STATE OF LOUISIANA
GOVERNOR JOHN BEL EDWARDS

LOUISIANA PRIORITY CLIMATE ACTION PLAN

January 2024

Office of the Commissioner
State of Louisiana
Division of Administration

JOHN BEL EDWARDS
GOVERNOR

JAY DARDENNE
COMMISSIONER OF ADMINISTRATION

December 20, 2023

US Environmental Protection Agency, Region 6
Air and Radiation Division Air Grants Section (6ARP-G)
1201 Elm Street, Suite 500
Dallas, Texas 75270-2102

RE: Submission of Louisiana Priority Climate Action Plan

To whom it may concern,

I am pleased to deliver the Louisiana Priority Climate Action Plan as part of the first deliverables of EPA's Climate Pollution Reduction Grant. Through this grant, Louisiana has prioritized strategies that will lead to improved air quality, reduce greenhouse gas and co-pollutants emissions, benefit disadvantaged communities, create jobs, strengthen the state's resilience, and reduce energy costs. We identified and honed in on these strategies with significant input from residents, elected officials, various task force members and agency and industry representatives. We would like to thank them for their time, willingness to share their knowledge and continued collaboration as the priorities will be implemented at all scales.

We are proud to have built this priority action plan on the efforts of Louisiana's Climate Action Plan. Louisiana is the only state in the Deep South to have adopted a climate action plan in 2022 which set out to net zero carbon emission by 2050. This is a significant task and the CPRG program has further enabled it to reach this goal. As we look toward implementation, we look forward to working closely with local governments and state and federal partners. Together we can learn, share, and realize the vision of a Louisiana that has diversified and strengthened its role in supplying energy to the nation, leads in the resilience of its communities and residents and is part of the transformative mobility that the Bipartisan Infrastructure Law and the Inflation Reduction Act support.

Sincerely,

Jay Dardenne
Commissioner

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The State of Louisiana, along with the Metropolitan Statistical Areas (MSAs) of New Orleans and Baton Rouge, received funding through the U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Grant (CPRG) to develop plans to reduce greenhouse gas (GHG) emissions and other harmful air pollution. The CPRG planning grant enables states, MSAs, and tribal governments to develop a Priority Climate Action Plan (PCAP), followed by a Comprehensive Climate Action Plan and Status Report, over a four-year period. EPA requires that all PCAPs include a Greenhouse Gas Inventory, quantified GHG reduction measures, a Low Income/ Disadvantaged Communities (LIDAC) Benefits Analysis, as well as a review of authority to implement each measure.

The Louisiana Priority Climate Action Plan presents a focused list of cross-sector measures to reduce GHG emissions and harmful air pollution and maximize the benefits of climate action in overburdened communities. Section One Sets the Stage and highlights background information, including a summary of the 2022 Louisiana Climate Action Plan which the Louisiana Priority Climate Action Plan builds on. Section Two focuses on the Process of development of the priority measures and elaborates on the outreach and engagement conducted to solicit input and feedback for the development of the focus areas and priority actions. Section Three contains the Priority Measures and provides information and details on the 13 focus areas, 29 priority outputs, and 89 priority actions, including quantified GHG emission reductions and a review of authority to implement. Within each of the focus areas, a status update and transformative impact of the respective measures are provided. An intersection with federal funding overview where Louisiana has pursued and/or received funding through the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) is also provided. Section Three concludes with the LIDAC Benefit Analysis. Section Four contains activities and plans as we look ahead to the next three years of the CPRG. The Louisiana Priority Climate Action Plan concludes with references, a glossary of terms, and appendices in sections five, six, and seven respectively.

The Louisiana Priority Climate Action Plan is a continuation of climate planning efforts commenced by the Climate Initiatives Task Force and serves as a resource and guide of implementing strategies and actions as part of the second phase of the CPRG and through eligible entities and beyond.

FOCUS AREAS FOR REDUCING GREENHOUSE GASES IN LOUISIANA

Offshore Wind

Clean Ports

Community Solar

Regional Transit

Community Reslience Hubs

Built Environment Retrofits

Transmission Planning

Community Forestry and Greening

Industrial Decarbonization

Sustainable Agriculture

Methane Emissions

Land Protection and Restoration

Fleet Transition

1

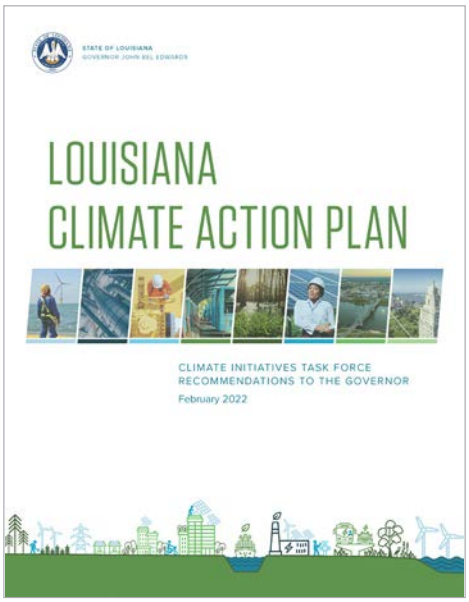
SETTING THE STAGE

THE LOUISIANA CLIMATE ACTION PLAN

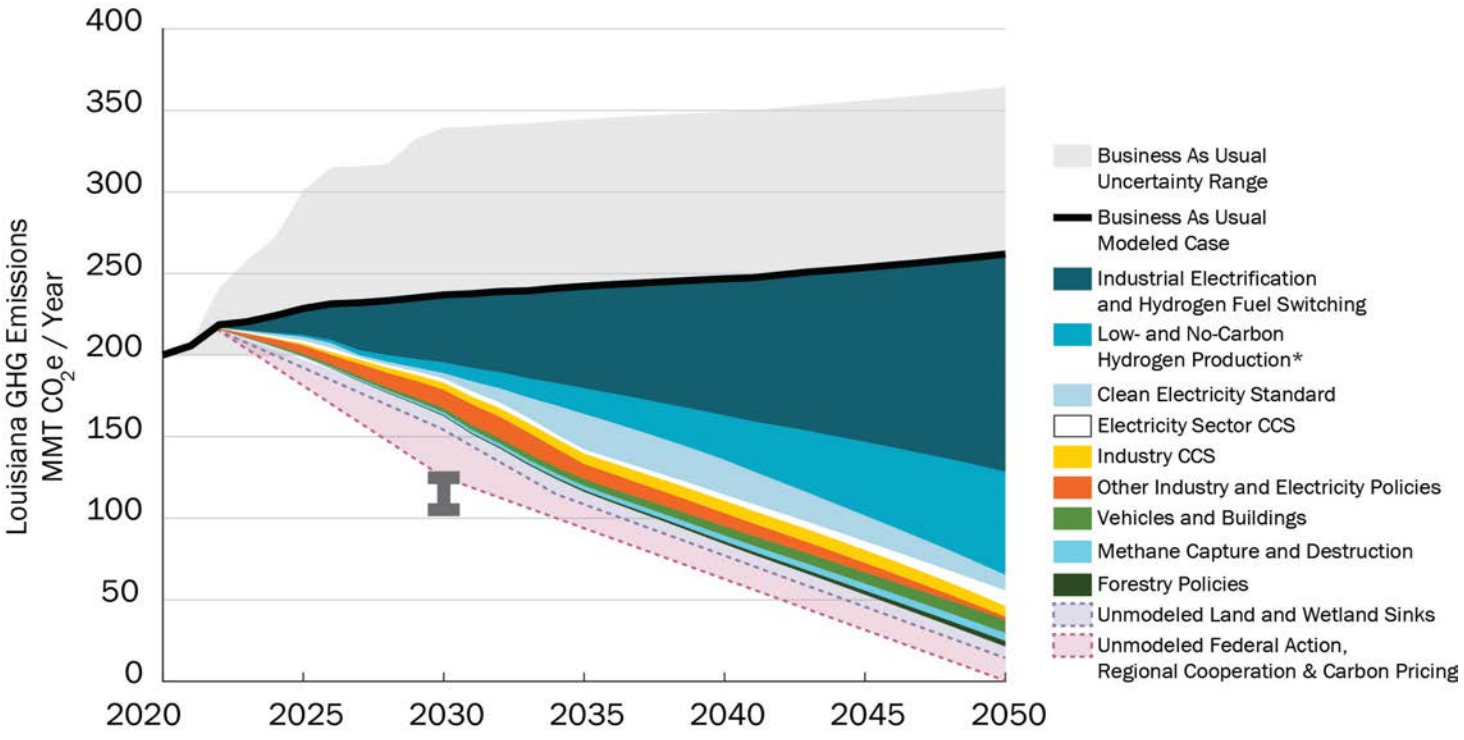
In August of 2020, Governor John Bel Edwards issued Executive Order JBE 2020-18 establishing emission reduction goals that culminate in reaching goals of net zero by 2050 in line with those of the Paris Agreement, the federal government, 25 other states, and hundreds of companies in the private sector. Governor Edwards created the Climate Initiatives Task Force and tasked this body with developing a Climate Action Plan to set Louisiana on a path to meet these goals and reduce GHG emissions to net zero by 2050, while seizing the opportunities presented by the global economic shift to zero carbon energy. The Task Force is made up of government, private sector, academic, environmental, and community justice voices and is supported by six emissions-based sector committees and four cross-sector advisory groups.

Organized in eight sections, 28 strategies, and 84 actions, the Louisiana Climate Action Plan lays out how Louisiana will reduce net greenhouse gas emissions over the coming decades to reach net zero greenhouse gas emissions by 2050. The Action Plan was developed through a bottom-up approach via a 15-month process that included over 49 public meetings and several rounds of public comment, culminating in its unanimous approval in January 2022 by the Climate Initiatives Task Force. It is an ambitious plan, and Louisiana has already made progress on its goals.

EPA's CPRG program allows the State to continue its climate planning efforts and build on the framework created by the Climate Initiatives Task Force and memorialized in the 2022 Louisiana Climate Action Plan. This PCAP supplements—but does not replace—the goals, strategies, and actions of the 2022 Louisiana Climate Action Plan.



Louisiana Climate Action Plan (2022)



Louisiana's Modeled Pathway to Net Zero by 2050

LOUISIANA'S GREENHOUSE GAS EMISSIONS

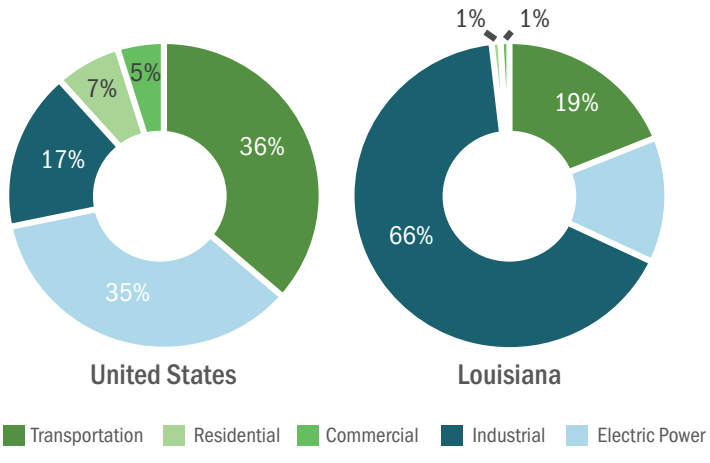
The Louisiana 2021 Greenhouse Gas (GHG) Inventory, prepared by the Louisiana State University (LSU) Center for Energy Studies using data from 2018, provides information about the GHG emissions across major economic sectors in the state. Using the EPA's State Inventory Tool (SIT) methodology, with additional analyses, this inventory is consistent with the methodology used to prepare the state's previous inventory. The prior GHG inventory was completed in 2010, using 2005 data. Louisiana's net GHG emissions in 2018 were 216 million metric tons of CO_2 equivalent (million MT CO_2e), compared to 215 net million MT CO_2e in 2005. The state's emissions have been nearly flat across this time period, despite increases in industrial production and decreases in coal-fired power generation, among other changes and trends.

Louisiana's GHG emissions baseline is unique among states and is significantly different from the nation's emissions baseline as whole. In the United States, 17% of overall national emissions come from the industrial sector; in Louisiana, the industrial sector contributes an overwhelming 66% of overall state emissions. Though Louisiana's GHG emissions are most concentrated in the industrial sector, transportation and power generation emissions across the state are also significant. The transportation sector is responsible for 19% of CO_2e emissions, and the electric power sector makes up 13% of Louisiana's CO_2e emissions.

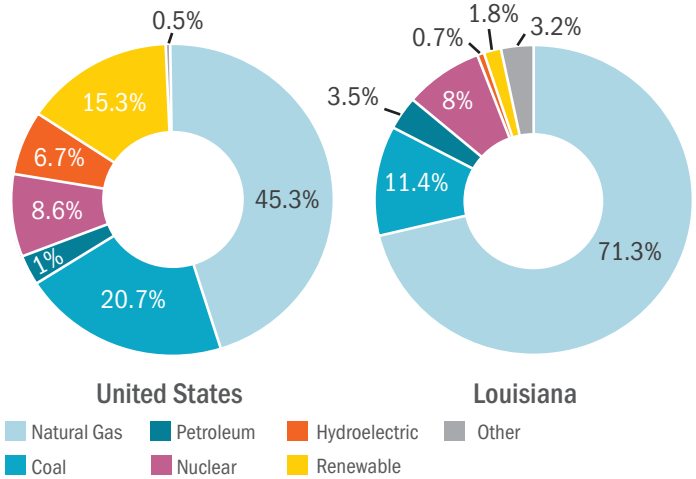
Unlike other states, or even national strategies, Louisiana cannot rely primarily on transportation or power sector strategies to address the vast majority of GHG emissions. Industrial GHG emissions are widely thought of as the most difficult GHG emissions to abate, and in Louisiana, they account for the significant majority of GHG emissions. Compared to the United States, Louisiana's power generation fuel mix distribution is less diverse. Louisiana's power generation fuel mix is composed of 71% natural gas and 1.6% renewable, compared to the U.S. where 45.3% of power generation is composed of natural gas and 15.3% is renewable. In 2018, industry accounted for 40% of GHG corresponding to electricity consumption in Louisiana, followed by 34% by residential and 26% by commercial.

Louisiana's leading sectors in industrial CO_2e emissions include chemical manufacturing, petroleum, and coal (refining), and natural gas processing. Together, these three sectors make up 94% of the state's industrial CO_2e emissions. In 2019, Louisiana's top 20 industrial GHG emissions facilities produced approximately 61 million MT CO_2e, which is up nearly 30% from the GHG emissions of the top 20 industrial facilities in 2012. This increase is primarily due to capital investments and expansions of these facilities.

In 2019, Louisiana's top 20 GHG emissions facilities (including power generation facilities) produced approximately 72.25 million MT CO_2e total, with an average of 3.613 million MT CO_2e per facility. Between 2012 and 2019, total CO_2e emissions within the top 20 emitting facilities increased by 5.725 million MT CO_2e. The top three highest GHG emitting facilities in 2019 included the chemical manufacturing facility CF Industries Nitrogen-Donaldsonville (10.01 million MT CO_2e), petroleum refining and chemical manufacturing complex ExxonMobil Baton Rouge Complex (6.36 million MT CO_2e), and the power generation facility Brame Energy Center (5.41 million MT CO_2e).



Comparison of Emissions Baselines in the U.S. and Louisiana



Comparison of Power Generation Fuel Mix in the U.S. and Louisiana in 2019

LOUISIANA'S GREENHOUSE GAS AND CO-POLLUTANT EMISSION REDUCTIONS

The quantification of projected GHG and co-pollutant emissions reductions does not provide a precise prediction. The exercise described herein was conducted to appreciate the relationship between the current baseline understanding of emissions, as represented by the 2021 Louisiana Greenhouse Gas Inventory, and the PCAP's proposed measures. In some cases, this relationship is in the form of a tool or calculator that provides unit conversions, while in others this involves connecting multiple assumptions and data sets in a logical chain. Because the goal is not a precise prediction of the future, the quantifications should be read as one potential outcome that is highly uncertain.

For each focus area, outputs were developed to represent a plausible outcome of the various actions and projects described therein. These outputs were used for quantification of emissions reductions. In some cases, multiple outputs were quantified together because of uncertainties in policy design, implementation pathways, data limitations, or other uncertainties. In other cases, some outputs were determined to be unquantifiable, but with strong qualitative reductions in emissions or high community benefits. A variety of approaches were taken to understand the potential impacts of these actions and projects; some are high in GHG reduction while others are higher in benefits.

To produce these quantifications, many different resources and methods were used, including EPA's tools and datasets, the Energy Policy Simulator (EPS) tool, reports prepared by universities and consultants, Census data, electricity data from EIA, and peer-reviewed literature. Some quantifications are straightforward, such as those that use EPA's AVERT tool, while others rely on several assumptions to structure a logical chain. These tools, methods, assumptions, and references are fully documented in the Technical Appendix (Appendix A).

Additionally, co-pollutant reductions have been analyzed, beginning with a base year emissions inventory of the Criteria Air Pollutants (CAP) and Hazardous Air Pollutants (HAP) emissions for Louisiana, based on the 2020 National Emissions Inventory (NEI). Co-pollutants are quantified in several ways, including direct tool outputs, percentage reductions of NEI sector-specific co-pollutants, literature reviews for qualitative analyses, and more. These tools, methods, assumptions, and references are also documented in the Technical Appendix (Appendix A).

Quantifications in this PCAP have been presented wherever possible in million metric tons of carbon dioxide equivalents (million MT CO_2e) or in metric tons of a specified co-pollutant. All units that were not in metric tons or million metric tons were converted to these units for consistency across focus areas.

LEVERAGING FEDERAL FUNDING

Louisiana has taken a proactive approach to capitalizing on federal opportunities and attracting private investment to reduce GHG emissions, adapt to the impacts of climate change, and accelerate the energy transition. Since the passage of the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA), Louisiana has seen more than $1.4 billion in federal investments in clean energy and the power grid, direct air capture, electric vehicles and charging infrastructure, plugging of orphaned wells, and more. Additionally, over the last six years, the private sector has announced over $55 billion in capital expenditures in low carbon or carbon free projects in Louisiana which are projected to create an estimated 25,000 jobs. The focus areas and priority actions included in this PCAP were selected and designed to build on and supplement gaps in major programs and opportunities. This approach positions Louisiana to optimize CPRG funding to continue momentum across the state.

AUTHORITY TO IMPLEMENT

The purpose of the Louisiana Priority Climate Action Plan (PCAP) is to identify near-term, high-priority, implementation ready measures to reduce GHG pollution. Accordingly, the PCAP focuses on measures that can largely be implemented with existing authority. Measures that require significant legislation were therefore not included in the PCAP. Measures that contemplate the state receiving or needing funding to implement may require implementing agencies to have the requisite budget authority and appropriate fund account to receive funds. Budget authority and the creation of receiving accounts are not considered to be barriers to implementation.

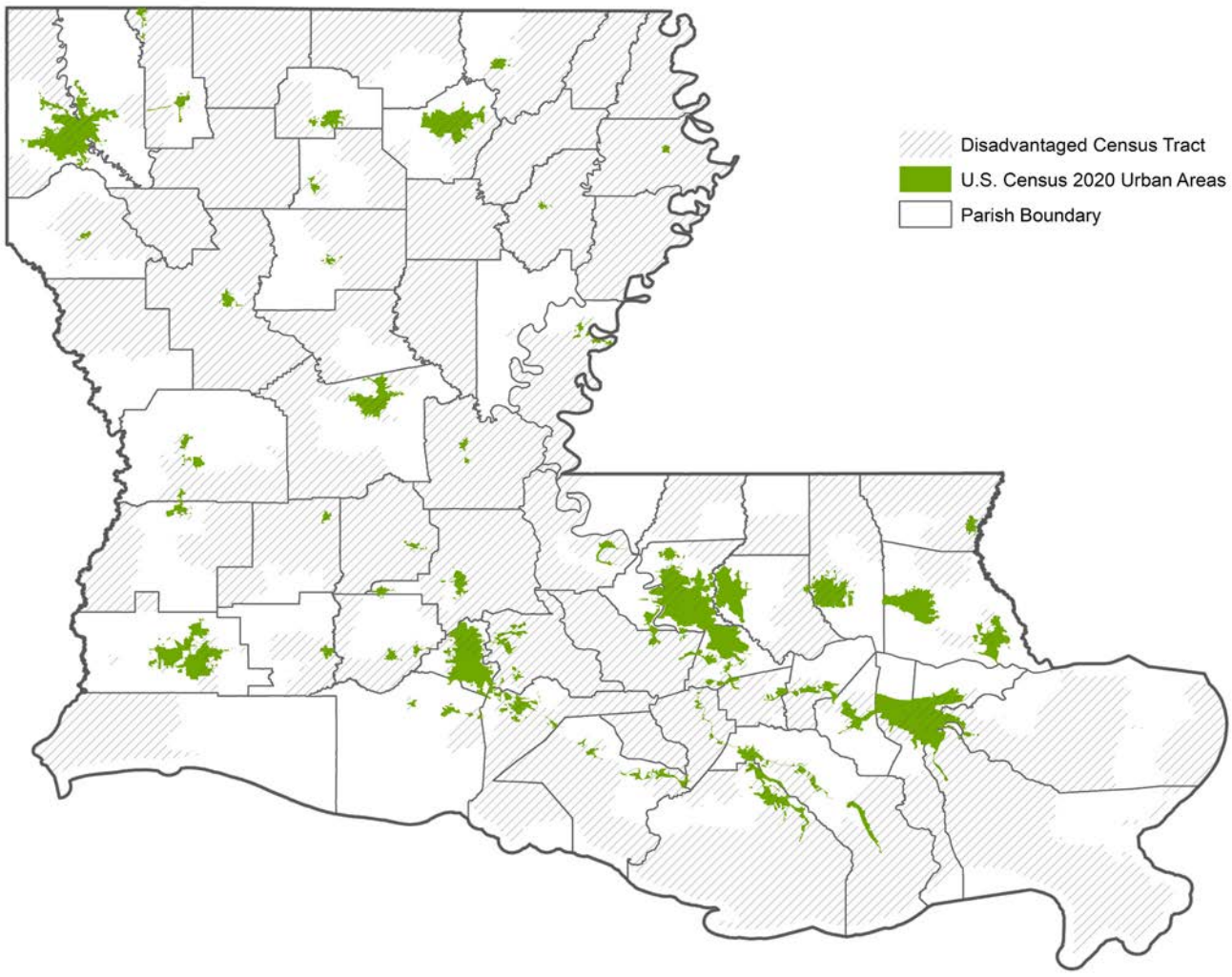
PCAP measures are drafted to provide flexibility during the implementation phase. Many of the measures have multiple implementation pathways, meaning they could be implemented by one of several state agencies or local governments using existing authorities. Allowing for greater flexibility during implementation is particularly helpful as Louisiana undergoes a gubernatorial transition in early January 2024. A more in-depth, action-by-action review of authority to implement is provided in Section three.

LOUISIANA'S OVERBURDENED COMMUNITIES

An objective of the CPRG program is to accelerate work to address environmental injustice and empower community-driven solutions in overburdened neighborhoods. The Equity Metrics for the Louisiana Climate Action Plan[1] report recommends consideration of the following critical questions to assess equity impacts before and during implementation of 2022 Louisiana Climate Action Plan implementation:

- How should various Climate Action Plan actions be prioritized in a manner that accounts for the distribution of impacts?
- How should various Climate Action Plan actions be designed and implemented to reduce the potential for inequitable impacts and to optimize benefit for marginalized and overburdened communities?
- What future needs, costs and benefits, and other consequences might arise in response to Climate Action Plan actions?

Accordingly, overburdened and historically underserved communities were prioritized both in direct engagement throughout the PCAP development process and in the design of priority measures that call for implementation in Low Income and Disadvantaged Communities (LIDAC) and increased engagement, education, and channeling of preferred benefits. Equity metrics and prioritization of overburdened communities will continue to inform the following stages of CPRG planning and implementation in Louisiana.

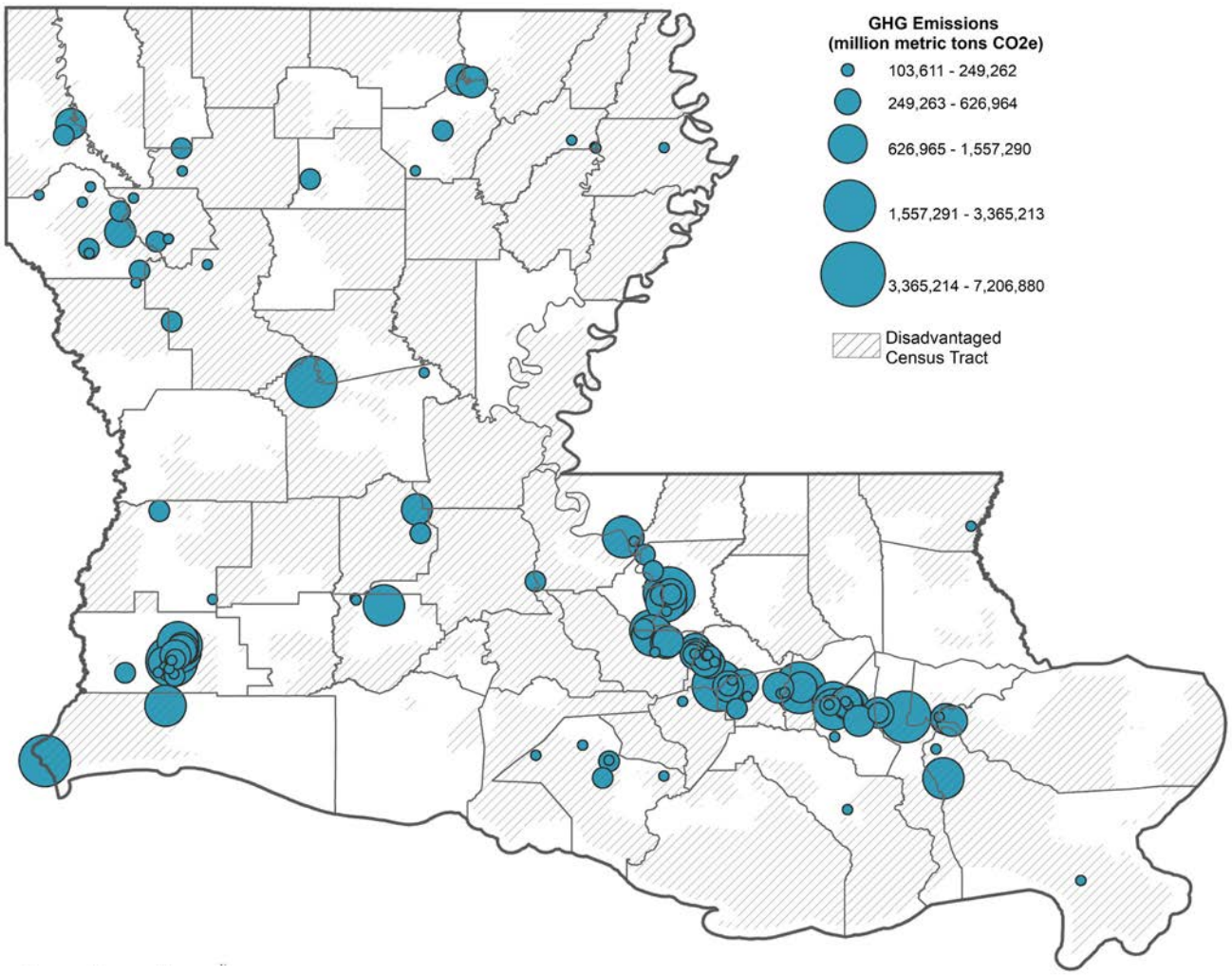


Urban Areas and Disadvantaged Census Tracts in Louisiana (2020)

The Climate and Economic Justice Screening Tool (CEJST), developed by the Council on Environmental Quality, identifies census tracts that are overburdened and underserved. Indicators of burden are divided into the following eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. A community is highlighted as disadvantaged if it is in a census tract that is (1) at or above the threshold for one or more environmental, climate, or other burdens, and (2) at or above the threshold for an associated socioeconomic burden. In addition, a census tract that is completely surrounded by disadvantaged communities and is at or above the 50% percentile for low income is also considered disadvantaged.

In Louisiana, out of 1,148 census tracts, 641 or 55.8% are disadvantaged, comprising 49% of Louisiana's total population. Disadvantaged census tracts are distributed throughout Louisiana; each of the 64 parishes includes at least one disadvantaged census tract.

Many disadvantaged communities throughout Louisiana are also burdened with significant pollutant emissions, whose sources include the industrial sector—such as chemical, petroleum, and coal products, natural gas manufacturing, transportation, and power generation. These communities are geographically located in northwest, central, southwest Louisiana, as well as the river parishes, which include Pointe Coupee, West Baton Rouge, Iberville, Ascension, St. James, St. John the Baptist, and St. Charles parishes.



GHG emissions (MMT CO_2e) and Disadvantaged Census Tracts in Louisiana

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THE PROCESS

This section covers the methodology for identifying community-driven, near-term, high-priority, implementation-ready measures and actions that align with 2022 Louisiana's Climate Action Plan. Leveraging and refining the 2022 Louisiana Climate Action Plan, the State implemented an iterative, four-month process based on a broad array of stakeholder and community feedback to develop the Louisiana Priority Climate Action Plan (PCAP). The PCAP builds on Louisiana's climate planning foundation, leverages other sources of federal funding and ongoing public and private efforts, and empowers community-driven solutions.

The State established a PCAP development model allowing for parallel tracks of engagement and iterative decision making to produce a focused and comprehensive list of priority actions in an accelerated time frame. The State developed an outreach and engagement plan inclusive of state, local, and tribal government coordination, discussions with key stakeholders and subject matter experts, and three public community meetings throughout the state of Louisiana. The State also bookended the process with guidance and support from the Climate Initiatives Task Force.

CORE PLANNING TEAM COLLABORATION

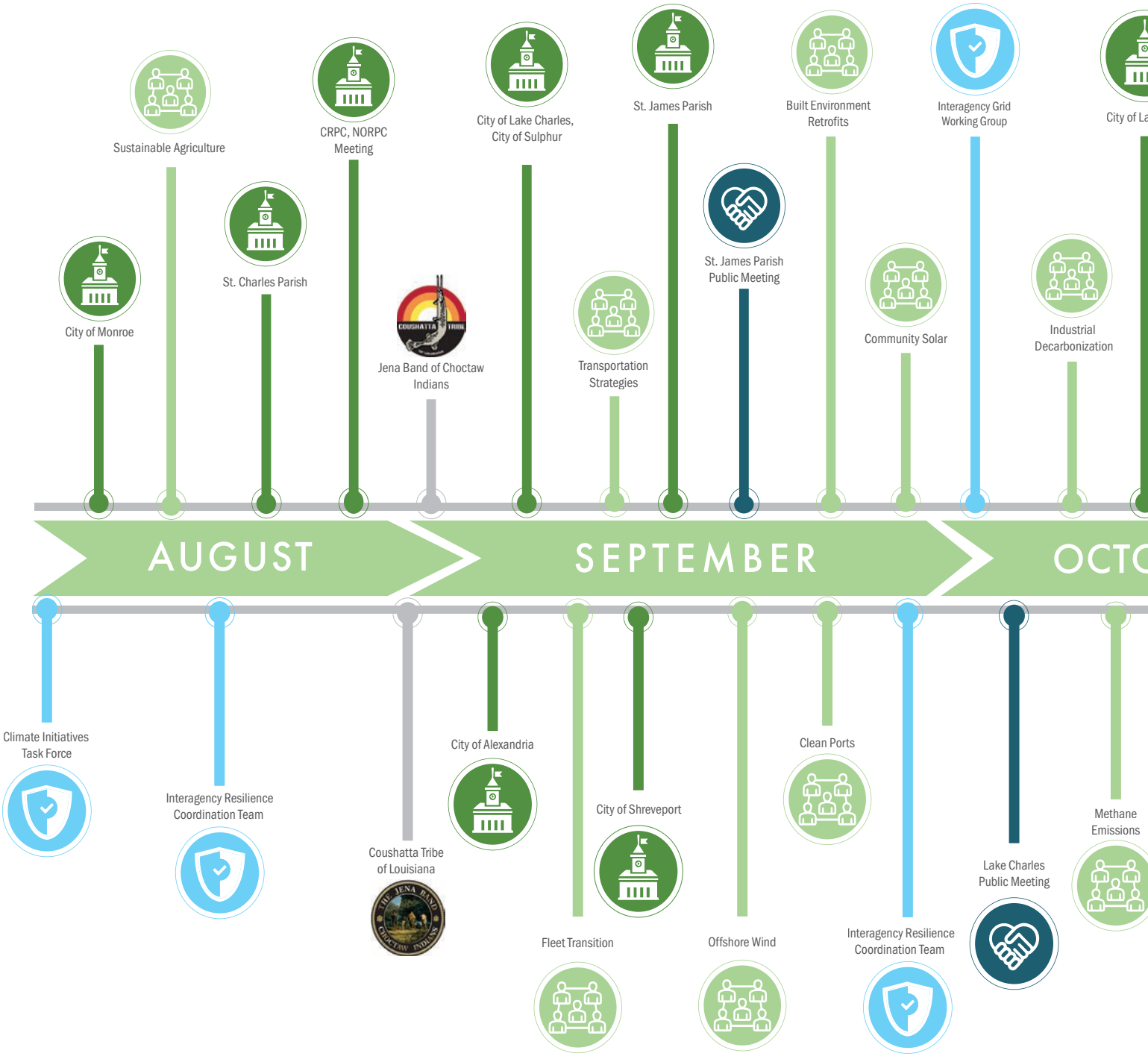
The Core Planning Team for the PCAP consisted of the Division of Administration (DOA), the Governor's Office, the Water Institute of the Gulf, the Center for Planning Excellence, and the Accelerate Group. The Planning Team met regularly throughout PCAP development to review input on focus areas and priority actions and ensure integration of the tenets of the CPRG planning program established by EPA.

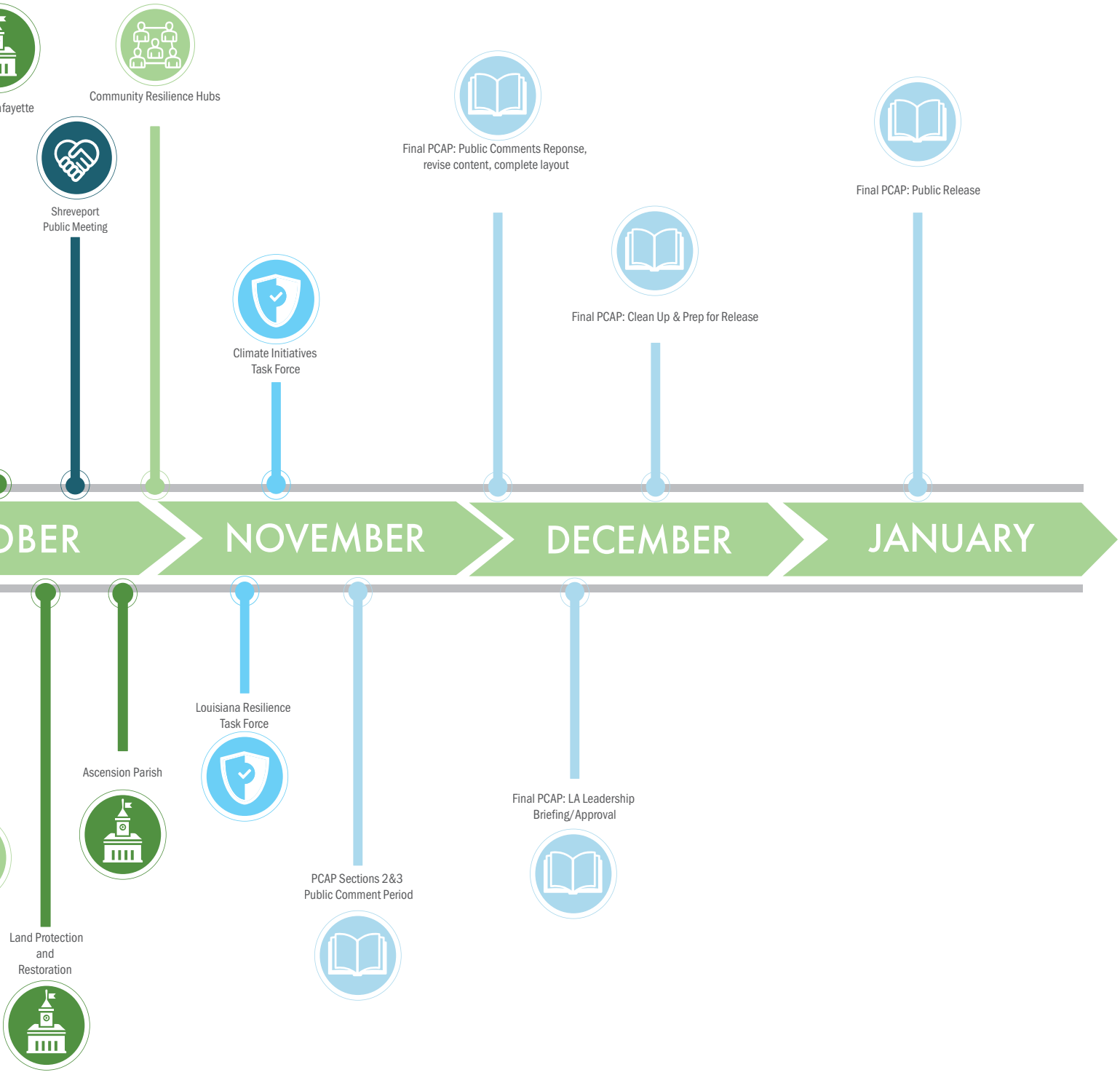
CLIMATE INITIATIVES TASK FORCE MEETINGS

This PCAP builds on the previous effort of the Climate Initiatives Task Force and its development of the 2022 Louisiana Climate Action Plan. Accordingly, with the full list of 2022 Louisiana Climate Action Plan actions as a foundation, PCAP development began with engaging members of the Climate Initiatives Task Force and other climate stakeholders.

Group Discussions at Public Meetings Hosted During the PCAP Development Process

DEVELOPMENT OF PRIORITY MEASURES




afayette
Community Resilience Hubs
Shreveport
Public Meeting
Final PCAP: Public Comments Reponse,
revise content, complete layout
Final PCAP: Public Release
Final PCAP: Clean Up & Prep for Release
Climate Initiatives
Task Force
OBER
NOVEMBER
DECEMBER
JANUARY
Louisiana Resilience
Task Force
Ascension Parish
Final PCAP: LA Leadership
Briefing/Approval
PCAP Sections 2&3
Public Comment Period
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PCAP
Planning

The Climate Initiatives Task Force met in August 2023 to prioritize actions from the 2022 Louisiana Climate Action Plan and identify opportunities to integrate workforce development, emission reductions, and benefits to LIDAC into the portfolio of priority actions. This workshop-style Task Force meeting was also open to the public and streamed online for virtual participation. More than 100 participants prioritized actions and provided input and feedback on the actions' benefits in-person and via an online engagement platform. Participants were encouraged to select two actions within each section of the 2022 Louisiana Climate Action Plan that best aligned with the PCAP directive to identify near-term, high-priority, implementation-ready measures. Input from the workshop was synthesized into a list of focus areas encompassing all sectors of Louisiana's economy, leveraging other sources of funding, and filling essential gaps in setting Louisiana on the pathway to net zero emissions identified in the 2022 Louisiana Climate Action Plan. The Task Force met again in November 2023 and was presented with the focus areas and priority actions prior to the release of a partial Draft PCAP for a 15-day public comment period.

INTERGOVERNMENTAL COORDINATION

Throughout the PCAP development process, the Core Planning Team connected virtually and in-person with relevant state, regional, local, and tribal government representatives. These representatives were engaged as both subject matter experts and potential implementation grant applicants, and in certain circumstances as fellow recipients of a CPRG Planning Grant.

STATE AGENCY COORDINATION

The DOA and Governor's Office coordinated closely with the Louisiana Department of Energy and Natural Resources (LDENR) and Louisiana Department of Environmental Quality (LDEQ) throughout the planning process. LDENR and LDEQ were identified as implementation partners for the most number of near-term actions in the 2022 Louisiana Climate Action Plan—20 and 15 actions, respectively. Accordingly, LDENR and LDEQ were essential partners both in designing methodology for PCAP development and as potential implementation grant applicants. State agencies were further engaged through existing interagency groups, namely the Interagency Grid Working Group and the Interagency Resilience Coordination Team.

The Interagency Grid Working Group (IGWG) consists of representatives from the Governor's Office, DOA, LDENR, Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), and Louisiana Public Service Commission (LPSC) and meets to coordinate around grid investment and long-term regional resilience opportunities. In July 2023, general information about the CPRG Planning Grant was shared with the IGWG. In September 2023, the IGWG was reengaged as a focus group of regulators and potential implementation grant applicants for feedback on measures related to Transmission Planning, Community Solar, and Offshore Wind.

The Interagency Resilience Coordination Team (IRCT) was established by the Louisiana Legislature in 2023 by Act 315 to maintain awareness, communication, and alignment with regard

Priority Development Activity During August 2023 CITF Meeting

to the state's resilience and risk mitigation needs, progress, and priorities and to oversee development of the statewide resilience report. The IRCT is chaired by the Louisiana Chief Resilience Officer and includes resilience officers from various state agencies. The IRCT was similarly engaged twice—information about CPRG was shared in August 2023 and a workshop-style activity that included IRCT members and in-person members of the public was conducted in September 2023 to solicit feedback on resilience components to capture in the PCAP, particularly related to Built Environment Retrofits, Community Solar, and nature-based solutions including Land Protection and Restoration and Community Forestry and Greening.

METROPOLITAN PLANNING ORGANIZATION COORDINATION

The Core Planning Team met twice with the Capital Region Planning Commission (CRPC) and New Orleans Regional Planning Commission (NORPC) as CPRG Planning Grant recipients for the Baton Rouge and New Orleans Metropolitan Statistical Areas, respectively. These meetings focused on aligning priority action development and outreach efforts as appropriate to bolster effective climate action through complementary efforts.

Additionally, the State engaged CRPC and NORPC as subject matter experts on transportation and land use in an effort to develop and implement strategies that reduce GHG emissions while also realizing LIDAC and workforce benefits. In Louisiana, transportation and land use investments and decisions are most often made at the regional and local levels, so these areas were identified as priorities for alignment between local programs and projects and the state's goals for climate pollution reduction. Looking at transportation improvement plans, both Metropolitan Planning Organizations identified several projects and strategies to inform Regional Transit priority actions.

LOCAL AND REGIONAL OUTREACH

The state solicited input from local and regional elected officials and government representatives from Louisiana's largest metropolitan areas that did not receive CPRG Planning Grants and parishes and municipalities with the highest concentrations of GHG emissions and co-pollutants.

During these virtual interviews, the State provided an overview of the 2022 Louisiana Climate Action Plan and an introduction to the CPRG planning effort. The Core Planning Team then facilitated a discussion about the most relevant, pressing climate pollution-related issues for the respective regions and any ongoing or planned efforts that may reduce GHG emissions in the area.

Local priorities and the status of ongoing climate action varied across the state. However, several focus areas consistently emerged as potential implementation grant subjects. In particular, Community Solar, Community Resilience Hubs, Fleet Transition, Regional Transit, and Community Forestry and Greening were discussed in multiple interviews. Local and regional governments have the authority to implement numerous actions across these focus areas; in fact, several municipalities are already pursuing projects that align with these priorities and that this PCAP is designed to build on. Additionally, several cities expressed an interest in receiving funding to pursue their own climate planning efforts as Baton Rouge and New Orleans did through the CPRG program.

FEDERALLY RECOGNIZED TRIBE ENGAGEMENT

Phase II of the CPRG program includes a discrete competition exclusively for federally recognized tribes and territories. EPA anticipates awarding approximately 25 to 100 implementation grants ranging between $1 million and $25 million under this competition. Louisiana is home to four federally recognized tribes: the Jena Band of Choctaw Indians, the Tunica-Biloxi Tribe of Louisiana, the Coushatta Tribe of Louisiana, and the Chitimacha Tribe of Louisiana. The Core Planning Team contacted all four tribes to share information about Louisiana's CPRG planning efforts and further engaged with two tribes to learn about their climate action needs and priorities which are reflected in this plan's priority actions.

STAKEHOLDER ENGAGEMENT

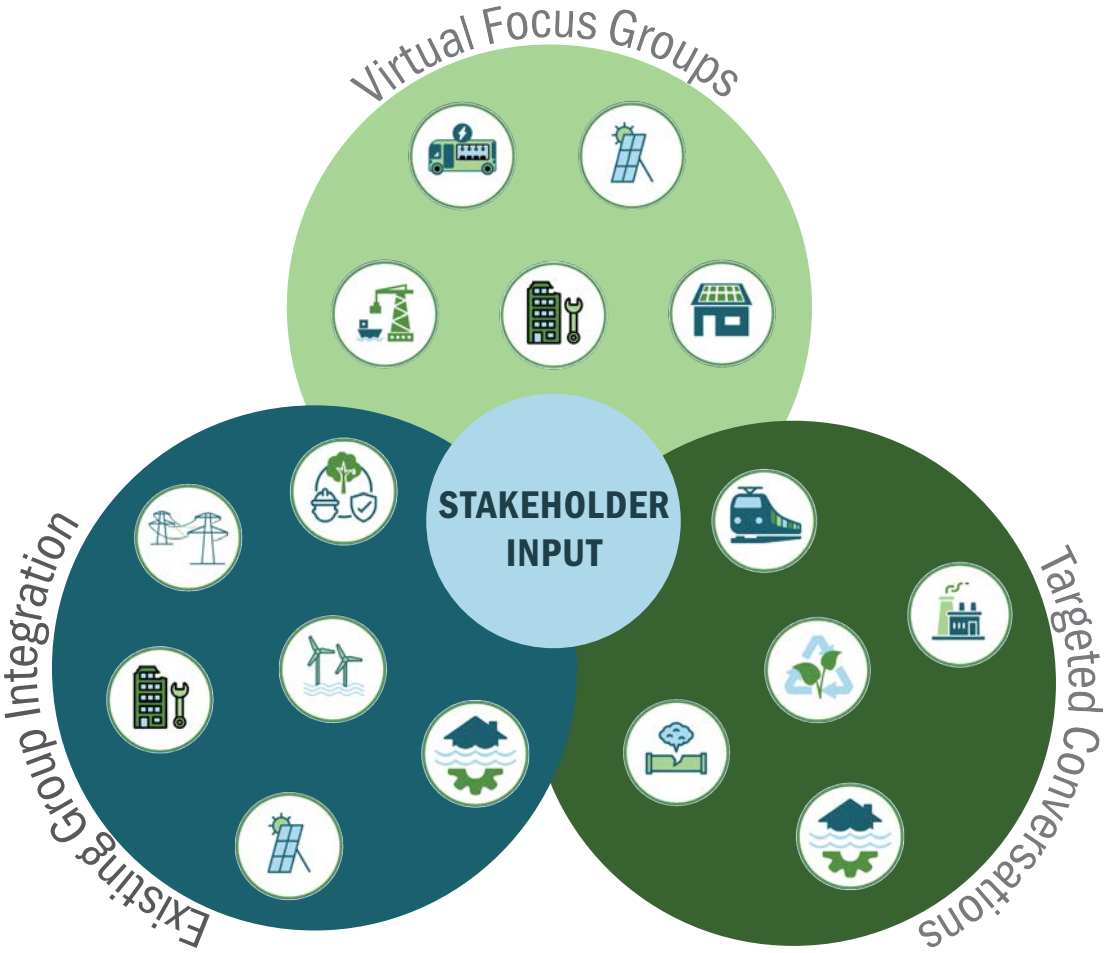
In order to build out a robust set of realistic priority actions, the State sought input from key stakeholders and subject matter experts by convening virtual focus groups, integrating into existing stakeholder groups, and conducting targeted conversations.

The State conducted virtual area-specific focus groups throughout the development of the PCAP to receive feedback from subject matter experts and key stakeholders on the most critical, implementation-ready programs, projects, or initiatives that would position Louisiana's state agencies and local governments well to compete for CPRG implementation grants. Focus groups reviewed 2022 Louisiana Climate Action Plan goals and objectives and

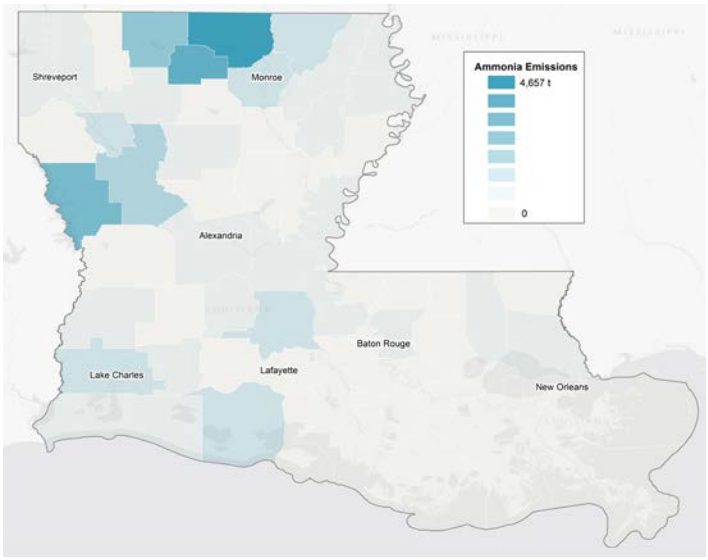
were asked to identify (1) near-term challenges and obstacles to reducing GHG emissions, (2) first steps that could jump-start progress, (3) ways to ensure that overburdened communities are prioritized for benefits, and (4) ways to scale up and sustain efforts over the long-term. Focus groups were tailored in size and composition depending on the specific focus area but generally consisted of representatives from the private and public sectors, non-governmental organizations, and academia.

The State also sought feedback at meetings from relevant existing groups of stakeholders, such as the IGWG and IRCT discussed above and the September 2023 session of the GNO Wind Alliance. Louisiana's PCAP development approach was also presented at the Louisiana Infrastructure Opportunities Webinar series in August 2023 and the Louisiana Chapter American Planning Association conference in September 2023.

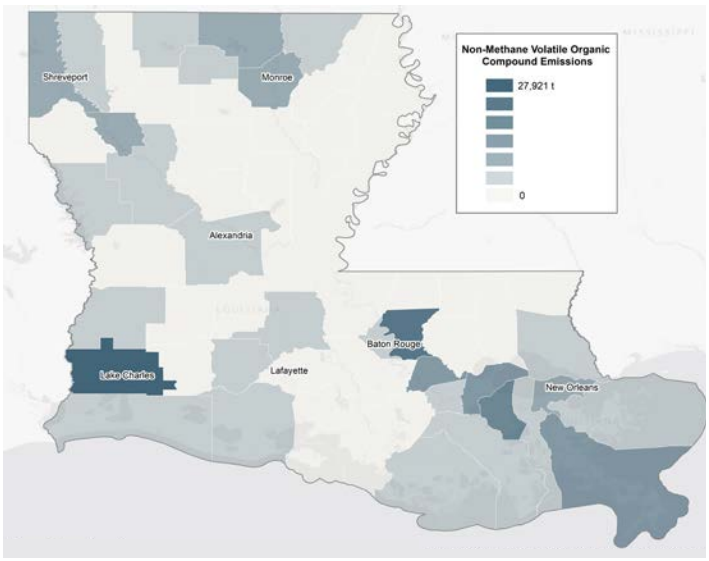
Finally, the state conducted targeted conversations with subject matter experts and stakeholders where time-constraints or other barriers prevented existing group integration or focus group assembly for a focus area. These discussions provided essential insights into, for example, market-readiness and private sector priorities for industrial decarbonization approaches and available technologies for methane emissions monitoring and abatement.



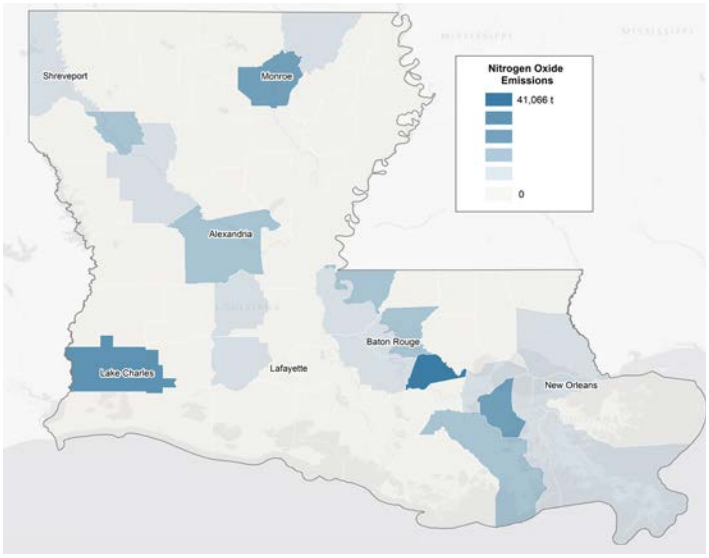
To receive stakeholder input, the State held targeted conversations with subject matter experts on methane emission reductions, industrial decarbonization, regional transit, sustainable agriculture, and land protection and restoration. Virtual focus groups were held for clean ports, community solar, fleet transition, community resilience hubs, and built environment retrofits. Existing workgroups were consulted on transmission planning, community solar, built environment retrofits, offshore wind, ommunity forestry and greening, and land protection and restoration.



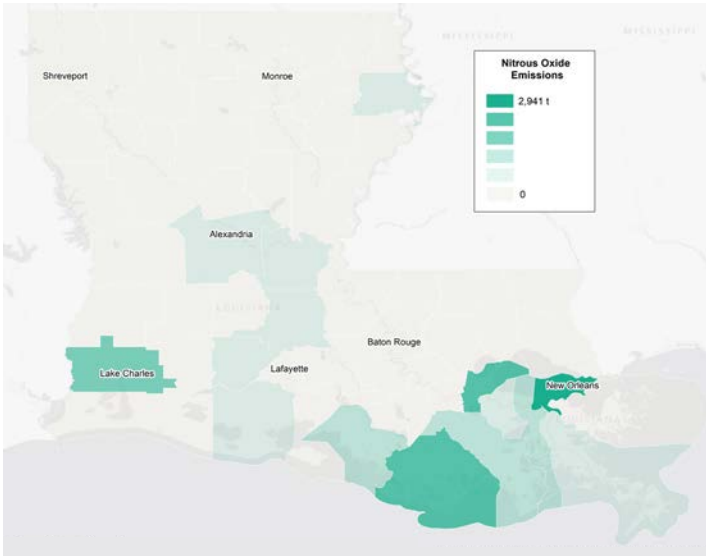
Ammonia emissions, by parish



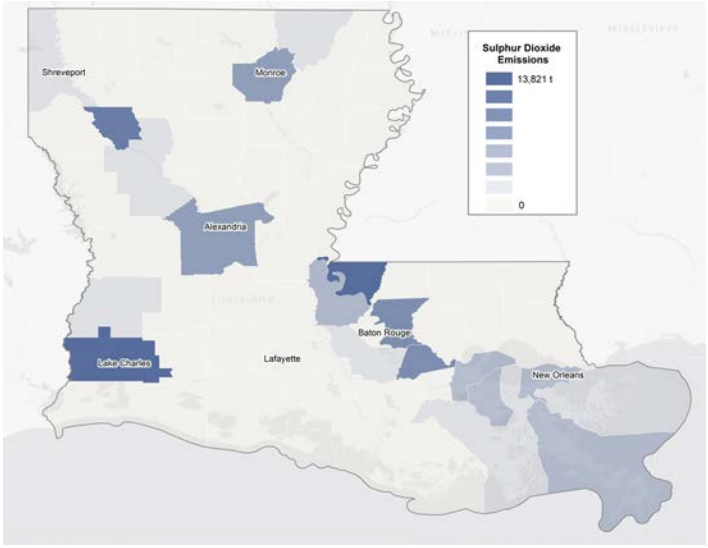
Non-methane volatile organic compound emissions, by parish



Nitrogen oxide emissions, by parish



Nitrous oxide emissions, by parish



Sulphur dioxide emissions, by parish

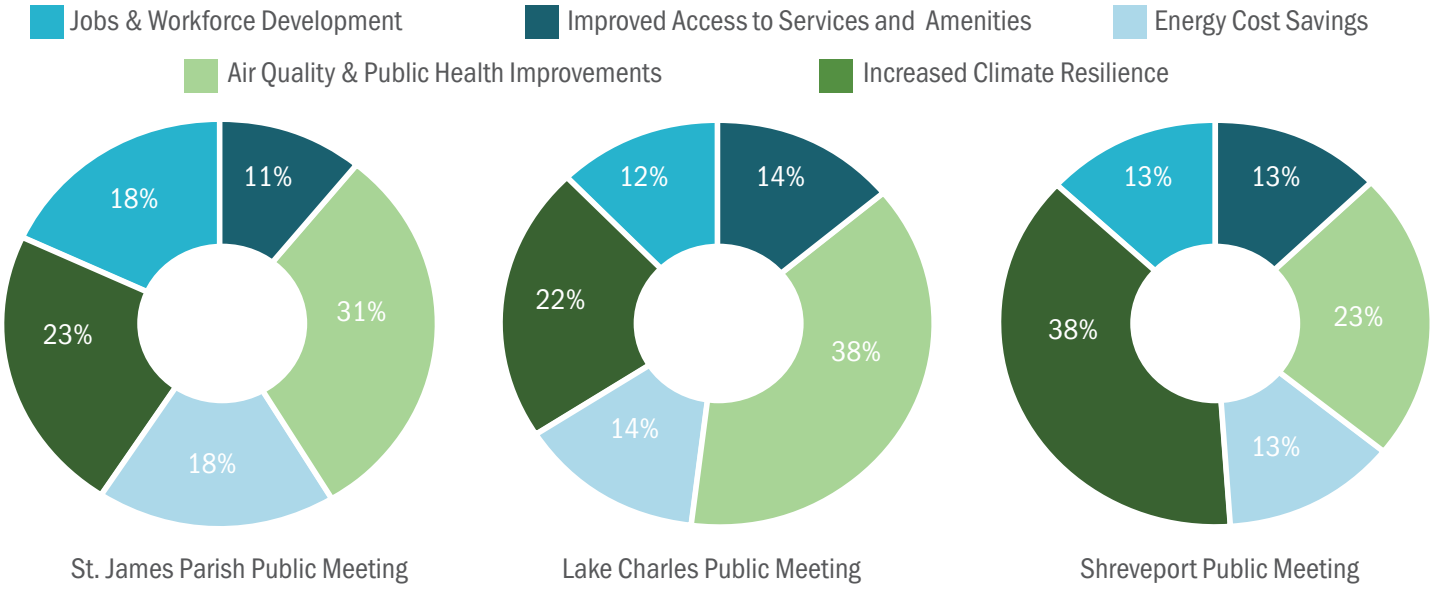
Maps generated using Gulf South Emissions; showing parish level air pollutant emissions from 2018 reporting year

COMMUNITY ENGAGEMENT

The State conducted in-person community meetings in St. James Parish and the cities of Shreveport and Lake Charles. These locations were chosen based on the heaviest GHG and co-pollutant emissions concentrations and significant concentrations of low to moderate income households and LIDAC representation. Population size was considered for the location of the public meetings, and central, accessible, community venues were chosen for on-site public meetings. Community meetings were also live-streamed on the Climate Initiatives Taskforce 's YouTube page and made accessible to the public.

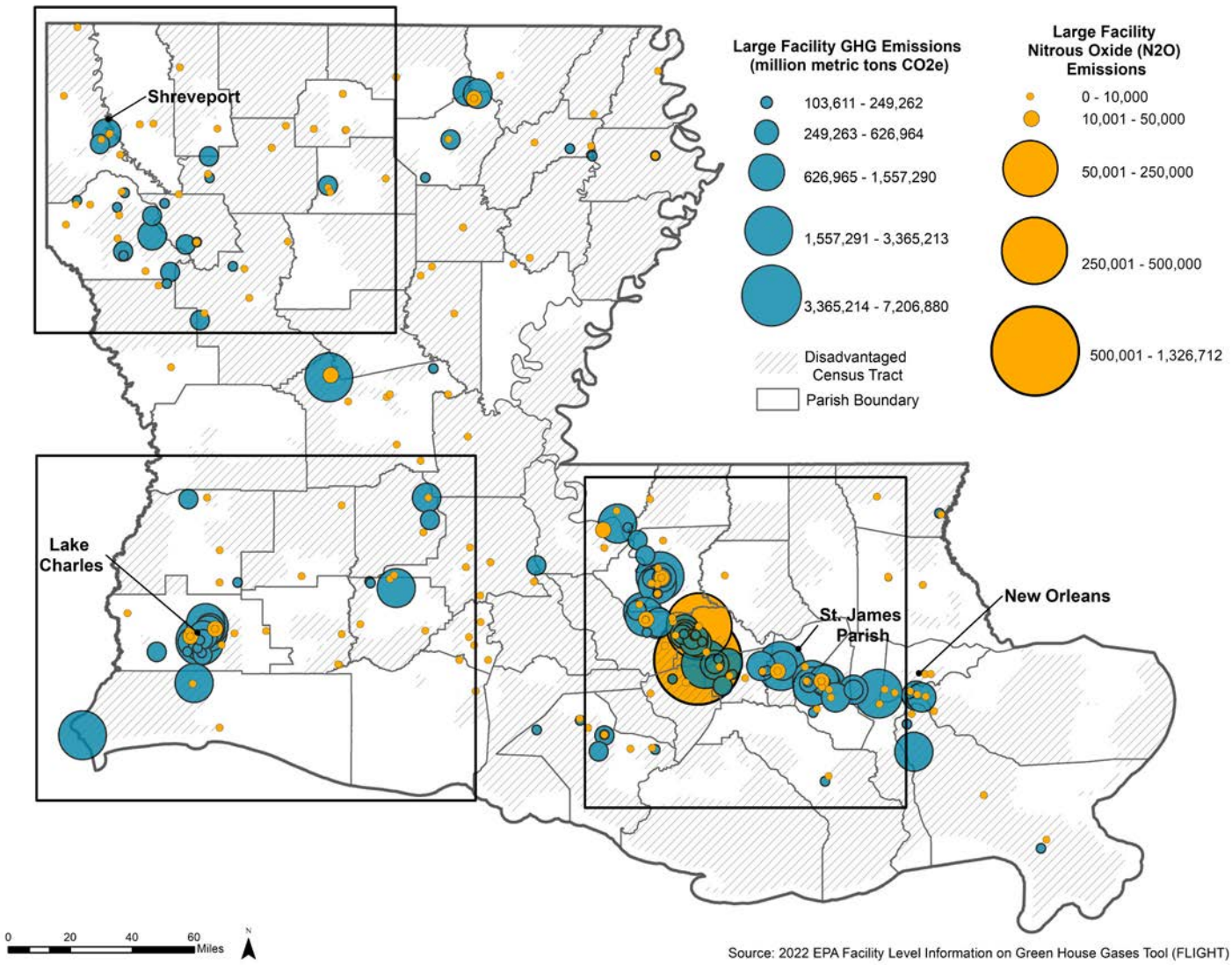
During the public meetings, the State provided an overview of the 2022 Louisiana's Climate Action Plan, an introduction to the CPRG program, and a focus on regional conditions and opportunities. Throughout the presentation, attendees were polled on relevant topics to gauge climate knowledge, communication preferences, and priorities of GHG reduction measures and their benefits. In each of the public meetings, more than 50% of participants did not know about the state's existing Climate Action Plan.

Attendees were then asked to participate in group discussions around the focus areas and community benefits and asked to discuss the greatest near-term challenges for them and their community, their greatest concerns related to climate change and clean energy, what types of climate-related activities they would like to see in their community in the next 5-10 years, and how the State could ensure that communities most burdened by pollution and economic inequality are prioritized for benefits. The results of these discussions are reflected in the next section.



St. James Parish Public Meeting | Lake Charles Public Meeting | Shreveport Public Meeting

Survey results during public meetings for "Which Community Benefit is the highest priority?"



Climate pollution extends throughout the state and overlaps with LIDAC; the Southwest , Northwest, and industrial corridor along the Mississippi River were chosen for public engagement.

3

PRIORITY MEASURES

The Climate Pollution Reduction Grant program enables states to develop and implement plans for reducing GHG emissions and other harmful air pollution while pursuing activities tailored to their unique resources, delivery capacity, and mix of key sectors responsible for emitting and absorbing GHGs. The 2022 Louisiana Climate Action Plan identified three key policy pillars for Louisiana to achieve net zero by 2050: renewable electricity generation, industrial electrification, and industrial fuel switching to low- & no-carbon hydrogen. These pillars are directly and indirectly supported by a number of focus areas and priority measures identified below. For example, community solar and offshore wind generate renewable power and rely on transmission planning to supply motor vehicles and the built environment, including community resilience hubs and ports. Industrial decarbonization requires fuel switching and industrial electrification—which requires transmission planning and renewable energy generation. Additional carbon reductions will be achieved by detecting and addressing methane emission sources, mode shifting and utilizing alternative fuel sources in transportation, accelerating energy efficiency upgrades in the built environment, and investing in carbon sequestration and co-pollutant reductions within natural working lands and wetlands. The priority measures are intended as a blueprint for implementation funding and climate action planning for state agencies, the LPSC, port authorities, regional planning commissions, and local governments across the state.

This section introduces thirteen focus areas. It describes the current status of each focus area in Louisiana and identifies priority actions that support future implementation. Each focus area description includes carbon reduction potential, a description of what has been done to date, and the focus area's potential for transformative impact. A crosswalk for alignment with federal funding is provided in Appendix C.

The priority actions represent a focused list of near-term, high-priority, implementation-ready steps that align with the state's climate roadmap, incorporate stakeholder input on obstacles and opportunities, and consider community concerns. GHG emission reductions for priority actions are quantified based on corresponding outputs those actions could reasonably be expected to produce. The Technical Appendix (Appendix A) to this PCAP details all assumptions, tools, citations, datasets, and methods used to estimate and quantify GHG emissions and co-pollutant reductions.

- **OFFSHORE WIND**
- **COMMUNITY SOLAR**
- **COMMUNITY RESILIENCE HUBS**
- **TRANSMISSION PLANNING**
- **INDUSTRIAL DECARBONIZATION**
- **METHANE EMISSIONS**
- **FLEET TRANSITION**
- **CLEAN PORTS**
- **REGIONAL TRANSIT**
- **BUILT ENVIRONMENT RETROFITS**
- **COMMUNITY FORESTRY AND GREENING**
- **SUSTAINABLE AGRICULTURE**
- **LAND PROTECTION AND RESTORATION**

OFFSHORE WIND

Offshore wind power is a renewable energy source that results in zero emission of GHGs. Offshore wind turbines in the Gulf of Mexico can supply a zero-emission source of electricity to Louisiana's power grid or to electrolyzers to produce no-carbon hydrogen fuel. Both activities will be essential in reducing emissions from Louisiana's industrial, transportation, building, and power sectors, which will require heavy dependence on electrification and fuel-switching. Development will require significant infrastructure build out, possibly including turbines in offshore waters, underwater export cables, onshore and offshore substations, hydrogen pipelines, dockside improvements, and grid interconnection lines.

According to the National Renewable Energy Laboratory, Louisiana ranks as the fourth highest state in the nation for offshore wind technical potential, with potential for a single offshore wind project to create 4,470 construction jobs and 150 full-time operations jobs. In addition to offshore wind deployment, Louisiana is well positioned to be a manufacturing and servicing hub for offshore wind across the United States. In fact, Louisiana companies were integral in the design, fabrication, and construction of the nation's first commercial offshore wind farm near Block Island, Rhode Island.

STATUS OF OFFSHORE WIND IN LOUISIANA

In August 2023, the Bureau of Ocean Energy Management (BOEM) held the first offshore wind energy auction in the Gulf of Mexico, resulting in one lease area offshore of Lake Charles receiving a high bid of $5.6 million from RWE. The 102,480-acre lease area has the potential to generate 1.24 gigawatts of offshore wind energy, which can power nearly 435,400 homes with clean, renewable energy. RWE earned bidding credits for commitments to support workforce training programs and develop a domestic supply chain for the offshore wind energy industry, as well as for contributing compensatory mitigation for impacts to fisheries. The final lease included further stipulations including tribal engagement and increased reporting requirements and assessments for protected species, among others. In October 2023, BOEM announced four additional Wind Energy Areas in the Gulf of Mexico, including another area south of Lake Charles.

In May 2023, the Louisiana Department of Energy and Natural Resources (LDENR) published a Notice of Intent to promulgate rules and regulations for entering into leases and operating agreements for offshore wind development on state water bottoms. In 2023, the Louisiana Legislature allocated $3 million for LDENR to develop a Comprehensive Wind Roadmap for the State of Louisiana. Over the next 24 months, the State intends to develop a robust presence for offshore wind energy and support the growth and development of its associated supply chain, ports, and vessels in Louisiana by developing and publishing the Louisiana Wind Roadmap. The Roadmap will provide a path for the state to guide offshore wind investments,

OUTPUT

Support 5 GW of offshore wind energy by 2035
See page 26

POTENTIAL BENEFITS

GHG emissions reduction

0.885 million MT CO_2e in 2030

Co-pollutant emission reduction

SO_2	547.48 MT
NO_x	626.16 MT
VOCs	20.41 MT
NH_3	29.06 MT

Community benefits

support and secure necessary supply chains, identify potential opportunities to achieve policy objectives, and coordinate a complex network of stakeholders and actions moving forward.

Across a spectrum of stakeholders–industries, businesses, developers, academia, non-profits, and coalitions, there has been collaboration on several initiatives, programs, and deliverables related to offshore wind development in Louisiana. Developers are working with non-profit organizations to create supply chain databases and webinars to inform local businesses and companies on how they can engage in the clean energy market. Organizational coalitions are working toward the development of a green hydrogen cluster potentially powered by offshore wind. Businesses and industries are researching and developing blades and turbines that are hurricane resistant, manufacturing wind components and materials for use in other parts of the country and internationally and building some of the first Jones Act-compliant service vessels for offshore wind. Higher education facilities and community and technical colleges are establishing curriculum and workforce training programs for blue- and white-collar jobs in the offshore wind sector.

INTERSECTION WITH FEDERAL FUNDING

In October 2023, President Biden and the U.S. Economic Development Administration (EDA) selected the Gulf Louisiana Offshore Wind (GLOW) Propeller as one of just 31 designated U.S. Tech Hubs. The Tech Hubs program, authorized by the bipartisan CHIPS and Science Act, aims to drive regional innovation and job creation by strengthening a region's capacity to manufacture, commercialize, and deploy technology that advances American competitiveness. The LSU-led GLOW Propeller consortium brings together five universities, two community colleges, industry groups, economic development, and workforce training organizations, applied research institutes, and various other public and private partners. Designation as a Tech Hub allows the consortium to apply for an EDA grant between $40 million and $70 million for implementation of its plan to accelerate offshore wind research and development in Louisiana.

COMMUNITY-DRIVEN SOLUTIONS

The workforce development and supply chain benefits of an expanding offshore wind industry are already apparent in Louisiana, and the priority actions in this plan aim to enhance Louisiana's role in the global offshore wind industry to diversify Louisiana's energy economy. This plan also aims to maximize the impacts of Community Benefits Agreements and otherwise bridge the physical gap between offshore wind and affected communities. This will be increasingly important in identifying onshore points of interconnection and building out transmission infrastructure.

Stakeholders voiced concern about where the transmission connection for an offshore wind development would be routed and the lack of Renewable Energy Credit market or incentive structure for incentivizing offshore wind production. During public meetings, participants' support and knowledge varied from either being unaware or indifferent to being supportive of offshore wind power. However, the opportunity to diversify the economy and invest in the local workforce were mentioned as desired outcomes of offshore wind development.

TRANSFORMATIVE IMPACT

The availability of wind power as an energy resource from the Gulf of Mexico has the potential to position Louisiana as a strong offshore energy producing state. Offshore wind power can supply clean energy to the industrial sector which is currently by far the highest contributor to GHG emissions in Louisiana. The successful implementation of offshore wind also has the potential for market adoption and future leases in the Gulf of Mexico both offshore and onshore, which could provide additional clean energy to Louisiana and beyond. Furthermore, as stated above, Louisiana's workforce is already skilled in contributing to wind turbine development and assembly. There is a great potential for scaling the turbine manufacturing and installation sector.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

The quantification for this output used the EPA AVERT tool and represents the amount of emissions reduction in the year 2030. Although the tool does not offer explicit modeling of offshore wind, it does offer modeling for onshore wind programs. While there are differences between the two, the analysis operates under the assumption that the two are comparable for the purposes of obtaining a first order emissions reduction estimate. The EPA AVERT tool also reports on several specific co-pollutants (SO_2, NO_x, VOCs, and NH_3). While the overall co-pollutant reduction was quantified in the tool, it is not possible to estimate the effects of those reductions without further information on where the emissions would be avoided. A review of offshore wind literature found that the emissions reductions could be understated; a 2021 report from the National Renewable Energy Laboratory found that achieving 30 GW of offshore wind by 2030 would result in a cumulative reduction of 78 million MT CO_2[2]. In that context, Louisiana's 5 GW would have a cumulative (not annual) reduction of 13 million MT CO_2 by 2030, which is higher than the AVERT estimate. Note that the AVERT tool does not have an option for offshore wind; onshore wind was used instead. For the full details of the assumptions made in the analysis please see the Technical Appendix (Appendix A) (Appendix A).

PRIORITY OUTPUT	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Support 5 GW of offshore wind energy by 2035	0.885

GHG Emissions reduction estimate for the offshore wind output. This analysis was conducted using EPA's AVERT tool and represents the amount of emissions reduction in the year 2030. Note that the AVERT tool does not have an option for offshore wind; onshore wind was used instead. For the full details of the assumptions made in the analysis, please see Technical Appendix (Appendix A).

PRIORITY OUTPUT	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
	SO_2	NO_x	VOCs	NH_3
Support 5 GW of offshore wind energy by 2035	547.48	626.16	20.41	29.06

Co-pollutant emissions reduction estimates for the offshore wind output. This analysis was conducted using EPA's AVERT tool, which outputs estimates for a selection of co-pollutants, and represents the amount of reductions for the year 2030. Note that the AVERT tool does not have an option for offshore wind; onshore wind was used instead. For the full details of the assumptions made in the analysis, please see Appendix A.

PRIORITY ACTIONS

SUPPORT A STATE WATERS TECHNOLOGY HUB

Through state and local government, support the development of a consortium-based offshore wind technology hub and accelerator focused on offshore wind development in state waters. The consortium's members will represent the core industry, agency, research, teaching, and training partners. The consortium should support national and state energy transition goals through the transformation of a historically underserved region into an epicenter of competitive energy transition talent and technology development. The primary purpose of the hub will be to "learn by doing" on what it will take to support a large-scale offshore wind development for the state. The cornerstones of the State Waters Technology Hub are:

- an "in-water" test center comprising multiple offshore wind turbines, and
- an onshore test center consisting of a wind tunnel and other equipment to test and validate prototype technologies, materials, and components. The State Waters Technology Hub would support the development of wind turbine technology options that are cost-efficient and resilient to operate in the coastal waters and mitigate impacts on coastal wildlife

» ***Authority to Implement***

LED, LDENR, City of New Orleans, and Greater Lafourche Port Commission are members of the GLOW Propeller, which was designated as an EDA Tech Hub in October 2023. Pursuant to La. Const. art. VII, § 14, state agencies and political subdivisions "may engage in cooperative endeavors with each other, with the United States or its agencies, or with any public or private association, corporation, or individual."

IDENTIFY POINTS OF GRID INTERCONNECTION, PREFERRED SITING, AND ROUTING

Through state and local government, work with state utilities, regional transmission organizations, BOEM, and other stakeholders to identify possible and preferred points of interconnection for clusters of offshore wind development in both state and federal waters, as well as preferred sites that minimize environmental impact, and preferred pathways for routing of submarine, underground, and overhead transmission infrastructure from offshore to onshore, and permitting requirements.

» ***Authority to Implement***

Pursuant to La. Const. art. IV § 21, the LPSC "shall regulate all common carriers and public utilities and have such other regulatory authority as provided by law. It shall adopt and enforce reasonable rules, regulations, and procedures necessary for the discharge of its duties, and shall have other powers and perform other duties as provided by law." Additionally, effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See La. R.S. 36:354. The City Council of New Orleans regulates Entergy New Orleans.

DEVELOP OFFSHORE WIND MANUFACTURING CLUSTER

Through state and local government, support the development of an Offshore Wind Manufacturing Cluster to drive the development of a supply chain network within Louisiana for projects ramping up in other states, to increase economic impact for Louisiana companies. Manufacturers involved in the cluster should include those that have experience with the offshore oil and gas industry, turbine and nacelle components, offshore and onshore substations and transmission equipment, and shipping. This effort will also help position the state to support manufacturing of wind components and construction for Louisiana Offshore Wind development anticipated from 2030-2035, and further growth beyond.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See

La. R.S. 36:354. Louisiana Economic Development and local governments also have existing programs, policies, and incentives that can support economic development.

IDENTIFY WORKFORCE TRAINING NEEDS

Through state and local government, conduct a skills gap analysis for offshore wind development, based on technology and development trends, and identify long-term workforce needs, including the number and type of workers, skills needed, and estimated salaries and wages supported by a new offshore wind development and manufacturing industry in the state.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See La. R.S. 36:354. LED, LWC, and local governments also have existing programs, policies, and incentives that can support economic development.

FOSTER LOCAL GOVERNMENT AND COMMUNITY PARTNERSHIPS

Through state and local government, support engagement with affected communities through an ongoing consultation process to provide clarity, identify local concerns, and co-create solutions. The State will support efforts to build local capacity and provide technical support to communities in order to promote investments and development of community benefits.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See La. R.S. 36:354. The DOA has existing offices, including the Office of Planning and Budget, that can engage with communities to build local capacity and co-create solutions.

COMMUNITY SOLAR

Community solar projects generate electricity from sunlight, and that electricity flows through a meter to the utility grid. Community solar subscribers (i.e. households, businesses, or any other electricity customer) pay for a share of the electricity generated by the community solar project.

Community solar customers typically subscribe to—or in some cases own—a portion of the energy generated by a solar array. Subscribers can either use the solar power directly or sell it back to the local utility, which can help reduce electricity costs for the subscriber. Community solar can be a great option to increase energy resilience, decrease utility costs, and reduce GHG emissions for people who are unable to install solar panels on their roofs because they are renters, they cannot afford solar, or their roofs or electrical systems are not suited to solar.

STATUS OF COMMUNITY SOLAR IN LOUISIANA

Currently, Louisiana is one of six states that does not have at least one community solar project or enabling legislation for community solar. Louisiana does not have a renewable energy portfolio or regulations in place that would decrease the uncertainty and delays facing investors. This challenge was shared by stakeholders during discussions: community solar implementation in Louisiana is viewed as too risky and the value of solar credits for community solar is too low for project development to make financial sense. Louisiana's current net metering regulations have opened up opportunities for co-ownership in solar resources. However, the system capacity under the state's current rules is only up to 300 kW. Having a cap of 300 kW is not cost-effective for the types of community solar projects that would be utilized under this program- current nationwide community solar projects are more in the 5 MW range. With projects larger than 300 kW going onto LPSC's agenda, the current policy framework is not congruent in a way that would help achieve the goal of delivering access to clean energy resources, particularly to low-income and disadvantaged communities.

Planned large-scale utility solar projects will increase Louisiana's solar operations in the next decade. Entergy Louisiana was approved by the LPSC to develop 475 MW of solar power, tripling its existing renewable capacity. Ventress Solar, the largest solar farm in Louisiana at 345 MW, is under construction in Pointe Coupee Parish. Amazon is planning two solar farms, a 100 MW farm in St. Landry Parish and a 200 MW farm in Morehouse Parish. Southwestern Electric Power Company will add 72.5 MW of solar from the Shreveport area near Houston. Cleco, an electric utility company, contracted a Power Purchase Agreement for 240 MW of solar on the site of their retired Dolet Hills coal-powered plant, enabling a green tariff for large customers. They are also optioning sites for an additional 50-200 MW of solar in their region. Additionally, First Solar selected Acadiana Regional Airport as the

OUTPUT

Support development of 500 MW of community solar statewide by 2030
See page 31

POTENTIAL BENEFITS

GHG emissions reduction

0.056 million MT CO_2e

Co-pollutant emission reduction

SO_2	31.00 MT
NO_x	49.15 MT
VOCs	1.74 MT
NH_3	1.95 MT

Community benefits

site of its fifth American manufacturing facility. With an investment of up to $1.1 billion, the facility will produce high-performance photovoltaic (PV) solar modules, creating more than 700 new direct jobs with a total annual payroll of at least $40 million. While private investments are underway, local governments are adopting ordinances to provide guidance for solar development. To ensure that the ordinances meet the goals intended, a Model Solar Toolkit was developed.

INTERSECTION WITH FEDERAL FUNDING

LDENR is pursuing funding under the U.S. EPA's Greenhouse Gas Reduction Fund's (GGRF) Solar for All Competition to develop incentives and complementary investments to help enable community solar development to support low-income households in the state. The State of Louisiana through LDENR will pursue the maximum amount of funding available to the state under the GGRF Solar for All competition: $250 million over the 5-year program period. The State's application includes a holistic program to reach 15,000 households across the state with opportunities for roof improvements, weatherization, solar panels, battery storage, community solar, and community resilience hubs. These efforts are designed to support, complement, and integrate with the state's nation-leading resilience initiatives, based on unique needs facing households in the state.

COMMUNITY-DRIVEN SOLUTIONS

Community solar is uniquely tailored to provide a wide-spectrum of community benefits, particularly in the areas of energy cost savings, climate resilience, and workforce development. Public outreach, local government engagement, and stakeholder input all suggested broad support for community solar as a clean source of distributed electricity. However, interviews with tribal governments and municipalities also uncovered concerns about available land and best use of land for solar farms. To address stated barriers, priority actions aim to improve education and awareness of community solar options, both for the benefit of the public and to provide pre-decisional resources for regulators and industry with concerns over the scalability of community solar in Louisiana.

TRANSFORMATIVE IMPACT

Local generation of electricity at or near where it will be used can accelerate the deployment of reliable, renewable technologies and projects in Louisiana. Community solar is also scalable and could create significant local economic and environmental benefits. Scaling up and receiving the benefits requires a number of conditions, such as cross-sector collaboration, usually with community-based organizations. Cross-sector collaboration towards implementation of community solar can have significant impact in underserved communities, promote business model innovations, and fill knowledge gaps around renewable energy production[3]. Furthermore, community solar provides an opportunity to generate clean energy and replace fossil fuel derived energy, improve air quality and public health, contribute to meeting rising energy demands in Louisiana, and support workforce development through solar-specific technical training, which can be applied throughout the country.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

The quantification for this output used the EPA AVERT tool and represents the amount of emissions reduction for the year 2030. To estimate the effect on emissions reductions, two separate analyses in the tool were performed: a phased analysis with 100 MW of distributed phased in every year for five years and second a non-phased analysis in which all 500 MW were added in a single year. Both analyses resulted in the same overall effect on emissions.

The EPA AVERT tool also reports on several specific co-pollutants (SO_2, NO_x, VOCs, and NH_3). While the overall co-pollutant reduction was quantified in the tool, it is not possible to estimate the effects of those reductions without further information on where the emissions would be avoided. For the full details of the assumptions made in the analysis please see the Technical Appendix.

PRIORITY OUTPUT	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Support development of 500 MW of community solar statewide by 2030	0.056

GHG Emissions reduction estimate for the community solar output. This analysis was conducted using EPA's AVERT tool and represents the amount of emissions reduction for the year 2030. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY OUTPUT	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
	SO_2	NO_x	VOCs	NH_3
Support development of 500 MW of community solar statewide by 2030	31.00	49.15	1.74	1.95

Co-pollutant emissions reduction estimates for the community solar output. This analysis was conducted using EPA's AVERT tool, which outputs estimates for a selection of co-pollutants, and represents the amount of emissions reduction for the year 2030. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

IMPROVE METERING RATE

Through state and local government, support analysis and facilitate collaborative processes to develop a fact base around the value of community solar installed at the distribution level in order to improve the metering rate for community solar billing. New rules around metering rates for community solar in the City of New Orleans can be leveraged as a model that can be expanded statewide.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or LPSC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting. The LPSC has the authority to regulate utilities and set metering rates. Pursuant to La. Const. art. IV, § 21, the LPSC, "shall regulate all common carriers and public utilities and have such other regulatory authority as provided by law. It shall adopt and enforce reasonable rules, regulations, and procedures necessary for the discharge of its duties, and shall have other powers and perform other duties as provided by law."

SIMPLIFY FINANCING AND ADVANCE COMMUNITY-DRIVEN PROJECTS

Through state and local government, in partnership or collaboration with financial institutions and community-based organizations, develop loan products that enable the growth of community solar projects led by local governments and non-profits and include local community benefits, such as community ownership or

wealth-building opportunities. Such financing can fill in the gaps of access to low-cost capital for such projects, enable them to access federal tax credits through elective pay, enable innovative financing structures, and allow them to compete with traditional community solar projects while supporting long-term community ownership and wealth-building. Simple and low-cost financing can be combined with proactive outreach, planning, and support in the development of community-driven projects supported and led by community members.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or LPSC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting. LDENR has submitted an application for EPA's Solar for All program and would implement this action in partnership with the state's designated green bank the Louisiana Clean Energy Fund, other green banks like Finance New Orleans and the LHA, utilities, and the LPSC.

INCENTIVIZE COMMUNITY SOLAR FOR LOW-INCOME HOUSEHOLDS

Through state and local government, incentivize community solar projects that provide at least 20% electricity bill savings to households in low-income and disadvantaged communities, and create opportunities for public involvement, community ownership, and other community benefits. The incentive will be based on economic analysis to determine a cost-effective incentive amount and performance requirement that enables project development and recruitment of low-income subscribers. The analysis will take into consideration models that enable projects to capture and maximize federal tax incentives provided under the Inflation Reduction Act, as well as depreciation, and elective pay opportunities for local governments and non-profit organizations. Low-income community solar efforts will focus on streamlining and simplifying opportunities for household subscriptions, while also protecting consumers.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or LPSC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

ESTABLISH A COMMUNITY SOLAR WORKING GROUP

Through state and local government, support the convening of a community solar working group with representatives from impacted communities, financial institutions, developers, utilities, and regulators. The working group can address regulatory, bureaucratic, and procedural obstacles to community solar development and issues such as standard practices, regulation updates, billing systems, consumer protections, marketing disclosures, performance, and sustainability of community solar program design.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or LPSC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

LEVERAGE SCHOOLS AND PUBLIC BUILDINGS AS LEAD SITES

Through state and local government, including school districts, support school facility operators to leverage public schools and public buildings as anchor and host sites for community-located community solar projects. Locating community solar projects at schools helps overcome trust and marketing gaps for projects, while supporting and providing direct community benefits. Further, community solar projects connected to a school premises, if co-located with energy storage, can support resilient school operations in the event of a broader grid outage, creating the opportunity for the school to act as a community resilience hub.

» ***Authority to Implement***

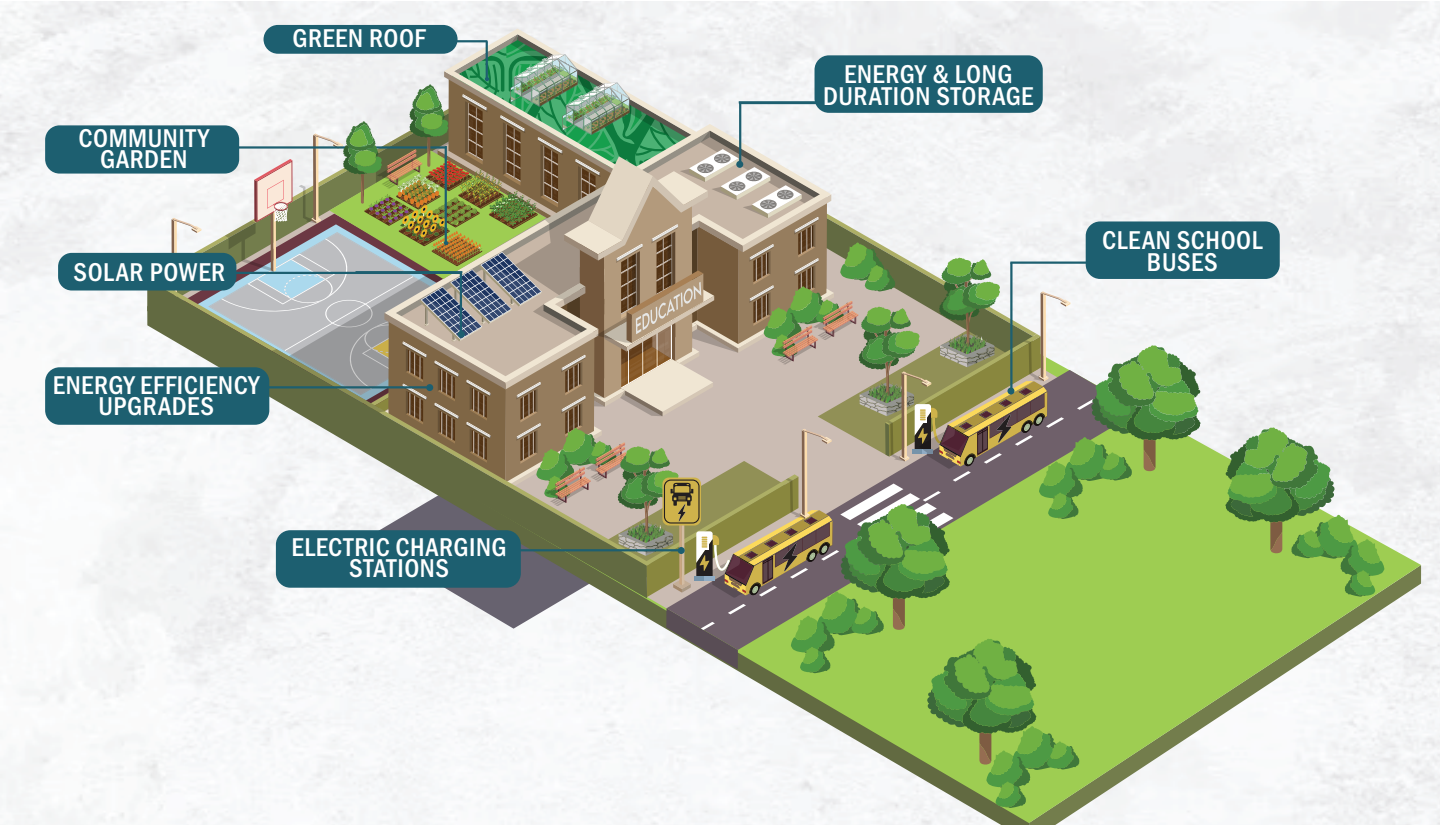
This action could be implemented with existing authority, whether at the state through LDENR, LPSC, Louisiana Office of Community Development, or at the local level through existing plenary powers of local governments and school boards. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

COORDINATE OUTREACH THROUGH TRUSTED LOCAL ENTITIES

Through state and local government, work with partners to engage community-based organizations to do geographic-specific outreach to support residential customer subscriptions to community solar projects. Community-based organizations can manage marketing, public outreach, public interactions, income verification (for Louisiana Solar for All), and other local education needs to overcome trust and information barriers to residential participation in community solar.

» ***Authority to Implement***

Effective January 10, 2024, the LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of the LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See La. R.S. 36:354. The DOA has existing offices, including the Office of Planning and Budget, that can engage with communities to build local capacity.



Conceptual illustration of a cross-cutting initiative of focus areas. Schools can serve as lead sites for implementing priority actions across several focus areas. These improvements lower energy costs, improve indoor air quality, reduce the carbon footprint, and enhance grid services. Decarbonizing school infrastructure fosters healthier learning environments and provides resilience benefits for the entire community.

COMMUNITY RESILIENCE HUBS

Community Resilience Hubs are community-serving buildings equipped with grid-interactive, carbon-free distributed energy resources and long-duration storage. During disasters, resilience hubs can provide shelter, air conditioning or heating, fresh water, emergency & health services, food distribution, and general information distribution. Community resilience hubs can provide different types of community amenities and grid improvement services during non-emergencies. Due to Louisiana's proximity to the Gulf of Mexico and experience with hurricanes and other events, post-disaster community resource hubs have emerged over time, but they currently lack energy security. Those in existence are powered by fossil fuel-generated energy. To increase the number of community resilience hubs available to Louisiana's residents, provide access to energy post-disaster, and reduce their carbon footprint, 385 carbon-free microgrids serving Community Resilience Hubs and critical facilities will be deployed by 2031. This effort would target a minimum of 40 MW of distributed solar and 251 MWh of energy storage for microgrids supporting community resilience hubs and critical facilities throughout Louisiana.

Initial deployment of community resilience hub pilots should be strategically located to target critical facilities and communities most at risk from environmental and economic harm. Importantly, community resilience hubs are a complement, and not a substitute, for evacuation strategies, larger scale investments in grid hardening, or other disaster mitigation programs.

STATUS OF COMMUNITY RESILIENCE HUBS IN LOUISIANA

Many efforts are underway statewide to provide services at centralized locations before, during, and after events. In the southeastern part of the state, the New Orleans City Council used $1 million in philanthropic funds for deploying resilience hubs in the City of New Orleans to increase energy resilience and reduce energy burdens. The "Community Lighthouse Program," led by the community-based organization Together Louisiana, is partnering with faith-based congregations and community institutions across New Orleans to deploy a network of commercial-scale solar powered microgrids with battery backup capacity, which will serve as resilience hubs during power outages and natural disasters. The Community Lighthouse Program has made plans and investments to expand statewide through similar community-led efforts statewide. Feed the Second Line, another New Orleans-based non-profit, launched the "Get Lit, Stay Lit Initiative" to deploy solar-powered microgrids with battery backup to be deployed among restaurants across the City of New Orleans to serve as resilience and food distribution hubs in disaster events.

Through its Next 100 Years Challenge, the Greater New Orleans Foundation awarded $100,000 to fund technical assistance for Hazard Mitigation and Tribal Resilience Hubs for the United Houma Nation. The United Houma Nation is the largest Native American tribe in Louisiana

OUTPUT

Deploy 385 carbon-free microgrids serving Community Resilience Hubs and critical facilities by 2031
See page 36

POTENTIAL BENEFITS

GHG emissions reduction

0.0045 million MT CO_2e in 2030

Co-pollutant emission reduction

SO_2	2.56 MT
NO_x	3.90 MT
VOCs	0.14 MT
NH_3	0.16 MT

Community benefits

with over 19,000 citizens, more than 50 percent of whom live in hurricane-prone, low-lying parishes. The project aims to minimize impact from hurricane and sea-level rise by anticipating the critical needs of tribal members following storms and utilizing indigenous knowledge of Louisiana bayou communities to emphasize cultural preservation.

In the south-central part of the state, the University of Louisiana at Lafayette is upgrading the Cleco Alternative Energy Center in Crowley to a general-purpose Grid Test Facility. Researchers will simulate and test a wide variety of microgrid-related equipment and related impacts on the grid overall. The same facility will also be home to the new hydrogen electrolysis test bed through the H2theFuture initiative, which will demonstrate generation of hydrogen from solar and biomass, and utilization of this hydrogen for electrical power generation and green fuel feedstock.

In the southwestern part of the state, following Hurricane Ida in 2021, the Community Foundation of Southwest Louisiana developed the Just Imagine SWLA Master Plan, a 50-year resiliency plan for Calcasieu and Cameron Parishes. Among other strategies, the plan identifies several critical areas for resilience hubs:

"While communities centrally located in Calcasieu Parish and in proximity to Lake Charles have several options for easily accessible and safe facilities that can be used as resilience hubs, those living in the northern, western, and eastern edges of the parish struggle to have the same access. Targeting these communities with new resilience hubs would minimize the driving distance to a resource center and promote storm-prepared communities."[4]

INTERSECTION WITH FEDERAL FUNDING

In 2023, the U.S. Department of Energy (DOE) announced a $249 million award for the State of Louisiana to launch the Hubs for Energy Resilient Operations (HERO) project, a strategic energy resilience initiative that will establish a foundational approach for accelerating more abundant, affordable, and reliable clean energy for greater power resilience in the face of rising extreme weather and more frequent natural disasters. HERO will support the deployment of 385 carbon-free microgrids serving community resilience hubs and critical facilities, initiate a comprehensive, data-driven integrated community energy planning process, and enhance state disaster response. The State will prioritize efforts that support and build on the comprehensive nature of the HERO project.

COMMUNITY-DRIVEN SOLUTIONS

Feedback from community members at public meetings confirmed that increasing climate resilience is a priority for residents across the state. According to National Oceanic and Atmospheric Administration (NOAA), Louisiana had the second highest cumulative damages in the country from billion-dollar disasters between 1980 and 2021. This disaster risk is not unique to coastal regions, nor is it confined to tropical storm events or flooding. Therefore, while resilience must be woven into any climate action plan for Louisiana, effective resilience measures will not look the same across all the state's communities. Strategically located community resilience hubs supported by carbon-free microgrids will allow a tailored approach to reducing GHG emissions, increasing energy security, and providing post-disaster services, particularly for low-income and disadvantaged communities. The demand for such hubs is supported by the state's HERO award and was repeatedly emphasized during the State's conversations with local, regional, and tribal government officials. The priority actions in this plan lay the groundwork for an extensive and coordinated network of community resilience hubs to increase resilience, provide a venue for equitable and accessible amenities, and demonstrate the value of renewable energy.

TRANSFORMATIVE IMPACT

Community resilience hubs have great potential for serving as model community facilities. Their performance in providing the targeted service efficiently and effectively could result in the formulation and adoption of standards for multi-purpose buildings, including being a place with energy security through renewable energy integration.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

The quantification for this output used the EPA AVERT tool. The output was modeled as 40 MW of distributed photovoltaic solar in the state of Louisiana, as the 385 microgrids are expected to total a minimum of 40 MW plus additional storage. The EPA AVERT tool also reports on several specific co-pollutants (SO_2, NO_x, VOCs, and NH_3). While the overall co-pollutant reduction was quantified in the tool, it is not possible to estimate the effects of those reductions without further information on where the emissions would be avoided. The emissions reductions from this strategy are small, relative to Louisiana's overall emissions profile, but these microgrids will have tremendous benefits in Louisiana's LIDAC, including reducing mortality after storm-related power outages. More information is available in the LIDAC benefits analysis.

PRIORITY OUTPUT	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Deploy 385 carbon-free microgrids serving Community Resilience Hubs and critical facilities by 2031	0.0045

GHG Emissions reduction estimate for the community resilience hubs output. This analysis was conducted using EPA's AVERT tool and represents the amount of emissions reduced in the year 2030. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY OUTPUT	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
	SO_2	NO_x	VOCs	NH_3
Deploy 385 carbon-free microgrids serving Community Resilience Hubs and critical facilities by 2031	2.56	3.90	0.14	0.16

Co-pollutant emissions reduction estimates for the community solar output. This analysis was conducted using EPA's AVERT tool, which outputs estimates for a selection of co-pollutants, and represents the amount of emissions reduction for the year 2030. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

DEPLOY COMMUNITY RESILIENCE HUBS

The State, through its HERO project, will work with communities to deploy 385 carbon-free microgrids serving community resilience hubs and critical facilities by 2031.

- Resilient-in-place hubs. Microgrids deliver resilient power to Hubs in communities that can provide shelter, food, medical support, emergency services support, and other community needs for community members that cannot be resilient at home, but that are unable to evacuate due to isolation, expense, and a variety of factors. The Resilient-In-Place Hubs can include shelters, churches, education campuses, and community gathering centers.
- Evacuation route hubs. Microgrids deliver resilient power to Hubs deployed along designated evacuation routes or along freeways further inland, that can be powered and can serve as accessible shelters for evacuating community members and support recovery efforts during extreme weather events and associated grid outages.
- Critical facilities. Microgrids deliver resilient power on-site at critical facilities, such as medical centers, flood and levee protection systems, emergency services, water treatment facilities, food storage and distribution, and other essential services that serve community resilience needs.

» ***Authority to Implement***

LDENR-led HERO Project was selected for a DOE GRIP Program Grid Utility and Industry Grant in October 2023. Pursuant to La. Const. art. VII, § 14, state agencies and political subdivisions "may engage in cooperative endeavors with each other, with the United States or its agencies, or with any public or private association, corporation, or individual."

FACILITATE COMMUNITY-DRIVEN PLANNING

Through state and local government, work closely with communities to pilot new models for community-centric energy resilience project planning, aimed to protect disadvantaged and critical communities during extreme weather, natural disasters, and other threats to energy security. The effort will focus on identifying, recruiting, training, and supporting community-based organizations in the design and deployment of community-based planning efforts; providing funding for community conversations that gain local knowledge on identifying and mapping community resilience needs.

» ***Authority to Implement***

The State, through the state's Chief Resilience Officer, GOHSEP and DOA, as well as local governments have existing authority and programs for resilience planning.

DEPLOY MOBILE BATTERY STORAGE

Through state and local government, support the launch of mobile energy storage projects that deploy small, packaged energy storage units to households with limited mobility or that rely on electricity-dependent equipment during extended outages.

» ***Authority to Implement***

The State, through entities like GOHSEP and La. DOTD, as well as local governments have existing authority and programs for emergency response. This action would provide new resources to provide emergency response with a low GHG footprint.

UNLOCK COMPENSATION FOR ENERGY STORAGE AS A GRID RESOURCE

Through state and local government, as part of an integrated community energy planning process, support efforts to enable distributed energy resource microgrids to get compensated for providing grid services, such as peak demand reduction or demand response. Complementary work through community-driven planning and engagement with regulators can help identify, unlock, and establish sustainable solutions for energy storage compensation.

» ***Authority to Implement***

The LPSC regulates electric utilities and sets their rate base and other forms of compensation, while the City Council of New Orleans regulates Entergy New Orleans and sets its rate base and other forms of compensation. In addition to these regulatory bodies, LDENR and DOA have existing authority to provide planning support relative to energy storage.

ESTABLISH RESILIENCY STANDARDS

Through state and local government, investigate the opportunity to incorporate requirements for energy resiliency, including efficiency and stable heating and cooling in the wake of extreme temperatures, into future building codes and/or development standards to ensure community gathering places have resilient power and are designed to support community members during extreme weather events and other energy disruptions.

» ***Authority to Implement***

The LSUCCC has the authority to evaluate, adopt, and amend the latest editions of the International Building Code, International Residential Code, International Energy Conservation Code, and the National Electric Code. Additionally, local governments have the authority to implement building standards that are more stringent than the baseline state codes.

SECURE LONG-TERM FEDERAL LOAN FOR VIRTUAL POWER PLANTS

The State and its state financial institution partners will pursue securing a long-term loan guarantee from the U.S. DOE Loan Programs Office for a lead state entity or coalition in order to get access to low-cost debt and a federal loan guarantee to deploy community resilience hubs and critical facility microgrids that include a grid-interactive role. The loan commitment would enable state and local partners to gain low-cost access to funds to deploy projects, capture federal tax incentives, and operate energy storage facilities as virtual power plants to ensure projects can achieve a return while providing long-term resilience and security value.

» ***Authority to Implement***

The DOE Loan Programs Office has the authority to designate existing state agencies as State Energy Finance Institutions, which allows for greater access to Loan Programs Office funds. The State of Louisiana can engage with DOE to designate the State Energy Office and/or LHC as a State Energy Financing Institution.

TRANSMISSION PLANNING

Transmission Planning refers to the necessary measures to prepare the power grid to support a clean energy transition and withstand increased climate-related hazards. Electricity is the backbone of the economy and a requirement for a high quality of life. A clean and resilient power grid is the linchpin for Louisiana's carbon emissions reduction ambitions. With increased adoption of industry, transportation, and building electrification measures, it is essential that Louisiana plans to meet anticipated load growth and resource requirements with clean and reliable electricity sources.

Louisiana's grid is managed by two Regional Transmission Organizations (RTOs), which are non-profit organizations created to ensure reliable supplies of power, adequate transmission infrastructure, and competitive wholesale electricity markets. Most of the state's grid is managed by the Midcontinent Independent System Operator (MISO), which includes 15 states mostly in the south and Midwest regions of the country. The grid in northwest Louisiana is managed by the Southwest Power Pool (SPP), which serves 17 states in the central part of the country. Engagement of these two RTOs is critical for effective and implementable transmission planning.

STATUS OF TRANSMISSION PLANNING IN LOUISIANA

Louisiana's transmission grid is aging with few current projects for large scale updates to address old and failing infrastructure and prepare for offshore and solar power distribution. Challenges of cost, timing, and siting must be overcome to update, upgrade, and increase transmission capacity. The current cost of grid investments is a significant capital investment and transmission line development often takes more than ten years because transmission projects have impacts across utilities and state lines, with complicated approval and cost-allocation processes through RTOs. Therefore, regional coordination is key to success. Despite these challenges, the State has been taking steps to modernize and prepare its power infrastructure.

INTERSECTION WITH FEDERAL FUNDING

Louisiana's Interagency Grid Working Group guides the state in developing and supporting initiatives related to grid modernization and energy transition through BIL and IRA. The group has collaborated with utilities, universities, and community partners to submit nearly $700 million in BIL proposals to support energy resilience and grid modernization in Louisiana.

OUTPUT

Increase new transmission capacity by 30% by 2035
See page 39

POTENTIAL BENEFITS

GHG emissions reduction

variable

Co-pollutant emission reduction

SO_2	variable
NO_x	variable
VOCs	variable
NH_3	variable

Community benefits

LDENR submitted to DOE a preliminary revision to Louisiana's Energy Security Plan in September 2022, with a final submission in September 2023. In collaboration with GOHSEP, this plan overlays Louisiana's energy profile with physical and cyber threats and vulnerabilities; the 2022 Louisiana Climate Action Plan is highlighted as an approach to address these risks.

TRANSFORMATIVE IMPACT

The priority actions identified support large-scale updates, upgrades, and investments in power transmission and the planning necessary to ensure grid integration of renewable energy generation into the existing infrastructure. Although an ambitious goal, the priority actions will provide long-term guidance for investments. Over time, these plans will be implemented and transform power distribution across Louisiana and its contributions to MISO.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

Increasing transmission capacity on its own does not reduce GHG emissions or co-pollutants. However, it is a critical policy for realizing larger decarbonization efforts in the electricity sector. The 2022 Louisiana's Climate Action Plan 2022 is, in part, based on three key policy pillars: renewable electricity generation, industrial electrification, and industrial fuel switching to no- and low-carbon hydrogen. Increased transmission is a core element of the first two pillars and supports the third through increased capacity to power hydrogen electrolyzers. Additionally, Action 1.6 in the 2022 Louisiana Climate Action Plan sets a goal of a 30% increase in MW-mile capacity by 2030, which was represented in the net zero pathway modeling in the EPS tool through their "Increase Transmission" policy.[5] In the EPS tool, this policy alone does not result in emissions reductions. But, in combination with other policies, it is a supportive policy that connects, for example, the construction of solar farms to the utilization of electricity by industrial boilers. The clearest policy connection to the EPS modeling from the 2022 Louisiana Climate Action Plan is to the Clean Electricity Standard; in the model, this policy "builds" new clean electricity, and showed a 3.2 million MT CO_2e reduction in 2030 before that reduction amount increases to over 22 million MT CO_2e in 2036. Increased transmission supports these reductions in emissions and reductions in co-pollutants from displaced electricity generation emissions, likely from methane combustion. These reductions will vary based on the amount of renewable electricity built, the rise in electricity demand from industry, the speed of interconnection approvals to the larger grid, and more. For the full details of the assumptions made in the analysis please see the Technical Appendix (Appendix A).

PRIORITY OUTPUT	GHG EMISSIONS REDUCTION
Increase new transmission capacity by 30% by 2035	Variable

GHG Emissions reduction estimate for the transmission output. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

INTEGRATE ADVANCED CONDUCTORS AND OTHER GRID-ENHANCING TECHNOLOGIES

The State will support the development of a comprehensive plan to integrate advanced conductors and other grid-enhancing technologies on existing and new transmission routes to expand transmission capacity and reduce risk of failure. The State will prioritize the following elements:

- Understanding future transmission needs. Conducting a review of contemporary transmission needs and planning studies to determine high and low scenarios of transmission expansion needed over the next 20 years.
- Evaluating role of advanced conductors and other grid-enhancing technologies. Conducting a study of the potential of advanced conductors and other grid-enhancing technologies to expand transmission capacity, reduce risk of failure, and lower energy cost, by transmission segment (new and existing).
- Establishing grid-enhancing technologies standards. Based on the fact base established in the transmission needs analysis and advanced conductor and grid-enhancing technologies study, working to establish a standard that requires the use of advanced conductors and other grid-enhancing technologies where cost-effective. Establishing a standard would allow for the rebuild of transmission lines with advanced conductors and other grid-enhancing technologies and create a cost-benefit basis for retrofit projects.

» ***Authority to Implement***

This action could be implemented with existing authority through LDENR or LPSC in coordination with the New Orleans City Council as the regulator of Entergy New Orleans. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

DEVELOP OFFSHORE WIND TRANSMISSION PLAN

In coordination with its Offshore Wind Roadmap, the State will support a study to determine routing strategies, interconnection needs, and anticipated costs of various scenarios for the connection of offshore wind development to the onshore transmission system.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or LPSC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

FACILITATE REGIONAL RESOURCE STRATEGIC PLANNING

Through state or local government, work with other states, utilities, and regional transmission organizations to a) begin a regional resource planning process based on future scenarios of energy generation availability, changes in electric loads, and anticipated transmission projects, and to b) identify multi-jurisdictional strategies to deploy new transmission projects across multiple states and transmission organizations to cover identified gaps in transmission capacity. This includes regional and interregional transmission projects within MISO, and between MISO and SPP. Transmission planning processes should additionally include communities and local governments impacted by transmission development.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or LPSC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

SUPPORT ESSENTIAL TRANSMISSION PROJECTS

Through state or local government, provide support to active transmission capital infrastructure development projects that provide access to new renewable energy generation with technical assistance on siting, permitting and other integration challenges. This includes regional and interregional transmission projects within MISO, and between MISO and SPP.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or LPSC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

Power sources and transmission. Adobe Stock Photo.

INDUSTRIAL DECARBONIZATION

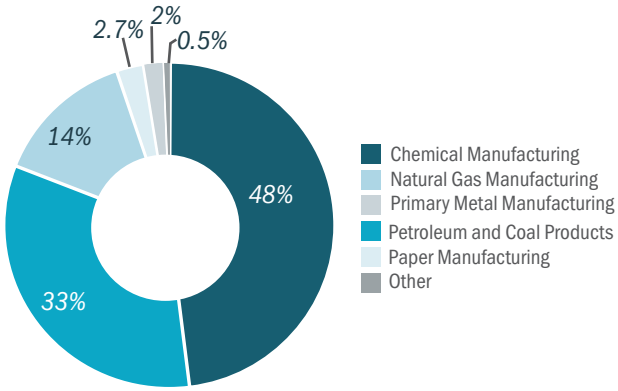
Industrial decarbonization refers to avoiding the combustion of fossil fuels to reduce emissions from the industrial process chain. Industrial decarbonization is inclusive of numerous cross-cutting technologies, processes, and practices, including energy efficiency upgrades, process equipment electrification, use and production of low- and no- carbon fuels and feedstock, advanced recycling, and deployment of carbon management technology.

The industrial sector accounts for two-thirds of Louisiana's emissions due to demand for products produced in Louisiana that are then exported and sold to the rest of the nation and world. Omitting large power generation facilities, Louisiana's top 20 industrial facilities emit around 61 million MT per year,[6] with ammonia production and oil refineries the highest emitting facilities. To reduce carbon and co-pollutant emissions, facilities need to increase efficiency, use low- and medium-heat industrial processes, and use low- and no-carbon hydrogen rather than fossil fuels.

STATUS OF INDUSTRIAL DECARBONIZATION IN LOUISIANA

Addressing carbon emissions in the industrial sector is one of the highest impact measures that can be taken to reduce greenhouse gases. To date, several efforts are underway to support clean hydrogen production, carbon capture, utilization, and storage (CCUS), and industrial electrification.

The report *Industrial Electrification in U.S. States* analyzes nine of Louisiana's industrial subsectors and the changes in energy use, CO_2 emissions, and energy costs that would occur if individual industrial processes were electrified.[7] This report studied Louisiana's industrial pulp and paper, container glass, ammonia, methanol, plastic recycling, wet corn



Louisiana Industrial GHG emission Shares by Sector (2019)

OUTPUTS

SEVERAL
See pages 45-46

POTENTIAL BENEFITS

GHG emissions reduction

57.72 - 59.25 million MT CO_2e

Co-pollutant emission reduction

SO_2	698.08 MT
NO_x	33,737.47 MT
VOCs	135,213.13 MT
NH_3	118.16 MT

Community benefits

milling, aluminum casting, beer, and soybean oil sectors. Key insights of the report include that electrifying ammonia or methanol production in Louisiana can significantly reduce emissions and electrifying recycled plastic production may reduce energy costs per unit of production.[8]

INTERSECTION WITH FEDERAL FUNDING

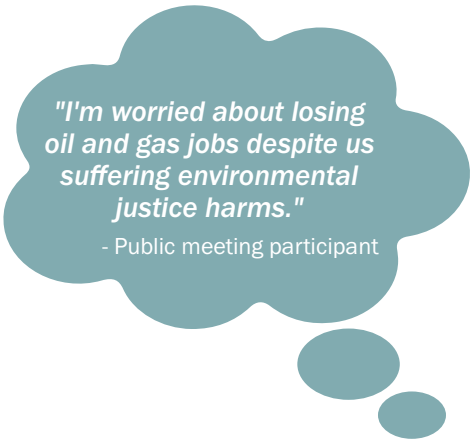
A $50 million grant from EDA's Build Back Better Regional Challenge in 2022 and $24.5 million from the State of Louisiana to H_2theFuture will support holistic, equitable economic and workforce opportunity throughout Louisiana's energy transition with 25 partner organizations across 35 Louisiana parishes. H_2theFuture will build a clean hydrogen energy cluster to decarbonize the South Louisiana industrial corridor through the execution of projects across five interrelated workstreams. These workstreams focus on research of low-carbon hydrogen technologies through university partnerships, create a physical and programmatic hub to foster collaboration and coordination between stakeholders, and identify business development initiatives supportive of the hydrogen value chain, workforce developing for displaced workers, rural citizens, and minorities, and private public partnerships to de-risk low carbon hydrogen investments at commercial scale.

Project Cypress, a Regional Direct Air Capture Hub to be located in southwest Louisiana, aims to capture more than 1 million MT of existing CO_2 from the atmosphere each year and sequester the CO_2 permanently deep underground. Project Cypress will implement a robust two-way communication program with local communities and stakeholders to solicit input into the project as it develops its Community Benefits Plan while also generating new employment opportunities and advancing diversity, equity, inclusion, and accessibility principles.

The HALO Hydrogen Hub is a bipartisan three-state partnership between Louisiana, Oklahoma, and Arkansas created to compete for up to $1.25 billion of a total $7 billion in funding set forth in the BIL. HALO's approach is to employ public-private partnerships to catalyze the development of an extensive hydrogen network in the three constituent states ultimately to be integrated into the national hydrogen network. HALO goals support transformative technologies and investments that will drive lower costs and increase adoption of hydrogen to reduce carbon and other emissions. DOE announced hydrogen hub finalists in October 2023, and the HALO Hub was not selected to receive funding through the Regional Clean Hydrogen Hubs program. Members of the HALO Hub are continuing to seek ways to leverage the partnerships that have been established through this effort.

COMMUNITY-DRIVEN SOLUTIONS

Decarbonizing the industrial sector is Louisiana's most pressing challenge and single largest opportunity to improve air quality and public health, which is a top priority of every community the State engaged during PCAP development. However, many residents are apprehensive about directing additional public funds to support Louisiana's large industrial actors. The public expressed strong concerns over state and federal oversight of industrial activities, including the number of plants permitted and their cumulative impact on air quality and perceived lack of emission regulation enforcements. This plan does not propose policy or regulatory recommendations as the intention is to identify options for CPRG implementation grant applications.[9] Therefore, the priority actions of this plan aim to address community concerns by prioritizing proactive and consistent engagement and transparency with affected populations; building capacity for regulators to better monitor and enforce existing standards; and responsibly siting new infrastructure to prioritize public health improvements, environmental protection, and cultural preservation.



TRANSFORMATIVE IMPACT

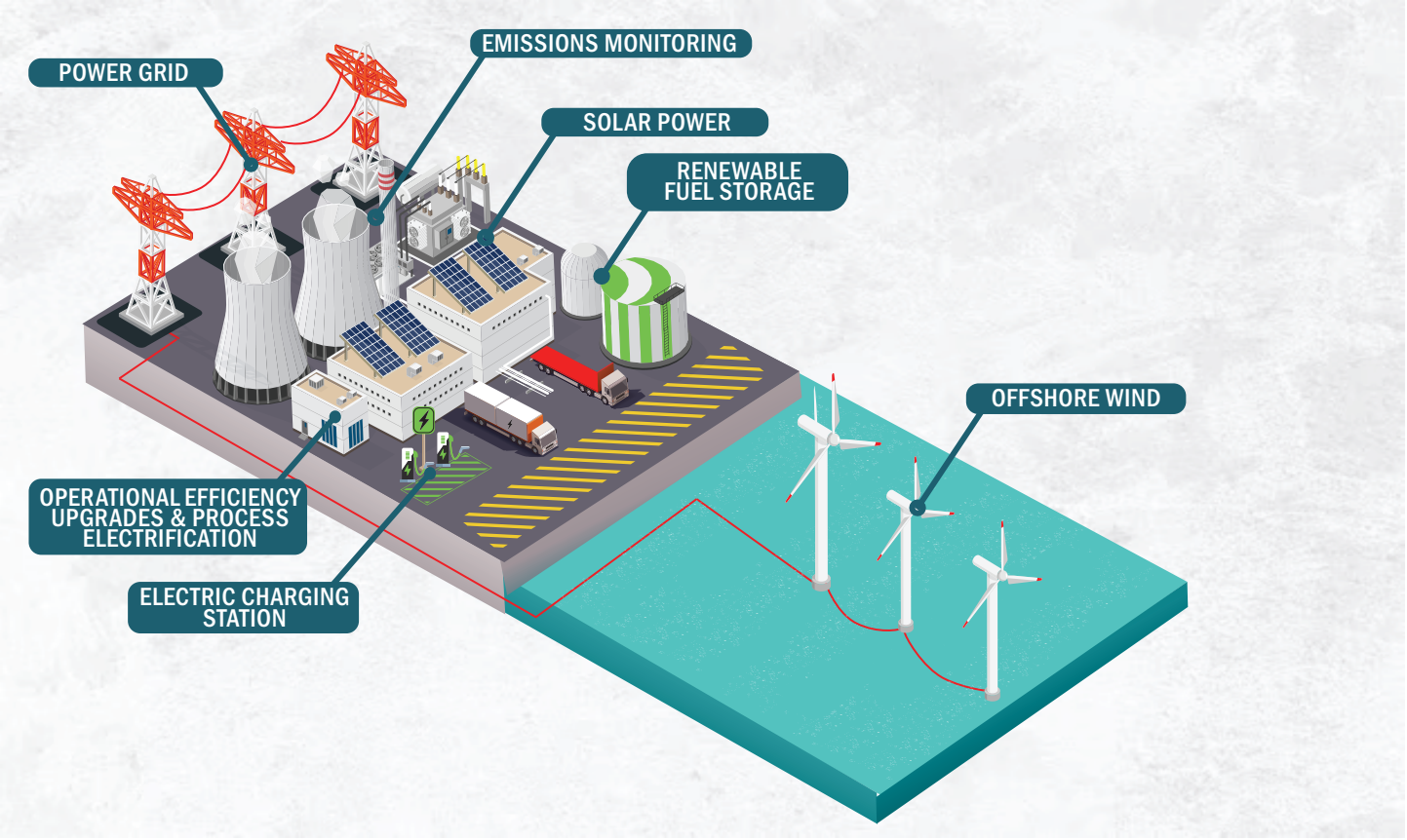
Industrial GHG emissions are widely thought of as the most difficult GHG emissions to abate. Therefore, many companies and governments alike do not plan to address these significant and challenging emissions within the decade, instead prioritizing lower hanging fruits. With an overwhelming contribution of emissions in the state from the industrial sector, Louisiana's unique net-zero pathway—which requires immediate and aggressive industrial GHG emission reductions—offers an opportunity to lead by example. The identified priority actions elevate the importance of engaging affected communities and increasing means for monitoring and

accountability that will be essential for Louisiana to responsibly deploy new technology and provide lessons that may be exported to other heavily industrialized areas. This plan also prioritizes incentivizing pilot projects and equipment that are currently cost prohibitive to prove market-readiness and future adoption.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

These quantifications were produced using a variety of methods.

- Energy efficiency was evaluated using the EPS policy for Industrial Energy Efficiency Standards (rising to 10% by 2030 for specific sectors).
- Process electrification was modeled using data from a consultant report produced for the State of Louisiana on industrial electrification opportunities, looking specifically at process heaters and boilers with variations on how clean the electricity grid was represented.
- Clean electricity was evaluated using the EPS tool, using a higher-level approach of shifting 20% of the electricity supply to the state's industrial sector to clean and renewable electricity.
- Low- and no-carbon hydrogen were considered together, as these two outputs represent both supply and demand, and were evaluated using the EPS tool.
- Circular Economy and Low-Carbon Materials policies were not able to be evaluated, as there are not sufficient data to understand baseline emissions and usage of these materials, and multi-system dynamics would be required to understand how production of these materials may shift to or from Louisiana as a downstream decision of policy designs.
- Carbon capture policies were evaluated using the EPS tool policies for process emissions in specific sectors.



Conceptual illustration of implementation of multiple priority actions in this focus area at a single industrial facility. The benefits of implementation could be amplified through coordinated planning at co-located or regionally-proximate facilities. The image also includes Offshore Wind, Community Solar, Transmission Planning, Fleet Transition, and Built Environment Retrofits, illustrating the importance of pursuing cross-sector approaches to decarbonization.

- N_2O abatement was converted to CO_2 equivalents using the EPA CO_2e calculator, based on the abatement outputs developed by the policy team.
- Co-pollutants were evaluated either through the EPS tool or by using 2020 NEI data to calculate a baseline percentage reduction. While not all co-pollutants could be quantified for these specific policies, EPA's own research, inventories, and monitoring in Louisiana shows links between industrial emissions and co-pollutants. More research is needed to determine spatially how those emissions and co-pollutants could be impacted through implementation of these actions at specific facilities.

Full details, including EPS tool settings, are included in the Technical Appendix (Appendix A).

PRIORITY OUTPUTS	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Enhance energy efficiency in chemical and refining facilities by an average of 10% by 2030	7.1*
Electrify 15% of all low- and medium-heat processes, with a goal of 100% of all new and replacement boilers and process heaters being electric by 2040	Between 0.42 and 1.95 depending on assumptions about electrical grid
Increase on-site renewable and clean electricity generation, including energy storage and grid integration, to 20% of industrial facilities by 2030	13.3*
Switch 25% of all hydrogen to clean hydrogen used in ammonia and refining production by 2030	15.5*
Transition 5 MTPA of steam methane reformers to low- or no-carbon hydrogen	
Reduce demand for cement, iron and steel, and water and waste by 30% through material efficiency, advanced recycling, and other circularity initiatives	No estimates were produced.
Apply carbon capture, utilization, and storage at as close as possible to 90% capture rate at a majority of natural gas processing facilities, petroleum refineries, and ammonia and chemical manufacturing plants by 2030	19.7*
Reduce ~6,000 tons of N_2O emissions annually from fertilizer production facilities through N_2O abatement strategies	1.7

*GHG emissions reduction estimates for outputs focused on industrial decarbonization. Due to overlap between different outputs, these should not be treated as additive. The Institute did not have enough information to provide estimates for all outputs. Additionally, values with *(asterisks) were generated using the Energy Policy Simulator tool which is better suited for the coarser policy analysis as compared to the more specific outputs analyzed here. As a result, these numbers should be viewed as an upper bound on the plausible effects of these outputs. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).*

PRIORITY OUTPUTS	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
	SO_2	NO_x	VOCs	NH_3
Enhance energy efficiency in chemical and refining facilities by an average of 10% by 2030		9,000*	14,000*	
Electrify 15% of all low- and medium-heat processes, with a goal of 100% of all new and replacement boilers and process heaters being electric by 2040	504.89	3,423.41	202.14	105.88
Increase on-site renewable and clean electricity generation, including energy storage and grid integration, to 20% of industrial facilities by 2030	193.19	314.06	10.99	12.28
Switch 25% of all hydrogen to clean hydrogen used in ammonia and refining production by 2030		17,000*	87,000*	
Transition 5 MTPA of steam methane reformers to low- or no-carbon hydrogen				
Reduce demand for cement, iron and steel, and water and waste by 30% through material efficiency, advanced recycling, and other circularity initiatives	No estimate was produced.			
Apply carbon capture, utilization, and storage at as close as possible to 90% capture rate at a majority of natural gas processing facilities, petroleum refineries, and ammonia and chemical manufacturing plants by 2030		4,000*	34,000*	
Reduce ~6,000 tons of N_2O emissions annually from fertilizer production facilities through N_2O abatement strategies	No estimate was produced.			

Co-pollutant emissions reduction estimates for outputs focused on industrial decarbonization. Due to overlap between different outputs, these should not be treated as additive. The Institute did not have enough information to provide estimates for all outputs. Additionally, values with asterisks were generated using the Energy Policy Simulator tool which is better suited for the coarser policy analysis as compared to the more specific outputs analyzed here. The EPS tool only provides estimates for a small subset of co-pollutants. As a result, these numbers should be viewed as an upper bound on the plausible effects of these outputs. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

ENHANCE PROCESS EFFICIENCY

Through state and local government, support the deployment of pilot and demonstration projects that accelerate energy and operational efficiency and leverage BIL stimulus and IRA incentives.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See La. R.S. 36:354. Pursuant to La. R.S. 2399.3, an employer may earn a tax credit for a modernization, defined as a capitalized investment in technology, machinery, building and/or equipment that increases the maximum capacity or efficiency of that facility by at least 10%.

INCENTIVIZE PROCESS ELECTRIFICATION

Through state and local government, support the adoption of industrial electrification measures accelerated with federal incentives, as well as provide additional rebates or incentives where federal resources are insufficient. For example, the state could provide funding to meet the marginal price difference of replacing conventional boilers with electric boilers. The State will further evaluate opportunities for process electrification for distillation columns, heaters, furnaces, scrubbers, turbines, and more.

» ***Authority to Implement***

Pursuant to La. R.S. 47:6037, LED, DOA, and the Office of the Governor are authorized to certify projects for purposes of a tax credit for the construction, repair, or renovation of "green projects" at "green job industries." Pursuant to La. R.S. 2399.3, an employer may earn a tax credit for a modernization, defined as a capitalized investment in technology, machinery, building and/or equipment that increases the maximum capacity or efficiency of that facility by at least 10%.

MONITORING, ACCOUNTABILITY, AND ENFORCEMENT

Through state and local government, build internal capacity to monitor and enforce emissions standards for existing facilities and operations, as well as emerging technologies that support decarbonization. This could include increased fence line and ambient monitoring to establish baselines and encourage accountability from emitters. This may also support added capacity to re-evaluate and improve methods of reviewing and quantifying the significance of GHG emissions, particularly in areas with high concentrations of emitting facilities and/or vulnerable populations.

» ***Authority to Implement***

LDEQ has the authority to promulgate rules establishing programs to monitor and analyze air emissions, provide current and accurate information to the public regarding the pollutants or contaminants present in the environment, collect and disseminate information on certain aspects of environmental protection and control, and compile and maintain an ongoing comprehensive air emissions inventory. La. R.S. 36:234; 30:2011; 30:2054. More specific statutory and budgetary authority would be required to establish broad fence line monitoring requirements or to enhance the existing ambient monitoring network.

ASSESS THE FEASIBILITY OF INDUSTRIAL HEAT ALTERNATIVES

Through state and local government, conduct a feasibility assessment of industrial heating solutions to guide electrification, fuel-switching, or lower-heat alternatives.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto.

INCREASE ACCESS TO CLEAN ENERGY

Through state and local government, support measures to increase direct or virtual industrial access to clean, high-capacity, firm power energy, such as building out on-site, behind-the-meter solar with long duration energy storage on underutilized acreage on or adjacent to industrial campuses or virtual power purchase agreements.

» ***Authority to Implement***

This action could be implemented with existing authority of the LPSC or New Orleans City Council. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting. The LPSC has the authority to regulate utilities and set metering rates. Pursuant to La. Const. art. IV, § 21, the LPSC "shall regulate all common carriers and public utilities and have such other regulatory authority as provided by law. It shall adopt and enforce reasonable rules, regulations, and procedures necessary for the discharge of its duties, and shall have other powers and perform other duties as provided by law."

INCENTIVIZE LOW- AND NO-CARBON HYDROGEN PRODUCTION

Through state and local government, support broad adoption of low- and no-carbon hydrogen to replace carbon-intensive hydrogen in chemicals and refining production through incentives and public-private collaborations to seize BIL stimulus and IRA incentives, specifically:

- Direct feedstock switching in refineries ;
- Transitioning steam methane reformers to clean hydrogen in sectors like ammonia production and refining, accelerated with IRA incentives;
- Integrating Carbon Capture & Storage into facilities with steam methane reformers will likely only capture the concentrated process emission streams as these provide the most economic capture costs.

» ***Authority to Implement***

Pursuant to La. R.S. 47:6037, LED, DOA, and the Office of the Governor are authorized to certify projects for purposes of a tax credit for the construction, repair, or renovation of "green projects" at "green job industries." Pursuant to La. R.S. 2399.3, an employer may earn a tax credit for a modernization, defined as a capitalized investment in technology, machinery, building and/or equipment that increases the maximum capacity or efficiency of that facility by at least 10%.

LOW- AND NO-CARBON HYDROGEN SUPPLY CHAIN

Through state and local government, support the formation of public and private collaborations to develop domestic electrolyzer manufacturing, recycling, raw materials, and components for electrolyzer production critical to the hydrogen value chain, with a plan for long-term growth and a self-sustaining market.

» ***Authority to Implement***

LED, LDENR, City of New Orleans, and Greater Lafourche Port Commission are members of the GLOW Propeller, which was designated as an EDA Tech Hub in October 2023. Pursuant to La. Const. art. VII, § 14, state agencies and political subdivisions "may engage in cooperative endeavors with each other, with the United States or its agencies, or with any public or private association, corporation, or individual."

PLAN FOR CLEAN HYDROGEN INFRASTRUCTURE

Through state and local government, plan for cost-effective pipelines, distribution, and storage infrastructure as critical anchors to the clean hydrogen economy with the launch of capital infrastructure plans with prioritized select pilots and demonstration projects.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto.

ENABLE LOW-CARBON MATERIAL USE AND RAW MATERIAL SUBSTITUTION

Through state and local government, support the formation of public and private collaborations to develop domestic electrolyzer manufacturing, recycling, raw materials, and components for electrolyzer production critical to the hydrogen value chain, with a plan for long-term growth and a self-sustaining market. Focuses may include:

- Renewable natural gas produced from biogas;
- Sustainable aviation fuel produced from waste oils or gasified waste woody biomass;
- CO_2 or industrial/consumer waste products (such as plastics) as feedstock to produce carbon-based chemicals and fuels.

» ***Authority to Implement***

Pursuant to La. R.S. 47:6037, LED, DOA, and the Office of the Governor are authorized to certify projects for purposes of a tax credit for the construction, repair, or renovation of "green projects" at "green job industries." Pursuant to La. R.S. 2399.3, an employer may earn a tax credit for a modernization, defined as a capitalized investment in technology, machinery, building and/or equipment that increases the maximum capacity or efficiency of that facility by at least 10%.

IMPROVE PRODUCT CIRCULARITY ACROSS THE SUPPLY CHAIN

Through state and local government, support the creation of integrated waste management hubs capable of mechanical and advanced recycling for residential, industrial, and agricultural waste streams. Hubs should be strategically located in high-population areas with rail and/or port access to efficiently move product to end markets. State and local governments can also build internal capacity to develop and execute a comprehensive product circularity plan across the supply chain to significantly reduce industrial Scope 3 emissions as a growing demand from end use customers.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDEQ or at the local level through existing plenary powers of local governments. Pursuant to La. R.S. 30:2154, LDEQ has the authority to "prepare and develop a general solid waste management plan which shall encourage the maximum practicable use of resource recovery procedures." Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

REDUCE N_2O EMISSIONS THROUGH ABATEMENT TECHNOLOGIES

Through state and local government, support the development of a performance-based incentive program or an emissions offset backstop to support private investment in long-term N_2O abatement strategies at fertilizer production facilities in the state. N_2O is a highly potent GHG with a global warming potential 273 times that of CO_2. Secondary N_2O abatement includes installation of a catalyst bed within the existing nitric acid reactor, under the platinum catalyst gauze. Total emissions reduction from secondary N_2O abatement strategies may range from 50-70%. Tertiary N_2O abatement is an end-of-pipe solution which involves installation of a separate reactor vessel, heater and reducing agent injection system to eliminate up to 99% of N_2O emissions.

» ***Authority to Implement***

LDEQ has statutory authority to develop regulations to limit emissions of air pollutants to protect human health and the environment. Rulemaking in accordance with the Louisiana Administrative Procedures Act would be needed to develop regulations specific to the fertilizer production sector for regulating N_2O, and budgetary authorization would be needed to implement the program. The rulemaking process takes 3-12 months from publication of a Notice of Intent to publication of the final rule.

DEMONSTRATE FEASIBILITY OF CARBON CAPTURE AND STORAGE IN NATURAL GAS PROCESSING

Through state and local government, support the deployment of pilots and demonstration projects to prove the feasibility of capture on lower-purity sources of CCS on high-purity CO_2 streams, such as natural gas processing, will help build out the infrastructure needed to reduce costs for projects on low-purity streams in the future. Focus early deployment in assets with nearby access to existing transport and storage infrastructure.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations

for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of the LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto.

MANAGE CARBON EMISSIONS IN COORDINATION WITH AFFECTED COMMUNITIES

Through state and local government, coordinate early-stage engagement with and between industry and community based on the DOE Office of Fossil Energy and Carbon Management framework on carbon management project development as guiding principles to ensure that tangible environmental, economic, and social benefits flow to communities during the decision-making process. State and local government can also collaborate with the private sector on DOE-supported "hubs" for direct air capture and CCUS by creating standard commercial arrangements that simplify the project development process. Across CCUS, the need for multiparty agreements (e.g., between emitting facilities, capture providers, transport providers, and storage facilities) and a lack of commercial standardization complicate project development are barriers to be addressed early on.

» ***Authority to Implement***

EPA approved LDENR's request for primacy of Class VI injection wells under the SDWA UIC program. Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing
the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto.

EXPAND THE WORKFORCE

Through state and local government, perform a labor needs assessment and engage companies, labor unions, and higher education institutions to develop a regional plan for skilled workforce and relevant training programs to rapidly expand the industrial decarbonization workforce and help ensure high-quality jobs are filled with members of the affected community to balance the distribution of impacts.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR, LED, LWC, or DOA or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

MAINTAIN CONSISTENT ENGAGEMENT WITH AFFECTED COMMUNITIES

Through state and local government, expand direct public engagement around issues of facility emissions and ambient air quality in LIDAC. This will include educational workshops to improve transparency and listening sessions to increase the opportunity for public input. The State will also provide technical assistance and/or directly collaborate with industrial actors wishing to address public concerns through the development of Community Benefits Plans, market adoption of Community Benefits Agreements, Project Labor Agreements, and responsible business and labor practices. State and local government can also maintain consistent engagement coordination with communities and industry to address inconsistent public acceptance of the industrial sector and decarbonization strategies due to environmental and human health risks, environmental justice, and labor concerns.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR or DOA or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

ESTABLISH INDUSTRY STANDARDS

Through state and local government, establish an Environmental Product Declarations (EPD) Assistance Program and a low-embodied-carbon "eco-labeling" system for construction materials currently under development by the EPA to simplify, centralize, and streamline the EPD development process, including the ready-mix concrete and asphalt pavement industries. Coordinate with the Clean Energy Ministerial Industrial Deep Decarbonization Initiative alongside industry and stakeholders to address the barriers so that EPDs are easy and affordable and have a greater degree of fairness, reliability, and comparability.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA and La. DOTD or at the local level through existing plenary powers of local governments. Pursuant to La. R.S. 40:1730.49, the DOA Office of Facility Planning and Control is authorized to adopt rules and regulations which "[i]mprove environmental quality in this state by decreasing the discharge of pollutants from state-funded buildings and their manufacture." DOA is also required to, in coordination with La. DOTD, adopt rules to require the use and purchase of goods with recycled content by all state agencies and political divisions. See La. R.S. 30:2415. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

FACILITATE PUBLIC-PRIVATE PARTNERSHIPS

Through state and local government, proactively form cooperative agreements to deploy public and private capital investments on industrial decarbonization pilots and demonstration projects based on technology readiness level (1-9) and adoption readiness level (1-9) to close the persistent cost gap between incumbent and decarbonized technology for industrial producers and de-risking public and private sector investment to achieve commercialization at scale.

» ***Authority to Implement***

Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR, toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See La. R.S. 36:354.

ESTABLISH A DECARBONIZATION PLANNING AND IMPLEMENTATION FUND FOR INDUSTRIAL CLUSTERS

Through state and local government, support coordinated decarbonization approaches that capitalize on geographic proximity, both for operations co-located at a common campus and regionally situated. State and local government can also establish a fund for the development of industrial cluster decarbonization plans and implementation of those plans. This fund would drive direct, facility-level investment in innovative regional decarbonization strategies and create new, high-quality jobs for a low-carbon future.

» ***Authority to Implement***

This action could be implemented with LDENR's existing authority in coordination and/or partnership with LDEQ, LPSC, federal agencies and local governments. Effective January 10, 2024, LDENR will have the authority to contract with private or public research organizations for services in scientific, economic, and technological research, including but not limited to surveys, studies, and experiments with a view toward protecting and replenishing the natural resources of the state under the jurisdiction of LDENR toward preventing the waste, wasteful use, and wasteful utilization thereof, toward preventing the use of the natural resources in such a manner and in such quantities as will threaten with premature exhaustion, extinction, and destruction of the supply of these resources in the state, and toward the energy policy of this state, and to prepare and implement plans and programs in relation thereto. See La. R.S. 36:354.

METHANE EMISSIONS

Methane is a common and elusive GHG and more than twenty-five times more potent than carbon dioxide. As such, leaks from orphaned wells, landfills, and routine industrial practices such as venting and flaring can significantly contribute to greenhouse gas emissions. The most effective way to reduce leaks is to require frequent, and where possible, continuous monitoring of leaks, and plugging orphaned wells. As of 2023, Louisiana had more than 4,600 documented orphaned wells[10] affecting air quality, water resources, and public health. Furthermore, there are ~17,000 non-productive wells in Louisiana that operators are not required to plug because of future utility registration.

Because methane is both a GHG and an ozone precursor, reductions of methane emissions have the potential to simultaneously mitigate climate change and improve air quality. Plugging leaks can also reduce economic losses for companies while creating jobs.

STATUS OF METHANE EMISSIONS IN LOUISIANA

In 2021, the Louisiana Legislature passed Senate Bill 245 to give LDENR more flexibility in how much it can spend to plug and restore abandoned wells. This has enabled LDENR to address a greater number of abandoned wells for remediation.

To ensure that current and future unproductive wells do not become orphaned or leak methane, LDENR revised regulations to limit operators from extending the future utility status of wells and increased fees on wells that have been inactive and unplugged for five years or more. The regulations also reduced fees for operators who plug ten or more wells a yea.[11] The new regulations help make Louisiana eligible for up to $70 million more in federal funding for plugging abandoned oil and gas wells. LDENR is also working to finalize a proposed rulemaking to prohibit venting and flaring of natural gas except as specifically authorized. Both rulemakings were specifically identified as actions in the Louisiana Climate Action Plan.

In December 2023, EPA finalized a new rule updating New Source Performance Standards for the oil and natural gas sector and providing guidelines for states to create implementation plans to cover existing sources. EPA estimates the new rule will reduce nationwide methane emissions by nearly 80%. These regulations complement state efforts to reduce emissions from inactive wells.

INTERSECTION WITH FEDERAL FUNDING

Through the BIL, Louisiana anticipates receiving more than $100 million through 2030 to plug orphaned wells. LDENR received an initial $25 million to develop procedures to measure and track contamination of groundwater and surface water, to deploy methane monitoring stations that will provide information to help identify which wells are most likely to leak methane and thus should be plugged

OUTPUTS

SEVERAL

See page 53

POTENTIAL BENEFITS

GHG emissions reduction

0.764 million MT CO_2e

Community benefits

most urgently, and to begin plugging, capping, and reclaiming orphaned wells across the state with a priority of those wells located in low-income communities. In 2023, LDENR plugged 636 wells. In December 2023, EPA and DOE announced that LDENR would receive an additional $15.7 million in formula funding to monitor and reduce methane emissions from the oil and gas sector. The IRA will make available more than $1 billion for additional investments to plug wells and other activities.

COMMUNITY-DRIVEN SOLUTIONS

Curbing methane emissions from wells, pipelines, refineries, and landfills has widespread support from stakeholders and the public as it is a potent GHG, harmful air pollutant to local communities, and waste of a valuable natural resource. Nonetheless, stakeholder and community engagement revealed concerns about monitoring, leak detection, and accountability. The priority actions of this plan aim to build on the significant progress the state has already made in reducing methane emissions with added state capacity, technology utilization, and prioritization of highest-emitting sources near vulnerable communities. Additionally, the priority locations for proposed landfill recovery projects would be in the state's LIDACs as confirmed by the CEJST and EJScreen tools, ensuring that the projects would benefit air quality in the communities surrounding these landfill sites.

TRANSFORMATIVE IMPACT

Many states have established Leak Detection and Repair (LDAR) programs, modeled after the EPA LDAR Program and Best Practices Guide, to monitor GHG emissions and criteria pollutants and require owners and operators to find and fix leaky and malfunctioning equipment at production facilities, compressor stations, natural gas storage facilities, and process plants within a set time period of detection. There is an opportunity for LDEQ to work with outside stakeholders to utilize and deploy emerging technologies, such as remote sensing and satellite imagery, alongside traditional in-situ sensing for continuous monitoring of methane emissions. The demonstration project was developed to identify scalability and effectiveness for wider adoption of anaerobic digester systems of organic waste.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

The quantification effort relies on data sourced from both the LSU Center for Energy Studies and LDEQ as well as use of the EPA's CO_2e calculator. LSU is monitoring and studying the efforts to plug abandoned wells using the first tranche of funding from BIL. Using new data that will be incorporated into LSU's next progress report, the sample of well emissions were analyzed for this output. The LSU data found that the top 20% of emitting wells account for approximately 80% of the total emissions in their sample, corresponding to values of roughly 21.52 and 26.9 thousand standard cubic feet of methane per day for the emissions from the top 20% and the total respectively. These values were scaled up to represent the complete state supply of leaking/emitting wells for the purpose of this analysis and converted to CO_2e using EPA's conversion calculator.

LDEQ independently used the EPA WARM model to estimate the emissions reduction impact of addressing landfill gas at 12 sites. Six of those sites currently lack a gas collection system and six others would be upgraded. The priority sites proposed are in Louisiana's LIDAC, ensuring that the projects would benefit air quality in communities surrounding the landfill sites.

Co-pollutant reductions were not specifically calculated; however, a literature review highlights that wells leaking methane also can release other VOCs and benzene. Orphaned wells can also contaminate groundwater. Data used in the analysis was drawn from the LSU Center for Energy Studies and LDENR. For the full details of the assumptions made in the analysis please see the Technical Appendix (Appendix A).

PRIORITY OUTPUTS	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Identify and address the top 20% of leaking/emitting wells	0.024
Support the development of 12 landfill methane recovery projects for recovered methane procurement	0.74

GHG emissions reduction estimates for outputs focused on methane emission reduction. Data used in the analysis was drawn from the LSU Center for Energy Studies and the Louisiana Department of Natural Resources. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

LAUNCH METHANE DETECTION AND MONITORING PROGRAM

The State will support the roll-out of a statewide methane detection and monitoring program to identify concentrations and associated emissions of methane from different sources within the state, including orphan, abandoned, and active wells, pipelines, refineries, and landfills, and create transparency through the public release of such data. Alternatively, local governments may roll out regional detection and monitoring programs. This will include selection of a cost-effective and precise measurement program and associated analysis, including handheld detectors at known facilities, fly-over measurements at unidentified or unmeasured facilities, and other innovative methods. The State will further support education, workforce, and capacity-building strategies to support operators in complying with future monitoring obligations.

» ***Authority to Implement***

LDEQ has the authority to promulgate rules establishing programs to monitor and analyze air emissions, provide current and accurate information to the public regarding the pollutants or contaminants present in the environment, collect and disseminate information on certain aspects of environmental protection and control, and compile and maintain an ongoing comprehensive air emissions inventory. La. R.S. 36:234; 30:2011; 30:2054. Regulations would need to be adopted in accordance with the Administrative Procedures Act to require monitoring as described in this strategy. The rulemaking process takes 3-12 months from publication of a Notice of Intent to publication of the final rule.

EXPAND ORPHANED & ACTIVE WELL LEAK DETECTION AND REPAIR

Through state and local government, use the results from the methane detection and monitoring program to identify the top 20% leaking/emitting orphaned and active wells in the state, which are estimated to be causing 80% of associated well emissions (based on preliminary testing). The cost to plug 20% of all wells in the state (3,300 wells) would be approximately $132 million. It is projected that orphaned wells are more likely to emit significant quantities of methane in comparison to marginal and idle wells, and thus the proportion of orphaned wells may represent a larger proportion of the total number of wells. A portion of the cost for orphaned wells could be leveraged from U.S. Department of Interior funding.

» ***Authority to Implement***

LDENR, through the Commissioner of Conservation, has the authority to make, administer, and enforce rules, regulations, and orders "[t]o require the plugging of each dry and abandoned well and the closure of associated pits, the removal of equipment, structures, and trash; and to otherwise require a general site cleanup of such dry and abandoned wells. Pursuant to La. R.S. 30:2, the waste of oil and gas is prohibited.

LAUNCH PIPELINE LEAK DETECTION AND REPAIR EFFORT

Through state and local government, use the results from the methane detection and monitoring program to identify significant sources of leaking/emitting methane from pipeline and other infrastructure. Identified leak locations from active networks will be communicated to network owners with warnings about the detected concentration or measured emissions from locations. The State will support efforts to create a publicly transparent database of leak locations, owners, and projected emission quantities, and make referrals for environmental enforcement where applicable.

» ***Authority to Implement***

LDEQ has the authority to promulgate rules establishing programs to monitor and analyze air emissions, provide current and accurate information to the public regarding the pollutants or contaminants present in the environment, collect and disseminate information on certain aspects of environmental protection and control, and compile and maintain an ongoing comprehensive air emissions inventory. La. R.S. 36:234; 30:2011; 30:2054. Regulations would need to be adopted in accordance with the Louisiana Administrative Procedures Act to require monitoring as described in this strategy. The rulemaking process takes 3-12 months from publication of a Notice of Intent to publication of the final rule.

PURSUE ANAEROBIC DIGESTER DEMONSTRATION PROJECT

Support the development of a local government high-efficiency anaerobic digester system to process yard, food, and other organic waste. This will introduce biogas production capability at a local government's Compost Facility and build on existing residential yard waste composting programs. The demonstration project will evaluate the feasibility and cost-effectiveness of the use of anaerobic digesters to process local organics collected by local governments to reduce methane emissions.

» ***Authority to Implement***

This action could be implemented with existing authority at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

SUPPORT LOCAL LANDFILL GAS COLLECTION PROJECTS

Through state and local government, support the installation of landfill gas collection control systems in Louisiana's municipal solid waste (MSW) landfills to capture and utilize methane for MSW landfills that currently lack a gas collection system and promote the conversion to recovery for energy at MSW landfills that currently employ only flaring as a control system. The state's efforts to reduce methane emissions from MSW landfills will include:

- Data-driven prioritization of highest-emitting MSW landfills. The State will work with facilities to use the LandGEM model to identify landfills that are large emitters of GHGs. This data will help determine the most cost-effective methods to reduce GHGs.
- Aerial monitoring to track methane reductions. The State will employ unmanned aerial vehicles equipped with methane laser technology to create methane heat maps of the landfills, enabling effective tracking of methane reduction.
- Outreach and education campaigns. The State will actively engage with landfill operators and promote the benefits of installing gas collection systems. Outreach campaigns will emphasize economic advantages, environmental responsibility, and the effective utilization of methane.
- Equity-driven approach to maximize benefits. Priority will be given to landfills located within CJEST-identified disadvantaged communities and those with high Environmental Justice indexes as indicated by EJScreen.
- Continued coordination to accelerate and improve implementation. The State will collaborate with landfills associations, offer workshops, and provide resources to facilitate the smooth implementation of gas collection systems in all of Louisiana's MSW landfills.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDEQ or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

FLEET TRANSITION

Fleet transition is the process of moving from fossil fuel-powered fleet vehicles to alternative fuel-powered, including electric, fleet vehicles. While "public fleet" typically refers to government vehicles, priority actions in this focus area may also apply to commercial fleets, public transit, school buses, and private vehicles.

Louisiana's 2021 Greenhouse Gas Inventory shows the transportation sector is the second largest share of GHG emissions, totaling over 49 million MT CO2e in 2018. From a high of over 60 million MT in 2000, transportation emissions have been relatively flat for the last decade (2008-2018). The sector represents 22% of the state's fossil fuel GHG emissions—more than the electric power sector (16%) but far less than the industrial sector (60%). Transportation sector emissions include multiple fuel types, such as aviation gasoline, motor gasoline, kerosene, naphtha, natural gas (methane), and other fuel types. Motor gasoline has the most emissions of all fuel types, though it has fallen from its 2006 peak as stricter fuel efficiency standards (NHTSA's corporate average fuel economy, or CAFE, standards) were enacted in 2007 and phased in beginning in 2011. Since 2015, natural gas-related transportation emissions have been rising, from below 3 million MT per year to over 7 million MT in 2018, as alternative fuel vehicles have come into increased use. About 3% of Louisiana's vehicles are publicly owned, and an assumed 9% of those are medium- and heavy-duty vehicles.

STATUS OF FLEET TRANSITION IN LOUISIANA

In 2019, the State in conjunction with Louisiana Clean Fuels, designated several of its interstates as alternative fuels corridors, followed by the release of a DC Fast Charging Master Plan in 2023. However, infrastructure to support alternative fuels is insufficient to fully support fleet transition, which is a concern that stakeholders have voiced, especially as it relates to evacuation needs. Other challenges include the current high upfront cost of medium- and heavy-duty electric vehicles; the lack of shared, publicly accessible charging infrastructure; incompatibility of charging time and fleet operation's needs; supply chain delays for vehicles and charging infrastructure; unwillingness of dealers to participate in public procurements; lack of information on life-cycle costs, benefits, and opportunities; and lack of upfront capital and resources for purchasing. Federal and private strategies and investments will need to be explored and implemented in the near future to address these challenges for a successful fleet transition.

OUTPUTS

SEVERAL

See page 58

POTENTIAL BENEFITS

GHG emissions reduction

4.00 - 4.43 million MT CO_2e

Co-pollutant emission reduction

SO_2	1.22 MT
NO_x	1,009.57 MT
VOCs	52.47 MT
NH_3	7.78 MT

Community benefits

INTERSECTION WITH FEDERAL FUNDING

As of October 2023, seven Louisiana school districts are participating in electric school bus adoption through EPA's Clean School Bus Rebate Program, and more than $43 million have been awarded to the districts to purchase new buses and eligible infrastructure.

The New Orleans Regional Transit Authority (NORTA) received $71.4 million as part of the Low- or No-Emission Bus program to electrify a portion of its bus fleet. Using these funds, NORTA will fund 20 new electric buses and charging infrastructure, including $30 million to build a microgrid of charging stations that continue to provide electricity during and after severe storms.[12]

The La. DOTD is participating in the National Electric Vehicle Infrastructure (NEVI) Program. Through this program, Louisiana will receive approximately $73 million for electric vehicle (EV) infrastructure throughout the state over five years. To disburse these funds, La. DOTD is developing a competitive and phased grant program to build out electric vehicle supply equipment within one mile of designated corridors.

COMMUNITY-DRIVEN SOLUTIONS

Public and commercial fleet transition, as well as building out infrastructure to support an increase in personal EVs, was widely supported by stakeholders and the public and also provides an opportunity for local governments to reduce GHG emissions. Stakeholders predictably noted procurement policy barriers; however, there was also concern over the long-term maintenance and ancillary services necessary to support an increasingly diversified fleet. The priority actions in this plan aim to address this concern as it was highlighted as a gap in other federal funding sources.

The importance of reliable vehicles for evacuation and disaster response operations was also noted as a significant concern and barrier to widespread fleet transition in Louisiana. Accordingly, priority actions call for improved support infrastructure, particularly along key evacuation routes, and integration of alternative energy transportation into statewide plans.

TRANSFORMATIVE IMPACT

Transitioning the fleet can result in significant fuel cost savings for agencies due to lower energy costs of alternative energy, reduced reliance on fossil fuels, and decreased greenhouse gas emissions. Modeling shows that actions aimed at decarbonizing vehicles and buildings had a small role in reducing emissions by 2030 (<1 million MT CO_2e per year), but a larger role by 2050 (>5 million MT CO_2e per year), indicating that the lag time of the actions results in carbon emission reductions long term.

As the infrastructure for alternative fuels is expanded, the potential for private vehicles to transition to low- to zero-carbon emission fuels increases. Since Louisiana has 3.8 million motor vehicles, there is an opportunity to significantly scale up vehicular transition beyond the public fleet and further reduce greenhouse gas emissions from Louisiana's second largest carbon emission sector. Over the long term, environmental benefits such as improved air quality and public health can be expected.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

Multiple methods were used to quantify these outputs. For Public Fleet Electrification, the lower value was derived from the 2021 GHG Inventory's figure of 49 million MT CO_2e annual emissions from the transportation sector divided by the total number of vehicles in Louisiana and scaled to 20,000 vehicles. The higher value was an output from the EPS tool's mode shifting policy set to 5% of annual trips as an approximation for the public fleet vehicles. As a point of comparison, EPA's equivalencies calculator estimates the emissions from 20,000 vehicles at 0.08 million MT CO_2e, so both figures may be on the high side.

For medium- and heavy-duty electrification and fuel-switching, the analysis was based on emissions data from the EPA's National Greenhouse Gas Inventory, which breaks emissions down into categories including light-duty vehicles, light-duty trucks, medium- and heavy-duty trucks, and more. An additional dataset, US Vehicles by Mode, was used to estimate a per-vehicle amount of million MT CO_2e by category at the national level. This factor was then applied to the proposed number of state vehicles in the output.

Charging station deployment is a policy that facilitates and supports the other actions in this area and cannot be quantified separately.

Co-pollutants were quantified using the state's baseline inventory (2020) and estimating a 5% reduction in CAP and HAP emissions for heavy duty vehicles. Co-pollutant reductions for electrifying 20,000 vehicles are dependent on if they are replacing gasoline or diesel vehicles. If gasoline, co-pollutant reductions can be estimated as follows: 914.25 MT CO, 48.53 MT NOx, and 1.61 MT $PM_{2.5}$. If diesel, co-pollutant reductions can be estimated as follows: 893.55 MT CO, 31.51 MT NO_x, and 1.38 MT $PM_{2.5}$. These were calculated using data from the Bureau of Transportation Statistics. For full details, please see the Technical Appendix (Appendix A).

PRIORITY OUTPUTS	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Support electrification of 20,000 (25%) public fleet vehicles by 2030.	0.25 - 0.68
Support electrification or fuel-switching (e.g. hydrogen and low-carbon or zero-carbon biofuels) of 119,250 (5%) medium- and heavy-duty vehicles in the state by 2030.	3.75
Deploy 1,200 fast and ultrafast charging stations or alternative fueling stations designed for on-route charging or fueling of medium- and heavy-duty vehicles.	This output facilitates the emissions reductions quantified above.

GHG emissions reduction estimates for outputs focused on fleet transition. Data used in the analysis was drawn from the Louisiana Greenhouse Gas Inventory, the EPA's National Greenhouse Gas Inventory and the EPS tool. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY OUTPUTS	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
	SO_2	NO_x	VOCs	NH_3
Support electrification of 20,000 (25%) public fleet vehicles by 2030.	Variable (see text above)			
Support electrification or fuel-switching (e.g. hydrogen and low-carbon or zero-carbon biofuels) of 119,250 (5%) medium- and heavy-duty vehicles in the state by 2030.	1.22	1,009.57	52.47	7.78
Deploy 1,200 fast and ultrafast charging stations or alternative fueling stations designed for on-route charging or fueling of medium- and heavy-duty vehicles.	This output facilitates the co-pollutant reductions quantified above			

Co-pollutant emissions reduction estimates for outputs focused on fleet transition. Note that co-pollutant emissions are only quantified for heavy-duty vehicles, not medium- and heavy-duty vehicles. For the full details of the assumptions made in the analysis as well as emissions reductions for additional co-pollutants, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

DEVELOP PUBLIC FLEET ELECTRIFICATION INCENTIVES

Through state and local government, coordinate the deployment of fleet vehicle purchases, through cost defrayment and easy-to-access financing, to enable state and local government to afford the upfront cost of electric vehicle purchasing for light-, medium-, and heavy-duty fleet vehicles, including transit vehicles, to enable public fleets to capture low life-cycle costs from electric vehicles over the life of the asset. Low-cost, easy-to-access financing will create an opportunity for local units of governments to avoid upfront capital constraints, as well as gain bridge financing to federal tax credits and elective pay options as well as federal rebate opportunities.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

PRIORITIZE SHARED ELECTRIFICATION INFRASTRUCTURE

Through state and local government, prioritize efforts to plan for and deploy publicly accessible shared charging infrastructure for medium- and heavy-duty fleet vehicles. Shared electrification infrastructure will be deployed in communities with large concentrations of fleet vehicle activity and in and near communities burdened by surface-level emissions from large traffic volumes of diesel vehicles and other cumulative pollution burdens. Efforts could include incorporation of on-site clean power to mitigate grid impacts.

» ***Authority to Implement***

Pursuant to La. R.S. 45:1622, it is "necessary and in the best interest of the state to promote rapid development of a statewide electric vehicle charging network by . . . [i]mproving the quantity, quality, and variety of electric vehicle charging amenities and consumer experience services available in the state." To this end, the LPSC is urged "to establish an electric vehicle charging rate structure that promotes long-term alternative fuel market competition by encouraging transparent pricing, more stable electricity costs, expanded investment opportunities in charging infrastructure, innovation, and a widespread implementation of publicly available fast charging, electric vehicle charging technology and equipment." La. R.S. 45:1622(2). This action also aligns with La. DOTD's Louisiana State Plan for Electric Vehicle Infrastructure Deployment under the NEVI program.

CREATE RESILIENT EVACUATION STRATEGY

Through state and local government, develop a statewide plan or regional plans for ensuring the resiliency of evacuation operations in the shift to electrified transport options for communities that rely on publicly- or privately-owned school bus, passenger, or transit vehicles for evacuating at-risk communities during extreme weather events and other emergencies. The plan(s) will include the assessment of needed charging infrastructure (and resilient power) along key evacuation routes, as well as the deployment of key pilot sites to support early adopters and the expansion of pilots once demonstrated.

» ***Authority to Implement***

Pursuant to La. R.S. 29:726, GOHSEP "shall prepare and maintain a homeland security and state emergency operations plan and keep it current. The Plan shall include . . . [a]ll parish hazard plans, hurricane evacuation and shelter plans, hazard mitigation plans, homeland security and emergency response plans, and such other emergency plans as required," and "[o]ther necessary matters." This action also aligns with the strategies for the Louisiana Fuel Team to address resilience and emergency evacuation in La. DOTD's Louisiana State Plan for Electric Vehicle Infrastructure Deployment under the NEVI program.

LEAD BY EXAMPLE THROUGH STATE PROCUREMENT

Through state and local government, commit to electrify 25% of its public vehicle fleet by 2030, consisting of 12,500 light-duty vehicles, 5,000 medium-duty vehicles, and 2,500 heavy-duty vehicles, including both owned and contracted vehicles. This will include training for state and local procurement officials to build capacity and tools for those making purchasing decisions.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA or at the local level through existing plenary powers of local governments. Pursuant to La. R.S. 39:361, DOA is authorized to "establish, develop, and administer a program for the management of motor vehicles

used by state employees." The commissioner is further authorized, "by rule or regulation, [to] prescribe the conditions and limitations governing the acquisition, either by lease or purchase,...of the vehicles by state officers and employees...". Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

CREATE DATA REPOSITORY

Through state and local government, support data collection to bolster statewide electric vehicle planning needs, including developing a repository for vehicle registration data on trends and locations in electric vehicle adoption and the identification of areas where infrastructure can be placed for higher-capacity charging infrastructure. This data will support planning efforts among utilities and the LPSC and will establish a common fact set for stakeholders.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through the Department of Public Safety and Corrections Office of Motor Vehicles or at the local level through existing plenary powers of local governments. See La. R.S. 47:501; OMV Policy 2.00. This action also aligns with the strategies for EVSE Data Collection & Sharing in La. DOTD's Louisiana State Plan for Electric Vehicle Infrastructure Deployment under the NEVI program.

DEPLOY FLEET CONVERSION PILOT PROJECTS

Through state and local government, support the deployment of electric fleet conversion pilot projects to develop case studies, best practices, and shared learnings to understand the challenges and opportunities for fleet electrification in Louisiana. Pilot projects will be prioritized based on potential for beneficial impacts to disadvantaged communities and be required to support information sharing activities statewide.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

BUILD CAPACITY FOR ANCILLARY SUPPORT

Through state and local government, support capacity building needs analysis for ancillary support services in areas lacking capacity to adapt to and learn about electric vehicles and infrastructure. This could include training and support of fire department response to fire incidents involving electric vehicles and safety training for electric vehicle infrastructure.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through La. DOTD, LED, LWC, or DOA or at the local level through existing plenary powers of local governments. Pursuant to La. R.S. 33:1324, "Any parish, municipality or political subdivision of the state, or any combination thereof, may make agreement between or among themselves to engage jointly in . . . the improvement of any public project or improvement, the promotion and maintenance of any undertaking or the exercise of any power," including "[p]olice, fire and health protection." Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

BUILD CAPACITY FOR MAINTENANCE, REPAIR, & WORKFORCE

Through state and local government, support capacity building for an electric vehicle and supporting infrastructure installation workforce, as well as for a maintenance and repair workforce and contractor network that can be stood up to support the near- to long-term repair and maintenance needs of public and private electric vehicle fleets in the state.

» ***Authority to Implement***

Pursuant to La. R.S. 33:1324, "Any parish, municipality or political subdivision of the state, or any combination thereof, may make agreement between or among themselves to engage jointly in . . . the improvement of any public project or improvement, the promotion and maintenance of any undertaking or the exercise of any power." La. DOTD's Louisiana State Plan for Electric Vehicle Infrastructure Deployment under the NEVI program includes a commitment from La. DOTD to add training and certification criteria for charging station development, installation, and maintenance. LED, LWC, and local governments also have existing programs, policies, and incentives that can support economic development.

EXPAND MARKETS FOR BIOFUELS

As an interim step, through state and local government, support education, training, and facilitation of markets to support lower-carbon solutions such as biofuels for harder-to-electrify vehicle types.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting. Pursuant to La. R.S. 45:1622, it is "necessary and in the best interest of the state to promote rapid development of a statewide electric vehicle charging network by . . . [i] mproving the quantity, quality, and variety of electric vehicle charging amenities and consumer experience services available in the state." To this end, the LPSC is urged "to establish an electric vehicle charging rate structure that promotes long-term alternative fuel market competition by encouraging transparent pricing, more stable electricity costs, expanded investment opportunities in charging infrastructure, innovation, and a widespread implementation of publicly available fast charging, electric vehicle charging technology and equipment." La. R.S. 45:1622(2).

REDUCE IDLING

Through state and local government, support efforts to implement strategies for the reduction of idling for diesel vehicles, particularly in areas near sensitive populations, such as schools and health facilities.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA, La. DOTD, or at the local level through existing plenary powers of local governments. Pursuant to La. R.S. 39:361, DOA is authorized to "establish, develop, and administer a program for the management of motor vehicles used by state employees." The commissioner is further authorized, "by rule or regulation, [to] prescribe the conditions and limitations . . . the use of the vehicles by state officers and employees . . .." La. DOTD, MPOs, and local governments are also authorized to implement projects that reduce transportation-related congestion. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

SUPPORT LOCAL GOVERNMENT AND BUSINESS EDUCATION

Through state and local government, support education, training, and planning for local governments and businesses looking to electrify their vehicles, including through making available fleet planning tools, frequently asked questions, data on pilot projects and case studies, and financial planning tools.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through La. DOTD, LED, LWC, or DOA or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

CLEAN PORTS

Onshore and waterborne operations at ports emit GHGs. There are 32 ports in Louisiana of which thirteen are inland ports, nine are coastal ports, six are deep draft ports, and four ports are in development. Neither the GHG Inventory nor the 2022 Louisiana Climate Action Plan Net Zero Pathway address port emissions specifically. The Inventory notes that boats comprise 17% of non-highway mobile emission shares, though ports also have vehicles that are not boats. The vessels categorized in the inventory emitted 0.029 million MT CO_2e in 2018.

STATUS OF CLEAN PORTS IN LOUISIANA

Louisiana's ports are working to install shore power options to allow vessels to use grid electricity instead of additional marine diesel while in dock. Following a 2020 shore power installation at Port Fourchon, Entergy recently completed a project at the Port of Lake Charles with the Crowley Corporation to power their tugboats. This project is estimated to reduce carbon dioxide emissions by 500 metric tons per year.

The Louisiana International Deep Water Gulf Transfer Terminal is currently in development and specifically focuses on becoming "America's first deep water 'Energy Hub' and transfer terminal designed to provide clean energy options and accommodate the demands of Post-Panamax and larger Cape Size vessels."[13]

INTERSECTION WITH FEDERAL FUNDING

Through the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) program, the U.S. Department of Transportation awarded the Columbia Port Commission $10.5 million for land acquisition and construction activities for a Truck Parking Facility located near the inland Port of Columbia, Ouachita River, and LA State Highway 165. This includes surface parking for approximately 50 commercial trucks, 100 cars, and 12 electric vehicle charging stations. The Clean Ports Program represents a significant opportunity to braid funds available through the CPRG. The IRA provides EPA with $3 billion to fund zero-emission port equipment and technology and to help ports develop climate action plans to reduce air pollutants. EPA anticipates a Notice of Funding Opportunity in late 2024 for the Clean Ports Program.

TRANSFORMATIVE IMPACT

Ports serve as a vital link in the global supply chain and can be acutely vulnerable to environmental risks such as rising sea levels, hurricanes, and drought. Therefore, ports provide an opportunity for cross-sector climate action with potential benefits spanning in scale from local to global.

OUTPUTS

SEVERAL

See page 63

POTENTIAL BENEFITS

GHG emissions reduction

0.39 - 0.81MT CO_2e

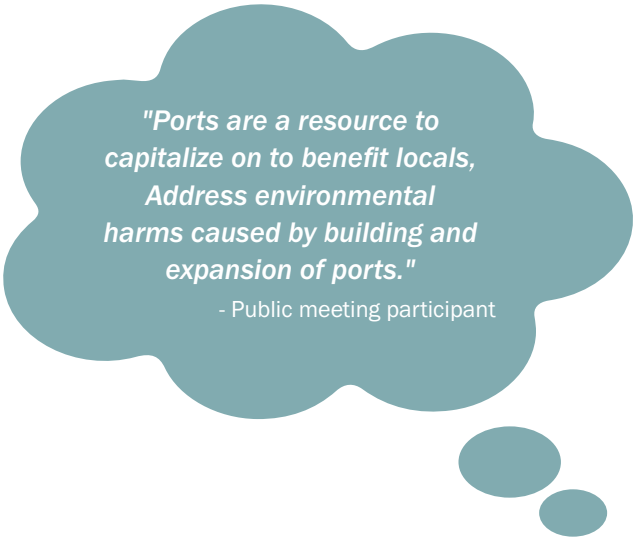
Co-pollutant emission reduction

N_2O	0.33 MT
NO_x	159.37 MT
PM_{10}	1.85 MT
CO	12.70 MT

Community benefits

COMMUNITY-DRIVEN SOLUTIONS

Conversations with public meeting participants identified emission reduction at ports through decarbonizing ships and reducing idling times and spills as an important aspect of improving air quality and public health locally. However, current challenges for emission reduction center around an unclear pathway to meet significant shore power demand of port tenants and tank cleaning businesses with renewable energy, high costs of electric and alternative fuel equipment, and idling of ships and off-site trucks.



GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

Multiple methods and data sources were used to quantify the GHG emissions reductions for ports. The shore power figure is derived from marine diesel emissions sourced from EIA, EPA's shore power calculator, the consultant report for the state of Louisiana on industrial electrification, and information from Port Fourchon on the number of gallons of fuel burned by ships in berth. For forklift electrification, EPA's Assessment of Fuel Cell Technologies at Ports was used in addition to some of the resources for shore power. Notably, these estimates are varied based on how "clean" Louisiana's electricity grid may be in the future.

For the marine diesel quantification, a per-gallon figure is provided rather than a sum, as total port marine diesel volumes used annually were not available to derive a total.

The mode-shift barge output was quantified using the emissions analysis from the Texas A&M Transportation Institute's Modal Comparison of Domestic Freight Transportation report, dated January 2022. Emissions factors for CO_2 and select co-pollutants are provided for a full barge of dry bulk cargo (1,750 tons) traveling a single mile.

Co-pollutant reductions for the shore power were derived from the EPA's Port Emissions Inventory Guidance, based on the assumptions of 800,000 gallons of marine diesel per berth per year. Co-pollutants for the other policies could not be calculated because of missing data. For full methods, please see the Technical Appendix (Appendix A).

PRIORITY OUTPUTS	GHG EMISSIONS REDUCTION (VARYING UNITS)	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
		N_2O	NO_x	PM_{10}	CO
Convert 100 berths at Louisiana ports to shore power by 2030	0.39 - 0.81 million MT CO_2e per year	159.37	0.33	1.85	12.7
Electrify 15% of port forklifts by 2030	2.9 - 88.5 MT CO_2e per forklift per year	No estimate was produced			
Displace 15% of Louisiana port marine diesel with hydrogen fueling by 2023	0.01 MT of CO_2e per gallon marine diesel	No estimate was produced			
Mode-shift material from truck transport to barge	0.21 MT CO_2 per full barge per mile traveled	0.0005		0.00003	0.0003

GHG and co-pollutant emissions reduction estimates for outputs focused on fleet transition. Data used in the analysis was drawn from the Louisiana Greenhouse Gas Inventory, the EPA's National Greenhouse Gas Inventory and the EPS tool. Emissions reduction values assume a 100% clean electrical grid. For the full details of the assumptions made in the analysis please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

DEPLOY SHORE POWER

Through state and local government and public port authorities, work to aggressively pursue the provision of shore power capacity at ports across Louisiana in order to reduce emissions from idling engines. Shore power is a type of electric power that is supplied to ships while they are docked. This power can be used to operate the ship's electrical systems, such as lights, air conditioning, and cooking equipment. Using shore power instead of idling engines reduces air pollution and noise. State and local government as well as port commissions can coordinate with electric utilities serving ports to assess the demand and potential for shore power to serve current and future customer needs. Shore power needs may be met with a combination of electric infrastructure expansion, energy efficiency, energy storage incorporation, and renewable deployment.

» ***Authority to Implement***

This action could be implemented with existing authority, whether through the state's Port Development and Improvement Program, or at the local level through existing plenary powers of local governments and individual port authorities. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or port authority meeting.

CONTRACT AND INSTALL FOR RENEWABLE POWER

Through state and local government and public port authorities, support contracting and installation of new renewable energy sources at ports, such as solar and wind power, to provide direct sourcing or offset of electricity for port operations, including shore power.

» ***Authority to Implement***

This action could be implemented with existing authority, whether through the state's Port Development and Improvement Program, or at the local level through existing plenary powers of local governments and individual port authorities. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or port authority meeting.

DEPLOY RESILIENT ALTERNATIVE FUEL TRANSPORT STATIONS (RAFTS)

Through state and local government and public port commissions, strategically plan for the co-location of alternative fuel stations near truck staging areas for port operations. The Resilience Alternative Fuels Transport Stations (RAFTS) would include support for multiple fuel types, including hydrogen and electric charging stations. Alternative fuels are a cleaner and more sustainable alternative to traditional fuels, such as gasoline and diesel, and would build necessary capacity for decarbonization of freight serving and using ports. Further, co-locating RAFTS near existing idling and staging areas allows for efficient dwell time as trucks are notified to enter the port. Further, in emergencies, RAFTS can serve as charging/refueling locations to support medium- and heavy-duty transit vehicles charging needs along evacuation corridors, when connected to resilient power sources.

» ***Authority to Implement***

This action could be implemented with existing authority, whether through the state's Port Development and Improvement Program, or at the local level through existing plenary powers of local governments and individual port authorities. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or port authority meeting.

BUILD HYDROGEN FUELING BARGE CAPACITY

Through state and local government and public port authorities, seed the purchase and operation of fuel tugs to support vessels fueled by hydrogen. This effort will build the capacity of local ports to provide hydrogen fueling options for shipping, including the development of hydrogen storage, and marketing to tenants for conversion.

» ***Authority to Implement***

This action could be implemented with existing authority at the local level through existing plenary powers of local governments and individual port authorities.

SUPPORT PLANNING FOR PORTS DECARBONIZATION

Through state and local government and public port authorities, support individual port planning, including targets, benchmarks, metrics, and goals, to coordinate investments by tenants in emission-reducing initiatives. Ports are typically not aware of all their tenants' individual plans for, or appetite for, emissions-reducing investments. This planning effort will focus on the development of planning timelines for upgrades for shared investments based on what customers on what they are looking for (such as shore power infrastructure investments, hydrogen fueling, transportation alternative fuel or charging needs, and the use of fuel cells for energy and resilience needs), map ambitions to grant opportunities, create significant opportunities for community engagement (particularly for environmental justice communities) in planning efforts, and develop strategies to share costs and needed investments.

» ***Authority to Implement***

This action could be implemented with existing authority at the local level through existing plenary powers of local governments and individual port authorities.

PILOT A SHARED CRANE FOR MODE SHIFT

Through state and local government and public port authorities, support foundational investments to encourage mode shift to lower-emitting barge traffic from higher-emitting rail and truck transport along shipping corridors. This initiative will deploy a shared crane(s) on a barge that can be deployed on river ports to create capacity at multiple ports that do not currently have the capacity to develop their own infrastructure. A shared crane could shift 270,000 tons of material annually to barge traffic as a more cost-effective shipping option to than other modes, creating a more efficient connection for freight transport to access I-49, I-10, and I-12 that run east to Florida and West to Texas, Arizona, and California than current North-South highway corridors.

» ***Authority to Implement***

This action could be implemented with existing authority, whether through the state's Port Development and Improvement Program, or at the local level through existing plenary powers of local governments and individual port authorities. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or port authority meeting. Pursuant to La. Const. art. VII, § 14, ports, local governments, and the State can enter into a cooperative endeavor agreement to delineate terms for shared equipment.

CREATE ELECTRIC FORKLIFT INCENTIVE

Through state and local government and public port authorities, work to establish an incentive program to support the switch to electric forklifts, reducing emissions. Electric forklifts are a clean and sustainable alternative to traditional forklifts. They produce zero emissions and can help to reduce air pollution.

» ***Authority to Implement***

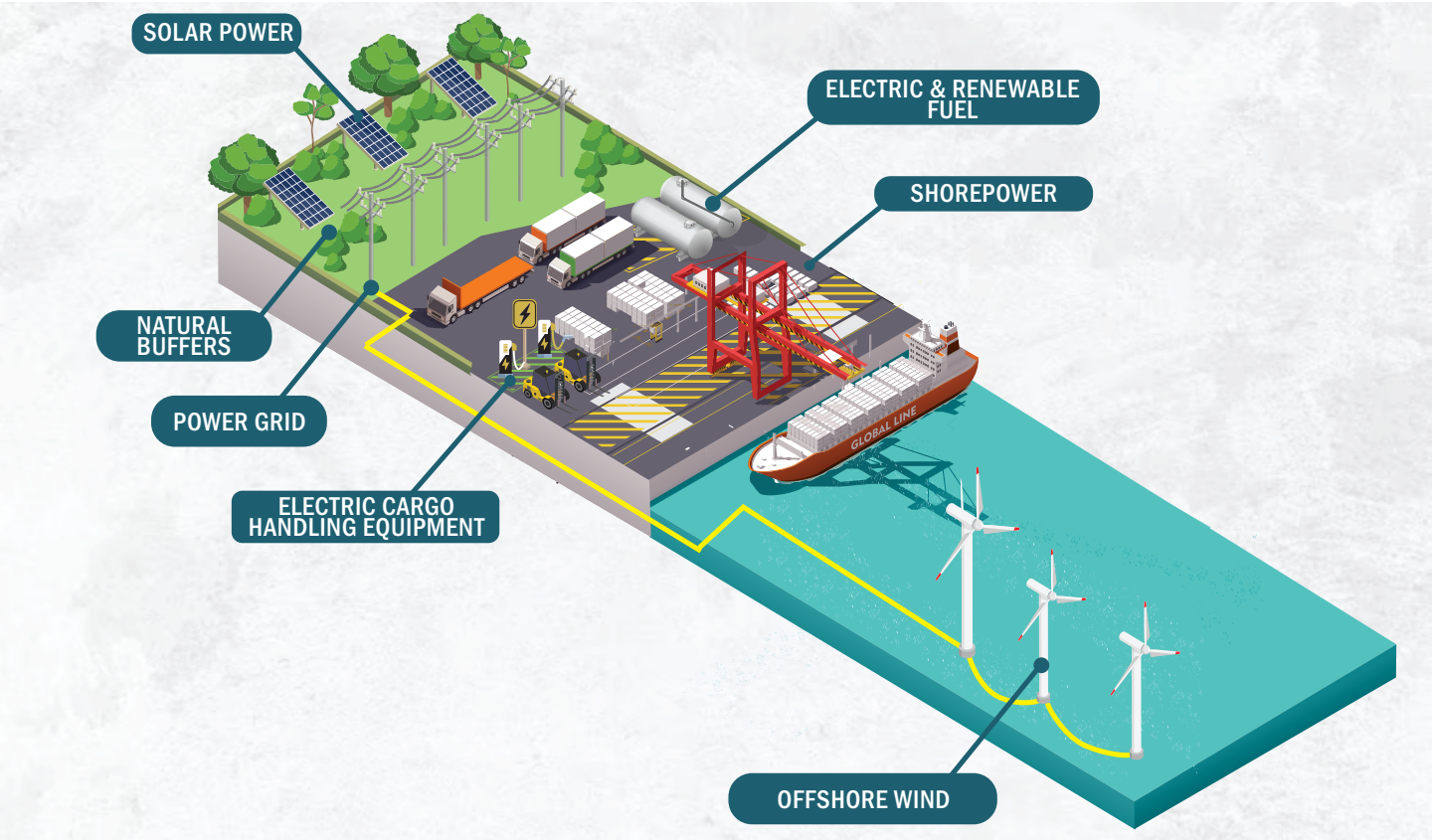
This action could be implemented with existing authority, whether through the state's Port Development and Improvement Program, or at the local level through existing plenary powers of local governments and individual port authorities. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or port authority meeting.

IDENTIFY BUFFER ZONE OPPORTUNITIES

Through state and local government and public port authorities, identify locations for the deployment of natural vegetation near ports, providing wildlife habitat and recreation areas and reducing air pollution impacts on nearby communities.

» ***Authority to Implement***

This action could be implemented with existing authority at the local level through existing plenary powers of local governments and individual port authorities.



Conceptual illustration of implementation of multiple priority actions in this focus area at a single port. The image also includes Offshore Wind, Community Solar, Transmission Planning, Fleet Transition, and Land Conservation and Protection, illustrating the importance of pursuing cross-sector approaches to decarbonization.

REGIONAL TRANSIT

Regional transit planning includes projects related to public transportation routes and vehicles as well as bike and pedestrian options, carpool lanes, traffic mitigation, physical resilience of roadways, and many other aspects that affect our ability to safely access and experience our neighborhoods and the surrounding communities. Regional transit, whether rail, bus, carpool, or other mass transit options, is currently not well built out in Louisiana. As a result, personal vehicles are the main mode of transportation for Louisiana residents, which contributes to the state's second largest GHG emission sector—Transportation.

STATUS OF REGIONAL TRANSIT AND INTERSECTION WITH FEDERAL FUNDING IN LOUISIANA

Identified as one of the most transformative projects following Hurricane Katrina and Rita post-disaster regional planning effort in 2007, the Baton Rouge to New Orleans train route is one step closer to fruition. While the communities that will have stops have prepared for station development[14] and the state was awarded a RAISE grant, Amtrak has updated the train tracks between Baton Rouge and New Orleans in recent years. In December 2023, the Federal Railroad Administration announced three $500,000 awards from the Corridor Identification and Development Program to initiate passenger rail service for three lines impacting Louisiana: Baton Rouge to New Orleans, New Orleans to Mobile, and the I-20 Corridor from Texas to Mississippi. An application for implementation funds for a New Orleans to Baton Rouge passenger rail line through the Federal-State Partnership for Intercity Passenger Rail Grant Program was unsuccessful; however, $3 billion remains available for future rounds. $178 million was awarded to Amtrak in October 2023 from the Consolidated Rail Infrastructure and Safety Improvements Program for the Gulf Coast Corridor Improvement Project to facilitate passenger rail service from New Orleans to Mobile.

The Rapides Area Planning Commission is working to improve transit service in its region by implementing improvements to Alexandria Transit and piloting a Natchitoches and Grant Parishes rural curb-to-curb transit service. Baton Rouge and Gonzales will receive $20 million for train stations along the future Baton Rouge-to-New Orleans InterCity Rail Service, while other projects in Shreveport and Natchitoches will provide much-needed improvements for bus service and protected bicycle lanes. The Kings Highway corridor in Shreveport will benefit from a $22 million RAISE grant, connecting healthcare institutions around the area. This project will reconstruct the roadway to include bus pull-outs, bus rapid transit improvements using battery-electric buses, improved bicycle facilities, and Americans with Disabilities Act (ADA) access. Similarly, in Natchitoches, a $17 million RAISE grant will support the Texas Street business corridor, install sidewalks, and implement bicycle and pedestrian routes throughout the city.

OUTPUTS

SEVERAL
See page 67

POTENTIAL BENEFITS

GHG emissions reduction

0.41 - 1.18 million MT CO_2e

Co-pollutant emission reduction

SO_2	7.24 MT
NO_x	586.34 MT
VOCs	733.28 MT
NH_3	80.38 MT

Community benefits

COMMUNITY-DRIVEN SOLUTIONS

Public meeting participants stated the need for regional transit for easier access to jobs and as a way to save on transportation costs associated with vehicle ownership. There was general knowledge and support for the ongoing regional transit efforts, including the commuter rail between New Orleans and Baton Rouge. A need for additional transit options to connect Shreveport to Dallas and Lake Charles to Houston was identified to be beneficial for regional connections.

TRANSFORMATIVE IMPACTS

Regional transit can have a transformative impact on Louisiana's urban and rural areas in numerous ways. By providing regional transit options, vehicular miles traveled will go down, thereby reducing congestion and GHG emissions. Regional transit can also be scaled up to connect several communities, including LIDAC, to meet the needs of people. A well-designed regional transit system at scale will achieve the desired outcomes of this grant, including access to jobs, energy cost savings (through fuel not purchased by individuals), improved air quality, and increased resilience as regional transit can move larger amounts of people to safety during events such as hurricanes.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

Two analyses were conducted, based on different definitions of "alternative modes," using US Census American Community Survey data for commuting ("Journey to Work") in Louisiana. After deriving these percentages and doubling them, the EPS tool's mode shifting policy for passenger vehicles was used to estimate GHG reductions for the year 2030. These same percentages were used to quantify the co-pollutant reductions, using the 2020 NEI data for CAP and HAP emissions of non-electric passenger cars. An alternative method using Vehicle Miles Traveled was also used. For full details, please see the Technical Appendix.

The Clean Transportation Options output is qualitatively beneficial, but difficult to quantify separately from the analysis above. Because it is more likely that the impacts significantly (if not completely) overlap with doubling use of alternative modes, this policy is assumed to have similar impacts.

PRIORITY OUTPUTS	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Double use of alternative modes of transportation by 2035	0.41-1.18
Increase access to clean transportation options, including public transit, for low-income and disadvantaged communities by 10% each year by 2030	

GHG emissions reduction estimates for outputs focused on regional transit. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY OUTPUTS	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
	SO_2	NO_x	VOCs	NH_3
Double use of alternative modes of transportation by 2035	7.24	586.34	733.28	80.38
Increase access to clean transportation options, including public transit, for low-income and disadvantaged communities by 10% each year by 2030				

Co-pollutant emissions reduction estimates for outputs focused on regional transit. The values provided correspond to the upper bound provided in the GHG emissions reduction estimates. For the full details of the assumptions made in the analysis as well as emissions reductions for additional co-pollutants, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

PROCURE ELECTRIC AND ALTERNATIVE FUELS PUBLIC TRANSIT VEHICLES

Through state, regional, and local government, support the procurement of electric and alternative fuel buses or other transit vehicles to reduce GHG and co-pollutant emissions.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through La. DOTD or through existing plenary powers of metropolitan planning organizations and local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

PURSUE TRAFFIC IMPROVEMENTS

Through state, regional, and local government, pursue traffic improvements that reduce idling and total travel time through signalized directional medians, traffic signal coordination, and signal synchronization projects. Traffic improvement planning must further prioritize durable public transit, regional transit, and low-carbon transportation opportunities, and not prioritize roadway expansion.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through La. DOTD or through existing plenary powers of metropolitan planning organizations and local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

INCREASE REGIONAL CONNECTIVITY

Through state, regional, and local government, support increased regional connectivity to encourage greater use of public transportation across rural and urban areas, with particular focus on improving access to services and amenities for low income and disadvantaged communities. Initial work will focus on launching substantive engagement with priority communities and be designed around community input and preferences. Possible measures to encourage regional transit use and carpooling include:

- Dedicated bus lanes
- High-occupancy vehicle lanes
- Bus Rapid Transit on major urban arterial roadways

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through La. DOTD or through existing plenary powers of metropolitan planning organizations and local governments. Pursuant to La. R.S. 33:1324, "Any parish, municipality or political subdivision of the state, or any combination thereof, may make agreement between or among themselves to engage jointly in the construction, acquisition or improvement of any public project or improvement, the promotion and maintenance of any undertaking or the exercise of any power[.]" Such arrangements may include activities concerning "roads, bridges, causeways, tunnels, ferries and other highway facilities, and public transportation." Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

EXPAND SHARED USE PATHS

Through state, regional, and local government, support the expanded inclusion of multi-use paths in city and regional transportation and land use plans to encourage mode shifting and reduce vehicular congestion.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through La. DOTD's Complete Streets Policy or through existing plenary powers of metropolitan planning organizations and local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

BUILD CAPACITY FOR ANCILLARY SUPPORT

Through state, regional, and local government, support the build-out of support facilities and preventative maintenance capacity for buses, vans, and other rolling stock. Facilities should support existing and projected electric or alternative fuel vehicles.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through La. DOTD or through existing plenary powers of metropolitan planning organizations and local governments. Pursuant to La. R.S. 33:1324, "Any parish, municipality or political subdivision of the state, or any combination thereof, may make agreement between or among themselves to engage jointly in . . . the improvement of any public project or improvement, the promotion and maintenance of any undertaking or the exercise of any power." Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

DEVELOP RESILIENCE PLANS

Through state, regional, and local government, support the development of regional transportation resilience plans that assess and plan for both physical and operational vulnerabilities of the transportation system. This could include considerations of the carbon intensity and durability of materials for planned projects and the coordination of local projects with local and statewide hazard and evacuation plans. These resilience plans will allow the varying authorities responsible for Louisiana's transportation system to align and improve braiding of resources.

» ***Authority to Implement***

Pursuant to La. R.S. 29:726, the Governor's Office of Homeland Security and Emergency Preparedness "shall prepare and maintain a homeland security and state emergency operations plan and keep it current. The Plan shall include . . . [a]ll parish hazard plans, hurricane evacuation and shelter plans, hazard mitigation plans, homeland security and emergency response plans, and such other emergency plans as required," and "[o]ther necessary matters." This action also aligns with the strategies for the Louisiana Fuel Team to address resilience and emergency evacuation in La. DOTD's Louisiana State Plan for Electric Vehicle Infrastructure Deployment under the NEVI program.

BUILT ENVIRONMENT RETROFITS

Built Environment Retrofits refers to a broad category of modifications to residential, commercial, and public buildings. Examples may include weatherization improvements and upgrades to appliances or structural components, which can reduce utility costs; reduce greenhouse gas emissions; improve air quality by decreasing air pollutants associated with electricity production; and increase the building's ability to withstand environmental hazards.

The Louisiana GHG Inventory shows that emissions from residential and commercial buildings comprised 5.2 million MT CO_2e in 2018. These emissions are down slightly from 6 million MT in 2000. The inventory notes that these emissions fluctuate slightly because of variations in weather-related demand for fossil fuels, particularly methane gas. Appendix 1 of the GHG Inventory further shows that emissions from residential buildings comprised 2.049 million MT CO_2e from methane gas combustion.

Retrofitting buildings over the next 25+ years will have direct and indirect effects on Louisiana's jobs and the workforce. Jobs will be created by the implementation of energy efficiency retrofits, and construction and manufacturing industries.[15] Already, it is anticipated that The Building Codes Implementation for Efficiency and Resilience Program will create more than 6,000 jobs from new construction.

STATUS OF BUILT ENVIRONMENTS RETROFITS IN LOUISIANA

As of January 1, 2023, the 2021 International Codes with Louisiana amendments are in effect. Act 635 of the Louisiana Legislature directed the LSUCCC to create an Energy Code Commission and to update the Louisiana Construction Code with the 2021 International Energy Conservation Code and 2021 International Residential Code (IRC) Chapter 11 on Energy Efficiency. This energy code update follows the regular code update cycle from 2022.

To make applications to the Weatherization Assistance Program (WAP) more accessible, local non-profits have developed outreach and application assistance events. These events are designed to reduce barriers for applicants, including limited access to information, lack of transportation, and the technical difficulty of completing the required forms and document requirements.

INTERSECTION WITH FEDERAL FUNDING

LHC received $31 million in BIL funding to implement WAP, designed to "create energy-efficient and comfortable living spaces for Louisiana homeowners.[16]" This program has been supported by local non-profits holding application events throughout the year, targeting low-income and underserved communities. CENLA Interfaith in Alexandria has an Energy Efficiency Program offering assistance to

OUTPUTS

SEVERAL
See pages 71-72

POTENTIAL BENEFITS

GHG emissions reduction

0.16 million MT CO_2e in 2030
1.4 million MT CO_2e in 2050

Co-pollutant emission reduction

SO_2	4.63 MT
NO_x	318.66 MT
VOCs	171.06 MT
NH_3	67.00 MT

Community benefits

residents for the Weatherization Program. There are opportunities emerging for training and capacity building for local non-profits to provide application assistance throughout the state.

Through the Building Codes Implementation for Efficiency and Resilience Program, the State received $1.6 million to build more energy-efficient houses that will be better equipped to survive hurricanes.[17]

The state also plans to administer a combined $212.5 million in formula funding towards the Home Energy Performance-Based, Whole-House Rebate Allocations and High Efficiency Electric Home Rebate Allocations. These programs will be administered through LDENR and are intended to "accelerate the deployment of clean energy technologies, catalyze local economic development and create jobs, reduce energy costs, and avoid pollution through place-based strategies involving a wide range of government, community, business and other stakeholders."[18]

COMMUNITY-DRIVEN SOLUTIONS

Community meetings revealed general interest in pursuing residential building retrofits, particularly due to increasingly costly utility bills. Additionally, there was support for improving the air quality of indoor environments, especially in key facilities such as schools. However, residents and business owners noted challenges with navigating the various financing programs and meeting minimum pre-weatherization requirements. Accordingly, the priority actions in this plan aim to eliminate barriers and improve the accessibility of programs that facilitate affordable retrofits.

TRANSFORMATIVE IMPACTS

Unlike in many other areas around the country, Louisiana's built environment does not constitute a major source of GHG emissions for the state. Nonetheless, energy efficiency and other improvements to the buildings where Louisianans live, work, play, and go to school has the potential to significantly improve residents' safety and well-being. Louisianans are increasingly burdened by unmanageable utility bills and are unable to make energy efficiency upgrades because of more immediate building resiliency concerns or requirements. Therefore, the priority actions in this focus area address not only efficiency investments, but pre-weatherization and weatherization upgrades that are essential in removing barriers to emission reductions. This approach will facilitate scalable opportunities that improve lives and create a more climate-ready built environment.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

To quantify a building retrofit policy, several assumptions were made, including that each retrofit would reduce energy consumption by 20% and would last for 15 years. Using household electricity consumption data from EIA, an implementation model with a ramp up was created to model the kilowatt hour reductions, which were converted to million MT CO_2e using EPA's CO_2e equivalency calculator. The scaling of up to 1% annual retrofits was measured against the number of existing households in each year. Co-pollutant reductions were estimated from the 2020 NEI baseline data, using a 20% reduction in residential fuel combustion as a simplified assumption.

PRIORITY OUTPUTS	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Scale up to 1% annual retrofits of residential households by 2030, 2% annual retrofits by 2035, and 5% annual retrofits by 2040.	0.16 in 2030 1.4 in 2050
Install 815,000 additional air and water heat pumps by 2030.	

GHG emissions reduction estimates for outputs focused on building retrofits. Due to the policy schedule ramp up, estimates are provided for both 2030 and 2050. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

The output *Install Additional Heat Pumps* was not quantified separately from building retrofits, for several reasons. While heat pumps generally reduce household energy consumption, emissions, and energy costs, the degree to which any of those would be true in Louisiana requires additional detailed modeling of energy consumption at an hourly resolution rather than seasonal or annual.[19] The degree to which the electricity grid itself decarbonizes also determines the degree to which heat pumps displace fossil fuel combustion emissions. These limitations are true for the building retrofit policy as well; the simplified implementation ramp and assumptions smooth out these uncertainties for the sake of the analysis. Whether additional heat pump installations would reduce overall energy consumption in a way that significantly deviates from the reductions modeled in the retrofit implementation ramp is too uncertain to separately quantify at this level of detail. Estimates for GHG emission and co-pollutant emission reductions correspond to the 2050 value provided in the GHG emissions reduction estimate. For the full details of the assumptions made in the analysis as well as emissions reductions for additional co-pollutants please see the Technical Appendix (Appendix A).

PRIORITY OUTPUTS	CO-POLLUTANT EMISSIONS REDUCTION (METRIC TONS)			
	SO_2	NO_x	VOCs	NH_3
Scale up to 1% annual retrofits of residential households by 2030, 2% annual retrofits by 2035, and 5% annual retrofits by 2040.	4.63	318.66	171.06	67.00
Install 815,000 additional air and water heat pumps by 2030.				

Co-pollutant emissions reduction estimates for outputs focused on building retrofits. Estimates correspond to the 2050 value provided in the GHG emissions reduction estimate. For the full details of the assumptions made in the analysis as well as emissions reductions for additional co-pollutants, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

DEVELOP ONE-STOP SHOP

The State will develop a statewide one-stop shop for state, federal, and local incentives, grants, and loans that can be leveraged for a project, including weatherization, roof repairs, Solar for All, and Home Energy Rebate programs. The one-stop shop should encourage braiding of resources to comprehensively address capital needs/resources. Messaging and resources should be especially geared towards low-income homes, multi-family homes, or rental properties that face additional barriers to adoption and tend to face a disproportionately higher energy burden.

» ***Authority to Implement***

This action contemplates using the existing authorities of the various state agencies that are currently administering siloed incentives, grants, and loans. Pursuant to La. Const. art. VII, § 14, "[f]or a public purpose, the state and its political subdivisions or political corporations may engage in cooperative endeavors with each other, with the United States or its agencies, or with any public or private association, corporation, or individual."

CREATE BUILDING RETROFIT LEARNING HUBS

Through state and local government, develop a statewide network of building retrofit learning hubs to create local networks of trusted advisors, local contractors, audits and assessments, and new incentive programs to accelerate building retrofit opportunities. The hubs will include physical demonstration facilities and expert personnel, and will be focused on market segments (such as low-income residential markets, multi-family buildings, commercial markets, and small industrial markets) to develop locally-specific messaging and education around the costs and benefits of retrofits and to serve as a nexus to state, federal, and local resources. The hubs will support the development and dissemination of local case studies and demonstration sites.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR, LHC, or LWC, or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

PRIORITIZE RESILIENCE UPGRADES

The State will prioritize energy efficiency upgrades that also improve energy resilience to better ensure access to adequate heating, cooling, ventilation, and shelter during and after natural disasters or other major disruptions. This includes weatherization, sealing, and load reductions that can be paired with energy storage to ensure long-duration resilience.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR, DOA, or LHC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting. The State, through the state's Chief Resilience Officer and DOA, as well as local governments, have existing authority and programs for resilience planning.

LEVERAGE CONTRACTORS AS CHANGE AGENTS

The State will work with regional hubs and other stakeholders to develop early education around end-of-life replacement to ensure replacements are best available, lowest life-cycle cost. This effort will include the consideration of the development of mid-stream rebates to incentivize contractors.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR, LWC, or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

CREATE STATEWIDE ENERGY EFFICIENCY IMPLEMENTER

The State will support the development of an independent, third-party energy efficiency program implementer that could be focused on outcome-based performance for energy efficiency programs and long-term sustainable delivery.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR, LPSC, or LHC at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

PROVIDE HEALTH & SAFETY FUNDING

The State will create a health & safety fund to support repairs and upgrades necessary prior to making energy efficiency upgrades and retrofits for low-income households. A lack of time and financial resources for these baseline improvements often stands as a barrier to pursuing emission reduction upgrades. This would largely include roof repair, wiring repairs, doorway and window structure repairs, ventilation and mold remediation, plumbing leaks, and other basic building envelope problems that must be addressed before energy efficiency investment can be made. Repairs and upgrades will focus on improving indoor air quality and protection from poor outdoor air quality. The State will investigate opportunities to leverage the state's Mitigation Revolving Loan Fund to finance retrofits.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through the Louisiana Office of Community Development or LHC, or at the local level through existing plenary powers of local governments and school boards. Budget authority and dedicated funds may need to be respectively increased or created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

CONDUCT DIRECT OUTREACH

The State will prioritize the development of a direct marketing effort to households that are low-income with high energy burden to provide specific messaging around opportunities and availability of funding and long-term assistance for new funding opportunities.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA or LHC or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

BUILD WORKFORCE CAPACITY

The State will prioritize investments in workforce development programs to support the skill set for building decarbonization investments, as well as weatherization and health & safety repairs. The workforce training efforts will focus on filling technical school, high school, and community college gaps, and include support of pre-apprenticeship training and apprenticeship programs. Workforce development should also include training and continuing education for professional services–including architects, engineers, and lawyers–that are essential pieces in implementing efficiency and weatherization upgrades and ensuring homeowners optimize state and federal resources.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDENR, LED, LWC, or Louisiana Board of Regents or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

DEVELOP BUILDING MATERIALS CASE STUDIES

The State will support pilot projects and case studies around the use of low-carbon and highly efficient building materials to demonstrate the long-term operational savings (and building and homeowner value) of such investments in Louisiana.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA, LDENR, or LHC, or at the local level through existing plenary powers of local governments. Pursuant to La. R.S. 40:600.91, LHC is authorized to "undertake and carry out or authorize the completion of studies and analyses of housing conditions and needs within the state and ways of meeting such needs." Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

LAUNCH NON-PROFIT RETROFIT PROGRAM

The State will develop an energy efficiency program focused on non-profits that serve low-income and disadvantaged communities to support energy cost reductions for these entities, and provide a pathway to facilitate federal payments/incentives.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through DOA, LDENR, LED, or LHC, or at the local level through existing plenary powers of local governments. Pursuant to La. R.S. 39:361, LHC is "authorized and directed to cooperate and coordinate with units of general local government, local public housing authorities, and other instrumentalities of local government, including but not limited to public trusts and local non-profit housing corporations, in developing a comprehensive plan and housing strategy." Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

INCENTIVIZE AUDITS AND DEEP RETROFIT EVALUATIONS

The State will develop a program to incentivize facility audits, energy management, and comprehensive retrofit evaluations for multi-family buildings, commercial buildings, and industrial facilities. The State will work with utility regulators to create pathways for streamlined access to data for customers and their designated contractors.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through LDOA, LDENR, LED, or LHC, or at the local level through existing plenary powers of local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

SIMPLIFY LOCAL PERMITTING

The State will support processes at the local level to reduce complexity, cost, and time involved in permitting retrofit projects, including incorporating advanced energy codes and performance-based options.

» ***Authority to Implement***

This action could be implemented with existing authority at the state through the Office of the State Fire Marshal, LDENR, and LSUCCC in collaboration with local governments. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

COMMUNITY FORESTRY AND GREENING

Community Forestry and Greening focuses on the care, maintenance, and placement of vegetation in urban cities, suburban areas, and towns. This takes place through community engagement, partnerships, and private sectors. The health of urban and community trees, forests, and gardens affect the quality of life for residents that are surrounded by them.

Green vegetation offers a variety of benefits to communities and residents such as positive impacts on mental health, a place for outdoor recreation and beautification, reduced cooling cost, reduced urban heat island effect, improved air quality, stormwater management, reduced noise pollution, wind moderation, enhanced wildlife habitat, and jobs creation.

Equitable tree cover means expanding tree canopies across the state to strategically reach communities living on low-incomes and communities of color and other communities disproportionately impacted by extreme heat and other environmental hazards. Tree Equity is making sure every neighborhood has enough trees so that every person can benefit from them. Urban tree canopy (UTC) is the overhead cover of leaves and greenery provided by trees that offers a plethora of mental and physical benefits to a community. UTC is often maintained by community groups, residents, and local governments.

An increase in urban forests and tree canopy cover brings development of jobs and opportunities. For every $1 million invested in urban forestry, an average of 25.7 jobs[20] are supported. These jobs could be full-time, part-time, or seasonal. There are a vast number of jobs that could become available with the increase in tree canopy. They can be arborists, traditional foresters and urban foresters, people who fight wildfires and prescribed burns to manage urban forests, people who grow trees in nurseries, arborists, urban foresters, and similar jobs that can benefit trees and green infrastructure.

Louisiana has an urban tree canopy density of approximately 48%. Louisiana residents who live in poverty and people of color usually inhabit and live in areas of the state that have about 29% or less of tree canopy cover. The state has 38% of people in poverty and 47% of people of color. By looking at the numbers, over 75% of residents living in poverty and over 60% of people of color do not live in an area of the state with adequate tree canopy cover and are experiencing the harmful effects due to the lack of trees. In most cities, trees are sparse in low-income and disadvantaged neighborhoods and some neighborhoods of color.

When considering expansion of urban and community forestry, several considerations should be taking into account:

Density. Too many trees can hinder the functionality of a community or urban forest. When trees are overstocked and grow too close together, they have to compete for these resources such as

OUTPUT

Plant and maintain 4 million trees in communities statewide by 2030, at least 60% of which are in LIDAC communities.
See page 77

POTENTIAL BENEFITS

GHG emissions reduction

0.24 million MT CO_2
(cumulative, ten-year period)

Community benefits

nutrients, water, and sunlight. This will result in weaker trees that are more susceptible to disease, insect infestations, and drought.

Invasive Species. Due to the lack of host trees and natural enemies, invasive species and a variety of diseases have caused significant damage to natural and urban forests. Invasive pests can decline rates of tree reproduction and survival and affect the growth of native species. As a result, there already has been a significant loss in tree canopy coverage and carbon storage. Purdue University revealed that the carbon storage lost to pests each year is the same as the amount of carbon emitted by five million vehicles.

Diseases. The introduction of new diseases can be intensified by climate change. Warm winters allow insect populations to continue to grow and cause serious disease outbreaks before spring arrives. Changes in the season allow insects and pathogens to expand into other regions that were previously not affected. Changes in rainfall and periods of drought can also make trees more vulnerable to both introduced and endemic pathogens.[21]

STATUS OF COMMUNITY FORESTRY AND GREENING IN LOUISIANA

The City of Gonzales formally adopted a Climate Action and Resilience Plan in February 2023. In the plan, there is a goal to increase green spaces by planting more trees, expanding tree canopy cover, and conducting an open space inventory. By accomplishing this goal Gonzales can be recognized as a Tree City, by Tree City USA along with Abita Springs, Alexandria, Brusly, Convington, Gretna, Hammond, Kenner, Lafayette, Mandeville, and New Orleans.

The organization Sustaining Our Urban Landscape (SOUL) developed a New Orleans Reforestation Master Plan that was recognized by the City Council in January 2023. The Plan addresses eight environmental challenges that are experienced in New Orleans from those challenges, benefits that urban forests will provide to New Orleans are listed, and three key goals for the city are discussed in great detail.

INTERSECTION WITH FEDERAL FUNDING

Baton Rouge, Southern University, Lake Charles, and New Orleans have received a combined $24 million in funding from the US Forest Service (USFS) through the IRA to plant and maintain trees, combat extreme heat and climate change, and improve access to trees and nature where people live, work, and play.

Implementation is underway by The Nature Conservancy to restore urban forests in 21 parishes that have been impacted by and in FEMA disaster declared areas due to the 2020 and 2021 hurricanes. The grant is funded through USFS.

COMMUNITY-DRIVEN SOLUTIONS

Public meeting participants supported increased tree canopy coverage in communities, particularly for the multitude of co-benefits such as reducing heat and stormwater runoff and improving residents' well-being. However, there were also concerns over competing land uses for available acreage, particularly in urban areas, for other activities such as community solar projects and over the risks that trees can pose to property during storms. The actions in this plan aim to increase tree plantings, community gardens, and other greening efforts in urban and rural communities with strategic planning to avoid conflicts and risks and equitably deliver benefits.

TRANSFORMATIVE IMPACTS

Increasing tree canopy in urban and community environments has numerous benefits, including reducing carbon and co-pollutants, managing stormwater, and abating urban heat island effects. As trees become more mature, they can combat the effects of climate change by removing carbon dioxide (CO_2) and other air pollutants, including $PM_{2.5}$, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and ozone (O_3), from the atmosphere and storing the pollutants in the wood, plant matter, and soil and releasing oxygen as an exchange. On average, a mature tree has the capacity to sequester 48 pounds of CO_2 annually. Between 31 and 46 trees have the capability to

remove 1 metric ton of CO_2 from the environment annually. Tree canopies can intercept rainwater by capturing and storing the water in their canopy and releasing water into the atmosphere ultimately reducing stormwater runoff and erosion. Although limited by available and suitable space for urban trees, there is potential for scaling urban canopy coverage up, which can also support workforce development to care for and maintain urban forests.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

EPA's Greenhouse Gas Equivalencies Calculator references include a conversion amount for urban trees planted, with many caveats, including that the trees would be grown in a nursery for one year until they become 1 inch in diameter at 4.5 feet above the ground, and that they are not densely planted. This figure also includes some assumptions about tree survival and growth rate. Finally, their figure incorporates the carbon sequestration amount for a period of ten years, so this is not an annual figure. The figure used by EPA is 0.060 metric ton CO_2 per urban tree planted. For four million trees, this totals 0.24 million MT CO_2 for a period of ten years for each tree. GHG emissions reduction estimates for urban forestry output. For the full details of the assumptions made in the analysis please see the Technical Appendix (Appendix A).

PRIORITY OUTPUT	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Plant and maintain 4 million trees in communities statewide by 2030, at least 60% of which are in LIDAC communities	0.24 (cumulative, ten-year period)

GHG emissions reduction estimates for urban forestry output. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

FUND URBAN TREE CANOPY ASSESSMENTS

Urban Tree Canopy assessments will provide critical baselines on the extent of a community's forest or tree resource. Cities and municipalities should lead in establishing tree inventories that establish a baseline quantity of canopy coverage and improve our geographic understanding of underserved communities that may be most vulnerable to climate change impacts such as heat island effect. The State will support a study to improve understanding of carbon sequestration and climate change mitigation potential from urban forestry.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through the LDAF or at the local level through existing plenary powers of local governments. Pursuant to La R.S. 3:4383, the forestry commission within LDAF is "authorized to implement a program in urban forestry to encourage better tree management and planting in urban areas, to assist the cities in seeking innovative solutions to problems such as tree maintenance and vandalism, and to encourage demonstration projects to maximize the benefits of urban forests." The commission has the responsibility of carrying out these actions in cooperation with other local, state, and federal agencies. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

SUPPORT NATIVE AND CLIMATE-RESILIENT TREE PLANTING

Through state and local government, support the planting of native and climate-resilient trees in communities identified by UTC assessments as vulnerable to climate change impacts such as heat islands, historically underserved or federally designated disadvantaged, lacking in urban tree canopy, or disproportionately energy burdened. This will include direct funding of comprehensive tree planting efforts on public property supported by local engagement and input, as well as education and access to material for planting on private property. Planning and education should include consideration of the potential energy conservation benefits of strategically planted trees. The right tree in the right place can reduce energy demand in the summer by providing shade and in the winter by providing wind protection. Tree planting programs should be paired with proactive maintenance to ensure strong and healthy urban forestry that does not create community hazards.

» ***Authority to Implement***

This action could be implemented with existing authority through LDAF, Soil & Water Conservation Districts, or existing plenary powers of local governments. Pursuant to La R.S. 3:4383, the forestry commission within LDAF is "authorized to implement a program in urban forestry to encourage better tree management and planting in urban areas, to assist the cities in seeking innovative solutions to problems such as tree maintenance and vandalism, and to encourage demonstration projects to maximize the benefits of urban forests." The commission has the responsibility of carrying out these actions in cooperation with other local, state, and federal agencies. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

SUPPORT URBAN AGRICULTURE AND COMMUNITY GARDENS

The State will speed the development of local agriculture through support of local food systems, community gardens, and small-scale urban agriculture. Projects will be supported in underserved communities such as food deserts, and create linkages to food procurement, such as grocery stores and restaurants.

» ***Authority to Implement***

This action could be implemented with existing authority, whether at the state through Office of Community Development within DOA or LDAF and the Louisiana Department of Education, or at the local level through existing plenary powers of local governments. LDAF has broad authority to promote, protect, and advance agriculture and forestry in the state. La. R.S. 3:2. LDAF is also authorized, in collaboration with the Board of Elementary and Secondary Education, to develop and implement a farm to school program, administered by the U.S. Department of Education, which includes a school garden program. Budget authority and dedicated funds may need to be created through statute during an upcoming legislative session, city council meeting, or similar local government meeting.

Urban Forest. Adobe Stock image.

SUSTAINABLE AGRICULTURE

Sustainable agriculture refers to farming techniques that aim to protect the environment, aid and expand natural resources, and make the best use of nonrenewable resources.[22] It is an integrated system that focuses on plant and animal production.[23] Sustainable agriculture, over time, should enhance environmental quality and the natural resource base where the agriculture economy depends, food and fiber needs, the quality of life for farmers and residents, and rural economies statewide. It should also sustain the economic viability of farm operations and integrate natural biological cycles.

According to the 2022 Louisiana GHG Inventory, the agricultural sector has several GHG emissions from livestock and soil management, and other farm activities. However, emissions from enteric fermentation, manure management, soil fertilizers, rice cultivation, crop residue burning, animals, and urea fertilization are relatively small compared to industrial and transportation sector emission contributions. Nevertheless, agricultural practices can have a significant impact on air and soil quality and thus public health.

Sugar cane is produced on slightly more than 500,000 acres of land in 25 of 64 Louisiana parishes. To support carbon emission reduction from agricultural practices, Louisiana will reduce acres of sugarcane burned each year by 66% (about 300,000 acres) by 2030. Increased beneficial use of crop residues will reduce burn-induced air quality deterioration, elevate soil carbon levels, and may support workforce development as alternatives to soil management are applied.

STATUS OF SUSTAINABLE AGRICULTURE IN LOUISIANA

SPROUT NOLA, an organization based in New Orleans, trains new farmers through public programs while helping existing farmers transition to more climate-smart agriculture; it also partners with federal agencies to conduct outreach and improve access to conservation programs. In 2022, SPROUT NOLA held 160 hours of farmer technical assistance field days which included offering free cover crop seeds to farmers statewide. In 2023, SPROUT launched a statewide climate-smart agriculture cohort that supported financial assistance and loan procurement for farmers for climate-smart agriculture.

OUTPUT

Reduce the need for prescribed burning on 66% of sugarcane acreage in Louisiana by 2030
See page 80

POTENTIAL BENEFITS

GHG emissions reduction

3.29 million MT CO_2 (annual)

Community benefits

INTERSECTION WITH FEDERAL FUNDING

The Louisiana Department of Agriculture and Forestry (LDAF) connects farmers to conservation formula programs like the Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP). Though these programs historically have received inadequate funding, the BIL and IRA reinvigorate sustainable farming and forestry through wide-scale deployment of the EQIP and CSP. There are many active Louisiana landowners and high participation in these programs, with 238,000 contract acres covered and $42 million obligated by EQIP and CSP combined in 2021.

Louisiana submitted 14 proposals under the first tranche of the Climate Smart Commodities Competition of the U.S. Department of Agriculture (USDA). Louisiana submissions span cotton, timber and forest products, livestock, rice, vegetables, and others, totaling a proposed investment of $659.5 million in climate-smart agriculture for Louisiana. The USDA will work with applicants to refine and finalize proposals in the coming months. Climate Smart Commodities alongside other recurring and new sources of funding bring a unique opportunity to invest in farmers and support sustainable management of working lands.

COMMUNITY-DRIVEN SOLUTIONS

Integrating more regenerative and sustainable agricultural practices provides an opportunity not only to reduce emissions and enhance sequestration of working lands, but also offers countless other ecological, economic, and health and safety benefits. Crop residue burning can potentially harm farmers' health as well as the air quality of surrounding communities while releasing greenhouse gases. Implementing agricultural best practices can address these issues while improving rural economies, yielding healthier soil for crop productivity and carbon sequestration, reducing the demand for chemical additives, and improving water quality through improved floodplain dynamics and decreased nutrient run off. Sustainable agriculture also integrates activities that proactively address the impacts of more regular extreme heat and changing seasonal climates on a critical Louisiana economic industry. Public input indicates strong support for expanding sustainable agricultural practices, including in urban settings which is reflected in the Community Forestry and Greening Focus Area. The priority actions in this Focus Area build on other programs supporting farmers and climate-smart agriculture and highlight the interconnectivity between this and other emitting sectors.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

To quantify the emissions from burning of sugarcane, first the percentage of bagasse (sugarcane waste) was estimated per yield. This yield was applied to the USDA-reported production tonnage of sugarcane from Louisiana in 2022. Finally, using an EPA report on bagasse combustion in sugar mills, the percent of carbon composition of bagasse was estimated. This resulting tonnage was converted into metric tons using the EPA equivalencies calculator. Because the composition figure came from a report about bagasse burning at mills, and not crop residue in fields, the emissions and associated co-pollutants like nitrogen and sulfur could be higher from unabated burning, as many mills use wet scrubbers to control PM2.5 and other pollutants from bagasse combustion. The final figure in the table above is an annual figure that is variable based on the acreage under production, among other uncertainties. For full assumptions made, sources and methods, please see the Technical Appendix (Appendix A).

PRIORITY OUTPUT	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
Reduce the need for prescribed burning on 66% of sugarcane acreage in Louisiana by 2030.	3.29 (annual)

GHG emissions reduction estimates for outputs focused on sustainable agriculture. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A).

PRIORITY ACTIONS

COORDINATE AND INCENTIVIZE TRANSPORTATION FOR WASTE STREAMS BETWEEN INDUSTRY AND AGRICULTURE

The State will support increased connectivity between industry and regional agriculture to utilize waste streams in line with principles of circular economy and sustainable agriculture.

- Sugar cane leaf residue feedstock. The State will support increased investment in biofuel production that utilizes local plant and crop residue as a renewable feedstock. To prepare for future demand from developers, the State will incentivize handling and transport of sugar cane crop residue intended for beneficial use. Supported alternatives to burning may include row sweeping, combining modifications to redistribute residue into furrows, post-harvest burning, and incorporating organic waste into the soil or terrain. Adaptive harvesting and residue management practices can reduce greenhouse gas emissions and improve floodplain productivity, nutrient retention, moisture retention, and plant productivity and soil health, serving as natural carbon sinks.

- Gypsum recycling. The State will support the reuse of flue gas desulfurization gypsum (FGDG) from local industrial processes for distribution to agricultural end users. Applied as a soil amendment, FGDG increases plant nutrient uptake, may improve soil structure, and reconditions salinated soil. This is particularly valuable in mitigating soil salinity stress from sea-level rise and hurricanes. This practice also promotes circular economy principles and cross-sectoral approaches to resource management.

» ***Authority to Implement***

Pursuant to La. R.S. 36:628, the office of soil and water conservation within LDAF shall perform the functions of the state relating to soil and water conservation. Pursuant to La. R.S. 3:1204, the State Soil and Water Conservation Commission shall facilitate, promote, assist, harmonize, coordinate, and guide the resource conservation programs and activities of Soil & Water Conservation Districts as they relate to other special-purpose districts, parishes, and other public agencies, and it may secure the cooperation and assistance of the United States and any of its agencies, and of agencies of the state, in the work of such districts and to accept donations, grants, gifts, and contributions in money, services, or otherwise from the United States or any of its agencies or from the state or any of its agencies in order to carry out the purposes of this Part.

LEAD ON BIOCHAR

The State will stand up a framework for converting biomaterials to biochar for agricultural application and utilizing the excess renewable heat byproduct to power industrial processes. This program will require coordination between biomass sources, agricultural biochar users, industrial heat users, and transportation between all parties. Biochar application can improve soil nutrient retention which may reduce the need for synthetic fertilizer application, which can require a carbon-intensive production process. Improved nutrient retention also improved watershed health which can benefit coastal wetlands that serve as important natural carbon sinks.

» ***Authority to Implement***

Pursuant to La. R.S. 36:628, the Office of Soil and Water conservation within LDAF shall perform the functions of the state relating to soil and water conservation. Pursuant to La. R.S. 3:1204, the State Soil and Water Conservation Commission shall facilitate, promote, assist, harmonize, coordinate, and guide the resource conservation programs and activities of Soil & Water Conservation Districts as they relate to other special-purpose districts, parishes, and other public agencies, and it may secure the cooperation and assistance of the United States and any of its agencies, and of agencies of the state, in the work of such districts and to accept donations, grants, gifts, and contributions in money, services, or otherwise from the United States or any of its agencies or from the state or any of its agencies in order to carry out the purposes of this Part.

LAND PROTECTION AND RESTORATION

Louisiana's natural lands comprise one of the state's strongest assets for maximizing climate mitigation and adaptation goals. Louisiana's abundant forests and wetlands have tremendous capacity for natural carbon storage as well as providing multiple co-benefits for surrounding communities and ecosystems. However, natural processes such as hurricanes, sea-level rise, erosion, subsidence, saltwater intrusion, and wildfires and human activities such as deforestation, cutting of canals, oil spills, and levee construction all contribute to natural land loss and declines in the ecosystem health. Since 1932, Louisiana has lost more than 2,000 square miles of coastal land.[24] This land loss has resulted in the loss of once productive habitats and ecosystem services, including carbon sequestrations. It also has been leading to shifts in population and economies, a trend predicted to continue as more land is predicted to be lost in the near- and long-term future. To address these changes, the Coastal Protection and Restoration Authority (CPRA) was created. Since its inception in 2005, CPRA has developed and implemented restoration and risk reduction projects that have benefited 55,807 acres (87.2 sq mi), restored 71.6 miles of barrier islands, improved 369 miles of levees, and placed 193 million cubic yards of sediment.[25]

While these projects protect and restore valuable natural sinks, GHG emissions from construction offset some of the benefits. Fuel switching and electrification of construction equipment offers a promising near-term opportunity for reducing operational GHG emissions. The primary hurdles to reducing the carbon footprint of marsh creations are cost, feasibility, and availability of electric dredges. The cost of biodiesel remains high per gallon, compared to fossil fuel diesel. The electric dredge fleet is also limited and privately owned, and connecting to an electric power source creates feasibility issues for restoration projects that are typically in remote locations.

STATUS OF LAND PROTECTION AND RESTORATION IN LOUISIANA

In its 18th year, coastal protection and restoration activities along Louisiana's coast have made significant progress in addressing land loss. There are however emerging challenges to continue this trend - namely sustainable funding sources and cost and material availability. Furthermore, a 2023 U.S. Supreme Court decision in *Sackett v. EPA* and subsequent change in regulations controlling the federal jurisdiction of wetlands limited an essential line of defense against destruction of wetlands.

In 2023, the Louisiana legislature authorized $3 million for the development of a carbon market for coastal restoration projects and researchers at local universities, state agencies, the U.S. Geological Survey, NOAA, the Water Institute of the Gulf, and other coastal scientists are studying the capacity of wetlands to store carbon, sometimes known as "blue carbon." This scientific research can demonstrate a defensible methodology for wetland restoration

OUTPUTS

SEVERAL
See page 84

POTENTIAL BENEFITS

GHG emissions reduction

0.299 million MT CO_2e

Community benefits

projects to be part of global carbon offset markets since carbon offsets are usually used to construct or preserve forests.

In October 2023, the Louisiana Department of Wildlife and Fisheries (LDWF) announced projects for the first funding cycle for the Louisiana Outdoors Forever Program. The Louisiana Outdoors Forever Program supports voluntary conservation projects that protect drinking water supplies, conserve wildlife habitat, provide recreational opportunities, and sustain working farms and forests. In 2022, Acts 714 and 167 established the Louisiana Outdoors Forever Program and Fund and appropriated $10 million as an initial investment. This $10 million, with $27 million in match funds, will support thirteen projects across Louisiana and result in the conservation or restoration of approximately 17,500 acres.

INTERSECTION WITH FEDERAL FUNDING

CPRA was awarded almost $8 million through the National Fish & Wildlife Foundation's (NFWF) National Coastal Resilience Fund for the Breton Landbridge Marsh and Living Shoreline Creation. The project will create and nourish tidal marshes in Plaquemines Parish that provide important habitat for fish and wildlife and natural storm buffers for communities. The NFWF Coastal Resilience Fund also awarded more than $1 million for Louisiana projects to the National Audubon Society in Vermilion Parish and Ducks Unlimited in the Barataria Basin.

In August 2023, CPRA submitted three letters of intent for project implementation grants as part of NOAA's Climate-Ready Coasts and Communities Climate Resilience Regional Challenge. The letters covered a suite of projects—including ecosystem restoration, home elevations, and the creation of community resilience hubs—in Greater New Orleans, Plaquemines Parish, and Terrebonne and Lafourche Parishes. NOAA received proposals for projects totaling around $16 billion for the $575 million program. Out of this competitive pool, CPRA's projects in Greater New Orleans and Terrebonne and Lafourche Parishes were selected to advance to the next round of full applications, due February 2024.

In November 2023, CPRA applied for a NOAA Transformational Habitat Restoration and Coastal Resilience Grant for a portion of a larger effort to restore the Chandeleur Islands. The Chandeleur Islands are an essential natural barrier between the Gulf of Mexico and parts of St. Bernard and Orleans Parishes and serve as habitat for sea turtles, birds, and other aquatic species.

COMMUNITY-DRIVEN SOLUTIONS

In discussion with community meeting attendees, the impacts of climate change on the natural environment and social aspects such as insurance are well understood, and mitigation measures are supported. Strategies that promote carbon sequestration by wetlands were especially supported by southern communities, where wetland loss is most prevalent, and impacts are most evident. Meeting attendees in all three locations identified the need for outdoor education and restoration and protection of public greenspaces as an important strategy to increase knowledge and carbon sequestration.

TRANSFORMATIVE IMPACT

While restoration and creation of marsh creates carbon sinks, switching dredging equipment to biofuels would further reduce carbon emissions. Scaling the use of biofuels for the state's restoration projects could create a pathway for the U.S. Army Corps of Engineers (USACE) to also reduce the carbon footprint from its dredging activities. Dredging is the largest individual item in the USACE civil works budget, and the USACE spends around $1.5 billion each year on dredging in hundreds of navigation projects across the country.

The GHG contributions of coastal carbon–both as a source and sink–are much less understood than terrestrial carbon. Investigations in Louisiana could inform efforts to preserve and restore coastal wetlands as key instruments of climate mitigation and adaptation across the globe.

GREENHOUSE GAS AND CO-POLLUTANTS EMISSIONS REDUCTION

This analysis uses information and assumptions provided by the Louisiana Coastal Protection and Restoration Authority about the use of diesel in dredging operations for coastal restoration projects, specifically:

- A dredge uses approximately 10,000 gallons of diesel per day for dredging projects
- Projects on the scale of 400-500 acres involve approximately 150-200 days of dredging
- Assuming 200 days at 12,000 gallons/day to be conservative, results in the factor of 4,800 gallons/acre

Using EPA's Emissions factor for CO_2 to diesel conversion, 10.21 x 10-3 Metric Tons of CO_2 / Gallon of Diesel Fuel, this results in 49 metric tons of CO_2 to run the dredge per acre of marsh creation. This same analysis, when run with EPA's Emissions factor for biodiesel (9.45 x 10-3 metric tons of CO_2 /Gallon), results in 45.4 metric tons of CO_2 per acre. Multiplied by 30,000 acres, the difference between the two fuels is 109,440 metric tons, or 0.109 million MT CO_2. This analysis does not include co-pollutants, as these emissions factors are for carbon only and do not include other greenhouse gases equivalent to carbon.

To calculate the sequestration value for 30,000 acres of fresh forested wetlands, a literature review was conducted for various associated habitat types (forest wetlands, bottomland hardwood, etc.) and aboveground net primary productivity (ANPP) for each type was converted to the same unit and averaged across the literature review sources. This resulted in an ANPP figure for fresh forested wetlands at 16.06 metric tons of CO_2e per hectare per year. This was applied to the acreage listed in the output after converting that figure to hectares. This sequestration figure does not include carbon stored in soils in these habitats.

PRIORITY OUTPUTS	GHG EMISSIONS REDUCTION (MILLION MT CO_2e)
By 2030, replace conventional diesel with renewable diesel or electricity for the construction of Coastal Master Plan projects creating or nourishing 30,000 acres	0.109
Conserve or restore 30,000 acres of fresh forested wetlands by 2030	0.19

GHG emissions reduction estimates for the coastal output. For the full details of the assumptions made in the analysis, please see the Technical Appendix (Appendix A)

PRIORITY ACTIONS

COLLECT DATA

The State will support scientific research, modeling, and data collection to bolster understanding of net GHG impacts of coastal wetlands loss, conservation, and restoration, as well as GHG impacts of conservation and restoration construction activities. This information will help inform strategies to reduce total project emissions, including through equipment efficiencies and material sourcing alternatives.

» ***Authority to Implement***

Pursuant to La. R.S. 49:214.6.2, the Coastal Protection and Restoration Authority "[has] oversight over the administration of all matters related to the study, planning, engineering, design, construction, extension, improvement, repair, and regulation of integrated coastal protection." The CPRA may also "[d]evelop, implement, operate, maintain, and monitor integrated coastal protection plans and projects." Under La. R.S. 9:1103, the state has the right to "[any] monetary compensation derived from the sequestration of carbon on the surface of land or water bottoms through biological processes" directly related to a project carried out or sponsored by the Coastal Protection and Restoration Authority.

ASSESS FEASIBILITY OF ELECTRIC OR ALTERNATIVE FUELS DREDGES

The State will support a feasibility assessment of utilizing electric or alternative fuels dredges for implementation of Coastal Master Plan projects. This should include an assessment of a near-term

or interim option such as funding the incremental cost premium of renewable diesel to replace conventional diesel for dredging projects. The State will work closely with providers of dredging services, as well as other major users of dredging services including the USACE, to maximize cost-effectiveness and emissions reductions across the state.

» ***Authority to Implement***

Pursuant to La. R.S. 49:214.6.2, CPRA "[has] oversight over the administration of all matters related to the study, planning, engineering, design, construction, extension, improvement, repair, and regulation of integrated coastal protection." The CPRA may also "[d]evelop, implement, operate, maintain, and monitor integrated coastal protection plans and projects."

FUND OUTDOOR CONSERVATION PROJECTS

The State will invest in conservation projects through the Louisiana Outdoors Forever Fund. The Louisiana Outdoors Forever Program supports voluntary conservation projects that protect drinking water supplies, conserve wildlife habitat, provide recreational opportunities, and sustain working farms and forests. These efforts avoid deforestation that results in a net increase in GHGs, and they enhance the health of vegetation and soil that serve as critical natural sinks.

» ***Authority to Implement***

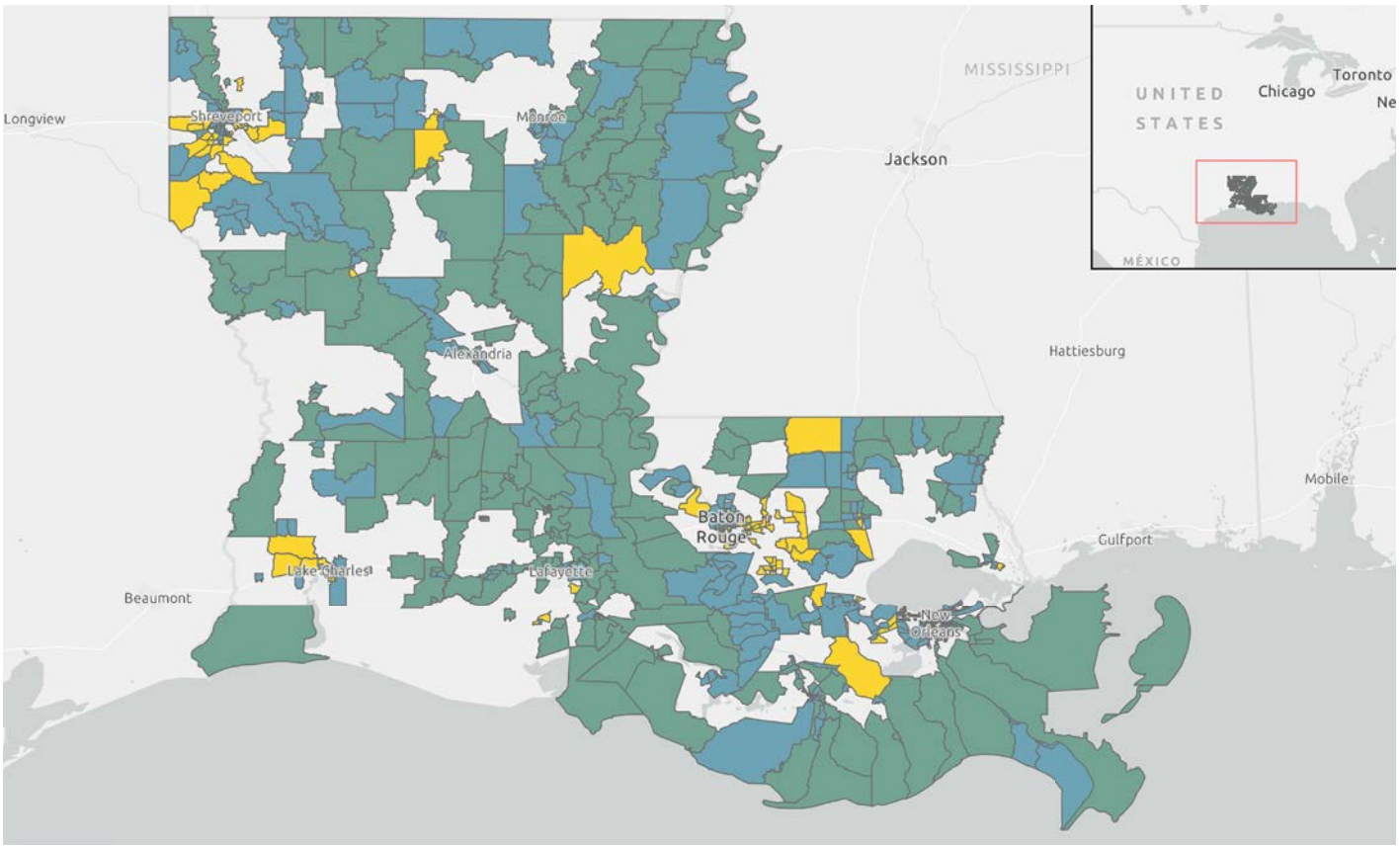
Pursuant to La. R.S. 56:1931 et seq., LDWF administers the Louisiana Outdoors Forever Program for the purpose of providing funding for outdoor conservation projects in the state. The program is strictly voluntary, and the following project types are eligible for funding: (1) Land conservation of important natural areas, including fish and wildlife habitat; (2) Water quality projects related to land conservation or land management, including those lands that protect drinking water supplies; (3) Working land, farms, and forested land; (4) Recreational properties related to important natural areas and public use; and (5) Historic properties adjacent to or integral to habitat restoration or enhancement.

LIDAC BENEFITS ANALYSIS

Hundreds of Louisiana communities are identified as Low Income and Disadvantaged Communities (LIDAC) through the parameters set by EPA for this analysis. The White House's CEJST screening tool identifies 642 census tracts in Louisiana as disadvantaged. 587 census tracts are at or above the 90th percentile for at least one of the EJScreen supplemental categories, and 376 census tracts meet both criteria. (These three numbers are not additive.) The map below shows these communities and how widespread they are throughout the state.

Louisiana's GHG emissions are dominated by the industrial sector, which is predominantly located in three clusters within the state: along the Mississippi River between New Orleans and Baton Rouge, Southwest Louisiana around Lake Charles, and Northeast Louisiana around Shreveport. The census tracts identified through this analysis include those impacted by industrial emissions, as well as other census tracts in places like the Mississippi Delta (Northeast Louisiana) and many other rural stretches of the state.

Engagement with communities has focused on the benefits of these priority climate actions in the following five categories:



LA census tracts at or above the 90th percentile for at least 1 EJScreen Supplemental Index category

LA census tracts identified as disadvantaged, CEJST

Overlapping CEJST and EJScreen LA census tracts

AIR QUALITY AND PUBLIC HEALTH IMPROVEMENTS

Major improvements to air quality and public health can be realized in these communities by cutting emissions from industrial facilities, electricity generation, methane leaks, medium and heavy-duty trucks, and ships at port. These activities all generate carbon dioxide and associated co-pollutants. Many frontline communities in Louisiana have been fighting for improved action on air quality from neighboring facilities for many decades.

EPA research from communities immediately adjacent to roadways has shown higher exposure to air pollutants and associated health impacts like increased rates of asthma and heart disease.[26] In Louisiana, much of the state is rural; most of the state's population lives and works near roadways, rivers, coastlines, and other places where they are likely to experience deleterious air quality. Addressing emissions from these facilities and roadways will benefit many Louisianans, including the census tracts identified above, by cutting carbon pollution and associated co-pollutants.

Several studies have looked at the air quality and health benefits of vehicle electrification. Camilleri et al. (2023)[27] demonstrate that electrifying 30% of heavy-duty vehicles over the region surrounding North America's largest freight hub, Chicago, "has robust air quality and health benefits, including reduced NO_2 and $PM_{2.5}$ concentrations and associated health benefits, reduced air pollution disparities among population subgroups, and reduced CO_2 emissions." They "find decreases in nitrogen dioxide (NO_2) and fine particulate matter ($PM_{2.5}$) concentrations but ozone (O_3) increases, particularly in urban settings. Over our simulation domain NO_2 and $PM_{2.5}$ reductions translate to ~590 and ~70 avoided premature deaths per year, respectively, while O_3 increases add ~50 deaths per year." High resolution air quality models such as those used in this study can be helpful for more concrete estimation of co-pollutant benefits of the PCAP policies on fleet transition. Reduced Complexity Models also can be helpful for a faster qualification. Using a reduced complexity model, Choma et al. (2020)[28] conducted "an updated assessment of health benefits of light-duty vehicle electrification in large metropolitan areas (MSAs) in the United States." They find that "electrification leads to large benefits, even with EVs powered exclusively by fossil fuel plants."

The 2023 drought and wildfire season in Louisiana revealed a new risk to air quality: smoke. Addressing more predictable sources of smoke, such as sugarcane stubble and bagasse burning, will improve air quality in communities downwind.

The health impacts of orphaned well pollutants are not widely studied. Elser et al. (2021) demonstrated "an association between long-term NO_2 and methane super-emitter exposure and odds of being a migraine patient.[29]" Kang et al (2023)[30] indicates that "orphaned wells can be associated with short-term (acute) and longer-term (chronic) exposures with the potential to adversely affect health" but there is a lack of studies and data on health impacts of orphaned wells as most of the previous studies are focused on active wells. The paper mentions that "the most concerning acute health risk arises from leakage along abandoned (incl. orphaned) wells that lead to methane accumulation in buildings. Such events can result in acute exposure to volatile organic compounds and other contaminants. Methane accumulations in confined spaces such as buildings that lead to exceedance of the lower-flammability limit for methane (~5% of air by volume) can lead to catastrophic explosions. A national-scale quantification of these acute exposures is not available."

If the 15% reduction in $PM_{2.5}$ emissions from the boilers is estimated from 2020 NEI data, millions in benefits can be realized, including $391.2 million benefit from reduction in directly emitted $PM_{2.5}$, $86.2 million benefit from reduction in SO_2, and $174.4 million benefit from reduction in NO_x.

Associated focus areas: *Industrial Decarbonization, Methane Emissions, Regional Transit, Fleet Transition, Clean Ports, Sustainable Agriculture*

Secondary impacts from: *Offshore Wind, Community Solar, Community Forestry and Greening*

Sector	Directly emitted $PM_{2.5}$	SO_2	NO_x	NH_3	NO_x	VOCs
	$PM_{2.5}$-Related Benefits				Ozone-related benefits	
Industrial Boilers	$192,000	$42,300	$15,200	$85,600	$64,800	$13,200

EPA reports benefit per ton of the $PM_{2.5}$ and ozone emission reductions values for 21 sectors[33], including industrial boilers.

ENERGY COST SAVINGS

Renewable and clean energy is cheaper than it has ever been, and constructing solar at community or utility scales makes it even more affordable. Some components of Louisiana's path to renewable energy, like offshore wind, are more cost-dependent, and are facing some struggles because of high interest rates. However, solar continues to grow, and communities that allow net metering and other behind-the-meter strategies that combine solar and storage see cost savings over fossil generated electricity. Louisiana communities face high electricity prices and frequent blackouts, in part because of struggles to rebuild the grid after more frequent storms. The priority actions in this plan are designed to address both the reliability and the cost of energy, through the community solar and community resilience hubs priorities.

Additionally, improved energy efficiency and household appliance electrification can reduce a household's energy costs significantly, particularly if combined with solar and storage. Retrofits are a key need in Louisiana's LIDAC, where structural issues (sometimes from previous hurricanes) can prevent needed efficiency upgrades, and deferred maintenance is a common problem. In these communities, housing stock has a slow rate of turnover, and so improved codes are not enough to address the problems. Targeted retrofits improving energy efficiency will reduce energy costs for these communities.

> **Associated focus areas**: *Community Solar, Community Resilience Hubs, Built Environment Retrofits*
>
> **Secondary impacts from**: *Offshore Wind, Transmission Planning*

INCREASED CLIMATE RESILIENCE

In Louisiana, climate mitigation and adaptation go hand in hand. Louisiana is on the front lines of climate change, and increasing resilience must be a priority along with mitigating emissions. Improving the reliability of energy, especially after disasters, is a key priority for many communities, especially where multiple storms have had devastating impacts. Southwest Louisiana was hit by Hurricanes Laura and Delta in 2020, and then had additional flooding and winter freezes; St. John the Baptist Parish was devastated by Hurricane Ida in 2021. These communities are included in the LIDAC analysis. Priorities in this plan, like community resilience hubs, are targeted to address these resilience needs.

Louisiana has unreliable electric power, particularly after storms, which are increasing in frequency and severity due to climate change. A recent study in Nature Communications showed that Louisiana experiences a dual burden of frequent outages longer than eight hours, high social vulnerability, and prevalence of electricity-dependent durable medical equipment use (Do et al, 2023). The benefits of microgrids in these resilience hubs will directly accrue to these communities with high social vulnerability by reducing mortality after disaster events. Data from previous events in Louisiana show that most deaths happen five to seven days after the actual storm, as carbon monoxide poisoning from generator use, heat stress from lack of air conditioning, and other factors compound. Resilient microgrids combined with a robust network of aid can alleviate these conditions.

Building retrofits, as with the energy costs savings benefits, will also increase community resilience by strengthening community housing. In Louisiana's LIDAC communities, it is critical to increase the number of buildings and homes that are resilient to extreme heat and high winds. Energy efficiency retrofits, particularly if combined with other features like a FORTIFIED roof, can provide benefits not just for one family, but for adjacent neighbors in times of disaster as well.

> **Associated focus areas:** *Community Resilience Hubs, Built Environment Retrofits, Community Solar, Transmission Planning*
>
> **Secondary impacts from**: *Regional Transit, Fleet Transition, Methane Emission*

JOBS AND WORKFORCE DEVELOPMENT

Increasing the number of training opportunities, jobs, and small business growth opportunities is a key goal of the PCAP. The focus areas in this plan have been selected in part because of the potential for job growth in LIDAC communities. A selection of these jobs include:

- Driving and maintaining electric vehicles, buses, and heavy-duty trucks
- Planning, constructing, and operating increased electricity transmission
- Designing, planning, constructing, installing, and maintaining offshore wind turbines
- Planning, building, and maintaining electric process heaters and boilers in industrial facilities
- Retrofitting thousands of buildings and homes with efficient electric heat pumps
- Working with community organizations to design and build resilient microgrids
- Planting and caring for trees and urban forests
- Installing shore power berths at Louisiana ports
- Monitoring, identifying, and plugging abandoned wellheads to prevent methane leaks

There are many more opportunities listed in each focus area. Many

of these focus areas also specify that over 40% of the benefits or installations will be in LIDAC communities, such as in Community Solar, where slightly less than half of the installations will be in New Orleans.

Associated focus areas: *All*

IMPROVED ACCESS TO SERVICES AND AMENITIES

Increasing mobility is a core benefit of the Regional Transit and Fleet Transition focus areas—not just through improved public transportation access, but by making the benefits of the electric vehicle transition more widespread throughout the state. Infrastructure like charging stations must be more widely distributed to be of use to many communities, including Louisiana's rural LIDAC communities. While not a part of this PCAP, the state's efforts to improve broadband access also increase access to services and amenities that are increasingly only available online. Keeping electricity affordable and reliable goes hand in hand with broadband, and so the solar and resilience actions also support this increased access.

Associated focus areas: *Regional Transit, Fleet Transition, Community Resilience Hubs*

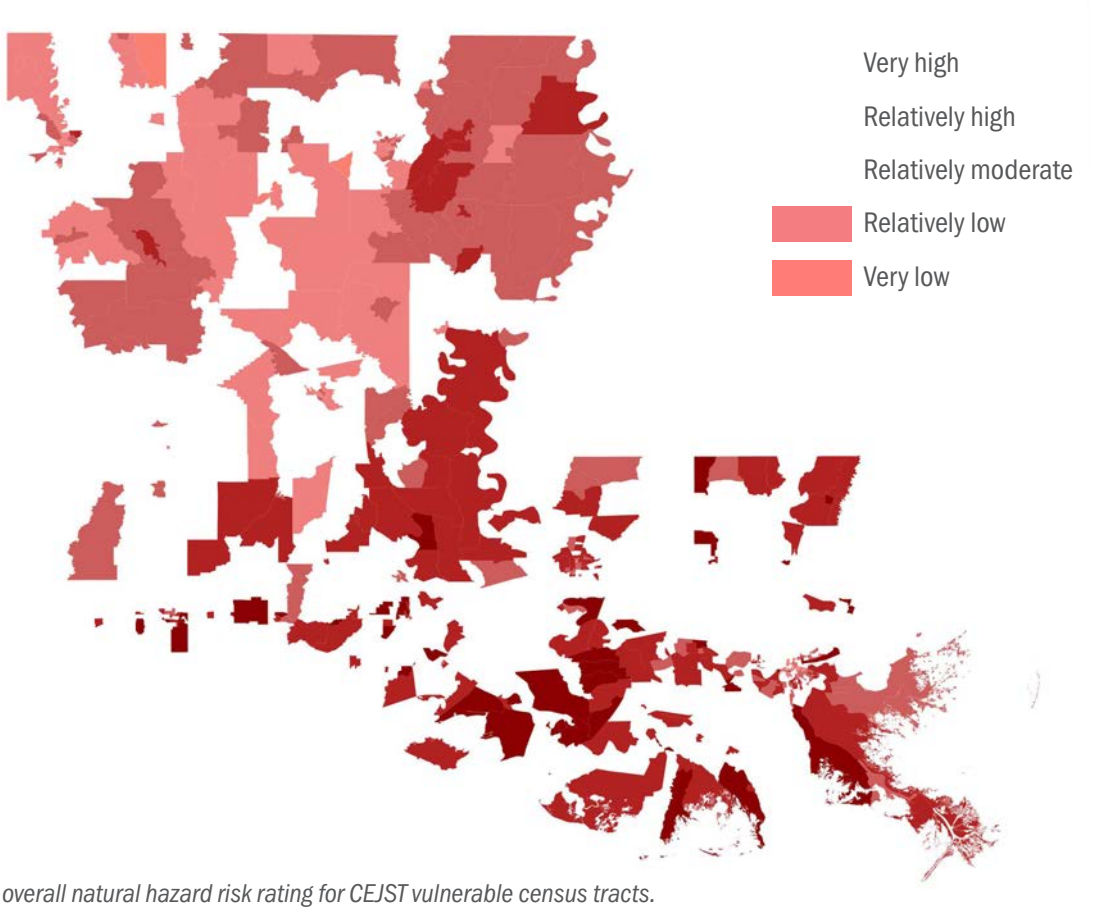
Secondary impacts from: *Community Solar, Transmission Planning*

The EPA technical reference document on benefits analyses for Low-Income and Disadvantaged Communities[31] suggests a three-step analysis for state CPRG grant recipients:

- Identifying low-income and disadvantaged communities.
- Engaging with the identified communities to understand community priorities.
- Estimating potential benefits of GHG emission reduction measures to the identified communities.

The document also mentions that the "grant recipients should first identify in their planning grant deliverables the specific climate impacts or risks to which disadvantaged communities in their jurisdiction are particularly vulnerable."

When CEJST tracts are overlaid with National Risk Index data[32] the major natural hazard for the tracts can be identified. The main natural hazards are shown if the tract had high or relatively high risk in that hazard category in the state of Louisiana. The most frequent hazards were lightning, hurricane, tornado, heat wave, and river flooding, respectively. The map below shows the composite natural hazard risk rating for the vulnerable tracts in the state of Louisiana. Note that the list of census tract ID numbers for CEJST vulnerable tracts had a discrepancy with NRI FIPS, so some tracts are missing from the map.



This map shows the overall natural hazard risk rating for CEJST vulnerable census tracts.

5

WRAPPING UP

Reducing GHG and co-pollutants is a long-term effort essential to the health, well-being, and basic function of Louisiana's communities, economies, and natural environments. This understanding aligns with national goals for a prosperous future. The priority actions identified here through community and stakeholder engagement are the next concrete steps to support GHG emission reductions in Louisiana. There is already significant investment occurring on all fronts, and nongovernmental organizations, quasi-governmental entities, and governmental entities have already taken advantage of the numerous grants available. Looking ahead, the Louisiana will continue pursuing these financial resources when and where appropriate, and support eligible entities within the state to do the same. The economic, environmental, and public health values of these investments is evident in the near-term and will continue to guide public and private decision-making in the long-term.

As part of the Climate Pollution Reduction Grant, the State will endeavor on the next phase and develop the Comprehensive Climate Action Plan. We will include updating the state's greenhouse gas emissions inventory, implementing a comprehensive community engagement plan, and further honing in on the various sectors' opportunities to improve air quality and public health, improve access to services and amenities, reduce energy cost burdens, increase climate resilience, and develop a workforce and create good jobs for Louisiana residents. The State will continue to work with EPA over the next two years to deliver a Comprehensive Climate Action Plan and Status Update on climate pollution reduction efforts in Louisiana.

GLOSSARY OF TERMS

Action	A specific policy, or program that can be directly implemented to achieve a specific goal or complete a process
Adaptation	Long-term adjustments that can be made to aid in withstanding current and future changes in environmental conditions
Alternative Fuel	Also known as non-conventional and advanced fuels, these are any materials or substances that can be used as fuels other than gasoline and fossil fuels for power generation, such as natural gas, methanol, biofuel, or electricity
Anaerobic Digester	The process through which bacteria break down organic matter in the absence of oxygen
Bipartisan Infrastructure Law (BIL)	Also called the Infrastructure Investment and Jobs Act, the legislation reauthorizes surface transportation programs for FY 2022-2026 and provides advance appropriations for certain programs.
Blue Carbon	Carbon stored in the sediment and plants of coastal and marine ecosystems, such as natural gas, methanol, biofuel, or electricity
Carbon Capture	The process of pulling CO_2 from the atmosphere naturally or through engineered methods from a point source emitter
Carbon Sequestration	The long-term capture and storage of carbon in oceans, soils, vegetation, and geologic formations, which can occur either naturally or through anthropogenic (human) mechanisms
Carbon Sink	Any reservoir, natural or otherwise, that accumulates and stores some carbon containing chemical compound for an indefinite period and thereby lowers the concentration of CO_2 from the atmosphere by storing more carbon than it emits
Carbon Storage	The containment of captured carbon when it is injected into deep, underground geological formations, where it is stored long-term, rather than being released into the atmosphere. Storage sites used for CO_2 include former oil and gas reservoirs, deep saline formations, and coal beds
Carbon Dioxide Equivalent (CO_2e)	A measure used in GHG inventories to compare the emissions from various GHGs, by converting amounts of other gases to the equivalent amount of CO_2 with the same global warming potential
Carbon Intensity	The number of grams of CO_2 that it takes to make one unit of electricity a kilowatt per hour (kW/hour); the amount of carbon by weight emitted per unit of energy consumed/unit of economic activity
Circular Economy	A model of production and consumption which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible; in this way, the life cycle of products is extended to reduce waste to a minimum which can help tackle major global challenges like climate change, biodiversity loss, waste, and pollution
Class VI Injection Wells	Wells used for injection of CO2 into underground subsurface rock formations for long-term storage, or geologic sequestration.
Clean Energy	Energy generated from non-renewable sources with little to zero GHGs, includes but is not limited to nuclear, biowaste, and natural gas with carbon capture

Climate and Economic Justice Screening Tool (CEJST)	A screening tool used to identify disadvantaged communities that are underserved and overburdened by pollution
Co-pollutant	Air-pollutants that may or may not be Greenhouse Gases and contain no carbon, such as sulfur dioxide, nitrous oxide, nitrogen dioxide, ammonia, and others. Volatile organic compounds may be included.
Coastal Master Plan	The state's 50-year blueprint for large-scale restoration and protection of Louisiana's critical coastal areas. The plan, authored by the Louisiana Coastal Protection and Restoration Authority (CPRA), is updated every six years as required by law to account for evolving science and changing environmental conditions. It combines projects that restore, build or maintain coastal wetlands with projects that provide enhanced risk reduction for coastal communities from storms and flooding
Community Resilience Hub	Community-serving buildings equipped with carbon free power and long-duration storage that provide grid services and protect disadvantaged and critical communities during extreme weather, natural disasters, and other threats to energy security
Community Solar	Any solar project or purchasing program, within a geographic area, in which the benefits of a solar project flow to multiple customers such as individuals, businesses, non-profits, and other groups; in most cases, customers are benefiting from energy generated by solar panels at an off-site array. The solar power installation accepts capital from and provides output credit and tax benefits to individual and other investors; in some systems, a person or group can buy individual solar panels which are installed in the solar farm after purchase
Complete Streets	A transportation policy and design approach that requires streets to be planned, designed, operated and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation, whether they are pedestrians, bicyclists, motorists, or public transportation users
Core Planning Team	Consists of staff from the Division of Administration, Office of the Governor, the Water Institute of the Gulf, the Center for Planning Excellence, and the Accelerate Group tasked with coordinating the planning process for the development of the Climate Action Plan and its timely completion.
Environmental Justice Screen (EJScreen)	An environmental justice mapping and screening tool that provides the U.S. Environmental Protection Agency (EPA) with a nationally consistent dataset and approach for combining environmental and demographic indicators.
Equity	Fairness or justice is the way people are treated, recognizing that we do not all start from the same place and must acknowledge and make adjustments to imbalances. This can be achieved by expanding access to opportunity, quality of life and prosperity
Green Hydrogen	Hydrogen is a fuel source that has multiple applications in transportation, electricity generation, industrial uses, and many more. Green hydrogen is produced using renewable energy through electrolysis. This is a process that splits water into its basic elements– hydrogen and oxygen– using an electric current. The electricity used in the process comes from renewable resources
Green Tariffs	Programs in regulated electricity markets offered by utilities that allow large commercial and industrial customers to buy bundled renewable electricity from a specific project through a special utility tariff rate; this allows customers up to 100 percent of their electricity from renewable sources located on their local grid. This is done through a price structure, or an electricity rate, that is approved by the state's Public Utility Commission

Greenhouse Gas (GHG)	A gas that contributes to the entrapment of heat in the atmosphere by absorbing infrared radiation. The primary GHGs in Earth's atmosphere are water vapor, CO2, methane, nitrous oxide, and ozone. Many GHGs are naturally occurring, though concentrations can be affected based on human input.
Greenhouse Gas Inventory	A list of emission sources, sinks, and the associated emissions over a certain period of time, quantified using standardized methods
HALO Hydrogen Hub	In 2022, Arkansas, Louisiana, and Oklahoma formed a regional partnership called the HALO Hydrogen Hub to develop a regional hydrogen business cluster that will produce, process, deliver, and store clean hydrogen
High-Occupancy Vehicle (HOV) Lanes	One or more lanes of a roadway that have restrictions on use to encourage ride-sharing and can reduce vehicle miles traveled (VMT) by being open to motor vehicles carrying two or more people and sometimes to motorcycles or vehicles that use alternative fuels (hybrid or electric vehicles). The goal of HOV lanes is to provide an incentive to use ride-sharing and public transportation, remove congestion from normal lanes of travel, and improve overall traffic operations
Inflation Reduction Act (IRA)	Act signed by president Biden on August 16, 2022 providing guidance on clean energy, climate mitigation and resilience, agriculture, and conservation-related investment programs.
Low Income/ Disadvantaged Communities (LIDAC)	Any community that meets at least one of the following characteristics: • Identified as disadvantaged by the Climate and Economic Justice Screening Tool (CEJST), • Any census block group that is at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state, and/or • Any geographic area within Tribal lands as included in EJScreen.
Metropolitan Planning Organizations (MPOs)	A federally mandated and federally funded transportation policy-making organization in the United States that is made up of representatives from local government and governmental transportation authorities, created and designated to carry out the metropolitan transportation planning process and required to represent localities in all urbanized areas (UZAs) with populations over 50,000, as determined by the U.S. Census
Microgrids	A small network of electricity users connected through a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity, with respect to the grid, via a local source of supply that is usually attached to a centralized national grid but is able to function independently
Midcontinent Independent System Operator (MISO)	An Independent System Operator (ISO) and Regional Transmission Organizer (RTO) providing open-access transmission service and monitoring of the high-voltage transmission system in the Midwest United States and Canada, including a southern United States region which includes much of Arkansas, Mississippi, and Louisiana
Mitigation	Generally, the reduction of something harmful or the reduction of the severity, seriousness, or painfulness of its harmful effects. In the climate context, mitigation refers to efforts to avoid and reduce the emission of GHG
Net Metering	A system in which solar panels or other renewable energy generators are connected to a public-utility power grid and surplus power is transferred onto the grid, allowing customers to offset the cost of power drawn from the utility. Through a billing mechanism, consumers who generate some or all of their own electricity are allowed to use that electricity anytime, instead of when it is generated; this is particularly important with renewable energy sources like wind and solar, which are non-dispatchable

Paris Agreement	A legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. Its overarching goal is to hold "the increase in the global average temperature to well below 2 degrees Celsius above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels"
Portfolio	A comprehensive set of strategies and actions towards achieving the GHG reduction targets and other fundamental objectives
Power Purchase Agreements (PPAs)	A contrast between two parties, one which generates electricity (producer) and one which is looking to purchase electricity (consumer), and defines the conditions of the agreement, such as the amount of electricity to be supplied, negotiated prices, accounting, and penalties for non-compliance
Priority Action	A near-term, high-priority, implementation-ready project or program that either directly results in or indirectly enables reductions in GHG emissions
Priority Measure	A combination of priority actions and priority outputs that represent projects or programs with quantified GHG emission reductions
Priority Output	An environmental activity, effort, and/or work product reasonably but ambitiously expected to result from associated priority actions
Renewable Energy	Energy generated from naturally replenishing energy sources with zero GHGs, including but not limited to solar, wind, hydropower, and geothermal
Shore Power	Provision of electrical power from the shore to a vessel at berth, thereby allowing the auxiliary engines to be turned off.
Social Vulnerability	The potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks
Southwest Power Pool (SPP)	A regional transmission organization and non-profit corporation mandated by the Federal Energy Regulatory Commission to ensure reliable supplies of power, adequate transmission infrastructure and competitive wholesale electricity prices on behalf of its members by managing the electric grid and wholesale power market for the central United States
The Accelerate Group	The Accelerate Group is a strategic consulting and innovation firm focused on accelerating large civic change initiatives. The Accelerate Group helps companies, governments, and not-for-profits working to advance clean tech, smart cities, innovation, good government and economic development projects at a local and global scale.
The Center for Planning Excellence (CPEX)	The Center for Planning Excellence is a non-profit organization leveraging the power of planning and policy to address Louisiana's most pressing challenges and enable communities and the state to seize opportunities for building a bright future that sustains our people, our economy, and our environment. CPEX works in partnership with all scales of government, providing expertise, policy guidance, and planning capacity to the state.
The Water Institute of the Gulf	The Water Institute of the Gulf is an independent, non-profit applied research organization that works across disciplines to advance science and develop integrated methods used to solve complex environmental and societal challenges. The Water Institute connects researchers across disciplines to support governmental, private sector, and nongovernmental organization (NGO) partners in planning for an uncertain future.

ACRONYMS

BIL	Bipartisan Infrastructure Law	**FEMA**	Federal Emergency Management Agency
BRT	Bus Rapid Transit	**FGDG**	Flue gas desulfurization gypsum
CAFE	Corporate Average Fuel Economy	**GGRF**	Greenhouse Gas Reduction Fund
CAP	Criteria Air Pollutants	**GHG**	Greenhouse Gas
CCAP	Comprehensive Climate Action	**GLOW**	Gulf Louisiana Offshore Wind
CCS	Carbon Capture and Storage	**GOHSEP**	Governor's Office of Homeland Security and Emergency Preparedness
CCUS	Carbon Capture Utilization and Storage	**GWP**	Global Warming Potential
CEJST	Climate and Economic Justice Screening Tool	**HAP**	Hazardous Air Pollutants
CPRA	Coastal Protection and Restoration Authority	**HERO**	Hubs for Energy Resilient Operations
CPRC	Capital Region Planning Commission	**HOV**	High Occupancy Vehicle
DOA	Louisiana Division of Administration	**IRA**	Inflation Reduction Act
DOE	US Department of Energy	**IRCT**	Interagency Resilience Coordination Team
EIA	US Energy Information Administration	**La. DOTD**	Louisiana Department of Transportation and Development
EPA	US Environmental Protection Agency	**LDAF**	Louisiana Department of Agriculture and Forestry
EPD	Environmental Product Declarations	**LDAR**	Leak Detection and Repair
EPS	Energy Policy Stimulator	**LDENR**	Louisiana Department of Energy and Natural Resources
EQIP	Environmental Quality Incentives Program	**LDEQ**	Louisiana Department of Environmental Quality
FECM	Fossil Energy Carbon Management	**LED**	Louisiana Economic Development

LHC	Louisiana Housing Corporation	**NORPC**	New Orleans Regional Planning Commission
LIDAC	Low Income/Disadvantaged Communities	**NO_x**	Nitrogen Oxides
LPSC	Louisiana Public Service Commission	**O_3**	Ozone
LSUCCC	Louisiana State Uniform Construction Code Council	**PCAP**	Priority Climate Action Plan
LSWA	Landfills Association	**$PM_{2.5}$**	Fine Particulate Matter
LWC	Louisiana Workforce Commission	**PV**	Photovoltaic
MISO	Midcontinent Independent System Operator	**RAFTS**	Resilient Alternative Fuel Transport Stations
MPO	Metropolitan Planning Organization	**RAISE**	Rebuilding American Infrastructure with Sustainability and Equity
MSA	Metropolitan Statistical Area	**RTO**	Regional Transmission Organization
MSW	Municipal Solid Waste	**SO_2**	Sulfur Dioxide
MT CO_2e	Metric Tons of Carbon Dioxide Equivalents	**USACE**	US Army Corps of Engineers
MTPA	million tonnes per annum	**USDA**	US Department of Agriculture
NEI	National Emissions Inventory	**USIC**	Underground Injection Control
NFWF	National Fish and Wildlife Foundation	**UTC**	Urban Tree Canopy
NH_3	Ammonia	**VOCs**	Volatile Organic Compounds
NO_2	Nitrogen Dioxide	**WAP**	Weatherization Assistance Program
NOAA	National Oceanic and Atmospheric Administration		

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6

APPENDICES

APPENDIX A: PRIORITY CLIMATE ACTION PLAN: QUANTITATIVE ASSESSMENTS [TECHNICAL APPENDIX]

APPENDIX B: LOUISIANA GREENHOUSE GAS INVENTORY (2021)

APPENDIX C: FEDERAL FUNDING CROSSWALK

APPENDIX D: SUMMARY OF PUBLIC COMMENTS

APPENDIX A: PRIORITY CLIMATE ACTION PLAN: QUANTITATIVE ASSESSMENTS

[TECHNICAL APPENDIX]

THE WATER INSTITUTE

Technical Appendix

PRIORITY CLIMATE ACTION PLAN: QUANTITATIVE ASSESSMENTS

Methodologies, Data, and Sources

December 11, 2023

Allison DeJong, Patrick Kane, Nastaran Tebyanian

INTRODUCTION

This appendix is a supplement to the State of Louisiana's Priority Climate Action Plan (PCAP), in support of the Environmental Protection Agency's (EPA) Climate Pollution Reduction Grant Program (CPRG). This appendix details the methodologies, data, sources, assumptions, and results of quantitative assessments performed in support of the priority actions in the PCAP, including quantifications of estimated greenhouse gas (GHG) emissions reductions and associated co-pollutant reductions.

The PCAP contains the following focus areas:

- Community Solar
- Offshore Wind
- Community Resilience Hubs
- Transmission Planning
- Industrial Decarbonization
- Methane Emissions
- Fleet Transition
- Clean Ports
- Regional Transit
- Built Environment Retrofits
- Community Forestry and Greening
- Sustainable Agriculture
- Land Conservation and Restoration

For details on each focus area and the actions proposed, please see the PCAP, which will be available with this appendix.

This appendix is intended to provide clarity and detail for readers seeking to understand how potential emissions reductions were quantified or conduct a similar analysis in preparation for a CPRG Implementation Grant application.

The assessments developed for the PCAP are based in part on previous modeling completed in support of the Louisiana Climate Action Plan (LCAP). The details of that modeling can be found in previous technical memoranda (DeJong, Dalyander, Kiskaddon, et al., 2022) prepared by The Water Institute (the Institute).

INTRODUCTION TO QUANTITATIVE ANALYSIS

APPROACH

The quantification of projected GHG and co-pollutant emissions reductions does not provide a precise prediction. The exercise described herein was conducted to understand the relationship between the current baseline understanding of emissions, as represented by the 2021 Louisiana Greenhouse Gas Inventory (Dismukes, 2021), and the PCAP's proposed measures. In some cases, this relationship is in the form of a tool or calculator that provides unit conversions, while in others this involves connecting multiple assumptions and datasets in a logical chain. Because the goal of this analysis is not a precise prediction of the future, the quantifications in this appendix should be read as one potential outcome that still contains a high amount of uncertainty, as do many emissions quantification efforts.

For each focus area, outputs were developed to represent a plausible outcome of the various actions and projects described therein. These outputs were used for quantification of emissions reductions. In some cases, multiple outputs were quantified together because of uncertainties in policy design, implementation pathways, data limitations, or other uncertainties. In other cases, some outputs were determined to be unquantifiable but with strong qualitative reductions in emissions or high community benefits. A variety of approaches were taken to understand the potential impacts of these actions and projects; some are high in GHG reduction while others are higher in community benefits.

To produce these quantifications, many different resources and methods were used, including EPA tools and datasets, the Energy Policy Simulator (EPS tool), reports prepared by universities and consultants, Census data, electricity data from Energy Information Administration (EIA), and peer-reviewed literature. Some quantifications are straightforward, such as those that use EPA's Avoid Emission and Generation tool (AVERT), while others relied on several assumptions to structure a logical chain. These tools, methods, assumptions, and references are fully documented in this appendix.

Additionally, co-pollutant reductions have been analyzed, beginning with a base year emissions inventory of the Criteria Air Pollutants (CAP) and Hazardous Air Pollutants (HAP) emissions for Louisiana, based on the 2020 National Emissions Inventory (NEI). Co-pollutants are quantified in several ways, including direct tool outputs, percentage reductions of NEI sector-specific co-pollutants, and literature reviews for qualitative analyses. These tools, methods, assumptions, and references are also documented in this appendix.

Quantifications in this PCAP have been presented wherever possible in million metric tons of carbon dioxide equivalents (MMT CO_2e) or in metric tons of a specified co-pollutant. All units that were not in metric tons or million metric tons were converted to these units for consistency across focus areas.

TOOLS

A variety of tools and datasets were used to estimate and quantify projected emissions reductions, including several developed by EPA. Tools used multiple times are listed below for reference; other sources are explained further in this appendix.

- EPA AVERT tool was used in the Community Solar, Offshore Wind and Community Resilience Hubs focus areas (U.S. Environmental Protection Agency, 2023a). The AVoided Emissions and geneRation Tool is a piece of EPA software designed for analyzing emissions reductions specifically from alternative electricity generation. AVERT was used for analyzing outputs that involved shifting specified amounts of electricity generation to renewable sources.
- EPS tool was used in Industrial Decarbonization and Regional Transit focus areas (Rissman et al., 2023). The Energy Policy Simulator tool designed by Energy Innovation, LLC is an energy demand model written in Vensim designed for simulating the effects of a broad range of statewide policies on emissions. While the tool is capable of modeling a broad range of statewide programs, it lacks the precision to model smaller scale or more precise policy choices such as those used in many of the smaller sectors of the PCAP, so its use is primarily confined to the industrial decarbonization outputs.
- Technical Opportunities for Electrification of Industrial Units in the State of Louisiana report was used in the Industrial Decarbonization and Clean Ports focus areas (Rodriguez et al., 2023). The report, authored by Carbon Solutions, LLC, contains information on the emissions under present conditions of the many pieces of industrial equipment used in the Louisiana industrial sector. These emissions are further broken down by the specific kinds of equipment as well as the specific industry in which they are used. The report also includes detailed information on the emissions of the Louisiana electrical grid and an analysis of the emissions reductions to be expected by electrification.
- CO_2e calculator was used in Industrial Decarbonization, Methane Emissions and Regional Transit focus areas (U.S. Environmental Protection Agency, 2015). The calculator is a tool created by EPA to handle converting various sources of emissions into equivalent amounts of CO_2. This includes converting other GHG emissions amounts into CO_2e, and handling conversions from things like fuel use for common fuel types.
- Louisiana Greenhouse Gas Inventory was used in Fleet Transition and Built Environment focus areas (Dismukes, 2021). A state level GHG inventory created by Louisiana State University (LSU) as part of the LCAP process. This inventory is often used to provide background information on emissions for various sectors in the PCAP, though in many cases it lacks the resolution to address specific PCAP outputs.
- EPA's National Emissions Inventory (NEI) data for Louisiana was used in the Industrial Decarbonization, Methane Emissions, Fleet Transition, Regional Transit and Building Retrofits focus areas (U.S. Environmental Protection Agency, 2020). A national inventory of emissions for both GHGs and co-pollutants containing breakdowns for different emissions sources as well as state-level data. This source is primarily used for estimating co-pollutant emissions reductions,

but the assumptions required to do so are often somewhat coarse and should be treated more as upper limits than plausible values.

FOCUS AREA APPROACH

For each focus area, the outputs developed by the PCAP Planning Team will be listed, followed by the quantitative analysis methods, tools, assumptions, and results. This will include both GHG emissions reductions and co-pollutant reductions, as available.

COMMUNITY SOLAR

OUTPUTS FROM PLANNING TEAM

- Support development of 500 MW of community solar statewide by 2030.

METHODS AND ASSUMPTIONS (GHG)

The quantification for this output relied on the EPA AVERT tool (U.S. Environmental Protection Agency, 2023a), with the geography set to the state of Louisiana. To estimate the effect on emissions reductions, the Institute performed two separate analyses in the tool. First, an analysis with 100 MW of distributed solar phased in every year for five years and second a non-phased analysis in which all 500 MW were added in a single year. Both analyses resulted in the same overall effect on emissions.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

The EPA AVERT tool also reports on several specific co-pollutants:SO_2, NOx, volatile organic compounds (VOCs), and NH_3.

RESULTS

The estimated value for emissions reduction from the output in the EPA AVERT tool was 0.056 MMT CO2e in the year of analysis (2030). This load profile was estimated to reduce 890 GWh of regional fossil fuel generation, which corresponds to co-pollutant reductions of 31 metric tons (MT) of SO_2; 49.15 MT of NOx; 1.74 MT of VOCs; and 1.95 MT of NH_3. The values for GHG and co-pollutant reductions are contained in Table 1and Table 2.

Table 1. GHG emissions reduction estimate for the community solar output.

Output	GHG emissions reduction (MMT CO_2e)
Support development of 500 MW of community solar statewide by 2030	0.056

Table 2. Co-pollutant emissions reduction estimates for the community solar output.

Output	Co pollutant emissions reduction (MT)			
	SO_2	NOx	VOCs	NH_3
Support development of 500 MW of community solar statewide by 2030	31.00	49.15	1.74	1.95

LIMITATIONS AND CONCLUSIONS

While community solar programs have several important co-benefits, solar generation on this scale is not sufficient to substantially impact the overall emissions of a state with Louisiana's emissions profile. Additionally, while it is possible to model the overall reduction in co-pollutants with the EPA AVERT tool, it is not possible to estimate the effect of those co-pollutant reductions without further information on where the emissions are being avoided.

OFFSHORE WIND

OUTPUTS FROM PLANNING TEAM

- 5 GW of offshore wind power by 2035.

METHODS AND ASSUMPTIONS (GHG)

The quantification for this output relied on the EPA AVERT tool (U.S. Environmental Protection Agency, 2023a), with the geography set to the state of Louisiana. Although the tool does not offer explicit modeling of offshore wind, it does offer modeling for onshore wind programs. While there are differences between the two, the analysis operates under the assumption that the two are comparable for the purposes of obtaining a first order emissions reduction estimate.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

The EPA AVERT tool also reports on several specific co-pollutants (SO_2, NOx, VOCs, and NH_3).

RESULTS

The estimated value for emissions reduction from the output in the EPA AVERT tool was 0.885 MMT CO2e in the year of analysis (2030). This load profile was estimated to reduce 14,203 GWh of regional fossil fuel generation, which corresponds to co-pollutant reductions of 547.48 MT of SO_2; 626.16 MT of NOx; 20.41 MT of VOCs; and 29.06 MT of NH_3. The values for GHG and co-pollutant reductions are contained in Table 3 and Table 4.

Table 3. GHG emissions reduction estimate for the offshore wind output.

Output	GHG emissions reduction (MMT CO_2e)
Support 5 GW of offshore wind energy by 2035	0.885

Table 4. Co-pollutant emissions reduction estimates for the offshore wind output.

Output	Co pollutant emissions reduction (MT)			
	SO_2	NOx	VOCs	NH_3
Support 5 GW of offshore wind energy by 2035	547.48	626.16	20.41	29.06

LIMITATIONS AND CONCLUSIONS

According to the National Renewable Energy Laboratory (Lantz et al., 2021), Louisiana ranks as the fourth highest state in the nation for offshore wind technical potential, with potential for a single offshore wind project to create 4,470 construction jobs and 150 full-time operations jobs. In addition to offshore wind deployment, Louisiana is well positioned to be a manufacturing and servicing hub for offshore wind across the U.S. Moreover, Louisiana companies were integral in the design, fabrication, and construction of the nation's first commercial offshore wind farm in Block Island, Rhode Island (Baurick, 2021).

The EPA AVERT tool only models onshore wind, not offshore wind. The Institute's analysis assumed that onshore wind and offshore wind have similar emissions reduction potential, but a literature review suggests this may not be the case. The emissions impact may be understated somewhat by this tool. A recent national analysis of the emissions implications of achieving 30 GW of offshore wind by 2030, equated to a cumulative reduction of 78 MMT through 2030 (Lantz et al., 2021). In the context of that study, Louisiana's 5 GW of offshore wind would have a cumulative emissions reductions equivalent to 13 MMT CO_2. This number is not directly comparable to the annual value produced by the EPA AVERT tool, but when annualized over the decade between 2021 and 2030 the cumulative emissions reduction would be equivalent to an annual value in excess of 1 MMT CO_2.

COMMUNITY RESILIENCE HUBS

OUTPUTS FROM PLANNING TEAM

- Deploy 385 carbon-free microgrids serving community resilience hubs and critical facilities by 2031. This effort would target a minimum of 40 MW of distributed solar and 251 MWh of energy storage for microgrids supporting community resilience hubs and critical facilities throughout Louisiana.

METHODS AND ASSUMPTIONS (GHG)

The quantification for this output relied on the EPA AVERT tool (U.S. Environmental Protection Agency, 2023a). The Institute modeled the output as 40 MW hours of distributed photovoltaic solar, with the geography set to the state of Louisiana.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

The EPA AVERT tool also reports on several specific co-pollutants (SO2, NOx, VOCs, and NH3).

RESULTS

The estimated value for emissions reduction from the output in the EPA AVERT tool was 0.0045 MMT CO_2e in the year of analysis (2030). This load profile was estimated to reduce 71 GWh of regional fossil fuel generation, which corresponds to co-pollutant reductions of 2.56 MT of SO_2; 3.9 MT of NOx; 0.14 MT of VOCs; and 0.16 MT of NH_3. The values for GHG and co-pollutant reductions are contained in Table 5 and Table 6.

Table 5. GHG emissions reduction estimate for the community resilience hubs output.

Output	GHG emissions reduction (MMT CO_2e)
Deploy 385 carbon-free microgrids serving Community Resilience Hubs and critical facilities by 2031	0.0045

Table 6. Co-pollutant emissions reduction estimates for the community resilience hubs output.

Output	Co pollutant emissions reduction (MT)			
	SO_2	NOx	VOCs	NH_3
Deploy 385 carbon-free microgrids serving Community Resilience Hubs and critical facilities by 2031	2.56	3.90	0.14	0.16

LIMITATIONS AND CONCLUSIONS

While community solar programs have several important co-benefits, solar generation on this scale is not sufficient to substantially impact the overall emissions of a state with Louisiana's emissions profile. However, the community benefits from this strategy are potentially vast. Louisiana has unreliable electric power, particularly after storms, which are increasing in frequency and severity due to climate change. A recent study in *Nature Communications* showed that Louisiana experiences a dual burden of frequent outages longer than eight hours, high social vulnerability, and prevalence of electricity-dependent durable medical equipment use (Do et al., 2023). The benefits of microgrids in these resilience hubs will directly accrue to these communities with high social vulnerability by reducing mortality after disaster events. Data from previous events in Louisiana show that most deaths happen five to seven days after the actual storm, as carbon monoxide poisoning from generator use, heat stress from lack of air conditioning, and other factors compound (Tompkins, 2021). Resilient microgrids combined with a robust network of aid can alleviate these conditions. Additionally, while it is possible to model the overall reduction in co-pollutants with the EPA AVERT tool, it is not possible to estimate the effect of those co-pollutant reductions without further information on where the emissions are being avoided.

TRANSMISSION PLANNING

Increasing transmission capacity on its own does not reduce GHG emissions or co-pollutants. However, it is a critical policy for realizing larger decarbonization efforts in the electricity sector. The LCAP (2022) is, in part, based on three key policy pillars: renewable electricity generation, industrial electrification, and industrial fuel switching to no- and low-carbon hydrogen. Increased transmission is a core element of the first two pillars and supports the third through increased capacity to power hydrogen electrolyzers. Additionally, Action 1.6 in the LCAP sets a goal of a 30% increase in MW-mile capacity by 2030, which was represented in the net zero pathway modeling in the EPS tool (Rissman et al., 2023) through their "Increase Transmission" policy (DeJong, Dalyander, Kiskaddon, et al., 2022). In the EPS tool, this policy alone does not result in emissions reductions. However, in combination with other policies, it is a supportive policy that connects, for example, the construction of solar farms to the utilization of electricity by industrial boilers. The clearest policy connection to the EPS modeling from the LCAP is to the Clean Electricity Standard; in the model, this policy 'builds' new clean electricity and showed a 3.2 MMT CO_2e reduction in 2030 before that reduction amount increases to more than 22 MMT CO_2e in 2036 (DeJong, Dalyander, Parfait, et al., 2022). Increased transmission supports these reductions in emissions and reductions in co-pollutants from displaced electricity generation emissions, likely from methane combustion. These reductions will vary based on the amount of renewable electricity built, the rise in electricity demand from industry, the speed of interconnection approvals to the larger grid, and more.

INDUSTRIAL DECARBONIZATION

OUTPUTS FROM PLANNING TEAM

- **Energy efficiency.** Implement enhanced energy efficiency in chemical and refining facilities by an average of 10% by 2030.
- **Process electrification.** By 2030, electrify 15% of all low and medium heat processes, such as boilers and process heaters, with a goal of 100% of all new and replacement boilers and process heaters being electric by 2040.
- **Clean electricity.** Increase on-site renewable and clean electricity generation, including energy storage and grid integration, to 20% of industrial facilities by 2030.
- **Low- and no-carbon hydrogen.**
    - **Use.** By 2030, 25% of all hydrogen used in ammonia and refining production will be clean hydrogen.
    - **Production.** Transition 5 million tonnes per annum (MTPA) of steam methane reformers to low- or no-carbon hydrogen.
- **Circular economy.** By 2030, reduce demand for cement, iron and steel, and water and waste by 30% through material efficiency, advanced recycling, and other circularity initiatives.
- **Carbon Capture, Utilization, and Storage (CCUS).** By 2030, apply CCUS at as close as possible to 90% capture rate at a majority of natural gas processing facilities, petroleum refineries, and ammonia and chemical manufacturing plants.
- **N_2O Abatement.** Reduce 6,331 tons of N_2O emissions annually from fertilizer production facilities through N_2O abatement strategies.

METHODS AND ASSUMPTIONS (GHG)

This quantification effort focuses on first order estimates of the individual outputs from the planning team. The actions that comprise these outputs often have minimal effect on their own, but when bundled into outputs, the actions have a larger impact. Notably there is the potential for overlap and thus double counting among the emissions reductions from the different outputs in this sector (see limitations). This approach builds on the modeling for the LCAP (DeJong, Dalyander, Kiskaddon, et al., 2022), which modeled the net zero pathway at the strategy level rather than the action level, to attempt to account for multi-system dynamics. The industrial sector is Louisiana's largest source of emissions, so this sector's actions have the most potential to reduce emissions. While these quantifications may not capture the same type of multi-system dynamics as the full pathway model did for the LCAP, all efforts to reduce industrial emissions and co-pollutants are critical for Louisiana and for the state's frontline and fenceline communities. Emissions from industrial facilities are one of the most prominent sources of co-pollutants in the state, including chloroprene (Laughland, 2022) and hydrogen sulfide (Mitchell, 2021). The assumptions for each individual output are listed below.

Energy Efficiency

This output was evaluated using the EPS tool (Rissman et al., 2023) that was used in the LCAP. The output was modeled by setting the energy efficiency standards policy to rise to a value of 10% by 2030 for the petroleum refining and coke and chemical sectors. The annual emissions reduction was modeled as the overall reduction in annual emissions compared to the business as usual (BAU) case in the year of analysis (2030).

Process Electrification

This output was modeled using data taken from a report on industrial electrification potential in Louisiana created by Carbon Solutions, LLC (Rodriguez et al., 2023). The report includes data on the overall emissions from industrial processes that could be electrified, as well as the amount of emissions reductions that were possible using a clean electrical grid or a partially clean grid based on the assumption that Louisiana's current non-clean grid produces 365 g of CO2e per kWh (with a 50% clean grid having 50% of the emissions per kWh). The original report breaks emissions down into several categories of equipment, and the Institute's analysis drew on the numbers for process heaters and boilers specifically. Because some of these process heaters and boilers are being used in industrial sectors that tend to rely on higher heat processes (refining of chemicals and metals), the Institute conducted an additional analysis with the process heaters and boilers from these industrial sectors removed. The 2030 values reported for the output were 15% of the total emissions reduction possible (for both a 50% and 100% clean grid) in accordance with the output targeting only 15% of the boilers and process heaters.

Clean Electricity

This output was evaluated using the EPS tool that was used in the LCAP. No single policy in the EPS tool perfectly corresponded to the output. The Institute opted to treat the output's emissions reduction as being equivalent to the emissions reduction of shifting 20% of the electricity supply for the state's industrial sector to clean and renewable. To isolate this value the Institute used a combination of the EPS tool's statewide clean energy standard being set to 100% and setting the industrial process electrification (low and medium heat) to 20% across all sectors. This combination forced the model to calculate how much emissions would be reduced by setting 20% of the electricity used in industrial process to being clean and renewable. The annual emissions reduction was modeled as the reduction in annual emissions compared to the BAU case in the year of analysis (2030) for the industrial electrification policy specifically (using the EPS tool's breakdown of emissions reductions by policy). The EPS tool cannot provide a co-pollutant breakdown by policy, so no co-pollutants were calculated.

Low- and No-Carbon Hydrogen

The Institute treated the outputs of shifting hydrogen usage to clean hydrogen and generating more clean hydrogen as a single output dealing with both the supply and demand side (with the emphasis on modeling the demand side). This output was evaluated using the EPS tool that was used in the LCAP. No single policy in the EPS tool perfectly corresponded to the output. The Institute opted to treat the output's emissions reduction as equivalent to the emissions reduction of shifting 25% of the fuel demand for the state's ammonia and refining sectors to hydrogen when all hydrogen being produced in the state was clean. To isolate this value, the Institute used a combination of the EPS tool's hydrogen production pathway being set to 100% electrolysis and the hydrogen fuel switching policy for (low, medium, and high heat) to be set to 25% for the chemical and petroleum refining and coke sectors. The annual

emissions reduction was modeled as the overall reduction in annual emissions compared to the BAU case in the year of analysis (2030). The EPS tool also provided co-pollutant reductions for select co-pollutants (NOx and VOCs).

Circular Economy

The Institute lacked the information to model the CO_2e emissions reduction from this policy.

Carbon Capture, Utilization and Storage

This output was evaluated using the EPS tool that was used in the LCAP. The output was modeled by setting the process emissions CCS policy to rise to a value of 72% (80% of 90%) by 2030 for the petroleum refining and coke, chemicals, and energy and gas processing industrial sectors. The annual emissions reduction was modeled as the overall reduction in annual emissions compared to the BAU case in the year of analysis (2030). The EPS tool also provided co-pollutant reductions for select co-pollutants (NOx and VOC).

N_2O Abatement

This output was modeled using the EPA's CO_2e calculator (U.S. Environmental Protection Agency, 2015). The annual N_2O emissions avoided were plugged into the calculator to generate an equivalent number of tons of CO_2e.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

Energy Efficiency

The EPS tool also provided co-pollutant reductions for select co-pollutants (NOx and VOC). Values were taken directly from the estimate provided by the tool.

Process Electrification

The analysis relied on the 2020 NEI data (U.S. Environmental Protection Agency, 2020) on co-pollutants emissions from industrial boilers' fuel combustion. This data was used to set the baseline of industrial boilers' co-pollutant emissions. To reflect the output, a 15% reduction in all baseline CAP and HAP pollutions was calculated. Note that NEI data include all boiler types and might not include process heaters, and the policy might not result in an exact 15% reduction in co-pollutants.

Clean Electricity

For the co-pollutant analysis, the data from the Technical Opportunities for Electrification of Industrial Units in the State of Louisiana report (Rodriguez et al., 2023) was used to calculate the total estimated equivalent electric capacity (MW) from all facilities included in the dataset. This number was used as a proxy for the amount that can be invested by clean electricity policies. 20 percent of this amount was calculated to reflect the PCAP clean electricity policy. Then this number (3221.38 MW) was used as an input in AVERT to be invested in distributed solar as an example of possible clean energy replacement. The co-pollutant reduction estimates from that analysis are reported in the results.

Low- and No-Carbon Hydrogen

The EPS tool also provided co-pollutant reductions for select co-pollutants (NOx and VOC). Values were taken directly from the estimate provided by the tool.

Circular Economy

The Institute lacked the information to model the co-pollutant emissions reduction from this policy.

Carbon Capture, Utilization and Storage

The EPS tool also provided co-pollutant reductions for select co-pollutants (NOx and VOC). Values were taken directly from the estimate provided by the tool.

N2O Abatement

Nitrous oxide (N_2O) is a greenhouse gas that is approximately 300 times more potent than carbon dioxide. The amount of N_2O that would be mitigated is already calculated. It is unknown how the proposed actions to reduce this N_2O would impact co-pollutants.

RESULTS

The emissions reductions in MMT CO_2e annually and where available co-pollutant reductions are provided below for each of the outputs for the sector. The values for GHG and co-pollutant reductions are contained in Table 8 and Table 9.

Energy Efficiency

The estimated value for the emissions reduction from this output using the EPS tool was 7.1 MMT CO2e in 2030. The estimated co-pollutant reductions were 9,000 MT of NOx and 14,000 MT of VOCs in 2030.

Process Emissions

The estimated value for the emissions reductions based on the Carbon Solutions, LLC data was 0.67 and 1.95 MMT CO_2e annually for a 50% clean and 100% clean energy grid across all sectors in the state. When the analysis excludes sectors that predominantly use high heat processes, these numbers drop to 0.42 and 1.18 MMT CO_2e annually for a 50% clean and 100% clean energy grid.

A detailed co-pollutant breakdown, including the 15% reduction values used as a rough proxy for the output, can be found in Table 7.

Table 7. Detailed co-pollutant emissions breakdown for the process emissions output.

Pollutant Type	Pollutant	Emissions (MT)	15% Reduction (MT)
CAP	Ammonia	705.84	105.88
	Carbon Monoxide	30,057.57	4,508.64
	Nitrogen Oxides	22,822.7	3,423.41
	PM10 Primary (Filt + Cond)	14,878.27	2,231.74
	PM2.5 Primary (Filt + Cond)	12,322.61	1,848.39
	Sulfur Dioxide	3,365.97	504.89
	Volatile Organic Compounds	1,347.61	202.14
CAP/HAP	Lead Compounds	0.1	0.02

Pollutant Type	Pollutant	Emissions (MT)	15% Reduction (MT)
HAP	1,3-Butadiene	3.92	0.59
	Acetaldehyde	57.06	8.55
	Acetophenone	0.13	0.02
	Acrolein	2.11	0.32
	Arsenic Compounds	0.02	0
	Benzene	13.15	1.98
	Benzyl Chloride	0.04	0.01
	Bromoform	0	0
	Cadmium Compounds	0	0
	Catechol	10.45	1.57
	Chloroform	0	0
	Chromium Compounds	0.01	0
	Cresol/Cresylic Acid (Mixed Isomers)	15.72	2.36
	Cyanide Compounds	0.15	0.02
	Dimethyl Sulfate	0	0
	Ethyl Chloride	0	0
	Ethylbenzene	0.77	0.12
	Formaldehyde	51.07	7.66
	Hydroquinone	0.57	0.09
	Methyl Methacrylate	0	0
	Methyl Tert-Butyl Ether	0	0
	Methylhydrazine	0.01	0
	Naphthalene	7.69	1.15
	Phenol	17.58	2.64
	Polycyclic Organic Matter	2.64	0.4
	Propionaldehyde	8.54	1.28
	Toluene	5.29	0.79
	Xylenes (Mixed Isomers)	2.61	0.39

Clean Electricity

The estimated value for the emissions reduction from this output using the EPS tool was 13.3 MMT CO_2e in 2030. The estimated co-pollutant reductions were 193.19 MT of SO_2, 314.06 MT of NOx, 10.99 MT of VOCs and 12.28 MT of NH_3.

Low- and No-Carbon Hydrogen

The estimated value for the emissions reduction from this output using the EPS tool was 18.4 MMT CO_2e in 2030. The estimated co-pollutant reductions were 17,000* MT of NOx and 87,000 MT of VOCs in 2030.

Circular Economy

No estimate was produced.

Carbon Capture, Utilization and Storage

The estimated value for the emissions reduction from this output using the EPS tool was 19.7 MMT CO2e in 2030. The estimated co-pollutant reductions were 4,000 MT of NOx and 34,000 MT of VOCs in 2030.

NO2 Abatement

The estimated value for the emissions reduction from the EPA's CO2e calculator was 1.7 MMT CO_2e annually.

Table 8. GHG emissions reduction estimates for outputs focused on industrial decarbonization. Due to overlap between different outputs, these should not be treated as additive. The Institute did not have enough information to provide estimates for all outputs. Additionally, values with asterisks were generated using the Energy Policy Simulator tool which is better suited for the coarser policy analysis as compared to the more specific outputs analyzed here.

Output	GHG emissions reduction (MMT CO_2e)
Enhance energy efficiency in chemical and refining facilities by an average of 10% by 2030	7.1*
Electrify 15% of all low- and medium-heat processes, with a goal of 100% of all new and replacement boilers and process heaters being electric by 2040	Between 0.42 and 1.95 depending on assumptions about electrical grid.
Increase on-site renewable and clean electricity generation, including energy storage and grid integration, to 20% of industrial facilities by 2030	13.3*
Switch 25% of all hydrogen to clean hydrogen used in ammonia and refining production by 2030	15.5*
Transition 5 MTPA of steam methane reformers to low- or no-carbon hydrogen	
Reduce demand for cement, iron and steel, and water and waste by 30% through material efficiency, advanced recycling, and other circularity initiatives	No estimates were produced.
Apply carbon capture, utilization, and storage at as close as possible to 90% capture rate at a majority of natural gas processing facilities, petroleum refineries, and ammonia and chemical manufacturing plants by 2030	19.7*
Reduce ~6,000 tons of N2O emissions annually from fertilizer production facilities through N2O abatement strategies	1.7

Table 9. Co-pollutant emissions reduction estimates for outputs focused on industrial decarbonization. Due to overlap between different outputs, these should not be treated as additive. The Institute did not have enough information to provide estimates for all outputs. Additionally, values with asterisks were generated using the Energy Policy Simulator tool which is better suited for the coarser policy analysis as compared to the more specific outputs analyzed here.

Output	Co pollutant emissions reduction (MT)			
	SO_2	NOx	VOCs	NH_3
Enhance energy efficiency in chemical and refining facilities by an average of 10% by 2030		9,000*	14,000*	
Electrify 15% of all low- and medium-heat processes, with a goal of 100% of all new and replacement boilers and process heaters being electric by 2040	504.89	3,423.41	202.14	105.88
Increase on-site renewable and clean electricity generation, including energy storage and grid integration, to 20% of industrial facilities by 2030	193.19	314.06	10.99	12.28
Switch 25% of all hydrogen to clean hydrogen used in ammonia and refining production by 2030		17,000*	87,000*	
Transition 5 MTPA of steam methane reformers to low- or no-carbon hydrogen				
Reduce demand for cement, iron and steel, and water and waste by 30% through material efficiency, advanced recycling, and other circularity initiatives	No estimate was produced.			
Apply carbon capture, utilization, and storage at as close as possible to 90% capture rate at a majority of natural gas processing facilities, petroleum refineries, and ammonia and chemical manufacturing plants by 2030		4,000*	34,000*	

LIMITATIONS AND CONCLUSIONS

Overall, the industrial sector is by far the largest emissions source in the state, and thus the outputs associated with it have some of the highest estimated potential for emissions reductions in the PCAP. However, there are several important caveats on these results. First, many of the outputs may target some of the same processes, such that the results listed here should not be treated as additive (e.g., the carbon capture calculation does not take into account reductions in process emissions from hydrogen fuel switching). Thus, the overall effect of outputs on this sector may be lower than their sum. Second, many of these analyses made use of the EPS tool, which has been previously used in Louisiana for modeling at a higher strategy level, rather than at a more granular action level. The tool's limitations may mean that these numbers may overestimate the emissions reductions (e.g., it may not be possible to capture as much carbon from the specific processes used in the Louisiana industrial sector). Additionally, the EPS tool does not perfectly correspond with the actions here, which may lead to further misestimates in the effects

on GHGs. Thus, the numbers should not be considered more than a rough estimate of the effects of the individual outputs.

METHANE EMISSIONS

OUTPUTS FROM PLANNING TEAM

- Identify and address the top 20% of leaking/emitting wells (900 wells).
- Support the development of 12 landfill methane recovery projects for recovered methane procurement.

METHODS AND ASSUMPTIONS (GHG)

The quantification effort relies on data sourced from both the LSU Center for Energy Studies (Upton, 2023) and the Louisiana Department of Environmental Quality (LDEQ) (*Internal Communications with Louisiana Department of Environmental Quality*, personal communication, n.d.) as well as use of EPA's CO2e calculator (U.S. Environmental Protection Agency, 2015).

Well Capping

The quantification effort relied on data sourced from the LSU Center for Energy Studies, which is currently monitoring and studying the efforts to plug abandoned wells using the first tranche of funding from the Infrastructure Investment and Jobs Act (IIJA). Specifically, the Institute relied on new data that will soon be incorporated into their Progress Report, measuring a sample of 827 wells out of 4,646 wells across the state. The LSU data found that the top 20% of emitting wells account for approximately 80% of the total emissions in their sample, corresponding to values of roughly 21.52 and 26.9 thousand standard cubic feet (mscf) of methane per day for the emissions from the top 20% and the total, respectively. Scaling these values up from the sampled wells to the entire state further relies on the assumption that the sampled wells are representative of the wells across the entire state. When scaling these values from the 827 sampled wells to the 4,646 total wells the methane emissions rise to 120.9 mscf per day. This value was annualized and run through EPA's CO_2e calculator (translating the volume to a mass using standard temperature assumptions) (*Realizing the Energy Potential of Methane Hydrate for the United States*, 2010).

Landfill Methane Recovery

The LDEQ independently estimated the emissions reduction impact of addressing landfill gas at 12 sites in the state. Using the EPA Waste Reduction Model, their estimates are as follows:

- Among these 12 sites, six landfills currently lack a gas collection system and disposed of roughly 260,000 tons in fiscal year 2021. This quantity is projected to emit approximately 332,000 metric tons of carbon dioxide equivalent (MT CO_2e) into the atmosphere.

- For the six landfills equipped with a gas collection system, approximately 1.6 million tons were disposed of in fiscal year 2021, expected to generate approximately 683,000 MT CO_2e emissions into the atmosphere.
- Based on a two-year installation period for gas collection systems, if all 12 municipal solid waste landfills implement gas recovery and high British thermal unit (BTU) gas systems, the total GHG reduction from the current state to the proposed gas recovery for energy is projected to reach approximately 73% by 2030.
- The emissions reduction was calculated as 73% of the total emissions across the 12 sites.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

Well Capping

The 2020 NEI data (U.S. Environmental Protection Agency, 2020) did not have a direct sector relevant to the above policies. For the policy of addressing the top 20% leaking wells, a review of existing literature was performed to add additional information relevant to the output. Note that it is not a qualification of co-pollutants for the output but insights relevant to its possible impact.

Landfill Methane Recovery

The Institute lacked the information to model the co-pollutant emissions reduction from this policy.

RESULTS

The emissions reductions in MMT CO2e annually are provided below for each of the outputs for the sector.

Well Capping

The estimated value for the emissions reduction from the EPA's CO2e calculator was 0.024 MMT CO_2e annually.

In terms of the co-pollutants impacts, the existing literature suggests that wells with methane leaks can release other toxic chemicals such as VOCs, including benzene (DiGiulio et al., 2023). More generally during oil and gas industry production methene is released alongside other toxic chemicals such as hydrogen sulfide, toluene, xylene, and benzene (Environmental Defense Fund, n.d.).

A recent study (Kang et al., 2023) reports several ways that orphaned well can contribute to air and water pollutions.

- Orphaned wells may increase the risk of nearby groundwater contamination. Based on the study, Louisiana ranks third among states in the number of orphaned wells (more than 600 wells) that have at least one groundwater site within 1 km.
- Among no-methane air pollutants, "benzene concentrations in production and bradenhead gas have widely been detected at actively producing wells surveyed in seven southern and western states." Two Louisiana parishes, Richland and Claiborne, are among counties with high benzene concentrations (more than 500 parts per million volume).

Landfill Methane Recovery

The GHG emissions reductions in 2030 were calculated as 0.74 MMT CO_2e in the year 2030. The GHG emissions reduction values can be found in Table 10.

Table 10. GHG emissions reduction estimates for outputs focused on methane emission reduction.

Output	GHG emissions reduction (MMT CO_2e)
Identify and address the top 20% of leaking/emitting wells	0.024
Support the development of 12 landfill methane recovery projects for recovered methane procurement	0.74

LIMITATIONS AND CONCLUSIONS

Overall, the impact of these methane policies is relatively minimal, in part because the overall emissions in this sector are a small part of Louisiana's emissions portfolio. Both analyses relied on data sourced from other analyses rather than explicit modeling on the part of the Institute and the quality of the analysis is dependent on the completeness of that data. In particular, the Institute extrapolated from the sample of wells in the LSU data to the overall number of statewide orphan wells (which itself is a subset of the total wells in the state). If the LSU sample is not representative of the overall state, this estimate may be biased either up or down. This estimate could be revisited when additional data has been added to the LSU sample.

The landfill analysis is constrained by LDNR's modeling and assumptions on the viability of these landfill gas recovery projects. The Institute was not able to independently investigate these assumptions.

FLEET TRANSITION

OUTPUTS FROM PLANNING TEAM

- Support electrification of 20,000 (25%) public fleet vehicles in Louisiana by 2030.
- Support electrification or fuel switching (e.g., hydrogen and low-carbon or zero-carbon biofuels) of 119,250 (5%) medium- and heavy-duty vehicles in the state by 2030.
- Deploy 1,200 fast and ultrafast charging stations or alternative fueling stations designed for on-route charging or fueling of medium- and heavy-duty vehicles.

METHODS AND ASSUMPTIONS (GHG)

The quantification was based on data taken from Louisiana's 2021 Greenhouse Gas Inventory (Dismukes, 2021) on the overall emissions from vehicles, as well as the EPA's National Emissions Inventory (U.S.

Environmental Protection Agency, 2020), the U.S. Vehicles by Mode dataset, and the EPS tool (Rissman et al., 2023).

Public Fleet Electrification

The Institute produced two quantifications for this output. The first used a simple mathematical averaging approach, taking the 49 MMT CO2e annual emissions estimate for the transportation sector reported in the Louisiana Greenhouse Gas Inventory and dividing it by the total number of vehicles in Louisiana (3.8 million) to produce an average annual emissions per vehicle of 12.9 MT of CO2e. This value was then scaled by the target of 20,000 vehicles to electrify in the output. The Institute also performed an alternative analysis using the EPS tool. The output was modeled using the mode shifting policy for public fleets with a target value of 5%. This percentage was derived by taking the percentage of Louisiana vehicles that are public vehicles (approximately 2.8%) and rounding up based on an assumption that public vehicles are driven more frequently than private vehicles. The annual emissions reduction was modeled as the overall reduction in annual emissions compared to the BAU case in the year of analysis (2030).

Medium- and Heavy-Duty Electrification

This analysis was based on emissions data from the EPA's National Greenhouse Gas Inventory, which breaks emissions down into categories including light-duty vehicles, light-duty trucks, medium- and heavy-duty trucks, and more. The analysis assumed the target was vehicles statewide (119,250 total vehicles targeted). The same approach as described above was used but applied to the larger number of vehicles. An additional dataset, U.S. Vehicles by Mode, was used to estimate a per-vehicle amount of MMT CO2e by category at the national level. This factor was then applied to the proposed number of state vehicles in the priority action. In this analysis, all vehicles were assumed to be electric, though the action states that alternative fuels could also be considered; without a proposed split between alternative fuels and electric vehicles, the assumption was made for 100% electric.

Charging Station Deployment

Based on the GHG modeling from the LCAP, this policy was determined to be an enabling policy for other electrification and not one with its own emissions reductions. Thus, these charging stations would enable the realization of the GHG emissions reductions modeled elsewhere in this focus area. For more information on this approach, please see the Institute's analysis supporting the LCAP (DeJong, Dalyander, Kiskaddon, et al., 2022).

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

Public Fleet Electrification

Two datasets from the Bureau of Transportation Statistics (Bureau of Transportation Statistics, 2023a, 2023b) were used to calculate the average co-pollutant emissions from a light-duty passenger car in 2020 in Louisiana. This baseline was used to calculate the 2020 estimates of the co-pollutant's emissions from 20,000 average cars. The estimates were then converted to metric tons.

Medium- and Heavy-Duty Electrification

On-Road Diesel Heavy Duty Vehicles CAP and HAP emissions from the 2020 NEI data were used as a baseline. To reflect the output, a 5% reduction amount was also calculated. Note that use of alternative fuels will not result in removing exactly 5% of all the pollutants, but this can provide an estimate relevant to the output.

Charging Station Deployment

Based on the GHG modeling from the LCAP, this policy was determined to be an enabling policy for other electrification, and not one with its own co-pollutant reductions. Thus, these charging stations would enable the realization of the co-pollutant reductions modeled elsewhere in this focus area.

RESULTS

The emissions reductions in MMT CO_2e annually are provided below for each of the outputs for the sector. The values for GHG and co-pollutant reductions are contained in Table 11 and Table 12.

Public Fleet Electrification

The estimated value for the emissions reduction from the simple average was 0.25 MMT CO_2e in 2030. The estimated value for the emissions reduction from this output using the EPS tool was 0.68 MMT CO_2e in 2030. These estimates form an uncertainty range for this action. However, as a point of comparison, EPA's equivalencies calculator estimates the emissions from 20,000 vehicles at 0.08 MMT CO_2e, so both figures may be on the high side.

The amounts of co-pollutant reductions are dependent on if the electric vehicles are replacing gasoline or diesel vehicles. If gasoline, co-pollutant reductions can be estimated as follows: 914.25 MT CO, 48.53 MT NOx, and 1.61 MT PM2.5. If diesel, co-pollutant reductions can be estimated as follows: 893.55 MT CO, 31.51 MT NOx, and 1.38 MT PM2.5.

Medium and Heavy-Duty Electrification

The estimated value for the emissions reduction from this output targeting public and private vehicles was 3.75 MMT CO_2e in 2030.

The 2020 baseline and 5% reduction in CAP and HAP emissions for heavy duty vehicles can be found in Table 11.

Table 11. Detailed co-pollutant emissions breakdown for the heavy-duty electrification output.

CAP	Ammonia	155.7	7.78
	Nitrogen Oxides	20,191.34	1,009.57
	PM2.5 Primary (Filt + Cond)	629.27	31.46
	Volatile Organic Compounds	1,049.4	52.47
	2,2,4-Trimethylpentane	2.98	0.15
	Acrolein	6.3	0.32
	Benzene	6.34	0.32
	Formaldehyde	76.05	3.8
	Manganese Compounds	0.1	0.01
	Nickel Compounds	0	0
	Propionaldehyde	4.32	0.22
	Toluene	9.92	0.5

Charging Station Deployment

No estimate was produced.

Table 12. GHG emissions reduction estimates for outputs focused on fleet transition.

Output	**GHG emissions reduction (MMT CO_2e)**
Support electrification of 20,000 (25%) public fleet vehicles by 2030.	0.25–0.68
	3.75

Output	GHG emissions reduction (MMT CO_2e)
Deploy 1,200 fast and ultrafast charging stations or alternative fueling stations designed for on-route charging or fueling of medium- and heavy-duty vehicles.	This output facilitates the emissions reductions quantified above.

Table 13. Co-pollutant emissions reduction estimates for outputs focused on fleet transition. Note that co-pollutant emissions are only quantified for heavy-duty vehicles, not medium- and heavy-duty vehicles.

Output	Co pollutant emissions reduction (MT)			
	SO_2	NOx	VOCs	NH_3
Support electrification of 20,000 (25%) public fleet vehicles by 2030.	Variable (see text in Results)			
Support electrification or fuel-switching (e.g., hydrogen and low-carbon or zero-carbon biofuels) of 119,250 (5%) medium- and heavy-duty vehicles in the state by 2030.	1.22	1,009.57	52.47	7.78
Deploy 1,200 fast and ultrafast charging stations or alternative fueling stations designed for on-route charging or fueling of medium- and heavy-duty vehicles.	This output facilitates the co-pollutant reductions quantified above.			

LIMITATIONS AND CONCLUSIONS

Louisiana's 2021 Greenhouse Gas Inventory shows that transportation emissions totaled over 49 MMT CO_2e in 2018. From a high of over 60 MMT in 2000, transportation emissions have been relatively flat for the last decade (2008–2018). The sector represents 22% of the state's fossil fueled GHG emissions, more than the electric power sector (16%) but far less than the industrial sector (60%). This makes the transportation sector an important target for reductions. However, in the LCAP (2022), actions aimed at decarbonizing vehicles and buildings had a small role in reducing emissions by 2030 (less than 1 MMT CO_2E per year), but a larger role by 2050 (more than 5 MMT CO_2e per year). Additionally, the above analysis assumes that all fuel switching is to electric rather than other low carbon fuel options which makes these emissions reduction estimates likely upper bounds of the overall emissions reductions.

CLEAN PORTS

OUTPUTS FROM PLANNING TEAM

- Convert 100 berths at Louisiana ports to shore power by 2030.
- Convert 15% of forklifts to electric by 2030.
- Displace 15% of Louisiana port marine diesel with hydrogen fueling by 2035.
- Mode-shift material from truck transport to barge.

METHODS AND ASSUMPTIONS (GHG)

The quantification relied on methodology taken from EPA's guidance on developing GHG inventories for port activities (U.S. Environmental Protection Agency, 2022a). However, in many cases the Institute lacked sufficient data on the Louisiana ports to reach a final quantification for emissions reduction. In this case, where possible, per unit emissions reductions were provided instead.

Shore Power

The Institute relied on information on marine diesel emissions sourced from the EIA (U.S. Energy Information Administration, 2023), information on ship auxiliary power consumption from EPA's shore power calculator (U.S. Environmental Protection Agency, 2022b), and information from Carbon Solutions, LLC's report on industrial electrification on the emissions from the Louisiana power grid and information sourced from Port Fourchon on the number of gallons of fuel burned in by ships in berth (*Correspondence with Port Fourchon Officials*, personal communication, 2023). This last value, 800,000 gallons of marine diesel per berth per year, corresponds to emissions of approximately 8,000 MT CO_2e each year (using the EIA's estimate of 22.44 pounds of carbon per gallon of marine diesel burned), and the entire 100 berths targeted would account for approximately 0.81 MMT CO_2e. To determine emissions under shore power, the Institute created a scaling factor by comparing the emissions per kWh of a ship's engine in auxiliary mode with the emissions per kWh of the Louisiana electrical grid under current conditions. These values were estimated as 705 grams of CO_2e per kWh and 365 grams of CO_2e per kWh from EPA's shore power calculator and Carbon, LLC's industrial electrification report, respectively. Because the emissions reduction is grid dependent, the Institute provides estimates for a grid a under current conditions as well as for a 50% and 100% clean grid.

Forklift Electrification

The Institute relied on guidance from EPA on the calculation of forklift emissions which are typically calculated by multiplying average horsepower, average load, average annual hours of operation and an emissions factor dependent on fuel type. However, the Institute did not have access to information on the number of forklifts in Louisiana ports, so a per forklift calculation was the furthest the Institute was able to take the analysis. Data from EPA's Assessment of Fuel Cell Technologies at Ports (Eastern Research Group, 2022) estimate that on average, forklifts have between 75–175 horsepower, average loads of 0.3 to 0.59, and average annual activity of 500 to 2200 hours per year. Finally, fuel efficiency for the forklifts used data from EPA's shore power calculator estimating 705 g CO_2e per kWh generated. Using these values, a single forklift is estimated to produce between 5 and 120 MT of CO_2e annually. The values for

emissions under current conditions where forklifts are powered by marine diesel were compared with values for electrically powered forklifts which depend on the emissions of the Louisiana grid. Grid emissions were estimated in Carbon, LLC's report on Louisiana electrification potential as 365 g CO_2e per kWh. Because the emissions reductions are grid dependent, the Institute provides estimates for a grid that is 0%, 50%, and 100% clean.

Marine Diesel to Clean Hydrogen

For this analysis, the Institute assumed that the production of clean hydrogen was done via electrolysis on a clean grid and thus had zero emissions. The Institute relied on the EIA's estimate of the emissions of a gallon of marine diesel (22.44 pounds CO_2e per gallon). The Institute was unable to obtain data on the total number of gallons of marine diesel being burned, so a per gallon analysis was the furthest the Institute was able to take the analysis.

Transport Mode Shifting to Barge

The Mode Shifting to Barge policy was quantified using the emissions analysis from the Texas A&M Transportation Institute's 2022 report, Modal Comparison of Domestic Freight Transportation (Kruse et al., 2022). Emissions factors for CO_2 and select co-pollutants were used to calculate the grams per ton-mile difference between two modes, trucking and inland barge. The report highlights that a fully loaded barge of dry bulk cargo carries 1,750 tons. The grams per ton-mile emissions factor difference between trucking and barge was multiplied by 1,750 tons to estimate the emissions reduction from a full barge traveling for one mile. This output was then converted to metric tons per ton-mile, or MT/t-m.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

Shore Power

The analysis relied on emissions factor tables from the Port Emissions Inventory Guidance (U.S. Environmental Protection Agency, 2022a) to calculate possible emissions from the 800,000 gallons of marine diesel per berth per year reflecting the ship auxiliary power consumption of 11,548,222.13 kWh derived from the calculations for the GHG emissions reduction of shore power. The analysis used the emissions factor for engine category 3 in auxiliary mode, with fuel type as marine gas oil (MGO)/marine diesel oil (MDO), across all engine types and keel-laid years.

Forklift Electrification

The Institute lacked the information to model the co-pollutant emissions reduction from this policy.

Marine Diesel to Clean Hydrogen

The Institute lacked the information to model the co-pollutant emissions reduction from this policy.

Transport Mode Shifting to Barge

The process for CO_2 estimates was repeated for selected co-pollutants provided in the Texas A&M Transportation Institute report: NOx, PM10, and CO.

RESULTS

The emissions reductions in MMT CO_2e annually are provided below for each of the outputs for the sector. The values for GHG and co-pollutant reductions are contained in Table 14 and Table 15.

Shore Power

The estimated emissions reductions under the current Louisiana power grid are 0.39 MMT CO_2e annually. The estimated reductions for a 50% clean grid are 0.6 MMT CO_2e annually, and the estimated emissions reduction for a 100% clean grid are 0.81 MMT CO_2e annually.

A detailed breakdown of co-pollutant emissions reduction estimates can be found in Table 14.

Table 14. Detailed co-pollutant emissions breakdown for the shore power output. Estimates were created for nitrogen oxides (NOx), particulate matter less than 10 micrometers (PM10), hard carbon (HC), carbon monoxide (CO) and nitrous oxide (N_2O).

Pollutants	Emission Factor	Emissions (MT)
NOx	2–13.8	23.1–159.37
PM10	0.01–0.16	0.12–1.85
HC	0.4	4.62
CO	1.1	12.7
N_2O	0.029	0.33

Forklift Electrification

The estimated emissions reductions under the current Louisiana power grid are between 2.85 and 57.59 MT of CO_2e annually per forklift. The estimated reductions for a 50% clean grid are between 4.38 and 88.50 MT CO_2e annually per forklift, and the estimated emissions reduction for a 100% clean grid are between 5.91 and 119.42 MT CO_2e annually per forklift.

Marine Diesel to Clean Hydrogen

The estimated emissions reduction for zero carbon hydrogen production is 22.44 pounds of CO_2e per gallon of marine diesel switched to clean hydrogen.

Transport Mode Shifting to Barge

The estimated emissions reductions for shifting material from trucks to a full barge (1,750 tons) is 0.21 metric tons of CO_2 per mile traveled.

Table 15. GHG emissions reduction estimates for outputs focused on ports. Note for several outputs, the Institute was not able to produce an annual estimate of total emissions reductions and instead produced per unit estimates. Estimated ranges represent varying assumptions about how clean the grid is.

Output	GHG emissions reduction (varying units)
Convert 100 berths at Louisiana ports to shore power by 2030	0.39–0.81 MMT CO_2e per year
Electrify 15% of port forklifts by 2030	2.9–88.5 MT CO_2e per forklift per year
Displace 15% of Louisiana port marine diesel with hydrogen fueling by 2023	0.01 MT of CO_2e per gallon marine diesel
Mode-shift material from truck transport to barge	0.21 MT CO_2 per full barge per mile traveled

Table 16. Co-pollutant emissions reduction estimates for outputs focused on ports. Emissions reduction values assume a 100% clean electrical grid.

Output	Co pollutant emissions reduction (MT)			
	NOx	N_2O	PM10	CO
Convert 100 berths at Louisiana ports to shore power by 2030	159.37	0.33	1.85	12.70
Electrify 15% of port forklifts by 2030	No estimate was produced.			
Displace 15% of Louisiana port marine diesel with hydrogen fueling by 2023	No estimate was produced.			
Mode-shift material from truck transport to barge	0.0005	-	0.00003	0.0003

LIMITATIONS AND CONCLUSIONS

While Louisiana has many important ports, the emissions from ports are likely not substantial compared with the emissions from the industrial sector. The 2021 Louisiana GHG Inventory does not contain a specific category for ports; however, the boats category is only responsible for 0.029 MMT CO_2e as of 2018. Additionally, estimating port emissions is complicated by the many different sources of emissions all of which rely on different data sources. Not all the data needed for a full analysis of the above outputs was available to the Institute, and specific information on the carbon efficiency of the engines used in both the ships in berths and the forklifts targeted by the outputs was lacking, lowering the quality of the estimates.

REGIONAL TRANSIT

OUTPUTS FROM PLANNING TEAM

- Double use of alternative modes of transportation by 2035.
- Increase access to clean transportation options, including public transit, for low-income and disadvantaged communities by 10% each year by 2030.

METHODS AND ASSUMPTIONS (GHG)

The quantification relied on data sourced from the U.S. Census American Community Survey (U.S. Census Bureau, 2021) to estimate current commuting mode share splits and the EPS tool to estimate mode share shifting.

Alternative Modes of Transportation

Data from the U.S. Census American Community Survey taken in 2021 provides five-year average values for mode share split of commuting to and from work is 90% by car, truck, or van, 1% by public transportation, 1.8% by walking, 0.4% by bicycling, and 1.4% by taxicab or motorcycles while 5.3% worked from home. The Institute performed two analyses with different definitions of alternative means. For the first, "alternative means" was taken to be public transportation, walking, and bicycling, which account for 3.2% of workers, and the target for 2035 was 6.4%. For the second analysis, "alternative means" was taken to be any non-car, truck, or van transit mode, providing a 2035 target of 20%. Both analyses were performed in the EPS tool (Rissman et al., 2023) by setting the mode shifting policy for passenger vehicle trips to 7% and 20% respectively. The annual emissions reduction was modeled as the overall reduction in annual emissions compared to the BAU case in the year of analysis (2030).

Clean Transportation Access

No separate estimate was produced, but the impacts are assumed to be similar to the policy above. There is no clear way to separate the impacts of "increasing access" to public transportation in specific communities and the impacts of mode-shifting trips across the state.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

Alternative Modes of Transportation

For quantifying the GHG emissions of the policy, two scenarios were developed: to shift 7% or 20% of passenger vehicle trips. For quantifying the co-pollutants impacts, two different methods were applied.

First, the 2020 NEI data was used to summarize the 2020 CAP/HAP emissions of non-electric passenger cars in the state of Louisiana. The 20% reduction for each pollutant was calculated to reflect the upper range of the policy. The simplified assumption is that a 20% cut in passenger vehicle trips will cut 20% emissions from passenger cars; this number can provide a helpful but not precise target in CAP/HAP reductions relevant to this policy.

Second, another quantification that incorporates the vehicle miles traveled parameter was calculated, to see if it improved the understanding of the co-pollutants impact of the policy. Using 2020 Highway Statistics data (Federal Highway Administration, 2022) Table VM-2 and VM-4, the following impacts were calculated:

- In rural Louisiana in 2020, the annual total vehicle miles traveled across all road systems is 18,971 million miles. With the average rate of 51.5% of the total miles traveled across different road types being by passenger cars, roughly 9,770 million miles can be attributed to passenger cars in rural LA.
- In urban Louisiana in 2020, the annual total vehicle miles traveled across all road systems is 29,404 million miles. With the average rate of 46.56% of the total miles traveled across different road types being by passenger cars, roughly 13,690 million miles can be attributed to passenger cars in urban LA.

The emissions factors from Choma et al (2020) were used, which represented an average light-duty gasoline vehicle in the U.S. fleet in 2018 based on the data from the Bureau of Transportation Statistics (2019). Then each of the urban and rural miles traveled were multiplied by emission factors to get the total estimation of emissions. A 20% reduction was calculated from this estimate to reflect the policy.

Clean Transportation Access

The Institute lacked the information to model this policy.

RESULTS

The emissions reductions in MMT CO_2e annually and co-pollutant reductions, where available, are provided below for each of the outputs for the sector. The values for GHG and co-pollutant reductions are contained in Table 17 and Table 18.

Alternative Modes of Transportation

The estimated value for the emissions reduction from this output for the 6.4% target using the EPS tool was 0.41 MMT CO_2e in 2035. The estimated value for the emissions reduction from this output for the 20% target using the EPS tool was 1.18 MMT CO_2e in 2035.

A detailed breakdown of the co-pollutant emissions reduction estimates for the first method can be found in Table 17.

Table 17. Detailed breakdown of co-pollutant emissions estimates for the first method of quantifying the alternative modes of transportation output.

Pollutant Type	Pollutant	Emissions (MT)	20% Reduction (MT)
CAP	Ammonia	401.9	80.38
	Carbon Monoxide	69,255.55	13,851.11
	Nitrogen Oxides	2,931.69	586.34
	PM10 Primary (Filt + Cond)	491.77	98.36
	PM2.5 Primary (Filt + Cond)	110.07	22.02
	Sulfur Dioxide	36.21	7.24
	Volatile Organic Compounds	3,666.38	733.28
GHG	Carbon Dioxide	5,459,259	1,091,852
	Methane	262.47	52.49
	Nitrous Oxide	81.36	16.27
HAP	1,3-Butadiene	7.73	1.54
	2,2,4-Trimethylpentane	94.2	18.84
	Acetaldehyde	18.82	3.76
	Acrolein	1.2	0.24
	Arsenic Compounds	0.04	0.01
	Benzene	66.94	13.39
	Ethylbenzene	55.84	11.17
	Formaldehyde	15.26	3.05
	Hexane	109.18	21.84
	Manganese Compounds	0.11	0.02
	Naphthalene	2.73	0.54
	Nickel Compounds	0.02	0
	Polycyclic Organic Matter	1.07	0.22
	Propionaldehyde	0.93	0.18
	Styrene	1.16	0.24
	Toluene	421.51	84.3
	Xylenes (Mixed Isomers)	209.92	41.98

A detailed breakdown of the co-pollutant emissions reduction estimates for the first method can be found in Table 18.

Table 18. Detailed breakdown of co-pollutant emissions estimates for the second method of quantifying the alternative modes of transportation output. Estimates were created for particulate matter less than 2.5 micrometers (PM25), sulfur dioxide (SO_2), nitrogen oxides (NOx), ammonia (NH_3), and volatile organic compounds (VOC).

Pollutant	2018 ICEV mg/mile	Rural Louisiana emissions from passenger cars (MT)	Urban Louisiana emissions from passenger cars (MT)	Total (MT)	20% Reduction (MT)
PM2.5	13	129.61	177.97	307.58	61.52
SO_2	7.7	76.77	105.41	182.18	36.44
NOx	390	3,888.29	5,339.09	9,227.39	1,845.48
NH_3	32	319.04	438.08	757.12	151.42
VOC	520	5,184.4	7,118.79	12,303.19	2,460.64

Clean Transportation Access

No estimate was produced.

Table 19. GHG emissions reduction estimates for outputs focused on regional transit.

Output	GHG emissions reduction (MMT CO_2e)
Double use of alternative modes of transportation by 2035	0.41–1.18
Increase access to clean transportation options, including public transit, for low-income and disadvantaged communities by 10% each year by 2030	

Table 20. Co-pollutant emissions reduction estimates for outputs focused on regional transit. The values provided correspond to the upper bound provided in the GHG emissions reduction estimates.

Output	Co pollutant emissions reduction (MT)			
	SO_2	NOx	VOCs	NH_3
Double use of alternative modes of transportation by 2035	7.24	586.34	733.28	80.38
Increase access to clean transportation options, including public transit, for low-income and disadvantaged communities by 10% each year by 2030				

LIMITATIONS AND CONCLUSIONS

The mode shifting policy in the EPS tool does not map onto commuting specifically but includes other kinds of vehicle trips that are outside the bounds of this output. However, the analysis does suggest that reducing single vehicle trips broadly would have a positive impact on emissions. Additionally, the EPS tool itself is designed for coarse strategy level analysis, not necessarily for considering the specific emissions reductions of specific outputs.

BUILT ENVIRONMENT RETROFITS

OUTPUTS FROM PLANNING TEAM

- Scale up to 1% annual retrofits by 2030, 2% annual retrofits by 2035, and 5% annual retrofits by 2040.
- Install 815,000 additional space and water heat pumps by 2030.

METHODS AND ASSUMPTIONS (GHG)

The quantification for these outputs relies on data drawn from the 2021 Louisiana Greenhouse Gas Inventory (Dismukes, 2021) as well as a data set taken from the EIA (U.S. Energy Information Administration, 2021).

Annual Retrofits

For this analysis, the Institute used data from the EIA on the number of households in Louisiana and the average annual household energy consumption. The Institute assumed that retrofits would reduce energy consumption by 20% and would last for 15 years. Following the output's implementation schedule, the Institute calculated that nearly 75,000 households would be retrofitted by 2030, with this number rising to 106,000 by 2050 (though the number of retrofitted households peaks in 2046 due to the 15–year lifespan on retrofits). These values correspond to reductions in energy consumption of 200 million and almost 2 billion kWh, which the Institute converted to MMT CO_2e using EPA's CO_2e equivalency calculator (U.S. Environmental Protection Agency, 2015).

Additional Heat Pumps

The policy Install Additional Heat Pumps was not quantified separately from building retrofits, for several reasons. While heat pumps generally reduce household energy consumption, emissions, and energy costs, the degree to which any of those would be true in Louisiana requires additional detailed modeling of energy consumption at an hourly resolution, rather than seasonal or annual (Deetjen et al., 2021). The degree to which the electricity grid itself decarbonizes also determines the degree to which heat pumps displace fossil fuel combustion emissions. These limitations are true for the building retrofit policy as well; the simplified implementation ramp and assumptions smooth out these uncertainties for the sake of the analysis. Whether additional heat pump installations would reduce overall energy consumption in a way that significantly deviates from the reductions modeled in the retrofit implementation ramp is too uncertain to separately quantify at this level of detail.

METHODS AND ASSUMPTIONS (CO-POLLUTANTS)

Annual Retrofits

There is no comprehensive category in 2020 NEI data (U.S. Environmental Protection Agency, 2020) to cover this output, so residential fuel combustion was selected as the target sector. The 2020 NEI data was used as the baseline of residential co-pollutant emissions as well as a 20% reduction amount to reflect the output impact. Note that this is based on a highly simplified assumption stated above.

Additional Heat Pumps

The Institute lacked the information to model the co-pollutant emissions reduction from this policy.

RESULTS

The emissions reductions in MMT CO_2e annually and where available co-pollutant reductions are provided below for each of the outputs for the sector. The values for GHG and co-pollutant reductions are contained in Table 22 and Table 23.

Annual Retrofits

The estimated value for the emissions reduction from this output was 0.16 MMT CO_2e in 2030 and 1.40 MMT CO_2e in 2050.

A detailed breakdown of co-pollutant emissions, including the 20% reduction used as a proxy for the output, can be found in Table 21.

Table 21. Detailed breakdown of the co-pollutant emissions estimates for the annual retrofit output.

Pollutant Type	Pollutant	Emissions (MT)	20% Reduction (MT)
CAP	Ammonia	335.02	67
	Carbon Monoxide	5494	1098.8
	Nitrogen Oxides	1593.29	318.66
	PM10 Primary (Filt + Cond)	768.69	153.74
	PM2.5 Primary (Filt + Cond)	764.92	152.99
	Sulfur Dioxide	23.13	4.63
	Volatile Organic Compounds	855.28	171.06
HAP	1,3-Butadiene	5.69	1.13
	Acetaldehyde	82.96	16.59
	Acetophenone	0.15	0.03
	Acrolein	3.06	0.61
	Benzene	21.39	4.28
	Catechol	15.19	3.04
	Cresol/Cresylic Acid (Mixed Isomers)	22.86	4.57
	Ethylbenzene	1.1	0.22
	Formaldehyde	57.89	11.58
	Hydroquinone	0.81	0.16
	Naphthalene	11.29	2.26
	Phenol	25.56	5.11
	Polycyclic Organic Matter	4.05	0.81
	Propionaldehyde	12.41	2.49
	Toluene	7.68	1.53
	Xylenes (Mixed Isomers)	3.79	0.76

Additional Heat Pumps

No estimate was produced.

Table 22. GHG emissions reduction estimates for outputs focused on building retrofits. Due to the policy implementation schedule, estimates are provided for both 2030 and 2050.

Output	GHG emissions reduction (MMT CO_2e)
Scale up to 1% annual retrofits by 2030, 2% annual retrofits by 2035, and 5% annual retrofits by 2040.	0.16 in 2030, 1.4 in 2050
Install 815,000 additional space and water heat pumps by 2030.	

Table 23. Co-pollutant emissions reduction estimates for outputs focused on building retrofits. Estimates correspond to the 2050 value provided in the GHG emissions reduction estimate.

Output	Co pollutant reductions (MT)			
	SO_2	NOx	VOCs	NH_3
Scale up to 1% annual retrofits by 2030, 2% annual retrofits by 2035, and 5% annual retrofits by 2040.	4.63	318.66	171.06	67.00
Install 815,000 additional space and water heat pumps by 2030.				

LIMITATIONS AND CONCLUSIONS

The GHG Inventory shows that emissions from residential and commercial buildings comprised 5.2 MMT CO_2e in 2018. These emissions are down slightly from 6 MMT in 2000. The inventory notes that these emissions fluctuate slightly because of variations in weather-related demand for fossil fuels, particularly methane gas (Dismukes, 2021). Overall this sector represents a small component of Louisiana's emissions, but relative to the overall emissions from buildings, retrofits can handle a large portion of the emissions. Overall, the emissions reductions form building retrofits are dependent on the emissions of the electrical grid, and as Louisiana's grid grows cleaner, the effect of retrofits on emissions will be lower (though they will still result in reduced energy consumption).

COMMUNITY FORESTRY AND GREENING

OUTPUTS FROM PLANNING TEAM

- Plant and maintain 4 million trees in communities statewide by 2030, at least 60% of which are in Low-income and disadvantaged (LIDAC) communities.

METHODS AND ASSUMPTIONS

This calculation relies on summary research underpinning EPA's CO_2e calculator (U.S. Environmental Protection Agency, 2015). This tool references a conversion amount for urban trees planted, with many caveats, including that the trees would be grown in a nursery for one year until they become 1 inch in diameter at 4.5 feet above the ground, and that they are not densely planted. This figure also includes some assumptions about tree survival and growth rate. Finally, their figure incorporates the carbon sequestration amount for a period of ten years, so this is not an annual figure. The figure used by EPA is 0.060 MT CO_2 per urban tree planted.

RESULTS

Multiplied by 0.060, 4 million trees sequester approximately 240,000 MT of carbon over a 10–year period. This is equivalent to 0.24 MMT CO_2. The values for GHG reductions are contained in Table 24.

Table 24. GHG emissions reduction estimates for community forestry output.

Output	GHG emissions reduction (MMT CO_2e)
Plant and maintain 4 million trees in communities statewide by 2030, at least 60% of which are in LIDAC communities	0.24 (cumulative, 10-year period)

LIMITATIONS AND CONCLUSIONS

The EPA's calculator is based on many assumptions and caveats, so this quantification should be taken as a highly improbable representation. The size and growth rate of trees will differ, and cities in Louisiana that may undertake tree planting programs may plant them more or less densely than this calculator specifies. Additionally, risks to tree survival such as hurricanes, floods, invasive species, pests, lightning, wildfire, poor soil, and poor maintenance may impact the survival rate embedded in this calculation. However, what this calculation does show is that tree planting strategies must aim to plant multiple millions of trees to have any kind of long-term impact on carbon sequestration. This type of policy may or may not be appropriate for all habitats and locations in the state.

SUSTAINABLE AGRICULTURE

OUTPUTS FROM PLANNING TEAM

- Reduce the need for prescribed burning on 66% of sugarcane acreage in Louisiana by 2030.

METHODS AND ASSUMPTIONS

To quantify the emissions from burning of sugarcane, first the percentage of bagasse (sugarcane waste) was estimated per yield. This yield was applied to the US Department of Agriculture (USDA)-reported production tonnage of sugarcane from Louisiana in 2022. Finally, using an EPA report on bagasse combustion in sugar mills, the percentage of carbon composition of bagasse was estimated. This resulting tonnage was converted into metric tons using the EPA equivalencies calculator.

- USDA statistics from 2022 show that Louisiana harvested 497,800 acres of sugarcane. The average yield is estimated at 33.4 net tons per acre, and the production total was 16.6 million net tons. These numbers are used to estimate a 66% reduction in acreage burning.
- A recent study (White Jr. et al., 2023) suggests that bagasse is 31% of cane delivered to mills.
    - The analysis assumes that bagasse is 31% of the production acreage of sugarcane and would be burned.
- An EPA report on combustion of bagasse in sugarcane mills (Hamlin, 1993) finds that the composition of bagasse is 19.2% carbon, 2.6% hydrogen, 0.15% nitrogen, and less than 0.1% sulfur, with a heating value of 7,620 kJ/kg.

- 16.6 million times 31% times 19.2% equals 988,032 short tons, which equals 3,286,534 MT of CO_2, or 3.29 MMT CO_2e.

RESULTS

The values for GHG reductions are contained in Table 25.

Table 25. GHG emissions reduction estimates for outputs focused on sustainable agriculture. For the full details of the assumptions made in the analysis please see the Technical Appendix.

Output	GHG emissions reduction (MMT CO_2e)
Reduce the need for prescribed burning on 66% of sugarcane acreage in Louisiana by 2030.	3.29

LIMITATIONS AND CONCLUSIONS

Because the composition figure came from a report about bagasse burning at mills and not in fields, the emissions and associated co-pollutants like nitrogen and sulfur could be higher from unabated burning, as many mills use wet scrubbers to control PM2.5 and other pollutants from bagasse combustion. The final figure in the table above is an annual figure that is variable based on the acreage under production, among other uncertainties.

LAND CONSERVATION AND RESTORATION

OUTPUTS FROM PLANNING TEAM

- By 2030, replace conventional diesel with renewable diesel or electricity for the construction of Louisiana Coastal Master Plan projects creating or nourishing a total of 30,000 acres.
- Conserve or restore 30,000 acres of fresh forested wetlands by 2030.

METHODS AND ASSUMPTIONS

This analysis uses information provided by the Louisiana Coastal Protection and Restoration Authority (CPRA) about the use of diesel in dredging operations for coastal restoration projects, specifically:

- A dredge uses approximately 10,000 gallons of diesel per day for dredging projects.
- Projects on the scale of 400–500 acres involve approximately 150–200 days of dredging.
- Assuming 200 days at 12,000 gallons/day to be conservative, results in the factor of 4,800 gallons/acre.

- Using the Federal Register and IPCC factor for CO_2e to diesel conversion, 10.180 x 10^{-3} MT of CO_2e/Gallon of Diesel Fuel, this results in 48.8 MT of CO_2e to run the dredge per acre of marsh creation.

Multiplying that factor by 30,000 acres results in 1.46 MMT CO_2e in emissions total from dredge operations for those projects. California's Low Carbon Fuel Standard Certified Carbon Intensities (Rodriguez et al., 2023), cited by the Department of Energy (U.S. Department of Energy, n.d.), shows that renewable diesel reduces carbon intensity on average by 65% compared to petroleum diesel. If intensity is equal to emissions, this would reduce GHGs by 0.95 MMT CO_2e for these projects. However, EPA's Emission Factors for Greenhouse Gas Inventories (U.S. Environmental Protection Agency, 2021) provides factors for mobile combustion of CO_2e, including 10.21 kg CO_2e/gallon of diesel and 9.45 kg CO_2e/gallon of biodiesel. This would increase our metric tons per acre figure to 49,008 and multiplying by 30,000 results in 1.47 MMT CO_2e (1,470,240 MT) from regular diesel. Repeating these figures for biodiesel, we would get 45.4 MT per acre, and a total of 1.36 MMT CO_2e (1,360,800 MT) for all 30,000 acres. The difference, or reduction, is 109,440 MT of CO_2e. In MMT, this is 0.109 MMT CO_2e. Based on the carbon intensity figures, this fuel may also have lower lifecycle emissions.

To calculate the sequestration value for 30,000 acres of fresh forested wetlands, a literature review was conducted for various associated habitat types (forest wetlands, bottomland hardwood, etc.) and aboveground net primary productivity (ANPP) for each type was converted to the same unit and averaged across the literature review sources. This resulted in an ANPP figure for fresh forested wetlands at 16.06 MT of CO_2e per hectare per year. This was applied to the acreage listed in the output after converting that figure to hectares. This sequestration figure does not include carbon stored in soils in these habitats.

The literature review for this quantification included the following references:

- Brantley et al., 2008 (2008)
- Cardoch et al., 2002 (2002)
- Hoeppner et al., 2008 (2008)
- Middleton and McKee, 2004 (2004)
- Conner and Day, 1976 (1976)
- Elder and Cairns, 1982 (1982)
- Day et al., 1977 (1977)
- Conner and Day, 1987 (1987)
- Shaffer et al., 2016 (2016)
- Shaffer et al., 2009 (2009)
- Edwards et al., 2019 (2019)
- Hillmann et al., 2019 (2019)
- Day et al., 2006 (2006)

RESULTS

The values for GHG reductions are contained in Table 26.

Table 26. GHG emissions reduction estimates for the coastal output.

Output	GHG emissions reduction (MMT CO_2e)
By 2030, replace conventional diesel with renewable diesel or electricity for the construction of Coastal Master Plan projects creating or nourishing 30,000 acres.	0.109
Conserve or restore 30,000 acres of fresh forested wetlands by 2030.	0.19

LIMITATIONS AND CONCLUSIONS

The emissions reductions for replacing conventional diesel with renewable diesel are predicated on assumptions from CPRA, which could vary based on conditions in the field. Not all types of renewable diesel are the same, and carbon content could vary. The emissions factor used by EPA for renewable diesel may not be accurate for what would work to power a dredge. Additionally, an electric-powered dredge could reduce these emissions further.

The carbon sinks potential of fresh forested wetlands is large; the figure estimated here provides only above-ground net primary productivity and does not include carbon stored in wetland soils. The literature review is a strong basis for analysis, but research into the carbon fluxes in Louisiana's wide variety of coastal habitats is ongoing, and the science may change. Carbon sequestered in natural environments like wetlands is also vulnerable to hazards, such as fire, drought, hurricane, pests, disease, changes in salinity, and other threats.

CO-POLLUTANTS BASELINE

The EPA technical reference document on co-pollutant impacts assessment (U.S. Environmental Protection Agency, 2023b) suggests a three-step co-pollutant analysis for state CPRG grant recipients to provide information on:

1. **A base year emissions inventory** of the CAPs (e.g., NOx, VOC, SO_2, and direct PM2.5) and the HAP emissions for impacted sources/sectors in the jurisdiction.
2. **Co-pollutant emission changes** from priority GHG reduction measures listed in the PCAP. Please note that specific types of GHG reduction measures may have different expectations.
3. **Projected future co-pollutant emission**s with and without GHG reduction measures, as feasible.

The complete list of CAPs and HAPs included in the 2020 NEI data (U.S. Environmental Protection Agency, 2020) for the state of Louisiana area is listed below.

The Criteria Air Pollutants (CAPs) included in NEI are Carbon Monoxide, Nitrogen Oxides, Volatile Organic Compounds, PM10 Primary (Filt + Cond), Ammonia, PM2.5 Primary (Filt + Cond), Sulfur Dioxide

The Hazardous Air Pollutants (HAPs) included in NEI are Xylenes (Mixed Isomers), Naphthalene, Acrolein, Benzene, Ethylbenzene, Propionaldehyde, Polycyclic Organic Matter, 2,2,4-Trimethylpentane, 1,3-Butadiene, Hexane, Styrene, Manganese Compounds, Arsenic Compounds, Nickel Compounds, Methanol, Methylene Chloride, 1,1,2,2-Tetrachloroethane, Ethylene Dibromide, Cumene, 1,4-Dichlorobenzene, Methyl Isobutyl Ketone, Phenol, Chlorobenzene, Cresol/Cresylic Acid (Mixed Isomers), Acetonitrile, Acetamide, Hydrochloric Acid, Mercury Compounds, Methyl Chloride, Acrylic Acid, Carbonyl Sulfide, Glycol Ethers, Ethylene Glycol, Trichloroethylene, Diethanolamine, Methyl Methacrylate, Dibutyl Phthalate, 2,4-Toluene Diisocyanate, 2,4-D, salts and esters, Trifluralin, Carbaryl, Vinyl Acetate, Dimethyl Phthalate, Tetrachloroethylene, Triethylamine, Phthalic Anhydride, Methyl Chloroform, Cyanide Compounds, Benzyl Chloride, Catechol, Hydroquinone, Acetophenone, Ethylene Dichloride, Dibenzofuran, Bis(2-Ethylhexyl)Phthalate, Isophorone, 2,4,6-Trichlorophenol, Polychlorinated Biphenyls, 1,2,4-Trichlorobenzene, Chloroform, Carbon Disulfide, Carbon Tetrachloride, Propylene Oxide, Vinylidene Chloride, Acrylonitrile, N,N-Dimethylaniline, Ethyl Chloride, Antimony Compounds, Cadmium Compounds, Chromium Compounds, Methylhydrazine, Chlorine, Phosphorus, 1,1,2-Trichloroethane, Propylene Dichloride, 1,3-Dichloropropene, Ethylidene Dichloride, Vinyl Chloride, Biphenyl, Ethylene Oxide, Hydrogen Fluoride, Methyl Tert-Butyl Ether, Dimethyl Sulfate, Bromoform, 2,4-Dinitrotoluene, Chloroprene, Allyl Chloride, p-Dioxane.

The CAP/HAPs included in NEI is Lead.

It is important to note other GHG emissions such as Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF6), and Nitrogen trifluoride (NF3) have been quantified for PCAP outputs but are not referred to as co-pollutants in the PCAP technical appendix. When possible, these gases were converted to CO_2 equivalent values to report the total GHG emission reductions from the policy.

BASE YEAR INVENTORY FOR CO-POLLUTANTS

Based on NEI data total 2020 CAP, HAP, and CAP/HAP emissions for the state of Louisiana are respectively 2,959,880; 125,632; and 0.44 tons compared to 38,717,884 million tons of GHGs. These values can be found in Table 27.

Table 27. Total emissions across CAP, HAP and GHG categories for Louisiana.

Pollutant Type	Emissions (Tons)
CAP	2,959,880.22
CAP/HAP	0.44
GHG	38,717,884.8
HAP	125,632.16

A detailed breakdown by PCAP sector for CAP and HAP emissions for can be found in Table 28.

Table 28. Detailed breakdown of co-pollutant emissions for select PCAP sectors.

Relevant PCAP Policy category	Pollutant Type	EIS Sector	Emissions (Tons)
Industrial decarbonization	CAP	Fuel Comb - Industrial Boilers, ICEs - Biomass	54,716.08
	CAP	Fuel Comb - Industrial Boilers, ICEs - Coal	4,975.19
	CAP	Fuel Comb - Industrial Boilers, ICEs - Natural Gas	33,926.53
	CAP	Fuel Comb - Industrial Boilers, ICEs - Oil	4.51
	CAP	Fuel Comb - Industrial Boilers, ICEs - Other	625.9
	CAP	Industrial Processes - Oil & Gas Production	108,219
	CAP/HAP	Fuel Comb - Industrial Boilers, ICEs - Coal	0.02
	CAP/HAP	Fuel Comb - Industrial Boilers, ICEs - Natural Gas	0.09
	CAP/HAP	Industrial Processes - Oil & Gas Production	0
	HAP	Fuel Comb - Industrial Boilers, ICEs - Biomass	205.94
	HAP	Fuel Comb - Industrial Boilers, ICEs - Coal	0.27
	HAP	Fuel Comb - Industrial Boilers, ICEs - Natural Gas	13.57
	HAP	Fuel Comb - Industrial Boilers, ICEs - Oil	0
	HAP	Fuel Comb - Industrial Boilers, ICEs - Other	0.19
	HAP	Industrial Processes - Oil & Gas Production	6,710.24

Relevant PCAP Policy category	Pollutant Type	EIS Sector	Emissions (Tons)
Fleet transition and regional transit	CAP	Mobile - On-Road Diesel Heavy Duty Vehicles	36,158.19
	CAP	Mobile - On-Road Diesel Light Duty Vehicles	6,721.69
	CAP	Mobile – On-Road non-Diesel Heavy Duty Vehicles	8,660.09
	CAP	Mobile - On-Road non-Diesel Light Duty Vehicles	262,335.7
	GHG	Mobile - On-Road Diesel Heavy Duty Vehicles	7,997,743
	GHG	Mobile - On-Road Diesel Light Duty Vehicles	867,689.4
	GHG	Mobile - On-Road non-Diesel Heavy Duty Vehicles	620,462
	GHG	Mobile - On-Road non-Diesel Light Duty Vehicles	18,679,884
	HAP	Mobile - On-Road Diesel Heavy Duty Vehicles	217.09
	HAP	Mobile - On-Road Diesel Light Duty Vehicles	65.4
	HAP	Mobile - On-Road non-Diesel Heavy Duty Vehicles	132.72
	HAP	Mobile - On-Road non-Diesel Light Duty Vehicles	3,384.01
Ports	CAP	Mobile - Commercial Marine Vessels	47,756.72
	GHG	Mobile - Commercial Marine Vessels	2,788,493
	HAP	Mobile - Commercial Marine Vessels	140.47
Built environment retrofits	CAP	Fuel Comb - Residential - Natural Gas	2,582.11
	CAP	Fuel Comb - Residential - Oil	3.71
	CAP	Fuel Comb - Residential - Other	194.88
	CAP	Fuel Comb - Residential - Wood	8,059.79
	HAP	Fuel Comb - Residential - Natural Gas	1.24
	HAP	Fuel Comb - Residential - Oil	0
	HAP	Fuel Comb - Residential - Other	0.08
	HAP	Fuel Comb - Residential - Wood	302.77
Sustainable agriculture	CAP	Fires - Agricultural Field Burning	78,613.3
	CAP	Fires - Prescribed Fires	533,473.6
	CAP/HAP	Fires - Prescribed Fires	0.23
	CAP/HAP	Fires - Wildfires	0
	HAP	Fires - Agricultural Field Burning	1,361.82
	HAP	Fires - Prescribed Fires	15,342.26

A map showing total CAP emissions across all sectors in each county in Louisiana can be found in Figure 1.

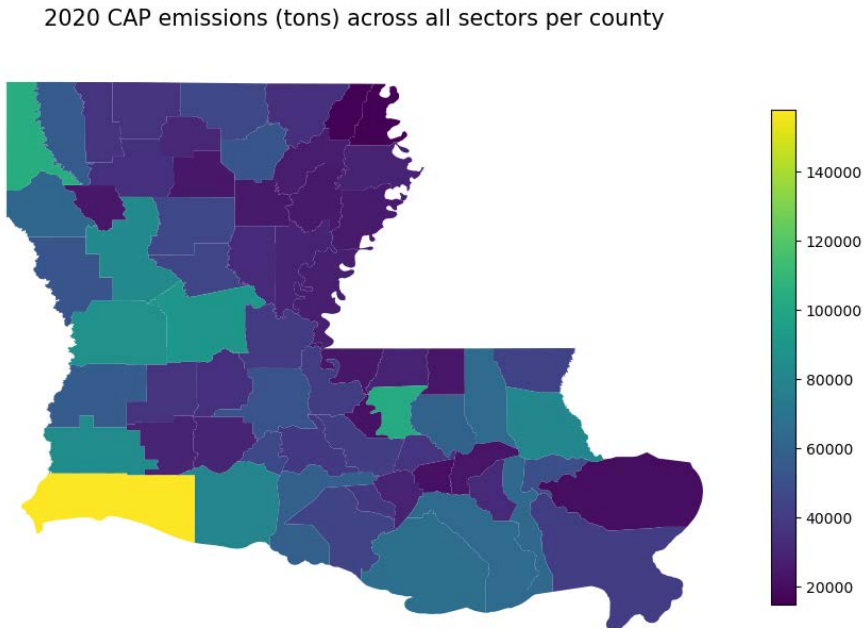

Figure 1. 2020 CAP emissions across all sectors per county.

A map showing total HAP emissions across all sectors in each county in Louisiana can be found in Figure 2.

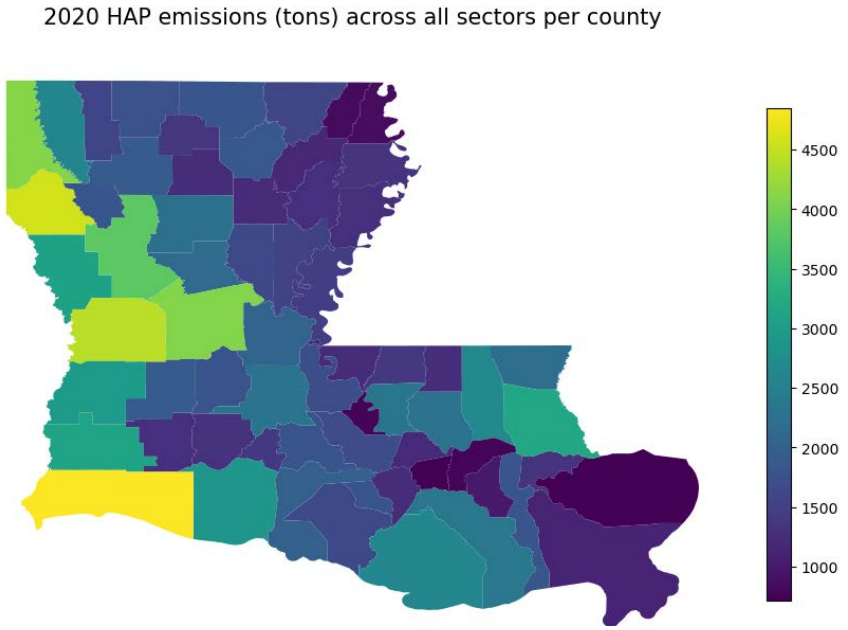

Figure 2. 2020 HAP emissions across all sectors per county.

A map showing total CAP/HAP (Lead) emissions across all sectors in each county in Louisiana can be found in Figure 3.

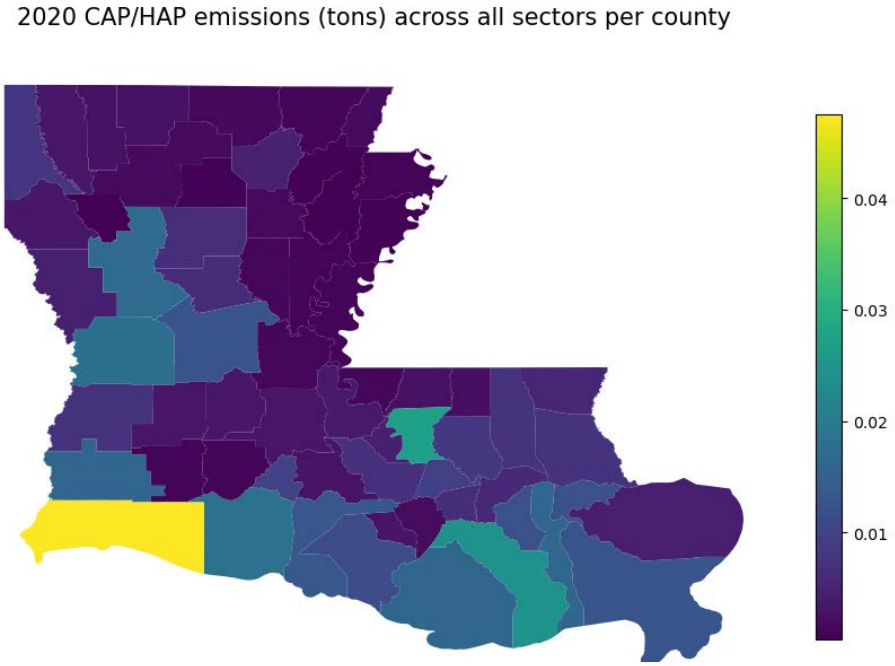

Figure 3. 2020 CAP/HAP emissions across all sectors per county.

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APPENDIX B: LOUISIANA GREENHOUSE GAS INVENTORY (2021)

Louisiana 2021 Greenhouse Gas Inventory

Prepared on behalf of the
Governor's Office of Coastal Activities
October 2021

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LSU | Center for Energy Studies

Louisiana 2021 Greenhouse Gas Inventory

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Table of Contents

Graphic design: Stephen W. Radcliffe

List of Figures

List of Tables

Appendices

CES Responses to Scientific Advisory Group Comments

Source List

1 | Introduction

In February 2020, Governor John Bel Edwards announced the creation of a Climate Initiatives Task Force (CTF) to consider the important implications that climate change and greenhouse gas (GHG) emissions have for the Louisiana economy and environment. A key data tool that is needed by this task force will be an update of the Louisiana GHG inventory that has been conducted by the Louisiana State University (LSU) Center for Energy Studies (CES) several times in years past (1997, 2010). In January 2021, the Governor's Office of Coastal Activities (GOCA) contracted with CES to estimate and assess Louisiana GHG emissions from all major sources, activity types, and pollutant types.

A GHG inventory surveys and estimates GHG emissions by activity type and economic sector. A GHG inventory can be thought of as a "cross-sectional" analysis, or snapshot in time that identifies where each major Louisiana economic sector stands in terms of its GHG emissions. The GHG inventory estimation process can also be thought of as a "tops-down" analysis since it estimates emissions across broad economic sectors and activities. Over the course of this investigation, CES has worked with the governor's office, other stakeholders, and the CTF's Scientific Advisory Group (SAG) to identify and estimate carbon emission sources and sinks in Louisiana. This analysis not only estimates GHG emissions, by activity type, economic sector, and GHG pollutant type, but also estimates all three across a broad time period, 2000-2018.

GHG inventories are important tools that can be utilized in the formulation of state clean air and clean energy policy. The quantitative estimates that arise from the inventory estimation process are necessary, since many economic sectors are not required to report their GHG emissions. Thus, the inventory process itself estimates GHG emissions for each economic sector based on that sector's energy use and other factors, such as unique manufacturing processes, processing capabilities, and land area, all of which can impact and influence GHG emissions, as well as GHG sinks (i.e., resources that sequester GHG emissions).

This GHG inventory process has been guided by the oversight and direction of the CTF's SAG. The SAG was briefed at the onset of the project about methods and approaches, was debriefed once an initial set of empirical results were available, and were again consulted once the final results and inventory were available. The various presentations provided to the SAG are available online. Overall, the SAG has provided at least two rounds of comments on the inventory and written replies to the original. A more detailed set of comments is provided in Appendix 14. In addition, several SAG members have reached out directly and provided additional insights and support during the estimation process. The input of the SAG and its individual members is greatly appreciated.

This report is organized into nine sections, including this introduction. Section 2 provides a high-level overview of Louisiana's GHG emission trends as compared to overall U.S. totals and averages. Section 3 provides a general discussion of the methods used in estimating Louisiana's GHG inventory. Section 4 provides a high-level analysis of Louisiana's GHG emission trends by economic sector. Section 5 provides Louisiana's GHG inventory, for 2018, and for individual years back to 2000, on an economic sector basis, an activity type basis, and by GHG emissions type (CO_2, CH_4, N_2O, and fluorinated gases). Section 6 provides a more specific, "bottoms-up" analysis of individual industrial and power generation GHG sources. Section 7 utilizes air permitting data to project potential future industrial GHG emissions. Section 8 discusses the uncertainties associated with GHG estimation. Lastly, Section 9 provides the conclusions.

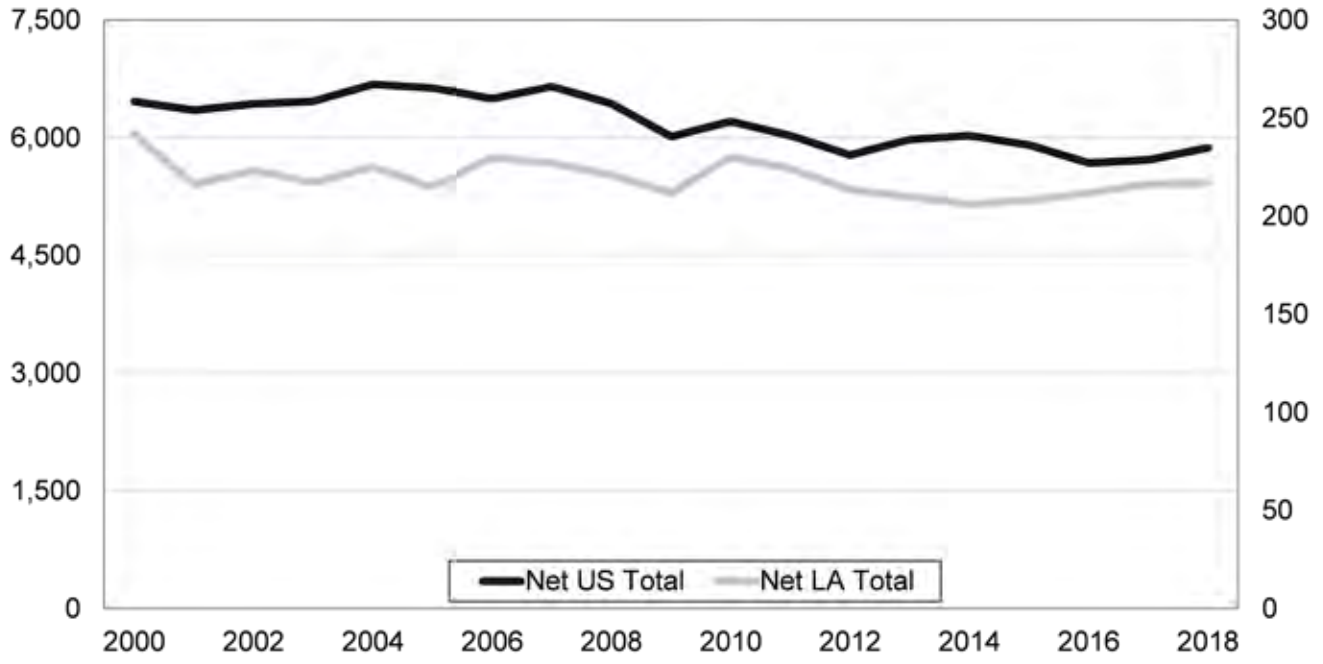
In addition, there are 15 appendices that are integral to the report and provide more detailed explanations about the GHG estimation process by major activity type. These appendices also provide considerably more detail examining GHG emission trends within various sub-sectors and activity types. This report also includes a "bottoms-up" plant-specific analysis of two large GHG emissions sectors: power generation and industry. This "bottoms-up" analysis is then compared to the "top down" analysis (i.e., the inventory itself) to assess the consistency of estimation outcomes and results between the two approaches. Two technical appendices (Appendix 12 and Appendix 13) provide more detailed analysis, at the plant level, regarding industrial and power generation GHG emissions that collectively account for 75 percent of all Louisiana GHG emissions. Lastly, the sources utilized in the estimation process and analysis are listed in Appendix 15.

2 | Louisiana aggregate GHG emission trends

U.S. and Louisiana total GHG emissions that arise from the combustion of fossil fuels have been decreasing since 2000. Figure 1 compares the GHG emission trends between the U.S. and Louisiana. In 2000, U.S. GHG emissions were reported at 6.5 billion metric tons, or gigatons (Gt), whereas Louisiana reported 242 million metric tons ("Mt"). Annual U.S. GHG emissions were relatively constant up to the 2008-2009 financial crisis and global recession. The recession slowed economic growth, and energy use, but also marked a period when a large degree of fuel switching, particularly in the power generation sector, stared to arise. Since the recession, U.S. GHG emissions have been decreasing and, as of 2018, are 12 percent lower than the pre-recession peak of 6.6 Gt.

Figure 1: Total U.S. versus Louisiana GHG emissions[1]

Source: Environmental Protection Agency



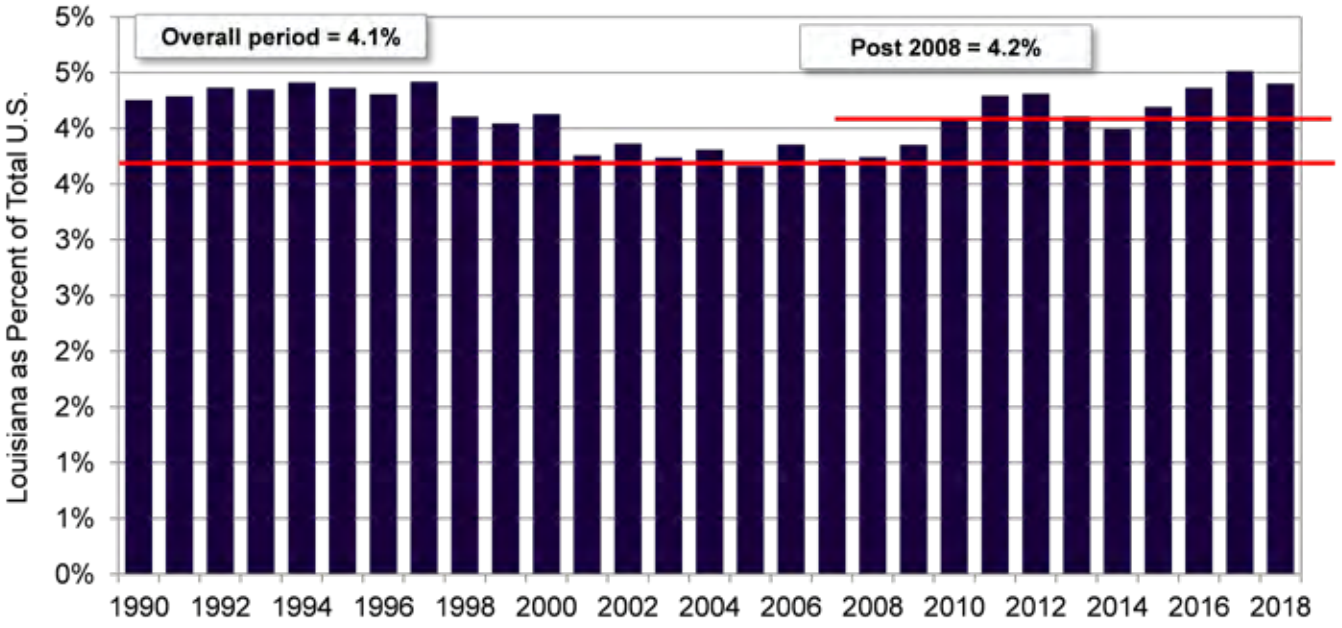
[1] Note that emissions are net of natural sinks at both the U.S. and Louisiana level.

Louisiana exhibits differing total GHG emission trends over the same time period. Louisiana's GHG emissions fell significantly between 2000 and 2002, likely due to decreased use of high-cost natural gas during this time period, and rebounded into the 225 to 229 Mt range, before peaking in 2010 at 230 Mt. As of 2018, Louisiana's total GHG emissions are down to 216 Mt, below the 20-year peak of 242 Gt, but at the same general place as in 2001.

Louisiana's share of total U.S. GHG emissions has also hovered around a constant rate of 4.1 percent to 4.2 percent of total, as seen in Figure 2. Throughout the 1990s, Louisiana's GHG emissions comprised a relatively higher share of the U.S. total, in large part due to relatively high in-state industrial output during this time period. The decade of the 2000s saw Louisiana's GHG emissions fall relative to U.S. totals, again, primarily due to a contraction of industrial activity that occurred as a result exceptionally high natural gas prices. Since 2000, Louisiana's share of total U.S. GHG emissions has been back on the rise, to about 4.2 percent of total, given the recent expansion of industrial activity in the state.

Figure 2: Louisiana share of total U.S. GHG

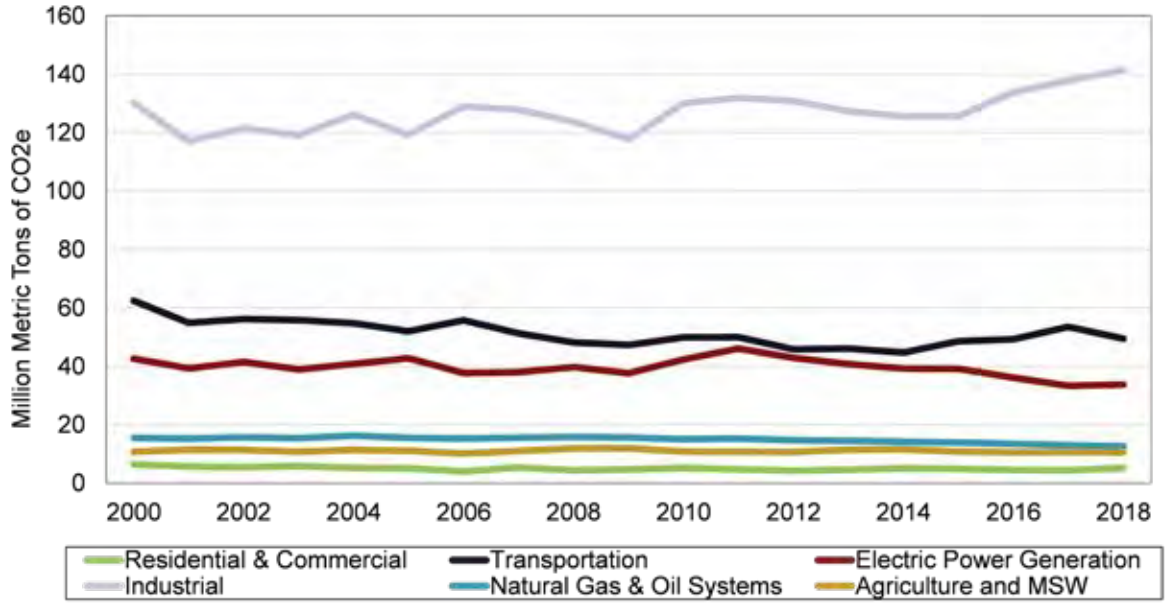
Source: Environmental Protection Agency



On a sector-specific basis, Louisiana's GHG emissions are highly concentrated in the industrial sector. Figure 3 shows the recent trends in Louisiana' sector-specific GHG emissions. The industrial sector has the largest emissions, increasing over the past several years to a near-term peak of around 141 Mt. The transportation sector follows, with recent years showing emission trends between 48 Mt to 52 Mt. Power generation, which includes utility and non-utility generation, ranks third at a recent level of 34 Mt. The other major sectors of the Louisiana economy, that include household and business, agriculture, and oil and gas production, account for the remaining GHG emissions in the state.

Figure 3: Louisiana GHG emission by sector

Source: Environmental Protection Agency



Louisiana's GHG emissions composition differs considerably from the national average. Figure 4 compares U.S. GHG emission shares by sector (left hand pie chart) to those in Louisiana (right-hand pie chart). The noticeable difference between the two charts is that U.S. GHG emissions shares are very highly dominated by power generation, not industrial activities. Louisiana's GHG emissions, on the other hand, are highly dominated by industrial activities.

Figure 4: U.S. and Louisiana GHG emission shares

Source: Environmental Protection Agency, Bureau of Economic Analysis.

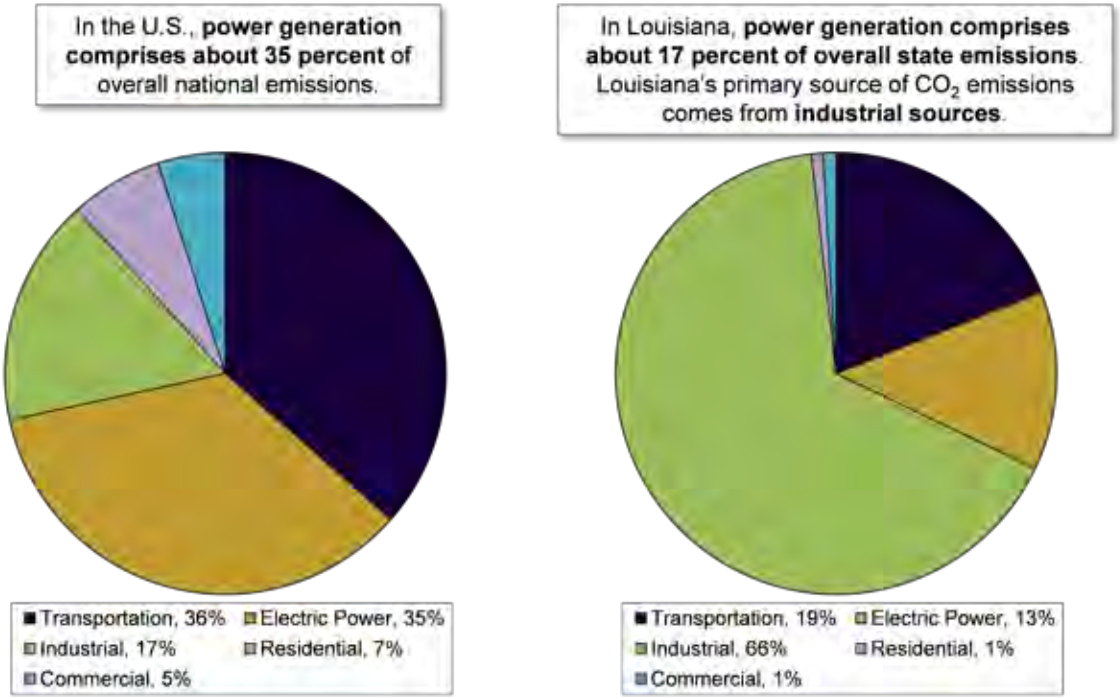


Figure 5: Louisiana and U.S. end use consumption comparison

Source: Environmental Protection Agency

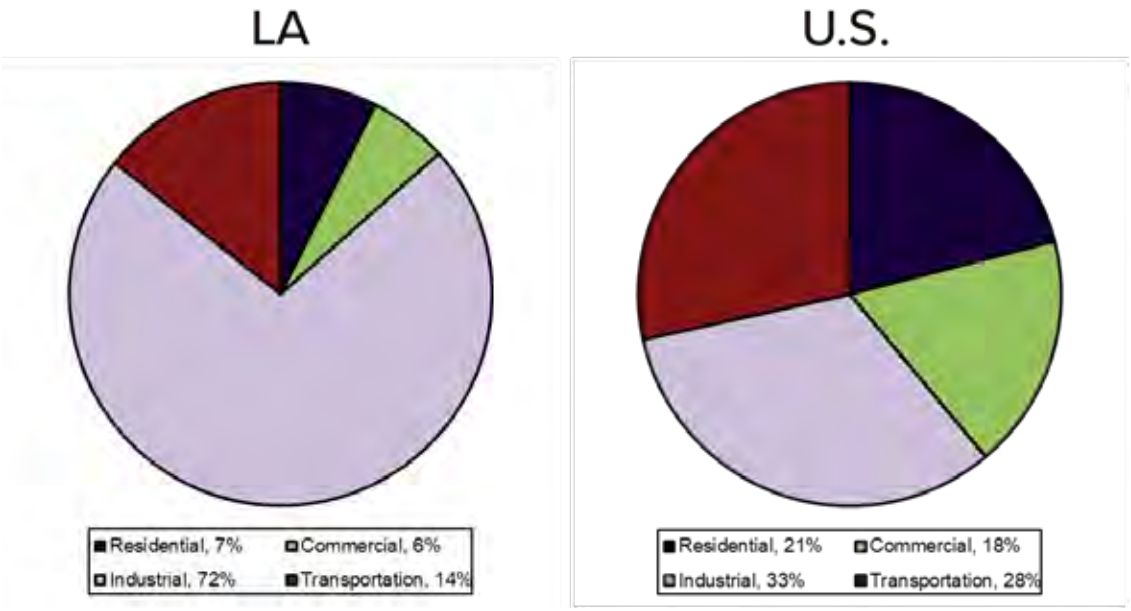
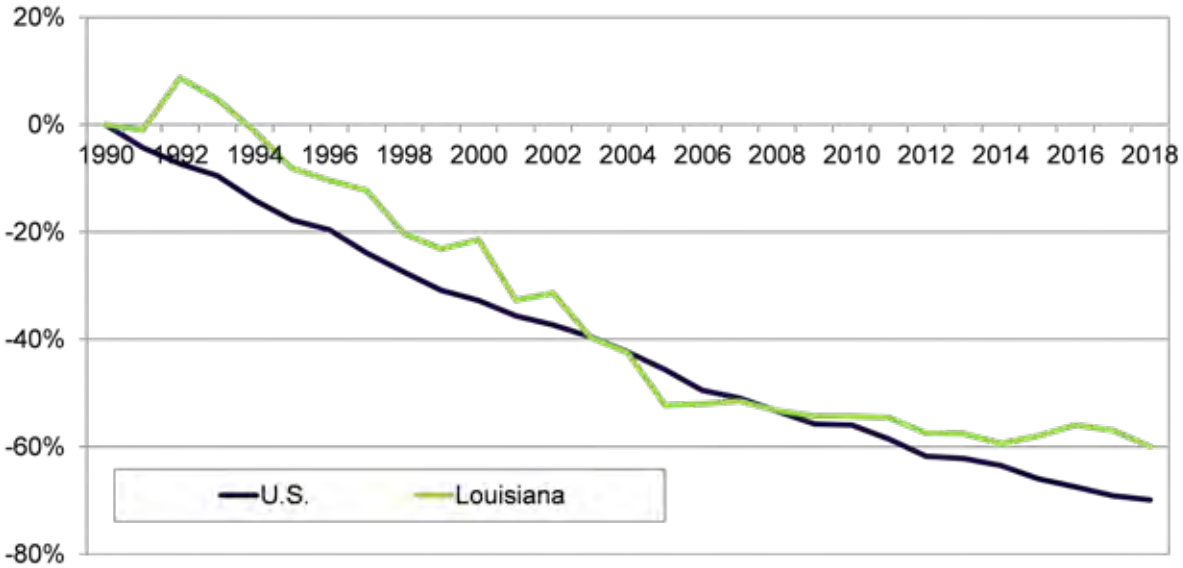


Figure 5 shows the important differences between Louisiana and U.S. average energy end uses, and their implications for GHG emissions. Industry comprises as much as 33 percent of all U.S. energy end uses. However, in Louisiana, industry comprises as much as 72 percent of all energy end uses.

Figure 6 examines trends in the level of GHG emissions per unit of economic output at both the state (Louisiana) and national levels. The chart shows that GHG emissions per unit of economic output have been falling at both the state and national level, although more so at the national level than in Louisiana.

Figure 6: Annual changes in U.S. and Louisiana GHG emissions per GDP

Source: Environmental Protection Agency, Bureau of Economic Analysis.



3 | State inventory estimation methods

The Intergovernmental Panel on Climate Change (IPCC) has published guidelines, starting in 1997, for GHG emissions inventory estimation. These guidelines have been adopted and incorporated into a tool developed by the Environmental Protection Agency (EPA) that in turn can be used to estimate state level GHG emissions across a wide range of sectors. This tool is referred to as the "State Inventory Tool" or "SIT." The SIT establishes a framework for estimating GHG emissions that span sectors, emission types, and processes. The SIT is composed of a variety of "modules" that estimate various GHG emission types by "activity" such as the combustion of fossil fuels, stationary processes, industrial processes, and land use activities, among others.

The basic "mathematics" of the SIT is relatively straightforward. An "emission factor" (expressed in terms of "emissions per activity") is provided by the tool and that factor is then multiplied by an "activity" to arrive at a total GHG emissions impact. This GHG emission is standardized to a CO_2 equivalent in order to arrive at a total impact across all modules and GHG emission types.

Figure 7 below provides just one example of how GHG emissions from the residential combustion of fossil fuels is estimated. The left column of the workpaper lists the various fossil fuel types combusted by the residential sector. The next column lists the volumes burned in any given year across all those fuel types (two years are provided in the example below, 2017 and 2018). The emissions factor is provided in pounds of carbon per units of heat input burned (by fossil fuel type). This is adjusted for an efficiency factor, which in turn is standardized in "short tons"[2] and then million metric tons of carbon equivalent (MMTCE), and million metric tons of CO_2 equivalent ($MMTCO_2E$).

Figure 7: Example, residential combustion of fossil fuel emission calculation

Source: EPA SIT, Louisiana.

Residential fuel types

Residential emissions factors

Residential GHG emissions

Residential Sector 2017

Fuel Type	Consumption (Billion Btu)		Emission Factor (lbs C/Million Btu)		Combustion Efficiency (%)		Emissions (short tons carbon)		Emissions (MMTCE)		Emissions ($MMTCO_2E$)
Coal	-	x	62.02	x	100.0%	=	-	=	0.000	=	0.000
Distillate Fuel	44	x	44.47	x	100.0%	=	978	=	0.001	=	0.003
Kerosene	2	x	44.01	x	100.0%	=	44	=	0.000	=	0.000
Hydrocarbon Gas Liquids	1,699	x	37.11	x	100.0%	=	31,525	=	0.029	=	0.105
Natural Gas	29,680	x	31.90	x	100.0%	=	473,396	=	0.429	=	1.575
Other	-	x		x		=	-	=	0.000	=	0.000

Residential Sector 2018

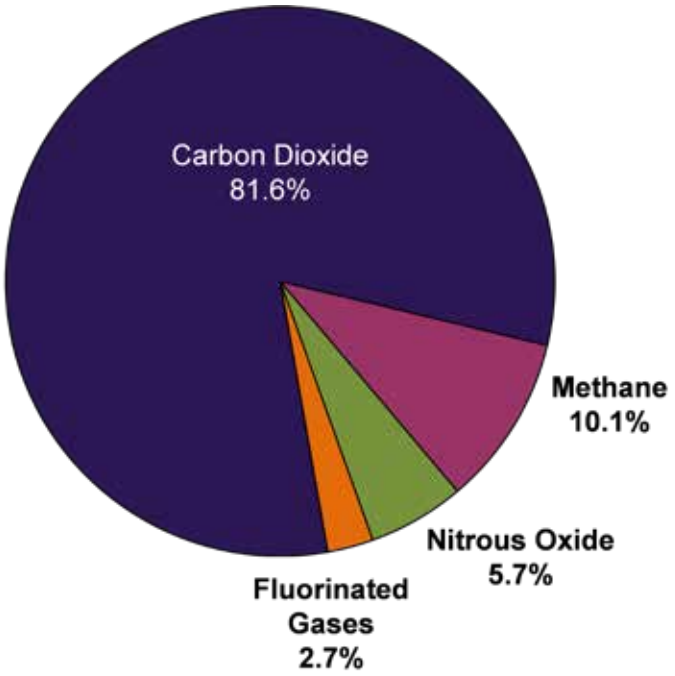
Fuel Type	Consumption (Billion Btu)		Emission Factor (lbs C/Million Btu)		Combustion Efficiency (%)		Emissions (short tons carbon)		Emissions (MMTCE)		Emissions ($MMTCO_2E$)
Coal	-	x	62.02	x	100.0%	=	-	=	0.000	=	0.000
Distillate Fuel	8	x	44.47	x	100.0%	=	178	=	0.000	=	0.001
Kerosene	4	x	44.01	x	100.0%	=	88	=	0.000	=	0.000
Hydrocarbon Gas Liquids	1,748	x	37.11	x	100.0%	=	32,434	=	0.029	=	0.108
Natural Gas	38,629	x	31.90	x	100.0%	=	616,133	=	0.559	=	2.049
Other	-	x		x		=	-	=	0.000	=	0.000

[2] "short ton" is equal to 2000 lbs.

All types of GHG emissions are considered in the SIT that include CO_2, N_2O, CH_4, and various fluorinated gases. CO_2 enters the atmosphere through the burning of fossil fuels, trees and wood products, solid wastes, and through other chemical reactions. Nitrous oxide is emitted during industrial process when organic fuels are burned at high temperatures and when air (including nitrogen) is used as the oxidant. These emissions can also arise in some agricultural emissions. Methane is emitted throughout the natural gas value chain (production, transportation, and distribution) as well as other refining and industrial activities. Methane can also be released through agriculture and livestock and the decay of organic material that can arise at landfills. Fluorinated gases (F-gases) are a family of gases that contribute fluorine. These F-gases are powerful and arise from the release of refrigerants, heat pumps, air conditioning, blowing agents for foam/solvent, and fire extinguishers. The decomposition and share of these GHG emissions, from a national perspective, are provided in Figure 8.

Figure 8: Total U.S. GHG emission shares (2018)

Source: EPA



The SIT is composed of 11 different "modules" that estimate various different GHG emissions across differing economic sectors and activities. These individual modules include:

- Agricultural Module
- Fossil Fuel Combustion Module
- Coal Module
- Electricity Consumption Module
- Industrial Process Module
- Land-use, Land-use Change, and Forestry Module
- Mobile Combustion Module
- Natural Gas and Oil Module
- Solid Waste Module
- Stationary Combustion Module
- Wastewater Module

While all of the modules listed above are important, the overwhelming share of all GHG emissions comes from the combustion of fossil fuels, so this module is very important in establishing the bulk of any state's GHG emissions. There are other modules that contribute to the estimation of CO_2 emissions, but several others such as the Industrial Process module, or the Natural Gas and Oil Module, focus on N_2O and/or CH_4 emissions exclusively.

As noted earlier, this report includes several appendices that discuss each of the modules above and provides specific GHG emissions estimates by a variety of detailed activity types. The main body of this report will focus on the higher-level, aggregate results across each major sector and module. The technical appendices offer greater level of granularity within each sector/module.

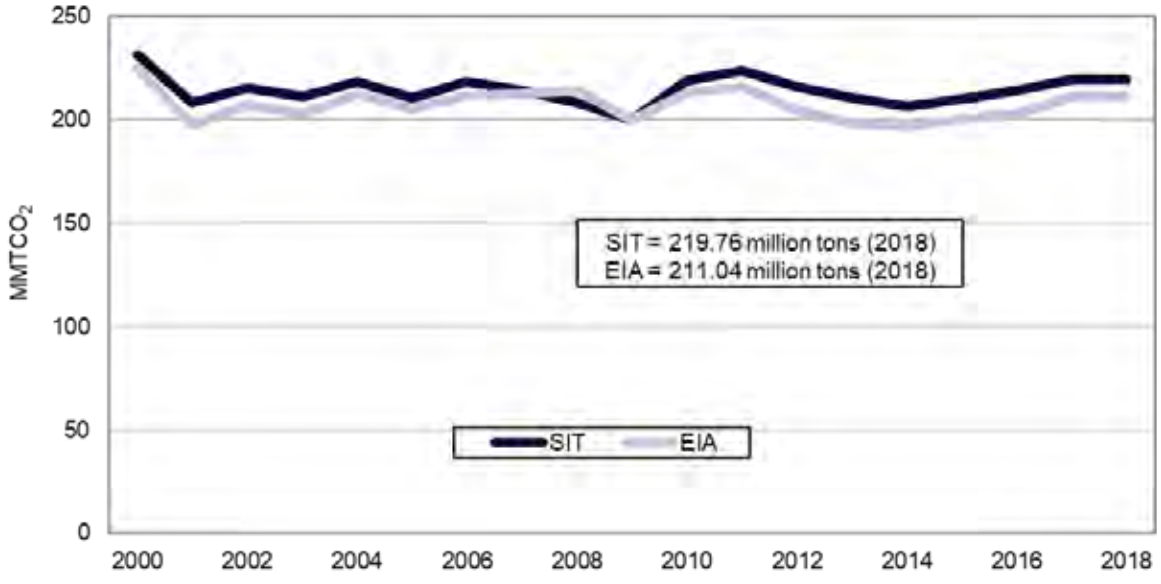
4 | Louisiana GHG emission trends

Figure 9 compares Louisiana's SIT-estimated GHG trends to those estimated and reported by the Energy Information Administration (EIA). Note that the comparison of GHG emission trends is for combustion related GHG emissions only, not total GHG emissions. The remaining GHG emissions are not included since EIA does not have consistent sector-specific detail at total emissions level basis (hence the purpose of the inventory). Later, in a subsequent section of this report, various tables are provided with the final GHG inventory that includes all GHG emissions, not only those associated with combustion activities.

Figure 9 shows relatively stable GHG emission trends for Louisiana dating back to 2000. While U.S. GHG emission trends have fallen, Louisiana GHG emission trends have been relatively flat. For 2018, the most recent year in which GHG emissions can be estimated, the SIT estimate for Louisiana is around 219 Mt (combustion only) whereas the independent estimate developed by the EIA for Louisiana is slightly lower at 211 Mt. Since 2010, the SIT based methods estimate consistently higher emission levels, although this bias is relatively small.

Figure 9: Louisiana GHG emission trends (combustion only)

Source: Author's estimates using EPA-SIT, EIA.



4.1 Residential and commercial GHG emission trends:

The trend in GHG emissions from the residential and commercial sectors of the Louisiana economy have been relatively consistent as seen in Figure 10. GHG emissions from the residential and commercial sector were close to 6 Mt in 2000, but have gradually fallen and flattened out to a level that hovers between 4.0 Mt to 5.0 Mt with 2018 emissions levels slightly up at 5.2 Mt. The up and down in the variation of the GHG emissions is likely a result of weather-related changes in fossil fuel demand, particularly retail natural gas demand.

Figure 10: Louisiana residential & commercial GHG emission trends (combustion only)

Source: Author's estimates using EPA-SIT, EIA.

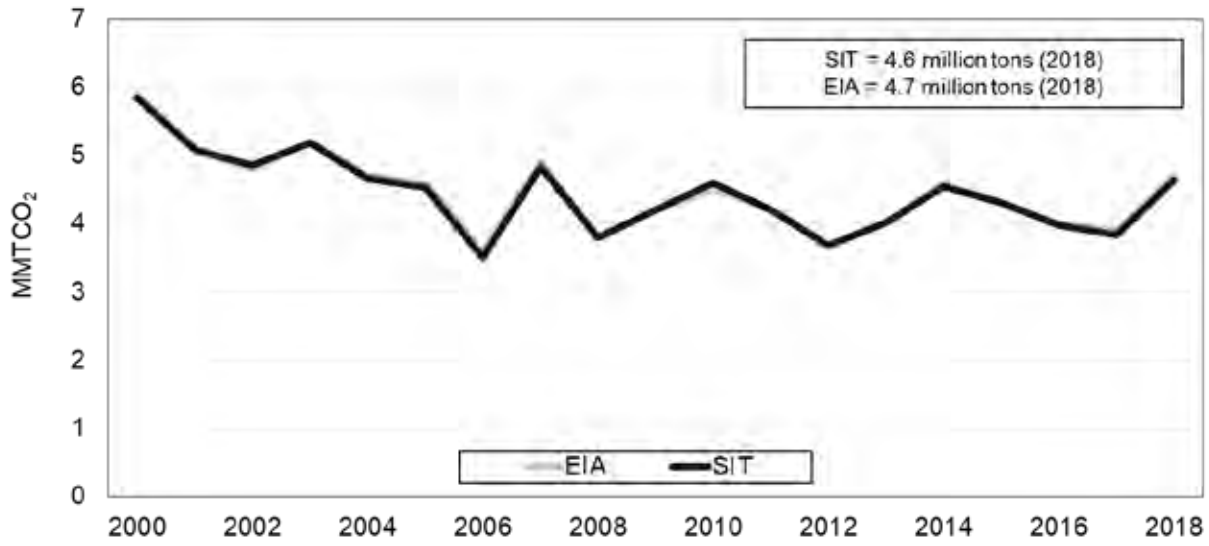


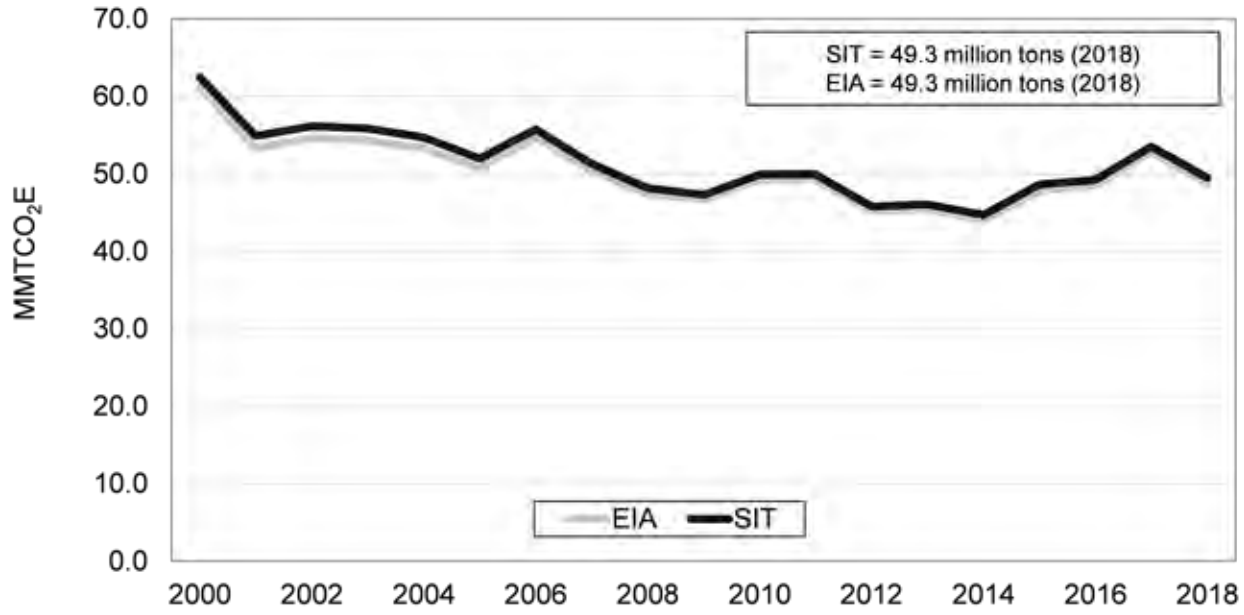
Figure 10 shows good comparability between EIA and the SIT-based GHG estimates for Louisiana. The SIT provides slightly more conservative estimates that tend to be consistently above the EIA estimates. Note that greater detail on the residential and commercial emissions can be found in Appendix 1: Combustion of Fossil Fuels. Almost all residential and commercial GHG emissions come from the combustion of fossil fuels.

4.2 Transportation GHG emission trends:

Figure 11 shows that Louisiana's transport related GHG emission trends have decreased from a 2000 level of around 60 Mt to a 2018 level at 49.1, close to a 10 Mt reduction. These decreases are likely due to greater vehicle fuel efficiencies that have arisen over the past decade as well as an increasing amount of fuel substitution to alternative fueled vehicle both for larger trucks and passenger vehicles.

Figure 11: Louisiana transportation GHG emission trends (combustion only)

Source: Author's estimates using EPA-SIT, EIA.



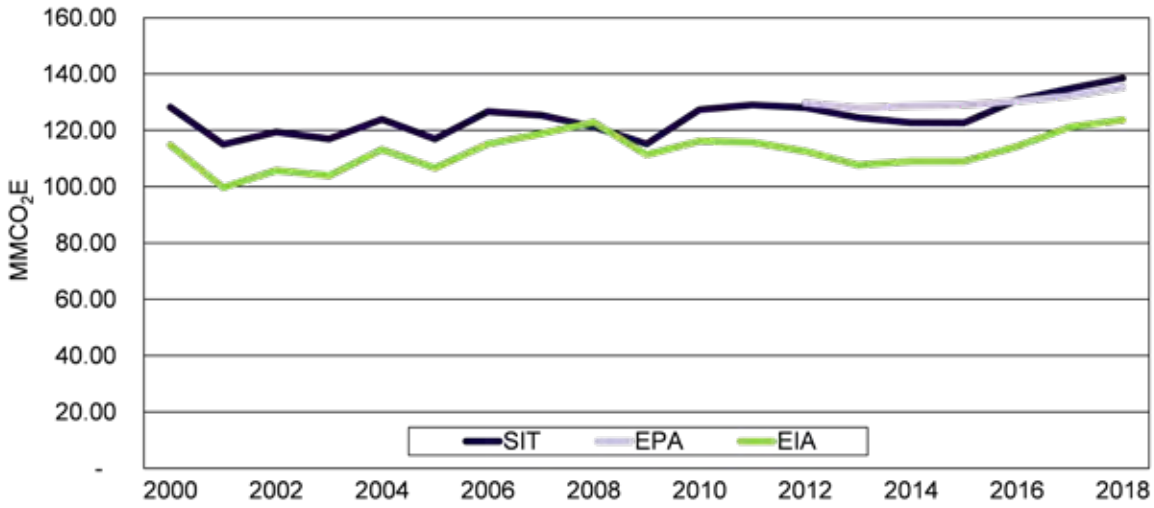
The comparability between the SIT-based estimates and those made by EIA for Louisiana's transportation sector are almost identical. This should come as no surprise since there are very few differences between how the EPA examines these emissions and the EIA. Greater detail on the transportation GHG emissions can be found in Appendix 1: Combustion of Fossil Fuels Module (CO_2 emissions only) and Appendix 5: Mobile Sources Module (CH_4 and N_2O only).The sum of these GHG emissions, on a CO_2E basis, will represent the entirety of Louisiana's transportation related GHG emissions. The chart provided above only examines the combustion related emissions to compare the accuracy of the SIT-estimates to other independent estimates provided by EIA.

4.3 Industrial GHG emission trends:

Louisiana's industrial GHG emission trends are provided in Figure 12. This is the largest GHG emitting sector in the analysis. Louisiana's industrial GHG emissions have increased since 2000 when there was an estimated 120 Mt for combustion related activities only. Industrial GHG emissions remained relatively constant around this level for the better part of a decade, and it was not until 2010, the year in which several large industrial plant expansions started to come on-line, that Louisiana's annual industrial GHG emissions started moving beyond the 120 Mt level. By 2018, Louisiana's industrial GHG emissions (combustion only) were up to around 140 Mt per year.

Figure 12: Louisiana industrial GHG emission trends (combustion only)

Source: Author's estimates using EPA-SIT, EIA, and EPA Flight database.



Three data series are compared within Figure 12: the SIT estimate and EIA estimates discussed earlier, as well as plant-level industrial emissions data that is made available by EPA after 2012 (EPA Flight). The chart shows a good reconciliation across all three series with the EIA data being the lower of the three. The EIA data is likely lower given that it does not include CO_2 emissions from feedstock use of fossil fuels like the SIT and the EPA-FLIGHT information.

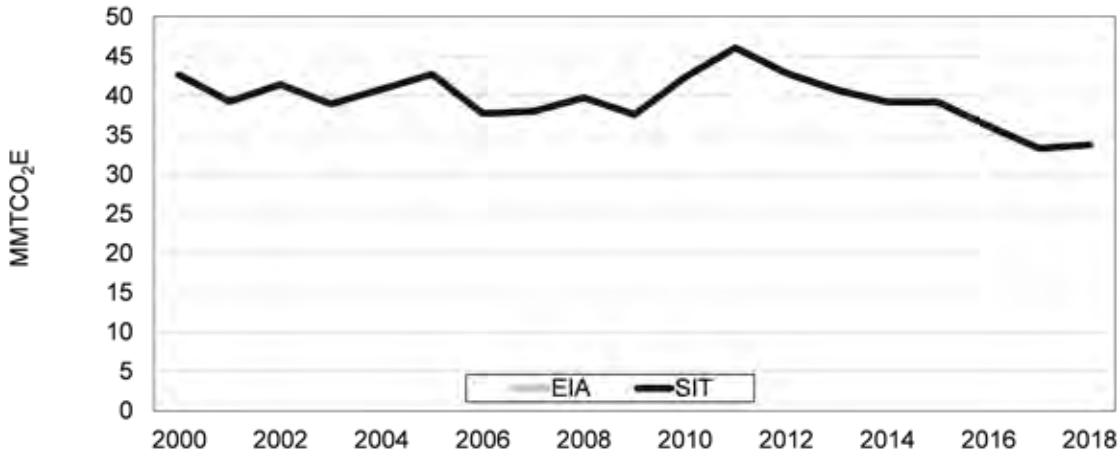
Detailed information on industrial GHG emissions can be found in several appendices and modules. Combustion related (including feedstock use) emissions can be found in Appendix 1: Combustion of Fossil Fuels Module. N_2O and CH_4 emissions are estimated in Appendix 2: Stationary Emissions Module, as well as Appendix 3: Industrial Process Module.

4.4 Power generation GHG emission trends:

Figure 13 examines the recent trends in Louisiana's power generation GHG emissions. The information provided on this chart is associated with all utility and industrial electric power generation facilities.

Figure 13: Louisiana power generation GHG emission trends

Source: Author's estimates using EPA-SIT, EIA.



The GHG emission trends from Louisiana's electric power generation have seen the most improvement of any sector, particularly after 2010. From 2000 to 2010, annual GHG emissions from the power generation sector hovered around 40 Mt. Since 2010, those annual GHG emissions have been on the decline, peaking at 45 Mt and dropping to below 35 Mt in 2018. A significant portion of this emissions reduction has come from increased thermal efficiencies at the state's natural gas fired generation facilities, and the closure of coal generation.

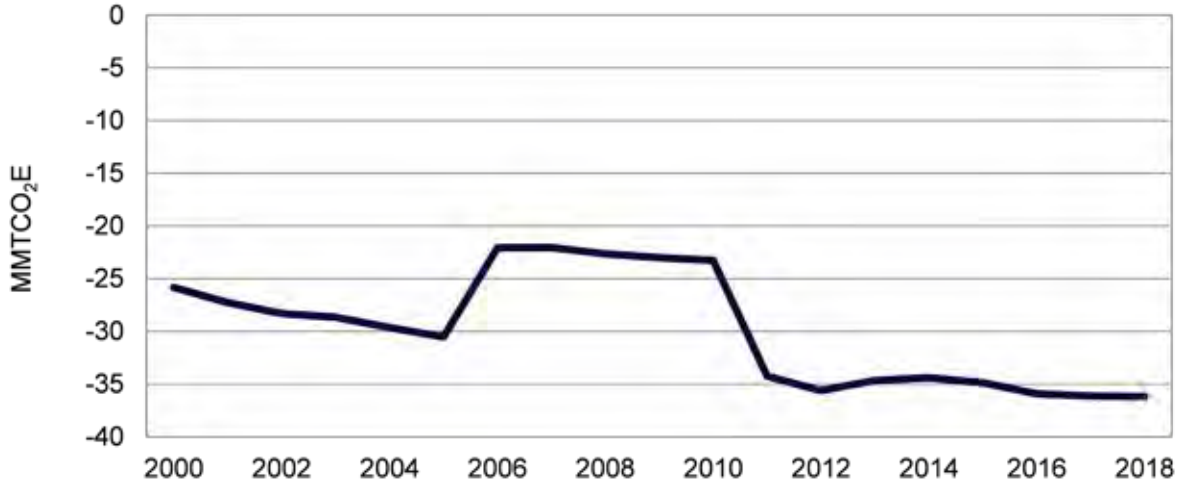
Additional detailed information can be found in Appendix 1: Combustion of Fossil Fuels; however, power generation represents a large sector with very large individual emission sources. This sector, along with Louisiana's industrial sector, has been selected for additional detailed analysis. Part of this analysis will be discussed later in this report; however, a very detailed analysis of the trends in Louisiana's power generation GHG emissions is provided in Appendix 13: Detailed Power Generation Analysis.

4.5 Land use and wetlands GHG emission trends:

Land use, particularly increasing forest area, can serve as a "sink" for sequestering Louisiana's carbon emissions. Louisiana's large forested lands, particularly in the northern part of the state, are a considerable carbon "sink," negative emission resources. This forestry land and other comparable sinks are included in the inventory as a negative number. This emission module reduces overall carbon emissions and does not increase those emission levels. Note that land use and wetlands do not include agricultural emissions. Figure 14 shows the trends in GHG emissions (or sink trends) since 2000.

Figure 14: Louisiana land use and wetlands GHG emission trends

Source: Author's estimates using EPA-SIT and data/preliminary modeling provided by EPA.



This version of the Louisiana GHG inventory, unlike prior estimates, includes the "sink" contribution made by wetlands as well as forests. Wetlands allow for large amounts of carbon sequestration and the restoration of wetlands can help combat greenhouse gas emissions. This addition was made possible by the EPA, which provided preliminary wetlands activity factors that were used in the national level inventory but are not available for the state level SIT modules at this time. The current

sink estimates, therefore, are based upon national, not regional, or state-level emissions factors; however, despite this limitation, the inclusion of wetlands is an important first step for Louisiana's GHG inventory, particularly given the importance of wetlands and coastal restoration to our economy and ecosystem.

Figure 14 shows that historically, Louisiana's GHG sinks increased (in absolute value) from 2000 until the tropical season of 2005. Sinks were increasing in absolute annual value from over 25 Mt to over 30 Mt. But the dual hurricanes of 2005 led to massive land use changes and coastal destruction that converted some forest land to wetlands (lower sink value in absolute terms) and some wetlands to open water. Louisiana was not able to recover this sink capability until after 2010 when the negative trend in emissions began to progress again. Since 2012, all land uses have annually contributed to around a negative 35 Mt of emissions. To put this into perspective, all of Louisiana's land use creates a carbon sink comparable to cover all the emissions from the state's power generation sector.

More information and detail about the various components of these sink estimates can be found in Appendix 11: Land Use and Wetlands Module.

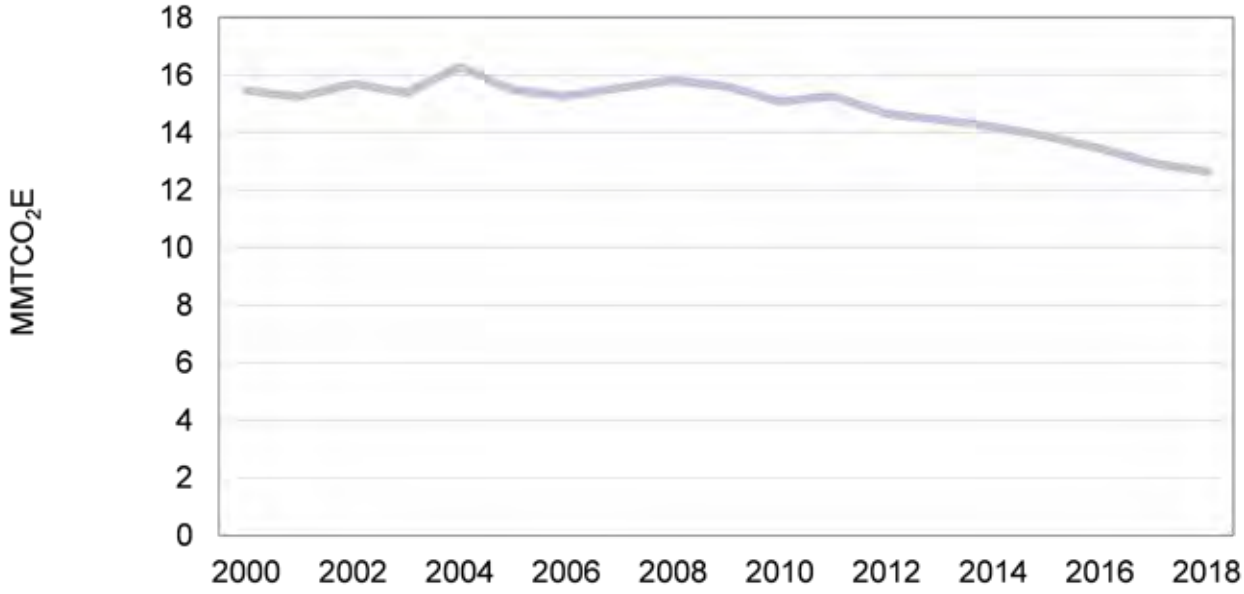
4.6 Natural gas and oil GHG trends:

Louisiana's oil and gas systems emit a variety of GHGs. The two largest GHG pollutants are CO_2 and methane (CH_4). The CO_2 emissions arise from combustion activities at production sites, compression stations, other transmission and distribution activities and refinery operations. The methane emissions arise from all industry sectors, particularly those at the wellhead level (wellhead releases, venting, flaring) and throughout the transmission and distribution pipeline system. Pipeline emissions are a function of the pipe diameter, the mileage of pipe, and pipe composition since some material types, particularly cast iron and bare steel, are more prone to leaks than others. The GHG estimates provided in Figure 15 are from methane emissions and not CO_2 emissions from combustion processes (although they are standardized in CO_2E terms).

Louisiana's oil and gas systems GHG emissions, related to methane alone, were at one time as high as 16 Mt per year. As oil and gas activity has decreased so have these methane related emissions. The 2018 estimates are around 13 Mt. It is important to note that these estimates are based upon the methodologies and emission factors provided that are part of EPA's SIT. No attempt has been made to this baseline estimate to account for the findings of recent research that notes that oil and gas GHG emissions could be considerably higher than past estimates, particularly those arising from SIT methods. Further, some issues were raised in public comments by Healthy Gulf regarding the role that abandoned pipelines play in this sector's GHG emissions. These issues will be discussed in greater detail in a later section of this report addressing emissions uncertainties. Detailed information about this sector can be found in Appendix 7.

Figure 15: Louisiana natural gas and oil systems GHG emission trends

Source: Author's estimates using EPA-SIT.



5 | Annual inventory estimates by sector and module

Three sets of GHG inventories have been developed using the provided data. The first inventory decomposes statewide GHG emissions on the basis of economic sector. The second GHG inventory decomposes emissions by activity type or SIT "module" since GHG emissions are estimated in modules that are defined by activity. The third inventory decomposes GHG emissions by type.

5.1 Louisiana GHG inventory by economic sector:

Table 1 provided below inventories total GHG emissions, by economic sector for the period 2000 to 2018. These emissions follow the discussion and analysis provided in the prior sections of this report; however, the series provided here are for all GHG emissions, not just those associated with combustion activities alone. Thus, the numbers will be slightly higher than examined earlier.

Table 1: Louisiana GHG inventory by economic sector[3]

	Total emissions ($MMTCO_2E$)						
Year	Residential & Commercial	Transportation	Electric Power Generation1	Industrial	Natural Gas Oil Sytems[2]	Other	Total
2000	6.40	62.46	42.76	130.21	15.46	-15.15	**242.13**
2001	5.62	54.89	39.39	117.06	15.24	-15.84	**216.37**
2002	5.41	56.15	41.54	121.54	15.70	-16.95	**223.39**
2003	5.74	55.84	39.07	119.14	15.38	-17.92	**217.25**
2004	5.21	54.70	40.95	126.27	16.29	-18.32	**225.11**
2005	5.06	51.96	42.85	119.28	15.48	-19.47	**215.17**
2006	4.00	55.75	37.86	129.01	15.28	-11.97	**229.92**
2007	5.34	51.27	38.13	127.83	15.55	-11.02	**227.11**
2008	4.32	48.18	39.87	123.72	15.82	-10.79	**221.11**
2009	4.73	47.28	37.74	117.75	15.60	-11.09	**212.00**
2010	5.13	49.90	42.48	130.07	15.08	-12.52	**230.14**
2011	4.74	49.95	46.24	131.84	15.26	-23.56	**224.46**
2012	4.22	45.78	42.99	130.88	14.65	-25.01	**213.52**
2013	4.57	46.04	40.84	127.34	14.45	-23.25	**209.99**
2014	5.10	44.67	39.33	125.63	14.20	-22.81	**206.11**
2015	4.84	48.62	39.27	125.57	13.88	-24.08	**208.10**
2016	4.51	49.22	36.21	133.86	13.44	-25.33	**211.90**
2017	4.36	53.50	33.38	137.77	12.94	-25.51	**216.44**
2018	5.17	49.47	33.84	141.46	12.65	-25.63	**216.96**

[3]Electric power generation includes coal, natural gas oil systems data from 2001-2003 estimated due to incomplete data

5.2 Louisiana GHG inventory by SIT module:

Table 2 below provides Louisiana's GHG inventory, on annual basis from 2000 to 2018, on a per activity or SIT module basis. Note that the total GHG emission level matches the total provided in the prior table. This table shows that over 86 percent of all Louisiana GHG emissions are associated with the combustion of fossil fuels.

Table 2: Louisiana GHG inventory by SIT module

Year	Total emission ($MMTCO_2E$)										
	Agriculture	Coal	Combustion of Fossil Fuels	Industrial Process	Land and Land Use	Mobile Combustion	Municipal Solid Waste	Natural Gas Oil Systems	Stationary Combustion	Wastewater	Total
2000	7.74	0.04	231.58	7.64	-25.85	1.43	2.96	15.46	0.63	0.50	**242.13**
2001	8.20	0.04	207.92	6.58	-27.29	1.34	3.26	15.24	0.59	0.49	**216.37**
2002	8.16	0.05	215.21	7.01	-28.33	1.27	3.22	15.70	0.60	0.50	**223.39**
2003	7.82	0.05	211.02	6.40	-28.67	1.21	2.93	15.38	0.62	0.50	**217.25**
2004	8.35	0.05	218.05	6.68	-29.65	1.10	2.98	16.29	0.71	0.55	**225.11**
2005	8.14	0.05	210.79	6.17	-30.54	0.98	2.94	15.48	0.62	0.55	**215.17**
2006	7.08	0.05	218.48	6.06	-22.08	0.88	3.03	15.28	0.62	0.53	**229.92**
2007	7.83	0.04	214.17	6.45	-22.05	0.78	3.20	15.55	0.60	0.54	**227.11**
2008	8.43	0.05	208.03	6.28	-22.65	0.69	3.44	15.82	0.50	0.54	**221.11**
2009	8.40	0.04	199.75	6.10	-23.01	0.58	3.52	15.60	0.49	0.53	**212.00**
2010	7.87	0.05	219.13	6.77	-23.29	0.56	2.91	15.08	0.53	0.54	**230.14**
2011	7.86	0.04	223.75	7.36	-34.26	0.52	2.84	15.26	0.54	0.55	**224.46**
2012	7.79	0.05	215.81	6.47	-35.64	0.46	2.84	14.65	0.53	0.56	**213.52**
2013	8.37	0.03	210.65	6.56	-34.67	0.44	3.05	14.45	0.54	0.56	**209.99**
2014	8.66	0.03	206.50	6.67	-34.41	0.40	2.94	14.20	0.56	0.56	**206.11**
2015	7.87	0.04	210.00	6.80	-34.90	0.40	2.96	13.88	0.50	0.56	**208.10**
2016	7.53	0.03	214.37	7.89	-35.94	0.41	3.08	13.44	0.53	0.56	**211.90**
2017	7.55	0.03	219.35	8.14	-36.16	0.43	3.11	12.94	0.50	0.56	**216.44**
2018	7.83	0.02	219.76	8.74	-36.20	0.36	2.74	12.65	0.50	0.56	**216.96**

5.3 Louisiana GHG inventory by GHG emissions type:

Table 3 provides the Louisiana GHG inventory by GHG emissions type. The table shows that over 92 percent of all 2018 GHG emissions, on a CO_2E basis, are associated with CO_2 emissions. Methane emissions account for 4.3 percent of total GHG emissions and N_2O emission account for 2.13 percent of all Louisiana GHG emissions.

Table 3: Louisiana GHG inventory by GHG emissions type

Year	Total emissions ($MMTCO_2E$)				
	CO_2	N_2O	CH_4	HFC, PFC NF6, SF6	Total
2000	225.11	5.26	10.08	1.59	242.04
2001	198.67	5.36	10.60	1.65	216.28
2002	205.75	5.35	10.49	1.72	223.31
2003	200.26	5.37	9.77	1.76	217.16
2004	207.54	5.43	10.25	1.79	225.01
2005	198.06	5.10	10.08	1.83	215.06
2006	213.95	4.89	9.19	1.79	229.81
2007	210.11	5.31	9.66	1.92	227.00
2008	203.36	5.26	10.32	2.06	221.00
2009	194.11	5.13	10.46	2.20	211.90
2010	213.26	4.33	10.13	2.32	230.03
2011	207.62	4.96	9.39	2.37	224.34
2012	196.78	4.98	9.28	2.38	213.42
2013	192.48	5.47	9.55	2.39	209.90
2014	188.41	5.48	9.68	2.46	206.03
2015	191.21	4.85	9.46	2.50	208.02
2016	195.17	4.54	9.60	2.52	211.83
2017	199.71	4.68	9.48	2.50	216.37
2018	200.40	4.63	9.37	2.49	216.89

6 | Detailed large source GHG emitters analysis

GHG emission from industrial and power generation sites in Louisiana account for around 75 percent of all of the state's GHG emissions. Thus, any strategy to reduce overall GHG emissions will need to place a considerable amount of attention on these two sectors. Fortunately, both sectors provide relatively detailed GHG emissions information at the plant/generator level. This GHG inventory, unlike CES' prior work in 2000 and 2005, includes a site-specific analysis of these large source emitters. A summary of this analysis is discussed below. The reader should reference the detailed appendices for each analysis for additional information and analysis.

6.1 Power generation analysis:

This report includes a very detailed analysis of historic power generation GHG emissions. The analysis was conducted early in this research project and funded by the Nature Conservancy. This detailed power generation analysis is provided in Appendix 13.

Figure 16 shows that Louisiana's power generation sector is considerably different than the rest of the U.S. While the rest of the country has and continues to rely heavily on coal and natural gas fired generation, most of the electricity generated in Louisiana is produced from natural gas and nuclear, both represent low, or zero GHG emission sources. Over 71 percent of all Louisiana power generation comes from a natural gas fired prime mover.

Figure 16: Louisiana power generation fuel mix

Source: Energy Information Administration.

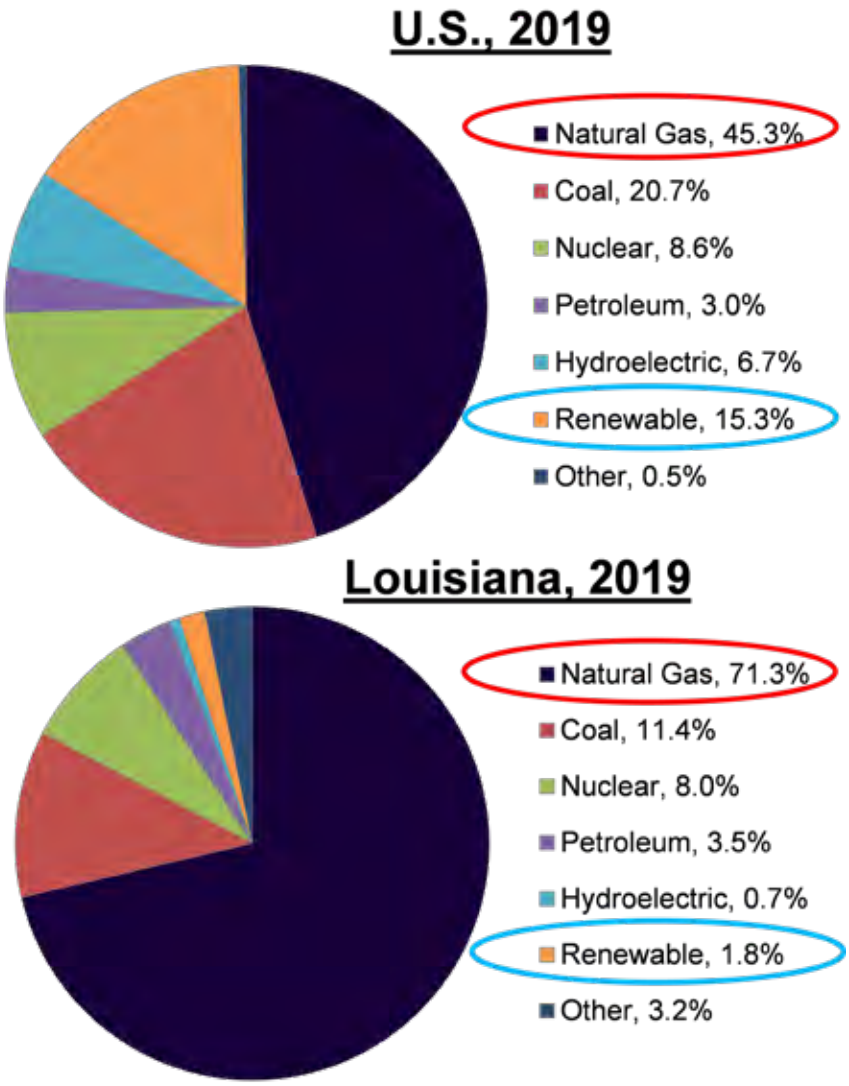


Figure 13, provided earlier, clearly shows that over the past decade, the GHG emissions from Louisiana's power generation facilities have improved dramatically. This improvement has been attributed, in large part, by the increase in thermal efficiencies at the active facilities in the state. While some units have been shut down over the past decade, the state continues to see overall capacity growth. This growth, and its increased generation, however, has not resulted in any new net GHG emissions. Overall, these GHG emission have fallen due to the improved heat rates, or thermal efficiencies, of the newer replacement generators (see Figure 17) that are all run on natural gas.

Figure 17: Louisiana power generation thermal efficiency trends

Source: Energy Information Administration and EPA eGrids.

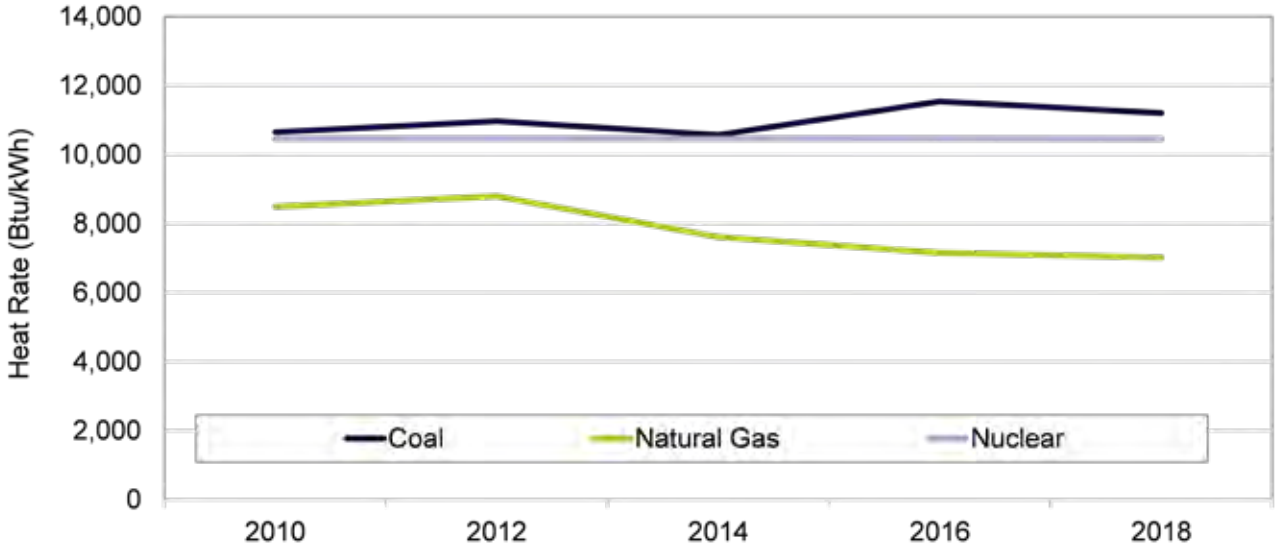


Table 4 below provides a listing of the top 10 GHG emission sources from Louisiana's power generators.

Table 4: Top 10 power generation GHG sources

Facility	Primary Fuel	CO_2 Emissions (tons)				
		2010	2012	2014	2016	2018
Brame Energy Center	Coal	6,056,503	5,891,000	7,413,244	7,085,451	7,706,781
Big Cajun 2	Coal	13,707,365	11,034,921	11,710,895	6,491,832	5,222,001
Ninemile Point	Natural Gas	3,108,900	2,889,195	2,671,810	4,603,281	4,540,252
Nelson Industrial Steam Co.	Petroleum Coke	1,508,339	n.a.	2,046,282	2,204,305	2,147,748
Taft Cogeneration Facility	Natural Gas	2,400,920	2,232,926	2,446,573	2,390,342	2,117,677
Acadia Power Station	Natural Gas	1,350,490	2,060,818	1,973,816	2,878,268	1,953,255
Dolet Hills Power Station	Coal	5,424,155	5,678,438	3,244,987	3,750,931	1,674,703
Perryville Power Station	Natural Gas	847,109	1,138,930	1,425,702	1,373,639	1,637,373
Ouachita Plant	Natural Gas	499,904	673,382	1,458,381	1,562,408	1,627,090
Plaquemine Cogen Facility	Natural Gas	1,470,373	1,689,653	1,459,147	1,866,356	1,565,446
Total		**36,374,058**	**33,289,264**	**35,850,838**	**34,206,814**	**30,192,324**
Percent of Total Louisiana		**63%**	**56%**	**71%**	**73%**	**71%**

Lastly, Figure 18 provides a map that shows the location for each of the large power generation GHG emission sources in Louisiana. These resources are located throughout the state given the need to diversify resources to meet various in-state electrical loads.

Figure 18: Louisiana power generation GHG emission source locations

Source: Author's construct using EIA information.

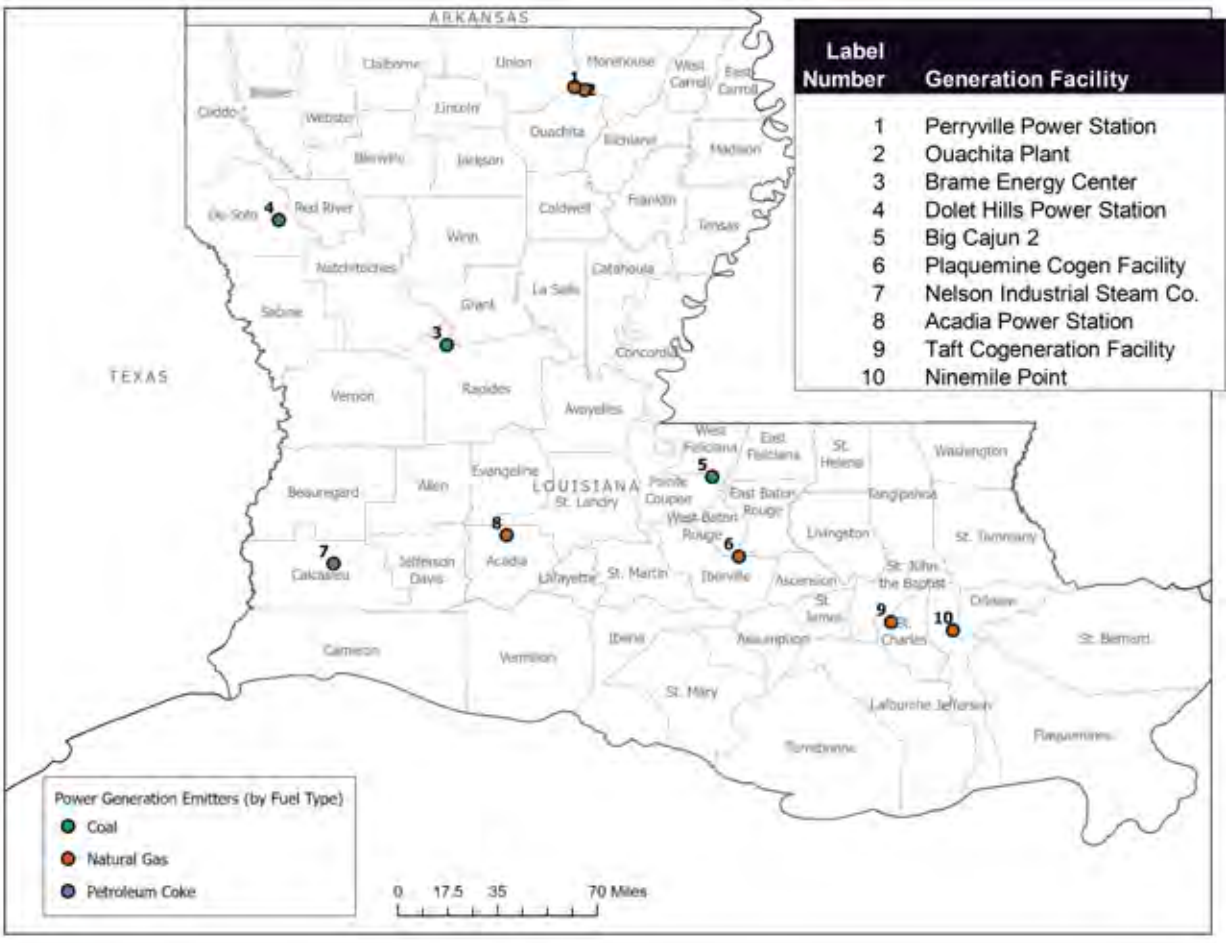


Table 5: GHG emissions from electricity consumption (2018)

Sector	2018 $MMTCO_2E$
Residential	12.78
Commercial	9.84
Industrial	14.92
Transporation	0.00
TOTAL	**37.55**

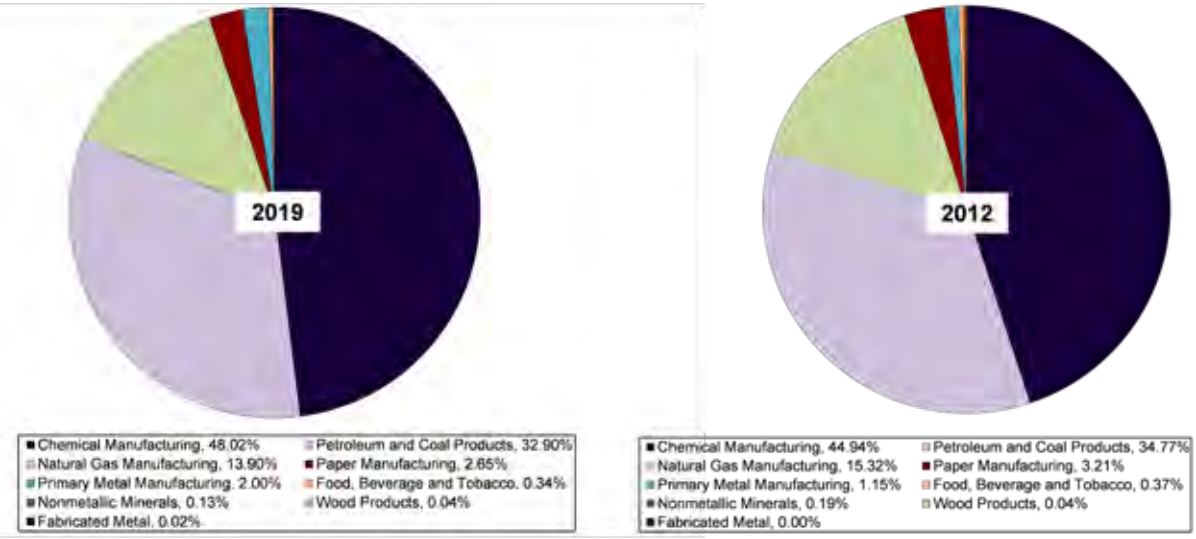
Table 5 provides estimates for GHG emissions from electricity end uses. The detail for these per sector electricity consumption-related GHG emissions estimates is provided in Appendix 4.

6.2 Industrial plant analysis:

A detailed GHG emissions analysis, using plant-specific information, for each industrial location has been provided in Appendix 12. This section summarizes some of the key findings of the analysis. Figure 19 shows that most of the state's industrial GHG emissions are concentrated in the chemical and refining sectors. These concentrations have only increased from 2012 to 2019, the years in which detailed, site-specific industrial GHG emissions information was made available.

Figure 19: Louisiana industrial GHG emission shares by sector (2012, 2019)

Source: EPA FLIGHT



Louisiana's industrial GHG emissions, which have been estimated via the SIT in this report, are very close to actuals, provided by EPA FLIGHT, as well as those estimated by EIA (see Figure 20). In addition, all three sources of information (FLIGHT, SIT, EIA) estimate or show that Louisiana's industrial emissions have been growing while the U.S. industrial average GHG emissions have been falling. Louisiana's 2018 industrial GHG emissions were between 8 to 12 percent higher (depending upon estimates/source) than 2012 levels. By comparison, U.S. industrial GHG emissions are down by over 10 percent since 2012.

Figure 20: U.S. and Louisiana industrial GHG emission trends

Source: EPA FLIGHT, SIT (author's estimates), EIA

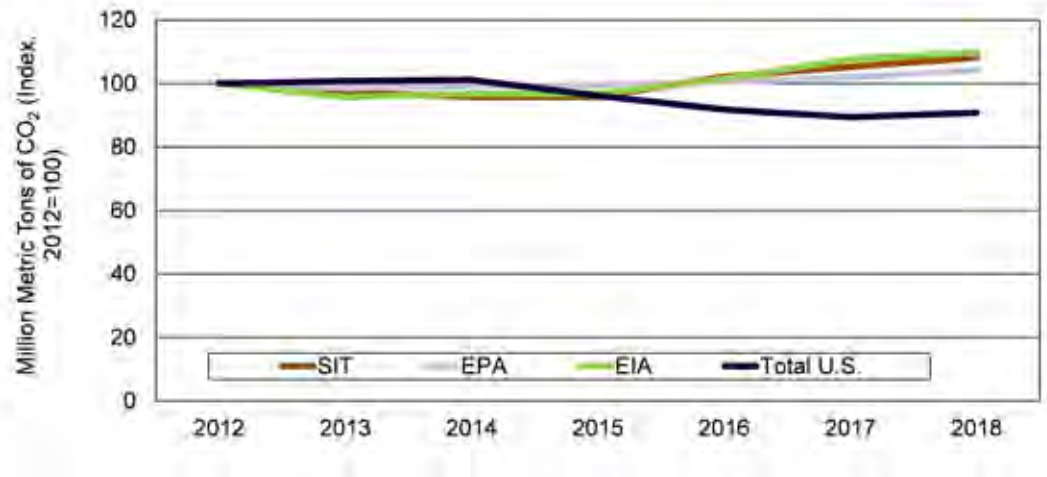


Table 6 lists the top 20 industrial GHG emission sources in Louisiana from the highest to the lowest based upon 2019 emission levels. This listing is strictly for industrial emitters and does not include large power generation facilities. These top 20 industrial facilities in Louisiana currently emit around 61 Mt per year. This is up considerably (29.6 percent) from the 47 Mt reported in 2012 for these top 20 industrial facilities; however, most of these large facilities are also those that have seen considerable capital investment and plant expansions over the past decade.

CF Industries, a large ammonia production facility in Louisiana, is the top GHG industrial emitter in the state. This facility, however, has seen considerable expansion over the past decade and is one of the largest of its type in the world. The increase in GHG emissions, from 2012 to current, mirrors the expansion of productive capacity at this plant.

The ExxonMobil Baton Rouge refinery is the second largest industrial GHG emission source in the state. Emissions for this facility have been relatively flat since 2012, despite seeing some mild productive capability expansions through normal efficiency gains and capacity creep. This refinery reported 2019 GHG emissions (6.3 Mt) that were slightly lower than those in 2012 (6.4 Mt).

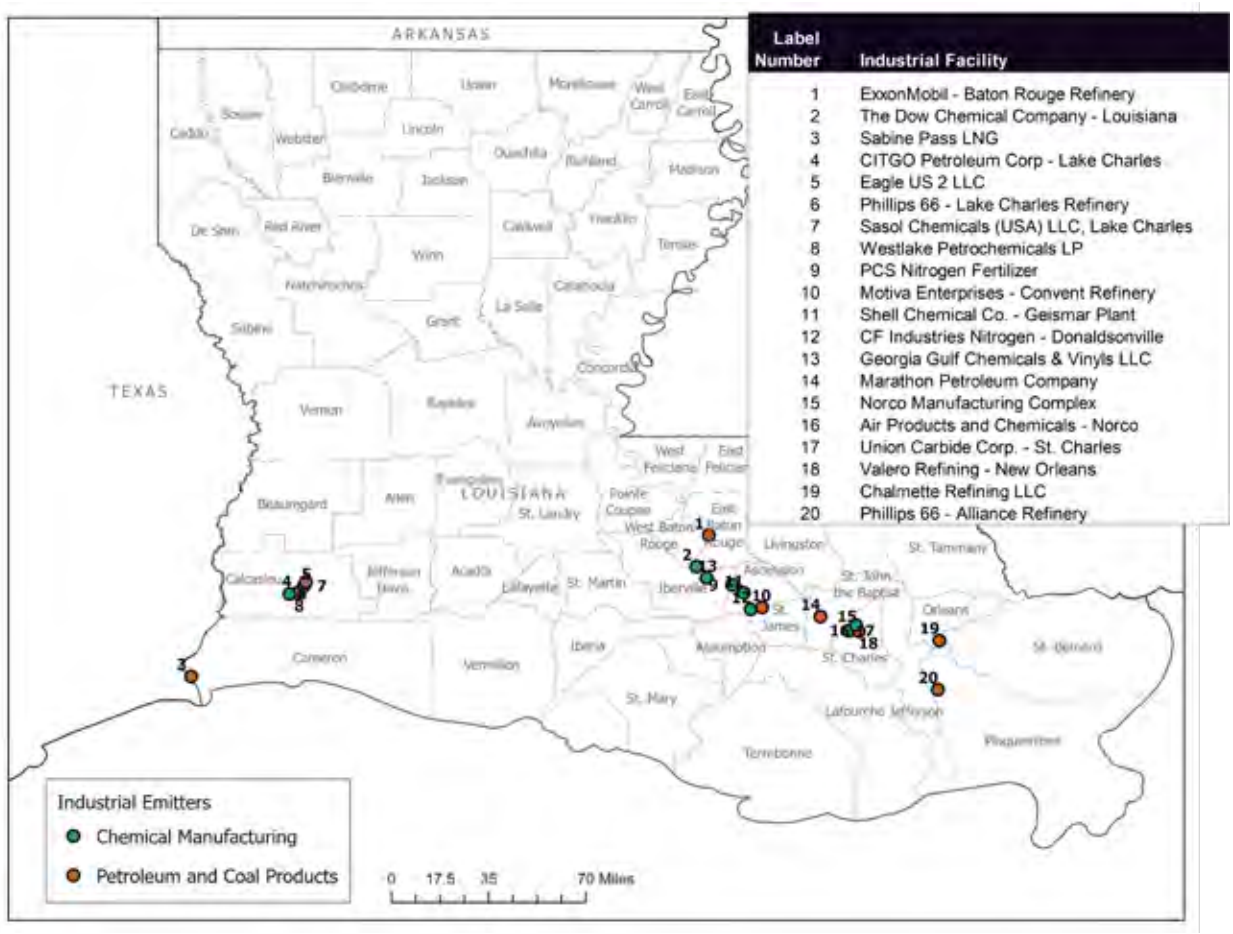
Table 6: Top 20 Louisiana industrial GHG emission sources

Facility Name	Facility Type	2012	2013	2014	2015	2016	2017	2018	2019
		(metric tons Co_2)							
CF Industries Nitrogen - Donaldsonville	Chemical Manufacturing	6,854,462	6,921,307	6,716,321	7,985,546	7,829,243	8,730,636	8,685,862	10,005,456
ExxonMobil - Baton Rouge Refinery	Petroleum and Coal Products	6,475,810	6,355,424	6,286,678	6,000,189	6,213,242	6,131,245	6,380,368	6,360,077
Sabine Pass LNG	Petroleum and Coal Products	62,003	59,472	173,625	181,518	1,259,324	3,383,744	4,197,628	5,093,801
CITGO Petroleum Corp-Lake Charles	Petroleum and Coal Products	4,370,519	4,587,270	4,792,825	4,723,531	4,652,445	4,681,829	4,895,572	4,703,535
Marathon Petroleum Company	Petroleum and Coal Products	3,958,139	3,946,970	3,956,022	3,978,498	3,806,019	4,040,303	4,103,370	3,967,921
Norco Manufacturing Complex	Petroleum and Coal Products	4,032,242	3,586,525	3,596,965	3,522,732	3,981,844	4,071,427	3,901,231	3,961,652
Eagle US 2 LLC	Chemical Manufacturing	2,991,200	3,053,842	2,843,695	2,787,825	2,673,863	2,894,510	2,962,654	3,307,323
Union Carbide Corp-St Charles	Chemical Manufacturing	2,089,716	2,830,069	2,905,740	2,868,338	2,881,109	2,957,077	3,053,784	2,970,876
Phillips 66 - Alliance Refinery	Petroleum and Coal Products	2,175,659	2,416,372	2,122,581	1,973,789	2,582,034	2,803,216	2,741,632	2,697,634
Valero Refining-New Orleans	Petroleum and Coal Products	2,395,982	2,764,110	2,606,177	2,529,869	2,800,860	2,535,694	2,528,290	2,312,540
Motiva Enterprises - Convent Refinery	Petroleum and Coal Products	2,044,250	1,985,611	2,089,138	2,271,203	2,371,145	2,370,044	2,165,013	2,301,471
Sasol Chemicals (USA) LLC, Lake Charles Chemical Complex	Chemical Manufacturing	724,244	743,325	808.304	781,522	771,955	780.782	818,956	1,798.680
The Dow Chemical Company — Louisiana Operations	Chemical Manufacturing	2,736,145	2,684,825	2,728,810	2,527,725	2,418,381	2,659,951	2,152,003	1,919,713
Phillips 66 - Lake Charles Refinery	Petroleum and Coal Products	1,624,822	1,682,175	1,584,268	1,739,973	1,730,893	1,779,721	1,896,562	1,730,933
Chalmette Refining LLC	Petroleum and Coal Products	1,582,620	1,473,867	1,533,904	1,601,253	1,614,862	1,604,410	1,653,272	1,601,075
Georgia Gulf Chemicals & Vinyls LLC	Chemical Manufacturing	1,377,625	1,349,492	1,291,403	1,271,561	1,137,967	1,168,226	1,215,427	1,149,415
Air Products and Chemicals - Norco	Chemical Manufacturing	———	———	844,232	1,139,730	1,156,879	1,169,458	1,073,525	1,072,351
Shell Chemical Co. - Geismar Plant	Chemical Manufacturing	918,606	907,640	939,534	933,213	898,534	917,053	980,823	1,064,539
PCS Nitrogen Fertilizer	Chemical Manufacturing	342,861	1,439,791	1,684,388	1,452,448	1,302,763	1,244,129	1,230,111	1,428,934
Westlake Petrochemicals LP	Chemical Manufacturing	1,055,582	1,157,973	2,102,927	901,198	785,374	896,666	740,227	1,034,631
Total		**47, 812, 487**	**49,946,058**	**51,607,536**	**51,171,663**	**52,868,737**	**56,820,121**	**57,376,309**	**60,482,558**
Average		**2,390,624**	**2,497,303**	**2,580,377**	**2,558,583**	**2,643,437**	**2,841,006**	**2,868,815**	**3,024,128**

Lastly, Figure 21 below provides a map that shows where all of the top 20 industrial GHG emission sources are located. Most of the large industrial GHG emission sources are located in the river corridor between Baton Rouge and New Orleans, and in the greater Lake Charles region.

Figure 21: Louisiana industrial GHG emission source locations

Source: Author's construct using EPA FLIGHT.



Label Number	Industrial Facility
1	ExxonMobil - Baton Rouge Refinery
2	The Dow Chemical Company - Louisiana
3	Sabine Pass LNG
4	CITGO Petroleum Corp - Lake Charles
5	Eagle US 2 LLC
6	Phillips 66 - Lake Charles Refinery
7	Sasol Chemicals (USA) LLC, Lake Charles
8	Westlake Petrochemicals LP
9	PCS Nitrogen Fertilizer
10	Motiva Enterprises - Convent Refinery
11	Shell Chemical Co. - Geismar Plant
12	CF Industries Nitrogen - Donaldsonville
13	Georgia Gulf Chemicals & Vinyls LLC
14	Marathon Petroleum Company
15	Norco Manufacturing Complex
16	Air Products and Chemicals - Norco
17	Union Carbide Corp. - St. Charles
18	Valero Refining - New Orleans
19	Chalmette Refining LLC
20	Phillips 66 - Alliance Refinery

6.3 Total large emission sources compilation:

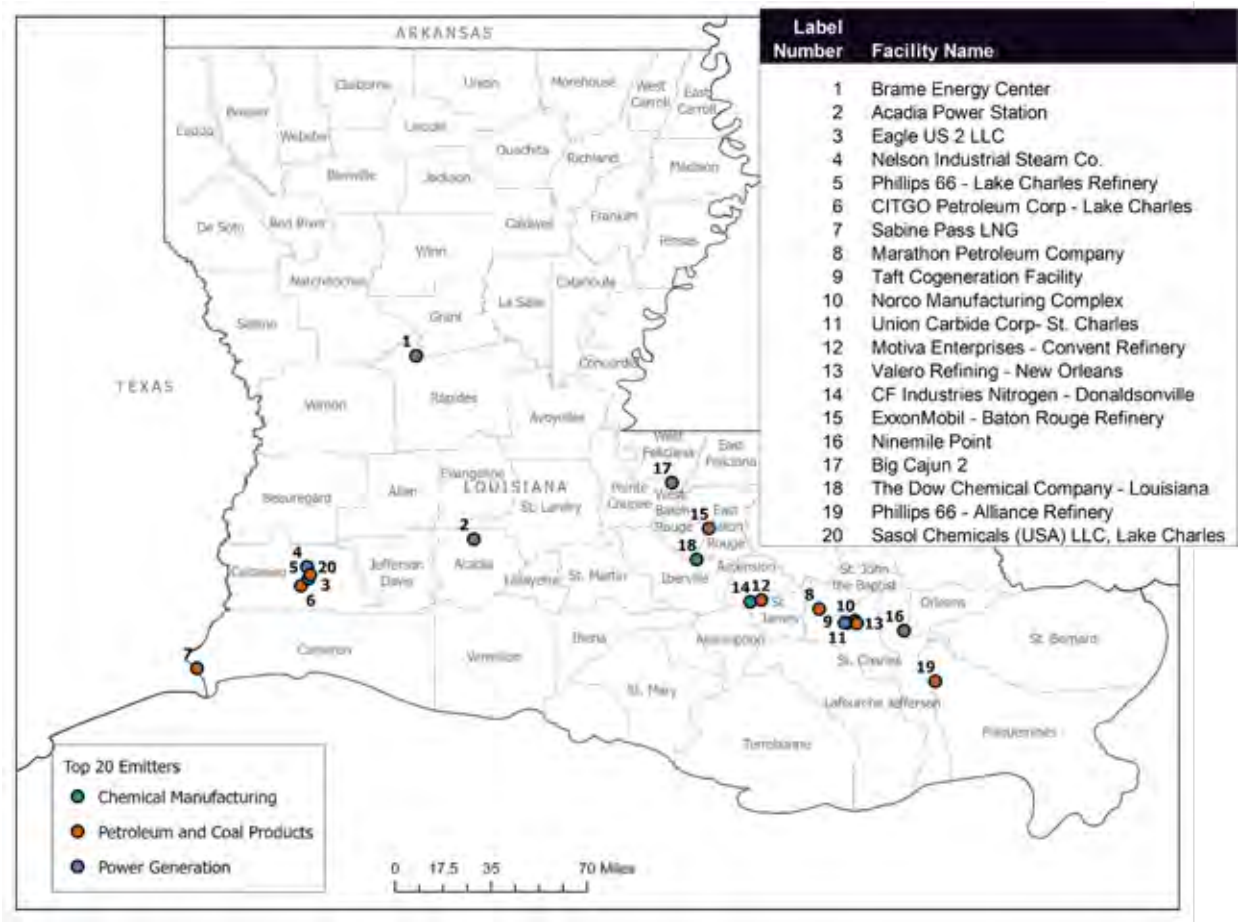
Table 7 combines the information provided in the prior two sub-sections to provide a composite table of the top 20 GHG locations in the state and their recent emission trends. Figure 22 maps those large GHG emission point sources.

Table 7: Louisiana's top 20 GHG emission sources

Facility Name	Facility Type	2012	2013	2014	2015	2016	2017	2018	2019
		(metric tons Co_2)							
CF Industries Nitrogen - Donaldsonville	Chemical Manufacturing	6,854,462	6,921,307	6,716,321	7,985,546	7,829,243	8,730,636	8,685,862	10,005,456
ExxonMobil - Baton Rouge Refinery	Petroleum and Coal Products	6,475,810	6,355,424	6,286,678	6,000,189	6,213,242	6,131,245	6,380,368	6,360,077
Brame Energy Center	Power Generation	5,359,464	7,645,036	6,736,624	6,187,695	6,439,245	6,122,036	7,017,058	5,409,289
Sabine Pass LNG	Petroleum and Coal Products	62,003	59,472	173,625	181,518	1,259,324	3,383,744	4,197,628	5,093,801
CITGO Petroleum Corp-Lake Charles	Petroleum and Coal Products	4,370,519	4,587,270	4,792,825	4,723,531	4,652,445	4,681,829	4,895,572	4,703,535
Ninemile Point	Power Generation	2,623,616	2,593,656	2,429,350	4,188,948	4,184,056	3,933,459	4,127,523	4,648,623
Marathon Petroleum Company	Petroleum and Coal Products	3,958,139	3,946,970	3,956,022	3,978,498	3,806,019	4,040,303	4,103,370	3,967,921
Norco Manufacturing Complex	Petroleum and Coal Products	4,032,242	3,586,525	3,596,965	3,522,732	3,981,844	4,071,427	3,901,231	3,961,652
Eagle US 2 LLC	Chemical Manufacturing	2,991,200	3,053,842	2,843,695	2,787,825	2,673,863	2,894,510	2,962,654	3,307,323
Union Carbide Corp- St. Charles	Chemical Manufacturing	2,089,716	2,830,069	2,905,740	2,868,338	2,881,109	2,957,077	3,053,784	2,970,876
Big Cajun 2	Power Generation	10,089,916	10,861,384	10,708,000	7,081,709	5,927,192	6,015,925	4,773,731	2,927,335
Phillips 66 - Alliance Refinery	Petroleum and Coal Products	2,175,659	2,416,372	2,122,581	1,973,789	2,582,034	2,803,216	2,741,632	2,697,634
Valero Refining-New Orleans	Petroleum and Coal Products	2,395,982	2,764,110	2,606,177	2,529,869	2,800,860	2,535,694	2,528,290	2,312,540
Motiva Enterprises - Convent Refinery	Petroleum and Coal Products	2,044,250	1,985,611	2,089,138	2,271,203	2,371,145	2,370,044	2,165,013	2,301,471
Taft Cogeneration Facility	Power Generation	2,190,413	2,171,509	2,285,092	2,081,806	2,441,617	2,325,817	2,239,733	2,399,413
Acadia Power Station	Power Generation	1,871,463	1,543,046	1,792,453	2,608,097	2,613,802	1,881,625	1,773,782	1,970,577
The Dow Chemical Company — Louisiana Operations	Chemical Manufacturing	2,736,145	2,684,825	2,728,810	2,527,725	2,418,381	2,659,951	2,152,003	1,919,713
Nelson Industrial Steam Co.	Power Generation	1,857,195	1,809,776	1,741,839	1,477,709	1,873,435	1,872,199	1,833,362	1,764,981
Sasol Chemicals (USA) LLC, Lake Charles Chemical Complex	Chemical Manufacturing	724,244	743,325	808,304	781,522	771,955	780,782	818,956	1,798,680
Phillips 66 - Lake Charles Refinery	Petroleum and Coal Products	1,624,822	1,682,175	1,584,268	1,739,973	1,730,893	1,779,721	1,896,562	1,730,933
Total		**66,527,259**	**70,241,702**	**68,904,508**	**67,498,222**	**69,451,705**	**71,971,241**	**72,248,114**	**72,251,830**
Average		**3,326,363**	**3,512,085**	**3,445,225**	**3,374,911**	**3,472,585**	**3,598,562**	**3,612,406**	**3,612,591**

Figure 22: Louisiana large GHG emission source locations

Source: Author's construct using EPA FLIGHT.



7 | Large industrial emissions projections

As noted earlier, most of Louisiana's GHG emissions come from large industrial facilities. There is a potential that these industrial emissions could grow as new industrial locations are developed. This is particularly true for LNG export facilities, an industrial sector that is (a) growing rapidly and (b) has large individual location GHG emissions profiles that are likely around the 5 Mt level per year or higher.

Several industrial project announcements, to date, have requested air permits from the Louisiana Department of Environmental Quality (DEQ) as part of their business development process. Information on these facilities permitting requests is available on-line within DEQ's Environmental Document Management System (EDMS). Furthermore, the Environmental Integrity Project (EIP), a non-profit environmental advocacy group, compiles this type of permitting information for Louisiana and other states in an easily-accessible database.[4] CES utilized the EIP database in order to ascertain permitting GHG emissions levels. CES spot-checked and compared several entries in the EIP database to the original DEQ/EDMS to assure accuracy.

[4] For information about EIP, see https://environmentalintegrity.org/. The data series collecting air permit information can be found at: https://environmentalintegrity.org/oil-gas-infrastructure-emissions/.

It is important to note that the use of air permits to estimate future GHG emissions is conservative since it is not uncommon to seek permits for the upper end of an individual facilities' emissions levels. Moreover, because a facility is authorized for a fixed level of emissions does not entail that it will emit at that level on a year-end and year-out basis. Further, the use of the permitted emissions levels does not consider future efficiency gains and opportunities in Louisiana's industrial sector. Thus, these industrial projections should be considered as the "outer boundary" or "book end" of future industrial GHG emissions given current project announcements. As project announcements increase, however this book end will also expand.

Figure 23 shows the incremental new GHG emission levels that have been permitted at DEQ as of September 2021. Information from 2019 forward is utilized to carry forward the earlier GHG industrial inventory estimates. A noticeable surge in emissions arises in the 2023-to-2026 time period which is primarily based on the approved permits for several very large LNG facilities.

Figure 23: Projected industrial GHG emissions

Source: Environmental Integrity Project, LDEQ

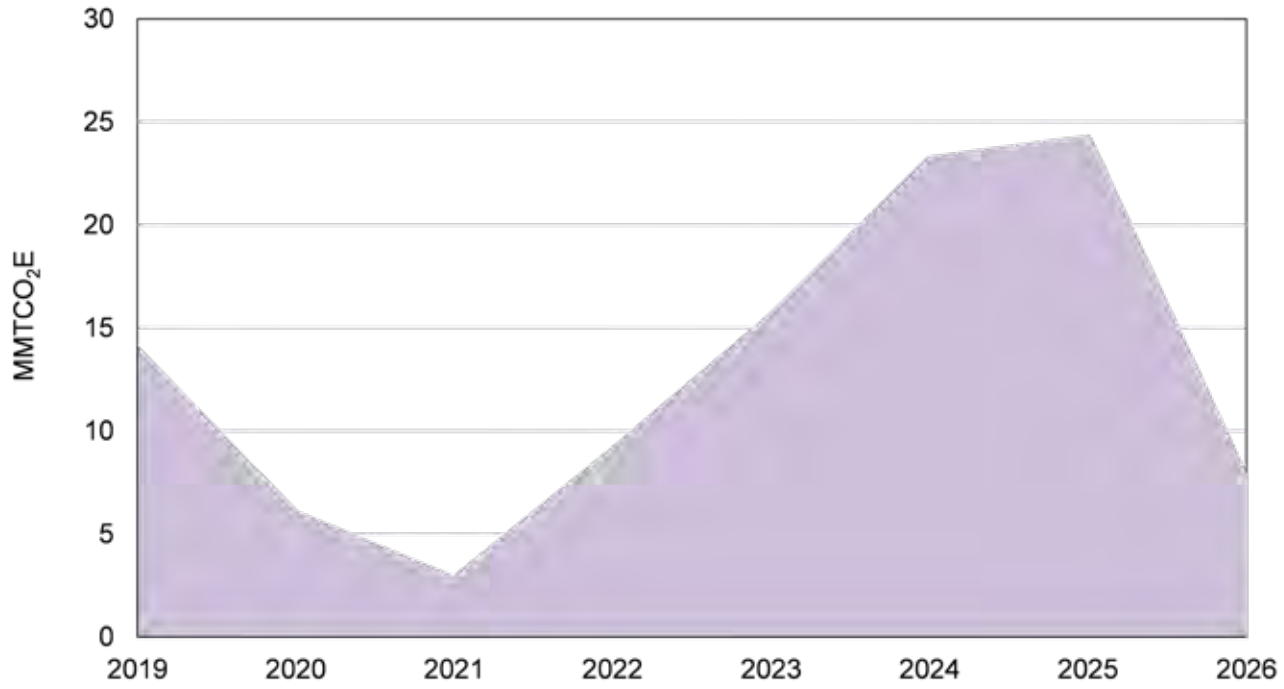


Figure 24 charts incremental industrial GHG emissions from 2019 to 2026. Again, the rapid growth post 2023 is attributable to LNG export facility development. Cumulative new industrial GHG emissions, based on announced project that have received air permits, is 120 Mt.

Figure 24: Cumulative industrial GHG emissions (proposed projects only)

Source: Environmental Integrity Project, LDEQ

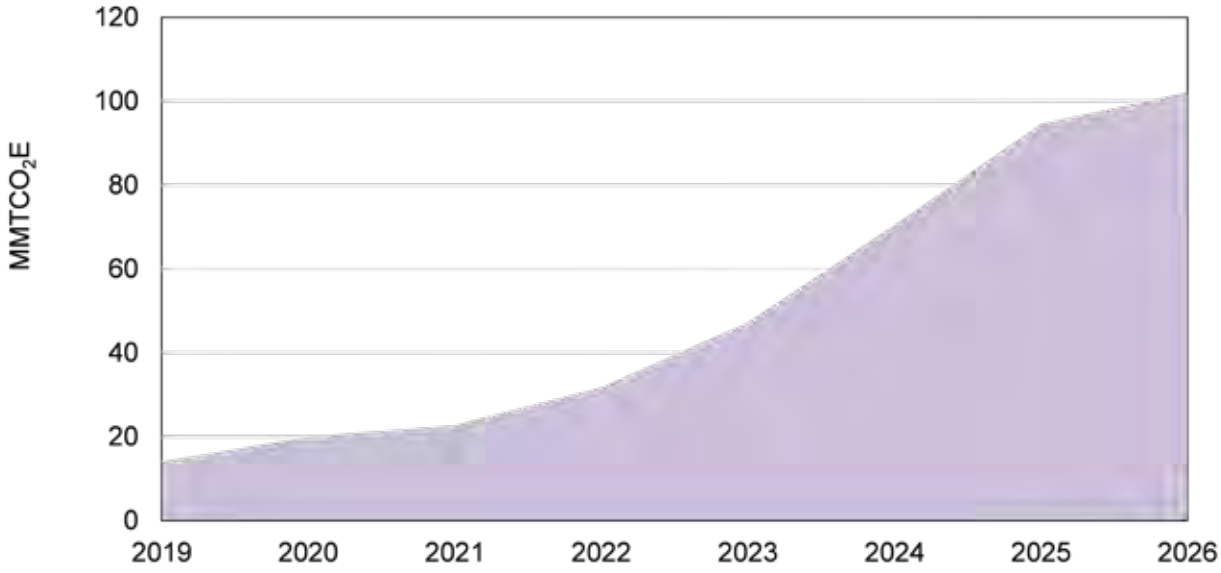


Figure 25 below brings together the industrial GHG inventory from 2000 and merges this data with the projections discussed above. As noted earlier, 2018 industrial GHG emissions are estimated at around 142 Mt. Adding this amount with the additional 101 Mt from the projected, permitted GHG emissions, results in a potential statewide total industrial emissions level of around 243 Mt. Again, this projection assumes (1) annual industrial GHG emissions that are exactly at permitted levels for each and every year those new facilities are in operation and (2) no change in GHG emissions from the existing industrial base present at the end of the GHG inventory (2018).

Figure 25: Total projected industrial GHG emissions (existing facilities and new project proposals)

Source: Environmental Integrity Project, LDEQ

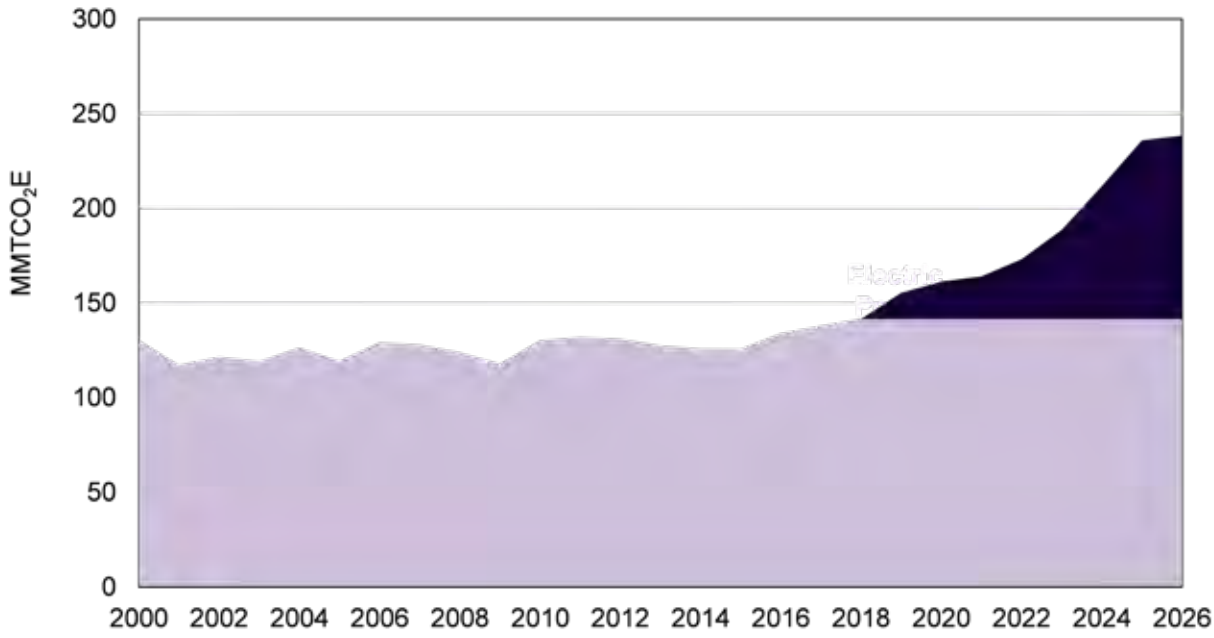


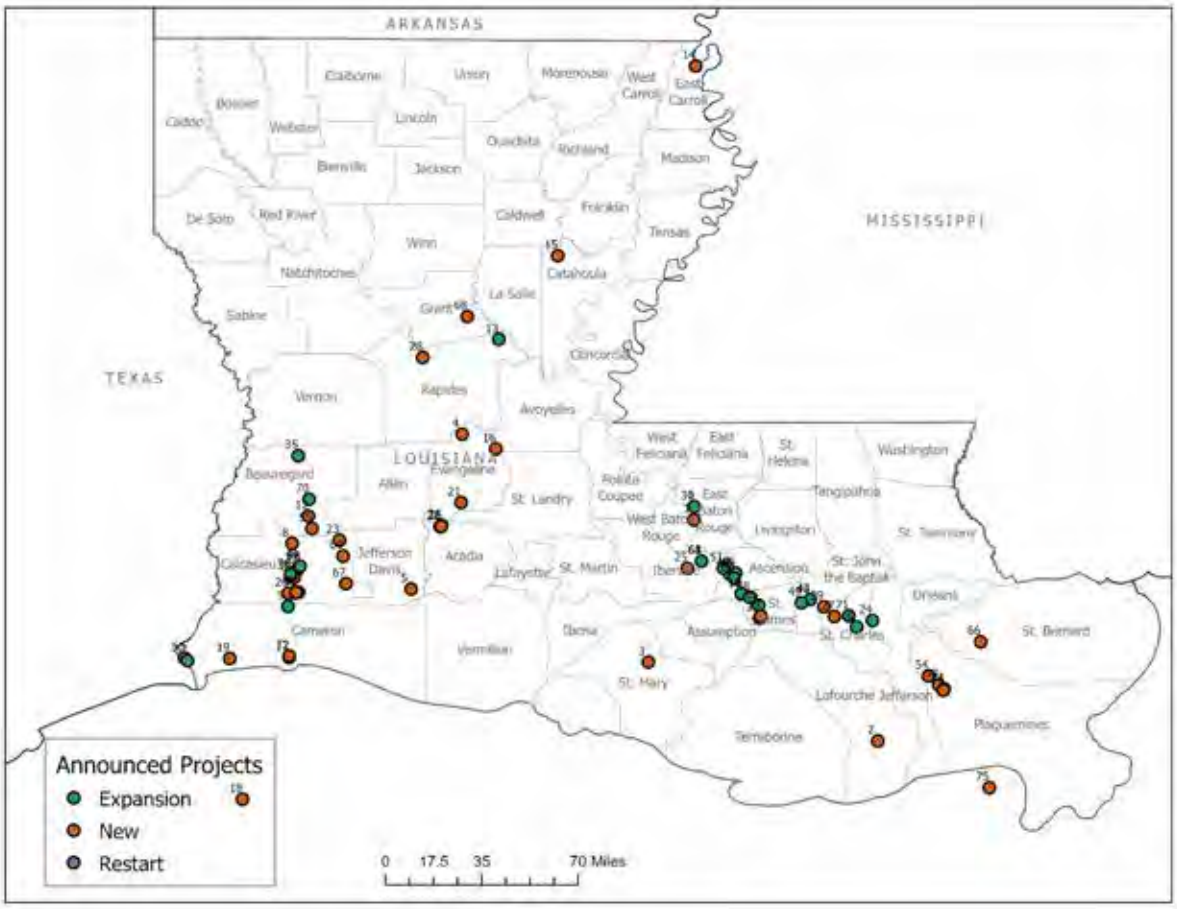
Table 8 provides additional information on potential future GHG emissions levels by sector over the entire period 2019-2026. Figure 26 provides a map of the location of these potential new industrial GHG emission sources.

Table 8: Projected additional industrial GHG emissions by sector in 2026

Category	$MMTCO_2E$
Natural Gas	3.14
LNG	54.94
Fertilizer and Pesticides	5.38
Plastics	0.01
Chemcial	35.57
Refining	2.94
Total	**101.99**

Figure 26: Location of announced industrial projects (based on approved/pending air permits)

Source: Environmental Integrity Project, LDEQ



Label Number	Facility Name
1	Air Liquide Large Industries U.S. LP
2	ANR Pipeline Company (dba TC Energy)
3	ANR Pipeline Company (dba TC Energy)
4	ANR Pipeline Company (dba TC Energy)
5	ANR Pipeline Company (dba TC Energy)
6	Bayer CropScience LP (Monsanto)
7	Big Lake Fuels, LLC (G2X Energy)
8	Cameron Interstate Pipeline, LLC
9	Cameron LNG, LLC (dba Sempra Energy)
10	CF Industries
11	CF Industries Nitrogen, LLC
12	Cheniere Creole Trail Pipeline LP (Cheniere Energy)
13	Columbia Gulf Transmission Co.
14	Columbia Gulf Transmission, LLC (dba TC Energy)
15	Columbia Gulf Transmission, LLC (dba TC Energy)
16	Columbia Gulf Transmission, LLC (dba TC Energy)
17	Commonwealth LNG LLC
18	Delfin LNG, LLC (dba Fairwood Peninsula Energy Corporation)
19	Delfin LNG, LLC (dba Fairwood Peninsula Energy Corporation)
20	Driftwood LNG, LLC (dba Tellurian)
21	Driftwood Pipeline LLC
22	Driftwood Pipeline LLC
23	Driftwood Pipeline LLC
24	Dyno Nobel Louisiana Ammonia
25	Enlink Processing Services, LLC
26	Enlink Processing Services, LLC
27	Enterprise Pelican Pipeline LP
28	Enterprise Products Operating LLC
29	Eurochem Louisiana, LLC
30	ExxonMobil
31	ExxonMobil Chemical Company
32	FG LA, LLC (Formosa Plastics)
33	IGP Methanol
34	Indorama Ventures Olefins LLC
35	Ingevity South Carolina LLC (Ingevity Corporation)
36	Kinder Morgan Louisiana Pipeline, LLC
37	LACC LLC (formerly Eagle US 2 LLC)
38	Lake Charles LNG LLC (dba Energy Transfer LP)

Label Number	Facility Name
39	Lake Charles Methanol, LLC
40	Louisiana Integrated Polyethylene JV LLC
41	Magnolia LNG, LLC
42	Marathon Petroleum, LLC
43	Marathon Petroleum, LLC
44	Marathon Petroleum, LLC
45	MCC Methacrylates Americas Inc
46	Methanex USA
47	Methanex USA
48	Mosaic Fertilizer LLC
49	Mt. Airy Terminal LLC
50	Natural Gas Pipeline Company of America, LLC (dba Kinder Morgan)
51	NOVA Chemicals (formerly Williams Olefins)
52	Phillips 66
53	Phillips 66
54	Plaquemines Liquid Terminal, LLC
55	Port Arthur Pipeline LLC (dba Sempra Energy)
56	Praxair, Inc.
57	Sabine Pass LNG LP (dba Cheniere Energy)
58	Sasol North America, Inc.
59	Sasol North America, Inc.
60	Shell Chemical LP
61	Shintech Louisiana LLC
62	Shintech Louisiana, LLC
63	Shintech Louisiana, LLC
64	Shintech Louisiana, LLC
65	South Louisiana Methanol, LP
66	Tennessee Gas Pipeline Company, LLC
67	Texas Eastern Transmission LP
68	TopChem Pollock, LLC
69	Trunkline Gas Company (dba Energy Transfer L.P.)
70	Trunkline Gas Company (dba Energy Transfer L.P.)
71	Valero Refining- New Orleans, LLC
72	Venture Global Calcasieu Pass, LLC
73	Venture Global Delta LNG, LLC
74	Venture Global Plaquemines LNG, LLC
75	West Delta LNG, LLC (dba LNG21, LLC)
76	Westlake Polymers
77	YCI Methanol One, LLC (dba Koch Methanol Investments, LLC)

8 | GHG inventory estimate uncertainties

The GHG estimation process is similar to many other types of modeling exercises in that a large part of the empirical results are a function of the input, assumptions, and data used in the calculations. As noted earlier, the underlying methods for estimating activity and sector specific emissions is through the product of (1) an emissions activity factor as measured in pounds per activity level and (2) an activity level, as measured in MWhs generated, or MMBtus of fuel combusted. Thus, the uncertainties that arise in the estimation of GHG emissions, using the EPA's SIT, are primarily associated with measurement and assumption errors in either (1) the emissions activity factor itself or (2) the activity level data.

Of the two potential areas of uncertainty, the emission activity factor is likely the one that can yield more uncertainties than activity level data itself. A large amount of the activity level data used by the SIT in the estimation process is from information that is routinely collected by a wide range of state and federal government executive agencies. In fact, these are government data sources, and the transparency that comes with using this information makes the SIT such a useful tool for independent GHG emissions estimation. A large part of the data collected by federal executive agencies, like the EIA, the FERC, the Department of Agriculture, and others is based on required filings; while the data is often surveyed or "self-reported," there are often civil penalties associated with misrepresentation of information. Thus, for SIT purposes, the data is likely not as problematic as, in some instances, the activity emissions factors.

Uncertainties that arise with activity emission factors can be generalized into two categories: (1) that the factors themselves are not accurately estimated or are biased for various different reasons or (2) the factors are generally accurate but are averaged or aggregated in ways that may make state-specific application a challenge.

The first problem that can lead to estimation uncertainty is simply accuracy in the emissions factors themselves. The bias for this estimation can, in theory, go in either fashion (upwards or downwards in estimating GHG emissions). As an example, consider the oil and gas sector and the considerable uncertainties that can arise from their estimation. Over the past decade, increasing attention has been placed on oil and natural gas emissions, particularly natural gas. While natural gas has potential favorable environmental attributes relative to other fossil fuels like coal, methane (CH_4) can be released throughout the value chain. The increased drilling activity around various unconventional basins in the U.S., including in Louisiana, helped focus attention on these fugitive methane emissions.

Several studies have questioned whether emissions from natural gas production and natural gas pipelines are actually contributing more than believed to GHG emissions. These studies have used a variety of methods that include remote sensing, satellite imagery, and other technologies, such as mobile methane "sniffing" technologies to identify and measure methane releases. The results of these studies have shown that current methods used to estimate GHG emissions do not sync well with actual measurements. One such study, published in 2018 in ***Science***, notes that the SIT inventory methods may underestimate methane releases by as much as 60 percent since the methods fail to capture releases that can arise from abnormal operations. For purposes of this study, it is important to keep in mind that the releases from production sources in Louisiana are likely to have some degree of uncertainty. Thus, it would not be unreasonable to consider "grossed up" inventory estimates from the oil and gas sector in evaluating policies and strategies to address such uncertainties. The current

estimates from this sector are at 12.65 Mt. A 60 percent gross up, for sensitivity purposes, would put those emissions at 20.24 Mt.

Aggregation and averaging can also serve as a source of uncertainty for the GHG estimates generated via the SIT. Many emission factors used in the tool are taken from national or regional averages and treat emissions as being relatively consistent across the country or broad geographic areas. In reality, however, these averages, while correct, may not adequately estimate more geographically specific emission characteristics.

Consider, as an example, Louisiana's wetlands. Recall from the earlier discussion that the emissions factor for wetlands is actually a negative number: wetlands are a net sink and actually sequester carbon rather than produce carbon. For purposes of this study, a national wetlands factor was used because, while EPA has utilized estimates for the national SIT, it has not worked these estimates down into the individual SITs for each state. This national emissions factor is based upon a national composite of all wetlands and wetland types across the country. However, Louisiana's wetlands can be quite unique and are formed from a variety of habitat types that vary in size and importance relative to the national average. Consider that the proportion of salt marshes in Louisiana alone is likely different than the share embedded into the national emissions factor estimate.

Thus, the estimates provided for wetlands sinks also represent an uncertainty for the GHG inventory, particularly given the size of the sink when wetlands are coupled with forestry related sinks. The inventory estimate for these sinks, collectively, is -36.2 Mt, a large amount and one slightly higher than the emissions from the entire power generation sector. Further, a comparison of the past CES SIT estimates for forestry alone show that the EPA has been revising these estimates in ways that have tended to increase, in absolute value, the positive impacts that natural systems can have in sequestering carbon.

The current wetlands share of the overall forestry and land use estimate is only around -1.0 Mt.; however, it is very likely that as the science in this area improves, those estimates, like the general land use and forestry estimates may increase. While EPA is continuing to revise its approach at estimating wetlands sinks, Louisiana is also independently working to improve its estimates as well. The Louisiana U.S. Geological Survey (USGS) and The Water Institute are working collectively at developing estimates across a series of studies that should provide better clarity on Louisiana-specific wetland carbon contributions by the end of 2021.

9 | Conclusions

Louisiana has a relatively high level of GHG emissions for its population size and GDP. Industrial sources explain the majority of the state's emissions, which varies greatly from the U.S. and other regional averages. While U.S. GHG emissions are heavily concentrated in power generation and transportation, Louisiana's are highly concentrated in industry, followed by transportation, and then power generation.

The purpose of this research has been to both (1) inform stakeholders about the trends in GHG emissions, across sectors, activities, and GHG emission types over the past two decades and (2) provide an inventory to the CTF and other stakeholders in their policy formation activities. The purpose of this report has not been to provide policy guidance but provide data that can be used to develop later policies to meet Louisiana's goal of net zero GHG emissions by 2050. However, after a review of this study, it is hard to walk away without reaching the conclusion that industrial decarbonization will have to be the predominate focus of attention for Louisiana policy makers in meeting our future GHG emission goals.

APPENDIX C: FEDERAL FUNDING CROSSWALK

OFFSHORE WIND		
Grant Programs	EDA Regional Technology and Innovation Hubs (Tech Hubs)	LSU-led GLOW Propeller designated a Tech Hub and received a $500,000 strategy development grant.
		Phase 2 Implementation Grant applications for designees due February 2024.
	DOE Offshore Wind Research and Development Grants	Gulf Wind Technology received $200,000 for R&D on wind turbine blades that automatically change shape.
		NREL received $10 million for WindExchange and Regional Resource Centers.
		Texas A&M Engineering Experiment Station received $5 million for the Ocean Energy Safety Institute.
	DOE Renewable Energy Siting through Technical Engagement and Planning (R-STEP)	LDENR submitted application November 2023
	DOE Wind Energy Tech Recycling Research & Development	$40 million available until expended
Tax Credits	DOE Transmission Siting and Economic Development Grants Program (TSED)	
	Sec. 48 Investment Tax Credit	
	Sec. 48 Production Tax Credit	
	Sec. 45D Extension and Modification of Credit for Electricity Produced from Certain Renewables	
COMMUNITY SOLAR		
Grant and Loan Programs	EPA Greenhouse Gas Reduction Fund Solar For All	LDENR submitted application in October 2023 to develop incentives and complementary investments to help enable community solar development to support low-income households in the state.
	DOE-SETO Solar Research and Development Funding Programs	UL Lafayette received $1 million to expand the solar energy workforce and create jobs in underrepresented communities.
	DOE-OCED Energy Improvements in Rural or Remote Areas Technical Assistance	
	SDA Rural Energy for America Program (REAP) Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans & Grants	Rural businesses across the state have so far received over $3M from REAP.
Tax Credits	Sec. 48 Investment Tax Credit	
	Sec. 48 Production Tax Credit	
	Sec. 45D Extension and Modification of Credit for Electricity Produced from Certain Renewables	

COMMUNITY RESILIENCE HUBS		
Grant Programs	DOE Grid Resilience and Innovation Partnerships (GRIP) Program	LDENR received $250 million for Louisiana Hubs for Energy Resilience Operations (HERO) Project
	DOE-OCED Energy Improvements in Rural or Remote Areas Technical Assistance	
	DOE Renew America's Schools	
	HUD Green and Resilient Retrofit Program	
	EPA Greenhouse Gas Reduction Fund Solar For All	LDENR submitted application in October 2023 to facilitate grants for energy storage and loans for solar installation at schools and community resilience hubs.
	USDA Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans & Grants	Rural businesses across the state have so far received over $3M from REAP.
Tax Credit	Sec. 179D Commercial Buildings Energy-Efficiency Tax Deduction	
TRANSMISSION PLANNING		
Grant Programs	DOE Preventing Outages and Enhancing the Resilience of the Electric Grid Grants (40101d)	LDENR has so far received $16 million for projects that modernize the electric grid and reduce impacts due to natural disasters.
	DOE Grid Resilience and Innovation Partnerships (GRIP) Program	Entergy New Orleans received $55 million for Line Hardening and Battery Microgrid project to enhance the local grid's resilience against severe weather events.
	DOE Transmission Siting and Economic Development Grants Program (TSED)	
	DOE Transmission Facilitation Program	
	DOE Transmission Facility Financing Program	
	DOE-OCED Energy Storage Demonstration and Pilot Grant Program	
	FEMA Building Resilient Infrastructure and Communities (BRIC)	Jefferson Parish received $19 million to harden power infrastructure
	USDA Electric Infrastructure Loan & Loan Guarantee Program	
Loan Programs	Title 17 Clean Energy Financing Program	DOE LPO received $5 billion in credit subsidy with up to $250 billion in lending authority for low-cost federally backed loans to replace, repurpose, or retool infrastructure, while providing economic opportunities for energy communities. The program also allows for refinancing of debt and equity for infrastructure that has ceased use.

INDUSTRIAL DECARBONIZATION		
Grant Programs	DOE-OCED Regional Direct Air Capture (DAC) Hubs	Project Cypress received $603 million for a Regional DAC Hub located in southwest Louisiana
		LSU received $3 million for Pelican-Gulf Coast Carbon Removal project to evaluate the feasibility of building a DAC hub in Louisiana that would remove CO2 already in the atmosphere and permanently store it.
	EDA Build Back Better Regional Challenge	GNO, Inc-led coalition received $50 million to create H2theFuture clean hydrogen cluster in South Louisiana.
	DOE Industrial Assessment Centers (IAC) Implementation Grant Program	$400 million available until expended for small and medium-sized manufacturers (SMMs) to implement recommendations made in Industrial Assessment Center or Combined Heat and Power Technical Assistance Partnership assessments since 2018 and recommendations made in assessments that DOE has deemed equivalent.
		Gulf South Machine, Inc. received $63,000 for Process Optimization.
Grant Programs	DOE-OCED Carbon Storage Validation and Testing	Advanced Resources International Inc. received $21 million to develop a commercial-scale geologic CO2 storage hub in state waters near Monkey Island.
		River Parish Sequestration LLC received $25 million to develop the River Parish Sequestration Project (RPS Project) as a CO2 transportation and storage solution for the Louisiana Chemical Corridor.
	DOE-OCED Carbon Capture Demonstration Projects Program Front-End Engineering Design (FEED) Studies	Entergy Services, LLC was selected for award negotiations for the Lake Charles Power Station Integrated CO2 Capture Project in Westlake.
		Taft Carbon Capture, LLC was selected for award negotiations for the Cypress Carbon Capture Project in Hahnville.
	DOE-OCED Industrial Demonstrations Program	
	DOE Advanced Industrial Facilities Deployment Program	
	DOE Battery Materials Processing Grants Program	Syrah Technologies LLC received $220 million for the Phase 3 Expansion of Syrah's Commercial-Scale Natural Graphite Active Anode Material Facility in Vidalia.
		Koura received $100 million for the LiPF6 Manufacturing Plant in St. Gabriel
	EPA Enhanced Air Quality Monitoring Competitive Grant	LDEQ, LSU health Foundation, Deep South Center for Environmental Justice (DSCEJ), and Louisiana Environmental Action Network (LEAN) received $2.4 million to enhance air quality monitoring in marginalized communities.
	EPA Multipollutant Monitoring	$50 million to support grants to state, local, and Tribal air agencies to expand the national ambient air quality monitoring network with new multipollutant monitoring stations, including capital investments to upgrade the existing network and add new sites.
	EPA Underground Injection Control Grants	Louisiana submitted an LOI and is eligible for grant funding.

Loan Program	Title 17 Clean Energy Financing Program	DOE LPO offers senior debt to support major industrial decarbonization and supply chain projects. These loans are intended to enable and accelerate the bankability of emerging industrial decarbonization technologies and the decarbonization of existing energy infrastructure while creating good jobs and supporting local communities.
Tax Credits	Sec. 45Q Carbon Sequestration Credit	
	Sec. 45V Production of Clean Hydrogen Credit	
	Sec. 45X Advanced Manufacturing Production Credit	
	Sec. 45Y Clean Electricity Production Credit	
	Sec. 45U Zero-Emission Nuclear Power Production Credit	
	Sec. 45Z Clean Fuel Production Credit	
	Sec. 48C Qualifying Advanced Energy Project Credit	
	Sec. 48E Clean Electricity Investment Credit	
METHANE EMISSIONS		
Grant Programs	DOI Orphaned Well Site Plugging, Remediation, and Restoration Grant Program	LDENR received $25 million to plug orphan wells.
	DOE/EPA Methane Emissions Reduction Program (MERP)	LDENR received $15.7 million in formula funds to monitor and reduce methane emissions.
	EPA Multipollutant Monitoring	$50 million to support grants to state, local, and Tribal air agencies to expand the national ambient air quality monitoring network with new multipollutant monitoring stations, including capital investments to upgrade the existing network and add new sites.

FLEET TRANSITION		
Grant Programs	EPA National Diesel Emissions Reduction Act (DERA) Grant Program	East Baton Rouge Parish School System received $734 thousand.
		Environmental Initiative received $646,000.
		Leonardo Academy Inc. received $9,000.
	DOT-FHWA National Electric Vehicle Infrastructure Formula Program (NEVI)	La. DOTD awarded $73 million over five years to administer the deployment of vehicle charging station infrastructure throughout the state.
	DOT-FHWA Charging and Fueling Infrastructure (CFI) Discretionary Grant Program	City of New Orleans applied with State support.
	DOT-FTA Bus and Low- and No-Emissions Grant	New Orleans Regional Transit Authority awarded $72 million to buy zero-emission vehicles and charging equipment, provide a microgrid to support charging resiliency after major storm events, and design and implement a workforce training program.
		Jefferson Parish Transit received $6.88 million to introduce low-emission vehicles to the fixed-route fleet and renovate the Eastbank Transit Facilities.
	DOT-FTA Electric or Low-Emitting Ferry Pilot Program	
	DOT Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program	La. DOTD has applied.
	DOE Electric Drive Vehicle Battery Recycling and 2nd Life Apps Program	
	DOE Battery Materials Processing Grants Program	Syrah Technologies LLC received $220 million for the Phase 3 Expansion of Syrah's Commercial-Scale Natural Graphite Active Anode Material Facility in Vidalia.
		Koura received $100 million for the LiPF6 Manufacturing Plant in St. Gabriel
Rebates and Tax Credits	EPA Clean School Bus (CSB) Rebate Program	Harriet Tubman Charter School, Pointe Coupee Parish, East Baton Rouge Parish, Bienville Parish, City of Monroe School District, Madison Parish, and Rapides Parish awarded $43 million total to purchase 111 clean school buses.
	EPA Diesel Emissions Reduction Act (DERA) Rebate	
	Sec. 30D Clean Vehicle Credit	
	Sec. 25E Previously-Owned Clean Vehicles Credit	
	Sec. 45Z Clean Fuel Production Credit	
CLEAN PORTS		
Grant Programs	EPA Clean Ports Program	
	EPA National Diesel Emissions Reduction Act (DERA) Grant Program	Port of New Orleans received $1.2 million to replace certain diesel-powered trucks at port facilities in Orleans, Jefferson, and Saint Bernard Parishes.
	DOT Port Infrastructure Development Program (PIDP)	
	DOT Reduction of Truck Emissions at Port Facilities Program	
	DOT RAISE Grant	
	DOT National Infrastructure Project Assistance (Megaprojects)	
	America's Marine Highway Grant Program	

REGIONAL TRANSIT		
Grant Programs	DOT-FRA Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program	Amtrak awarded $178 million for Mississippi – Gulf Coast Corridor Improvement Project for rail corridor from New Orleans, LA to Mobile, AL.
	DOT-FRA Corridor Identification and Development Program	La. DOTD received $500,000 to develop a scope, schedule, and cost estimate for preparing, completing, or documenting its service development plan for Baton Rouge – New Orleans intercity passenger rail service.
	DOT-FRA Federal-State Partnership for Intercity Passenger Rail Grant Program	An application for a Baton Rouge – New Orleans passenger rail line was unsuccessful. $3 billion remains available for future rounds of funding.
	DOT-FTA Bus and Low- and No-Emissions Grant	New Orleans Regional Transit Authority awarded $72 million to buy zero-emission vehicles and charging equipment, provide a microgrid to support charging resiliency after major storm events, and design and implement a workforce training program.
		Jefferson Parish Transit received $6.88 million to introduce low-emission vehicles to the fixed-route fleet and renovate the Eastbank Transit Facilities.
	DOT Rural Surface Transportation Grant Program	La. DOTD received $25 million to design and construct two ferry boats in Plaquemines and Cameron Parishes.
	DOT-FTA Passenger Ferry Grant Program	New Orleans Regional Transit Authority (NORTA) received $5.6 million for projects that will enhance and revitalize passenger ferry systems in urbanized areas.
	DOT-FTA Electric or Low-Emitting Ferry Program	
	DOT RAISE Discretionary Grant Program	Baton Rouge and Gonzales awarded $20 million for right-of-way acquisition, design, and construction of the Baton Rouge Train Station and Gonzales Train Station along the planned Baton Rouge-New Orleans (BR-NO) Inter-City Rail Service, including ADA accessible platforms and stations and supporting infrastructure.
	DOT-FHWA Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Formula Program	La. DOTD will receive $134 million over five years for construction projects that will increase the resilience of the state highway system to natural disasters and climate change effects like sea level rise and increased flooding.
	DOT-FHWA Congestion Mitigation and Air Quality Improvement Program	
	DOT-FHWA Charging and Fueling Infrastructure (CFI) Discretionary Grant Program	

BUILT ENVIRONMENT RETROFITS		
Grant Programs	DOE Renew America's Schools	
	DOE Energy Efficiency and Conservation Block Grant	
	DOE State-Based Home Efficiency Contractor Training Grants	Application due January 2024.
	DOE Resilient and Efficient Codes Implementation (RECI)	Southeast Energy Efficiency Alliance awarded $1.6 million to develop and deliver accessible and replicable energy code resources, technical assistance, training, and workforce development strategies to stakeholders in the State of Louisiana, to increase the state industry's knowledge and expertise in response to Louisiana's energy code update.
	DOE Technical Assistance for the Adoption of Building Energy Codes	
	DOE Weatherization Assistance Program	Louisiana has received $31 million
	DOE Energy Auditor Training Grant Program	$40 million available until expended
	DOE Career Skills Training Program	$10 million available until expended
	DOE Industrial Assessment Centers (IAC) Implementation Grant Program	UL Lafayette received $900,000 to establish a Building Training and Assessment Center (BTAC) to educate and train students and build performance professionals to deploy modern building technologies to small businesses and K-12 schools.
	DOE-OCED Energy Improvements in Rural or Remote Areas Technical Assistance	
	EPA Greenhouse Gas Reduction Fund Solar For All	LDENR submitted application in October 2023 to develop incentives and complementary investments for residential solar and enabling upgrades.
	USDA Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans & Grants	
	FEMA Safeguarding Tomorrow Revolving Loan Fund	GOHSEP received $7 million to make structures more resilient to natural hazards, including enforcing adoption of resilient building codes.
Loan Programs	DOE Energy Efficiency Revolving Loan Fund	
	USDA Energy Efficiency and Conservation Loan Program (EECLP)	
Rebates and Tax Credits	Home Efficiency Rebates	
	Home Electrification and Appliance Rebates	
	Energy Efficient Home Improvement Tax Credit	
	Residential Clean Energy Tax Credit	
	Sec. 179D Commercial Buildings Energy-Efficiency Tax Deduction	

COMMUNITY FORESTRY AND GREENING		
Grant Programs	DOT Reconnecting Community and Neighborhoods (RCN) Grant Program	La. DOTD received a $500,000 planning grant to support community engagement for the Reconnecting Claiborne project in New Orleans.
	USFS Urban and Community Forestry Assistance Program	Southern University and A&M College received $9.5 million for the Generating Resources for Environmental Excellence Network toward Leadership and Advancement Building (GREEN LAB).
		City of New Orleans received $8 million for the New Orleans Canopy Training, Urban Reforestation, and Neighborhood Leadership (NOCTURNL) project.
		The Walls Project received $6 million for the Agroforestry Apprenticeship Program to Promote Tree Equity, Climate Resilience, and Workforce Readiness in Baton Rouge.
		City of Lake Charles received $866,000 for ReTree LC Corridor Enhancements.
SUSTAINABLE AGRICULTURE		
Grant Programs	USDA Wood Innovations Grant Program	Southern Packaging, Inc. received $300,000 for a project that removes vegetation for biochar and innovative wood products.
	USDA Community Wood Grant Program	
Incentives	USDA-NRCS Environmental Quality Incentives Program (EQIP)	Residue and Tillage Management, No-Till (Ac.) (329) Conservation Practice Standard
		Amending Soil Properties with Gypsum Products (Ac.) (333) Conservation Practice Standard
		Mulching (Ac.) (484) Conservation Practice Standard
		Waste Transfer (No.) (634) Conservation Practice Standard
LAND PROTECTION AND RESTORATION		
Grant Programs	NOAA Climate-Ready Coasts and Communities Climate Resilience Regional Challenge	CPRA submitted three letters of intent for project implementation grants in Greater New Orleans, Plaquemines Parish, and Terrebonne and Lafourche Parishes. The proposals for projects in Greater New Orleans and Terrebonne and Lafourche Parishes were selected to advance to the next round of full applications. Applications are due February 2024.
	NFWF National Coastal Resilience Fund	CPRA received $8 million for the Breton Landbridge Marsh and Living Shoreline Creation.
		Ducks Unlimited received $800,000 for West Barataria Basin Evaluation and Design.
		National Audubon Society received $650,000 for Enhancing Resiliency of the Rainey Conservation Alliance Landscape.
	NFWF America the Beautiful Challenge	CPRA received $950,000 for the engineering and design phase of the Central Wetlands Restoration Project.
		Manomet received $436,000 for Capacity Building and Technical Assistance to Farmers for Shorebirds of Louisiana Wetlands.
	USFWS National Coastal Wetlands Conservation Grants	
	HUD Community Development Block Grants (CDBG)	
	USFWS Coastal Impact Assistance Program (CIAP)	
	USACE IIJA Spending Plan	Louisiana has received a total of $129 million for projects relating to navigation, water supply, flood and storm protection, and aquatic ecosystem restoration.

APPENDIX D: SUMMARY OF PUBLIC COMMENTS

OVERARCHING CONSIDERATIONS AND APPROACH

On November 15, 2023, the State released a partial Draft PCAP for a 15-day public comment period. Public comments were received until November 30, 2023.Fourteen responses to the draft were received with comments and suggestions, including from non-profit organizations, local government, industry, including in the energy, environmental and agricultural sectors, and anonymous submissions.

The responses and comments were fully considered in the finalized language of the PCAP. The responses and comments constitute one of many inputs in the formulation of the PCAP. They were considered in context of all the input received over the planning period as well as leading emissions reduction technical and policy guidance. Takeaways are summarized below.

KEY TAKEAWAYS FROM COMMENTS ON THE DRAFT LOUISIANA PRIORITY CLIMATE ACTION PLAN

The following comments were incorporated into the final language of the PCAP. Comments that were not directly incorporated into the text of the Plan are either already addressed in the Plan or need more evaluation and may be further considered in the implementation of the PCAP and in the development of the Comprehensive Climate Action Plan.

TOPIC: GENERAL COMMENTS

The PCAP incorporates recommendations for community-driven solutions and additional community engagement and involvement across various initiatives, including community solar, offshore wind, community resilience hubs.

TOPIC: OFFSHORE WIND

The PCAP incorporates recommendations to coordinate offshore wind development and identify points of preferred siting and routing that minimize environmental impacts.

TOPIC: COMMUNITY SOLAR

The PCAP incorporates recommendations to leverage public buildings as anchor and host sites for community-located community solar projects and provide support and low-cost financing to community-driven projects led by community members. The PCAP also incorporates recommendations to create opportunities for public involvement, community ownership, and other community benefits and focus low-income community solar efforts on streamlining and simplifying opportunities for household subscriptions, while also protecting consumers. The PCAP also incorporates recommendations to reference the City of New Orleans' new rules around metering rates for community solar that can serve as a model and be expanded statewide.

TOPIC: COMMUNITY RESILIENCE HUBS

The PCAP incorporates recommendations to note that community resilience hubs should complement but not substitute disaster mitigation programs, including evacuation strategies and grid hardening investments. The PCAP incorporates recommendations to list food storage and distribution facilities among the examples of critical facilities. The PCAP also adopts recommendations to improve community-driven planning and engagement and investigate opportunities to update building codes/standards with efficiency and stable heating and cooling requirements for community gathering places during extreme weather events.

TOPIC: TRANSMISSION PLANNING

The PCAP incorporates recommendations to include broader grid-enhancing technologies in the transmission planning processes in addition to advanced conductors, including in establishing grid-enhancing technologies standards. The PCAP also addresses recommendations to clarify engagement in MISO and MISO/SPP regional and interregional transmission planning and direction to include communities and local governments impacted by transmission development in the transmission planning process.

TOPIC: INDUSTRIAL DECARBONIZATION

The PCAP incorporates recommendations to evaluate process electrification opportunities for distillation columns, heaters, furnaces, scrubbers, turbines, and more. The PCAP also incorporates recommendations to add a performance-based incentive program and other options to the N_2O abatement strategies.

TOPIC: METHANE EMISSIONS

The PCAP incorporates recommendations to reference the additional $1.5 billion funding that will be available under the Inflation Reduction Act for additional investments to plug wells and other activities. The Plan incorporates recommendations for further support for education, workforce, and capacity-building strategies to support operators in complying with future monitoring obligations for methane detection and monitoring. The PCAP also incorporates recommendations for better transparency and public release of the statewide methane detection and monitoring data.

TOPIC: FLEET TRANSITION

In response to public comments, the PCAP clarifies that "public fleet" includes government vehicles, commercial fleets, public transit, school buses, and private vehicles.

TOPIC: CLEAN PORTS

In response to public comments, the PCAP adds that one of the focus areas for port decarbonization planning is creating opportunities for community engagement in the planning efforts, particularly for environmental justice communities.

TOPIC: REGIONAL TRANSIT

In response to public comments, the PCAP clarifies that traffic improvement planning must prioritize durable public transit, regional transit, and low-carbon transportation opportunities, rather than roadway expansion. The PCAP also notes that initial work on increased regional connectivity should have substantive engagement with priority communities and should be designed around community inputs and preferences.

TOPIC: BUILT ENVIRONMENT RETROFITS

In response to public comments, the PCAP clarifies the annual retrofit targets and priority actions related to contractors. The PCAP also notes that the State will investigate opportunities to leverage state's Mitigation Revolving Loan Fund to finance retrofits and will work with utility regulators to create pathways for streamlined access to data for customers and their designated contractors.

TOPIC: COMMUNITY FORESTRY AND GREENING

In response to public comments, the Community Forestry and Greening section of the PCAP was amended to incorporate urban gardening and was renamed accordingly. The PCAP language incorporates suggestions to add a focus on community gardening. This section of the PCAP now includes support for urban agriculture and community gardens, including funding support, technical assistance, and capacity building for local food systems, community gardens, and small-scale urban agriculture in underserved, low-income, and disadvantaged communities. This priority action description notes a focus on creation of linkages to food procurement channels, such as grocery stores, restaurants, schools, food banks and other programs.

TOPIC: SUSTAINABLE AGRICULTURE

The PCAP incorporates comments related to sustainable urban gardening in the Community Forestry and Greening focus area, as noted above.

TOPIC: LAND PROTECTION AND RESTORATION

Many of the issues raised in public comments have already been addressed in the PCAP, either in this section or in other relevant places across the PCAP.

TOPIC: LIDAC BENEFITS ANALYSIS

Many of the issues raised in public comments have already been addressed in the PCAP, either in this section or in other relevant places across the PCAP.

Isabel Englehart

From: Sophia Adelle [redacted]
Sent: Monday, November 20, 2023 10:08 AM
To: GOV Climate; Christine Foreman (DEQ)
Subject: CPRG Recommendation - Prioritize Food Waste in PCAP

Follow Up Flag: Follow up
Flag Status: Completed

Dear Christine,

We are writing on behalf of The Farmlink Project, **a national organization with a mission to connect surplus produce to communities in need, reduce carbon emissions, and empower the next generation of young changemakers**. The Farmlink Project serves as a "link" connecting the broken supply chains of the agricultural and food access industries in Louisiana and across the United States. As your agency prepares to allocate funding through the Climate Pollution Reduction Grants, including developing the associated Priority Climate Action Plan, we urge you to prioritize initiatives aimed at combating food loss and waste (FLW).

FLW is responsible for 6% of all U.S. GHG emissions and nearly 60% of all landfill methane emissions—making landfills the country's third largest source of methane. Beyond these climate impacts, food waste unnecessarily strains our supply chains and drinking water supply by using nearly one-fifth of all freshwater and 16% of our cropland to grow, process, transport, and cool food we then waste. At The Farmlink Project, we are on track to deliver 200 million pounds of food by the end of 2023, the equivalent of 240 million meals, made possible for individuals in food insecure communities across the United States, while reducing over 200,000 metric tons of CO2e in greenhouse gas emissions.

The order of investments should follow the EPA Wasted Food Scale hierarchy, which ranks pathways of addressing food waste based on environmental preferability and creating a more circular economy. According to this hierarchy, funding can prioritize the highest use of food by making investments in food recovery and compost. These initial investments must come before investments in landfill infrastructure. It is vital that policies and programs established through funding disincentivize least preferred pathways and incentivize most preferred pathways established in the EPA's From Field to Bin Report. Donation and upcycling of foods are the most preferred pathways, so funding should prioritize these goals. To support these pathways and maximize impact, infrastructure investments are needed as well.

By prioritizing actions that keep food out of landfills and incinerators, while also strengthening landfill emission controls, Climate Pollution Reduction Grants can achieve substantial GHG reductions with multiple co-benefits. Policies and programs that disincentivize food from being landfilled or incinerated (such as food donation or recycling mandates) incentivize greater food waste prevention, while new infrastructure (such as food rescue, food hub, or composting facilities) help businesses and

communities donate, upcycle, and recycle more of their excess food. These measures additionally support new jobs, help businesses and individuals cut their food purchasing costs, alleviate food insecurity among low-income and disadvantaged communities, and mitigate the longstanding environmental justice impacts of landfills and incinerators on local communities. We are confident that by allocating a portion of the CPRG grants to projects focused on food loss and waste, your agency can take a crucial step in the right direction, promoting environmental sustainability, economic resilience, and social equity.

We would be delighted to offer our expertise, collaborate, or provide further information to assist in the decision-making process. As you draft the Priority Climate Action Plan, we recommend leveraging the Zero Food Waste Coalition's State Policy Toolkit, which provides examples of policies and actions that can be incorporated into climate action plans to keep food waste out of landfills and reduce associated landfill methane emissions. Together, we can make a significant impact on the reduction of greenhouse gas emissions and the improvement of our state's overall sustainability.

Thank you for your time and consideration. We look forward to discussing this important matter further and working together to create a more sustainable future.

Sincerely,
Sophia Adelle

Sophia Adelle
Head of Policy / **The Farmlink Project**
Phone: [redacted]
Email: [redacted]
Website: farmlinkproject.org

Isabel Englehart

From: Cavell, David (D) [redacted]
Sent: Tuesday, November 28, 2023 4:36 PM
To: Isabel Englehart; Harry Vorhoff
Cc: White, Michelle (M)
Subject: La. Priority Climate Action Plan and CPRG Follow Up

Follow Up Flag: Follow up
Flag Status: Completed

Harry & Isbel,

Hope you are both having a good week. Our colleagues asked that we follow up with you on some additional thoughts from our calls regarding Louisiana's Climate Action Plan and the EPA's State Climate Pollution Implementation Grants Program (CPRG). Please let us know if you have any questions or concerns. Thank you.

Some recommended uses we would like to share:

1. **Energy Efficiency**.
   - Incremental energy efficiency projects can reduce absolute carbon emissions and improve carbon intensity in the existing manufacturing asset base. A portfolio of new and retrofittable technologies are required to maintain cost advantaged manufacturing. The industrial base expects to utilize existing assets for the foreseeable future, so improvements help meet carbon reduction goals. Energy efficiency can include improved heat exchange/capture technology, upgrading of power and steam generating assets for improved heat rates, capturing and utilization of waste heat that is lost today, applying advanced control and optimization to ensure perform at optimum levels, or improving steam systems, among others.

2. **Electrification of process technology**.
   - This would include distillation columns, heaters, furnaces, scrubbers, etc. In some cases, it could be replacing a steam driven turbine, or another turbine, with an electric one. In other cases, some process development work might be required (i.e., e-cracking, e-boiling at scale). In all, the electrification depends on a variety of sources that are low carbon sources of electricity, most likely from the grid or dedicated nuclear.

3. **Oxyfiring**.
   - Oxyfiring is the combustion of natural gas in the presence of oxygen (not air) to generate electricity and/or steam for process heat. As the combustion gas is only carbon dioxide and water (no nitrogen), it is relatively easy to separate the carbon dioxide out and send to sequestration (or utilization). NetPower is scaling this for electricity use. We want to use it to generate process heat – which requires some technology development. This uses a lot of existing technology – air separation into nitrogen and oxygen, natural gas, cogeneration for heat/electricity.

4. **Hydrogen ready fired equipment**.
   - Hydrogen is not a drop-in solution for natural gas. Burners need to be modified/replaced, and often piping, gaskets, etc. along with the burners. The opportunity is to make those changes now to be ready for when hydrogen becomes more readily available, either from external sources (the recently announced hydrogen hubs) or internal (circular hydrogen from our own crackers).

5. **Methane reductions**.
   - This project would aim to reduce purpose methane flaring and methane fugitive emissions through-out the value chain. This type of reduction would be a means to impact the decarbonization goals along the complete petrochemical value chain. For Dow this would mainly be applicable on our scope 3 emissions.

6. **Circularity and recycling**.
   - It's important that money is allocated for recycling and circularity projects like integrated waste management hubs. These projects are part of a broader effort to reduce greenhouse gases, combat waste, reduce environmental degradation, while promoting economic growth. Projects at the state-level should support funding initiatives that can bolster recycling infrastructure, enhance waste diversion programs, and encourage innovative approaches to circularity.

Best,

David A. Cavell
State Government Affairs, Southeast Region
Dow, Inc.
dcavell@dow.com| [redacted]

General Business

Isabel Englehart

From: Dempsey, Linda [redacted]
Sent: Thursday, November 30, 2023 1:46 PM
To: GOV Climate
Subject: Louisiana Draft Priority Climate Action Plan

Dear Sir or Madam:

On behalf of CF Industries ("CF"), I welcome the opportunity to provide these comments in response to the draft Louisiana Priority Climate Action Plan (PCAP).

U.S.-headquartered CF is a leading producer of ammonia and nitric acid, which are essential components for fertilizer and industrial uses. Louisiana is home to CF's Donaldsonville Complex, in southeastern Louisiana, which is the world's largest and most flexible ammonia production facility, serving customers on nearly every continent, and also has three unabated nitric acid plants.

The Opportunities and Challenges of N_2O Abatement

About 80 percent of the nitric acid production in the United States is consumed as an intermediate in the manufacture of ammonium nitrate (AN) and urea ammonium nitrate (UAN) used as fertilizer. Lesser amounts of nitric acid and AN are used in other chemical processes and in the explosive industry. UAN is the most commonly used direct application nitrogen fertilizer in the United States and has grown in popularity over the years due to its versatility in a number of agricultural practices, economic advantages, ease of handling and transport, and safety.

Installation of effective N_2O emissions reduction technology—secondary or more effectively (but more costly) tertiary abatement—is, however, a challenge for many U.S. fertilizer manufacturers given the highly competitive and volatile global nitrogen fertilizer market in which manufacturers operate:

- Nitrogen fertilizers, produced and consumed around the world, are globally traded commodities, like the corn, wheat, and other crops they feed.
- The U.S. nitrogen sector faces an intensely competitive market due to the global nature of nitrogen fertilizer production, sales, and trade; the commodity nature of these products (which are sold largely on the basis of small price differentials); and the significant levels of foreign government subsidies and other distortive practices, particularly related to UAN.

Incurring the additional costs of the two viable N_2O abatement technologies, particularly the more effective but also more costly tertiary abatement, when foreign competitors are not incurring similar costs, represents a risk to domestic manufacturing where market swings and unfair trade can quickly make such investments a major burden on domestic producers. While federal incentives including the 45Q tax credit are supporting CCS-related investments, there are no federal tax incentives to support N_2O abatement.

Potential Design of a State N_2O Abatement Program

CF welcomes the state's proposal to help the hard-to-abate fertilizer sector move forward quickly on a highly impactful decarbonization path.

The draft PCAP notes that the state "will support the development of an emissions offset backstop to support private investment in long-term N_2O abatement strategies at fertilizer production facilities in the state." As the state works to finalize its PCAP, we offer below ideas and perspectives on the structure that such a program might take with the support of EPA funding under the Climate Pollution Reduction Grants (CPRG) program.

- ***Direct Grant Program.*** A simple and straightforward approach would be a direct, upfront grant program to defray the capital costs necessary for a secondary or tertiary N_2O abatement project. Tertiary abatement, which can achieve substantial N_2O emission reductions, is particularly capital intensive—up to ten times the cost of secondary abatement, which can reduce emissions in the lesser 50-70% range. Neither secondary nor tertiary abatement projects are expected to require significant ongoing operating expenses, so the direct funding (full or partial) of the capital investment, particularly for more effective and costly tertiary abatement, will make project economics more favorable and help them to move forward.
- ***Performance-Based Incentive Program.*** Alternatively, a program could provide a performance-based financial incentive based on the quantity of N_2O that a nitric acid producer abates annually. A fund could be established to provide annual payments on a $\$/CO_2e$-abated basis, as compared to a pre-abatement baseline up to the full costs or a percentage thereof of the abatement (purchasing equipment and installation). A performance-based approach could be structured either as a direct annual payment or as a state tax credit (akin to the federal 45Q credit, the value of which is based on the tons of CO_2 a taxpayer captures and either permanently sequesters or utilizes for commercial purposes). This approach would reduce the program's upfront costs for state while still providing the necessary incentive for nitric acid producers to invest in abatement projects.
- ***Offset Backstop Program.*** A program could also be structured as a backstop to fund the difference between the total N_2O abatement project cost and any payments a producer receives for offset credits generated by the project. Carbon offset registries such as the Climate Action Reserve have developed protocols to allow nitric acid producers to generate carbon offset credits by installing N_2O abatement technologies. Those credits can then be sold through the voluntary carbon market to companies who wish to use the credits to offset their emissions. A backstop program could be established to provide financial support for projects less the value of any carbon offset credits sold. To the extent that carbon offsets completely finance the N_2O abatement project, a facility would not be eligible for support under the state program. We observe, however, that a backstop program would almost certainly reduce the value of offset credits in the voluntary market given the guarantee of government financial support and could limit the ability to move projects forward.

Thank you for your consideration of these comments. We would welcome the opportunity to engage further on these issues. If you have any questions, please do not hesitate to contact me.

Best,

Linda

Linda Dempsey
Vice President, Public Affairs
Office: [redacted]
Cell: [redacted]
[redacted]

TAPROOT EARTH

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Governor's Office of Coastal Affairs (GOCA)
P.O. Box 44027
Baton Rouge, Louisiana 70804

November 30, 2023

RE: Draft Louisiana Priority Climate Action Plan (PCAP)

Dear Louisiana Governor's Office of Coastal Activities,

Thank you for accepting our comments on the DRAFT Priority Climate Action Plan (PCAP) that will be used as the basis for the state's strategy for pursuing EPA Climate Pollution Reduction Grants.

Taproot Earth is an international climate justice organization based in Slidell, LA, that builds power and cultivates solutions among frontline communities advancing climate justice and democracy. Our founder and Vision and Initiatives Partner, Colette Pichon Battle, served as a member of the Louisiana Climate Initiatives Task Force (CITF) and chair of the Equity Advisory Group.

Throughout the process, we worked with your office to bring frontline community voices to the table to help ensure the CITF maintains its commitment to climate equity. We are proud that Louisiana was the first state in the deep south to assemble a climate task force and draft a Climate Action Plan (CAP). This PCAP is a step in the right direction toward statewide climate action, and we would like to offer some comments that could further strengthen it.

I. Big Picture

One of Taproot Earth's consistent points of emphasis has been the need to weave equity through the climate action plan. In some ways, this plan approaches that goal by incorporating community-driven solutions throughout many of the focus areas. However, this approach was based on three community consultation meetings that only some people were able to attend, with more than half unaware that a climate action strategy existed. It is good to bring in new voices, but GOCA can also continue to work with its existing bodies, such as the Equity Advisory Group of the CITF, to provide ongoing feedback to the state's coordinated climate actions.

A. Equity Metrics

One good example of Equity Advisory Group engagement was the creation of the equity metrics report titled "Equity Metrics to Support the Louisiana Climate Action Plan: A Framework," which was authored by the Data Center with feedback from Taproot Earth and other partners. Taproot Earth encouraged the CITF throughout the CAP process to create stronger accountability mechanisms for achieving climate equity. For many institutions, equity or climate/environmental justice amounts to consultation sessions with impacted people rather than actions that materially benefit poor and BIPOC communities. We suggested equity metrics that could be presented alongside greenhouse gas emissions statistics so that the state and all stakeholders would be able to evaluate whether proposed climate actions would move us toward climate equity. If the state had pursued the funding to fully complete the climate equity metrics project, we might see projected equity impacts alongside greenhouse gas emissions reductions in this report. We urge the state to prioritize completing the equity metrics project and adopt its recommendations as soon as possible to create accountability mechanisms to demonstrate the impact of the state's climate action plan on the state's people. Showing the benefits of climate action will only increase the support for the climate action plan in the future.

B. Listening to Community Feedback

Meaningful stakeholder engagement requires the democratization of information, sufficient notice for members of the public to engage, the ease of access for community input, and meaningful reflection and action by policy makers based on said input. We know the state was working on an abbreviated timeline to complete the PCAP, but we have some comments about community engagement for the future.

We first note that notice for the public comment period for the PCAP was sent via email but no information on the PCAP is mentioned on the Louisiana Climate Initiatives Task Force (CITF) website, nor is the link available. Notification of the public comment period was sent via email from the CITF Nov. 15th, 2023 with a deadline of Nov. 30, 2023.

Given that the time period for public comment overlapped a significant period of time when people were traveling or had taken time off for the Thanksgiving holiday and the website has no information about this comment period, we believe this cannot be categorized as meaningful public engagement in the process. These discrepancies in intent and implementation need to be addressed. We acknowledge that the PCAP is available on the Louisiana's Infrastructure website. However, there is no indication of or reference to opportunities to engage in the process by comment or otherwise.

Taproot Earth firmly believes that stakeholder engagement should always occur when frontline communities are best able to engage. This sometimes means setting meeting times for evenings and weekends as opposed to traditional workweek hours. Further, community engagement should be utilized as a planning opportunity throughout rather than an ask to attend a scheduled event for which they had no input in planning. Every effort should be made

to “meet people where they are” in the community engagement process. Outreach to Indigenous leaders, frontline leadership, churches, community groups, youth groups, etc. should be prioritized when developing a strategy for engagement and implementing engagement.

That all said, the stakeholder meetings did provide some insight into what frontline community members want out of the PCAP. Looking at this somewhat limited data, we see a clear trend: Communities want climate action that makes their communities safer. At all three meetings, more than 50 percent voted for solutions that improve public health and air quality or increased climate resilience. Nearly all of the PCAP’s focus areas would improve air quality or community resilience, except for at least one major and notable exception: certain forms of industrial decarbonization that involve carbon capture and clean hydrogen, which will be discussed further below.

C. Tribal Sovereignty

Tribal sovereignty is at the core of Taproot’s mission, as native people are owed a debt by this country for having had their land taken and their people murdered. Tribes also hold traditional ecological knowledge that will help in implementing the state’s priority climate actions, which Taproot has great appreciation for. This is why we worked to increase tribal participation throughout the CITF process in tandem with Elder Chief Shirell Parfait-Dardar to bring in representatives of the United Houma Nation and the Apalachee Indians of the Talimali Band for a special CITF meeting focused on equity n September 2021. We are pleased to see that the state has continued to pursue tribal engagement by reaching out to federally recognized tribes concerning the PCAP process. However, we believe that the state should have also reached out to state-recognized tribes.. Louisiana’s largest tribe is the United Houma Nation, which is state-recognized. Even though the state is pursuing a federal grant, it is free to work with state-recognized tribes, which is presumably why they granted them state recognition. Furthermore, many of the state tribes are structured as nonprofit corporations that would be eligible to participate in federal climate programs and receive grant funding or tax credits.

II. **Focus Areas**

A. Community Solar

We support the state’s plans for community solar and particularly the plan to focus on public schools. However, we believe this is merely a first step. Public financing should help increase public and community ownership of solar projects rather than simply benefit investor-owned utilities or get diverted to communities that already have the wealth and expertise to pursue renewable energy projects. The state should be proactive in working with low-income communities to develop their own solar projects, providing technical assistance for grant applications and matching funds wherever possible. Louisiana should not require burdensome asset tests for low-income residents and recognize that paperwork and onerous proofs of income can discourage applicants who would otherwise qualify for programs.

Further, Louisiana should look to models in other states for developing solar energy. One example is the Build Public Renewables Act in New York, a model in which the state itself uses federal funding to generate its own renewable energy. A market-based approach has so far led to Louisiana being a bottom-10 solar producing state despite having more exposure to the sun than northern states.

Community feedback showed that residents are worried about solar competing with other land uses such as agriculture and forestry. In order to achieve this vision of community solar, the state should ensure that solar development avoids greenfields whenever possible. Solar development should prioritize the built environment, such as rooftops and parking lots. The state should create a regulatory framework that makes it easier to build on existing structures while discouraging builds in greenfields.

B. Offshore Wind

Taproot Earth supports the state's plan to pursue offshore wind energy. Offshore wind generation peaks just as solar is winding down, making it an ideal companion to community solar. Offshore wind does not compete with onshore land uses, and wind has lower life cycle impacts compared to other sources of energy.[1]

Louisiana has done a better job of showing openness to offshore wind, which may be one reason RWE selected Louisiana for offshore wind development instead of Texas. However, Louisiana has work to do to unlock its offshore wind potential. Many suitable wind energy areas in federal waters off the coast of Louisiana were not selected for auction because of conflicts with existing and abandoned oil and gas infrastructure, such as the 18,000 miles of pipelines left in the ocean by industry. Louisiana must work with the federal government and push them to provide more funding for clean-up off the coast of Louisiana so offshore wind can flourish. Louisiana should also work to accelerate the phase out of fossil fuels and resist the buildout of offshore carbon capture, which will require the buildout of more pipelines that compete with offshore wind.

When developing offshore wind in state waters, the state should be proactive in coordinating development. We believe the state should look to New Jersey's model of developing a public wind port. State-level guarantees of demand and other support and surety are necessary to grow needed investment in the offshore wind sector.[2]

Rather than allowing industry to select sites and then conduct an environmental analysis prior to issuing a permit, the state should work now to identify suitable sites that will minimize impacts to wetlands and wildlife. This will be key to keeping important stakeholders supportive of offshore

[1] Torres JF, Petrakopoulou F. A Closer Look at the Environmental Impact of Solar and Wind Energy. Glob Chall. 2022 Jun 22;6(8):2200016. doi: 10.1002/gch2.202200016. PMID: 35958828; PMCID: PMC9360340.

[2] Taproot Earth and climate + community project, "#WeChooseNow: Energy Policy Playbook," May 2023, https://taproot.earth/wp-content/uploads/23_05_04_WCN-ENERGY.pdf.

wind development, such as seafood harvesters, Indigenous tribes, and environmental groups. All of these groups will require intentional and frequent engagement throughout the process of offshore wind development.

The state can help improve the safety of offshore wind by supporting the right to organize. Louisiana should require project labor agreements for wind developed in state waters and work with unions on safety training. Studies show that unionized workers have lower accident rates.

Lastly, there is concern that offshore wind could benefit the fossil fuel sector if it is prioritized for green hydrogen that is used to extend the life of petrochemical facilities that could be retired. To permit this would be inconsistent with the goals of the CITF and those of the communities who have stated they want solutions that prioritize public health. Louisiana should evaluate the end uses for offshore wind before awarding any new permits.

C. Community Resilience Hubs

Resilience hubs should be a compliment to evacuation strategies. Some people will still need help getting out of harm's way when increasingly strong hurricanes hit the state. The state should enact policies that make it easier to issue mandatory evacuations and provide transportation for all people, with the recognition that children, elderly people, disabled people, and people with pets need special accommodations, as well as financial assistance to evacuate. None of this is easy, but we must remind ourselves that nobody should be asked to shelter in place during a category 5 storm just because it is expensive or that storms intensify more quickly now.

Several members of Taproot staff are former restaurant workers who were ordered to work during hurricanes, even when voluntary evacuation orders were issued. This section specifically mentions restaurants as possible hubs for hurricanes, but restaurant workers should not be expected to be emergency workers without significant training and increases in benefits and pay. All non-emergency workers should be able to evacuate during any named storm in which they are in the cone of uncertainty without fear of losing their jobs. To facilitate their evacuation, the state should expand unemployment insurance to cover evacuations during storms that can be immediately accessed by workers in the cone of uncertainty.

D. Transmission Planning

The state is planning for new renewable energy sources to come online, yet our transmission is lacking and is not being built at a pace and scale needed to ensure reliability and resilience - like many other places in the nation. Lack of transmission lines has caused renewable energy developers to back out of projects due to uncertainty which leaves climate benefits on the table. In order to fully realize carbon emissions reductions and achieve a 100% clean electricity grid, we must double current transmission capacity by 2030. We are encouraged to see that Louisiana is planning to ramp up its current capacity to 30% by that time. It is also necessary to reform policy to modify and improve the rules of the road for planning, paying for and siting

transmission. Further, offshore transmission facilities should be considered in the planning process relative to wind energy.

While transmission planning and siting should be done quickly, activities should not be done at the expense of community health, meaningful engagement and environmental protection. We have picked quick development over community protection. Now is the time to reject that false choice.

Taproot is encouraged to see that Louisiana will facilitate regional resource strategic planning as a step toward achieving its goals. We encourage the multi-jurisdictional approach and inclusion of regional states, utilities and transmission operators. However, one glaring omission is the exclusion of stakeholders from communities impacted by transmission sites now or in the future. We strongly urge the state to rethink its strategic planning process and give great consideration to how the table is being shaped.

E. Industrial Decarbonization

There are major issues with the state's plan for industrial decarbonization. The state's industrial decarbonization plans include carbon capture and storage (CCS), which will increase air pollution.[3] The state continues to pursue blue hydrogen projects, which are worse for the climate than coal.[4] Many "green hydrogen" projects have been mislabeled and are not using new renewable energy capacity to perform electrolysis, and the state has no regulations in place to ensure that green hydrogen is green. And any new hydrogen or carbon pipelines built in the coastal zone will lead to land loss, which will actively decrease climate resilience.[5] Lastly, carbon pipelines can explode and asphyxiate people, which is in direct opposition to community requests for better public health outcomes.[6]

Instead of pursuing dirty hydrogen and CCS, which has not been proven at scale and may never live up to its promise,[7] the state should look to reduce its industrial emissions by decreasing demand. Throughout the CITF process, Colette Pichon Battle urged the state to consider decreasing industrial production. The state should commission a study that looks at the end uses for industrial facilities and determine which are socially beneficial and necessary.

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[3] Jacobson, Mark, "The health and climate impacts of carbon capture and direct air capture,"Energy Environ. Sci., 2019,12, 3567-3574.

[4] Howarth, RW, Jacobson, MZ. How green is blue hydrogen? Energy Sci Eng. 2021; 9: 1676–1687. https://doi.org/10.1002/ese3.956

[5] Priest, Tyler & Theriot, Jason, "Who Destroyed the Marsh? Oil Field Canals, Coastal Ecology, and the Debate over Louisiana's Shrinking Wetlands," Jahrbuch für Wirtschaftsgeschichte / Economic History Yearbook, 2009, 50. 10.1524/jbwg.2009.50.2.69.

[6] Zegart, Dan, "The Gassing Of Satartia," Huffington Post, August 26, 2021, https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f.

[7] The Institute for Energy Economics and Financial Analysis (IEEFA), Reality Check on CO2 Emissions Capture at Hydrogen-from-Gas Plants, February 2022, https://ieefa.org/wp-content/uploads/2022/02/Reality-Check-on-CO2-Emissions-Capture-at-Hydrogen-From-Gas-Plants_February-2022.pdf.

Facilities that produce unnecessary things like single-use plastics should be decommissioned. For other facilities that produce harmful products like oil and gas that will be phased out, the state should make plans for their retirement. For existing facilities that serve a purpose and cannot be decommissioned, the state should prioritize non-CCS solutions in the PCAP such as fuel switching, efficiency upgrades, and electrification. Facilities that are frequent offenders of air pollution laws or those whose impacts pose significant cancer risk should have their permits revoked, as the governor of Illinois did when he learned about the risks of ethylene oxide.[8] These actions would bring the plan closer in line with the community's desire for safety and resilience.

To summarize:

- The decommissioning of carbon emitting plants should be prioritized/coupled with any alternate strategy of reducing carbon emissions.

- False solutions to carbon reduction such as Carbon Capture and Storage should not be relied upon in the PCAP. Until this method of carbon reduction, or any method, can be proven effective and safe for communities and the environment, these plans should be put on hold.

- Many "green hydrogen" projects have been mislabeled and are not using new renewable energy capacity to perform electrolysis, and the state has no regulations in place to ensure that green hydrogen is green. And any new hydrogen or carbon pipelines built in the coastal zone will lead to land loss, which will actively decrease climate resilience.

- Any PCAP should include the remediation of the approximately 4,500 total orphaned wells in Louisiana, as well as addressing the 21,357 inactive oil and gas wells in Louisiana, nearly half of which have been inactive for over five years and are abundantly capable of harmful emissions.

F. Methane Emissions

In step with the state's methane management strategy, we are encouraged to learn of the significant federal and state investment to achieve stated goals: to increase and mobilize resources for decommissioning legacy oil and gas infrastructure and monitor and regulate methane emissions. Maximizing the co-benefits of methane reduction of mitigating climate change and improving air quality are key, and we must urgently consider how we may use resources to specifically improve conditions in favor of other uses, like renewable energy.

With funding through the Infrastructure Investment and Jobs Act and recent state appropriations, the state is poised to undertake a suite of activities to address methane, including the plugging, capping and reclaiming orphaned wells across the state with a priority on

[8] Lerner, Sharon, "A Tale of Two Toxic Cities," The Intercept, February 24, 2019, https://theintercept.com/2019/02/24/epa-response-air-pollution-crisis-toxic-racial-divide/

wells located in low-income, Black and Indigenous communities. It is also preparing to finalize a natural gas venting and flaring rule to capture loss revenue due to waste. In the interest of equity, we believe that revenue collected pursuant to venting and flaring regulations should be diverted to communities most impacted in order to address harm caused by fossil fuel activities. The state must move past talk and meaningfully engage and support low-income communities. Lastly, local residents must be prioritized in hiring in those communities where work is being done. This is all a start to scaling resources to the size of the problem, and we must do more.

G. Fleet Transition

The state should be more ambitious with its transition to an all electric fleet. Several states and the federal government have goals to get to an all electric fleet by 2035.[9]

The state should also follow the recommendations of the climate + community project in its recent report "Achieving Zero Emissions with More Mobility and Less Mining" to minimize environmental impacts in Louisiana and elsewhere:[10] Their report found that the United States can achieve zero-emissions transportation while limiting the amount of lithium mining necessary by reducing the car dependence of the transportation system, decreasing the size of EV batteries, and maximizing lithium recycling.

H. Ports

Port pollution is a growing crisis and a major source of air and greenhouse gas pollution. We are disappointed to see that while boats comprise 17% of non-highway mobile emission shares, neither the GHG Inventory nor the CAP Net Zero Pathway addresses port emissions specifically. This is not acceptable especially in a climate where the state is actively working with developers to establish the nation's first deep water facility to accommodate the world's largest polluting vessels - Post-Panamax ships and large cape size vessels.

Louisiana ports already operate as large industrial ecosystems of refining capacity, export terminal development, nodes of rails and highway networks, and all sorts of auxiliary services. This fact cannot be ignored. The state should aggressively pursue opportunities to build and expand electric infrastructure, increase energy efficiency, incorporate energy storage and deploy *real* renewable energy such as wind, solar, and well regulated green hydrogen. Blue hydrogen that uses fossil fuels as a feedstock is not a green solution. It is a false solution.

[9] Womble, Joseph and Lori Bird, "How the US Can Electrify Its Public Fleets, from City Buses to Garbage Trucks," World Resources Institute, October 12, 2023, https://www.wri.org/insights/us-public-fleet-electrification.

[10] : Thea Riofrancos, Alissa Kendall, Kristi K. Dayemo, Matthew Haugen, Kira McDonald, Batul Hassan, Margaret Slattery, and Xan Lillehei, "Achieving Zero Emissions with More Mobility and Less Mining," 2023, Climate and Community Project [http://www. climateandcommunity.org/more-mobility-less-mining].

To be most effective, ports must slow and stop the export facility buildout and commit to decommission fossil fuel infrastructure. Louisiana is perfectly postured to pursue a swift just transition to wind energy, and we urge the prioritization of a public wind port development.

I. Regional Transit

We are pleased to see plans to increase regional connectivity to encourage greater use of public transportation across rural and urban areas, with particular focus on improving access to services and amenities for low income and disadvantaged communities. The state should ensure meaningful engagement with those communities to learn what is most important to them and not merely plan for presumed benefits without the communities' input. Further, transportation planning should be aligned with land use planning to ensure smart land use.

J. Built Environment Retrofits

Taproot is encouraged to see general interest and a desire by the state to retrofit residential, commercial and public buildings. At the community level, there is great interest in pursuing residential building retrofits, particularly due to increasingly costly utility bills. This is not surprising considering that 1 in every 10 homes will be impacted by climate events like extreme heat according to a recent report by CoreLogic, an international data property company.

Louisiana must continue to pursue opportunities for more resources for education, technical assistance, training and to build workforce capacity. The state should also make a concerted effort to improve regulations wherever possible to achieve the best possible results. Perhaps the state could capture resources for poor and BIPOC communities through initiatives like the Housing and Urban Development's Green and Resilient Retrofit Program.

K. Urban and Community Forestry

The recognition of the variety of benefits of urban and community forests, including reducing carbon and co-pollutants, managing stormwater, and abating urban heat island effects is a great start. From a policy perspective, the state should continue to support development and implementation of local plans and work across agencies, legislative chambers and with stakeholders and local governments to address policy deficiencies and reduce burdensome requirements that make land expansion and management (like prescribed fires and thinning) difficult.

2023 was an unprecedented year in Louisiana with record breaking wildfires in the face of record heat and drought fueled by climate change. This fact should not be taken lightly and must be considered – in forestry policy and decision-making going forward – in both urban and rural communities. Further, competing land use priorities like community solar should be carefully considered with expanding urban and community forestry landscapes. To the greatest extent possible, one true and viable carbon reduction solution should not be pitted against another.

L. Sustainable Agriculture

Agriculture practices have a significant impact on air and soil quality and when executed poorly, they negatively impact public health. From a broad perspective, one recent example of negative impacts that underscores the need for sustainable agriculture is the record breaking 2019 Mississippi River flood that sent massive nutrient loads down to Louisiana coastal waters. Subsequently, loads of agricultural runoff flowed into the Gulf of Mexico thereby feeding the growing dead zone. This was not great for the environment, residents generally, or for farmers on land or for downstream fishers who suffered great loss.

Continued investment in programs like climate-smart agriculture are vital to fostering greater coordination and linking programmatic work like wetland conservation and water quality together. Interstate collaboration on sustainable agriculture is encouraged as well. Nonetheless, we urge continued farmer engagement in urban and rural communities, as well as expedited development and further investment in local agriculture through support of local food systems, community gardens, and small-scale urban agriculture in underserved communities - those that are poor and BIPOC.

More sustainable alternatives for managing agricultural waste, such as recycling it for compost, is a good investment for the state and the planet. Burning agricultural waste can emit carbon dioxide (CO2) into the atmosphere. Agricultural waste, such as sugar cane, and other organic materials, contain carbon that was initially absorbed from the atmosphere by the plants during their growth. When these materials are burned, the carbon is released back into the atmosphere in the form of CO2.

Lastly, flue gas gypsum is made from the byproduct of burning coal, one of the worst possible things for the climate. Rather than promoting novel uses for the byproducts of coal, the state should phase out coal usage as soon as possible and transition to justly sourced renewable energy with an equitable grid.

M. Coastal Restoration

The importance of wetlands cannot be overstated, including their function as carbon sinks. It is imperative to understand the net greenhouse gas impacts of coastal wetlands loss, conservation, and restoration as well as greenhouse gas impacts of conservation and restoration construction activities. Studies in this regard must continue for the purpose of carbon quantification. However, the creation of carbon markets should be avoided at all costs because they function to the detriment of poor and BIPOC communities that are already disproportionately burdened by climate impacts. It is clear that where polluting industries are allowed to commodify and exploit public resources, they will continue this practice as long as they can.

N. Low-Income and Disadvantaged Communities Benefit Analysis

In general, the state's approach to low-income and disadvantaged communities seems to be to track the data and hope that the state's climate actions trickle down to poor people, who are disproportionately BIPOC. We support data collection–especially fully funding the equity metrics project developed by the Data Center, but we think the state should be more proactive in making poor people less poor. From the decrease in child poverty following the response to the COVID pandemic to academic studies, there is a consensus emerging that cash transfers are the most effective way to fight poverty.[11] There are many ways of structuring cash transfers but two options with a climate connection are a carbon tax and dividend or the creation of a state fund similar to the Alaska Permanent Fund that could initially be grown with revenue from clean energy.[12] While the state pursues ways to transfer cash to low-income and disadvantaged community members, we also suggest:

- Air Quality and Public Health Improvements: For many consecutive years, the Louisiana Legislature has struck down bills that would require fence line air monitoring at industrial facilities capable of releasing harmful emissions into the air communities have no choice but to breathe. To date, no meaningful measure has passed. Plants or facilities capable of releasing toxic emissions should be required to monitor and report their emissions in a timely and transparent manner. The state should be required to monitor this process. The results should be made available to the public in a timely manner. Should the state choose not to require facilities to comply, the state should step in and perform the monitoring itself in a timely and transparent manner. All efforts should be made to ensure that the public has timely and accurate information as to what they are possibly inhaling.

- Jobs and Workforce Development: Funding for training opportunities and small business growth opportunities should be prioritized for historically Black colleges and universities, community colleges, and technical colleges located as closely as possible to areas identified as low-income and disadvantaged communities. Financial assistance for those not able to afford tuition or fees associated with any educational opportunity should be made available for these community members.

III. Conclusion

Taproot Earth appreciates the opportunity to comment on the PCAP. We understand the urgency in applying for federal grant funding and implementing decarbonization plans as quickly as possible to avoid the worst impacts of the climate disaster on our vulnerable state. We hope you will consider these suggestions for the PCAP that we believe will only strengthen the state's commitment to climate equity and support for frontline communities.

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[11] Egger, Dennis, Johannes Haushofer, Edward Miguel, Paul Niehaus, and Michael Walker. (2022). "General Equilibrium Effects of Cash Transfers: Experimental Evidence from Kenya", Econometrica, 90 (6): 2603-2643, doi: 10.3982/ECTA17945.

[12] Fremstad, Anders and Mark Paul, "Disrupting the Dirty Economy," People's Policy Project, September 2018, https://www.peoplespolicyproject.org/wp-content/uploads/2018/09/CarbonTax.pdf.

Sincerely,

Faye Matthews, Ashley Herad, and Kendall Dix on behalf of Taproot Earth

The Coalition to Restore Coastal Louisiana (CRCL) would like to thank you for this opportunity to provide comments on the Draft Louisiana Priority Climate Action Plan (Draft Plan). While we do not have specific comments on the various aspects of the plan, we would like to comment broadly on the work being done to curb emissions and to have our state become carbon neutral by 2050.

As the state's first nonprofit dedicated solely to coastal restoration, CRCL has decades of knowledge of the coast and the challenges we face as a state when it comes to land loss. It is truly a crisis that we, along with a host of partners, have tried to meet head on. The Draft Plan does a thorough job of describing the factors that have led to the land loss crisis of today, and it also does a good job of describing the challenges of today and tomorrow.

We know the tremendous capacity that the coastal wetlands of Louisiana have to sink carbon and combat climate change. We applaud the state and its partners for investing time and money into research to show just how efficient the marsh is at sequestering carbon and lowering our carbon footprint. That said, without taking the actions outlined in the Draft Plan, the effects of climate change will continue to stifle our progress and destroy more of our coast.

We know that without bold action and leadership on the state level, we will not be able to overcome the challenges that we are facing. Without a unified front with coordination from the governor's office and various state agencies, we will be missing opportunities to draw federal funds to assist us in this fight. For these reasons, it is critical that the state retain the chief resiliency officer role in order to accomplish the interagency coordination as contemplated by Act 315 of the 2023 Regular Session of the Legislature.

In closing, CRCL would like to commend Governor Edwards and his staff along with the members of the Climate Initiatives Task Force on their work to address the climate challenges facing Louisiana. In preparing this plan, you brought together community leaders, leaders of business and industry, elected officials and experts so that you could create a solid outline for the bold action required for us to change course in a way that causes the least amount of economic harm while producing the desired outcomes of the plan. Given the gravity of the situation for Louisiana, it is our hope that the incoming administration will continue this work and follow the roadmap of priorities outlined in this Draft Plan.

Tyler M. Bosworth
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Coalition to Restore Coastal Louisiana

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SIERRA CLUB

Governor's Office of Coastal Affairs (GOCA)
P.O. Box 44027
Baton Rouge, Louisiana 70804

November 30, 2023

RE: Draft Louisiana Priority Climate Action Plan (PCAP)

Dear Louisiana Governor's Office of Coastal Activities (GOCA),

Thank you for accepting our comments on the draft Priority Climate Action Plan (PCAP). We are thankful for the opportunity to engage in this process. The Sierra Club is America's oldest, largest, and most influential grassroots environmental organization. Our mission is to explore, enjoy, and protect the wild and beautiful places of the Earth; to practice and promote the responsible use of the Earth's ecosystems and resources; to educate and enlist people to protect and restore the quality of the natural and human environment; and to use all lawful means to carry out these objectives. The Sierra Club has over 3 million members and supporters nationwide. Inspired by nature, we work together to protect our communities and the planet. Our Delta Chapter in Louisiana is supported by more than 30,000 of your neighbors, with 3,500 members at work to protect our residents and environment.

While this PCAP is a step in the right direction toward statewide climate action, we would like to offer some comments that could further strengthen Louisiana's plan. The Sierra Club emphasizes the importance of community engagement in this process, as this plan will be used as the basis for the state's strategy for pursuing EPA Climate Pollution Reduction Grants. The EPA's stated intent for these grants is to "develop and implement ambitious plans for reducing greenhouse gas emissions and other harmful air pollution". We hope that through this engagement process, the Climate Initiatives Task Force will bring in more frontline community voices and maintain its commitment to climate equity while working to build a cleaner Louisiana.

Please find our specific feedback on the PCAP focus areas and actions below.

I. Community Solar

We endorse the state's initiatives for community solar, with a specific emphasis on supporting public schools. However, we view this as an initial stride and propose that public funding be directed towards fostering greater public involvement and community ownership of solar endeavors. The benefits of solar should not go exclusively to investor-owned utilities or communities already endowed with the resources and knowledge to pursue renewable energy initiatives. We advocate for the state to proactively collaborate with low-income communities, assisting them in developing their solar projects. This support can manifest through technical guidance for grant applications or matching funds. Additionally, it is crucial for states to ensure that prioritizing low-income residents does not entail imposing cumbersome asset tests. Excessive paperwork and stringent proof of income requirements can dissuade eligible applicants from participating in programs they would otherwise qualify for. Through the state's Solar for All program, there will be ample opportunities to increase access to solar within low-income communities. The Sierra Club encourages GOCA to maintain proper communication with the State Energy Office, to collaborate on the buildout of community solar and ensure that the Solar for All funding is used to its full potential.

Input from the community has highlighted residents' concerns regarding solar energy potentially conflicting with other land uses, such as agriculture and forestry. It is essential for the state to guarantee that solar development minimizes its impact on greenfields whenever feasible. The state should establish a regulatory framework that prioritizes solar development in the built environment, including rooftops and parking lots, instead of greenfields that benefit the community.

II. Offshore Wind

The Sierra Club endorses the state's initiative to advance offshore wind energy. Offshore wind power reaches its peak generation precisely when solar energy is tapering off, establishing it as an excellent complement to community solar initiatives. Unlike onshore alternatives, offshore wind doesn't vie for land use, and its life cycle impacts are comparatively lower when contrasted with various other energy sources.[1]

When developing offshore wind in state waters, the state should be proactive in coordinating development. Rather than allowing industry to select sites and then conduct an environmental analysis prior to issuing a permit, the state should work now to identify suitable suits that will minimize impacts to wetlands and wildlife. This will be key to keeping important stakeholders– such as seafood harvesters, Indigenous tribes, and environmental groups–supportive of offshore

[1] Torres JF, Petrakopoulou F. A Closer Look at the Environmental Impact of Solar and Wind Energy. Glob Chall. 2022 Jun 22;6(8):2200016. doi: 10.1002/gch2.202200016. PMID: 35958828; PMCID: PMC9360340.

wind development. All of these groups will require intentional and frequent outreach throughout the process of offshore wind development.

Numerous promising offshore wind areas off the Louisiana coast were left out of auctions due to conflicts with existing oil and gas infrastructure, including 18,000 miles of abandoned pipelines. Louisiana should work with the federal government to secure more funding for coastal cleanup of this abandoned infrastructure, enabling the growth of offshore wind. The clean up of this infrastructure poses an excellent opportunity for green job creation in our state. It is also important for Louisiana to advocate for phasing out fossil fuels and resisting the expansion of offshore carbon capture, which often involves building more pipelines that could impede offshore wind development.

It is imperative that the state take a proactive approach to coordinating the development of offshore wind within state waters. Instead of letting the industry choose sites and subsequently conduct environmental analyses before permit issuance, the state should proactively identify suitable locations that minimize impacts on wetlands and wildlife. The state must also maintain effective and continuous outreach to key stakeholders, including seafood harvesters, Indigenous tribes, and environmental groups, throughout the offshore wind development process.

Finally, the Sierra Club is concerned that focusing offshore wind on producing green hydrogen would benefit the fossil fuel sector. This might prolong the life of petrochemical facilities set for retirement, conflicting with CITF goals and community preferences for health-focused solutions. Louisiana should assess offshore wind end uses before issuing new permits.

III. Resilience Hubs

Sierra Club supports the initiative to establish resilience hubs throughout the state, especially in the low-income communities of color that need these hubs the most in the wake of natural disaster. As noted during Together LA's Community Lighthouse launch in LaPlace, LA, more people die from lack of power after a storm than from the actual storm itself. However, we want to emphasize that these resilience hubs are a compliment, not a substitute, for evacuation strategies. Assistance will remain crucial for those struggling to evacuate during more intense hurricanes. The state should implement policies simplifying mandatory evacuations and ensuring transportation for everyone. The necessity of special accommodations, including support for children, the elderly, and disabled individuals, should be recognized. Financial aid for evacuations should also be made available to ensure equitable access.

IV. Transmission Planning

Louisian's transmission is not being built at a pace and scale needed to ensure reliability and resilience. Lack of transmission lines has caused renewable energy developers to back out due to uncertainty leaving climate benefits on the table. In order to fully realize carbon emissions

reductions and achieve a 100% clean electricity grid, Louisiana needs to ramp up transmission capacity by at least 30% by 2030. Louisiana's utilities should also be pressured to invest further in transmission instead of being allowed to drag their feet at ratepayers' expenses.

While transmission planning and siting should be done quickly, activities should not be done at the expense of community health and engagement and environmental protection. We do not have to choose between proactive development and community health and safety. The Sierra Club is glad to see Louisiana's commitment to facilitating regional resource strategic planning. While we support the multi-jurisdictional approach involving regional states, utilities, and transmission operators, a notable gap exists in the exclusion of stakeholders from communities affected by transmission siting. This oversight includes community members and government officials. We strongly advocate for a thoughtful strategic planning process, urging the state to carefully consider and include the relevant stakeholders at the table.

V. Industrial Decarbonization

The state's strategy for industrial decarbonization heavily relies on carbon capture and storage (CCS), a method that would increase air pollution.[2] Additionally, the state persists in pursuing blue hydrogen projects, which have worse impacts on our climate than coal.[3] Many "green hydrogen" projects have been mislabeled and are not using new renewable energy capacity to perform electrolysis, and the state has no regulations in place to ensure that green hydrogen is green. Furthermore, the construction of new hydrogen or carbon pipelines in coastal areas is anticipated to result in land loss, actively diminishing climate resilience.[4] It is crucial to note that carbon pipelines also present the potential hazard of explosions and asphyxiation, directly conflicting with community calls for improved public health outcomes.[5]

Rather than relying on hydrogen and CCS, the state should focus on reducing industrial emissions by addressing demand. Initiating a comprehensive study to assess the end uses of industrial facilities is imperative, aiming to identify those industries that are essential and contribute to societal well-being. For other facilities that produce harmful products like oil and gas that will be phased out, the state should make plans for their retirement. In cases where facilities serve a purpose that cannot be easily replaced, the state should prioritize non-CCS solutions within the PCAP. This includes strategies like fuel switching, efficiency upgrades, and

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[2] Jacobson, Mark, "The health and climate impacts of carbon capture and direct air capture,"Energy Environ. Sci., 2019,12, 3567-3574.

[3] Howarth, RW, Jacobson, MZ. How green is blue hydrogen? Energy Sci Eng. 2021; 9: 1676–1687. https://doi.org/10.1002/ese3.956

[4] Priest, Tyler & Theriot, Jason, "Who Destroyed the Marsh? Oil Field Canals, Coastal Ecology, and the Debate over Louisiana's Shrinking Wetlands," Jahrbuch für Wirtschaftsgeschichte / Economic History Yearbook, 2009, 50. 10.1524/jbwg.2009.50.2.69.

[5] Zegart, Dan, "The Gassing Of Satartia," Huffington Post, August 26, 2021, https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f.

electrification. Implementing these measures aligns the plan more closely with the community's aspirations for safety and resilience.

VI. Methane Emissions

With funding through the Infrastructure Investment and Jobs Act and recent state appropriations, the state is poised to undertake a suite of activities to address methane, including the plugging, capping and reclaiming orphaned wells across the state with a priority on wells located in low-income, Black and Indigenous communities. This poses yet another excellent opportunity for green job creation for our workers in Louisiana, and lowering our state's economic dependency on the fossil fuel industry. The Sierra Club is in support of these efforts, and hopes that the state will consider allocating revenues from this activity to the communities that have been harmed by their proximity to these abandoned wells.

VII. Fleet Transition

According to a report from the climate + community project, the United States can achieve zero-emissions transportation while limiting the amount of lithium mining necessary by reducing the car dependence of the transportation system, decreasing the size of EV batteries, and maximizing lithium recycling. The Sierra Club believes that Louisiana should be more ambitious with its transition to an all electric fleet– we should follow the example of other states and the federal government, which have goals to achieve an all electric fleet by 2035.

VIII. Regional Transit

The Sierra Club welcomes the initiatives aimed at enhancing regional connectivity to promote increased reliance on public transportation. This focus spans both rural and urban areas, with a specific emphasis on enhancing access to services and amenities for low-income and disadvantaged communities. It is imperative that the state ensures substantive engagement with these communities, actively seeking their input to discern their priorities. Planning benefits should not be unilateral; instead, they should be informed by the valuable insights and preferences of the communities involved.

IX. Urban and Community Forestry

We are pleased to see the state recognize the wide variety of benefits of urban and community forests, including reducing carbon and co-pollutants, managing stormwater, and abating urban heat island effects is a great start. The state should persist in backing the development and execution of local plans, fostering collaboration across various agencies, legislative chambers, and engaging with stakeholders and local governments. It is essential to identify and address policy deficiencies while alleviating burdensome requirements that hinder effective land expansion and management practices, such as prescribed fires and thinning.

In navigating competing land use priorities, such as community solar, careful consideration is paramount when expanding urban and community forestry landscapes. Striving for harmony, it is

crucial to avoid pitting one viable carbon reduction solution against another to the greatest extent possible. This approach ensures a comprehensive and integrated strategy that maximizes the collective impact of various initiatives.

X. Sustainable Agriculture

Sustaining investment in initiatives such as climate-smart agriculture is imperative for promoting enhanced coordination and linking programmatic efforts, including wetland conservation and water quality initiatives. Encouraging interstate collaboration on sustainable agriculture is crucial for comprehensive impact. However, it is essential to emphasize ongoing involvement in both urban and rural communities. Urgent attention should be directed towards the swift development and increased investment in local agriculture, with a focus on supporting local food systems, community gardens, and small-scale urban agriculture, particularly in underserved communities—those that are impoverished and predominantly people of color.

XI. Coastal Restoration

The significance of wetlands, particularly their role as carbon sinks, cannot be overstated. It is crucial to comprehensively assess the net greenhouse gas impacts associated with the loss, conservation, and restoration of coastal wetlands.

With the understanding that our coastal wetlands are one of our most precious resources, it is essential to exercise caution and avoid the establishment of carbon markets. Such markets have the potential to adversely impact poor and BIPOC communities, which already disproportionately bear the brunt of climate change. Allowing polluting industries to commodify and exploit public resources within these markets may perpetuate harmful practices as long as they remain economically feasible for these industries.

XII. Low-Income Community

The Sierra Club advocates for a proactive state approach to uplift Louisianans out of poverty. Recognizing the decrease in child poverty during the response to the COVID pandemic and supported by academic studies, there is a growing consensus that cash transfers represent the most effective means to combat poverty.[6] Within this framework, two options with a climate connection are particularly noteworthy: the implementation of a carbon tax and dividend, or the establishment of a state fund akin to the Alaska Permanent Fund. The initial funding for these mechanisms could be sourced from revenue generated by clean energy initiatives.[7]

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[6] Egger, Dennis, Johannes Haushofer, Edward Miguel, Paul Niehaus, and Michael Walker. (2022). "General Equilibrium Effects of Cash Transfers: Experimental Evidence from Kenya", Econometrica, 90 (6): 2603-2643, doi: 10.3982/ECTA17945.

[7] Fremstad, Anders and Mark Paul, "Disrupting the Dirty Economy," People's Policy Project, September 2018, https://www.peoplespolicyproject.org/wp-content/uploads/2018/09/CarbonTax.pdf.

While the state explores avenues for cash transfers to benefit low-income and disadvantaged community members, we also recommend:

- Air Quality and Public Health Improvements: It is imperative that plants or facilities with the potential to release toxic emissions be obligated to conduct and report their emissions promptly and transparently. The state should oversee and monitor this process, with the results promptly disclosed to the public. If the state opts not to enforce compliance by facilities, it should assume responsibility for monitoring, ensuring transparency and timeliness. Every effort must be exerted to provide the public with timely and accurate information about the potentially inhaled substances.

- Jobs and Workforce Development: Prioritizing funding for training and small business growth opportunities is crucial, with a focus on Historically Black Colleges and Universities, Community Colleges, and Technical Colleges situated in close proximity to areas identified as Low Income and Disadvantaged Communities. Financial assistance should be readily accessible for individuals unable to afford tuition or associated fees related to any educational opportunity within these communities. This approach ensures equitable access to educational and entrepreneurial resources, fostering economic development and empowerment in historically marginalized areas.

In conclusion, the Sierra Club appreciates the opportunity to comment on the PCAP. We hope you will consider these suggestions for the PCAP that we believe will only strengthen the state's commitment to climate equity and support for frontline communities.

Respectfully,

Emma Hopkins, on behalf of the Sierra Club
Field Organizer
[redacted]

SIERRA CLUB

November 30, 2023

Re: EDF Comments to Draft Priority Climate Action Plan

To whom it may concern:

The Environmental Defense Fund appreciates the opportunity to provide public comments on Louisiana's Draft Priority Climate Action Plan. We have included our comments below.

General Feedback on Sections 3 & 4

a. While the Louisiana Climate Action Plan largely serves as a general resource and guide for climate mitigation actions, we are pleased to see climate resilience projects highlighted in several focus areas that work to maximize climate mitigation and equitable adaptation goals. Resilience planning is consistently and widely supported by the people and leaders of Louisiana, alike; therefore, building resilience into mitigation planning is critical to adoption and continued success of the PCAP.

Specific Feedback on Focus Areas and Sections

- **Community Resilience Hubs**
  - **a.** Community Resilience Hubs, supported and funded by a variety of stakeholders across Louisiana's coast and including inland parishes, are excellent examples of projects that work to both enhance the state's resilience strategy and reduce reliance on fossil fuel-powered energy grids. We are excited to see progress on the many projects highlighted in this focus area of the PCAP, including the Community Lighthouse Program and Get Lit, Stay Lit in the City of New Orleans, Hazard Mitigation and Tribal Resilience Hubs for the United Houma Nation funded by GNOF, and upgrades to the Cleco Alternative Energy Center by ULL. We encourage the state and its partners to prioritize LIDAC communities most in need of resilience hubs in the face of more frequent extreme weather events.

- **Transmission Planning**
  - a. Overall, the PCAP does reasonably well at describing the issue and identifying potential steps, but we think it could benefit from two things: (a) expansion of the first bullet point beyond just advanced conductors to other "grid-enhancing technologies" or "advanced transmission technologies" and (b) a little more specificity and detail on some of the opportunities for regional transmission buildout.

b. On the first point, it is great that Louisiana is interested in integrating advanced conductors into the grid. However, advanced conductors are just one of a portfolio of technological and operational solutions that can improve the capabilities and reliability of both the existing grid and newly developed lines. These solutions are often grouped as grid-enhancing technologies ("GETs") or alternative transmission technologies ("ATTs"). EDF would encourage Louisiana to expand its study to incorporate a broader set of GETs and consider similarly expanding the proposed standard to require the use of a broader range of GETs as appropriate. One good source of a list of "shovel ready" GETs is FERC's Order 2023, the interconnection reform order. It required that interconnection studies include, in addition to advanced conductors, the following additional technologies: static synchronous compensators, static VAR compensators, advanced power flow control devices, transmission switching, synchronous condensers, voltage source converters, and tower lifting. FERC made a strong finding in Order 2023 that each of these are well-established solutions with the potential to improve transmission utilization. FERC is also looking at the use of dynamic line ratings to improve transmission efficiency and capability. Another good source on GETs is the WATT Coalition, an advocacy group that focuses on encouraging use of three specific GETs: advanced power flow control, dynamic line ratings, and topology optimizations. Their website has a number of resources, including a report from April of this year estimating the benefits that those three technologies can provide as well as information on the federal funding available to support GETs.

c. The need for regional and interregional transmission expansion includes several specific types of need, including: (1) transmission expansion within MISO South; (2) increased transmission connection between MISO South and MISO North; and (3) increased transmission connection between MISO South and SPP (due to the small footprint of SPP within Louisiana, we don't view intra-SPP expansion as particularly relevant for Louisiana). MISO does much of its transmission planning through the Long-Range Transmission Planning ("LRTP") process. Tranches 1 and 2 of the LRTP are focused on transmission development in MISO North; Tranche 1 was very successful in identifying and selecting projects and Tranche 2 is currently well underway. Tranche 3 is intended to focus on transmission expansion within MISO South while Tranche 4 is intended to focus on the connections between MISO North and South. States play a very important role in LRTP as a core part of its design is developing an agreement on cost allocation among the states, work which is currently underway for Tranche 3. While we understand that the PCAP is intended to be relatively high-level and wouldn't expect it to go deep into these topics, we think it could be useful for it to note the LRTP Tranche 3 and 4 processes and explicitly state that Louisiana intends to participate in and support the development of projects through those processes, in addition to interregional MISO-SPP projects.

d. For the state to participate in/support the development of projects in LRTP tranches 3 and 4, primarily it would take more active participation, mostly by the LPSC, but potentially other state agencies could have some involvement as well. The LPSC and other agencies would need to be active on the MISO committee processes related to LRTP, which for tranche 3 currently includes the Regional Expansion Criteria and Benefits Working Group; it could also include more behind-the-scenes efforts to encourage MISO to move those processes forward quickly. Louisiana should also prepare for robust engagement and support of these processes by doing work at the state level to develop a strong understanding of the benefits of different categories of transmission projects.

- **Industrial Decarbonization**
  a. We would like to flag that the hydrogen hub, HALO, mentioned throughout the draft was not selected by DOE. Louisiana should clarify that and remove it from the projects mentioned.
  b. Regarding the language on p. 20 promoting "Advanced recycling" as a strategy to decarbonize the industrial sector, EDF would like to encourage more thorough interrogation of advanced recycling or chemical recycling as a proposed decarbonization solution.

  Advanced recycling more deeply entrenches fossil-based polymers like plastics into our economy and leverages vocabulary and positive connotations associated with traditional recycling processes towards an effort to greenwash industrial activities. Instead, advanced recycling is increasingly proven to be highly toxic to human health and the environment. The pyrolysis (plastic-burning) process used for most advanced recycling facilities is toxic from start to finish and is also not proven to be better for GHG emissions in the US. Industry actors have been circulating a study funded by American Chemistry Council claiming advanced recycling is better for climate, however, their methodology is not appropriate to apply in the US context, and there is other literature, from the recent Beyond Plastics Chemical Recycling report, demonstrating 10-100x greater climate emissions given the high heat and energy required for pyrolysis. We have attached to the email our comments to EPA that outline our concerns with and risks of advanced recycling. We also provide for your convenience a number of resources created by Moms Clean Air Force, including Chemical Recycling 101 and this letter to Congress on Chemical Recycling from September 2022.

- **Methane Emissions**

  a. In the "Intersection with Federal Funding" subsection, the State may want to consider referencing funding opportunities associated with the Inflation

Reduction Act's Methane Emissions Reduction Program ("MERP"). MERP allocated $1.55 billion to cut methane pollution from oil and gas industry operations through financial and technical assistance. The program will help reduce climate pollution from the oil and gas industry by improving and deploying new equipment, supporting technological innovation, permanently shutting in and plugging wells, and other activities, according to the EPA. EPA and DOE are jointly administering the MERP funding, currently evaluating applications for $350 million in funding for states to plug low-producing and idle wells, with additional funding opportunities anticipated in the future.

b. The State observes that many states have established LDAR programs modeled after EPA's LDAR Program and Best Practices Guide. EPA is soon expected to announce the finalization of its methane standards for the oil and gas sector. At the time of this comment, EPA has not yet finalized these standards but in its November 2022 proposal, EPA proposed to require that all well sites be routinely monitored for leaks, with the type and frequency of inspection based on the type and amount of equipment on site. Louisiana's PCAP identifies an opportunity for DEQ to utilize and deploy technologies to monitor methane emissions, but it is important to recognize if EPA's final rule includes LDAR requirements for operators, eventually (timing depending on whether the source is new or existing) operators themselves will have an obligation to conduct LDAR. Although we support the development of state government expertise and capacity in monitoring for methane emissions, we also encourage Louisiana to consider how this state led program can be leveraged to facilitate education and increased capacity of operators to conduct these activities at their sites.

c. Priority Action – "Launch Methane Detection and Monitoring Program." We support enhanced monitoring and compliance assurance efforts, such as those described in this priority action. Enhanced monitoring can improve data quality, increase transparency and accountability, and for portions of the oil and gas sector, help ensure that EPA's forthcoming methane standards are adhered to and deliver on their promised emissions reductions. It is unclear whether the State envisions a one-time survey of methane emissions sources in Louisiana or an ongoing program to detect and monitor emissions. Since sources and rates of methane emissions are dynamic, we suggest that the State establish a regular detection and monitoring program to track how emissions are changing over time.

d. Priority Action – "Expand Orphan & Active Well Leak Detection and Repair." The State focuses on plugging as a means to remediate leaks at wells, which is intuitive and appropriate for orphaned wells and potentially some idled or marginally producing wells, depending on the circumstances. At actively producing wells with detected leaks, the repair options may differ and could include equipment repair or replacement, maintenance, or operational changes.

As a general matter, the State should prioritize other programs ahead of direct assistance to operators to repair leaks since operators will already have an obligation to reduce emissions under EPA's methane standards.

e. As referenced earlier, the EPA is expected to finalize its oil and gas methane standards for new and existing sources soon. Once the rules are finalized, states will be able to develop state plans to implement the emissions guidelines for existing sources. Swift development, submittal, and approval of a state plan will secure methane emissions reductions. The State may want to consider how CPRG funding can support the state's development of a state plan and incorporate the development of a state plan as a priority action.

f. Regarding Orphaned Wells, due to the extensive plugging of inactive and orphaned wells, there are many jobs being created and significant community benefits from the increased jobs in addition to the reduced environmental degradation from well plugging. Also, DNR has recently revised the future utility/idled wells regulations to create more protections.

g. Regarding the following section on Page 26, we would like to suggest adding the additional language in red:

> **Intersection with Federal Funding -** … In 2023, DNR plugged 636 wells, and in the process created jobs for Louisiana field services workers and the opportunity for new well plugging businesses to take root and create hundreds of additional jobs to plug the remaining 3,952 documented orphaned wells In 2023 DNR also amended its Future Utility Rule (Louisiana Administrative Code 43:XIX, Subpart I, Chapter 1, § 137) to incentivize operators to return wells to production or timely and properly abandon them, reduce future orphan wells, and increase revenue for restoring existing orphaned wells and sites. Timely plugging of Louisiana's population of inactive wells (~17,000) will create thousands more plugging industry jobs, boosting local economies in addition to protecting those living in close proximity to these wells.

- **Ports**

a. The Louisiana ports are struggling with what most ports suffer from – the lack of clear guidance about how to move the needle on their decarbonization plans, so they sort of stab in the dark, and grab at projects that seem doable / workable near them. That said – the list of projects are interesting, and would assist in some emissions reductions.

b. The real issue with what is laid out is that there are **no targets, benchmarks, measurements or goals.** In order for the state to know what impact these various projects will have on the baseline is to have a baseline, and the only

mention of an emissions inventory we see is at the start of the report, but its from 2018, which is considerably old data, especially as many of the LA ports have seen huge growth since then. Louisiana should be doing emissions inventories (called Goods Movement Emissions Inventories, or GMEIs) every year to track the emissions from all aspects of the Ports' operations. There is best practice guidance from EPA to do this: https://www.epa.gov/state-and-local-transportation/port-emissions-inventory-guidance

c. Secondly, the state should be aiming towards a goal. EDF has been pushing ports to set a net zero by 2050 goal, and then lay out interim targets and plans for how they plan to achieve this goal. While planning can often seem like a delay tactic in certain situations, in this case, it's essential that the ports establish their baseline with a new GMEI, understand what the largest contributors to their operations (both within and outside of their gates), develop interim targets and goals, and align policies and programs (including purchasing new equipment) to these interim targets. Without these, while the things they lay out will help with the GHG problem, there are no assurances they are putting their money and energies into the best possible solutions.

d. In terms of the specific projects being put forward:

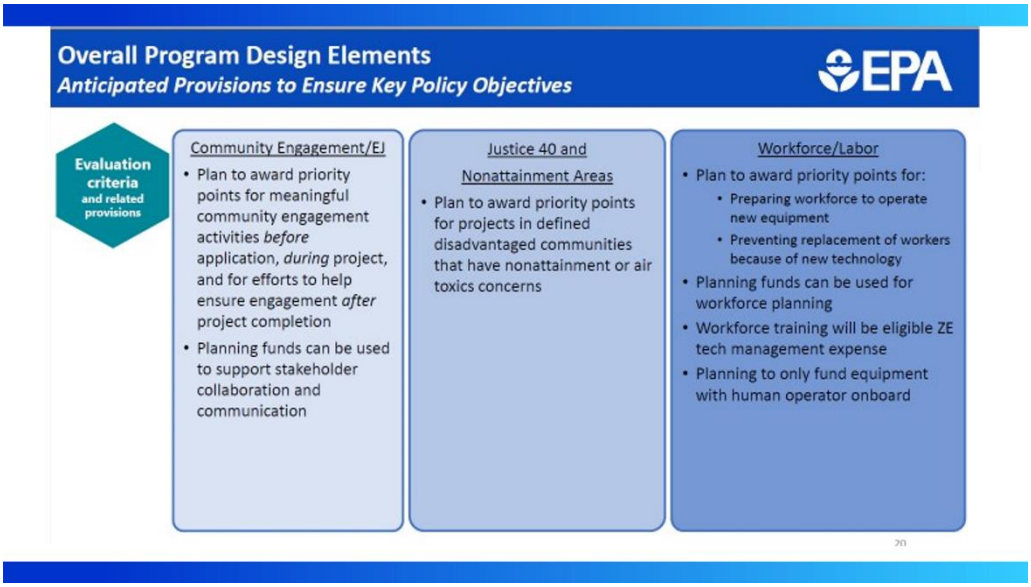
i. Generally shore power gets at the worst emission source at ports (idling ships which rely on the dirtiest of diesel fuel), however, they are costly projects, so it's important that shore power is prioritized in the areas that need it most, and programs to address drayage truck or rail emissions (where the switcher locomotives are often as old as the 1950s!) may be better suited for certain situations.

ii. The target of electrifying 15% of their forklifts by 2030 seems small/not very ambitious (though hard to know given we don't have a count of how many pieces of equipment that really entails).

iii. Displace 15% of Louisiana port marine diesel with hydrogen fueling by 2023

e. Finally, there is no mention of engagement with port adjacent, EJ communities, an essential part of the J40 initiative which overlays all the port grant opportunities within BIL / IRA. The EPA has provide a great deal of information about how ports can / should initiate community engagement strategies to ensure that their emission reduction programs (climate goals) harmonize with their local communities' goals to minimize health impacts from other emissions while working towards important climate goals.

f. The EPA Clean Ports Program's $3B IRA funds which are mentioned in the report as an important source of funds for their programs **requires** community engagement in the design, implementation and evaluation of projects the port puts together. Here's their evaluation criteria for the grant program (below) and in fact, part of the funds are for planning where they will require that ports have GMEI's to establish baselines so they can measure their own impacts over time.



The best summary of our goals for all ports is what the EPA clean ports program states:

g. In summary – we would at minimum emphasize the need to:
    i. Establish a baseline with a current GMEI and a commitment for regular GMEIs of all ports;
    ii. Develop clear targets, benchmarks and goals for net zero by 2050 for all LA ports;
    iii. Create more ambitious programs for inside the gate: increase the speed/% of cargo handling equipment (the report only state forklifts, but its more and includes cranes, yard hostlers, etc.) swap out; and
    iv. Establish community engagement protocols and processes to ensure that EJ/port-adjacent communities are part of the planning process.

- **Built Environment Retrofit**

a. The Built Environment Retrofits focus area within the PCAP provides excellent opportunities to make our communities more resilient and sustainable, while also creating new avenues for networks, collaboration, and new jobs in our state's workforce to accelerate deployment of state-of-the-art building improvements. Initiatives highlighted in the PCAP that are currently being deployed, including the Weatherization Assistance Program and the Building Codes Implementation for Efficiency and Resilience Program, are opportunities that blend mitigation goals through improving energy efficiency and resilience goals through making households more equipped to survive tropical storm events. We urge the state to continue its work towards building a one-stop shop for navigating incentive programs, grants, and loans to increase the accessibility and visibility of these opportunities.

- Coastal Protection and Restoration

a. We are happy to see the PCAP include and navigate the intersection between the state's coastal program and its climate mitigation goals. Since CPRA's inception, as mentioned in the PCAP, restoration projects have benefitted over 50,000 acres of land, restored 71.6 miles of barrier islands, and improved almost 370 miles of our structural defenses of levees. The connection between the state's climate goals and the continued focus on restoring our coast is clear in the projects highlighted in the PCAP as well as those prioritized in the 2023 Coastal Master Plan. As the Coastal Master Plan is science-driven in its prioritization of restoration projects, the PCAP urges parallel backing for research into the GHG impacts of coastal wetland loss, conservation, and restoration construction activities. As the looming fiscal cliff approaches within the next decade for the coastal program, we encourage the state to continue to pursue creative and diverse funding mechanisms for coastal restoration and community resilience projects as highlighted in the Coastal Protection and Restoration focus area.

EDF appreciates the opportunity provide public comments on Louisiana's Draft Priority Climate Action Plan and we look forward to working with the Louisiana Office of the Governor and other stakeholders in ensuring our PCAP is developed properly for the EPA Climate Pollution Reduction Grant (CPRG) Planning Grant. We look forward to continued input during the coming stages and development of the final PCAP.

Respectfully submitted,

Environmental Defense Fund
Bria M. Calvin; Project Manager, Louisiana Political Affairs[redacted]
Liz Russell; Louisiana State Director, Political Affairs[redacted]

#2

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Wednesday, November 29, 2023 10:05:40 AM
Last Modified: Wednesday, November 29, 2023 1:16:17 PM
Time Spent: 03:10:37
IP Address: [redacted]

Page 1

Q1 **Respondent skipped this question**

Please provide feedback on Section 3 - Development of the Priority Measures here.

Q2

Please provide general feedback on Section 4 - Louisiana's Focus Areas and Actions here.

All focus areas and actions should prioritize benefits to community as an equal priority as benefits to environment. That is to say, we must pursue solutions that both help our people and protect our planet. We cannot invest in solutions that sacrifice the long term health and wellbeing of the people that live here.

Q3 **Respondent skipped this question**

Community Solar feedback.

Q4 **Respondent skipped this question**

Offshore Wind and Power feedback.

Q5

Community Resilience Hubs feedback.

Community resilience hubs are spaces that can and should create connections between disaster impacted food producers seeking market outlets and cold storage for immediate pre-storm harvests and communities in need of food post-storm. To often post-storm disaster feeding prioritizes large-scale imported food products and locally produced crops spoil because we could plan appropriately. Essentially, farmers need to be able to harvest and store harvests locally before storms, disaster support groups need to then be able to purchase those supplies and ready them for immediate distribution post-storm.

Q6 **Respondent skipped this question**

Transmission Planning feedback.

Q7 **Respondent skipped this question**

Industrial Decarbonization feedback.

Q8

Methane Emissions feedback.

Anaerobic digesters should not be pursued as a priority area. Resources should be funneled towards closing/sealing abandoned and orphaned wells.

Q9 **Respondent skipped this question**

Fleet Transition feedback.

Q10 **Respondent skipped this question**

Ports feedback.

Q11 **Respondent skipped this question**

Regional Transit feedback.

Q12 **Respondent skipped this question**

Built Environment Retrofit feedback.

Q13

Urban and Community Forest feedback.

We applaud the prioritization of low-income and disadvantaged communities in urban greening and reforestation efforts. This should be maintained.

Q14

Sustainable Agriculture feedback.

There is relatively little specificity and planning included here, relative to the other priorities. More attention should be paid to this area as conventional/non-sustainable agriculture relies upon petrochemical/fossil fuel-based fertilizers and pesticides, thus constituting a major outlet for a significant emitting industry in the state, and producing emissions itself. The reliance on fossil fuel-based inputs should be included in the framing of this section. We must transition toward more sustainable agricultural practices to reduce use of fossil fuels in agriculture and accessory industrial production practices. Additionally, unlike many of the proposed priority areas, sustainable agriculture is one of the few that can safely store carbon and reverse emissions.

This goal, "30% of Louisiana's interior natural lands to be conserved or protected by 2030 ", lacks clarity. What constitutes conservation or protection? Lands used for conventional commodity agriculture are neither conserving nor protecting land.

Under "Support Urban Agriculture and Community Gardens"
Projects supported should include projects that target support for underserved or historically marginalized agricultural producers. Additionally, a more expansive scope for food procurement should be added. Institutional feeding or large-scale feeding pathways and market development for small-scale and sustainable producers of USDA-defined specialty crops (i.e. fruits, vegetables, and other crops intended for human consumption as food) should also be supported project areas. These can include food procurement and feeding pathways such as in hospitals, schools, food banks, and other feeding programs beyond the purview of merely restaurants and grocery stores. Wholesale and large-scale markets are huge opportunities for sustainable producers that wish to feed communities, but at present these are not accessible. Lack of accessible to a variety of viable markets hampers overall viability of smaller and sustainable producers, and also exacerbates food access issues for underserved communities.

Q15

Respondent skipped this question

Coastal Protection and Restoration feedback.

#3

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, November 30, 2023 10:40:05 AM
Last Modified: Thursday, November 30, 2023 10:49:14 AM
Time Spent: 00:09:09
IP Address: [redacted]

Page 1

Q1 **Respondent skipped this question**

Please provide feedback on Section 3 - Development of the Priority Measures here.

Q2 **Respondent skipped this question**

Please provide general feedback on Section 4 - Louisiana's Focus Areas and Actions here.

Q3 **Respondent skipped this question**

Community Solar feedback.

Q4 **Respondent skipped this question**

Offshore Wind and Power feedback.

Q5 **Respondent skipped this question**

Community Resilience Hubs feedback.

Q6 **Respondent skipped this question**

Transmission Planning feedback.

Q7

Industrial Decarbonization feedback.

This comment relates to the following output: Increase on-site renewable and clean electricity generation, including energy storage and grid integration to 20% of industrial facilities by 2030. In order to achieve the proposed goals of increased on-site renewable and clean electricity generation at industrial facilities, industrials must be provided with more options to access such generation including through direct negotiations with renewable developers, and PPAs between deregulated renewable power developers and retail customers. These options should be included, as well as expanded opportunities for buying and selling power supplied from industrial Combined Heat & Power ("CHP") cogeneration in Louisiana.

Q8 **Respondent skipped this question**

Methane Emissions feedback.

Q9 **Respondent skipped this question**

Fleet Transition feedback.

Q10 **Respondent skipped this question**

Ports feedback.

Q11 **Respondent skipped this question**

Regional Transit feedback.

Q12 **Respondent skipped this question**

Built Environment Retrofit feedback.

Q13 **Respondent skipped this question**

Urban and Community Forest feedback.

Q14 **Respondent skipped this question**

Sustainable Agriculture feedback.

Q15 **Respondent skipped this question**

Coastal Protection and Restoration feedback.

#4

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, November 30, 2023 3:18:45 PM
Last Modified: Thursday, November 30, 2023 3:21:51 PM
Time Spent: 00:03:05
IP Address: [redacted]

Page 1

Q1

Please provide feedback on Section 3 - Development of the Priority Measures here.

The Alliance is encouraged by the State's development of these Priority Measures, including community meetings around the state and targeted discussions with subject matter experts. We have been concerned that meetings associated with the Task Force are often only announced a few days in advance, sometimes making it difficult for stakeholders to plan and participate. We urge the State to continue these meetings and other outreach activities related to emissions reductions and the energy transition to maintain two-way communication with Louisianans who are experiencing the impacts of climate change, as the priorities may change based on those impacts.

Q2

Respondent skipped this question

Please provide general feedback on Section 4 - Louisiana's Focus Areas and Actions here.

Q3

Community Solar feedback.

The PCAP does a good job outlining the needed steps to enable Community Solar for Louisianans. The plan leaves out the existing regulations that does enable Community Solar in New Orleans, which has recently been amended to support financial foundations for community owned and directed energy. We encourage the plan to make mention of these existing rules, and urge the next steps of the Public Service Commission to develop rules similar to those in New Orleans so that the market for these solar developments is cohesive across the state. Additionally, at least 12 municipally owned and operated electric utilities in the state have the opportunity to develop their own Community Solar programs. The State could add an action in this section to work with the Louisiana Municipal Association to coordinate the development of model community solar programs for public power systems that could then leverage Solar For All investments without the need for LPSC action. This could unlock community solar for 100s of thousands of Louisianans.

Q4

Offshore Wind and Power feedback.

The possibility of Louisiana serving as a locus for national and global offshore wind manufacturing supply chains and workforce development is a clear opportunity for the state, and the Alliance is glad to see mention of grid interconnection and transmission planning included among the priority actions for this section. But recent business and financial reporting indicates that offshore wind is facing significant hurdles that may require direct state investment in projects to be made economically viable. Additionally, it would be helpful to see the “Build Local Capacity” priority action bolstered to more clearly state that any offshore wind development in state or federal waters that will connect to Louisiana should be planned to used in ways that provides renewable energy to more than just industrial customers, without putting the full costs of offshore wind transmission and infrastructure development on ratepayers.

Q5

Community Resilience Hubs feedback.

Within this Community Resilience section, the “Unlock compensation for energy storage” should include how the State intends to work with the LPSC and/or stakeholders at the Commission to address this action. The State should either continue the inter-agency working group and include this effort as a priority, or the State (through the State Energy Office) should intervene in dockets at the LPSC to advocate for the positions in this plan. Language in this plan to continue to improve building standards for resilience purposes is encouraging, and The State should include efficiency and stable heating/cooling to address extreme temperatures expected in the coming decades.

Q6

Transmission Planning feedback.

In this section, the State should be more specific about its commitments to engage with transmission operators. For example, the State could participate as a stakeholder in the MISO process, or could provide letters of support for Long Range Transmission Planning to the leadership at the transmission operators. In the absence of clean energy mandates, this kind of clear communication from the state will help provide the basis for RTOs to ensure planning for our region is robust.

Q7

Industrial Decarbonization feedback.

As this section notes, if Louisiana is to meaningfully abate – and eventually, eliminate – GHG emissions, it is crucial to prioritize industrial decarbonization. However, relying on Carbon Capture and Sequestration (CCS) is not the way to achieve these ends. Despite continued claims by industry, and stated hopes by government agencies, there is no evidence that CCS can be scaled up and capture emissions at the rates necessary to meet the ambitious goals laid out in this plan.

Additionally, the deployment of pipeline and well infrastructure for the purposes of "storage" will fundamentally undermine the ability of the State to achieve its larger environmental justice and decarbonization goals by prolonging the use of fossil fuels, or necessitating their use to meet the enormous energy needs for operating CCS technologies. Furthermore, the scale of pipeline and injection well infrastructure would necessarily be counter to the wetlands restoration and protection that is necessary to protect coastal Louisiana and which also naturally sequesters carbon dioxide. The Alliance is also deeply concerned about the implementation of CCS at power plants. Despite generous federal tax subsidies, there is little doubt that the costs associated with implementation of CCS on fossil fuel-burning plants – particularly given their negative impact on efficiency – will be borne primarily by ratepayers, many of whom are already facing unaffordable energy bills. Only by focusing on the development and deployment of fully renewable energy sources and transitioning away from fossil fuels in every way possible will Louisiana achieve true industrial decarbonization. At this time, permitting and planning in Louisiana's industrial sector indicates an increase in industrial emissions, not a reduction.

Q8

Methane Emissions feedback.

The Alliance is glad to see methane emissions prioritized in the PCAP, and in particular, identifying priority actions related to monitoring and repair of active and orphaned wells and pipelines. While it is sensible (and perhaps more practical) to focus primarily on orphaned and active wells, the Alliance would recommend that abandoned and idle wells also be included in monitoring and repair programs in some way. After all, these wells will need to be decommissioned, monitored, and maintained in perpetuity just the same as orphaned and active wells to truly accomplish decarbonization in Louisiana. We would also suggest it is better to target these wells (in addition to active wells) before they are orphaned or abandoned, particularly with the unpredictable swings of global oil and gas markets that often cause this infrastructure to become abandoned or orphaned. Through the Department of Environmental Quality the state should improve transparency and reporting of methane and other emissions, including posting the data on their website.

Q9

Fleet Transition feedback.

The City of New Orleans passed an ordinance in 2022 requiring the transition of city owned fleets to electric vehicles. The Council's decision to create this directive was partly driven by the cost-savings that will accrue to the City as a result of phasing out combustion engines. The State should make a commitment (and implementation plan) that goes beyond 25% of public fleet. National projections indicate electric vehicles representing 40-50% of vehicles by 2030. If the state truly intends to lead by example and reduce transportation emissions that are at the discretion of the state, a higher percentage is warranted. The state should commit to at least 60% of state fleet vehicles are electric.

Q10

Ports feedback.

The Alliance strongly supports the inclusion of shore power as a priority action, and would only add that priority should make explicit that this be provided by renewable energy sources. Accordingly, the other port priorities should focus mainly on proven decarbonization solutions that are immediately available – renewables and battery storage in particular. While green hydrogen may have promise, that industry remains very much in its infancy; that being said, treating hydrogen generally as a clean fuel without specificity to its production is concerning. In our view, Louisiana should not prioritize hydrogen development that relies on fossil fuels at all, and minimize decarbonization plans that depend on hydrogen generally.

Q11

Regional Transit feedback.

The State of Louisiana is in a position to increase regional and even state-wide transit that could not only reduce emissions, but could improve quality of life and enable residents and workers to reduce their transportation costs significantly. As a starting point, the State should commit to re-introducing the Swift bus program, which reduced single occupancy vehicles traveling from New Orleans to Baton Rouge, and enabled inexpensive travel. Similar programs could be offered across the I-10 corridor, enabling greater regional connectivity for lower cost and reduced emissions. Similarly, the state should expand such a program to include Central and North Louisiana. Such a program could be re-introduced for relatively little cost to the State. The IIJA includes funding for this kind of transit program, and the State should develop a proposal along with regional planning authorities for funding support.

Q12

Built Environment Retrofit feedback.

Built Environment Retrofits should be a top priority for the state. Louisiana residents and businesses have long suffered with inefficient buildings, causing unmanageable utility bills and even health and safety concerns as the programs and actions outlined in this section of the PCAP have benefits well beyond the GHG emissions reductions. As new and existing programs expand from federal funding and LPSC regulations around efficiency, now is the time for the state to work closely across agencies to streamline program offerings and access to ensure low-income households are not left behind. There is an outstanding challenge that is not addressed in this plan: without investments directly in homes to bring them up to a standard to receive efficiency and renewable retrofits, many households will not be able to afford to participate. Many homes in Louisiana have structural damage related to age or even major storms, which require pre-weatherization before basic insulation or fortified roofing can be installed. The state must create a standing fund for pre-weatherization and home stabilization to remove this barrier. The first step should be to direct disaster relief funding to a fund for this purpose, followed immediately with weatherization, fortified roofing, efficiency investments, and finally solar and energy storage. If deployed at scale, homes participating in such a program will reduce GHG emissions, lower energy costs, protect residents against the extremes of climate change (heat, humidity, cold, storm damage), and importantly, reduce insurance risks, lowering costs for insuring housing across the state.

Q13 **Respondent skipped this question**

Urban and Community Forest feedback.

Q14 **Respondent skipped this question**

Sustainable Agriculture feedback.

Q15 **Respondent skipped this question**

Coastal Protection and Restoration feedback.

#5

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, November 30, 2023 4:21:27 PM
Last Modified: Thursday, November 30, 2023 4:23:40 PM
Time Spent: 00:02:12
IP Address: [redacted]

Page 1

Q1 **Respondent skipped this question**

Please provide feedback on Section 3 - Development of the Priority Measures here.

Q2 **Respondent skipped this question**

Please provide general feedback on Section 4 - Louisiana's Focus Areas and Actions here.

Q3

Community Solar feedback.

Yes, please! More community solar

Q4

Offshore Wind and Power feedback.

Yes to this as well!

Q5

Community Resilience Hubs feedback.

Yes, please.

Q6 **Respondent skipped this question**

Transmission Planning feedback.

Q7

Industrial Decarbonization feedback.

Absolutely not. Carbon Capture and Sequestration is DANGEROUS for our communities. https://www.npr.org/2023/05/21/1172679786/carbon-capture-carbon-dioxide-pipeline --- PLEASE Read this.

Q8 **Respondent skipped this question**

Methane Emissions feedback.

Q9 **Respondent skipped this question**

Fleet Transition feedback.

Q10 **Respondent skipped this question**

Ports feedback.

Q11 **Respondent skipped this question**

Regional Transit feedback.

Q12 **Respondent skipped this question**

Built Environment Retrofit feedback.

Q13 **Respondent skipped this question**

Urban and Community Forest feedback.

Q14 **Respondent skipped this question**

Sustainable Agriculture feedback.

Q15 **Respondent skipped this question**

Coastal Protection and Restoration feedback.

#6

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, November 30, 2023 4:28:00 PM
Last Modified: Thursday, November 30, 2023 4:52:56 PM
Time Spent: 00:24:56
IP Address: [redacted]

Page 1

Q1 **Respondent skipped this question**

Please provide feedback on Section 3 - Development of the Priority Measures here.

Q2 **Respondent skipped this question**

Please provide general feedback on Section 4 - Louisiana's Focus Areas and Actions here.

Q3 **Respondent skipped this question**

Community Solar feedback.

Q4 **Respondent skipped this question**

Offshore Wind and Power feedback.

Q5 **Respondent skipped this question**

Community Resilience Hubs feedback.

Q6 **Respondent skipped this question**

Transmission Planning feedback.

Q7

Industrial Decarbonization feedback.

Climate Reality Project Greater New Orleans Chapter objects to the widespread use of carbon capture & waste injection as a way to reach Louisiana's emissions goals. This false solution will be an excuse for more fossil fuel extraction and use that will put us on the wrong path for fighting global warming and climate crisis. Carbon waste injection is an extremely dangerous technology that risks the lives of thousands of Louisianans if implemented, especially at the proposed scale companies are planning. Also, the destruction of more wetlands for the pipelines is in direct conflict with our Coastal Master Plan - why would we want to waste hundreds of millions of dollars and risk destroying the progress we have made by agreeing to more pipelines in these areas? Please reject CCUS as a climate solution in Louisiana.

Q8 **Respondent skipped this question**

Methane Emissions feedback.

Q9 **Respondent skipped this question**

Fleet Transition feedback.

Q10 **Respondent skipped this question**

Ports feedback.

Q11 **Respondent skipped this question**

Regional Transit feedback.

Q12 **Respondent skipped this question**

Built Environment Retrofit feedback.

Q13 **Respondent skipped this question**

Urban and Community Forest feedback.

Q14 **Respondent skipped this question**

Sustainable Agriculture feedback.

Q15 **Respondent skipped this question**

Coastal Protection and Restoration feedback.

#7

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, November 30, 2023 10:49:08 PM
Last Modified: Thursday, November 30, 2023 11:47:23 PM
Time Spent: 00:58:14
IP Address: [redacted]

Page 1

Q1 **Respondent skipped this question**

Please provide feedback on Section 3 - Development of the Priority Measures here.

Q2 **Respondent skipped this question**

Please provide general feedback on Section 4 - Louisiana's Focus Areas and Actions here.

Q3 **Respondent skipped this question**

Community Solar feedback.

Q4 **Respondent skipped this question**

Offshore Wind and Power feedback.

Q5 **Respondent skipped this question**

Community Resilience Hubs feedback.

Q6 **Respondent skipped this question**

Transmission Planning feedback.

Q7

Industrial Decarbonization feedback.

The plan is really tight in a lot of ways. It incorporates a lot of our priorities. However, carbon capture is still a false solution for Louisiana and is not supported by science to be a useful, viable use of time. We cannot build our measures off of an industry faux science, just so they continue to have their influence over our lives, our communities and our politics and legislation. They have to give this up and we cannot buy into it. See the recent WHEJAC recommendations on Carbon Management. Their statement includes:""De-classify as “Justice40 Covered Programs” those programs that advance CCUS, CCS and any other carbon management technologies that do not immediately reduce dependency on fossil fuel sources of energy."

"Federal agencies should not count carbon management projects towards Justice40 goals. This is a direct subversion of the Justice40 initiative and is an indicator of burden rather than a community benefit. In fact, they should be tracking the harms that carbon management projects may introduce. The Justice40 policy was not designed to represent benefits through programs that, for diverse reasons, increase the burdens of health and environmental risk on communities already saddled with environmental injustice. The introduction of “community benefits” agreements perpetuates environmental injustice and environmental racism by targeting overburdened communities for accepting risks and burdens in exchange for the promise of some future potential economic returns historically granted outright to nondisadvantaged communities. Communities should not have to trade off their health and well-being for basic economic survival."

Please see this article on hydrogen and its harms: https://nmindepth.com/2022/hydrogen-is-a-false-climate-solution/ and here: https://earthjustice.org/article/carbon-capture-the-fossil-fuel-industrys-false-climate-solution

Q8 **Respondent skipped this question**

Methane Emissions feedback.

Q9 **Respondent skipped this question**

Fleet Transition feedback.

Q10 **Respondent skipped this question**

Ports feedback.

Q11

Regional Transit feedback.

We (the Sierra Club Delta Chapter and our transit partners and coalition) have a vision for a statewide transit plan - multimodal at every level and while trains are a big factor, so are buses. What is the plan to ensure that DoTD implements the GHG rule? What about fortifying the bus fleet and financials (addressing the fiscal cliff) that all major transit agencies are going through right now, especially RTA in New Orleans? DoTD has to be more than for new mega projects for regional transit to actually happen.

Q12 **Respondent skipped this question**

Built Environment Retrofit feedback.

Q13

Urban and Community Forest feedback.

A lot of municipalities and developers are harming urban forests, wetlands, floodplains and grasses, daily. They are very much not working in concert with these efforts outlined.

Q14

Respondent skipped this question

Sustainable Agriculture feedback.

Q15

Coastal Protection and Restoration feedback.

Companies and industries have to stop harming the coast, if any mega projects are ever going to work.

#8

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, November 30, 2023 10:30:56 AM
Last Modified: Sunday, December 03, 2023 1:23:17 AM
Time Spent: Over a day
IP Address: [redacted]

Page 1

Q1

Respondent skipped this question

Please provide feedback on Section 3 - Development of the Priority Measures here.

Q2

Please provide general feedback on Section 4 - Louisiana's Focus Areas and Actions here.

These comments are submitted by Zach Monroe on behalf of the City of New Orleans.

Q3

Community Solar feedback.

In addition to supporting efforts to use local school district properties as anchor locations for community solar projects, the State should consider state facilities and schools, including properties managed by DOTD, LSU, UNO, and other state entities.

There have been parishes who have passed pretty dramatic set back restrictions for utility scale solar development which would make the projects unfeasible – there should be some sort of measure to restrict this type of rulemaking or education/workaround to incentivize the proliferation of larger scale solar projects whether it's a community solar project or utility PPA project (https://www.theadvocate.com/baton_rouge/pointe-coupee-parish-updated-its-solar-ordinance/article_c2d206c8-1046-11ee-bd2a-074250689179.html#:~:text=At%20a%20meeting%20on%20June,restrictions%20for%20future%20solar%20permits.).

Create model zoning code for community/utility solar

Q4

Offshore Wind and Power feedback.

Focusing on reworking existing skill sets from oil/gas jobs should be a priority with workforce development

Q5

Community Resilience Hubs feedback.

Creating some sort of building pipeline would be helpful, especially if buildings require more enabling upgrade/efficiency/electrification and/or structural hardening measures ahead of solar installation. Engage with buildings who require more upgrades on a longer-term basis to ensure they have better capacity to support microgrids

Q6

Transmission Planning feedback.

Include community feedback in transmission planning process
Incorporate Justice40 principles when sighting transmission and distribution projects – both in terms of upgrades/maintenance and creation of new transmission/distribution infrastructure projects (Michigan just proposed)

Q7

Industrial Decarbonization feedback.

Wherever hydrogen is involved, opt for no-carbon hydrogen instead of low-carbon.

Along with product circularity, limiting the amount of embodied carbon across the supply chain could also be an avenue to explore for carbon reduction.

Q8 **Respondent skipped this question**

Methane Emissions feedback.

Q9

Fleet Transition feedback.

Priority Actions: 1) Is the support for electrification of 20k vehicle in the public fleet apply to state fleet vehicles or any level of government? 3) Is the focus on fast and ultrafast charging infrastructure for medium and heavy duty vehicles because NEVI is being used for fast charging for light duty?
Prioritize shared electrification: specifically mention Port facilities as locations as a focus of charging infrastructure for medium and heavy duty vehicles.

Support local government and business education: this can also include a clearinghouse of best practices, polices, etc for local government to support and incentivize electric vehicles within their communities beyond the public fleet.

Q10 **Respondent skipped this question**

Ports feedback.

Q11

Regional Transit feedback.

Pursue traffic improvements: be careful that this objective doesn't provide justification for roadway expansions in the false hope of reducing congestion and improving emissions.
Increase regional connectivity: include light rail transit as a option. For example, light rail could provide new low-carbon options for connections between Downtown New Orleans and Louis Armstrong International Airport.

Support for inter-city rail could be included as a priority, both for the existing Amtrak service (City of New Orleans, Crescent, and Sunset Limited) and the proposed service (Baton Rouge-New Orleans and I-20 Corridor).

Q12

Built Environment Retrofit feedback.

The report mentions that structural retrofits to a building envelope for energy efficiency may also make the building more resistant to natural hazards, namely wind, but more should be said about this. Avoiding structural damages lead to huge reductions in solid waste and the embodied energy in the building materials. Recommend accounting for these avoided emissions, as well as the investments that are being made in natural hazard mitigation.

The Action objective to "Scale up to 1% annual retrofits…" is not clear. Does this mean through WAP or another particular program? Is this 1% of the buildings in the state, or some other metric? Clarifying this action will help to benchmark this objective and monitor progress.

Recommend adding a priority action that addresses the state's Mitigation Revolving Loan Fund as a tool for financing built environment retrofits.

The action item to "Reduce Contractor Resistance" would benefit from providing some additional context. The report doesn't identify what this resistance is, how it has manifested, etc. so this is hard to evaluate. Consider adding a brief mention/discussion in the introductory section on the status of these actions, so that the reader can understand what the intention of this action is.

Under the second priority action, remove "space" from the description since this alludes to using space heaters. The goal is just to adopt heat pumps in lieu of traditional AC/HVAC systems and remove the need for space heaters which are costly and dangerous.

Both HOMES/HEERA have a utility data transparency component – ensuring utilities are on board with creating data access/aggregation tools is critical for buildings large and small in understanding their energy use trends.

The state passed a benchmarking requirement for state properties around 20 years ago – reinstate this legislation and have the state begin energy benchmarking and disclosure to model behavior and create transparency around the rest of the state for further building performance policy adoption.

There's no mention of water conservation in here, mostly energy efficiency/conservation. Given the recent drought there should be more around promoting water conservation measures on the residential, commercial, and industrial scale (I.e think watering schedules, low flow appliances, non-potable water reuse for industrial processes, etc) - this suggestion could also live in the industrial decarb or sustainable agricultural section.

Q13

Urban and Community Forest feedback.

Major priority area for City of New Orleans.

Tree planting could be separated into two areas: heat mitigation and climate resilience/mitigation. There should be more detail around trees as heat mitigation, especially in low-income or historically redlined communities, but also across the entire state in general since we know we will continue to see increased heat for the years to come.

Q14

Sustainable Agriculture feedback.

New Orleans has a growing urban agriculture movement. Please include urban agriculture.

It would help to expand here on the types of support that the state could offer to urban agriculture. Is this funding support, technical assistance, capacity-building etc? Are there state-owned lands that could be leased for urban agriculture? Other forms of support might include supporting establishment and operation of tool libraries, marketing assistance and small business incubator spaces for urban agriculture.

Q15

Coastal Protection and Restoration feedback.

Can anything be added to plan about saltwater intrusion that impacted southeast Louisiana drinking water?

STATE OF LOUISIANA
GOVERNOR JOHN BEL EDWARDS
JANUARY 2024