Louisiana Climate Action Plan

Draft, Partial, Final Report

DRAFT Sections for Public Comment

August 23, 2021

GOVERNOR'S OFFICE OF COASTAL ACTIVITIES

Contents

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Glossary of Terms and Acronyms

Action: a specific policy, program, or project 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

Adaptive Governance Initiative: State-led effort to increase the resilience of state agencies to the impacts of the coastal crisis. Working through resilience coordinators at each agency, the adaptive governance initiative seeks to integrate projections from the coastal master plan into decision making and develop and institutionalize resilience actions within and across state government

Blue Carbon: Carbon stored in the sediment and plants of coastal and marine ecosystems, such as mangroves, tidal marshes, and seagrass beds

Blue Hydrogen: Hydrogen is a fuel source that has multiple applications in transportation, electricity generation, industrial uses, and many more. Blue hydrogen is produced through the typical reforming process used to create most of the hydrogen used today, but the carbon dioxide that is emitted from that process is captured and stored rather than being released into the atmosphere

Carbon Capture: The process of pulling carbon dioxide 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 (CO_2) Equivalent: The number of metric tons of CO_2 emissions with the same global warming potential as one metric ton of another greenhouse gas (GHG)

Climate Equity: a people-centered approach to addressing the global climate crisis through action that seeks to achieve long-term equality of outcomes by acknowledging institutionalized harms to historically marginalized people and communities and by holding accountable those who benefit from the root causes of climate change that disproportionately impact the most vulnerable

Coastal Protection and Restoration Authority Board (CPRA Board): Group that represents the state's position in policy relative to the protection, conservation, enhancement, and restoration of the coastal area of the state. They do so by overseeing the Coastal Protection and Restoration Trust Fund, developing a master plan an annual plan for integrated coastal protection, and enforcing compliance with the Coastal Master Plan

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 five 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

Equity: Fairness or justice in 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

Emissions Pathway: The modelled trajectories of global anthropogenic emissions over the 21st century based on predictions of how concentrations of GHG in the atmosphere will change in the future as a result of human activities

Fundamental Objectives: In Structured Decision Making (SDM), these are essential goals or solutions of this work that have been informed by the Climate Initiatives Task Force, Advisory Groups, Sector Committees, and public that guide development and evaluation of strategies and actions

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

Greenhouse Gas (GHG): A gas that contributes traps heat in the atmosphere by absorbing infrared radiation. The primary GHG in Earth's atmosphere are water vapor, CO_2, methane, nitrous oxide, and ozone. Many GHGs are naturally occurring, though concentrations can be affected based on human input

GHG Inventory: A list of emission sources, sinks, and the associated emissions over a certain period of time, quantified using standardized methods

Intergovernmental Panel on Climate Change (IPCC): An intergovernmental body of the United Nations that is dedicated to providing the world with objective, scientific information relevant to understanding the scientific basis of the risk of human-induced climate change, its natural, political, and economic impacts and risks, and possible response options

Louisiana Watershed Initiative: State-led program through which floodplain management responsibilities are coordinated across federal, state, and local agencies, with the goal being to leverage the state's past and present flood-risk reduction and resilience efforts through a variety of projects

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

National Academy of Sciences: A United States nonprofit, non-governmental organization charged with providing independent, objective advice to the nation on matters related to science and technology. The organization is committed to furthering science in America, and its members are active contributors to the international scientific community

National Climate Assessment: Summary reports detailing the impacts of climate change on the U.S. now and in the future. They are updated and released approximately every 5 years, starting in 2000, through the Global Change Research Act of 1990. The reports are extensively reviewed by the public and experts, including federal agencies and a panel of the National Academy of Sciences

Office of the Governor—Coastal Activities (GOCA): Team within the Governor's Office that develops and implements policies, plans, and programs relative to the protection and restoration of Louisiana's unique coastal resources and the flood protection of communities in the state, as well as climate and coastal resiliency

Planning Team: Consists of staff from the Office of the Governor—Coastal Activities and the Water Institute of the Gulf (TWI) tasked with coordinating the planning process for the development of the Climate Action Plan and its timely completion

Portfolio: A comprehensive set of strategies and actions towards achieving the GHG reduction targets and other fundamental objectives

Relative Sea Level Rise: A combination of the absolute (global) sea level rise, which is the change in the height of the ocean surface above the center of the earth, plus changes (up or down) in land elevation for the relevant coastal area. Sea level rise at specific locations may be more or less than the global average due to many local factors such as subsidence, ocean currents, variations in land height, and whether the land is still rebounding from the compressive weight of Ice Age glaciers

Resilient Louisiana Commission: State entity charged with examining Louisiana's economy amid the COVID-19 pandemic and making recommendations for more resilient business-related activities and commerce that includes a task force structure dedicated to strengthening specific sectors of Louisiana's economy. The RLC was specifically created to guide the state through the Covid-19 crisis and expand the economy so that it can cope more easily with any future crises

Water Institute of the Gulf: An independent, non-profit, applied research institution advancing science and developing integrated methods to solve complex environmental and societal challenges. The Water Institute is a part of the Water Campus and works to develop scientific and technological solutions to coastal and deltaic issues in Louisiana and the Gulf in general. The Institute connects academic, public, and private research providers and conducts applied research to serve communities and industry and that will help coastal

communities and economies become more resilient to land subsidence, storms, rising sea levels, and other coastal threats

Strategy: A high-level path (plan of action or policy) designed to achieve a major or overall aim/ one or more long-term or overall goals under conditions of uncertainty (e.g., GHG emissions reduction)

Structured Decision Making (SDM): An explicit and transparent approach that utilizes a broad set of methods for analyzing decisions and identifying solutions that achieve desired outcomes. This approach supports decisions based on clearly articulated fundamental objectives, integrates science and policy, and remains flexible to legal mandates and public preferences (or values) in decision making

Vector-Borne Disease: Human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors, which are living organisms that can transmit infectious pathogens between humans, or from animals to humans

Executive Summary

An executive summary will be included in the final report.

Introduction

In August of 2020, Governor John Bel Edwards signed executive order JBE 2020-18, formally creating the Climate Initiatives Task Force (CITF) to make recommendations for how Louisiana could play its part in reducing the greenhouse gas (GHG) emissions driving up global temperatures and changing the world's climate, a crisis with direct and immediate impacts for Louisiana's people and future. After multiple public meetings of the CITF and across supporting groups of experts, this Louisiana Climate Action Plan [will be] formally adopted in January of 2022.

This plan provides an overview of the Governor's vision for climate action in Louisiana, establishes the urgent need for action based on the global and local threats posed by increasingly severe impacts of climate change, and discusses opportunities for Louisiana presented by considered climate action. It explains the planning process and utilized to arrive at this strategy, provide an update to Louisiana's GHG sources and sinks inventory, and lay out the strategies and actions recommended for economy-wide reductions to GHG emissions alongside projections for how implementing this plan will reduce GHG emissions and provide co-benefits to our state.

There is no single solution that will fix the world's climate problems overnight, and many damaging changes to the environment with harmful human consequences are already being felt and will be felt in Louisiana no matter the success of this Climate Action Plan. However, choosing to act in the face of these difficult truths is still essential work.

Not taking action is a choice to pass even more harmful impacts resulting from climate change down to the next generation and makes the task of adapting to life on the edge of the Gulf of Mexico even more difficult and costly. Choosing inaction ignores the long-standing inequities present in our state that contribute to the disparate climate impacts felt across our communities and turns a blind eye to the new injustices created and magnified by a rapidly changing climate. Inaction is also the surest way to miss opportunities. By taking action to address GHG emissions in Louisiana, our state has an opportunity to improve the health and enhance the quality of life for our people and to create a more vibrant, inclusive economy. Ultimately, it is a chance to ensure that this state remains one that we, our children, and children's children want and can invest in.

The dedicated members of the CITF, its sector committees, and advisory groups worked relentlessly over 16 months to choose action over inaction. This diverse group of leaders came together to have hard conversations, set priorities, discuss tradeoffs, and produce this Louisiana Climate Action Plan which establishes a pathway to reach the state's emission reduction goals and a to a healthier, safer, more equitable, and vibrant state. While this plan is an important first step toward decarbonization, the road to 2050 will include many new developments and inevitable setbacks, and the strategies and actions laid out here will need to be revisited for their ambition, effectiveness, and continued relevance in the years to come. But the first, crucial order of business will be the effective implementation of this plan, a task that will depend on the continued collaboration, public engagement, and commitment that produced this plan and much more.

Objectives and Targets

BACKGROUND & EXECUTIVE ORDER

Shortly after his inauguration in February of 2020, Governor Edwards held a press conference to announce his second term policy priorities for the coastal program. Attended by nearly every member of his cabinet, Governor Edwards committed to forming the CITF that would develop a set of recommendations to address the state's GHG emissions. This effort was formalized at the August 2020 Coastal Protection and Restoration Authority (CPRA) Board meeting when he signed Executive Order JBE 2020-18.

Referencing the value of Louisiana's coast and the projections for an additional 2,250 to 4,120 square miles of coastal land loss over the next fifty years, Executive Order JBE 2020-18 connects Louisiana's coastal crisis, the catastrophic human costs of natural disasters, and the international scientific consensus that GHG emissions are causing unprecedented global warming. "To improve our resilience, sustain our coast, and help avoid the worst impacts of climate change," the order states, "Louisiana must proactively work to reduce the GHG emissions that are driving up global temperatures, raising sea levels, and increasing risks that threaten our health and safety, quality of life, economic growth, and vital habitats and ecosystems." Governor Edwards also clearly articulated his desire for solutions to this problem to be developed in partnership with multiple stakeholders with the ultimate goal of reaching a "balanced" set of strategies that would both help "limit the impacts of climate change that harm our state's natural and cultural heritage," and provide ways for us to adapt "to maintain [our] position as a world leader in energy, industry, agriculture, and transportation."

The Executive Order established a twenty-three-member CITF, supported by six sector committees and four advisory groups, and called for an updated GHG emissions inventory, an interim report in February of 2021, and a final climate strategy by February of 2022.

GHG EMISSIONS REDUCTION GOALS

Importantly, the Executive Order also established ambitious GHG reduction goals to focus the work of the CITF on the best approaches to meet these goals. According to the Executive Order, by 2025, Louisiana should: 1) reduce its net GHG emissions by 26-28% from 2005 levels; 2) reduce its net GHG emissions by 40-50% from 2005 levels by 2030; and 3) aim to be a net zero GHG emitter by 2050.

These goals are derived in part from the declaration by the Intergovernmental Panel on Climate Change (IPCC) that "global net human-caused emissions of carbon dioxide…would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050."[1] It also aligns with the U.S.' Nationally Determined Contributions (NDCs) which represent its commitment in the Paris Agreement to limit global warming to 1.5°C,[2] and are calibrated to 2005 to correspond to Louisiana's 2010 GHG inventory which was built on data from 2005. Additionally, Governor Edwards' goals put Louisiana in line with commitments made by dozens of other states, and businesses operating in multiple sectors internationally, nationally, and within Louisiana. These businesses are from a variety of industrial

sectors including energy producers, public utilities, chemical manufacturers, technology firms, and finance.

VISION

Governor Edwards' Executive Order also clearly established a vision for Louisiana, one that addresses climate change head on while being open to opportunities that stretch our traditional economic strengths to remain competitive in a global, low-carbon economy. Our state "can and will reduce GHG emissions to limit the impacts of climate change that harm the state's natural and cultural heritage while adapting to maintain its position as a world leader in energy, industry, agriculture, and transportation."

The realization of that vision has been the central mission of the CITF. With input from the public and experts, it has investigated and offered recommended actions including in this plan for the reduction of GHG emissions in Louisiana to achieve the stated GHG emissions reduction goals. In addition to GHG reductions, the CITF also considered other important outcomes in the formulation of this plan including: improving the health and welfare of the people of Louisiana, becoming a more equitable society, strengthening our ability to adapt to environmental hazards, and advancing Louisiana's economic and energy profile. Notably, the CITF exists alongside and builds upon other state efforts such as the Louisiana Watershed Initiative, the Coastal Master Plan, the Adaptive Governance Initiative, and the Resilient Louisiana Commission.

Planning Process

Governor Edwards called on the CITF to produce a Climate Action Plan that outlines actions to reduce net GHG emissions from all sectors of the economy and to set Louisiana on a path to meet its short-, medium-, and long-term emission reduction goals. Actions and strategies reduce GHG emissions while achieving other co-benefits for Louisiana's communities, environment, and economy. Achieving this vision and the state's emission reduction goals in a manner that is inclusive and balanced required a deliberate and transparent planning process.

STRUCTURE

The CITF, its sector committees, and advisory groups comprise over 140 experts from state government, colleges and universities, the private sector, and civil society that have advised and contributed to the portfolio of strategies and actions contained in this Climate Action Plan (see Figure 1).

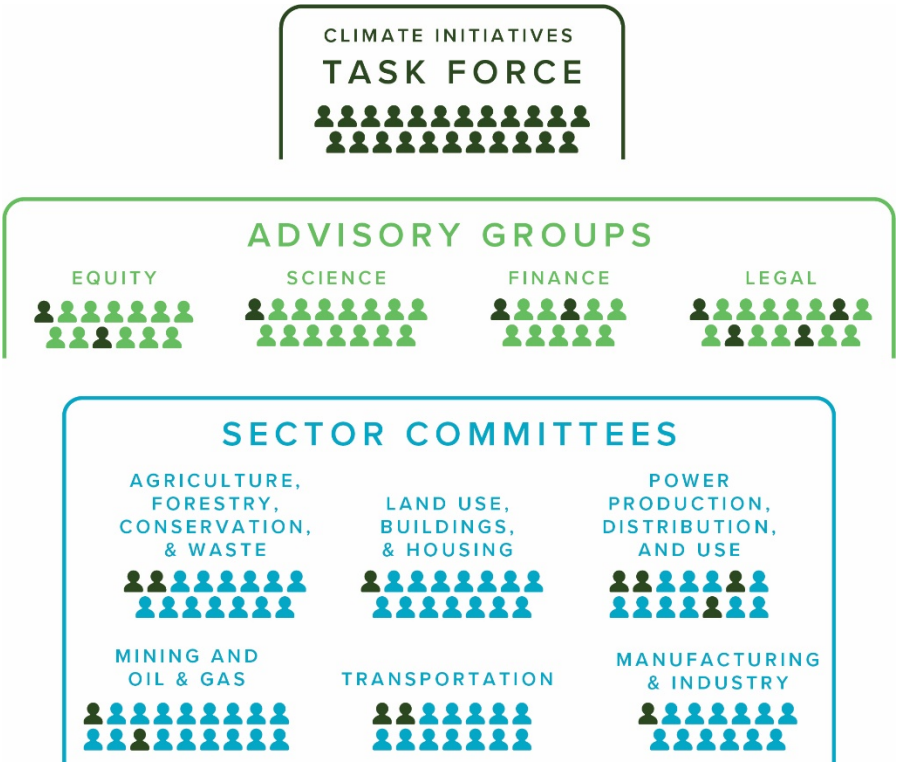

Figure 1. Climate Initiatives Organizational Structure

The CITF is the decision-making body tasked with submitting an interim report and Climate Action Plan to Governor Edwards in accordance with the executive order. This twenty-three-member body set priorities for the overall planning process, weighed trade-offs among different approaches, and ultimately approved a set of recommendations for the Climate Action Plan.

The four advisory groups were charged with providing technical expertise to the CITF and committees throughout the process and upon request regarding questions that transcend individual committee scopes. While each of the four advisory areas are reflected in the membership of the CITF and sector committees, specific opportunities to evaluate and improve actions and strategies are necessary to ensure the planning process accounts for equitable impacts, sound science, financial feasibility and economic implications, and legal considerations in each step. In addition to discussions during meetings, advisory groups provided key feedback during two rounds of consequence analysis. At each round, advisory group members expressed how groups of actions to reduce GHG emissions could result in positive or negative impacts on the social, economic, and resilience outcomes of the plan. More information about the membership and charges of the equity, financial, legal, and scientific advisory groups can be found later in this document.

GHG emission sources and sinks are present in all aspects of the Louisiana economy. To acknowledge the progress already being made and discuss the specific opportunities to reduce emissions from a broad range of operations and activities in each sector, six sector committees were charged with developing and evaluating implementable emission reduction actions and comprehensive strategies that significantly reduce net GHG emissions across all aspects of their respective sector. Committees are reflective of the Governor's vision to achieve balance through their broad-based composition with representatives from corporate entities, advocacy organizations, regulators, academics, and community representatives. Bringing together a variety of stakeholders with seemingly separate interests and opposing values allowed for robust and challenging discussions that ensure the end result of comprehensive strategies that set Louisiana on a path to reach short-, medium-, and long-term GHG emission reduction goals.

The CITF is chaired and staffed by the Office of the Governor, Coastal Activities (GOCA). Under leadership of the Executive Assistant to the Governor for Coastal Activities, GOCA serves as the staff and managers of the CITF, advisory groups, and sector committees in coordination with advisory and committee chairs. As staff of this effort, GOCA also works alongside all members, state agencies, outside stakeholders, and the public to build investment in the process, expand partnerships, and coordinate among all entities. As Louisiana's Innovation and Collaboration Hub, the Water Institute of the Gulf (TWI), assists GOCA as it led the planning process for and development of the Climate Action Plan. This Planning Team, comprised of GOCA and TWI, ensures the CITF remains on track to meet deliverables within their respective timelines.

STRUCTURED DECISION MAKING

The planning process for developing the Climate Action Plan is grounded in a Structured Decision Making (SDM) approach. In basic terms, SDM is "a formalization of common sense for decision problems which are too complex for informal use of common sense".[3,4] SDM is an approach that integrates science and policy to break down complex decisions and identify solutions that achieve the desired ends (referred to as "fundamental objectives" in SDM) in a manner that is explicit and transparent. SDM is not a prescriptive approach to problem solving, but rather it encompasses broad methods that rely on clearly articulating fundamental objectives and analyzing potential impacts to those objectives using data-driven analysis. See Figure 2 for the six steps of the iterative SDM

process. The charges to the sector committees and advisory groups supported the SDM process and helped the CITF make informed, data-driven decisions on which strategies to pursue to best meet the emission reduction goals and other desired outcomes for Louisiana.

Figure 2. The Six-Step SDM Process

The following iterative six-step SDM process provides the framework for the development of the Climate Action Plan.

1. **Defining the Problem and Decision Context:** A critical first step is ensuring all parties share a common understanding of the problem that has initiated the process, as outlined in the Executive Order. Louisiana's Climate Action Plan synthesizes the science on current and future risk to Louisiana posed by climate change that makes the case for reducing GHG emissions. This plan also contains an overview of the Louisiana's updated 2020 GHG Emissions Inventory which shows baseline information about Louisiana's emissions sources and sinks that provide context informing the solutions in this plan and benchmarks by which to measure progress toward achieving the Governor's goals.
2. **Determining the Objectives:** The CITF has established a set of "fundamental objectives" that are essential goals of this effort and guided the development and evaluation of actions and strategies. The CITF's fundamental objectives include reduction of net GHG emissions as well as economic and societal goals considered important in how co-benefits and consequences are evaluated. A full list of the fundamental objectives can be found in the "Synthesized Fundamental Objectives" section.

3. **Identifying Alternatives:** Proposed emissions reduction actions (specific policies, programs, or projects) have been developed collaboratively by the CITF, committees, advisory groups, GOCA, and public submissions using a common template. Throughout an iterative process that resulted in the actions contained in this final plan, "alternative means" to achieve emissions reductions and the goals of the additional fundamental objectives were refined before being included in this plan.
4. **Forecasting Consequences:** The advisory groups and GOCA evaluated the impact of proposed actions, strategies, and alternative emission pathways on the fundamental objectives and collectively achieving the GHG emission reduction targets. Evaluations of the GHG emission reduction potential were conducted using the Energy Policy Simulator Modeling Tool. Impacts to the other fundamental objectives were evaluated through two rounds of consequence analysis surveys by the advisory groups.
5. **Discussing the Trade-offs:** Before arriving at the final Climate Action Plan, trade-offs in approach, timing, and prioritization were analyzed and discussed by the CITF, informing their recommendations about which strategies and actions to pursue and how.
6. **Making the Decision and Taking Action:** Recommendations put forth by the CITF based on trade-off discussions were provided to the Governor for consideration. After incorporating public comment, the CITF finalized the Climate Action Plan in January of 2022, in accordance with the timeline established in the Governor's executive order.

Synthesized Fundamental Objectives

Fundamental objectives are the essential goals of this effort and served to guide the development and evaluation of actions and strategies. The objectives below represent strongly held values and helped to identify co-benefits of climate mitigation action and potential negative consequences of the actions considered in this plan. The fundamental objectives (in bold) are grouped here by theme.

REDUCING NET GHG EMISSIONS

Minimize net GHG emissions.

IMPROVING QUALITY OF LIFE FOR RESIDENTS AND COMMUNITIES

Maximize quality of and access to essential goods, services, and infrastructure for residents.

Maximize positive public health outcomes and public safety.

Maximize the preservation of cultural heritage.

CREATING A MORE EQUITABLE SOCIETY

Reduce socioeconomic, demographic, and geographic disparities in future opportunities and outcomes.

Maximize reduction and mitigation of historic and structural inequities and their impacts for underserved and marginalized communities, including communities of color and Indigenous peoples.

Maximize engagement with and participation of communities in decision-making and implementation.

MANAGING FOR SHORT- AND LONG-TERM SUCCESS

Maximize confidence of the public and stakeholders in the outcome of emissions-reduction strategies to increase support for their implementation.

Maximize the efficiency and effectiveness of emissions-reduction strategies.

Maximize timely implementation of emissions-reduction strategies.

Maximize the durability of emissions-reduction strategies in an uncertain future.

STRENGTHENING THE ECONOMY AND WORKFORCE

Maximize employment, economic opportunity, and support for Louisiana workers.

Maximize economic growth.

CONSERVING NATURAL RESOURCES & PROTECTING THE ENVIRONMENT

Maximize preservation of natural resources and ecosystem services.

Maximize environmental stewardship and support of healthy ecosystems.

ADAPTING TO A CHANGING CLIMATE

Increase resilience of the built and natural environment to climate change.

Increase the resilience of communities to climate change.

The Need for Action: Climate Risks to Louisiana

Climate change is a planetary threat being driven by human-induced increases in GHG concentrations in the atmosphere that have raised global temperatures and made extreme weather more common.[5] In 2019, carbon dioxide (CO_2) concentrations in the atmosphere were at their highest over the last 2 million years,[6] and 19 of the 20 warmest years on record have occurred since 2000[7], arctic summer sea ice reached its lowest level on record in 2012,[8] and global average sea level has risen faster in the past century than at any time in the past 1000 years.[9] The unprecedented fires, droughts, floods, and heatwaves the world is already experiencing will intensify as global temperature continue to go up putting millions of lives and trillions of dollars of assets at risk.[10] Throughout this ongoing upheaval, the most severe impacts have and will continue to fall on the poor and otherwise marginalized communities.

Louisiana is among the most vulnerable states in the United Stations to the impacts of climate change. Impacts from climate change are significantly affecting the amount of coast that can be preserved and the effectiveness of state and local restoration and protection efforts. Inland from the coast, other climate impacts are making flooding more common and heat more unbearable, and they are straining our best efforts to become more resilient. Most of all, these changes to the environment are translating into hardships for the people who call this state home—hardships that will continue to increase in scope, scale, and intensity unless the world comes together to dramatically reduce global GHG emissions.

The impacts to people being felt today in Louisiana include direct physical, mental, and financial tolls from extreme weather and indirect impacts to social systems and infrastructure that is struggling to cope with the increasing prevalence and severity of natural disasters. As is the case globally, Louisiana's low-income communities, communities of color, Indigenous people, and other marginalized residents without the resources to mitigate and adapt to these evolving environmental hazards are being hit especially hard. These groups have been excluded from the opportunity to build wealth for generations, they are more likely to live and work near heavily-polluting facilities, are more likely to live in areas with higher flood risk, and more likely to experience insufficient or delayed investments in infrastructure and disaster recovery efforts.

The need for climate action in Louisiana is paramount. Throughout the state whole communities are being displaced. Workers regularly lose their cars to flooding from abnormal rain events. Some are unable to evacuate from hurricanes because they lack the means or must stay and work in order to keep their jobs. We are losing our coast and the culture that it supports. And our economy is consistently challenged by the disruption and damages of disaster, response, and recovery. The remainder of this section will provide an overview of the scientific underpinnings to the problem of global climate change and more details on how those environmental changes are producing impacts to communities, ecosystems, and the economy in Louisiana.

SCIENTIFIC UNDERPINNINGS

Since 1988, the Intergovernmental Panel on Climate Change (IPCC) has provided scientific information to governments at all levels for the development of climate policy. The regular reports issued by the IPCC represent contributions from thousands of scientists spanning the globe who assess the latest published works to arrive at a comprehensive summary of what is known about climate change. They report on the drivers of climate change, the impacts and future risks associated with climate change, and how adaptation and mitigation can reduce current and future exposure.

In 2018, the IPCC issued its *Special Report: Global Warming of 1.5°C* to inform the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. This report affirmed that human activities are estimated to have contributed to 1°C of global warming above pre-industrial levels and that global warming is anticipated to reach 1.5°C above preindustrial levels between 2032 and 2050 if current rates continue. This rate of global warming, the IPCC concluded, will increase the overall "climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth." These risks further increase as global temperatures rise to 2°C above pre-industrial levels.

In August of 2021, the IPCC released a working group report on the latest scientific understandings of climate change as well as projections for future warming and its impact on the Earth's systems. Some of the report's conclusions include:

- Human-induced climate change is already affecting many weather and climate extremes in every region across the globe.
- Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other GHG emissions occur in the coming decades.
- Many changes in the climate system become larger in direct relation to increasing global warming. They include increases in the frequency and intensity of hot extremes, marine heatwaves, and heavy precipitation, agricultural and ecological droughts in some regions, and proportion of intense tropical cyclones, as well as reductions in Arctic Sea ice, snow cover and permafrost.
- With further global warming, every region is projected to increasingly experience concurrent and multiple changes in climatic impact-drivers. Changes in several climatic impact-drivers would be more widespread at 2°C compared to 1.5°C global warming and even more widespread and/or pronounced for higher warming levels.
- From a physical science perspective, limiting human-induced global warming to a specific level requires limiting cumulative CO_2 emissions, reaching at least net zero CO_2 emissions, along with strong reductions in other GHG emissions. Strong, rapid and sustained reductions in methane emissions would also limit the warming effect resulting from declining aerosol pollution and would improve air quality.[11]

Scientists working across the U.S. government and the National Academy of Sciences also produce summary reports detailing the impacts of climate change on the U.S. specifically known as the National Climate Assessment. In 2018, the most recent National Climate Assessment was released with similar findings as the IPCC report, including the conclusion that "climate change creates new risks and

exacerbates existing vulnerabilities in communities across the U.S., presenting growing challenges to human health and safety, quality of life, and the rate of economic growth."[12]

Another point made by both the IPCC and the National Climate Assessment is the unequal distribution of climate impacts. The vulnerable, those who are low income, communities of color, children, the elderly, Indigenous populations, and others who are marginalized have a lower capacity to prepare for and cope with extreme weather, climate-related events, and other changes. Vulnerable populations may also be disproportionately affected by actions taken to address the underlying causes and impacts of climate change if those inequities and circumstances are not considered explicitly.

Louisiana is particularly vulnerable to the impact of climate change. The National Climate Assessment produced four key messages for the southeastern region of the U.S., and each resonates deeply with Louisiana.

1. **Urban Infrastructure and Health Risks.** Compared to cities in other regions of the country, cities in the southeast are particularly vulnerable to climate change impacts to infrastructure and human health specifically from increasing heat, flooding, and vector-borne diseases.
2. **Increasing Flood Risks in Coastal and Low-Lying Regions.** Home to people, critical industries, cultural resources, and tourism economies, the coastal plain and low-lying regions of the southeast are extremely vulnerable to climate change impacts. Flood frequencies, extreme rainfall events, and sea level rise will affect property values and the viability of infrastructure.
3. **Natural Ecosystems will be Transformed.** Diverse natural ecosystems that provide multiple social benefits will be transformed by climate change through changing winter temperature extremes, wildfire patterns, sea levels, hurricanes, floods, droughts, and warming oceans that will redistribute species and greatly modify ecosystems. "Future generations can expect to experience and interact with natural systems that are much different than those that we see today."
4. **Economic and Health Risks for Rural Communities.** More regular extreme heat and changing seasonal climates are projected to have impacts on exposure-linked health and economic vulnerabilities in agricultural, timber, and manufacturing sectors. Reduced labor hours from extreme heat can also compound existing social stresses.

With climate risks manifesting every day and all but certain to grow in severity in the future, the need to reduce GHG emissions driving global warming is crucial. Reducing GHG emissions is a viable way to mitigate climate-related risks and increase opportunities for people and improve or protect their quality of life in the long run. As is made clear in national and international scientific reports, the evidence of human-caused climate change is overwhelming, the impacts of climate change are present today and intensifying, and the threats to physical, social, and economic well-being are on the rise.[13] In the coming sections, brief glimpses of climate change's current and future potential impacts on Louisiana will be explored through the lenses of social, health, equity, economic, and environmental outcomes.

HUMAN AND ENVIRONMENTAL IMPACTS TO LOUISIANA

Louisiana's human and physical geography makes it one of the earliest and hardest hit areas of the U.S. when it comes to experiencing the negative impacts of climate change. The state's hot and humid climate and location at the mouth of the Mississippi River and the edge of the Gulf of Mexico carry environmental challenges that have direct and indirect impacts on communities. While the widespread risks from climate change are alarming, this troubling fact can be a unifying force across an often fractured political and social spectrum, serving to point us all toward common action. Despite the commonality of risk experienced across Louisiana, it is also true that some communities are feeling more pain, greater disruption, and more severe impacts to their health, quality of life, and economic stability than others. This reality is observed by both the IPCC and the National Climate Assessment and manifests in Louisiana along racial, income, ethnic, and age categories. This section will provide an overview of the ways that climate change is today producing impacts to communities and the environment in Louisiana as well as how those impacts are projected to change in the future.

HEALTH IMPACTS

According to the National Climate Assessment, climate change is already producing negative health effects for Americans that will worsen as climate change progresses. In addition to the intensification of current health challenges, climate change will also bring new challenges to individual and public health. These challenges will arise as more people are exposed to hazardous conditions like heat waves, floods, droughts, vector-, food-, and water-borne diseases, as the quality and safety of water, air, and food deteriorate, and as these many conditions create additional strains on mental health and well-being.[14] Beyond the direct health effects of extreme weather events, human health can also suffer from the disruption of vital public health, healthcare, and related systems in ways that can be harmful to health long after a weather event. The following sections will look at national and Louisiana-specific ways that human health suffers because of climate change.

Heat

Globally, more than 1/3 of heat-related deaths can be attributed to the extra warming associated with climate change which, in many locations, adds up to dozens to hundreds of deaths each year[15] and in the U.S., more deaths are caused by extreme heat than any other severe weather event.[16] As the climate continues to change, the dangers of heat exposure will increase as extreme heat becomes more frequent with both higher summer temperatures overall and the onset of high temperatures earlier in the spring and lasting longer into the fall.

Even when it is not deadly, heat remains dangerous for human health especially for children, the elderly, the sick, and for people who are low income. High heat essentially overwhelms the body's capacity to cool itself which can lead to heat exhaustion and ultimately heat stroke.[17] When the heart beats faster in attempts to regulate body temperature, people with heart disease can be particularly vulnerable.[18] Dehydration, loss of labor productivity, and even decreased learning can also result from exposure to high heat.[19] Another type of heat-related threat of relevance to Louisiana is the danger of so called "wet-bulb" temperature events-- when high humidity combined with high heat slows and can stop the evaporation of sweat. This combination of high heat and humidity prevents the natural ability of the human body to cool itself which can lead to organ failure and death. According to a study published in May of 2020, the Gulf South experienced multiple incidences of wet-bulb temperatures above 88°F.[20]

Extreme heat is already on the rise in Louisiana, particularly in urban areas that experience higher air temperatures associated with the urban heat island effect. A report by Climate Central, a research and journalism organization, published in 2020 found that cities in Louisiana are experiencing at least two more weeks of extremely hot days compared to 50 years ago. Shreveport felt 31 more days above 95°F, Baton Rouge, Lake Charles, and Monroe each saw 22 more days above 95°F, Lafayette had 20 additional days, New Orleans 15, and Alexandria had 13 additional days over 95°F compared to 1970.[21] In July of 2021, Climate Central published another study of the urban heat island effect in U.S. cities and ranked New Orleans the worst of 159 cities nationwide. This study found that temperatures in New Orleans could be as much as 9° warmer inside the city than in areas outside of developed areas. Lafayette, Louisiana also ranked 19th.[22] Looking to the future, a study by the Union of Concerned Scientists estimated that Louisianans will suffer three full months where the heat index is over 105 by the end of the century.[23]

Within a city, factors like the amount of green space and tree canopy, the amount of heat absorbing and radiating surfaces like asphalt, highways, and parking lots, as well as architectural choices and surface reflectivity can create a "heat gap" between neighborhoods that can be disproportionately experienced along racial and economic lines. National studies have documented a lack of tree canopy and a greater instance of impervious surfaces in low-income communities relative to higher income communities[24] and parts of cities that are poorer and with higher concentrations of residents of color can be 5 to 20° hotter in the summer than wealthier and whiter areas of the same city.[25] According to a 2021 study in the journal *Nature Communications*, the average person of color lives in a census tract with a higher surface urban heat island intensity than non-Hispanic whites in all but 6 of the 175 largest urbanized areas in the continental U.S. A similar pattern was found for people living in households below the poverty line relative to households more than two times the poverty line.[26]

In 2016, a study by the University of Richmond found that this heat gap was a reflection of redlining practices perpetrated throughout the 1900s. Beginning in the 1930s, the federal Home Owners' Loan Corporation created racially-biased "residential security" maps in hundreds of cities that helped fuel the practice of denying access to federally backed mortgages and credit to racial minorities. Within New Orleans, the only Louisiana city included in the University of Richmond study, a 4.6-degree heat gap between the "most desirable" neighborhoods in New Orleans and those labeled "hazardous" by HOLC maps.

High heat also carries environmental and economic implications for Louisiana. Seasonal changes to temperature caused by climate change are disrupting the natural system and the ability for people to make a living from those systems. By the end of the century, it is estimated that health concerns from increased heat will result in a reduction of labor hours by more five hundred million in the Southeast for high-risk industries, such as agriculture, forestry, fishing, mining, manufacturing, transportation, and utilities.[27]

Air Quality

According to the National Climate Assessment "more than 100 million people in the U.S. live in communities where air pollution exceeds health-based air quality standards" and unless specific action to improve air quality is taken, "climate change will worsen existing air pollution levels."[28] Common air pollutants that pose a serious threat to respiratory and cardiovascular health and are most linked to changes brought on by climate change include ground level ozone and particulate matter. The adverse reactions to these air pollutants include premature death, respiratory hospital

admissions, aggravated asthma, lost days of school, and reduced productivity among outdoor workers.[29] Higher temperatures also promote the increased formation of ozone and higher concentrations of particulate matter which carry their own deleterious health effects like triggering asthma attacks and increased risk from premature death from heart or lung disease.[30] As the climate continues to change, heat-related health risks will intensify and progress toward clean air will become even more difficult.[31]

Even with population and economic growth, ozone air quality in the U.S. has improved dramatically due to control efforts for specific emissions over the past few decades dropping by 22% between 1990 and 2016. Louisiana has also shared in this positive trend but not to the degree of the rest of the country. According to a ProPublica, Times Picayune and The Advocate analysis, toxic air emissions in Louisiana's 50 most polluted census blocks improved by an estimated 75% from 1988 to 2017 compared to the median 94% improvement rate for the nation's most polluted block groups.[32] The analysis also identified that the state's share of the most heavily polluted census blocks nationwide increased from 3% to 7%.[33] The National Climate Assessment warns that, "the prevailing evidence strongly suggests" that climate change will partially counteract the progress made in reducing ozone precursors.[34]

The National Climate Assessment clearly documents that these impacts to air quality will harm certain groups more than others: the elderly, children, and those with chronic illnesses are particularly vulnerable to ozone and particulate matter-related effects.[35] In Louisiana, where 200 facilities along the Mississippi River between Baton Rouge and New Orleans report air emissions to the Environmental Protection Agency, a historical and racial element underscores the imbalanced distribution of these facilities' air quality impacts. During Reconstruction, groups of former slaves purchased small slivers of former plantations along the river, while the majority of the large plantations were retained by white land owners. This practice resulted in "a pattern along the river of large, contiguous blocks of open land under a single ownership…separated by communities of freed blacks and poorer whites."[36,37] Many of the residents in these communities today are descendants of the slaves who worked the adjacent land, which has seen significant industrial development due in part to the size of the tracts and their access to the Mississippi River's trade corridor. These communities of color are disproportionately affected by the pollution emanating from oil refineries, plastics plants, and chemical facilities along this corridor, formerly dubbed as "Plantation Country" and now called "Cancer Alley."

Disease

Mosquitos, ticks, and other disease-carrying animals, or "vectors," can be expected to have altered ranges, seasonal distributions, or abundance as climate change continues to impact weather patterns, ecosystems, and human land use and demographics. The southeastern region of the U.S. already has the most favorable conditions for the *Aedes aegypti* mosquito which can carry diseases such as dengue fever and the Zika virus.[38]

Water is also an extremely powerful disease vector being affected by climate change. As water temperatures increase, it can change the seasonality and range of pathogens and harmful algae. As rainfall events become more frequent and intense, runoff can create negative impacts for recreational bodies of water and drinking water sources and cause additional problems for inadequate water and sewer infrastructure that can in turn lead to bacterial and viral contamination of water that can be harmful to public health.

Mental Health

A number of mental health impacts can be attributed to the stress and distresses caused by climate change-related circumstances. These mental health effects interact with other health, social, and environmental stressors in ways that can compound and negatively affect an individual's mental well-being. As with so many other from climate change, some groups are more likely than others to be at risk to the negative mental health effects including those with preexisting mental illness, first responders, the elderly, pregnant women, the economically disadvantaged, and Indigenous people.[39] Experiencing a flood, even flood risk has been documented to produce higher levels of depression and anxiety that can persist for years after the event.[40] Disasters and droughts are also linked to increased use of alcohol and tobacco, higher temperatures can lead to an increase in aggressive behaviors.

IMPACTS TO INDIGENOUS PEOPLES

In addition to the ways that everyone is affected by climate change, Indigenous peoples are also uniquely and disproportionately impacted particularly because of impacts to ecosystems, species, and lands that are culturally, economically, and historically significant; and by the compounding health issues related to the loss of traditional foods, practices, or the mental stress of adaptation or relocation.[41] The National Climate Assessment contains an entire chapter dedicated to the challenges posed by an ever-changing climate on Indigenous peoples nationwide and the contributions Indigenous peoples have made to an understanding of local and national climate change risks in earlier assessments. The efforts by Indigenous peoples to adapt to climate-change-induced changes can also be curtailed by limitations to self-determination that arise differently for federally or state recognized tribes and non-federally and non-state recognized tribes.[42]

In matters of health, Indigenous peoples can be even more vulnerable to the physical challenges brought on by climate change because of "social determinants of health" related to historic and ongoing social, political, and economic factors with tangible impacts on human health. While health outcomes vary regionally, Indigenous peoples are disproportionately more likely to suffer from asthma, cardiovascular disease, Alzheimer's disease or dementia, diabetes, and obesity, disparities that can be exacerbated by climate-induced changes to pollen, air quality, and exposure to extreme weather events.[43]

In coastal Louisiana, hurricanes, saltwater intrusion, erosion, subsidence, sea level rise, and manmade challenges like the creation of canals splitting the wetlands and the *Deepwater Horizon* oil spill have all undermined the ability of Indigenous people to carry on traditional activities and threaten their survival. In 2020, four non-federally recognized tribes from coastal Louisiana joined with another tribe from Alaska in a protest to the United Nations arguing that sea level rise and coastal erosion had overcome burial sites and that continued land loss threatens food sources of food and that federal and state government had done too little to address it.[44] Indigenous peoples in coastal Louisiana are also working toward or actively pursuing relocating as an adaptation strategy to accelerating environmental risk.[45]

ENVIRONMENTAL IMPACTS

Louisiana's coastal plain has been slowly sinking for nearly 90 years with nearly 2,000 square miles of land lost since the 1930s. As climate change-driven global warming increases sea levels, coastal Louisiana's current challenges to staying above water will also increase. According to the National Climate Assessment, relative to the year 2000, global mean sea level rise is very likely to increase by 1 to 4.3 feet by 2100 with the western Gulf of Mexico likely to experience relative sea level rise that is greater than the global average.[46] As sea levels rise, some coastal ecosystems will be submerged and converted to open water, saltwater penetration will move further inland displacing inland ecosystems, and hurricane impacts will stretch further on shore causing additional ecological changes that will affect inland ecosystems and drinking water supplies.[47]

Already, Louisiana's coastal land loss crisis has exposed nearly 2 million people to the dangers of storm surge-based flooding with some communities threatened to be completely submerged just three or four decades into the future. Projections in the 2017 Coastal Master Plan indicate that without significant investment in coastal restoration and protection projects southern Louisiana could lose between 2,254 and 4,123 square miles of additional land over the next fifty years. Even with an investment of $50 billion in the implementation of every project in the master plan, 1,454-2,965 square miles of coastline are still likely to be submerged due to continued subsidence and sea level rise.[48]

This loss of land translates directly into greater exposure to hurricane risk, an exposure that will also increase as hurricane characteristics change in response to global warming. This level of risk poses an existential threat to individuals, families, neighborhoods, and entire towns and economies; to vibrant cultural traditions, hunting and fishing grounds, and long held, sacred lands all of which are endangered as land turns to open water. By 2014, the National Oceanic and Atmospheric Administration (NOAA) had already removed 40 place names from nautical maps of Louisiana including bays, bayous, and small islands because they had become indistinguishable from open water.[49] The National Climate Assessment estimates that one meter of sea level rise will erase over 13,000 recorded historic and prehistoric archaeological sites and more than 1,000 locations that are currently eligible for inclusion on the National Register of Historic Places across the southeast.[50]

Climate change is also having an impact on coastal residents' ability to get out of harm's way when hurricanes approach. The rapid intensification of hurricanes, as seen most recently in Hurricanes Harvey, Michael, Laura, and Delta, has been partially attributed to climate change.[51] Hurricane Delta, for example went from a Tropical Depression to a Category 4 storm in less than two days.[52] Fast moving changes to a hurricane's strength, especially just before landfall can pose challenges for forecasters and can make effective evacuations, which are already challenging for some senior citizens, people with disabilities, workers who cannot take time off, and those physically or economically unable to leave their homes, impossible. Indirect challenges to populations from storm surge and coastal flooding events can also be disastrous as a result of impacts to transportation networks and healthcare facilities.

Other types of environmental change are also affecting fishing. According to the National Climate Assessment, fishing and oyster harvesting activities along the coast will face "substantial challenges."

These challenges like increased ocean temperature, acidification, and sea level rise translate to a decline in oyster harvests by between 20 and 46%.[53]

Across Louisiana, people and ecosystems must adjust to the extremes of too much or too little water. Flooding—be it from storm surge, persistent high tides, increasingly heavy downpours, or from rivers swollen from changes to up-basin precipitation patterns is affecting populations throughout the state. Even floods that do not force people from their homes disrupt lives, add financial and emotional stress to individuals and families, and strain resources that could otherwise be invested elsewhere. Shortly after the 2016 floods in Louisiana, which forced the evacuation of thirty thousand people and flooded at least sixty thousand homes across twelve parishes, NOAA and collaborators at the World Weather Attribution (WWA) conducted a rapid assessment of the role of climate change on the event. Researchers found that heat-trapping GHG increased the likelihood of this type of event by at least 40% as compared to events that occurred back in 1900.[54]

Temperature and rainfall changes create challenges for crops and livestock as well. While some crops may become newly viable alternatives under changing conditions, the overall impact will be negative. Decreasing productivity in cotton, corn, soybeans, and rice is expected with higher temperatures as are increased stresses on livestock.[55] Changes in precipitation patterns can be expected to impact forestry.

ECONOMIC IMPACTS TO LOUISIANA

The impacts of climate change are exceedingly costly. These costs strain individual households, cities, states, and countries and can even threaten the health of the entire financial system.[56] According to NOAA's National Centers for Environmental Information, in 2020 "[t]here were 22 separate billion-dollar weather or climate related disaster events, shattering the previous annual record of 16 events, which occurred in 2017 and 2011."[57] It was also the sixth year in a row with 10 or more billion-dollar natural disasters.[58] The costliest event in 2020 occurred in Louisiana when Hurricane Laura caused $19 billion in damage.[59] According to the National Climate Assessment, without sustained and substantial mitigation and adaptation efforts, "climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century." In combination with other loses caused from impacts to human health and the environment, annual economic losses have the potential to reach hundreds of billions of dollars by the end of the century, which is more than the gross domestic product of many states.[60]

Estimates of future risk to Louisiana include two prominent examples from the coast. Estimates of economic risk to Louisiana from the 2017 Coastal Master Plan suggest that coast-wide expected annual damages from storms with a 1% chance of occurring in a year at the end of 50 years could reach $12.1 billion dollars under the medium scenario.[61] And an economic study by LSU estimated that a storm with a similar track to Katrina could cause $138 billion in damages to the New Orleans region in a future without master plan investments even with the existing $14.5 billion Hurricane Storm Damage Risk Reduction System.

Climate change also increases the frequency and likelihood of chronic conditions that can also pose high economic costs for states like Louisiana. Rainfall events that do not rise to the level of a federal

disaster, nuisance flooding, and saltwater intrusion all bring financial costs to homeowners, municipalities, and serve to weaken infrastructure that is costly to repair, replace, or redesign. Damages to the economy also occur as transportation networks and commodities flows that are significant for the state and national economy are interrupted by major and minor climate-related events. There is also considerable unknown risk in the built environment because existing federal flood insurance rate maps do not account for the future flood risk anticipated as a result of climate change or new development that may also reduce a floodplain's ability to manage stormwater. The nonprofit First Street Foundation created a tool to estimate and communicate a property's flood risk that includes risk from riverine, rainfall, tidal and storm surge sources as well as how that risk can change over time due to environmental factors affected by climate change. According to their calculations, 14.6 million properties across the country are at substantial risk including 5.9 million who are currently not identified as being within a FEMA special flood hazard area. Louisiana, already one of the most at-risk states, will see an increase in flood risk of 69.7% by 2050.[62]

Other types of future economic losses are possible as markets and investors make decisions about community capacity to address climate risk and about the ability of existing industrial facilities to minimize their carbon footprint. Today, investors, large financial institutions, and bond ratings agencies are beginning to consider risks posed by climate change in their decisions. These determinations could have real impacts on a community's ability to finance infrastructure or a business's cost of raising capital. Additionally, as global demand gradually shifts away from carbon-based fuels, some plants will close either because of reduced demand or because the cost of continued operations is too high to remain profitable. The most high-profile example of this was the closure of the Shell Convent refinery at the end of 2020. The 1,100 employee operation that formerly manufactured jet fuel, gasoline, and diesel, and was the largest employer in St. James Parish,[63] was shuttered as "part of the company's global strategy to invest in a core set of uniquely integrated manufacturing sites that are strategically positioned for the transition to a low-carbon future."[64]

Opportunities Posed by Climate Action

The dangers of inaction in the face of climate change in Louisiana are staggering. They threaten tremendous harm to our people, natural environment, and economy. The silver lining is that the state is joining a growing chorus of countries, states, and private corporations that are endeavoring to do their part to lower the GHG emissions that are driving these catastrophic changes to the earth's atmosphere. While dangerous consequences from climate change are already manifesting here and around the world, these risks can be mitigated and adaptation efforts can be more successful if the global community is successful in keeping global warming below 1.5°, or even 2°C, by the end of this century.[65] Every actor at every level has a role to play in achieving this global goal, including Louisiana.

To achieve the level of GHG mitigation needed to avert the worst impacts of climate change, an unprecedented investment of time, resources, and labor will be required across every sector of the economy. The International Energy Agency estimated that annual investments in clean energy alone would need to reach $4 trillion by 2030 to meet next zero emissions targets.[66] These investments to mitigate the effects of climate change will help avoid some of the negative impacts of climate change

detailed in the previous section of this report and also create a once-in-a-generation opportunity to reshape our state: to preserve and care for our abundant natural resources, to create thousands of good-paying jobs in an inclusive clean energy economy, to breathe new life into communities by sharing more equitably the opportunities to create wealth while adapting to a low carbon economy, and to lead by example for other states and communities.

This section will identify a few key areas of opportunity for Louisiana as it begins to take action to reduce the GHG emissions fueling global climate change.

ECONOMIC OPPORTUNITIES

In recent decades, Louisiana has found economic benefits from aggressively taking action against the coastal crisis.[67] Just as investment in the state's coastal program has created expertise and experience for Louisiana businesses to export around the world, state investment and leadership in the work of GHG emissions mitigation and in a low-carbon economy could also provide significant economic opportunities to the people of this state--creating and mobilizing new technologies in clean energy, batteries, hydrogen electrolysis, carbon capture, and direct air capture will create millions of new jobs globally.[68]

One area of considerable job growth and economic opportunity is in renewable energy. A dramatic drop in costs for solar energy and onshore wind have helped lead investments in renewable power across the country. Interest in solar development is growing inside the state[69] and Louisiana is working with the Bureau of Ocean Energy Management (BOEM) to complete the necessary steps to hold a lease sale in the Gulf of Mexico for offshore wind power production. According to the National Renewable Energy Laboratory, Louisiana ranks fourth in the nation for offshore wind technical potential[70] and a single offshore wind project could create 4,470 construction jobs and 150 full time operations jobs.[71] In addition to offshore wind deployment, Louisiana is well positioned to be a manufacturing and servicing hub for offshore wind being proposed and implemented across the U.S. In fact, Louisiana companies were integral to the design, fabrication, and construction of the nation's first commercial offshore wind farm in Block Island, Rhode Island.[72]

Reducing net GHG emission may also be an impetus for greater investment in the state's coastal master plan. By constructing projects to restore coastal ecosystems, we can adapt to the impacts of climate change and sequester CO_2. Through a Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act planning grant, CPRA and the TWI will examine in more detail the carbon capture potential of coastal ecosystem restoration known as "blue carbon." Information will be developed about current coastal carbon storage conditions, how coastal restoration could influence those conditions, and the modeling tools and markets available to assess and support coastal carbon capture.

Finally, the work of the CITF is presenting the state with an opportunity to address the challenges of a changing economy head on. Production of oil and gas has declined in Louisiana over the past several years as have the number of jobs provide by that traditionally strong industry in the state economy. Global markets and policy decisions being made far outside of Louisiana may have continued impacts

on segments of the state economy that are carbon intensive. Navigating the need and capacity for existing industries to adapt and innovate to meet the needs of a low carbon economy will be critically important for the state. This too is an opportunity to revisit and address long-standing questions about who benefits from economic growth in Louisiana and who must carry the burden of transitions. It is also an opportunity to recommit to the importance of human and environmental health for any thriving economy. As the CITF does its work, it must be vigilant in its pursuit of a more inclusive, thriving, adaptable economy that provides benefits for all Louisianans.

HEALTH BENEFITS

The public health impacts associated with GHG emissions are tremendously costly for Louisiana. In addition to the direct impacts of diseases, climate change and its impacts are detrimental to mental health. The stress, anxiety, and trauma of continued and worsening cycles of hurricanes, flooding, extreme heat, sea level rise, and coastal degradation are heavy burdens to bear. But addressing emissions through policies and programs to reduce the risks brought on by climate change can have short and long-term benefits for human health.[73]

Keeping GHG emissions in line with lower emissions scenarios by the end of the century can save thousands of lives and hundreds of billions of dollars in costs associated with health care. These positive benefits accumulate from reductions in heat intensity, infectious disease, and water.[74] Many of the processes that produce GHG emissions also release hundreds of other air pollutants that can cause serious illness and premature death creating. Because of this relationship, cutting GHG emissions to reduce the impacts of climate change can also mitigation other harmful impacts on human health.[75] The adverse impacts caused by these pollutants are particularly severe for elderly, children, and those with chronic illnesses and among Black and Indigenous communities. Addressing GHG emissions can also provide an opportunity to mitigate against longer pollen seasons, increased pollen production by plants, and altered degrees of allergic reaction.[76]

ADVANCING CLIMATE EQUITY

In Louisiana and around the world, climate change and GHG emissions disproportionately impact low-income, Black, Indigenous, and coastal communities. These communities are the least responsible for emissions, but bear the highest costs in health, environmental degradation, and even migration. Actions and strategies to reduce GHG emissions must be informed, designed, and implemented to prioritize and offer tangible benefits to these communities and also allow them to design, participate, and lead the envisioning and work of repairing our environment and building an equitable and sustainable clean energy future.

Without intentional policy design, Louisiana's actions to build a new, low-carbon economy will reinforce and replicate the stratification and divisions that are so fundamental to the old economy. From disasters like Hurricanes Katrina and Laura that laid bare the intertwined environmental hazards compounded by systems of historic and current racism and segregation, generational poverty, and discriminatory inequitable disaster recovery strategies, to the everyday struggles of residents in the River Parishes, to farmers and agricultural workers along our state's great rivers, and other fence-line communities, to the loss of land and community that has impacted Indigenous and long-standing communities in the coastal zone – there is no shortage of examples of the connections between climate impacts, environmental injustice, disaster, class and race.

In spite of the challenges, low-income, Black, and Indigenous communities are crucial to Louisiana's climate future. These communities hold tremendous knowledge of the state's lands, waters, wildlife, and environment and are leaders in the implementation of GHG reductions. The CITF is developing actions and strategies with climate equity at the forefront. Commitments to equity are reflected in the composition of the CITF and the supporting committees and in the conversations taking place in their meetings. In addition, an equity advisory group was formed to specifically consider the potential outcomes of policy proposals for advancing or negating progress toward a more equitable society. A definition of climate equity was created and criteria were developed to help measure each proposed policy's potential impact on the three equity fundamental objectives.

By intentionally moving considerations of climate equity to the forefront, the CITF aims to ensure that the costs of mitigation or adaptation actions do not to fall unequally on the already disadvantaged and that this opportunity to use climate mitigation and adaptation to address long standing historical inequities is fully realized. This work begins with the CITF, but will continue for years to come.

Problem Context: Emissions in Louisiana

This section will be updated for the final report based on information from the final 2020 GHG Inventory.

Climate Portfolio (strategies and actions)

This section will be updated for the final report.

Consequence Analysis

This section will be updated for the final report and include information on how the strategies and actions adopted by the CITF perform in terms of GHG emissions reductions and by offering additional co-benefits.

GHG EMISSIONS REDUCTION POTENTIAL ANALYSIS

CO-BENEFITS ANALYSIS

Gaps and Additional Research Needs

This section will be updated for the final report.

Implementation Matrix

This section will be updated for the final report.

Appendix A. Committee and Advisory Group Membership and Charge

Appendix B. Schedule of Meetings

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