantify the unusualness of an observation when data follow a normal distribution. A Z-score for a particular value indicates the number of standard deviations above and below the mean that the value falls. For example, a Z-score of 2 indicates that an observation is two standard deviations above the average while a Z-score of -2 indicates the value is two standard deviations below the mean. A Z-score of zero represents a value that equals the mean. As appropriate, E&E will also use hypothesis tests to find outliers, or an interquartile range (IQR) to calculate boundaries for what constitutes minor and major outliers. The methods used will be driven by the scale and type of data. E&E will determine outlier detection methods to be used based on the initial review of the data. Identified outliers will be highlighted to the EPA PO or delegate with options for treatment.

2.3. Non-direct Measurements

All environmental information operations conducted on this project will involve existing, non-direct measurement data. All existing data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use.

Consistent with the EPA's QA requirements, this QAPP describes the procedures that will be used to ensure the selection of appropriate data and information to support the goals and objectives of this project. Specific elements addressed by this QAPP include:

- Identifying the sources of existing data,
- Presenting the hierarchy for data selection,
- Describing the review process and data quality criteria,
- Discussing quality checks and procedures should errors be identified, and
- Explaining how data will be managed, analyzed, and interpreted.

Data presented in the GHG inventory will be traced to its source (e.g., database input and output). Key resources include data collected by the EPA (e.g., GHGRP data), and data from EPA-approved data sources (e.g., EIA Form 923 data). These sources may include primary literature (i.e., peer-reviewed journal articles and reports) or databases. We may also use approved existing sources (e.g., handbooks, databases). Original sources for all information and data contained in the document will be included in a list of references with appropriate citations. When peer-reviewed literature or EPA-approved data sources cannot be used, we will document any significant limitations to the data sources used.

We will document information regarding each dataset and our rationale/selection criteria for selecting the data sources used in the inventory. The TL will be responsible for overseeing and confirming the selection of the data for the project tasks.

Table 3.1 presents an example hierarchy for data quality when identifying and reviewing available sources of data and information. When evaluating data resources, efforts will be made to identify and select data sources that most closely conform to the highest ranked criteria. Data quality metrics and documentation may not be provided by each source, and as necessary, we may consult with subject matter experts from permitted facilities or trade associations operating in Arkansas to qualify data for use to meet project objectives.

Any available data quality information will be reviewed by E&E and project advisors to ensure that the data represent full-scale designs and commercial processes, and that they are applicable to economic and regulatory conditions in the United States. E&E will document data sources used and any significant limitations of utilized data or information to ensure that the data are appropriate for their intended use. An internal technical reviewer will review the approach for selecting and compiling data; the review will include examination of the data sources and the intended use of the data. The specific QC techniques used will depend on the technical activity or analysis to which they are applied. The E&E TL is responsible for verifying the usability of data and related information.

Table 3.1 Existing Data Quality Ranking Hierarchy

Quality Rank	**Source Type**
Highest	Federal, state, and local government agencies
Second	Consultant reports for state and local government agencies
Third	NGO studies; peer-reviewed journal articles; trade journal articles; conference proceedings
Fourth	Conference proceedings and other trade literature: non-peer-reviewed
Fifth	Individual estimates (e.g., via personal communication with vendors)

E&E will work with EPA to ensure that all data used for the project are appropriate for their intended use. The main criteria that will be used in the selection of the data are the quality of the data (based on peer review, credible source, and/or QA documentation), availability, suitability for the intended purpose, and agreement with SIT estimates.

E&E will use the Secondary Data Quality Ranking Hierarchy when identifying and reviewing available sources of information. The source types in **Table 3.1** appear in the order in which they are likely to meet data quality criteria. For example, federal government data are more likely to be from a credible source, thoroughly reviewed, suitable, available, and representative, and any exceptions to these data criteria are likely to be noted in the government data, providing transparency. Data from individuals are expected to be less reliable, not peer reviewed, and may not be suitable or representative.

If it is determined that data meeting the fourth (i.e., conference proceedings and other trade literature: non peer-reviewed) or fifth (i.e., individual estimates such as personal communications with vendors) level are from the best or only available data source, the TL will include in the inventory a description of these data with associated limitations for review by the EPA PO or delegate.

These measures of data quality will be used to judge whether the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will include in the inventory a discussion for review by the EPA PO or delegate explaining how emissions estimates that relied on such data compare to SIT estimates.

We will also consider, for example, the age (i.e., date of dataset) and the representativeness of the data and will include in the inventory report for review by the EPA of any quality concerns regarding data that are outdated or that have other quality issues, like data gaps or inconsistency with other sources. Any data source utilized that is older than 10 years will specifically be flagged in the inventory report.

Representativeness will be evaluated by determining that the emissions or activity data are descriptive of conditions in the United States, data are current, and data are descriptive of similar processes within Arkansas. Any incomplete datasets will be identified, and deficiencies will be evaluated to determine whether data are missing or confusing and if they meet the secondary-use quality objectives.

Key screening criteria will be used to screen the sources identified. The E&E TL will provide oversight to the screening process to ensure sources collected are the most relevant and meet quality requirements. Available data and information from the selected sources will be compiled and relevant summary information will be extracted out of the information sources to develop the required output for each of the project tasks.

2.3.1. Criteria for Accepting Existing Data for Intended Use

The criteria for determining whether the data are acceptable for use in developing the statewide inventory will be based on a comparison of the associated emissions estimate to the emissions estimate produced using the EPA's SIT. While some differences between the state's calculations and SIT calculations are expected, differences of more than 10 percent must be accompanied by an explanation subject to approval by the EPA prior to using the state's estimate in lieu of the SIT estimate.

2.3.2. Criteria for Options Identification in Planning Phase

The criteria for reviewing all activities under each task and identifying the best options for emissions reductions will be based on the following criteria[14] in the EPA's CPRG program guidance:

1. Quantity of reductions in emissions of climate pollution under the option.
2. Number of jobs likely to be created by the option.
3. Benefits of the project on communities with legacy pollution concerns, including the number of people living in such neighborhoods that will benefit from the option.
4. Quantity of reductions in criteria and toxic air pollutants that can be achieved by option.
5. Number of people living, working, recreating, and going to school in the area(s) benefiting from the option.

[14] CPRG Program Guidance, page 4. Available at https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants#CPRGProgramGuidance.

2.4. Data Management

Data management procedures include file storage and file transfer. All project and data files will be stored on E&E project servers. Files will be organized and maintained by the TL in folders by project, task, and function, including a system of file labeling to ensure version control. Any files containing confidential business information will be stored on secure computers. The TL will make sure that staff are trained and adhere to the project file organization and version control labeling to ensure that files are placed in consistent locations. All files will be backed up each night to avoid loss of data. Data are stored in various formats that correspond to the software being used. As necessary, data will be transferred using various techniques, including email, File Transfer Protocol, or shared drives. Typically, records will be archived once the project is completed. Record retention times will be based on contractual and statutory requirements or will follow E&E's practices for storing materials of up to 2 years after the end of the period of performance (POP). Multiple project staff are granted access rights to the archived file system for each project. Records may be retrieved from archived file system by the TL, PM, or other project staff with access during the records retention period. As soon as allowed by applicable regulations or the grant agreement, records will be destroyed according to E&E policies and procedures. For any sensitive information that is gathered under the project, E&E's policy is consistent with EPA–recommended methods of destruction, which include degaussing, reformatting, or secure deletion of electronic records; physical destruction of electronic media; recycling; shredding; incineration; and pulping. Should the grant specify some other manner of disposition (e.g., transfer to the client), E&E will comply with that directive. As noted above, E&E has developed a file naming convention/nomenclature for electronic file tracking and record keeping. Foremost, all files must be given a short but descriptive name. For those records and files gathered or provided to E&E, the filename may include the identification of "original" in its filename.

Similarly, files that have undergone a review by an independent, qualified person will include, at the end of the filename, the initials of the reviewer or the suffix "rev" (in lieu of initials) if more than one reviewer reviewed the file, along with the date reviewed and version number, as a way to track which staff person(s) reviewed the file and when. Filenames of draft versions will follow an incremental, decimal numbering system. More specifically, each successive draft of a document is numbered sequentially from version 0.1, 0.2, 0.3… until a final version is complete. Final versions will be indicated by whole numbers (e.g., version 1.0). Final versions of documents that undergo revisions will be labeled version X.1 for the first set of revisions. While the document is under review, subsequent draft versions will increase incrementally (e.g., 1.2, 1.3, 1.4) until a revised final version is complete (e.g., version 2.0).

In the event data retrieval is requested and to prevent loss of data, all draft and final file versions will be retained electronically—that is, superseded versions will not be deleted.

Note that changes made to deliverables will be done using the software's *track changes* feature, which allows a user to track and view all changes that are made to the document version. All deliverable reviews will be documented in a QC Documentation Form (see **Appendix B**) for the project. This form will be maintained in the project files.

For this project, it is not anticipated that any special hardware or software will be used. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work (described in **Tables 2.1–2.5)** for this project.

3. Assessment and Oversight (Group C)

E&E is committed to preparing a comprehensive and reliable inventory of GHG emissions from Arkansas. Under this project our senior management team has dedicated the necessary resources to ensure we deliver an inventory that can be relied upon for future policy decisions. Accordingly, under this project, we will concurrently implement existing quality management systems that E&E has previously utilized for submissions to the EPA under Title I of the Act where task-level deliverables will be subjected to required, regular reviews (e.g., quarterly) to ensure that technical, financial, and schedule requirements of this project are consistent with the EPA PO's and QAM's expectations. This section discusses Elements C.1 (assessments and response actions) and C.2 (reporting) applicable to this project.

3.1. Assessments and Response Actions

The QA program includes periodic review of data files and draft deliverables. The essential steps in the QA program are as follows:

1. Identify and define the problem
2. Assign responsibility for investigating the problem
3. Investigate and determine the cause of the problem
4. Assign and accept responsibility for implementing appropriate corrective actions
5. Establish the effectiveness of and implement the corrective action
6. Verify that the corrective action has eliminated the problem.

The TL will provide day-to-day oversight of the quality system. Periodic project file reviews will be carried out by the QAC, at least once per year to verify that required records, documentation, and technical review information are maintained in the files. The QAC will ensure that problems found during the review are brought to the attention of the Task Leader and are corrected immediately. All nonconforming data will be noted, and corrective measures to bring nonconforming data into conformance will be recorded.

The TLs and QAM are responsible for determining whether the quality system established for the project is appropriate and functioning in a manner that ensures the integrity of all work products. All technical staff have roles and will participate in the corrective action process. Corrective actions for errors found during QC checks will be determined by the TL and, if necessary, with the QAM. The originator of the work will make the corrections and will note on the QC form that the errors were corrected. A reviewer or TL, not involved in the creation of the work, will review the corrections to ensure the errors were corrected. Any problems noted during audits will be reviewed and corrected by the QAM and discussed with the TL as needed. Depending on the severity of the deficiency, the TL may consult the QAM and stop work until the cited deficiency is resolved. Deficiencies identified and their resolution will be documented in monthly project reports, as applicable. The QAM and TL will comply and respond to all internal and EPA audits on the project, as needed. The QAM will produce a report outlining any corrective actions taken.

3.2. Reports to Management

The periodic progress reports (to the EPA PO) required in the grant agreement will be reviewed by the PM and the PM's Manager, the Associate Director, to ensure the project is meeting milestones and that the resources committed to the project are sufficient to meet project objectives. These periodic progress reports will describe the status of the project, accomplishments during the reporting period, activities planned for the next period, and any special problems or events including any QA/QC issues. Reports to the EPA will be drafted by the TL or other project staff familiar with project activities during the reporting period.

Any QC issues impacting the quality of a deliverable, the project budget, or schedule will be identified and promptly discussed with the assigned TL and the PM or QAC as appropriate. All significant findings will be included in monthly reports with the methods used to resolve the specific QC issue or the recommendations for resolution for consideration by the EPA's PO or designee.

Based on the technical work completed during the reporting period, progress reports will be reviewed internally by an independent, qualified technical person (equivalent or senior to the TL), prior to submitting to the PM. The PM will conduct a final review of the report before transmitting the progress report to the EPA PO and the PM's manager will be cc'd on all progress reports.

4. Data Validation and Usability (Group D)

4.1. Data Review, Verification, Validation

All work conducted under this project will be subject to technical and editorial review. When existing data for the same GHG-emitting activity are available from multiple sources, the background information documents will be reviewed for all sources to determine the dataset that is the most representative of operations in the state. Additionally, the inventory report will include the vintage of the existing data resource and preference will be given to the most recent dataset that is representative of similar GHG-emitting activities in the state. Reviews will be conducted by an independent, qualified person—or a person not directly involved in the production of the deliverable. The term "validation" refers to whether the data meet the QAPP-defined user requirements while the term "verification" refers to whether conclusions can be correctly drawn from the data. The quality of data used and generated for the project will be reviewed and verified at multiple levels by the project team. This review will be conducted by the E&E TL or a senior technical reviewer with specific, applicable expertise. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all units of measure will be checked for consistency. Any potential issues identified through this review process will be evaluated and, if necessary, data will be corrected, and analysis will be revised as necessary, using corrected data. These corrections will be documented in project records. These measures of data quality will be used to judge whether the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will document these findings in the inventory along with corrective actions or use of alternative data sources.

4.2. Verification and Validation Methods

As a standard operating procedure, all data (retrieved and generated) will be verified and validated through a review of data files by an independent, qualified technical staff member (i.e., someone other than the document originator), and ultimately, the E&E TL. A checklist of QC activities for deliverables under this project is provided as **Appendix A**. Forms for documenting QC activities and review of deliverables are included in **Appendix B**. Documentation of calculations will be included in spreadsheet work products and in supporting memoranda, as appropriate.

The TL is responsible for day-to-day technical activities of tasks, including planning, data gathering, documentation, reporting, and controlling technical and financial resources. The TL is the primary person responsible for quality of work on tasks under this project and will approve all-related plans and reports. These reports will be transmitted by the TL to the QAM for final review and approval.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Reviews of analyses will include a thorough evaluation of content and calculated values. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all measurement units will be checked for consistency. Any potential issues identified through this review process will be evaluated, errors corrected, and analysis repeated using the corrected data. All corrections will be documented in project records.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Typical data verification reviews can include checks of the following:

- Data sources are clearly documented,
- Calculations are appropriately documented,
- All relevant assumptions are clearly documented,
- Conclusions are relevant and supported by results, and
- Text is well-written and easy to understand.

The documented review process will be stored with deliverables for the project. For the narrative describing the methodologies used for the inventory, all comments on drafts will be clearly and concisely summarized including a description of how substantive issues raised by commenters were resolved.

As discussed in Section 1.7, QC objectives include verification that data in database tables are stored and transferred correctly, algorithms call data correctly, units are internally consistent, and reports pull the required data. These data management issues will be addressed as part of the QC checks of data acquisition and document preparation.

For this project, it is not anticipated that any special data validation software will be required. However, where calculations are required to assess the data/datasets, calculations will be performed using computer spreadsheets (like Excel spreadsheets with predefined functions, or formulas) and calculators to reduce typographical or translation errors. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work as described in Section 1.6 for this project.

4.3. Reconciliation with User Requirements

All data (retrieved and generated) and deliverables in this project will be analyzed and reconciled with project data quality requirements. To ensure deliverables meet user requirements, the TL or senior technical lead will review all data and deliverables throughout the project to ensure that the data, methodologies, and tools used meet data quality objectives, are clearly conveyed, and represent sound and established science.

E&E will review each project with the EPA at the planning stage to ensure the approach is fundamentally sound and will meet the project objectives. The TL or senior technical lead will evaluate data continuously during the life term of the project to ensure they are of sufficient quality and quantity to meet the project goals. Prior to submission of draft and final products, the TL or senior technical lead will make a final assessment to determine whether the objectives have been fulfilled in a technically sound manner. Assumptions made in preparing project analyses will be clearly specified in the inventory.

As discussed in Section 1.7.1, uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific inventory activity being evaluated.

5. References

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Appendix A: Example Check Lists of Quality Control Activities for Deliverables

<table>
<tr><th>Tasks and Deliverables</th><th>Quality Control Procedures</th></tr>
<tr><td colspan="2">Task 1. Transportation Sector GHG Inventory (Mobile Sources)</td></tr>
<tr><td>Statewide tabular inventory of GHG emissions from mobile sources with narrative report describing data sources, methodology, and documentation of QAPP implementation.</td><td>
1. Comparison of (a) statewide inventory versus (b) statewide inventory developed using the EPA’s State Inventory Tool (SIT).
2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory versus SIT estimates:
<table>
<tr><td>Transportation Fuel</td><td>State Estimate</td><td>Federal Estimate</td><td>Statistics*</td></tr>
<tr><td>Aviation Gasoline</td><td></td><td></td><td rowspan="11"></td></tr>
<tr><td>Distillate Fuel</td><td></td><td></td></tr>
<tr><td>Ethanol</td><td></td><td></td></tr>
<tr><td>Jet Fuel, Kerosene</td><td></td><td></td></tr>
<tr><td>Jet Fuel, Naphtha</td><td></td><td></td></tr>
<tr><td>Hydrocarbon Gas Liquids</td><td></td><td></td></tr>
<tr><td>Lubricants</td><td></td><td></td></tr>
<tr><td>Motor Gasoline</td><td></td><td></td></tr>
<tr><td>Natural Gas</td><td></td><td></td></tr>
<tr><td>Residual Fuel</td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
</table>
* Precision and bias calculations will be in accordance with the EPA’s Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state’s estimate taken as the measured value and the SIT value taken as the audit value.
3. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate.
4. Editor review—writing is clear, free of grammatical and typographical errors.
</td></tr>
</table>

Tasks and Deliverables	**Quality Control Procedures**
Task 2. Electric Power Generation and Consumption	
Statewide tabular inventory of GHG emissions from electric power generation with narrative report describing data sources, methodology, and documentation of QAPP implementation.	1. Comparison of (a) statewide inventory *versus* (b) statewide federal estimate developed by the EPA. 2. For any values in the state inventory that are significantly different from federal estimates, the table below will be utilized to assess precision and bias of the state's estimate versus the federal estimate:

Electric Power Fuel	State Estimate	Federal Estimate	Statistics*
Coal			
Distillate Fuel			
Natural Gas			
Petroleum Coke			
Residual Fuel			
Wood			
Other			

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state's estimate taken as the measured value and the SIT value taken as the audit value.

Ensure the GWPs used for the state estimate and the federal estimate are on the same basis. For example, the SIT tool uses AR5 GWP (e.g., methane GWP = 28).

3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate.
4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate)
5. Editor review—writing is clear, free of grammatical and typographical errors.

<table>
<tr><th>Tasks and Deliverables</th><th>Quality Control Procedures</th></tr>
<tr><td colspan="2">Task 3. Natural and Working Lands and Forestry</td></tr>
<tr><td>Statewide tabular inventory of GHG emissions and sinks from natural and working lands and forestry with narrative report describing data sources, methodology, and documentation of QAPP implementation.</td><td>
1. Comparison of (a) statewide inventory versus (b) statewide inventory developed using the EPA's State Inventory Tool (SIT).

2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory versus SIT estimates:

<table>
<tr><th>Natural and Working Lands and Forestry Component</th><th>State Estimate</th><th>SIT Estimate</th><th>Statistics*</th></tr>
<tr><td>Net Forest Carbon Flux</td><td></td><td></td><td rowspan="7"></td></tr>
<tr><td>Urban Trees</td><td></td><td></td></tr>
<tr><td>Landfilled Yard Trimmings Food Scraps</td><td></td><td></td></tr>
<tr><td>Forest Fires</td><td></td><td></td></tr>
<tr><td>N_2O from Settlement Soils</td><td></td><td></td></tr>
<tr><td>Agricultural Soil Carbon Flux</td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
</table>
* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state's estimate taken as the measured value and the SIT value taken as the audit value.

3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate.

4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate)

5. Editor review—writing is clear, free of grammatical and typographical errors.
</td></tr>
</table>

Tasks and Deliverables	Quality Control Procedures

Task 4. State Inventory of GHG Emissions from Other Major Sectors

Statewide tabular inventory of GHG emissions from the state's major industrial, sources with narrative report describing data sources, methodology, and documentation of QAPP implementation.

1. Comparison of (a) statewide inventory *versus* (b) statewide inventory developed using the EPA's State Inventory Tool (SIT).
2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory versus SIT estimates:

Fuels and Feedstocks for Other Major Sectors	State Estimate	SIT Estimate	Statistics*
Asphalt and Road Oil			
Aviation Gasoline Blending Components			
Coal			
Coking Coal			
Crude Oil			
Distillate Fuel			
Feedstocks, Naphtha less than 401 F			
Feedstocks, Other Oils greater than 401 F			
Hydrocarbon Gas Liquids			
Kerosene			
Lubricants			
Misc. Petro Products			
Motor Gasoline			
Motor Gasoline Blending Components			
Natural Gas			
Pentanes Plus			
Petroleum Coke			
Residual Fuel			
Special Naphthas			
Still Gas			
Unfinished Oils			
Waxes			
Wood			
Other			

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state's estimate taken as the measured value and the SIT value taken as the audit value.

3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate.
4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of detail appropriate.
5. Editor review: writing is clear, free of grammatical and typographical errors.

<table>
<tr><th>Tasks and Deliverables</th><th>Quality Control Procedures</th></tr>
<tr><td colspan="2">Task 5. State Inventory of GHG Emissions from Minor Sectors</td></tr>
<tr><td>Statewide tabular inventory of GHG emissions from the state’s minor sectors with narrative report describing data sources, methodology, and documentation of QAPP implementation.</td><td>
1. Comparison of (a) statewide inventory versus (b) statewide inventory developed using the EPA’s State Inventory Tool (SIT).
2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory for minor sectors versus SIT estimates:
<table>
<tr><th>Fuels and Feedstocks for Other Major Sectors</th><th>State Estimate</th><th>SIT Estimate</th><th>Statistics*</th></tr>
<tr><td>Asphalt and Road Oil</td><td></td><td></td><td></td></tr>
<tr><td>Aviation Gasoline Blending Components</td><td></td><td></td><td></td></tr>
<tr><td>Coal</td><td></td><td></td><td></td></tr>
<tr><td>Coking Coal</td><td></td><td></td><td></td></tr>
<tr><td>Crude Oil</td><td></td><td></td><td></td></tr>
<tr><td>Distillate Fuel</td><td></td><td></td><td></td></tr>
<tr><td>Feedstocks, Naphtha less than 401 F</td><td></td><td></td><td></td></tr>
<tr><td>Feedstocks, Other Oils greater than 401 F</td><td></td><td></td><td></td></tr>
<tr><td>Hydrocarbon Gas Liquids</td><td></td><td></td><td></td></tr>
<tr><td>Kerosene</td><td></td><td></td><td></td></tr>
<tr><td>Lubricants</td><td></td><td></td><td></td></tr>
<tr><td>Misc. Petro Products</td><td></td><td></td><td></td></tr>
<tr><td>Motor Gasoline</td><td></td><td></td><td></td></tr>
<tr><td>Motor Gasoline Blending Components</td><td></td><td></td><td></td></tr>
<tr><td>Natural Gas</td><td></td><td></td><td></td></tr>
<tr><td>Pentanes Plus</td><td></td><td></td><td></td></tr>
<tr><td>Petroleum Coke</td><td></td><td></td><td></td></tr>
<tr><td>Residual Fuel</td><td></td><td></td><td></td></tr>
<tr><td>Special Naphthas</td><td></td><td></td><td></td></tr>
<tr><td>Still Gas</td><td></td><td></td><td></td></tr>
<tr><td>Unfinished Oils</td><td></td><td></td><td></td></tr>
<tr><td>Waxes</td><td></td><td></td><td></td></tr>
<tr><td>Wood</td><td></td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td><td></td></tr>
</table>
* Precision and bias calculations will be in accordance with the EPA’s Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state’s estimate taken as the measured value and the SIT value taken as the audit value.
3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate.
4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of detail appropriate.
5. Editor review: writing is clear, free of grammatical and typographical errors.
</td></tr>
</table>

Appendix B: Example QC Documentation Form

<Grantee Org.>

Documentation of QA Review and Approval of Electronic Deliverables

Approvals on this form verify that all technical and editorial reviews have been completed and the deliverable meets the criteria for scientific defensibility, technical, and editorial accuracy, and presentation clarity as outlined in the Quality Assurance (QA) Project Plan, QA Narrative, Quality Management Plan, and/or according to direction from the EPA PO.

Client:	EPA Region <X>
Grant Number:	<enter grant number>
EPA Project Officer:	<enter EPA PO>
Project Number:	<enter internal Project ID>
Project Name:	<enter internal project name>
Grantee Org. Project Manager	<enter grantee's project manager>

QA Form Details

Item Number	File Name (Copy the name of the File Reviewed)	Deliverable Description	Date Sent to Client	Deliverable (Draft)	Deliverable (Final)	Document Originator	QA Review Information (Review Type)	(Reviewer Name)	(Date Review was Performed)	(Brief Summary of Review Findings and Other Notes)	QA Review Information (Have all Findings Been Resolved)	(Originator Signature)	(Reviewer Signature)	(File Location) *Copy Long Folder Path Name*
01				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			
02				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			
03				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			
04				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			

Appendix C: Compliance with Requirements Under the Privacy Act of 1974

Important Note about Personally Identifiable Information (PII)

The Privacy Act of 1974 (5 U.S.C. § 552a) mandates how federal agencies maintain records about individuals. Per OMB Circular A-130, Personally Identifiable Information (PII) is "information that can be used to distinguish or trace an individual's identity, either alone or when combined with other information that is linked or linkable to a specific individual."

EPA systems/applications that collect PII must comply with EPA's Privacy Policy and procedures to guard against unauthorized disclosure or misuse of PII in all forms. For more information click here. If PII are collected, then the QAPP will describe how the PII are managed and controlled.

Personally identifiable information (PII):

Please verify one of the following two options by checking the corresponding box:

1. This project **will not** collect Personally Identifiable Information (PII): x
2. This project **will** collect Personally Identifiable Information (PII): ☐

This QAPP will comply with 5 U.S.C. § 552a and EPA's Privacy Policy.

Attachment 1: Example Electric Power Generation Calculations

A	B	C	D	E	F	G	H	I
Fuel Type Code (EIA 923 RY2020)	**Fuel Description (EIA 923 - RY2020)**	**Example Totals for Arkansas (million Btu) (EIA 923 - RY2020)**	**CO_2 Emission Factors from 40 CFR Part 98 Table C-1 (kg CO2/MMBtu)**	**CO_2 Emission Factors from 40 CFR Part 98 Table C-1 (kg CH4/MMBtu) (GWP = 25)**	**CO_2 Emission Factors from 40 CFR Part 98 Table C-1 (kg N2O/MMBtu) (GWP = 298)**	**Million Metric Tons CO2e (C x D/1E09) + (C x E/1E09 x 25) + (C x F/1E09 x 298)**	**Biogenic Fraction**	**Million Metric Tons CO2e (Fossil Fuels) (G x (1 - H))**
WND	Wind	0	0	0	0	0.00E+00	0	0
LIG	Lignite Coal	0	97.72	1.10E-02	1.60E-03	0.00E+00	0	0
WAT	Water at a Conventional Hydroelectric Turbine and …	39,719,998	0	0	0	0.00E+00	0	0
NG	Natural Gas	149,250,673	53.06	1.00E-03	1.00E-04	7.93E+00	0	7.92741965
OG	Other Gas	0	59	3.00E-03	6.00E-04	0.00E+00	0	0
SUB	Subbituminous Coal	158,577,328	97.17	1.10E-02	1.60E-03	1.55E+01	0	15.5281774
DFO	Distillate Fuel Oil. Including diesel, No. 1, No. 2, and No. 4	516,257	73.96	3.00E-03	6.00E-04	3.83E-02	0	0.03831339
WH	Waste Heat not directly attributed to fuel	0	0	0	0	0.00E+00	0	0
TDF	Tire-derived Fuels	184,873	85.97	1.10E-02	1.60E-03	1.60E-02	0.24	0.01218471
AB	Agricultural By-Products	0	118.17	3.20E-02	4.20E-03	0.00E+00	1	0
PG	Gaseous Propane	0	61.46	3.00E-03	6.00E-04	0.00E+00	0	0
RFO	Residual Fuel Oil Includes No. 5 & 6 and bunker C…	21658	75.1	3.00E-03	6.00E-04	1.63E-03	0	0.00163201
WO	Waste/Other Oil. Including crude oil, liquid butane, liquid propane, naphtha, oil waste …	0	74	3.00E-03	6.00E-04	0.00E+00	0	0
Fossil Fuel Total								**23.5077272**

Attachment 2: Example Table for CO_2 Combustion Emissions in State of North Dakota

CO_2 Emissions from Major-emitting Combustion Sources in State of North Dakota

A	B	C	D	E	F
State	**Primary NAICS Code**	**Statewide GHGs[15] Reported to GHGRP Direct Emitting Subparts (MT CO2e)**	**Fraction of Statewide Emissions**	**Primary NAICS Descriptor**	**SIT Category**
ND	221112	27,832,255	80.7%	Fossil Fuel Electric Power Generation	Electric Power
ND	221210	2,822,240	8.2%	Natural Gas Distribution	Industrial
ND	486210	875,129	2.5%	Pipeline Transportation of Natural Gas	Industrial
ND	311313	833,225	2.4%	Beet Sugar Manufacturing	Industrial
ND	211130	800,699	2.3%	Natural Gas Extraction	Industrial
ND	325193	504,764	1.5%	Ethyl Alcohol Manufacturing	Industrial
ND	324110	466,909	1.4%	Petroleum Refineries	Industrial
ND	311224	81,072	0.2%	Soybean and Other Oilseed Processing	Industrial
ND	311411	76,234	0.2%	Frozen Fruit, Juice, Vegetables	Industrial
ND	221330	59,627	0.2%	Steam and Air-Conditioning Supply	Industrial
ND	311221	53,420	0.2%	Wet Corn Milling	Industrial
ND	923110	45,296	0.1%	Administration of Education Programs	Industrial
ND	424710	25,912	0.1%	Petroleum Bulk Stations and Terminals	Industrial
ND	562212	1,172	0.003%	Solid Waste Landfill	Solid Waste, Step 9
Total		**34,477,956**			
Electric Power Total		**27,832,255**			
Industrial Total		**6,644,529**			
Solid Waste Step 9		**1,172**			

[15]Example Data from the EPA's Greenhouse Gas Reporting Program [2021_data_summary_spreadsheets.zip] available at https://www.epa.gov/ghgreporting/data-sets.

1. Project Management (Group A)

1.1. Title and Approval Page

Quality Assurance Project Plan for
Energy and Environmental Innovation Plan
Data Analysis and Management
Grant No. 02F35201

Prepared by:
Arkansas Department of Energy and Environment
5301 Northshore Drive
North Little Rock, AR 72118

Prepared for:
US EPA Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270

APPROVALS:

Deputy Associate Director (Project Manager):	Date: December 7, 2023
Associate Director:	Date: December 8, 2023
Quality Assurance Coordinator:	Date: December 7, 2023
Quality Assurance Manager:	Date: December 8, 2023
USEPA Region 6 Grants Project Officer:	Date:
USEPA Region 6 Quality Assurance Manager:	Date:

QAPP Revision History

Revision No.	Description	Author	Date
0	Original Version	Tricia Treece	08/30/2023
1	1.1 Grant number added to Title and Approval page Exhibit 1.1. Updated to correct organization chart with recent changes 1.3 Table updated for EPA QAM and to remove table redundancy for Task Leader 1.4 Specify PM as assigned Deputy Associate Director 1.5.2. Task leader decision responsibilities clarified in text 2.1.2. Task list updated	Mikayla Shaddon	12/7/2023

1.2. Table of Contents[1]

[1] For grantees who are not familiar with using MS Word's TOC functions, please review the video at https://www.youtube.com/watch?v=0cN-JX6HP7c. Accessed on 6/23/2023.

List of Tables

List of Exhibits

Abbreviations

CAA	Clean Air Act
CFR	Code of Federal Regulations
CAP	Comprehensive Action Plan
CPRG	Climate Pollution Reduction Grant
DEQ	Division of Environmental Quality
E&E	Arkansas Department of Energy and Environment
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program (40 CFR Part 98)
ICR	Information Collection Request
OAR	EPA Office of Air and Radiation
OAQ	Office of Air Quality
PM	Project Manager
PO	EPA Project Officer for Grant
POP	Period of Performance

POR	EPA Project Officer's Representative
PWP	Project Work Plan
PAP	Priority Action Plan
QA	Quality Assurance
QAC	Quality Assurance Coordinator
QAM	Quality Assurance Manager
QAMD	Quality Assurance Manager Delegate
QAPP	Quality Assurance Project Plan
QC	Quality Control
SIT	State Inventory Tool (provided by the EPA)
TL	Task Leader

1.3. Distribution List

This section presents the primary staff who will be working on the project. This section presents specific staff members who will be identifying existing[2] data resources for evaluation and potential use under the project. This section also includes all other staff who will be serving in project-specific roles for implementing the Quality Assurance Project Plan. The listing in **Table 1.1** includes staff responsible for implementing independent internal quality management steps and staff serving in external oversight roles.

This QAPP and, as applicable, all major deliverables relying on existing data will be distributed to the staff presented in **Table 1.1.** Additionally, this QAPP will be provided to any unlisted staff who are assigned to perform work under this project. A secured copy of this QAPP will be maintained in the project files under the E&E Public Network Drive under the file path, *G:Quality Assurance Team\OAQ\Integrated Compliance Information System.*

Table 1.1 QAPP Distribution List

Name	**Organization**	**Role**
Terry Wright	US EPA, Region 6	EPA Project Officer (PO) or PO Representative (POR)
Brenton Gildner	US EPA, Region 6	EPA Quality Assurance Manager or Delegate
Demetria Kimbrough	E&E	E&E Sr. Approver, Associate Director
Heath Cobb	E&E	E&E Project Manager, Deputy Associate Director
Erika Droke	E&E	E&E Task 1 – 5 Leader, SIP/Planning Supervisor
Jonathan Westmoreland	E&E	E&E Quality Assurance Manager
Tanisha Harper	E&E	E&E Quality Assurance Coordinator, Office of Air Quality
Mikayla Shaddon	E&E	Epidemiologist
Kelly Jobe	E&E	Epidemiologist
Katrina Jones	E&E	Policy Development Coordinator
Vacant	E&E	Extra Help
Vacant	E&E	Extra Help

[2] The term "existing data" is defined by the EPA's *Environmental Information Quality Policy* (CIO 2105.3) as "… data that have been collected, derived, stored, or reported in the past or by other parties (for a different purpose and/or using different methods and quality criteria). Sometimes referred to as data from other sources." The term "secondary data" may also be used to describe "existing data" in historical EPA quality-related documents.

1.4. Project/Task Organization

The primary personnel responsible for implementation of this project are the E&E Project Manager (PM), Quality Assurance Manager (QAM), Quality Assurance Coordinator (QAC), and Task Leaders (TLs). Their duties are outlined briefly in this section. The project QAM is independent of the unit generating the data.

The E&E PM role will be fulfilled by the assigned E&E Office of Air Quality Deputy Associate Director for the duration of this project and will provide senior-level oversight as needed. The PM is responsible for E&E's technical and financial performance with respect to this QAPP as well as maintaining communications with the EPA to ensure mutual understanding of grant requirements, EPA expectations, and conformity with EPA quality procedures; managing oversight and conduct of project activities including allocation of resources to specific tasks; ensuring that quality procedures are incorporated into all aspects of the project; developing, conducting, and/or overseeing QA plans as necessary; ensuring that any corrective actions are implemented; operating project activities within the documented and approved Quality Assurance Project Plan; and ensuring that all products delivered to the EPA are of specified type, quantity, and quality.

The E&E PM will assign a TL for each technical task with instructions to complete a baseline emissions inventory for the sector(s) under the task and to develop sector-specific options for potential emissions reduction projects including estimates of the potential reductions under each option and estimates of uncertainties for each reduction option. **Table 1.1** presents the TLs for each technical task who will be responsible for day-to-day task-level activities, including planning, reporting, and controlling of technical and financial resources allocated to the task by the PM. Accordingly, each TL is primarily responsible for implementing the Quality Program and this Quality Assurance Project Plan on task-level assignments.

Task-level management system. For each of the major deliverables under each task, the assigned TL will review all QA-related plans and reports and is responsible for transmitting them to the QAC and QAM for review and approval. Each TL is responsible for ensuring that quality procedures are implemented at the task level and for maintaining the official, approved, task-level QAPP content. Each TL will discuss any concerns about quality or any proposed revisions to task-level QAPP content with the QC Coordinator to identify, resolve, or preclude problems or to amend task-level plans, if necessary. In addition, each TL will work with the E&E PM and the QAM to identify and implement quality improvements. The E&E PM is responsible for ensuring the consistency of similar or related QA measures across tasks, and the TLs are responsible for overseeing task-level work performed by technical staff and providing assurance that all required QA/QC procedures are being implemented.

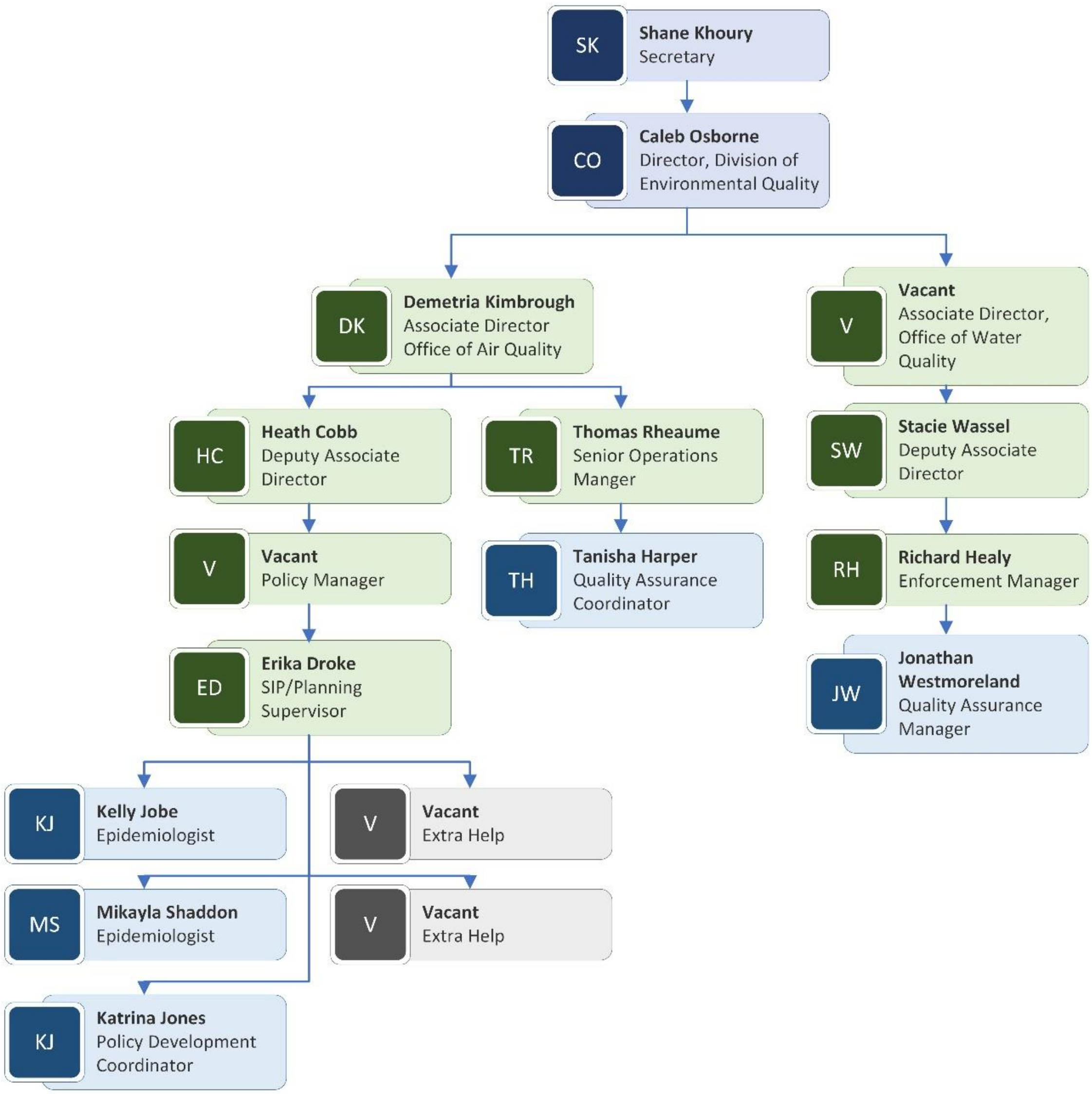
Project-level management system. Tasks are expected to proceed concurrently, in parallel. The PM will maintain close communications with each TL and ensure any difficulties encountered or proposed changes at the task level are reviewed for implications on other similar or related tasks. The PM is also responsible for communicating progress or difficulties encountered (across all tasks) to the EPA PO or POR, who provides EPA's primary oversight function for this project at EPA OAR/EPA R6 and is responsible for review and approval of this QAPP and any future revisions. The PM (with support from TLs and assigned E&E technical staff) will be responsible for consulting with the EPA PO or POR, on planning, scheduling, and implementing the QA/QC for all project deliverables and obtaining required EPA approvals.

The QAM is responsible for overseeing the program quality system, monitoring, and facilitating QA activities on tasks, and generally helping the E&E PM and TLs understand and comply with EPA QA requirements. The QAM is employed by E&E's Office of Water Quality Enforcement group, which is in a separate Office from E&E's Office of Air Quality. For each task under this project, the QAM is supported by the QAC, who will assist in the implementation of the quality system. At the request of the E&E PM, the QAM is responsible for conducting periodic independent audits of this project's QA program and will produce written documentation of the audit results and recommendations. The QAM will work closely with the PM and QAC to improve any deficiencies noted during these audits.

The QAC is responsible for assisting the PM and TLs in planning, documenting, and implementing the QA requirements for this project. Working with the PM, and in consultation with the QAM, the QAC will ensure that process- and project-specific QA documents are developed; that required or recommended protocols are followed; that data are reduced, validated, and reported according to specific criteria; and that QC assessments are performed. The QAC will report to the PM and the QAM, as needed, on quality issues.

Additionally, QC functions will be carried out by other technical staff and monitored by the PM, who will work with the QAM and QAC to oversee this plan and implement quality improvements. Other technical staff will include persons with expertise in industrial processes and air pollution engineering, technical reviewers, database specialists, quality auditors, and technical editors. The PM will ensure that technical staff do not review work in a QA capacity for which they were a primary or contributing author. **Exhibit 1.1** presents the organizational chart.

Exhibit 1.1 Project Organization[3]



f

[3] Under CIO 2105-S-02.0, section 3, the organization chart must also identify any contractor relationships relevant to environmental information operations.

1.5. Problem Definition / Background

Under this project, E&E will identify, evaluate, and utilize existing data resources[4] to develop a statewide inventory of the major sources of greenhouse gas (GHG) emissions within Arkansas and use that inventory data to develop an Energy and Environment Innovation Plan. This QAPP focuses on the handling of environmental information under sector-specific tasks by technical staff charged with completing the following subtasks in a future planning project implemented in accordance with this QAPP:

1. Develop a comprehensive GHG inventory for the largest sources within each sector,
2. Develop options for reducing emissions within each sector,
3. Develop estimates or ranges of estimates for the reductions achievable under each option,
4. Develop uncertainty analyses for the emissions reduction estimate(s) or ranges under each option, and
5. Present the inventory, options listing, and associated analyses in a technical report for consideration by state policymakers with the authority to approve the deliverables under the CPRG planning grants.

The GHG inventory may utilize the EPA's State Inventory Tool (SIT),[5] state-level GHG inventories prepared by the EPA,[6] and data reported to the EPA's Greenhouse Gas Reporting Program (GHGRP)[7] together with any independent, sector-specific estimates prepared by the state. Any state estimates will be compared to corresponding federal estimates for validation. Significant differences will be evaluated and discussed in the inventory report with the underlying data and methodology used for the independent state estimates. The statewide inventory will include the following sectors and gases:

Sectors	***Greenhouse Gases (across all sectors)***
1. Transportation 2. Electricity generation and/or use 3. Natural and working lands 4. Industry 5. Agriculture 6. Commercial and residential buildings 7. Waste and materials management 8. Wastewater	carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases (F-gases) including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3)

1.5.1. Rationale for Selection of Sectors

For each sector included in the statewide inventory **Table 1.2** briefly describes why the sector was included in the inventory and the relative significance of the sector in terms of the magnitude of air emissions from existing inventories, the associated geographic distribution of the sources, and recent trends in readily available activity data for the source category.

[4] EPA, *Environmental Information Quality Policy*, CIO 2105.3, 03/07/2023 (p. 8) provides common examples of environmental information used to support the EPA's mission at https://www.epa.gov/system/files/documents/2023-04/environmental_information_quality_policy.pdf.
[5] https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool
[6] https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals
[7] https://www.epa.gov/ghgreporting/data-sets

Table 1.2 Rationale for Sector Selection

Sectors Included in Inventory	**Rationale for Including in GHG Inventory**
Transportation	Transportation activities were the largest source (29 percent) of total U.S. greenhouse gas emissions in 2021. From 1990 to 2021, transportation CO_2 emissions from fossil fuel combustion increased by 19 percent. Transportation activities occur across all states.
Electric power generation	The electric power sector accounted for 25 percent of total U.S. greenhouse gas emissions in 2021. Power generation and/or consumption occurs across all states.
Industry	The industrial sector accounted for 24 percent of U.S. greenhouse gas emissions in 2021. Since 1990, industrial sector emissions have declined by 11 percent. In 2021, total energy use in the industrial sector increased by 2 percent due to an increase in total industrial production and manufacturing output. EPA's GHGRP data provide additional insights into underlying trends in the industrial sector.
Natural and working lands[8]	Natural and working lands include fluxes of carbon from activities such as converting forests to agricultural use and practices that remove CO_2 from the atmosphere and store it in long-term carbon sinks like forests. In 2021, the net CO_2 removed from the atmosphere by natural and working lands was 12% of total U.S. greenhouse gas emissions. Between 1990 and 2021, total carbon sequestration in this sector decreased by 14%, primarily due to a decrease in the rate of net carbon accumulation in forests, as well as an increase in CO_2 emissions from urbanization.
Agriculture	Agriculture accounted for about 10 percent of U.S. greenhouse gas emissions in 2021, and agricultural soil management was the largest source of N_2O emissions. Enteric fermentation was the largest source of CH_4 emissions.
Commercial and residential buildings	In 2021, the commercial and residential sectors accounted for 7 and 6 percent of total U.S. greenhouse gas emissions, respectively. Emissions from the commercial and residential sectors have increased since 1990. Total residential and commercial greenhouse gas emissions, including direct and indirect emissions, in 2021 have increased by 2% since 1990. In 2021, an increase in heating degree days (0.5 percent) increased energy demand for heating in the residential and commercial sectors, however, a 1.8 percent decrease in cooling degree days compared to 2020 reduced demand for air conditioning in the residential and commercial sectors.
Waste and materials management	This sector includes landfills, composting, and anaerobic digestion. Landfills were the third largest source of anthropogenic methane emissions in 2021, and landfills accounted for 1.9 percent of total U.S. greenhouse gas emissions.
Wastewater	Wastewater treatment, both domestic and industrial, was the third largest anthropogenic source of N_2O emissions in 2021, accounting for 5.2 percent of national N_2O emissions and 0.3 percent of total U.S. greenhouse gas emissions. Emissions from wastewater treatment increased by 6.1 MMT CO_2e (41.6 percent) since 1990 as a result of growing U.S. population and protein consumption.

[8] Under international GHG inventory protocols this category is called "Land use, land-use change, and forestry."

1.5.2. Decisions to be Made

Existing EPA datasets and the SIT cover categories of GHG emissions by sector and by activity or segment (e.g., electric utility combustion of natural gas). The SIT provides many default values to facilitate developing statewide estimates that are consistent with the National Inventory of GHG Emissions.[9] Task Leaders will be charged with four primary decisions under each task of this project:

1. Determine (for each major activity estimate) if existing EPA data or the SIT default estimate for the sector/activity should be used for the statewide, baseline estimate, or should the state's estimate be derived from existing information available to the state (including other EPA datasets, state inventories, or GHGRP publications)?
2. Determine the best options for reducing emissions of air pollution and achieving the following objectives[10] under the Inflation Reduction Act:
   a. Reduce GHG emissions, create high-quality jobs, and lower energy costs for families.
   b. Accelerate work addressing environmental injustices and empowering community driven solutions in overburdened neighborhoods.
   c. Deliver cleaner air by reducing harmful air pollution in places where people live, work, play, and go to school.
3. Develop an estimate (or range) of reductions that could be achieved under each option.
4. Estimate the uncertainty of the emissions reduction estimate under each option.

1.5.3. Actions to be Taken, Action Limits, and Expected Outcomes

Existing state-level estimates prepared by the EPA or the SIT tool will be utilized with federal default values for each sector/activity relevant to GHG-emitting activities within the state. Actions will be limited to the GHG-emitting activities defined in the SIT or in the existing EPA estimates used by the state. Subsequently, the state may elect to prepare separate, independent estimates for the state's major sector/activities based on the state's existing data resources. If the state elects to incorporate these independent estimates in the inventory, the independent estimate will be compared to the SIT estimate or the EPA's state-level estimate by subject matter experts with the requisite knowledge of the source category, and the rationale for utilizing the state's independent estimate will be documented in the state's GHG inventory report along with the underlying data and calculation methodology. E&E expects that sectors that include major stationary sources under CAA Title V with longstanding requirements for submission of activity data and emissions estimates may be better represented in the GHG inventory based on existing data. For minor sources of GHGs, E&E expects that the SIT default estimates for the state will provide the better estimates.

When identifying the best options for reducing air pollution, each Task Leader will consider the activities affecting the largest numbers of families, business establishments, recreation areas, and schools.[11] Options may include measures for achieving potential reductions in areas with pollutant concentrations within 90% of the NAAQS and impacting residential, commercial, and school districts near the largest sources of air pollution. E&E expects that each task will produce up to three options for sector-specific emissions reduction projects for further consideration by management and policymakers.

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[9] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021

[10] CPRG Program Guidance, page 4. Available at https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants#CPRGProgramGuidance.

[11] Ibid.

1.5.4. Reason for Project

The baseline GHG inventory and options analyses developed under this project will be utilized by E&E for planning purposes to support Arkansas's development of the following three deliverables under the CPRG Program:

- Arkansas's **Priority Action Plan** (PAP), which is due on March 1, 2024. This plan will include near-term, implementation-ready, priority GHG reduction measures and is a prerequisite for any implementation grant.
- Arkansas's **Comprehensive Action Plan** (CAP), which is due in 2025. This plan will review all sectors that are significant GHG sources or sinks, and include both near- and long-term GHG emission reduction goals and strategies.
- Arkansas's **Status Report** on progress towards goal, which is due in 2027. This progress report will include updated analyses, plans, and next steps for key metrics.

This QAPP describes in detail the necessary QA and QC requirements and technical activities that will be implemented to ensure the baseline GHG inventory and the sector-specific emissions reduction options are reliable for the PCAP and CCAP. As necessary, revisions to the QA and QC requirements defined in this QAPP will be updated in the 2027 Status Report.

1.5.5. Relevant Clean Air Act Mandates and Authorizations

The inventory and options analyses produced under this project will support a grant application authorized under 42 U.S.C.A. § 7437 for *Greenhouse Gas Air Pollution Plans and Implementation Grants*. The inventory and options analyses will be used to evaluate opportunities for reducing GHG emissions from all major-emitting sources including both mobile source categories and stationary source categories. This project will include the fundamental research necessary to evaluate and plan new programs (and amendments to existing Clean Air Act [CAA] programs) for reducing emissions from fossil fuel combustion activities. Many sectors and activities that will be included in the GHG inventory (and subsequent emissions reductions options analyses) include major sources of criteria and toxic pollutants. Accordingly, the purpose of this project (to evaluate and plan for reductions in GHG emissions, including reductions from usage or production of fossil fuels) is also consistent with the following statutory mandates and authorizations under Clean Air Act Title I:

- ***§ 7403. Research, investigation, training, and other activities***
  (a) Research and development program for prevention and control of air pollution
  The Administrator shall establish a national research and development program for the prevention and control of air pollution ….
    (1) conduct, and promote the coordination and acceleration of, research, investigations … and studies related to the causes … extent, prevention, and control of air pollution;
    (2) encourage, cooperate with, and render technical services and provide financial assistance to air pollution control agencies and other appropriate public or private agencies, institutions, and organizations, and individuals in the conduct of such activities ….
  (b) Authorized activities of Administrator in establishing research and development program
  In carrying out the provisions of [paragraph (a)] the Administrator is authorized to–
    (1) collect and make available, through publications and other appropriate means, the results of and other information, including appropriate recommendations by him in connection therewith, pertaining to such research and other activities;….
    (2) make grants to air pollution control agencies … for purposes … in subsection (a)(1) ….

- ***§ 7404. Research related to fuels and vehicles***

(a) Research programs; grants; ….
The Administrator shall give special emphasis to research and development into new and improved methods, having industry-wide application, for the prevention and control of air pollution and control of air pollution resulting from the combustion of fuels… he shall–
(1) conduct and accelerate research programs directed toward development of improved , cost-effective techniques for–
(A) control of combustion byproducts of fuels, ….
(B) improving efficiency of fuels combustion so as to decrease atmospheric emissions ….

- ***§ 7405. Grants for support of air pollution planning and control programs***
  (a) Amounts; limitations; assurances of plan development capability.
  (1)(A) The Administrator may make grants to air pollution control agencies … in an amount up to three-fifths of the cost of implementing programs for the prevention and control of air pollution …. For the purpose of this section, "implementing" means any activity related to the planning, developing, establishing, carrying-out, improving, or maintaining of such programs….
  (C) With respect to any air quality control region or portion thereof for which there is an applicable implementation plan under section 7410 … grants under subparagraph (A) may be made only to air pollution control agencies which have substantial responsibilities for carrying out such applicable implementation plan.

1.5.6. Information Provided by the EPA under § 7403(b)(1)

Under authority of CAA § 7403(b)(1) the EPA has provided the following resources to states to ensure reliable air emissions inventories are produced to support plans for reducing emissions. :

- Agency-wide Quality Program Documents
- Quality Assurance-specific Directives
  - CIO 2105.3 – *Environmental Information Quality Policy*, April 10, 2023
  - CIO 2105-P-01.3 – *Environmental Information Quality Procedure*, March 7, 2023
  - CIO 2105-S-02.0 – EPA's Environmental Information QA Project Plan (QAPP) Standard
  - EPA Regional Sites for Quality Management Plans and Guidance:
    - Region 1
    - Region 2
    - Region 3
    - Region 4
    - Region 5
    - Region 6
    - Region 7
    - Region 8
    - Region 9
    - Region 10
- QA Guidance
  - EPA QA/G-4 – *Guidance on Systematic Planning Using Data Quality Objectives Process*
  - EPA QA/G-5 – *Guidance for Quality Assurance Project Plans*

E&E will utilize these resources, as applicable, to ensure evaluation of existing data and utilization of those data are consistent with the EPA's relevant directives and guidance.

1.6. Project / Task Description

An example schedule of deliverables for the technical tasks (Tasks 1-5) for GHG inventory QAPPs is presented in **Tables 2.1** through **2.5.** The work to be performed under this project by E&E involves preparing a statewide GHG emissions inventory for Arkansas. The organization of the work is based on the use of the EPA's SIT[12] under the following sector-specific tasks:

Task 1: State inventory of transportation-related GHG emissions.

Task 2: State inventory of electric power generation-related GHG emissions.

Task 3: State inventory of GHG emissions and sinks from natural working lands and forestry

Task 4: State inventory of GHG emissions from other major sectors.

Task 5: State inventory of GHG emissions from minor sectors.

For each sector-specific task, **Tables 2.1–2.5** provide planned activities and a schedule of deliverables for use by states preparing GHG inventories. The EPA's SIT, other resources, and answers to frequently asked questions are also located on the State and Tribal Greenhouse Gas Data and Resources webpage.[13]

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	**Schedule**
Task 1. Transportation Sector (Mobile Sources)	
1. Produce a profile of mobile source emissions using the EPA's state-level GHG data from https://www.epa.gov/system/files/other-files/2023-02/State-Level-GHG-data.zip. Use the EPA estimates as the baseline GHG inventory for the state. 2. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the options with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. A description of any benefits that the option will impart to communities with air toxics concerns. f. Evaluation of the option's impacts on soil, water, or other natural resources.	Within 120 days of QAPP approval by EPA or by federally authorized delegate. .

[12] https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool.
[13] https://www.epa.gov/ghgemissions/state-and-tribal-greenhouse-gas-data-and-resources.

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables	**Schedule**
Task 2. Electric Power Generation and Consumption	
1. Use the EPA's State Inventory and Projection Tool (SIT) at https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool. Utilize the [co2ffc-module.xlsm] for the electric power sector. Review the user's manual available using the "Consult User's Guide" button on the [Control] sheet. This tool produces GHG estimates through 2020 for the state selected on row 3 of the [Control] sheet. 2. Download the 2020 electric power data published under EIA Form 923 at https://www.eia.gov/electricity/data/eia923/. Use the [Page 1 Generation and Fuel Data] sheet, the [Page 7 File Layout] sheet (for fuel type code definitions), and the following columns on the [Page 1 Generation and Fuel Data] sheet to determine the total fuel consumption by power plants in Arkansas: a. Column G – "Plant State" b. Column O – "Reported Fuel Type Code" c. Column CP – "Total Fuel Consumption MMBtu" 3. For 2020, review SIT default entries for fuels labeled "electric power …" (reported in billion btu/year or Bbtu/yr) on the [Default State Energy Data Table] sheet. a. Based on the total heat input for each type of fuel reported under EIA 923, use the heating values for the corresponding fuels under 40 CFR Part 98 Subpart C, Table C-1 and the global warming potentials under Part 98 Subpart A Table A-1 to calculate total power sector emissions from the use of fossil fuels. Example calculations are included as **Attachment 1**. b. Compare the statewide values calculated with the EIA 923 fuel usage data to the fuel usage in the SIT's [Default State Energy Data Table] sheet. c. Document calculations and comparison of the SIT's Bbtu/yr values versus the state's calculation from EIA 923 data. d. In the GHG inventory, report the GHG emissions estimate from the [Electric Power] sheet and the comparison of the values calculated from the EIA 923 data. 4. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the option with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the option with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state, or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. A description of any benefits that the option will impart to communities with air toxics concerns. f. Evaluation of the option's impacts on soil, water, or other natural resources.	Within 120 days of QAPP approval by EPA or by federally authorized delegate.

Table 2.3 Technical Task Descriptions for Task 3.

Tasks and Deliverables	**Schedule**
Task 3. Natural Working Lands and Forestry	
1. Develop estimates for this sector using the following dataset: https://www.epa.gov/system/files/other-files/2023-02/State-Level-GHG-data.zip.] 2. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the option with an associated uncertainty estimate. c. The quantity of criteria emissions reduced or mitigated (such as by adsorption of PM2.5 on the surfaces of leaves) by the option with an associated uncertainty estimate. d. A description of any benefits that the option will impart to communities. e. Evaluation of the option's benefits on soil, water, or other natural resources.	Within 120 days of QAPP approval by EPA or by federally authorized delegate.

Table 2.4 Technical Task Descriptions for Task 4.

Tasks and Deliverables	**Schedule**
Task 4. State Inventory of GHG Emissions for Other Major Sectors	
1. Use the EPA's State Inventory and Projection Tool (SIT) at https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool to develop estimates for the following sectors: (see table below)	Within 120 days of QAPP approval by EPA or by federally authorized delegate.

GHGRP Values	SIT Modules
Non-biogenic CO_2 from combustion (excluding electric power)	[co2ffc-module.xlsm] [solid-waste-module.xlsm, step 9] [natural-gas-and-oil-module.xlsm, flaring]
CH_4 and N_2O emissions	[stationary-combustion-module.xlsm] [coal-module.xlsm] [natural-gas-and-oil-module.xlsm] [solid-waste-module.xlsm] [wastewater-module.xlsm](industrial only)
Non-biogenic CO_2, N_2O and F-gases	[ip-module.xlsm]

2. Use data published by the EPA's Greenhouse Gas Reporting Program (GHGRP) to develop a comparison of the estimates:
Download the most recent set of data summary spreadsheets for each reporting year published by the EPA's GHGRP as a zip file at https://www.epa.gov/ghgreporting/data-sets. Website also has detailed GHGRP emissions data for the power sector, fluorinated gas production, HCFC-22 production, HFC-23 destruction, adipic acid, lime manufacturing, silicon carbide production, and soda ash. These GHGRP data include the state where each

Tasks and Deliverables	Schedule
Task 4. State Inventory of GHG Emissions for Other Major Sectors	

GHG source is located. Use these data to develop an inventory for each GHG-emitting sector in Arkansas for the selected reporting year:

a. *GHGRP non-biogenic CO_2 from combustion*. From the [2021] file published by the GHGRP, use the file for the selected reporting year. Use the data on the [Direct Emitters] sheet to develop a summary table similar to the table in **Attachment 2** with the following columns:
   i. State (from column E of GHGRP file)
   ii. Primary NAICS Code (from column K)
   iii. Primary NAICS Code Description (from https://www.census.gov/naics/?48967)
   iv. Statewide Total CO_2 by NAICS (sum ***column O*** by NAICS).
   v. Fraction of direct CO_2 emissions reported to GHGRP from Arkansas.
   vi. Category among SIT CO_2 combustion categories.
      1. Electric Power Generation
      2. Industrial
      3. Solid Waste (Step 9 - combustion)

b. *GHGRP methane emissions.* Develop another table similar to **Attachment 2**, but utilize the columns and categories for CH_4:
   i. Statewide Total CH_4 by NAICS (sum ***column P*** by NAICS Code).
   ii. Fraction of direct CH_4 emissions reported to GHGRP from Arkansas.
   iii. Category among SIT CH_4 categories.
      1. Electric Power Generation
      2. Industrial
      3. Solid Waste

c. *GHGRP N_2O emissions*. Develop a table similar to **Attachment 2**, but utilize the following columns and categories for N_2O:
   i. Statewide Total N_2O for NAICS (sum of ***column Q*** for each NAICS).
   ii. Fraction of direct N_2O emissions reported to GHGRP from Arkansas.
   iii. Category among SIT N_2O combustion categories.
      1. Electric Power Generation
      2. Industrial
      3. Solid Waste
   iv. Sort the sectors in the table in descending order by metric tons N_2O emitted in the selected year

d. *Other GHGs.* For other GHGs reported to GHGRP, develop table similar to Attachment 2, but utilize ***columns R through Z***, as appropriate, on [Direct Emitters] sheet for mass of emissions reported to the GHGRP from Arkansas.

3. In the inventory document, include a comparison of values calculated from the GHGRP data versus values calculated using the SIT. Evaluate the differences and discuss the types of industrial sources in the state that operate below the GHGRP applicability thresholds under 40 CFR Part 98 subpart A. Discuss the GHG sources in the state that are operating below GHGRP thresholds and provide estimates of the number of minor permits issued in the sectors where the SIT inventory has higher emissions than the GHGRP inventory.
4. In the GHG inventory report or in a separate report based on the inventory, include a listing of options for emission reductions from this sector that includes the following components:

Tasks and Deliverables	**Schedule**
Task 4. State Inventory of GHG Emissions for Other Major Sectors	
a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the option with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the option with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state, or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. A description of any benefits that the option will impart to communities with air toxics concerns under the option. f. Evaluation of the option's impacts on soil, water, or other natural resources.	

Table 2.5 Technical Task Descriptions for Task 5.

Tasks and Deliverables	**Schedule**
Task 5. Compile Statewide Inventory for Minor GHG Sources	
1. Develop estimates for the following sectors using the federal default values in the EPA's State Inventory and Projection Tool (SIT). 2. In the GHG inventory report or a separate report based on the inventory, include a listing of option for emission reductions from this sector that includes the following components: g. Specific source categories and activities affected by the proposed option. h. Quantity of GHG emissions reduced by option with uncertainty estimate. i. Quantity of criteria emissions reduced by option with uncertainty estimate. j. Quantity of toxic emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with associated uncertainty estimate. k. Description of any benefits the option will impart to communities with air toxics concerns under the option. l. Evaluation of the option's impacts on soil, water, or other natural resources.	Within 120 days of QAPP approval by EPA or by federally authorized delegate.

1.7. Quality Objectives / Criteria

The primary objectives for this project are to develop reliable inventories for each of the primary GHG-emitting sectors in Arkansas and to identify options for reducing emissions from those sectors. Accordingly, all quality objectives and criteria are aligned with these primary objectives. The quality system used for this project is the joint responsibility of the E&E PM, Task Leaders, and QAC. As discussed in Section 1.4, an organizationally independent QAM will maintain oversight of all required measures in this QAPP. QC functions will be carried out by technical staff and will be carefully monitored by the responsible Task Leaders, who will work with the QAM and QAC to identify and implement quality improvements. All activities performed under this project will conform to this QAPP.

1.7.1. Data Quality, Management, and Analyses

For this project, E&E will use a variety of QC techniques and criteria to ensure the quality of data and analyses. Data of known and documented quality are essential components for the success of the project, as these data will be used to inform the decision-making process for the Arkansas's PAP and CAP as discussed in Section 1.5.4 of this QAPP. The table in **Appendix A** lists by task the specific QC techniques and criteria that are part of this QAPP.

The data quality objectives and criteria for this project are accuracy, precision, bias, completeness, representativeness, and comparability. *Accuracy* is a measure of the overall agreement of a measurement to a known value. It includes a combination of random error (precision) and systematic error (bias). *Precision* is a measure of how reproducible a measurement is or how close a calculated estimate is to the actual value. *Bias* is a systematic error in the method of measurement or calculation. If the calculated value is consistently high or consistently low, the value is said to be biased. Our goal is to ensure that information and data generated and collected are as accurate, precise, and unbiased as possible within project constraints. It is not anticipated that this project will include primary data collection. Generally, existing data and tools provided by the EPA and other qualified sources will be used for project tasks. A subject matter specialist familiar with technical reporting standards (such as a permit writer or compliance engineer with knowledge of the state's facilities operating in the sector) will be used to QA all data utilized for developing the statewide GHG inventory. E&E will verify the accuracy of all data by checking for logical consistency among datasets. All existing environmental data shall meet the applicable criteria defined in CFR and associated guidance, such as the validation templates provided in the *EPA QA Handbook Volume II*.

Uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific project activity being evaluated.

When available, data originally gathered using published methods whose applicability, sensitivity, accuracy, and precision have been fully assessed, such as EPA reference methods, will be preferred and considered to be of acceptable quality. Project decisions may be adversely impacted if, for example, existing data were used in a manner inconsistent with the originator's purpose. Metadata can be described as the amount and quality of information known about one or more facets of the data or a dataset. It can be used to summarize basic information about the data (e.g., how, why, and when the existing data were collected), which can make working with specific data or datasets easier and provides the user with more confidence. Metadata are valuable when evaluating existing data, as well as when planning for collection primary data that may be required in the future. However, the effort needed to locate and obtain original source materials can be costly. Accordingly, a graded approach to planning will be applied and ongoing discussions with the EPA will be held to determine what magnitude and rigor of QA effort are appropriate and affordable for the project.

For the data analysis completed under this project, analytical methods will be reviewed to ensure the approach is appropriate and calculations are accurate. Spreadsheets will be used to store data and complete necessary analyses. Design of spreadsheets will be configured for the intended use. All data and methodologies specific to each analysis will be defined and documented. Tables and fields will be clearly and unambiguously named. Spreadsheets will be checked to ensure algorithms call data correctly and units of measure are internally consistent. Hand-entered or electronically transferred data will be checked to ensure the data are accurately transcribed and transferred.

The draft inventory will be evaluated for GHG-emitting-sector and geographic completeness. E&E will utilize the framework of sectors in the EPA's SIT tool or the EPA's state-level GHG inventories to ensure that the inventory prepared under this project includes all major GHG-emitting sectors. To ensure the inventory is geographically complete, the draft inventory will also be submitted for review by E&E staff within the state's regional offices or by stakeholders from the various regions of the state to ensure that all major-emitting activities in all regions of the state are included in the inventory.

Representativeness is a qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. E&E will use the most complete and accurate information available to compile representative data for this project.

Data c*omparability* is a qualitative term that expresses the measure of confidence that one dataset can be compared to another and can be combined for the decision(s) to be made. E&E will compare datasets when available from different sources to check for the quality of the data. This QA step will also ensure that any highly correlated datasets or indicators are identified. Supporting data, such as information on test methods used and complete test reports, are important to ensure the comparability of emissions data.

1.7.2. Document Preparation

All documents produced under this project will undergo internal QC review, as well as technical review and an editorial review, prior to submission to the EPA PO. QC will be performed by an engineer, scientist, or economist, as appropriate, with sufficient knowledge. The technical reviewer will review the document for accuracy and integrity of the technical methodologies, analyses, and conclusions.

An editorial review of all final documents will be performed. Editors will verify clarity, spelling, and grammatical correctness, and ensure documents are free of typographical errors. Editors will verify that references are cited correctly. This will include a comparison against the original documents.

The *QC Documentation Form* (**Appendix B**) will be used to track the approval process. The form must be completed and signed for all document deliverables. The signatures required include those of the Task Leader and technical and editorial reviewers. Completion of this form certifies that technical review, editorial review, and all required QC procedures have been completed to the satisfaction of the TL and QAC. Copies of these signed forms will be maintained in the project files.

1.8. Special Training / Certifications

All E&E staff assigned to work on this project shall have appropriate technical and QA training to properly perform their assignments. E&E staff serving in QAM or QAC roles under this project will have completed a training course on QA/QC activities similar to the course available at https://www.epa.gov/quality/training-courses-quality-assurance-and-quality-control-activities. The PM and all TLs under this project will have completed an online training course on air emissions inventory on the Air Knowledge website at https://airknowledge.gov/EMIS-SI.html.

If training is required for new staff or for particular segments of the GHG inventory, the PM in coordination with the associated TL will identify available training resources for the inventory segment and incorporate the required training into the project schedule.

1.9. Documents and Records

E&E will document in electronic form (and/or hard copy) QC activities for this project. The TL is responsible for ensuring that copies of all completed QC forms, along with other QA records (including this QAPP), will be maintained in the project files. Project files will be retained by E&E for a minimum of 2 years after closure of the period of performance. The types of documentation that will be prepared for this project include:

- Planning documentation (e.g., QAPP)
- Implementation documentation (i.e., Review/Approval Forms and QA records)
- Assessment documentation (i.e., QA audit reports).

Detailed documentation of QC activities for a specific task or subtask will be maintained using the *QC Documentation Form* shown in **Appendix B**. This form will document the completion of the QC techniques planned for use on this project as listed in the table in **Appendix A**. One or more completed versions of these forms, as necessary, will be maintained in the project files. The types of documents for which QC will be conducted and documented may include raw data, data from other sources such as data bases or literature, field logs, sample preparation and analysis logs, instrument printouts, model input and output files, and results of calibration and QC checks.

Technical reviews will be used along with other technical assessments (i.e., QC checks) and QA audits to corroborate the scientific defensibility of any data analyses. A technical review (i.e., internal senior review) is a documented critical review of a specific technical work product. It is conducted by subject matter experts who are collectively equivalent (or senior) in technical expertise to those who performed the work. Given the nature of the deliverables under this project, a technical review is an in-depth assessment of the assumptions, calculations, extrapolations, alternative interpretations, and conclusions in technical work products. Technical review of proposed methods and associated data will be documented in the *QC Documentation Form* shown in **Appendix B**. The form will include the reviewer's charge, comments, and corrective actions taken.

Additionally, E&E has developed and instituted document control mechanisms for the review, revision, and distribution of QAPPs. Each QAPP has a signed approval form, title page, table of contents, and a document control format that conforms to EPA's Environmental Information QAPP Standard; see header at top of the page. The distribution list for this QAPP was presented in **Table 1.1**. During the course of the project, any revision to the QAPP will be circulated to everyone on the distribution list, as well as to any additional staff supporting this project. Any revision to the QAPP will be documented in a QAPP addendum, approved by the same signatories to this QAPP, and circulated to everyone on the distribution list by the E&E PM.

At this time, E&E does not know if the project will collect or handle personally identifiable information (PII) subject to the Privacy Act of 1974. However, if during the course of this project technical staff determine that PII is required to support project objectives, E&E will meet all requirements of the Privacy Act of 1974. **Appendix C** indicates the status of the state's determination regarding applicability of the Privacy Act of 1974 under this project.

2. Existing Data Acquisition and Management Protocols (Group B)

2.1. Sampling Process Design

2.1.1. Need and Intended Use of Data Used

As indicated in **Tables 2.1–2.5**, a wide range of data for a diverse set of GHG-emitting activities is necessary to prepare a statewide inventory. Existing data resource may include sector-specific or facility-specific GHG emissions estimates, emissions factors, or activity data for use with emissions factors. The experimental design for this inventory project relies on the EPA's State Inventory Tool (SIT) together with independent estimates prepared by E&E. The SIT allows for expedited estimates for many sectors with default entries included in the tool. Existing data resources from previously completed inventories will be utilized to develop GHG emissions estimates that are comparable to the SIT estimates. Subsequently, the SIT estimates for each sector will be compared to any independent state estimate utilized for the statewide inventory.

2.1.2. Identification of Data Sources and Acquisition

In addition to the data integrated into the EPA's SIT tool, the following data sources will be utilized under each task to develop estimates for the major-emitting sectors in Arkansas

- Task 1: Activity data for electricity generators published by the U.S. Department of Energy (DOE) under EIA Form 923.
- Task 2: Data published by the EPA under the Greenhouse Gas Reporting Program.
- Task 3: The EPA's SIT tool is expected to be the primary source for this task.

2.2. Quality Control

All environmental information operations conducted for this project will involve existing, non-direct measurement data. All data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use. In addition to reviewing and assessing the data collected, all data entered into spreadsheets and all calculations completed for analyses will be reviewed by a senior technical reviewer. The reviewer will evaluate the approach to ensure the methods are appropriate and have been applied correctly to the analysis. The technical reviewer will also confirm all data were entered correctly and that calculations are complete and accurate. Calculations will be checked by repeating each calculation, independently, and comparing the results of the two calculations. Any data entry and calculation errors will be identified and corrected. Data tables prepared for the draft and final reports will be checked against the spreadsheets used to store the data and complete the analysis.

Where calculations are required to assess the data/datasets, calculations will be performed using computer spreadsheets and calculators to reduce typographical or translation errors–mathematical/statistical calculations are performed using spreadsheets or software programs with predefined formulas and functions. E&E will ensure that any manipulations performed on the data/dataset were done correctly. Such calculations could involve statistical checks to look for data outliers. One approach, for example, that may be used to identify outliers or unusual data points is sorting a datasheet for one or more data variables. This approach is a simple but effective way to highlight unusually high or low values. Graphing data using boxplots, histograms, and scatterplots is another method used to identify gaps in the data (missing data), outliers, or unusual data points. Another approach is the use of Z-scores, which can quantify the unusualness of an observation when data follow a normal distribution. A Z-score for a particular value indicates the number of standard deviations above and below the mean that the value falls. For example, a Z-score of 2 indicates that an observation is two standard deviations above the average while a Z-score of -2 indicates the value is two standard deviations below the mean. A Z-score of zero represents a value that equals the mean. As appropriate, E&E will also use hypothesis tests to find outliers, or an interquartile range (IQR) to calculate boundaries for what constitutes minor and major outliers. The methods used will be driven by the scale and type of data. E&E will determine outlier detection methods to be used based on the initial review of the data. Identified outliers will be highlighted to the EPA PO or delegate with options for treatment.

2.3. Non-direct Measurements

All environmental information operations conducted on this project will involve existing, non-direct measurement data. All existing data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use.

Consistent with the EPA's QA requirements, this QAPP describes the procedures that will be used to ensure the selection of appropriate data and information to support the goals and objectives of this project. Specific elements addressed by this QAPP include:

- Identifying the sources of existing data,
- Presenting the hierarchy for data selection,
- Describing the review process and data quality criteria,
- Discussing quality checks and procedures should errors be identified, and
- Explaining how data will be managed, analyzed, and interpreted.

Data presented in the GHG inventory will be traced to its source (e.g., database input and output). Key resources include data collected by the EPA (e.g., GHGRP data), and data from EPA-approved data sources (e.g., EIA Form 923 data). These sources may include primary literature (i.e., peer-reviewed journal articles and reports) or databases. We may also use approved existing sources (e.g., handbooks, databases). Original sources for all information and data contained in the document will be included in a list of references with appropriate citations. When peer-reviewed literature or EPA-approved data sources cannot be used, we will document any significant limitations to the data sources used.

We will document information regarding each dataset and our rationale/selection criteria for selecting the data sources used in the inventory. The TL will be responsible for overseeing and confirming the selection of the data for the project tasks.

Table 3.1 presents an example hierarchy for data quality when identifying and reviewing available sources of data and information. When evaluating data resources, efforts will be made to identify and select data sources that most closely conform to the highest ranked criteria. Data quality metrics and documentation may not be provided by each source, and as necessary, we may consult with subject matter experts from permitted facilities or trade associations operating in Arkansas to qualify data for use to meet project objectives.

Any available data quality information will be reviewed by E&E and project advisors to ensure that the data represent full-scale designs and commercial processes, and that they are applicable to economic and regulatory conditions in the United States. E&E will document data sources used and any significant limitations of utilized data or information to ensure that the data are appropriate for their intended use. An internal technical reviewer will review the approach for selecting and compiling data; the review will include examination of the data sources and the intended use of the data. The specific QC techniques used will depend on the technical activity or analysis to which they are applied. The E&E TL is responsible for verifying the usability of data and related information.

Table 3.1 Existing Data Quality Ranking Hierarchy

Quality Rank	**Source Type**
Highest	Federal, state, and local government agencies
Second	Consultant reports for state and local government agencies
Third	NGO studies; peer-reviewed journal articles; trade journal articles; conference proceedings
Fourth	Conference proceedings and other trade literature: non-peer-reviewed
Fifth	Individual estimates (e.g., via personal communication with vendors)

E&E will work with EPA to ensure that all data used for the project are appropriate for their intended use. The main criteria that will be used in the selection of the data are the quality of the data (based on peer review, credible source, and/or QA documentation), availability, suitability for the intended purpose, and agreement with SIT estimates.

E&E will use the Secondary Data Quality Ranking Hierarchy when identifying and reviewing available sources of information. The source types in **Table 3.1** appear in the order in which they are likely to meet data quality criteria. For example, federal government data are more likely to be from a credible source, thoroughly reviewed, suitable, available, and representative, and any exceptions to these data criteria are likely to be noted in the government data, providing transparency. Data from individuals are expected to be less reliable, not peer reviewed, and may not be suitable or representative.

If it is determined that data meeting the fourth (i.e., conference proceedings and other trade literature: non peer-reviewed) or fifth (i.e., individual estimates such as personal communications with vendors) level are from the best or only available data source, the TL will include in the inventory a description of these data with associated limitations for review by the EPA PO or delegate.

These measures of data quality will be used to judge whether the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will include in the inventory a discussion for review by the EPA PO or delegate explaining how emissions estimates that relied on such data compare to SIT estimates.

We will also consider, for example, the age (i.e., date of dataset) and the representativeness of the data and will include in the inventory report for review by the EPA of any quality concerns regarding data that are outdated or that have other quality issues, like data gaps or inconsistency with other sources. Any data source utilized that is older than 10 years will specifically be flagged in the inventory report.

Representativeness will be evaluated by determining that the emissions or activity data are descriptive of conditions in the United States, data are current, and data are descriptive of similar processes within Arkansas. Any incomplete datasets will be identified, and deficiencies will be evaluated to determine whether data are missing or confusing and if they meet the secondary-use quality objectives.

Key screening criteria will be used to screen the sources identified. The E&E TL will provide oversight to the screening process to ensure sources collected are the most relevant and meet quality requirements. Available data and information from the selected sources will be compiled and relevant summary information will be extracted out of the information sources to develop the required output for each of the project tasks.

2.3.1. Criteria for Accepting Existing Data for Intended Use

The criteria for determining whether the data are acceptable for use in developing the statewide inventory will be based on a comparison of the associated emissions estimate to the emissions estimate produced using the EPA's SIT. While some differences between the state's calculations and SIT calculations are expected, differences of more than 10 percent must be accompanied by an explanation subject to approval by the EPA prior to using the state's estimate in lieu of the SIT estimate.

2.3.2. Criteria for Options Identification in Planning Phase

The criteria for reviewing all activities under each task and identifying the best options for emissions reductions will be based on the following criteria[14] in the EPA's CPRG program guidance:

1. Quantity of reductions in emissions of climate pollution under the option.
2. Number of jobs likely to be created by the option.
3. Benefits of the project on communities with legacy pollution concerns, including the number of people living in such neighborhoods that will benefit from the option.
4. Quantity of reductions in criteria and toxic air pollutants that can be achieved by option.
5. Number of people living, working, recreating, and going to school in the area(s) benefiting from the option.

[14] CPRG Program Guidance, page 4. Available at https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants#CPRGProgramGuidance.

2.4. Data Management

Data management procedures include file storage and file transfer. All project and data files will be stored on E&E project servers. Files will be organized and maintained by the TL in folders by project, task, and function, including a system of file labeling to ensure version control. Any files containing confidential business information will be stored on secure computers. The TL will make sure that staff are trained and adhere to the project file organization and version control labeling to ensure that files are placed in consistent locations. All files will be backed up each night to avoid loss of data. Data are stored in various formats that correspond to the software being used. As necessary, data will be transferred using various techniques, including email, File Transfer Protocol, or shared drives. Typically, records will be archived once the project is completed. Record retention times will be based on contractual and statutory requirements or will follow E&E's practices for storing materials of up to 2 years after the end of the period of performance (POP). Multiple project staff are granted access rights to the archived file system for each project. Records may be retrieved from archived file system by the TL, PM, or other project staff with access during the records retention period. As soon as allowed by applicable regulations or the grant agreement, records will be destroyed according to E&E policies and procedures. For any sensitive information that is gathered under the project, E&E's policy is consistent with EPA–recommended methods of destruction, which include degaussing, reformatting, or secure deletion of electronic records; physical destruction of electronic media; recycling; shredding; incineration; and pulping. Should the grant specify some other manner of disposition (e.g., transfer to the client), E&E will comply with that directive. As noted above, E&E has developed a file naming convention/nomenclature for electronic file tracking and record keeping. Foremost, all files must be given a short but descriptive name. For those records and files gathered or provided to E&E, the filename may include the identification of "original" in its filename.

Similarly, files that have undergone a review by an independent, qualified person will include, at the end of the filename, the initials of the reviewer or the suffix "rev" (in lieu of initials) if more than one reviewer reviewed the file, along with the date reviewed and version number, as a way to track which staff person(s) reviewed the file and when. Filenames of draft versions will follow an incremental, decimal numbering system. More specifically, each successive draft of a document is numbered sequentially from version 0.1, 0.2, 0.3… until a final version is complete. Final versions will be indicated by whole numbers (e.g., version 1.0). Final versions of documents that undergo revisions will be labeled version X.1 for the first set of revisions. While the document is under review, subsequent draft versions will increase incrementally (e.g., 1.2, 1.3, 1.4) until a revised final version is complete (e.g., version 2.0).

In the event data retrieval is requested and to prevent loss of data, all draft and final file versions will be retained electronically—that is, superseded versions will not be deleted.

Note that changes made to deliverables will be done using the software's *track changes* feature, which allows a user to track and view all changes that are made to the document version. All deliverable reviews will be documented in a QC Documentation Form (see **Appendix B**) for the project. This form will be maintained in the project files.

For this project, it is not anticipated that any special hardware or software will be used. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work (described in **Tables 2.1–2.5)** for this project.

3. Assessment and Oversight (Group C)

E&E is committed to preparing a comprehensive and reliable inventory of GHG emissions from Arkansas. Under this project our senior management team has dedicated the necessary resources to ensure we deliver an inventory that can be relied upon for future policy decisions. Accordingly, under this project, we will concurrently implement existing quality management systems that E&E has previously utilized for submissions to the EPA under Title I of the Act where task-level deliverables will be subjected to required, regular reviews (e.g., quarterly) to ensure that technical, financial, and schedule requirements of this project are consistent with the EPA PO's and QAM's expectations. This section discusses Elements C.1 (assessments and response actions) and C.2 (reporting) applicable to this project.

3.1. Assessments and Response Actions

The QA program includes periodic review of data files and draft deliverables. The essential steps in the QA program are as follows:

1. Identify and define the problem
2. Assign responsibility for investigating the problem
3. Investigate and determine the cause of the problem
4. Assign and accept responsibility for implementing appropriate corrective actions
5. Establish the effectiveness of and implement the corrective action
6. Verify that the corrective action has eliminated the problem.

The TL will provide day-to-day oversight of the quality system. Periodic project file reviews will be carried out by the QAC, at least once per year to verify that required records, documentation, and technical review information are maintained in the files. The QAC will ensure that problems found during the review are brought to the attention of the Task Leader and are corrected immediately. All nonconforming data will be noted, and corrective measures to bring nonconforming data into conformance will be recorded.

The TLs and QAM are responsible for determining whether the quality system established for the project is appropriate and functioning in a manner that ensures the integrity of all work products. All technical staff have roles and will participate in the corrective action process. Corrective actions for errors found during QC checks will be determined by the TL and, if necessary, with the QAM. The originator of the work will make the corrections and will note on the QC form that the errors were corrected. A reviewer or TL, not involved in the creation of the work, will review the corrections to ensure the errors were corrected. Any problems noted during audits will be reviewed and corrected by the QAM and discussed with the TL as needed. Depending on the severity of the deficiency, the TL may consult the QAM and stop work until the cited deficiency is resolved. Deficiencies identified and their resolution will be documented in monthly project reports, as applicable. The QAM and TL will comply and respond to all internal and EPA audits on the project, as needed. The QAM will produce a report outlining any corrective actions taken.

3.2. Reports to Management

The periodic progress reports (to the EPA PO) required in the grant agreement will be reviewed by the PM and the PM's Manager, the Associate Director, to ensure the project is meeting milestones and that the resources committed to the project are sufficient to meet project objectives. These periodic progress reports will describe the status of the project, accomplishments during the reporting period, activities planned for the next period, and any special problems or events including any QA/QC issues. Reports to the EPA will be drafted by the TL or other project staff familiar with project activities during the reporting period.

Any QC issues impacting the quality of a deliverable, the project budget, or schedule will be identified and promptly discussed with the assigned TL and the PM or QAC as appropriate. All significant findings will be included in monthly reports with the methods used to resolve the specific QC issue or the recommendations for resolution for consideration by the EPA's PO or designee.

Based on the technical work completed during the reporting period, progress reports will be reviewed internally by an independent, qualified technical person (equivalent or senior to the TL), prior to submitting to the PM. The PM will conduct a final review of the report before transmitting the progress report to the EPA PO and the PM's manager will be cc'd on all progress reports.

4. Data Validation and Usability (Group D)

4.1. Data Review, Verification, Validation

All work conducted under this project will be subject to technical and editorial review. When existing data for the same GHG-emitting activity are available from multiple sources, the background information documents will be reviewed for all sources to determine the dataset that is the most representative of operations in the state. Additionally, the inventory report will include the vintage of the existing data resource and preference will be given to the most recent dataset that is representative of similar GHG-emitting activities in the state. Reviews will be conducted by an independent, qualified person—or a person not directly involved in the production of the deliverable. The term "validation" refers to whether the data meet the QAPP-defined user requirements while the term "verification" refers to whether conclusions can be correctly drawn from the data. The quality of data used and generated for the project will be reviewed and verified at multiple levels by the project team. This review will be conducted by the E&E TL or a senior technical reviewer with specific, applicable expertise. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all units of measure will be checked for consistency. Any potential issues identified through this review process will be evaluated and, if necessary, data will be corrected, and analysis will be revised as necessary, using corrected data. These corrections will be documented in project records. These measures of data quality will be used to judge whether the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will document these findings in the inventory along with corrective actions or use of alternative data sources.

4.2. Verification and Validation Methods

As a standard operating procedure, all data (retrieved and generated) will be verified and validated through a review of data files by an independent, qualified technical staff member (i.e., someone other than the document originator), and ultimately, the E&E TL. A checklist of QC activities for deliverables under this project is provided as **Appendix A**. Forms for documenting QC activities and review of deliverables are included in **Appendix B**. Documentation of calculations will be included in spreadsheet work products and in supporting memoranda, as appropriate.

The TL is responsible for day-to-day technical activities of tasks, including planning, data gathering, documentation, reporting, and controlling technical and financial resources. The TL is the primary person responsible for quality of work on tasks under this project and will approve all-related plans and reports. These reports will be transmitted by the TL to the QAM for final review and approval.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Reviews of analyses will include a thorough evaluation of content and calculated values. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all measurement units will be checked for consistency. Any potential issues identified through this review process will be evaluated, errors corrected, and analysis repeated using the corrected data. All corrections will be documented in project records.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Typical data verification reviews can include checks of the following:

- Data sources are clearly documented,
- Calculations are appropriately documented,
- All relevant assumptions are clearly documented,
- Conclusions are relevant and supported by results, and
- Text is well-written and easy to understand.

The documented review process will be stored with deliverables for the project. For the narrative describing the methodologies used for the inventory, all comments on drafts will be clearly and concisely summarized including a description of how substantive issues raised by commenters were resolved.

As discussed in Section 1.7, QC objectives include verification that data in database tables are stored and transferred correctly, algorithms call data correctly, units are internally consistent, and reports pull the required data. These data management issues will be addressed as part of the QC checks of data acquisition and document preparation.

For this project, it is not anticipated that any special data validation software will be required. However, where calculations are required to assess the data/datasets, calculations will be performed using computer spreadsheets (like Excel spreadsheets with predefined functions, or formulas) and calculators to reduce typographical or translation errors. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work as described in Section 1.6 for this project.

4.3. Reconciliation with User Requirements

All data (retrieved and generated) and deliverables in this project will be analyzed and reconciled with project data quality requirements. To ensure deliverables meet user requirements, the TL or senior technical lead will review all data and deliverables throughout the project to ensure that the data, methodologies, and tools used meet data quality objectives, are clearly conveyed, and represent sound and established science.

E&E will review each project with the EPA at the planning stage to ensure the approach is fundamentally sound and will meet the project objectives. The TL or senior technical lead will evaluate data continuously during the life term of the project to ensure they are of sufficient quality and quantity to meet the project goals. Prior to submission of draft and final products, the TL or senior technical lead will make a final assessment to determine whether the objectives have been fulfilled in a technically sound manner. Assumptions made in preparing project analyses will be clearly specified in the inventory.

As discussed in Section 1.7.1, uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific inventory activity being evaluated.

5. References

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US DOT, *Highway Statistics Series* at https://www.fhwa.dot.gov/policyinformation/statistics/2021/vm1.cfm . Accessed on 7/26/2023.

Appendix A: Example Check Lists of Quality Control Activities for Deliverables

Tasks and Deliverables	**Quality Control Procedures**
Task 1. Transportation Sector GHG Inventory (Mobile Sources)	
Statewide tabular inventory of GHG emissions from mobile sources with narrative report describing data sources, methodology, and documentation of QAPP implementation.	1. Comparison of (a) statewide inventory *versus* (b) statewide inventory developed using the EPA's State Inventory Tool (SIT). 2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory versus SIT estimates: (see table below) 3. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate. 4. Editor review—writing is clear, free of grammatical and typographical errors.

Transportation Fuel	State Estimate	Federal Estimate	Statistics*
Aviation Gasoline			
Distillate Fuel			
Ethanol			
Jet Fuel, Kerosene			
Jet Fuel, Naphtha			
Hydrocarbon Gas Liquids			
Lubricants			
Motor Gasoline			
Natural Gas			
Residual Fuel			
Other			

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state's estimate taken as the measured value and the SIT value taken as the audit value.

<table>
<tr><th>Tasks and Deliverables</th><th>Quality Control Procedures</th></tr>
<tr><td colspan="2">Task 2. Electric Power Generation and Consumption</td></tr>
<tr><td>Statewide tabular inventory of GHG emissions from electric power generation with narrative report describing data sources, methodology, and documentation of QAPP implementation.</td><td>
1. Comparison of (a) statewide inventory versus (b) statewide federal estimate developed by the EPA.

2. For any values in the state inventory that are significantly different from federal estimates, the table below will be utilized to assess precision and bias of the state’s estimate versus the federal estimate:

<table>
<tr><th>Electric Power Fuel</th><th>State Estimate</th><th>Federal Estimate</th><th>Statistics*</th></tr>
<tr><td>Coal</td><td></td><td></td><td rowspan="7"></td></tr>
<tr><td>Distillate Fuel</td><td></td><td></td></tr>
<tr><td>Natural Gas</td><td></td><td></td></tr>
<tr><td>Petroleum Coke</td><td></td><td></td></tr>
<tr><td>Residual Fuel</td><td></td><td></td></tr>
<tr><td>Wood</td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
</table>
* Precision and bias calculations will be in accordance with the EPA’s Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state’s estimate taken as the measured value and the SIT value taken as the audit value.

Ensure the GWPs used for the state estimate and the federal estimate are on the same basis. For example, the SIT tool uses AR5 GWP (e.g., methane GWP = 28).

3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate.

4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate)

5. Editor review—writing is clear, free of grammatical and typographical errors.
</td></tr>
</table>

<table>
<tr><th>Tasks and Deliverables</th><th>Quality Control Procedures</th></tr>
<tr><td colspan="2">Task 3. Natural and Working Lands and Forestry</td></tr>
<tr><td>Statewide tabular inventory of GHG emissions and sinks from natural and working lands and forestry with narrative report describing data sources, methodology, and documentation of QAPP implementation.</td><td>

1. Comparison of (a) statewide inventory versus (b) statewide inventory developed using the EPA's State Inventory Tool (SIT).

2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory versus SIT estimates:

<table>
<tr><th>Natural and Working Lands and Forestry Component</th><th>State Estimate</th><th>SIT Estimate</th><th>Statistics*</th></tr>
<tr><td>Net Forest Carbon Flux</td><td></td><td></td><td rowspan="7"></td></tr>
<tr><td>Urban Trees</td><td></td><td></td></tr>
<tr><td>Landfilled Yard Trimmings Food Scraps</td><td></td><td></td></tr>
<tr><td>Forest Fires</td><td></td><td></td></tr>
<tr><td>N_2O from Settlement Soils</td><td></td><td></td></tr>
<tr><td>Agricultural Soil Carbon Flux</td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
</table>
* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state's estimate taken as the measured value and the SIT value taken as the audit value.

3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate.

4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate)

5. Editor review—writing is clear, free of grammatical and typographical errors.
</td></tr>
</table>

Tasks and Deliverables	**Quality Control Procedures**
Task 4. State Inventory of GHG Emissions from Other Major Sectors	
Statewide tabular inventory of GHG emissions from the state's major industrial, sources with narrative report describing data sources, methodology, and documentation of QAPP implementation.	1. Comparison of (a) statewide inventory *versus* (b) statewide inventory developed using the EPA's State Inventory Tool (SIT). 2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory versus SIT estimates: (see table below) 3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate. 4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of detail appropriate. 5. Editor review: writing is clear, free of grammatical and typographical errors.

Fuels and Feedstocks for Other Major Sectors	State Estimate	SIT Estimate	Statistics*
Asphalt and Road Oil			
Aviation Gasoline Blending Components			
Coal			
Coking Coal			
Crude Oil			
Distillate Fuel			
Feedstocks, Naphtha less than 401 F			
Feedstocks, Other Oils greater than 401 F			
Hydrocarbon Gas Liquids			
Kerosene			
Lubricants			
Misc. Petro Products			
Motor Gasoline			
Motor Gasoline Blending Components			
Natural Gas			
Pentanes Plus			
Petroleum Coke			
Residual Fuel			
Special Naphthas			
Still Gas			
Unfinished Oils			
Waxes			
Wood			
Other			

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state's estimate taken as the measured value and the SIT value taken as the audit value.

Tasks and Deliverables	**Quality Control Procedures**

Task 5. State Inventory of GHG Emissions from Minor Sectors

Tasks and Deliverables: Statewide tabular inventory of GHG emissions from the state's minor sectors with narrative report describing data sources, methodology, and documentation of QAPP implementation.

Quality Control Procedures:

1. Comparison of (a) statewide inventory *versus* (b) statewide inventory developed using the EPA's State Inventory Tool (SIT).
2. For any values used in state inventory inconsistent with values calculated using the SIT, the table below will be utilized to assess precision and bias of the statewide inventory for minor sectors versus SIT estimates:

Fuels and Feedstocks for Other Major Sectors	State Estimate	SIT Estimate	Statistics*
Asphalt and Road Oil			
Aviation Gasoline Blending Components			
Coal			
Coking Coal			
Crude Oil			
Distillate Fuel			
Feedstocks, Naphtha less than 401 F			
Feedstocks, Other Oils greater than 401 F			
Hydrocarbon Gas Liquids			
Kerosene			
Lubricants			
Misc. Petro Products			
Motor Gasoline			
Motor Gasoline Blending Components			
Natural Gas			
Pentanes Plus			
Petroleum Coke			
Residual Fuel			
Special Naphthas			
Still Gas			
Unfinished Oils			
Waxes			
Wood			
Other			

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the state's estimate taken as the measured value and the SIT value taken as the audit value.

3. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate.
4. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of detail appropriate.
5. Editor review: writing is clear, free of grammatical and typographical errors.

Appendix B: Example QC Documentation Form

<Grantee Org.>

Documentation of QA Review and Approval of Electronic Deliverables

Approvals on this form verify that all technical and editorial reviews have been completed and the deliverable meets the criteria for scientific defensibility, technical, and editorial accuracy, and presentation clarity as outlined in the Quality Assurance (QA) Project Plan, QA Narrative, Quality Management Plan, and/or according to direction from the EPA PO.

Client:	EPA Region <X>
Grant Number:	<enter grant number>
EPA Project Officer:	<enter EPA PO>
Project Number:	<enter internal Project ID>
Project Name:	<enter internal project name>
Grantee Org. Project Manager	<enter grantee's project manager>

QA Form Details

Item Number	File Name (Copy the name of the File Reviewed)	Deliverable Description	Date Sent to Client	Deliverable (Draft)	Deliverable (Final)	Document Originator	QA Review Information (Review Type)	(Reviewer Name)	(Date Review was Performed)	(Brief Summary of Review Findings and Other Notes)	QA Review Information (Have all Findings Been Resolved)	(Originator Signature)	(Reviewer Signature)	(File Location) *Copy Long Folder Path Name*
01				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			
02				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			
03				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			
04				☐	☐		*Technical*				☐ Yes			
							Technical				☐ Yes			

Appendix C: Compliance with Requirements Under the Privacy Act of 1974

Important Note about Personally Identifiable Information (PII)

The Privacy Act of 1974 (5 U.S.C. § 552a) mandates how federal agencies maintain records about individuals. Per OMB Circular A-130, Personally Identifiable Information (PII) is "information that can be used to distinguish or trace an individual's identity, either alone or when combined with other information that is linked or linkable to a specific individual."

EPA systems/applications that collect PII must comply with EPA's Privacy Policy and procedures to guard against unauthorized disclosure or misuse of PII in all forms. For more information click here. If PII are collected, then the QAPP will describe how the PII are managed and controlled.

Personally identifiable information (PII):

Please verify one of the following two options by checking the corresponding box:

1. This project **will not** collect Personally Identifiable Information (PII): **x**
2. This project **will** collect Personally Identifiable Information (PII): ☐

This QAPP will comply with 5 U.S.C. § 552a and EPA's Privacy Policy.

Attachment 1: Example Electric Power Generation Calculations

A	B	C	D	E	F	G	H	I
Fuel Type Code (EIA 923 RY2020)	**Fuel Description (EIA 923 - RY2020)**	**Example Totals for Arkansas (million Btu) (EIA 923 - RY2020)**	**CO_2 Emission Factors from 40 CFR Part 98 Table C-1 (kg CO2/MMBtu)**	**CO_2 Emission Factors from 40 CFR Part 98 Table C-1 (kg CH4/MMBtu) (GWP = 25)**	**CO_2 Emission Factors from 40 CFR Part 98 Table C-1 (kg N2O/MMBtu) (GWP = 298)**	**Million Metric Tons CO2e (C x D/1E09) + (C x E/1E09 x 25) + (C x F/1E09 x 298)**	**Biogenic Fraction**	**Million Metric Tons CO2e (Fossil Fuels) (G x (1 - H))**
WND	Wind	0	0	0	0	0.00E+00	0	0
LIG	Lignite Coal	0	97.72	1.10E-02	1.60E-03	0.00E+00	0	0
WAT	Water at a Conventional Hydroelectric Turbine and …	39,719,998	0	0	0	0.00E+00	0	0
NG	Natural Gas	149,250,673	53.06	1.00E-03	1.00E-04	7.93E+00	0	7.92741965
OG	Other Gas	0	59	3.00E-03	6.00E-04	0.00E+00	0	0
SUB	Subbituminous Coal	158,577,328	97.17	1.10E-02	1.60E-03	1.55E+01	0	15.5281774
DFO	Distillate Fuel Oil. Including diesel, No. 1, No. 2, and No. 4	516,257	73.96	3.00E-03	6.00E-04	3.83E-02	0	0.03831339
WH	Waste Heat not directly attributed to fuel	0	0	0	0	0.00E+00	0	0
TDF	Tire-derived Fuels	184,873	85.97	1.10E-02	1.60E-03	1.60E-02	0.24	0.01218471
AB	Agricultural By-Products	0	118.17	3.20E-02	4.20E-03	0.00E+00	1	0
PG	Gaseous Propane	0	61.46	3.00E-03	6.00E-04	0.00E+00	0	0
RFO	Residual Fuel Oil Includes No. 5 & 6 and bunker C…	21658	75.1	3.00E-03	6.00E-04	1.63E-03	0	0.00163201
WO	Waste/Other Oil. Including crude oil, liquid butane, liquid propane, naphtha, oil waste …	0	74	3.00E-03	6.00E-04	0.00E+00	0	0
Fossil Fuel Total								**23.5077272**

Attachment 2: Example Table for CO_2 Combustion Emissions in State of North Dakota

CO_2 Emissions from Major-emitting Combustion Sources in State of North Dakota

A State	B Primary NAICS Code	C Statewide GHGs[15] Reported to GHGRP Direct Emitting Subparts (MT CO2e)	D Fraction of Statewide Emissions	E Primary NAICS Descriptor	F SIT Category
ND	221112	27,832,255	80.7%	Fossil Fuel Electric Power Generation	Electric Power
ND	221210	2,822,240	8.2%	Natural Gas Distribution	Industrial
ND	486210	875,129	2.5%	Pipeline Transportation of Natural Gas	Industrial
ND	311313	833,225	2.4%	Beet Sugar Manufacturing	Industrial
ND	211130	800,699	2.3%	Natural Gas Extraction	Industrial
ND	325193	504,764	1.5%	Ethyl Alcohol Manufacturing	Industrial
ND	324110	466,909	1.4%	Petroleum Refineries	Industrial
ND	311224	81,072	0.2%	Soybean and Other Oilseed Processing	Industrial
ND	311411	76,234	0.2%	Frozen Fruit, Juice, Vegetables	Industrial
ND	221330	59,627	0.2%	Steam and Air-Conditioning Supply	Industrial
ND	311221	53,420	0.2%	Wet Corn Milling	Industrial
ND	923110	45,296	0.1%	Administration of Education Programs	Industrial
ND	424710	25,912	0.1%	Petroleum Bulk Stations and Terminals	Industrial
ND	562212	1,172	0.003%	Solid Waste Landfill	Solid Waste, Step 9
Total		**34,477,956**			
Electric Power Total		**27,832,255**			
Industrial Total		**6,644,529**			
Solid Waste Step 9		**1,172**			

[15]Example Data from the EPA's Greenhouse Gas Reporting Program [2021_data_summary_spreadsheets.zip] available at https://www.epa.gov/ghgreporting/data-sets.