


City of Bloomington  
**Climate Action Plan**

March 2021





# Table of Contents

	<b>Executive Summary</b>	Page ii
	<b>Section 01 Introduction</b>	Page 1
	<b>Section 02 Transportation and Land Use</b>	Page 17
	<b>Section 03 Energy and Built Environment</b>	Page 35
	<b>Section 04 Waste Management</b>	Page 53
	<b>Section 05 Water and Wastewater</b>	Page 67
	<b>Section 06 Local Food and Agriculture</b>	Page 77
	<b>Section 07 Health and Safety</b>	Page 87
	<b>Section 08 Greenspace and Ecosystem Health</b>	Page 99
	<b>Section 09 Climate Economy</b>	Page 111
	<b>Section 10 Climate Action Implementation</b>	Page 121
	<b>Acknowledgements</b>	Page 124
	<b>Appendix 1 GHG Forecast Assumptions</b>	
	<b>Appendix 2 Glossary of Terms</b>	
	<b>Appendix 3 Supporting Research</b>	
	Bloomington Climate Risk and Vulnerability Assessment	
	Bloomington Renewable Energy Potentials Study	
	<b>Appendix 4 Bloomington Climate Infographics</b>	
	<b>Appendix 5 Cumulative Potential Cost Savings Assumptions</b>	

## By the 2050s Bloomington Will Likely See an Increase in...

Average Annual Temperature:



Days Above 95°F:



Air Conditioning Demand:



Average Rainfall:



Heavy Precipitation Events:



Growing Season:



## Executive Summary

The City of Bloomington has a long-standing commitment to sustainability. City programs and community efforts focused on energy conservation, waste reduction, solar development, and the growth of the local food market have established Bloomington as a regional sustainability leader. Building on decades of environmental progress, the 2018 Sustainability Action Plan (SAP) represented the first formal sustainability planning effort for the City of Bloomington. The SAP serves as the City's strategic guide to preserve natural resources, maintain Bloomington's culture, build a diverse and thriving economy, and ensure a healthy and equitable standard of living for all residents.

Bloomington's Sustainability Action Plan established clear goals and priority actions to lower the environmental impact of City operations, reduce community greenhouse gas emissions, improve ecosystem health, support the local food economy, and reduce energy, water, and waste generation. The actions identified by the SAP are helping Bloomington mitigate emissions and prepare for the impacts of climate change, while enriching quality of life for residents. In recognition of the City's efforts to improve environmental performance in city operations, the Indiana Department Environmental Management awarded the Greening the Government Award to the City of Bloomington in 2019. For more on Sustainability Action Plan and to learn about implementation progress please visit: <https://bloomington.in.gov/sustainability>

One fundamental objective of the Sustainability Action Plan is to prepare Bloomington for the impacts of climate change and minimize greenhouse gas emissions. The City of Bloomington demonstrated its commitment to meeting greenhouse gas (GHG) reduction goals set by the 2015 Paris Climate Agreement as a signatory to both the Mayors National Climate Action Agenda and the "We Are Still In" letter. Building on the City's initial 2006 commitment to the U.S. Mayors Climate Protection Agreement, the City of Bloomington has continued to demonstrate its leadership on climate by joining the Global Covenant of Mayors in 2019.

To mobilize climate action, the City of Bloomington has also developed emissions profiles for the community and local government operations to help build a roadmap towards emissions reduction. This Climate Action Plan continues Bloomington's efforts towards climate action by establishing a detailed comprehensive plan of specific goals, strategies, and actions that will be necessary to reduce community greenhouse gas emissions and build climate resilience.

### Our Challenge

Combustion of fossil fuels is warming earth's atmosphere and changing our climate, disrupting the delicate balance of our ecosystems. Climate change is already affecting Bloomington by straining city infrastructure, adversely affecting human health, and causing disruptions to the local economy. It is important to address these climate impacts now, as climate change will become much more severe in the coming decades, contributing to additional strain on vulnerable populations, social systems, and overall community resilience.

### Our Opportunity

Local action by cities is key to addressing climate change because many emissions are produced and can be reducing at a community level with immediate positive impacts on community quality of life. Climate change represents an opportunity for Bloomington to take this action and lower its carbon footprint through more efficient infrastructure and sustainable development. Transformation of Indiana's energy infrastructure will be essential to meet climate goals due to the current utilization of carbon intensive fuel sources for electricity generation. This transition towards renewable and low carbon fuel sources represents a chance for Bloomington to reduce the community's carbon footprint. Directing the community's energy investments towards renewable sources will create a more diversified and resilient energy system, while also fostering local job creation. The promise of innovation, technological, and social change that climate action can bring represents the possibility of improved environmental, economic, and equity outcomes across the community.

### Our Climate Action Vision

Bloomington's vision is to be climate resilient, leading in the social and economic transitions necessary to reduce citywide greenhouse gas emissions in accordance with the Paris Climate Agreement, while protecting Bloomington's natural ecosystems, most vulnerable populations, and economic vitality against the increasing impacts of climate change.

# Executive Summary

## GHG Emission Reduction Goal in Global Context

To validate the appropriateness of the City’s Climate Action Plan emissions reduction goal, the recommendations of the International Panel on Climate Change (IPCC) were considered. The IPCC is the United Nation Environment Programme (UNEP) body that assesses the science related to climate change and provides support to countries globally in climate action policy making. The scientific consensus of the most recent IPCC recommendations is that it is necessary to reduce global GHG emissions at a pace that will limit global warming to 1.5°C. The Paris Agreement affirms this recommendation by aiming to limit global warming to 1.5°C to 2°C above pre-industrial levels, considered to be the threshold for dangerous climate impacts.

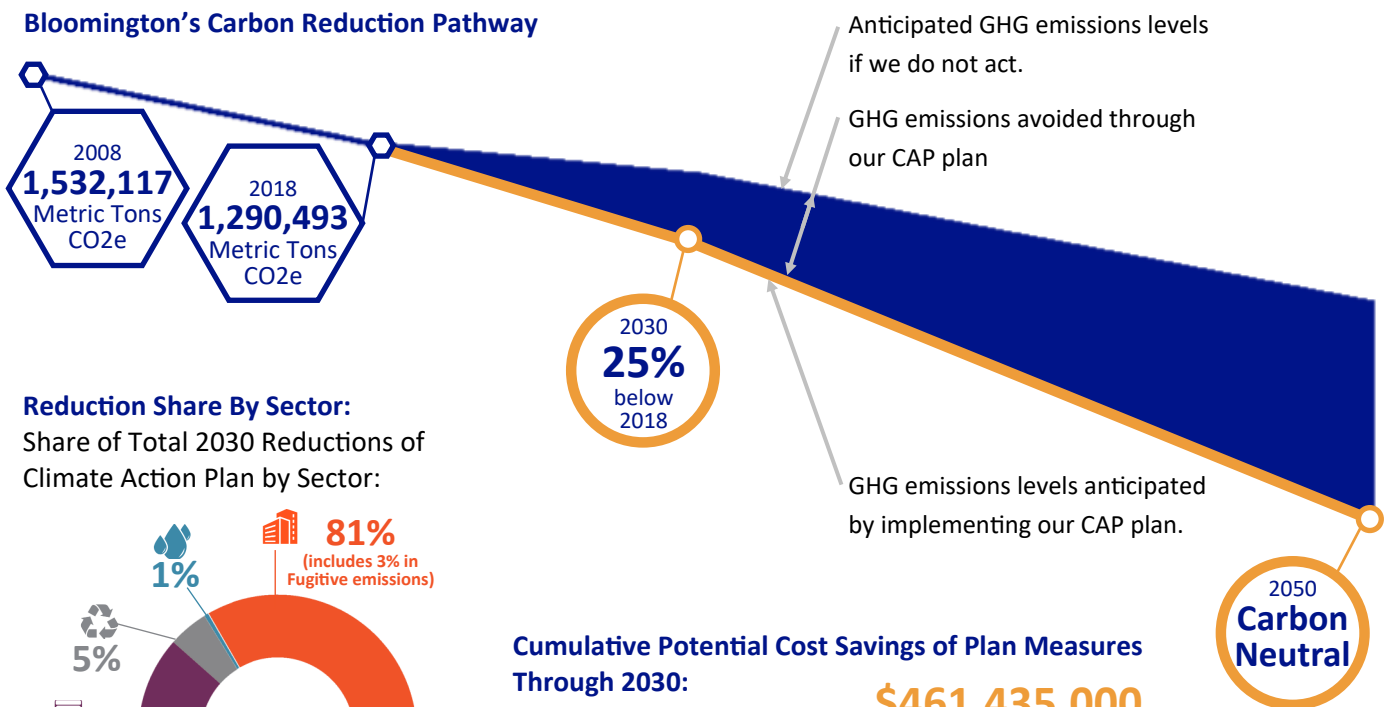
The UNEP Emissions Gap Report published in November 2019 asserts that by 2030, global emissions will need to be 25% lower than 2018 emissions levels to put the world on the least-cost pathway to limiting global warming to below 2°C, the level required to meet Paris Agreement goals. To limit global warming further to 1.5°C, the same report finds emissions would need to be 55% lower than 2018 emissions levels by 2030. By 2050, IPCC guidance indicates it will be necessary to achieve 80% to 100% emission reductions (carbon neutral) by 2050 to remain within the 1.5°C-2°C global warming range. These global recommendations were accounted for in the formulation of appropriate carbon reduction goals for Bloomington.

## Our Carbon Reduction Goal

The Bloomington Climate Action Plan (CAP) seeks to re-affirm the City of Bloomington’s commitment to meeting the goals of the Paris Climate Agreement. To accomplish this carbon reduction target, the CAP goal must align with the IPCC suggested carbon emission reduction goals of a 25%-55% reduction in emissions by 2030 and an 80% or greater reduction in emissions by 2050. To reduce community-wide GHG emissions in line with the Paris Climate Agreement with intermediate reduction goals based on the latest IPCC scientific recommendations as follows:

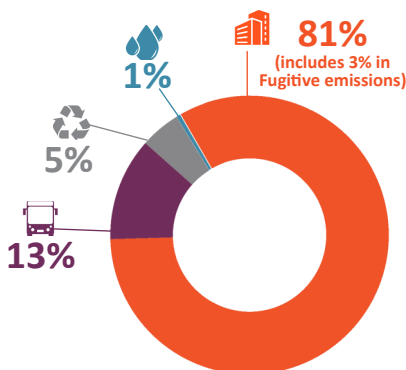
**To reduce Bloomington community greenhouse gas emissions 25% below 2018 emissions levels by 2030 and achieve carbon neutrality by 2050 .**

### Bloomington’s Carbon Reduction Pathway



### Reduction Share By Sector:

Share of Total 2030 Reductions of Climate Action Plan by Sector:



### Cumulative Potential Cost Savings of Plan Measures Through 2030:

**\$461,435,000**

Implementing many of the measures in this plan, such as reduction of energy consumption can save money for the community. (see Appendix for more)





# Executive Summary

## Climate Action Plan as Living Plan

The Bloomington Climate Action Plan is intended as a “living plan” rather than a static document. This means that the implementation phase of this plan should be characterized by intermittent measurement of progress and plan adjustments. Plan adjustments may include increasing implementation speed for scope areas which illustrate success, modifying goals for strategies which may fall short of desired outcomes, and identifying additional opportunities for action.

As a “living plan,” the 2030 emission reduction goal should be seen as a guiding constant to achieving emissions reductions. However, recognition should be given that the initial implementation actions may not yet fully achieve plan goals. Intermittent plan progress measurements and adjustments will be necessary to identify additional actions that may be necessary to reach the CAP goal, as well as any adjustments to implementation targets that may be needed to meet the greenhouse gas reduction goal by 2030.

## Our Climate Action Goals

### Section 02 Transportation and Land Use

**Goal TL 1** Decrease vehicle miles traveled (VMT) by 8% of 2018 values.

**Goal TL 2** Support and encourage electric vehicle adoption, achieve 30% of vehicles sold and 15% of VMT community-wide by 2030.

### Section 03 Energy And Built Environment

**Goal EB 1** Increase distributed renewable energy to 250,000 MWH of total generation annually by 2030.

**Goal EB 2** Increase energy efficiency citywide 16% for electricity and 12% for natural gas of 2018 values.

**Goal EB 3** Support decarbonization of the local electricity grid.

**Goal EB 4** Promote “fuel switching” to reduce on-site fossil fuel use in the building sector by 3% of 2018.

**Goal EB 5** Increase financing options for energy efficiency and renewable energy projects citywide.

### Section 04 Waste Management

**Goal WM 1** Increase landfill solid waste diversion by 30% of 2018 values (26,500 tons of waste reduction).

**Goal WM 2** Educate, motivate, and empower the public to achieve waste reduction and diversion.

### Section 05 Water and Wastewater

**Goal W 1** Decrease potable water consumption by 3% of 2018 values.

**Goal W 2** Maintain source and drinking water quality through climate related challenges.

**Goal W 3** Reduce energy use associated with treating and transporting water and wastewater by 10% of 2018 values.

**Goal W 4** Mitigate flood hazards and impacts.

### Section 06 Local Food and Agriculture

**Goal FA 1** Increase food and nutrition security citywide.

**Goal FA 2** Increase local agricultural resilience to climate shocks.

**Goal FA 3** Increase and stabilize local food market.

### Section 07 Health and Safety

**Goal HS 1** Educate, engage, and empower the public for climate health and safety.

**Goal HS 2** Prepare Bloomington for climate risks and impacts.

**Goal HS 3** Respond to climate risks and impacts.

### Section 08 Greenspace and Ecosystem

**Goal G 1** Increase quantity and quality of greenspace within the community.

**Goal G 2** Increase quantity and quality of climate adaptive native habitats.

**Goal G 3** Increase citywide tree canopy coverage by 3% of 2018 values.

**Goal G 4** Reduce stormwater and micro heat island impacts.

### Section 09 Climate Economy

**Goal CE 1** Build marketplace climate resilience.

**Goal CE 2** Attract, create, and support businesses that are committed to sustainability and climate goals.

**Goal CE 3** Develop new mechanisms for financing City climate action plan implementation.









# Section 01

## Introduction



[Click here to return to TOC](#)



## Introduction

The City of Bloomington addresses sustainability through careful attention to environmental, economic, and social equity issues. Sustainability and livability are guiding principles and are considered to be foundational to quality, long-lasting economic and community development.

In 2019, as part of Bloomington’s commitment to the Global Covenant of Mayors, the City of Bloomington began developing a Climate Risk and Vulnerability Assessment and Climate Action Plan. To assess local risks, hazards and vulnerabilities to climate change, the Climate Vulnerability Assessment evaluated Bloomington’s forecasted exposure, sensitivity, and adaptive capacity to changing climate conditions and serves as a crucial reference document to prioritize climate action and mitigation actions. The Climate Vulnerability Assessment was presented to the Bloomington City Council in 2020 to detail how climate change is affecting Bloomington now, identify current and future climate vulnerabilities, and forecast how climate vulnerabilities will change in coming decades. This Climate Action Plan has built on past emissions inventories, planning efforts, and climate assessments to develop science based targets to implement climate mitigation and adaptation commitments.

### Support of Bloomington Plans

This Climate Action Plan leverages, supports, and expands on the City’s other recent planning efforts. The strategies and actions included in this report relate closely to the foundational work already completed by the City, including the 2018 Sustainability Action Plan, as well as the 2018 Bloomington Comprehensive Plan.



### Climate Action as a Journey

The Climate Action Plan represents a robust vision of the future with a comprehensive scope of action befitting the magnitude of the collective climate challenge ahead. This Climate Action Plan establishes a long-term climate resilience vision and mitigation goal for the community through 2050. The plan itself, its strategies, and detailed actions, are intended as a 10 year plan. It is anticipated that this plan would be updated by 2030 to outline the next phase of action towards achieving the long-term community-wide goals.

The Bloomington Climate Action Plan should be seen as a living document. Action progress and effectiveness should be reviewed at regular intervals through the plan’s implementation and adjustments should be made to expand or modify the scope of individual actions and to augment the plan with new actions as appropriate to respond to ever-changing market and community conditions.





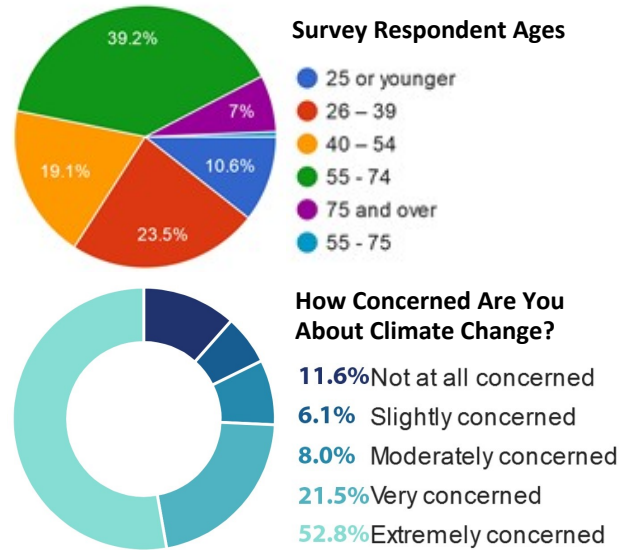
## Introduction

### The process

The Climate Action Plan was developed in consultation with a 27 person planning team of community members, economic development representatives, Monroe County and City of Bloomington staff. The planning team was organized into sub-teams aligned with each of the sectors included in this plan (see Plan Framework). The plan's strategic framework, goals, strategies, and actions were developed and refined through a number of planning workshops held between June and October 2020.

### Community Survey

The City of Bloomington issued a community survey about climate change to collect input from members of the community. The online survey was an important early step in climate action planning process in identifying issues of concern to the community, as well as areas of support for climate action. The survey was instrumental in identifying initial sustainability and climate adaptation needs, opportunities, priorities, and issues for the City of Bloomington at the start of the planning process. The community responses collected by survey informed the development of the strategies and detailed actions included in this plan. The community climate survey was designed as an online questionnaire survey with self-selected engagement. The survey was made available online on a dedicated webpage and was available from March 2020 through June 2020 and was completed by 472 community members representing a broad demographic of the community .



### Community Engagement

At the beginning of 2020, the City of Bloomington began the climate action planning process. To engage community members, an engagement plan was developed with consultant assistance to ensure that the recommendations of the plan had received feedback from a range of constituents and community members.

Initially, the engagement plan included community gatherings to discuss the development of the Climate Action Plan. Due to emergent realities of COVID-19 and community stay-at-home orders, the engagement was conducted entirely through virtual sessions. These virtual sessions were hosted by community groups and leaders who were interested in providing their perspective on Bloomington's climate goals. The co-hosts of these virtual sessions included staff and constituents of the Banneker Community Center, Bloomington Housing Authority, Bloomington Community and Family Resource Department, and Indiana University students.

Three virtual sessions were held in June-August 2020 to inform the development of the climate planning strategies. The feedback provided was utilized to develop of the draft Climate Action Plan. After the draft was released for public feedback, three more listening sessions were held from October 2020- January 2021, in addition to presentations to the Bloomington Commission on Sustainability, the Bloomington Environmental Commission, the Bloomington City Council Climate Action Committee, and written comments received by City of Bloomington staff, planning team members, and the public. Input received from public engagement has been considered and integrated into the final Climate Action Plan .

## Introduction

### Why Create a Climate Action Plan

The creation and dedicated implementation of a Climate Action Plan (CAP) is an organized way for a city to contribute to solving the global climate crisis while helping its resident and business communities create improved resilience to the current and future impacts and risks of climate change. Climate action can also create investment in innovation, jobs and actions that save households and businesses money.

### What is a Climate Action Plan (CAP)

The development and dedicated implementation of a Climate Action Plan (CAP) provides a dedicated roadmap for a city to reduce greenhouse gas emissions and build resilience to climate impacts. Implementation of CAP strategies helps contribute to solving the global climate crisis and improves resilience to climate change risks and impacts. By taking specific steps to reduce emissions and build resilience, climate action can also foster investments in innovation and job growth, while saving households and businesses money.

### What is Climate Change Mitigation?

Climate change mitigation addresses the root causes of climate change by taking action to reduce or prevent greenhouse gas (GHG) emission generation. Mitigation can include utilizing new technologies such as renewable energy, improving the energy efficiency of existing technologies, or changing management practices or consumer behavior.

### What is Climate Change Adaptation?

Some climate change impacts are now inevitable due to the current atmospheric concentrations of greenhouse gases. Adaptation actions seek to lower the risks posed by these impacts by anticipating and responding effectively to the threats that climate change poses. Both mitigation and adaptation actions are necessary to perform, because even if global emissions are dramatically decreased, society will need to adapt to the climate impacts already set in motion.

### The Role of Cities in Climate Action

Cities play an important role in addressing climate change because urban areas representing the majority of the population generate the majority of the emissions accelerating climate change. Even though each individual city's impact on global greenhouse emissions is relatively small, the role of leadership to motivate change in each community can be extremely significant. According to a survey by the US Conference of Mayors, more than half of member cities (53%) had committed to reducing greenhouse gas emissions, a necessary first step to addressing climate change.





# Introduction

## Using This Plan

This Climate Action Plan includes an implementation framework designed to achieve community-wide goals for greenhouse gas reduction and climate adaptation and resilience. The plan is structured around the eight community-wide sectors that are central to achieving greenhouse gas reduction and climate resilience.

Each of these sectors has a dedicated chapter that includes background information on that sector, as well as the current status of Bloomington’s efforts. In the beginning of each chapter, equity considerations are identified that should be addressed during implementation.

Every sector has over-arching strategies that were identified as necessary to accomplish 2030 climate goals, as well as detailed actions for implementation. Actions in each sector are focused on climate mitigation, climate adaptation, or both mitigation and adaptation (see Climate Action Plan Framework).

**Strategies:** specific statements of intent that expand on the sustainability vision and GHG reduction goals to guide decisions about future public policy, community investment, and actions.

**Actions:** detailed activities that should be completed to carry out the vision and strategies identified in the plan.

## Co-Benefits

Climate action strategies may offer additional benefits to Bloomington residents and businesses beyond emissions reduction. These co-benefits are highlighted by icons in each section. Each icon is labelled with the respective co-benefit type.

### Co-Benefits

Reduced Costs



Improved Air Quality



Improved Energy Resilience



Reduced Pollution



Improved Public Health



Jobs / Economic Development



Enhanced Transit System



Reduced Traffic Congestion



Safer Streets



Improved Community Resilience



Protected / Enhanced Ecosystems



Improved Social Connectivity



Improved Mobility



Improved Quality of Life



Improved Building Quality and Comfort



Reduced GHG Emissions



Improved Community Equity



# Introduction

## Climate Action Plan Framework

Each of the sectors of this CAP have strategic focus on Climate Mitigation, Climate Adaptation, or both:

**Climate Mitigation:** addresses the root causes of climate change through the reduction or prevention of greenhouse gas (GHG) emissions. Sectors with this as a significant focus are shown to the right with this symbol:



**Climate Adaptation:** seeks to lower the risks posed by the impacts of climate change which are now inevitable or likely. Sectors with this as a significant focus are shown to the right with this symbol:



**Transportation and Land Use**

Emissions from on-road vehicle traffic occurring in the community. Strategies in this sector area include reductions in vehicle miles traveled as well as shifts to public transit and alternative modes of transportation like biking and walking.



**Energy and Built Environment**

Emissions associated with all electricity and natural gas consumption within the city. Strategies in this sector area include improved energy efficiency and resilience.



**Health and Safety**

Community health impacts and resilience in the face of current climate impacts and projected risks. Strategies in this sector focus on community resilience to extreme heat and weather, vector-borne and water-borne disease, and air quality impacts of climate change.



**Climate Economy**

Economic development, jobs, and business creation potential represented by the actions and goals of all sectors in this Climate Action Plan. Strategies in this sector include workforce development, economic development and new business financing, and resilience of businesses in the community.





## Introduction



All solid waste generated by residents and businesses within the community and their associated emissions. Strategies in this sector focus on diversion of food, consumer, and construction waste, as well as reduction of landfill gas generation and beneficial use of unavoidable landfill gas emissions.



All potable water distributed to Bloomington residents and businesses, wastewater collection and treatment, stormwater collection, flood mitigation, and surface water health. Strategies in this sector focus on water conservation, wastewater reduction and beneficial use of wastewater emissions, flood mitigation, and stormwater infiltration.



Commercial and non-commercial food cultivation and distribution, food and nutrition insecurity, and food waste. Strategies in this sector area include reduction of food waste, food system and distribution resilience, strengthening of local food production capacity, and equitable access to healthy food.



Environmental, climate resilience and benefits of urban tree canopy, ground cover, community greenspace and parks, and ecosystems that rely on these natural elements. Strategies in this sector include resilience/expansion of urban tree canopy coverage, improvement of beneficial use of lawn areas, and mitigation of



### Climate Action Benefits

-  Job creation and economic development
-  Improved air quality and public health
-  Cost savings for residents and businesses
-  Improved energy resilience
-  Improved water quality and ecosystems
-  Improved community resilience

## Introduction

### Bloomington's Vulnerability to Climate Risks:

Climate change is a global phenomenon that creates local impacts. It presents one of the most profound challenges of our time. A broad international consensus exists among atmospheric scientists that the Earth's climate system is being destabilized due to elevated levels of greenhouse gas emissions in the atmosphere.

Two changes to Indiana's climate are occurring already: shorter winters with fewer cold extremes, and more heavy and extreme precipitation events. Increases in the global surface temperature and changes in precipitation levels and patterns are expected to continue and intensify for decades. In turn, these changes in climate have subsequent impacts on the economy and health of local communities.

The following highlights the vulnerabilities to climate risks facing Bloomington, excerpted from the 2020 Bloomington Climate Vulnerability Assessment:

#### Heat Stress (High)



Warmer temperatures and more extreme heat may lead to higher risk of heat-related illness.

#### Air Quality (High)



Increased heat may result in more days of poor air quality and exposure to allergens, impacting respiratory illnesses.

#### Vector-Borne Disease (Medium)



Longer growing seasons and higher temperatures may increase vector-borne diseases like West Nile Virus and Lyme disease.

#### Mental Health (Medium)



Exposure to increased climate impacts and disasters may lead to increased anxiety and other mental health ramifications.

#### Housing (High)



Warmer temperatures will increase demand for air conditioning and weatherization needs. Energy costs may be difficult for vulnerable populations to meet. Heavier rains coupled with higher risk of surface drought conditions may cause more local flooding, particularly "flash flooding" which could cause damage to housing and reduce mobility for portions of the community.

#### Stormwater Management (High)



Heavier rains coupled with higher risk of surface drought conditions may significantly increase demand on stormwater management. The city's stormwater infrastructure may not be capable of handling the amount of runoff during more frequent heavy down pours, requiring resources to make needed upgrades.

#### Trees, Greenspace, and Agriculture (High)



Increased temperatures and changes to precipitation will stress trees, greenspace, and agriculture. Conditions may be more favorable for disease, pests, and invasive species. Trees and crop species which formerly thrived in the area's climate may be less suited for future climate conditions.

#### Surface Water Quality (Low)



Increases to heavy rain events and flooding/flash flooding risk may negatively impact water quality in the city's lakes, streams, and rivers. Increased pollutants and contamination potential, combined with increased annual water temperatures could increase risk to algal and bacterial growth, harming habitats and limiting recreation.





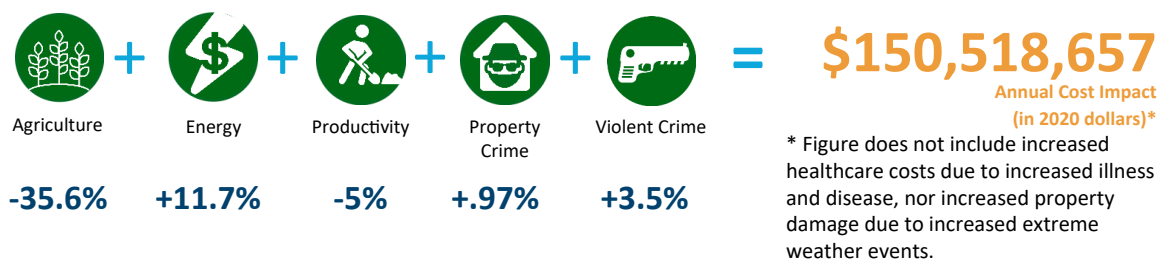
## Introduction

### Estimated Economic Risk of Climate Change to Bloomington by 2100

Incidents of severe weather in the United States, such as significant flooding in the Midwest, are tangible examples of the types of projected climate trends that will have significant economic impacts. Future economic and social impacts of climate change include impacts to agriculture, energy costs, labor impacts, death rates, and crime impacts among others. “Estimating Economic Damage from Climate Change in the United States,” a study from the University of California Berkeley, was a comprehensive effort at quantifying the economic impacts for every county within the United States.

The study collected national data documenting the responses in six economic sectors to short-term weather fluctuations. These data sets were integrated with probabilistic distributions from a set of global climate models and used to estimate future costs during the remainder of this century across a range of scenarios. In terms of overall effects on gross domestic product, the authors predicted negative impacts in the southern United States and positive impacts in some parts of the Pacific Northwest and New England.

The sectors assessed, and the findings for annual economic impact as a percentage of GDP for Monroe County and the City of Bloomington are:



### Estimated Social Cost of Carbon

“Social Cost of Carbon” is an effort to properly account for the damages caused by greenhouse gas emissions and the resulting climate change impacts. By including the social cost of carbon in planning efforts, agencies and business can properly evaluate policies and decisions that affect greenhouse gas emissions. The “Social Cost of Carbon” is measure of the share of climate change economic harm and impacts from emitting one ton of carbon dioxide into the atmosphere. For Bloomington it can be calculated as follows:



### Cumulative Economic Savings Potential of Implementing the Climate Action Plan Through 2030



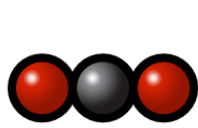
\* Value does not include economic potential of job creation and new business potential represented in the Climate Action Plan actions. (see Appendix for more)

## Introduction

### What Are GHG's?

Greenhouse gases (GHG) absorb radiation and trap heat in the Earth's atmosphere. These gases are the basis of the greenhouse effect, a process that warms the Earth's surface. The more GHGs there are, the more heat that is trapped in our atmosphere and the more climate change accelerates. The most common greenhouse gases include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O).

GHG emissions reduction pathways are different high impact ways to approach driving down emissions. The pathways towards high impact GHG emissions reduction include:



Carbon dioxide CO<sub>2</sub>



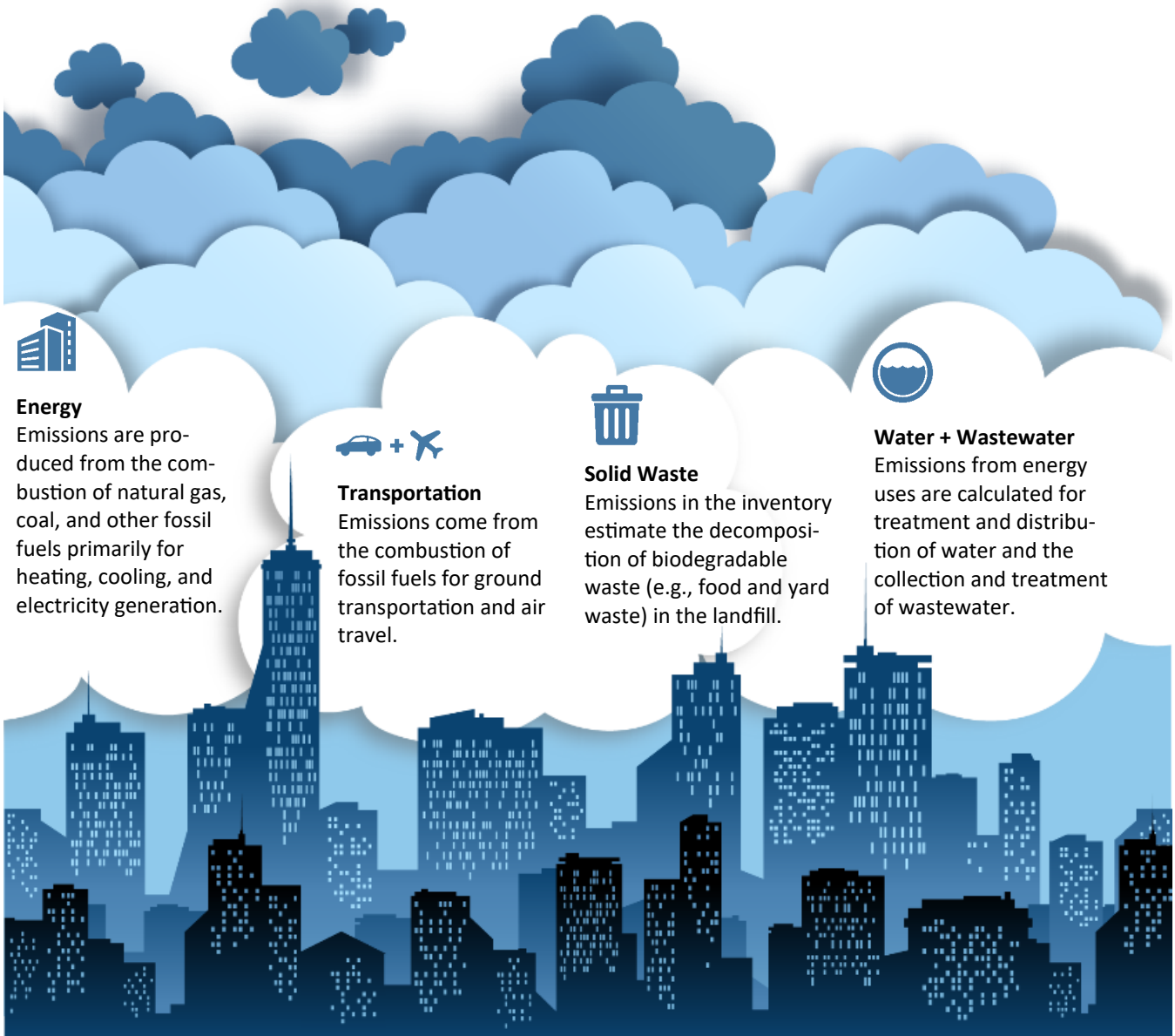
Methane CH<sub>4</sub>



Nitrous oxide N<sub>2</sub>O

### Greenhouse Gas Sectors

Where do citywide GHGs come from?



#### Energy

Emissions are produced from the combustion of natural gas, coal, and other fossil fuels primarily for heating, cooling, and electricity generation.



#### Transportation

Emissions come from the combustion of fossil fuels for ground transportation and air travel.



#### Solid Waste

Emissions in the inventory estimate the decomposition of biodegradable waste (e.g., food and yard waste) in the landfill.



#### Water + Wastewater

Emissions from energy uses are calculated for treatment and distribution of water and the collection and treatment of wastewater.





## Introduction

### Higher Impact GHG Emissions Reduction Pathways

GHG emissions reduction pathways are themes which represent higher impact greenhouse gas reduction potentials. The pathways towards high impact GHG emissions reduction include:



#### Reduction

A focus on reducing consumption of fossil fuels is an important strategy across all sectors. This includes reducing the direct combustion of fossil fuels, as well as reducing of the consumption of services, products, and materials that require fossil fuel energy in their creation, use, or disposal.



#### Fuel Switching

Converting energy sources from fossil fuel based to low and no-carbon renewable energy sources is paramount to the reduction of our greenhouse gas emissions. A major focus in this pathway is the decarbonization of the electric grid by generating electricity from renewable energy sources rather than fossil fuel sources. This pathway also includes the creation of on-site renewable energy sources and equipment conversion from fossil fuel combustion based to renewable fuel and electricity based power .

These pathways weave across citywide GHG emissions sectors and can be found throughout this Climate Action Plan. Below are how these pathways are applied in the major GHG emissions sectors in Bloomington:



#### Transportation and Land Use

- **Reduction:** Reductions in this sector focus on decreasing vehicle use to reduce the total amount of transportation related fuel use. Actions to achieve vehicle fuel use reduction include the use of more fuel efficient vehicles, increasing shared and public transit options and use, increasing walking/biking mobility, and decreasing demand for transportation through increased land use density and approaches like increased work-from-home employment options.
- **Fuel Switching:** In this sector, fuel switching includes a focus on converting vehicle stock from traditional internal combustion engines to electric vehicles, plug-in hybrid vehicles, or vehicles using low-carbon renewable fuels such as hydrogen or biodiesel derived from non-fossil fuel sources.



#### Energy and Built Environment

- **Reduction:** Reductions in this sector focus on decreasing electricity, natural gas, and heating fuel consumption by improving energy efficiency. Actions to improve energy efficiency include conducting energy audits and upgrades for homes and businesses, establishing energy benchmarking programs to help owners and renters better understand potential energy efficiency improvements, and promoting high performance building construction design and technology.
- **Fuel Switching:** In this sector, fuel switching focuses on increasing on-site renewable energy installations, supporting actions by electric utilities to procure electricity from renewable energy sources, electrifying heating and cooking systems, and switching natural gas consumption to renewable natural gas.

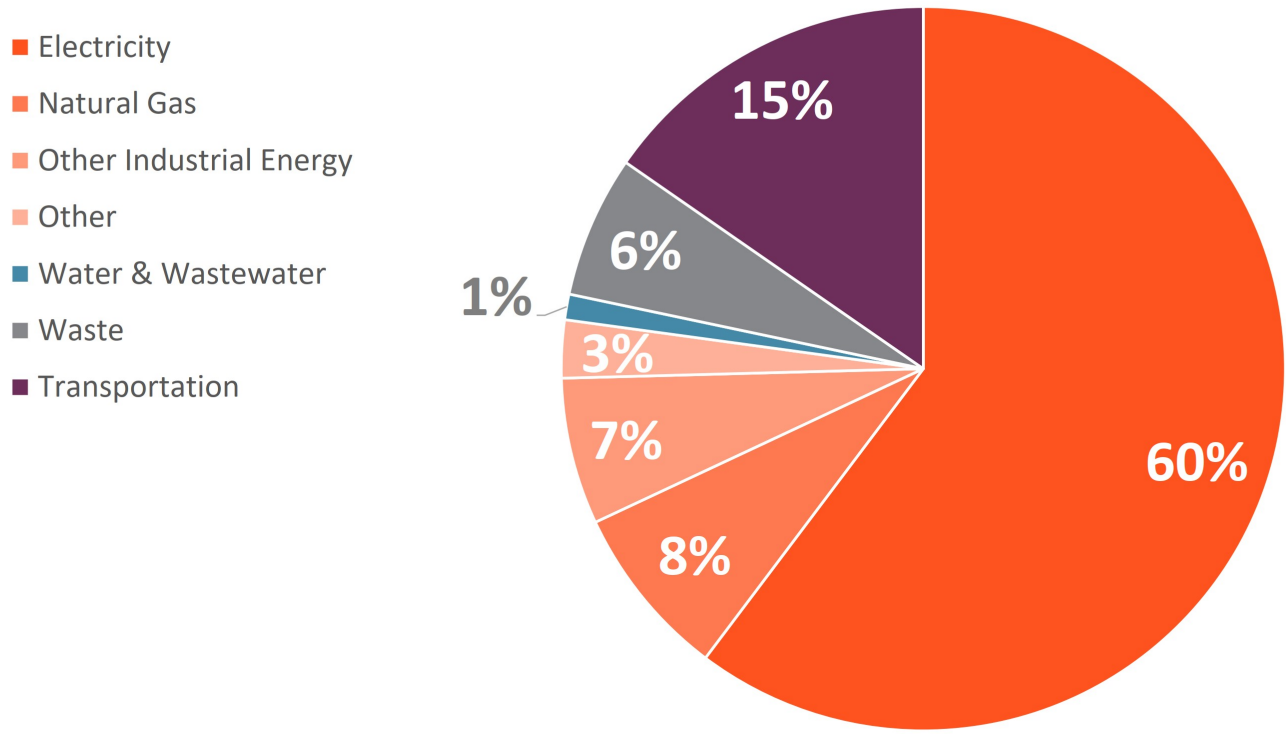
## Introduction

### Citywide GHG Emission History 2008-2018

Bloomington emitted nearly 1.3 million metric tons of carbon dioxide equivalent (MT CO<sub>2</sub>e) in 2018. Energy use in residential, commercial, and industrial buildings was the largest source of greenhouse gas (GHG) emissions in Bloomington in 2018, accounting for 68% of emissions. The majority of Bloomington’s 2018 GHG emissions are associated with electricity use—a value that has fallen in recent years as the electricity supply has decarbonized and efficiency has improved. Natural gas is the other source of significant energy use in buildings. The next largest source of 2018 GHG emissions was transportation at 15% of the total, which is primarily from the fuel use of personal and commercial vehicles. Indiana University’s combined heat and power (CHP) plant also emitted 7% of GHG emissions in 2018, while Solid waste accounted for 6% of GHG emissions. The electricity use to supply and treat water, along with the nitrous oxide production associated with wastewater treatment resulted in 1% of emissions. Electricity lost as it is transmitted and distributed from power plants to end use accounted for 2% of 2018 emissions and methane fugitive emissions associated with natural gas consumption accounted for 0.3% of emissions.

In 2020, the City of Bloomington standardized reporting of Bloomington’s historical emissions to utilize current emissions reporting protocols. More up to date data was integrated, resulting in minor adjustments to 2018 emissions values. For more information about Bloomington emissions values- see 2018 GHG Inventory.

### Citywide GHG Emission 2018



(Source: City of Bloomington 2018 GHG Inventory as Updated in 2020 )





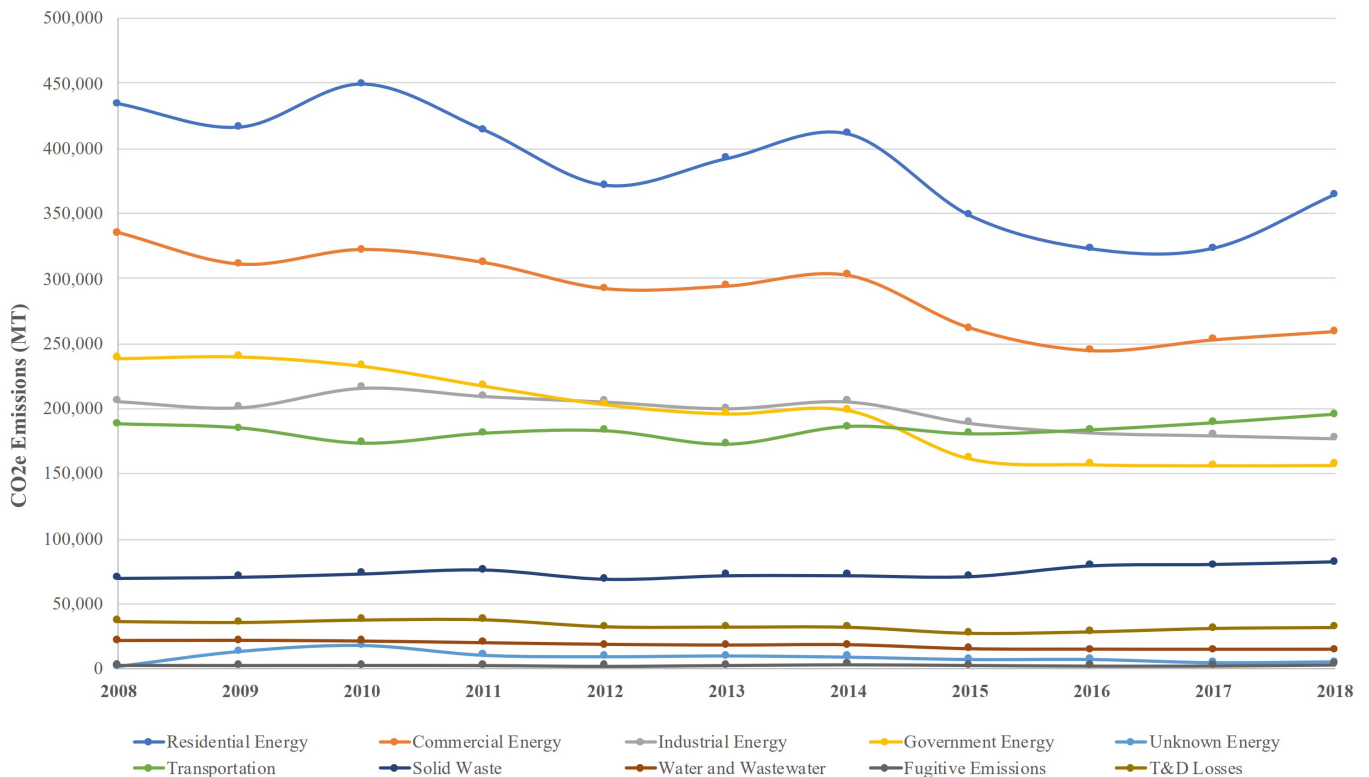
## Introduction

This historical look at Bloomington’s GHG emissions from 2008-2018 shows that emissions associated with energy use can vary from year-to-year, often due to weather variability, but overall energy emissions declined over that decade. Electricity use fell a modest 2% across all sectors, but the sources of electricity became 24% less carbon intensive over that period. Natural gas use grew 8%, however, partially offsetting building emissions savings. This chart shows the general trends behind the Residential, Commercial, Industrial, Government, Unknown, Fugitive, and T&D Losses. Bloomington’s transportation emissions grew from 2008-2018 as vehicle miles traveled grew 8% over that decade. Vehicle fuel economy in the U.S. improved slightly over that period, but not enough to offset the increased travel in Bloomington, so transportation emissions grew 4%. However, considering population growth, transportation emissions fell 7% per capita.

The emissions associated with solid waste treatment grew 17%-- an equivalent to a 5% increase per capita when accounting for population growth. The emissions from water and wastewater fell 31% as those systems used less electricity and the electricity utilized became less carbon intensive. In total, Bloomington’s GHG emissions fell 16% from 2008 to 2018 a change overwhelmingly driven by the reduced carbon intensity of Bloomington’s electricity sources.

In total, Bloomington’s GHG emissions fell 16% from 2008 to 2018 a change overwhelmingly driven by the reduced emissions of Bloomington’s electricity sources.

### Citywide GHG Emissions History 2008-2018 by Sector



(Graphic source: City of Bloomington 2008-2018 GHG Backcast)

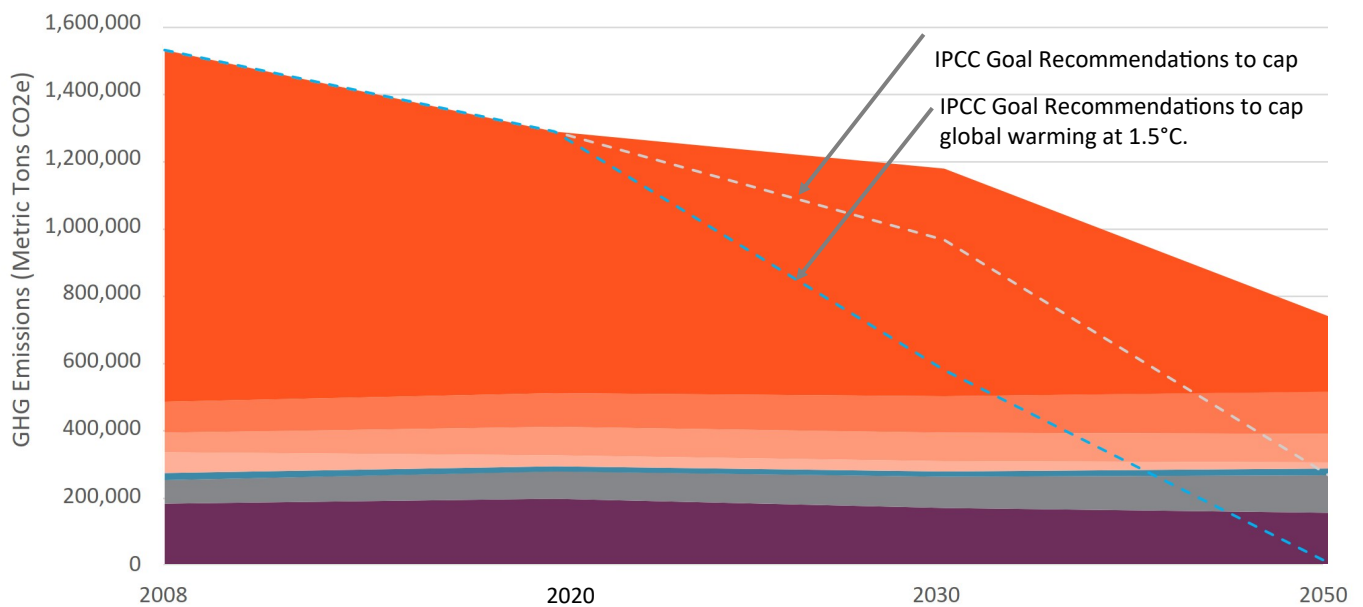
# Introduction

## Citywide GHG Emissions Forecast

A GHG emissions forecast supports GHG reduction planning efforts by anticipating what emissions may be like if action is not taken. Emissions are typically forecasted under a business-as-usual (BAU) scenario. The Intergovernmental Panel on Climate Change (IPCC) defines a “business-as-usual” baseline case as the level of emissions that would result if future development trends follow those of the past and no changes in policies take place. The City of Bloomington GHG forecasts included here were based on population and employment growth estimates determined by 10 and 20 year historic growth rates. In addition to these data, the BAU draws from information from the US Environmental Protection Agency, US Department of Transportation, and US Energy Information Agency. The full assumptions used for the Business-as-Usual GHG Emissions Forecast model are outlined in detail in the appendix of this plan.

The BAU projections illustrate a reduction of 9% in city-wide emissions from 2018 levels by 2030 and a 43% reduction by 2050. These reductions are a result of a number of factors (please see appendix). The largest projected change in Bloomington's future emissions is the decarbonization of the electricity grid; Duke Energy has pledged net zero emissions by 2050. The forecast also accounts for hotter summers and warmer winters in Bloomington that will change energy demand and transportation trends of vehicle efficiency and electrification. Consequently, the total electricity consumption is projected to increase through 2030 and beyond even while overall electrical emissions decrease.

## Citywide GHG Emissions Forecast



### BAU Legend

- Transportation
- Waste
- Water & Wastewater
- Other
- Other Industrial Energy
- Natural Gas
- Electricity

- - - IPCC Goal Recommendations 2.0°C
- - - IPCC Goal Recommendations 1.5°C

### GHG Emissions Reducing, But Not Enough

As illustrated above, greenhouse gas emissions in the City of Bloomington are projected to decrease in the coming decades. This reduction, however, is not enough to meet the scientific consensus of what is needed in order to cap global warming to 1.5°C to 2°C above pre-industrial levels as established by the Paris Agreement. The light gray dashed line in the chart above indicates the IPCC recommended maximum GHG emissions in order to limit global warming to 2°C while the blue dashed line indicates the maximum emissions needed to limit global warming to 1.5°C. See the next section for additional information on IPCC recommendations.





## Introduction

### Our Carbon Reduction Goal

This plan has established GHG emissions reductions goals which re-affirm the City's commitment to the Paris Climate Agreement. To do so, the plan must align itself within the IPCC suggested carbon emission reduction goals of 25% to 55% reduction by 2030 and 80% or greater reductions by 2050. The plan's city-wide emission reduction goals based on this latest IPCC scientific recommendations is as follows:

**To reduce Bloomington community greenhouse gas emissions 25% below 2018 emissions levels by 2030 and achieve carbon neutrality by 2050 .**

This community-wide goal is reflected in goals established for individual sectors which seek to both support the City's Climate Action Plan in creating a climate resilient community and to reduce city-wide GHG emissions in line with the above goal. Sector goals related to GHG emissions reductions are designed to balance reduction across all sectors and achieve the overall emissions goals set forth for the community. The goals seek to strike a balance between achievability while also reaching for improvement beyond business-as-usual.

### Estimated Citywide GHG Reductions Included in This Plan

Through successful implementation of this climate action plan, annual GHG emissions are projected to be 321,856 metric tons below 2018 citywide levels. The potential cumulative GHG emissions reductions over the 10 year implementation period are estimated at over 1,162,719 metric tons - an elimination of over 22.8 billion cubic feet of manmade greenhouse gas atmosphere resulting from this climate action plan.

The total projected GHG emissions reductions estimated for the initial implementation actions of this plan are projected to be sufficient to achieve a total reduction in annual emissions of 25% below 2018 baseline emissions by 2030. As outlined on the previous page, the implementation phase of the plan should be characterized by intermittent measurement of progress and plan adjustments based on results in order to achieve the ultimate 2030 reduction goals.

### Citywide GHG Emission Reductions Wedge Diagram

The diagram below shows the estimated emission reductions from the Business-as-Usual projections, by emission sector, of the Climate Action Plan actions and targets.

