# Framework and Best Practices for Developing a Climate Action Plan

FINAL MEMORANDUM

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Texas A&M Transportation Institute

# TECHNICAL MEMORANDUM – DRAFT FOR REVIEW

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## Sub-Task 3.3 – Plan Support

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**TO:** Janie Temple, Texas Department of Transportation
Laura Norton, Texas Department of Transportation

**FROM:** Ben Ettelman
Tara Ramani
Elizabeth Rhinehart
Alice Grossman

Texas A&M Transportation Institute

**FOR MORE INFORMATION:**

Tara Ramani
979-393-0688
t-ramani@tti.tamu.edu

# TABLE OF CONTENTS

# 1. INTRODUCTION

Climate action plans provide strategies to reduce greenhouse gas (GHG) emissions and address the effects of climate change through adaptation and mitigation techniques. Developing a climate action plan for the State of Texas can support coordinated action toward mitigation and adaptation strategies. This is especially important in light of the Infrastructure Investment and Jobs Act (IIJA), which also prioritizes addressing and planning for changes in climate. Past research indicated that incorporating GHG reduction strategies in the transportation planning process rather than relying on federal and state regulations can help prepare states to respond to the climate crisis (Kenney et al., 2014). The aim of this activity, conducted under the Texas A&M Transportation Institute (TTI) and Texas Department of Transportation (TxDOT) Air Quality and Conformity Interagency Contract is to provide TxDOT with information regarding climate action plans, and a framework and best practices for their development. This activity also links to aspects of resiliency planning and greenhouse gas mitigation/carbon reduction.

## 1.1 Greenhouse Gas Emission Implications of Climate Action Plans

Greenhouse gases, such as carbon dioxide, methane, and nitrous oxide, can be emitted into the air from both natural and anthropogenic sources. Since these emissions are often long-lived in the atmosphere, they can retain heat and contribute to the warming of air and surface temperatures (EPA, 2020). Increasing concentrations of GHG emissions can also harm human health, coastal areas, agriculture, and other societal sectors.

As of 2019, Texas released more carbon dioxide into the atmosphere than any other state, with transportation being the largest contributor (Marshall & Thompson, 2019). However, this is largely due to the state's growing population and economy, both of which contribute to an increase in vehicle miles traveled, which in turn contributes to increased GHG emissions. Although Texas' per capita statistic for carbon emissions is relatively lower (ranked 18$^{th}$ among states), climate change and infrastructure resilience remain key concerns for the transportation sector.

## 1.2. Climate Change Implications of Climate Action Plans

Climate change is a complex issue, and its association with extreme weather events—including heat waves, hurricanes, wildfires, droughts, and floods—can lead to severe environmental and infrastructure impacts (National Oceanic and Atmospheric

Administration, 2021; National Wildlife Federation, 2019). The emission of pollutants in the air from various anthropogenic sources—including the transportation sector—can further result in changes to the climate. Transportation-related air pollution can introduce additional oxides of nitrogen ($NO_x$) and volatile organic compounds (VOC), which, when combined with heat and sunlight can lead to the creation of tropospheric, or ground level ozone—which has a wide range of impacts to climate change on air quality (EPA, 2022a; EPA, 2020).

## 1.3. Resiliency Implications of Climate Action Plans

Many communities are not adequately prepared to respond to climate change-related events, so resiliency is a critical component to be considered in a statewide climate action plan. Factors that need to be addressed include how communities can invest in and improve the resiliency of physical infrastructure, including transportation system components; as well as the adoption of best practices to make sure all members of the population are protected against climate change-related events. Typically, certain marginalized groups—such as lower-income, racial minorities, or indigenous people—have been excluded from the benefits of infrastructure and community investments, so climate action plans must also include a variety of methods to address these groups' needs and achieve health equity (EPA, 2021; Executive Order No. 14008, 2021). Additionally, climate action plans that seek to reduce social injustice by integrating resiliency components are more likely to be successfully implemented and sustained long-term (Meerow & Woodruff, 2019).

## 1.4 Memorandum Outline

The following sections of this memorandum will provide an overview of the policies related to the development of climate action plans, including federal state, and local policies; the development of climate action plans, including best practices and guidance provided by national and international agencies and organizations, the components typically included in climate action plans, and a review of existing climate action plans; and concludes with a framework for TxDOT to refer to when considering the development of a climate action plan for the State of Texas.

# 2. POLICIES RELATED TO DEVELOPMENT OF CLIMATE ACTION PLANS

The following subsections provide an overview of federal, state, and local policies associated with the development of climate action plans.

## 2.1. FEDERAL POLICIES

The following subsections provide an overview of policies from the federal government associated with the development of climate action plans.

### 2.1.1. Executive Order (E.O.) 14008: Tackling the Climate Crisis at Home and Abroad

Prior to the IIJA being signed into law, President Biden issued Executive Order 14008 (Tackling the Climate Crisis at Home and Abroad) in January 2021, which required major federal agencies to release their own climate adaptation and resilience plans (Executive Order No. 14008, 2021). The overarching goal of the executive order was to reduce climate pollution in every economic sector, while protecting public health and delivering environmental justice. Among the objectives within the executive order was instruction to federal agencies to identify risks and vulnerabilities that are contributing to the climate crisis at the federal government level. The executive order also established a National Climate Task Force to be chaired by the National Climate Advisor—along with members from other federal agencies, including the Secretary of Transportation—to facilitate the planning and implementation of federal actions to combat the climate crisis.

In response to E.O. 14008, numerous agencies released their Climate Adaptation and Resilience Plans in October 2021. The United States Department of Transportation's (USDOT) Climate Action Plan included provisions to incorporate resilience criteria into transportation discretionary grant and loan programs and to identify priority adaptation actions. The plan also aims to promote health equity by considering the impacts of major climate change-related hazards that affect environmental justice communities when designing and implementing new projects (U.S. DOT, 2021). Finally, the plan can be used by state agencies when developing their own state-level climate action plans to ensure that their targets and goals align with the federal-level goals.

### 2.1.2. Infrastructure Investment and Jobs Act (IIJA)

Passed into law on November 15, 2021, the IIJA includes provisions and funding related to transportation and power infrastructure, clean drinking water, access to reliable high-speed internet, investments in disenfranchised communities, as well as ways to tackle the climate crisis. The bill will provide approximately $350 billion for highway programs between fiscal years 2022-2026, including both formula and discretionary funding programs. Table 1 provides a summary of some of the notable funding programs in the IIJA that relate to transportation emissions.

*Table 1. Summary of Funding Programs in IIJA.*

| Section | Program | Agency | Funding |
|---|---|---|---|
| 11115 | Congestion Mitigation and Air Quality Improvement Program | DOT | $13.2B |
| 11405 | PROTECT Formula Program | DOT | $7.3B |
| 11403 | Carbon Reduction Program | DOT | $6.4B |
| 30018 | Low or No Emission Grants | DOT | $5.6B |
| 71101 | Clean School Bus Program | EPA | $5B |
| Division J | National Electric Vehicle Formula Program | JOET | $4.2B |
| 11401 | Charging and Fueling Infrastructure Grants | DOT | $1.3B |
| 13009 | Transportation Resilience and Adaptation Centers of Excellence | DOT | $500M |
| 11402 | Reduction of Truck Emissions at Port Facilities | DOT | $400M |
| Division J | Joint Office of Energy and Transportation | DOT; DOE | $300M |
| 11404 | Congestion Relief Program | DOT | $250M |
| 71102 | Electric or Low-Emitting Ferry Pilot Program | DOT | $250M |

A complete summary table of IIJA components that are related to carbon emissions, climate change, equity, and resilience elements can be found in Appendix A.

In addition, in January 2022, the Biden administration released an IIJA Guidebook to help state and local governments find detailed information about various programs under the bipartisan infrastructure law (The White House, 2022). Users can sort the programs according to the administering agency or bureau, funding amount or

mechanism, and category—such as transportation; climate, energy, and the environment; broadband; or other programs. This guidebook maximizes transparency of the IIJA so that community members and other stakeholders can easily acquire information pertaining to their organizational or personal needs.

#### 2.1.2.1. IIJA Funding for Public Transportation Infrastructure

With the transportation sector being the largest single source of GHG emissions in the country, the IIJA makes significant allocations to improve the nation's public transportation system. Approximately $91 billion will be invested to expand infrastructure, make public transportation infrastructure more resilient against the impacts of climate change, improve access to public transportation—including several programs related to access in rural areas—and modernize transit vehicles with clean, zero emissions vehicles.

#### 2.1.2.2. Joint Office of Energy and Transportation (JOET)

Additionally, the Departments of Energy and Transportation have established a Joint Office of Energy and Transportation (JOET) with the purpose of facilitating cooperation and aligning resources towards the deployment of infrastructure for electric vehicle charging and zero-emission fueling. JOET will also oversee the implementation of the $5 billion National Electric Vehicle Formula Program which aims to deploy an interconnected network of electric vehicle (EV) charging infrastructure. This program also places a focus on expanding the EV charging network in rural and disadvantaged populations (DOE, 2021).

JOET will be responsible for providing technical assistance to states when developing their own EV charging infrastructure plans. In addition, JOET has released a recommended template for state EV charging plans that can be accessed at driveelectric.org to aid in the plan development process (JOET, n.d.). This template includes sections related to state agency coordination; public engagement; contracting with private entities; infrastructure deployment and implementation; equity considerations; and program evaluation. Providing technical assistance to states will also ensure that it contributes to the Administration's Justice40 Initiative, which states that at least 40% of benefits derived from federal efforts relating to climate and clean energy solutions will be invested into disadvantaged communities.

### 2.1.2.3. IIJA Centers of Excellence

The IIJA also directs the secretary of USDOT to designate Centers of Excellence for Resilience and Adaptation at the regional and national levels to advance research and development focusing on infrastructure resiliency related to the effects of climate change. These centers will be responsible for supporting climate vulnerability assessments, stakeholder engagement, and the development of resilient infrastructure strategies.

### 2.1.2.4. Additional Notable Funding Programs in IIJA

Additional notable funding programs within the IIJA include:

- Building Resilient Infrastructure and Communities (BRIC) Program: Although established in fiscal year 2020, the IIJA provides $1 billion to the BRIC program, led by the Federal Emergency Management Agency (FEMA). This program provides competitive grants to eligible entities—including states, U.S. territories, tribal governments, and local communities—for hazard mitigation activities. These activities may relate to programs designed to improve community resilience to extreme weather events or other mitigation projects.
- Carbon Reduction Program: The IIJA includes provisions for over $6 billion that will be allocated by USDOT to establish a state Carbon Reduction Program with activities to reduce transportation emissions. Eligible state activities for this program will include electrification and public transportation improvements.
- Clean School Bus Program: The IIJA invests $5 billion in a Clean School Bus Program to be led by the EPA and distribute grant funds to state or local governments, eligible contractors, and nonprofit school transportation associations. The funds will go towards zero-emission school buses and alternative fuels and may be prioritized for rural and low-income communities.
- Congestion Relief Program: The IIJA establishes $250 million for a Congestion Relief Program to be led by USDOT to reduce congestion and its associated economic and environmental costs. Entities eligible for funding include states, metropolitan planning organizations (MPO), or cities who engage in activities related to congestion management systems and other incentive programs.
- Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program: The new (PROTECT) grant program provides over $7 billion in formula funding to states and over $1 billion in discretionary

grants to other eligible entities—such as states, MPOs, local governments, or tribal governments—who are working to improve transportation infrastructure resilience.

### 2.1.3. Fixing America's Surface Transportation (FAST) Act

Preceding the IIJA, the Obama administration signed the Fixing America's Surface Transportation (FAST) Act in December 2015. The FAST Act authorized $305 billion through fiscal year 2020 for highway and motor vehicle safety, public transportation, and other surface transportation infrastructure programs (U.S. DOT, 2015). It established new programs related to easing congestion and facilitating freight movement which have the potential to reduce GHG emissions. The FAST Act continued funding for the Congestion Mitigation and Air Quality (CMAQ) Program to help state and local government projects meet the requirements of the Clean Air Act. Additionally, it requires actors engaged in the transportation planning process to evaluate projects that can improve the resiliency of the transportation system.

This law allowed states and local governments to engage in critical transportation projects since it provided long-term funding certainty from the federal government. Along with introducing new programs, the IIJA expanded funding so that various FAST Act highway programs could continue through fiscal year 2026.

## 2.2. State and Local Policies

After Winter Storm Uri's widespread devastating impacts in Texas in February 2021, House Bill 2206: The Texas Climate Action Act was filed by Representative James Talarico (Tex. H.B. 2206, 2021). The Texas Climate Action Act intended to encourage the state to create and adopt a climate action plan, set emission goals, and prepare for future climate disasters. The bill was referred to the House Environmental Regulation Committee but died in committee.

Although Texas does not have any statewide policies in place that relate to climate action planning, several Texas cities, including Austin, Dallas, and Houston, have developed their own local and regional climate action plans. Additionally, the Texas Emissions Reduction Plan (TERP), administered by the Texas Commission on Environmental Quality (TCEQ) offers grants and other incentives to eligible entities to reduce emissions from outdated vehicles and equipment (TCEQ, 2022b). TERP aims to reduce pollution from emissions and improve ambient air quality.

Finally, the U.S. Climate Alliance, a bipartisan coalition of 25 governors—not including Texas—aims to reduce GHG emissions with goals that are consistent with the Paris Agreement (U.S. Climate Alliance, 2022). Member states are committed to climate actions that align with a series of collective goals grouped into categories ranging from electricity, equity, transportation, industry, buildings, and natural and working lands. The goals that are associated with transportation include low- and zero-emission vehicle standards, as well as clean truck and clean fuel standards. The Alliance's inventory of best practices in combatting climate change through policies can be used by states in the development of climate action plans.

# 3. CLIMATE ACTION PLAN DEVELOPMENT

The following subsections provide best practices, guidance, and requirements associated with the development of climate action plans; components included in climate action plans; and finally, a review of existing climate action plans for reference.

## 3.1. BEST PRACTICES/GUIDANCE/REQUIREMENTS

Numerous resources exist to support local and state entities in the development of climate action plans. Government agencies, including the Department of Energy (DOE) and the Environmental Protection Agency (EPA), and nonprofits such as the American Public Transportation Association (APTA) have published guidelines for climate action planning. There are also several international organizations that provide climate action planning framework recommendations, including the United Nations Habitat program and C40 Cities Climate Leadership Group. The following subsections provide an overview of best practices, guidance, and requirements for developing a climate action plan.

### 3.1.1. Activities Prior-to and During Climate Action Plan Development

Both DOE and EPA suggest that, prior to developing a climate action plan, a comprehensive GHG emissions inventory should be conducted to identify the climate action plan's reduction targets (DOE, 2010; EPA 2016). Climate action plans should break down emissions by sector, explain how the data was collected, and include any variations in population vulnerability to emissions (Meerow & Woodruff, 2019). Population variations could depend on geographic location, race, or other socioeconomic factors.

According to the EPA, additional actions that should be taken prior to development of climate action plan include communicating objectives and timelines with key audiences and stakeholders—such as state and local governments, private entities (including contractors, business owners, industry interest groups, and corporations), and nonprofits—to increase public engagement and support for the implementation of the plan (EPA, 2016). Providing an individual actor or organization ownership and responsibility for a specific strategy can generate accountability and increase buy-in (DOE, 2010). The developing organization must also have specific, yet attainable, goals

based on current conditions and available resources that they hope to achieve as another way to increase accountability.

Further, there are distinct transportation-related collaborations and planning activities that can aid in the development of climate action plans. According to the Federal Highway Administration (FWHA), transportation planning requires the cooperation of all members of the transportation system, including private businesses and corporations, community groups, and the public (FWHA, 2022). The FHWA also identifies a number of steps in the transportation planning process, including monitoring existing conditions; forecasting population growth; identifying transportation issues; developing long-range and short-range programs; estimating the future impact of modifications; and developing a secure financial plan. Utilizing this planning process while designing GHG reduction strategies can have positive impacts on the transportation system while protecting public health.

### 3.1.2. Implementation & Monitoring

Climate action planning should be inclusive, equitable, comprehensive, coordinated, and evidence based. Identifying and prioritizing actions and strategies that span across multiple sectors will ensure that the strategies laid out in the climate action plan will address diverse issues and concerns. Climate action plans that have a specific implementation plan, including identified responsible parties, funding and staffing sources, and political support are more likely to be sustained long-term. Continuous monitoring and evaluation will demonstrate if implemented strategies are successful, demonstrate if any modifications are needed, and increase transparency and chances of future application.

## 3.2. Climate Action Plan Components

The components included within climate action plans can vary depending on the goals of the agency or organization developing the plan. During a comprehensive review of existing climate action plans, TTI staff identified and documented components that are consistently included.

### 3.2.1. Introduction, Background, & Goals

Climate action plans frequently begin with a long-term vision statement, a GHG reduction goal and timeline, and a brief background on climate change science (APTA, 2011; UN Habitat, 2015). The introduction may also include the state or agency's existing climate change reduction strategies. In addition, the introductory section of climate action plans often discusses the purpose and benefits of the plan as well as the tangible outcomes that the authoring agency or organization hopes to achieve.

### 3.2.2. Greenhouse Gas Emissions Inventory

A current GHG emission inventory is provided to establish baseline data and document which sectors contribute the most to GHG emissions within the state. It is common for the transportation sector to account for a significant portion of total GHG emissions, with some state and city climate action plans attributing nearly 50% of emissions to transportation. In addition to baseline data, another component of a GHG emissions inventory is the forecasted emissions based on a "business-as-usual" scenario versus a projection of emissions if the state or locality is to adopt the strategies that are identified in the climate action plan. This comparison of GHG emissions before and after strategy implementation provides a clear depiction of the importance of taking swift climate action. Including a description of the additional benefits of reducing GHG levels—such as public health, environmental, and economic implications—can further persuade governments, MPOs, and other actors to implement changes that reduce GHG production.

### 3.2.3. Sector-Specific Strategies

It is common for climate action plans to describe sector-specific strategies to reduce GHG emissions, improve the health and quality of life for communities, and adapt to climate change. Some of the most common sectors include energy and electricity;

residential/commercial/industrial (RCI); agricultural; forestry; water; waste management; and transportation.

Strategies identified within climate action plans typically include a description of the strategy, specific actions to implement the strategy, and metrics to track the strategy's effectiveness in achieving the climate action plan's goals. Actions to implement each strategy may include state or citywide policies, private sector regulations, individual behavior change, and other approaches that result in tangible outcomes. In addition, details on cost savings—or conversely, the cost of not acting—may also be included To demonstrate a strategy's feasibility. A detailed financial analysis of a strategy provides additional rationale for implementation, both from the perspective of protecting human health and the environment, but also with respect to preserving government and/or organizational funds. Typically, climate action plans reiterate that the emissions reduction goal can be met if the strategies and associated actions are properly implemented.

The following subsections provide an overview of sector-specific strategies that were commonly found in existing climate action plans.

#### *3.2.3.1. Transportation Sector*

Transportation-related strategies range from implementing policies and programs, establishing mandates or incentives, or forming partnerships with other entities. These strategies can be a part of ongoing efforts at the state or local level, or they can be new actions that will require more groundwork to launch. In addition, it is important to identify strategy-specific actions that individuals and businesses can undertake, as opposed to actions identified strictly for policymakers and other government officials. This approach can empower individuals to adopt the recommendations established in the climate action plan.

Examples and descriptions of transportation-related strategies include:

- Vehicle electrification programs and infrastructure: Encouraging the adoption of electric vehicles (EVs) by providing incentives and increasing charging infrastructure can reduce the level of GHG emissions. Utilizing national-level grants and other funding sources can help extend the development of EV infrastructure. Additionally, establishing incentives for increasing battery-electric or plug-in hybrid-electric vehicle ownership can also lower transportation emissions.

- Transit-oriented environments: Modifying the built environment to improve access to public transportation can reduce GHG emissions if fewer people commute using their personal vehicle. This will require investment in the public transportation system, such as increasing bus and rail service, expanding coverage area by modifying or adding routes, and replacing outdated infrastructure—such as diesel buses—with cleaner and more fuel-efficient vehicles. Additionally, improvements in sidewalk infrastructure—especially in historically marginalized communities—can ensure that all populations have access to public transit options.
- Pedestrian-friendly environments: Ensuring that the transportation system is accessible to pedestrians can reduce the number of single-occupancy vehicle trips and in turn, the level of GHG emissions. Improving the reliability and interconnectedness of sidewalk networks and bicycle paths can encourage transportation users to adopt more active forms of transportation. Prioritizing the walkability of communities can be done through adding well-marked and safer crosswalks, increasing the distance between sidewalks and vehicular travel, and adding green infrastructure to provide shade and enhance aesthetics.
- Mixed land use patterns: Comprehensive land use patterns where affordable housing is located near city centers and public transportation options can reduce both transportation costs and GHG emissions. Compact land use strategies can improve the connectivity of cities, thereby discouraging personal vehicle use and reducing traffic congestion. This can also include mixed-use development, where restaurants, grocery stores, gyms, offices, schools, parks, healthcare services, and other community resources are located in the same area to reduce the number of trips. This is especially important for the more vulnerable members of society who tend to have lower private vehicle ownership rates and less access to these resources.
- Alternative fuel programs: Increasing the production and use of alternative fuels—such as biodiesel and ethanol—can promote cleaner forms of travel that reduces harmful vehicular emissions. In addition to electrification, alternative fuels can be a viable option to maximize emission reductions.
- Vehicle regulations: Strict vehicle emission policies and vehicle inspection standards can reduce the number of vehicles on the road that are emitting high levels of pollutants.

#### 3.2.3.2. Energy & Electricity Sector

The energy and electricity sector is often identified as a producer of GHG. Some of the most frequently identified strategies for this sector in climate action plans include:

- Modernizing the energy grid.
- Increasing the use of clean electricity generation resources.
- Growing investments in renewable energy.
- Investing in carbon capture technology.
- Implementing performance-based regulations to create incentives to shift towards clean energy.

#### 3.2.3.3. Residential/Commercial/Industrial Sector

In the RCI sector, there are many strategies that can be implemented to decrease GHG emissions and increase climate change resiliency, including:

- Reducing building energy use by developing programs that improve energy efficiency and adopting advanced building energy codes.
- Requiring commercial facilities to track and self-report energy use.
- Accelerating industrial electrification.
- Ensuring that new buildings are sustainable and are carbon neutral.
- Promoting the use of low-carbon building materials in construction.

#### 3.2.3.4. Agricultural and Forestry Sectors

The agricultural and forestry sectors contain similar strategies, such as:

- Promoting regenerative farming.
- Improving soil function and carbon sequestration.
- Ensuring the food system is resilient to extreme weather events.
- Protecting ecosystem resilience and addressing vulnerabilities.
- Preserving natural lands and expanding urban green space areas.
- Creating reforesting policies.

#### *3.2.3.5. Water and Waste Management Sectors*

Climate action plans also incorporate a variety of water and waste management strategies that can be implemented by a range of stakeholders, including:

- Conserving water resources and using best management practices.
- Protecting neighborhoods from flooding.
- Reducing waste generation.
- Strengthening local recycling and composting efforts.
- Reducing methane emissions from landfills and sewage plants.

### 3.2.4. Mitigation & Adaptation

Climate action plans often focus on mitigation and adaptation techniques. Mitigation techniques aim to reduce the threat of climate change through sector-specific policies and strategies. Adaptation techniques focus on preparing for the effects of climate change despite mitigation efforts. However, some climate action plans include both mitigation and adaptation approaches. In addition, there is growing awareness surrounding the implications of mitigation and adaptation strategies on disadvantaged populations. Incorporating equity, environmental justice, and resiliency into mitigation and adaptation strategies has become increasingly common in climate action plans. Disadvantaged populations are those that have been burdened by higher-than-normal environmental pollution and/or have been marginalized in society, such as low-income and minority populations. Incorporating environmental justice and social equity considerations ensures that historically disadvantaged populations and communities are not disproportionately burdened or left out of climate change mitigation strategies.

### 3.2.5. Identifying Partnerships & Funding

Climate action plans may also include information on partnerships that are essential to the successful implementation of identified strategies and associated actions. The organization developing a climate action plan should make sure that their goals align with the private sector's practices and approaches. For example, city planners play a critical role in engaging the community in climate action planning to gather data and other critical information, such as current city plans and infrastructure resources. Additionally, acquiring political support from government leaders and political action committees can increase the probability of policy implementation related to the strategies identified in the climate action plan. Moreover, political support can secure

funding from government organizations, private companies, or non-profits and provide ongoing resources towards the implementation of the climate action plan.

In addition to transportation and planning experts, public health professionals should be involved to better inform stakeholders of the direct and indirect impacts that the built environment present to human health, both advantageous and detrimental. Business analysts and economists are also valuable experts in developing cost-benefit analyses of various strategies and can provide input on the recommendations within climate action plans. Finally, state and local health departments and environmental organizations can provide useful data pertaining to the level of emissions in an area, the top health issues and concerns among community members, and other regulatory information.

### 3.2.6. Monitoring & Evaluation

It is common for climate action plans to establish a transparent structure for monitoring and evaluating progress and success to ensure that ongoing climate action efforts are both cost-effective and impactful in reducing GHG emissions. Performance measures, or key performance indicators (KPIs) should be quantifiable, such as tracking emissions from each sector within a climate action plan. Establishing data-driven metrics to track the performance of implemented strategies can be used to compare baseline data with improvements in GHG emissions, public health, and other measures of success. For example, proposed transportation metrics could include the number of electric vehicles on the road, the number of electric charging stations, the percentage of the population using public transportation, or the number of miles added for pedestrian and bicycle paths. Additionally, maintaining and regularly updating a statewide GHG inventory provides the ability to consistently monitor progress and hold responsible entities accountable for GHG reduction goals. Incorporating a GHG emissions reporting process at all stages of project planning for both the public and private sectors can further aid in the monitoring and evaluation stage.

## 3.3. Review of Existing Climate Action Plans

The TTI team conducted an extensive review of existing climate action plans from federal, state, and local agencies and organizations. The following subsections provide an overview these climate action plans. A summary table of climate action plans identified and evaluated by TTI is provided in Appendix B. This summary table includes the lead agency or organization that developed the plan, the year the plan was published, and the components included within the plan.

### 3.3.1. U.S. Department of Transportation Climate Action Plan

Currently, there are many climate action plans that have been published at the national, state, and local levels that include the components discussed in the previous section. In August 2021, USDOT's Office of the Secretary of Transportation drafted a climate action plan that set forth the agency's priorities for confronting climate change (U.S. DOT, 2021). USDOT began with a summary of the leadership responsible for coordinating climate adaptation actions, followed by how climate change impacts transportation.

The plan also identified priority action areas including goals, a lead agency, risks and opportunities, timeframe, implementation methods, challenges, and other considerations. Many of these action areas focus on resiliency and adaptation methods, such as ensuring that transportation projects supported grant and loan programs incorporate protective features; that project plans are designed with the consideration of climate change impacts; and that USDOT is leading by example in their own operations. In addition, the plan identified vulnerabilities that might stand in the way of effective climate action planning. Vulnerabilities can include transportation projects that do not incorporate resiliency; disruptions to the supply and availability of critical USDOT supplies; and insufficiently trained USDOT personnel in climate change and resiliency topics. The agency summarized actions to address workforce climate literacy and ensure climate-ready services. Climate literacy will be addressed through internal and external climate education efforts to educate both USDOT personnel and stakeholders on the importance of resiliency and adaptation efforts. USDOT will ensure climate-ready supplies are readily available through the procurement requirements and policies and updated contracting mechanisms. The climate action plan also addressed equity issues and acknowledged how many climate change-related impacts disproportionately impact vulnerable populations that have less capacity to prepare and respond to these events.

### 3.3.2. State, Regional, & Local Climate Action Plans

Several states have developed their own climate action plans, with some being developed over a decade ago (e.g., Maine 2004) and others having been published recently (e.g., Louisiana Feb. 2022). There are a range of agencies that develop and publish climate action plans, ranging from state government entities to ad-hoc groups, such as climate change advisory groups and committee; for example, the Montana Climate Solutions Council developed the state's climate action plan in August 2020 (State of Montana, 2020). It is not common for a state department of transportation to lead the development of a state climate action plan. However, the Oregon Department

of Transportation's Climate Office led the development of Oregon's climate action plan, which was completed in July 2021.

In addition to states, several major cities have developed climate action plans. Many of these plans are produced by city offices and or other ad-hoc groups, such as the Chicago Climate Task Force or Detroiters Working for Environmental Justice. Nearly all state and local climate action plans include sector-specific strategies, including strategies related to the transportation sector. In addition, most state and local climate action plans include an emissions inventory and a clear GHG reduction goal. The inclusion of details associated with equity, environmental justice, resiliency, or adaptation planning were more common in climate action plans developed in recent years. For example, of the state, regional, and local climate action plans that were reviewed for this report, only 5 of the 36 plans that included equity or environmental justice components were published before 2015. However, it should be noted that many states have only just published their own climate action plans in recent years as climate change and its effects have become more widely discussed, and only a handful were published more than a decade ago.

## 3.3.3. Climate Action Plans Developed by Cities in Texas

The following subsections provide a review of the climate action plans developed by cities in Texas, including Austin, Dallas, and Houston.

### *3.3.3.1. Austin Climate Equity Plan*

The City of Austin developed the *Austin Climate Equity Plan* in 2020. This plan updates a previous climate action plan from 2015 that had a goal of net-zero emissions by 2050 with a new 2040 target (Austin, 2020). The plan provides an explanation of the urgency of climate action using climate change science and GHG emission predictions to support the reduction target. Within the transportation section of the climate action plan, there is an emphasis on smart growth patterns, public transit, people-powered transportation, and EV charging infrastructure. There is an environmental justice component within the climate action plan, which takes an equity-focused approach to ensure that low-income communities and communities of color are equally represented in the proposed strategies. The climate action plan introduces a Community Climate Ambassador Program for Austin where representatives work with historically underrepresented groups within the city and engage these communities in climate-related discussions in an effort to build trust and meaningful relationships. The ambassadors led discussions with community members to hear their perspectives on a range of issues relating to

healthy environments; affordability concerns; economic opportunity and empowerment; accessibility of services; cultural preservation; community capacity; and accountability. The Austin climate action plan also places a high priority on collaboration between stakeholders, developing an implementation plan, securing funding, and measuring and reporting implementation progress.

#### *3.3.3.2. Dallas Comprehensive Environmental and Climate Action Plan*

The City of Dallas's *Comprehensive Environmental and Climate Action Plan* also emphasizes an equitable approach to climate action through mitigation and adaptation techniques (City of Dallas, 2020). The climate action plan provides an introduction to climate action; a timeline of the city's current environmental initiatives; challenges associated with climate change; how climate change impacts people, the economy, and the environment; GHG emissions and targets; and identifies specific strategies and actions to reach targets. Each strategy is categorized by sector, type of action (such as advocacy, education, incentives, policies, or programs), the primary benefit of the action (mitigation, adaptation, environmental quality, or environmental justice), as well as additional co-benefits, (such as improvements in public health or air quality, cost savings, employment access, and other positive impacts). The transportation-related actions are clearly defined and categorized into themes, including shifting the surface transportation system toward fuel-efficient vehicles; reducing single-occupancy vehicle trips; synergizing land use and housing with transportation infrastructure; and ensuring that infrastructure is safe and reliable for all users. Accompanying each action are also equity considerations, such as the impact to certain vulnerable populations or neighborhoods. For example, increasing EV use and ownership would have to address the lack of access to new technologies among lower-income neighborhoods to prevent deeper inequalities. The climate action plan concludes with an implementation and monitoring plan that describes how to encourage buy-in from stakeholders and how the city will provide regular reports on the plan's implementation status.

#### *3.3.3.3. Houston Climate Action Plan*

Houston's *Climate Action Plan* also focuses on equitable and inclusive solutions to climate change impacts through mitigation and adaptation techniques (City of Houston, 2020). The climate action plan provides a brief overview of what the user should understand before reading this plan, including the purpose, intention, and organization of the plan. Like the other Texas city's climate action plans, Houston's plan includes a

climate change background, GHG baseline inventory, and reduction targets. The targets include a 40% GHG emission reduction by 2030; a 75% reduction by 2040; and a 100% reduction by 2050. Moreover, the emission reduction potential for implementing the climate action plan strategies is also included. The remainder of the plan is organized into four focus areas: transportation, energy transition, building optimization, and materials management. Each of these focus areas includes a range of goals. One of the goals within the energy transition focus area is to protect and enhance Houston's ability to capture carbon. Within the transportation focus area, the goals include shifting the regional fleet to electric and low-emission vehicles; reducing VMT per capita; and providing equitable and safe transportation options.

# 4. FRAMEWORK FOR DEVELOPMENT OF A CLIMATE ACTION PLAN IN TEXAS

The following section provides an overview of a broad framework that can be followed to develop the implementation component of a climate action plan. It should be noted that additional information should precede the implementation section of a climate action plan. This information may include a long-term vision statement, an overall GHG reduction goal and timeline, a brief background on climate change science, existing climate change reduction strategies, and the purpose and benefits of the plan should be incorporated into the introduction of a climate action plan.

## 4.1. Identify Lead Agency, Key Stakeholders, & Strategic Partnerships

Before significant advances in climate solutions can be made, solidifying partnerships with government organizations, the private sector, and community members is essential to the successful implementation of a statewide climate action plan. Collaboration among stakeholders is needed to provide continuous feedback regarding the expected results and feasibility of implementing various emission reduction strategies. Expertise from a wide range of individuals and organizations can accelerate progress towards achieving the climate action plan's GHG reduction goals, particularly in sectors where TxDOT may have limited control, such as in the private sector. Additionally, identifying a lead agency who will be responsible for implementing each strategy will be necessary to conserve resources and reduce duplication of efforts. Typically, larger agencies have more resources, including funding and staffing, to enforce more complex strategies. However, community members—particularly disadvantaged and/or marginalized communities—should remain at the center of collaboration efforts to ensure that strategies are equitably implemented across the population.

## 4.2. Conduct Emissions Inventory

Establishing a baseline to compare failure or success against is one of the most crucial components of a climate action plan. To that end, identifying the specific sectors that contribute GHG emissions within the State of Texas' and conducting an emissions inventory is among the most important elements of developing a climate action plan. The emissions inventory should include input from local and regional governments, environmental districts, and other relevant entities. Based on a previous report, it is often the state that is the responsible entity for developing GHG inventories (Kenney et

al., 2014). Retrieving data for GHG inventories can be done in either a "top-down" or "bottom-up" approach. The top-down approach utilizes aggregated data at an institutional level, while the bottom-up approach utilizes more detailed local and regional data.

EPA develops an annual inventory of GHG emissions that includes emissions for all human-made sources in the United States (EPA, 2022b). The inventory documents the emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. The annual report also accounts for the removal of carbon dioxide from the environment through "sinks", or reductions in atmospheric GHG emissions though the storage of carbon in other forms (e.g., forests and vegetation). In Texas, TCEQ keeps detailed inventories of both point-source (e.g., chemical plants and manufacturing facilities) and non-point source (e.g., on-road and non-road mobile) emissions that can be used to assist in identifying various emission points and developing a statewide GHG inventory (TCEQ, 2022a).

In addition, a climate action plan should include data specific to individual strategies and actions implemented. This may include specific emissions data associated with sector-specific strategies and actions, as well as financial data, such as a cost-benefit analysis and return on investment of each action, if applicable. This data should be publicly available to ensure transparency and strengthen public support for the plan's strategies and actions.

## 4.3. Develop Sector-specific Strategies and Actions

The development of evidence-based, sector-specific strategies and associated actions can be undertaken by reviewing climate action plans of other states, as well as calling upon stakeholders to identify and prioritize actions. Engaging with the community is essential to determine the most pressing climate-related issues and determine which strategies should be included in the climate action plan. Each strategy should then be evaluated in terms of feasibility and acceptability to determine which strategies should be prioritized in terms agency lead and financial support. For example, strategies that are expected to have greater positive impacts on the most people should be ranked above strategies that may have lower impact or less support among stakeholders.

## 4.4. Identify Mitigation and Adaptation Strategies

Sector-specific mitigation strategies should also be identified and prioritized. Mitigations strategies may include enacting climate-ready policies at the state and local levels and reducing sources of GHG in numerous sectors, including the transportation, land use, energy, RCI, agricultural, or water and waste management sectors. While mitigation strategies are included in many climate action plans, it has become increasingly commonplace for climate action plans to incorporate adaptation techniques that involve minimizing vulnerability to climate change effects. Some adaptation strategies include reducing flood risks to certain areas, building more resilient infrastructure, and properly managing natural resources. Vulnerability assessments can identify sectors or populations that are more at risk to negative impacts of climate change and can help prioritize actions. Including sector-specific mitigation and adaptation strategies are an effective approach to developing an effective climate action plan.

## 4.5. Develop Performance Measurement Plan

Specific KPIs should be developed for each strategy identified in the climate action plan. KPIs should be specific, measurable, achievable, relevant, and timed (SMART). In addition, there should be a tracking mechanism incorporated into the implementation plan to measure progress and overall performance. This can identify where modifications are needed to improve the effectiveness of climate strategies. Quantitative indicators—including percent GHG emission reductions or percent of the population served—as well as certain qualitative indicators can be beneficial when developing a performance measurement plan. Tracking these performance indicators is an ongoing effort that requires the cooperation of all stakeholders, so it is crucial to maintain continuous communication and transparency throughout this process.

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# APPENDIX A—Summary Table of Infrastructure Investment and Jobs Act: Components Related to Carbon Emissions

The document for Appendix A has been submitted as an accompanying Excel spreadsheet titled: Framework and Best Practices for Developing a Climate Action Plan Memorandum – Appendix A

# APPENDIX B—Summary Table Climate Action Plans

The document for Appendix A has been submitted as an accompanying Excel spreadsheet titled: Framework and Best Practices for Developing a Climate Action Plan Memorandum - Appendix B