City of Bloomington

Climate Action Plan

CITY OF BLOOMINGTON

October 2020

Prepared by:

making change personal

paleBLUEdot LLC

Table of Contents

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Executive Summary

The City of Bloomington has a long-standing commitment to environmental sustainability. Programs related to energy conservation, renewable energy, waste reduction, and the local food economy and local volunteer efforts have helped establish Bloomington as a regional sustainability leader. The passage of the 2018 Sustainability Action Plan represented the first formal sustainability planning effort for the City of Bloomington.

Bloomington has a vision to minimize the generation of GHG emissions from all sources, toward an end goal of carbon neutrality, and prepare for climate change. As a member of the Global Covenant of Mayors, a signatory to the We Are Still In Letter, Mayors National Climate Action Agenda since 2017, and the U.S. Mayors Climate Protection Agreement since 2006, the City has expressed its commitment to meeting greenhouse gas (GHG) reduction goals set by the 2015 Paris Climate Agreement.

Our Challenge

The complex systems that make up modern civilization result in stressors on the delicate balance of our ecosystems. The combustion of fossil fuels is warming earth's atmosphere and changing our climate. Climate change is already affecting Bloomington and its impacts are projected to become much more severe in the coming decades. These impacts also contribute to additional strain on vulnerable populations, social systems, and overall community resilience.

Our Opportunity

The impacts of cities represent a major sustainable development opportunity. Transformation of our energy system is essential in order to stop burning fossil fuels. This transition presents an opportunity for Bloomington. Directing our energy investments into renewable sources will make them more decentralized and resilient and provide for local job creation. Innovation, technology, and collective social change inherent in sustainability action can also support greater community abundance and shared equity.

Our Climate Action Vision

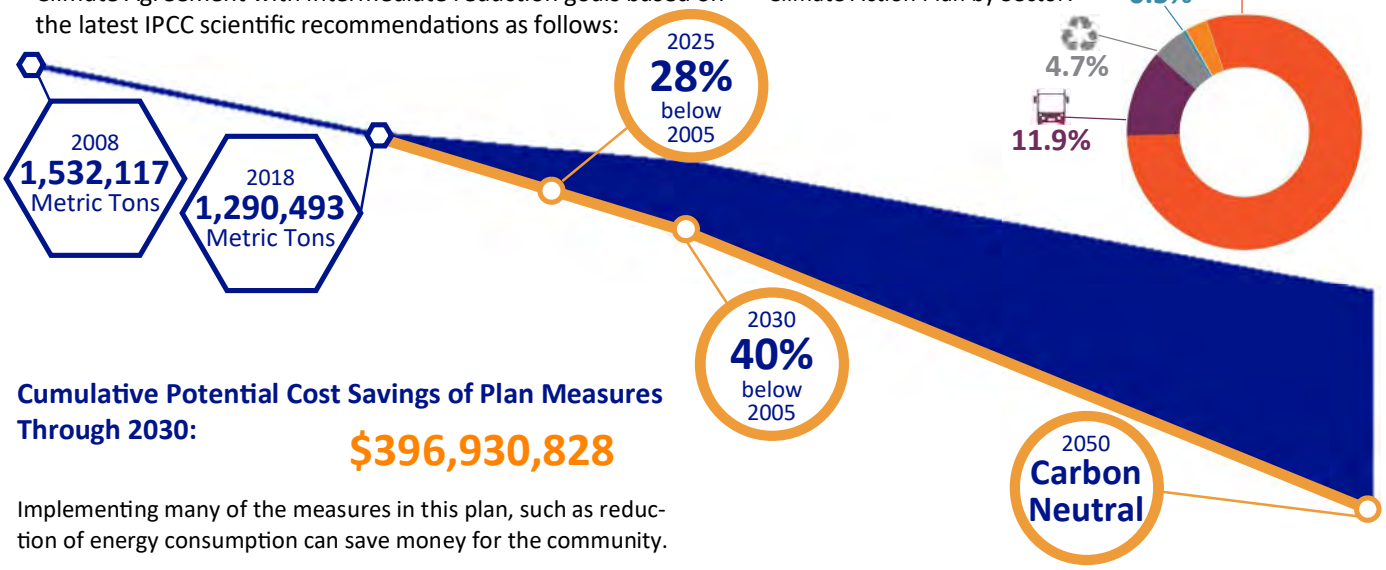
To be the first Climate Resilient community in Indiana, leading in the social and economic transitions necessary to reduce citywide greenhouse gas emissions in-line with the Paris Climate Agreement while protecting Bloomington's natural ecosystems, most vulnerable populations, and economic vitality against the increasing impacts of climate change.

By the 2050's Bloomington Will Likely See…

Increase in Average Annual Temperature:	Days Above 95°F:	Air Conditioning Demand:	Average Rainfall:	Heavy Precipitation Events:	Growing Season:
+5°F	+49 days	+28%	+8%	+15%	+26 days (Time for 4 more generations of mosquitoes)

Our Carbon Reduction Goal

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:



Reduction Share By Sector:

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

Cumulative Potential Cost Savings of Plan Measures Through 2030:

$396,930,828

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

Executive Summary

Our Climate Action Goals:

Transportation and Land Use

Goal T1 - Decrease vehicle miles traveled (VMT) by 8% by 2030.

Goal TL2 - Support and encourage electric vehicle adoption, achieve 30% of vehicles sold and 15% of VMT community-wide by 2030.

Energy And Built Environment

Goal EB 1 - Increase distributed renewable energy to 18% of citywide consumption by 2030.

Goal EB 2 - Increase energy efficiency citywide 16% for electricity and 2% for natural gas by 2030.

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

Waste Management

Goal WM 1 - Increase landfill solid waste diversion by 30% by 2030 (26,500 ton reduction).

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

Water and Wastewater

Goal W1 - Promote increased water conservation citywide.

Goal W2- Maintain source and drinking water quality through climate related challenges.

Goal W3 - Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030.

Goal W4 - Mitigate flood hazards and impacts.

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.

Health and Safety

Goal HS1 - Educate, engage, and empower the public for climate health and safety.

Goal HS2 - Respond to climate risks and impacts.

Goal HS3 - Prepare Bloomington for climate risks and impacts.

Greenspace and Ecosystem Health

Goal G1 - Increase quantity and quality of greenspace within the community.

Goal G2 - Increase quantity and quality of climate adaptive native habitats.

Goal G3 - Increase citywide tree canopy coverage by 3% by 2030.

Goal G4 - Reduce stormwater and micro heat island impacts.

Climate Economy

Goal CE1 - Build marketplace climate resilience.

Goal CE2 - Attract, create, and support businesses that are committed to sustainability and climate goal.

Goal CE3 - Develop new mechanisms for financing City climate action plan implementation.

Section 01 Introduction

Click here to return to TOC

Introduction

The City addresses sustainability through careful attention to environmental, economic, and social equity issues, and looks for linkages among those issues. Sustainability and livability are our guiding principles and are the foundations of quality, long-lasting economic and community development.

In October 2019, the City of Bloomington issued a request for proposals for the development a Climate Risk and Vulnerability Assessment and Climate Action Plan. The goal of project was to serve as an assessment of Bloomington's forecasted exposure, sensitivity, and adaptive capacity to changing climate conditions and serve as a foundation for prioritizing climate action and mitigation actions. The assessment was to detail how climate change is affecting Bloomington now, identify current and future climate vulnerabilities, and how those vulnerabilities will change in coming decades. The Climate Action Plan was to recommend strategies for the City and community to prepare for and adapt to local climate change effects and reduce carbon emissions.

In December 2019 the City hired paleBLUEdot to develop the Climate Risk and Vulnerability Assessment as well as this Climate Action Plan. In support of establishing the renewable energy goals included in this plan, paleBLUEdot also produced a citywide Renewable Energy Potentials Study.

> You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make.
>
> Jane Goodall,
> Anthropologist

The process

The plan was developed in collaboration with a 27 person planning team of community members, economic development representatives, Monroe County staff, 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 was developed through a number of planning workhops from June through October 2020.

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 in response 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. 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 impacts on the economy and health of local communities.

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

Medium | Medium-High | High

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)

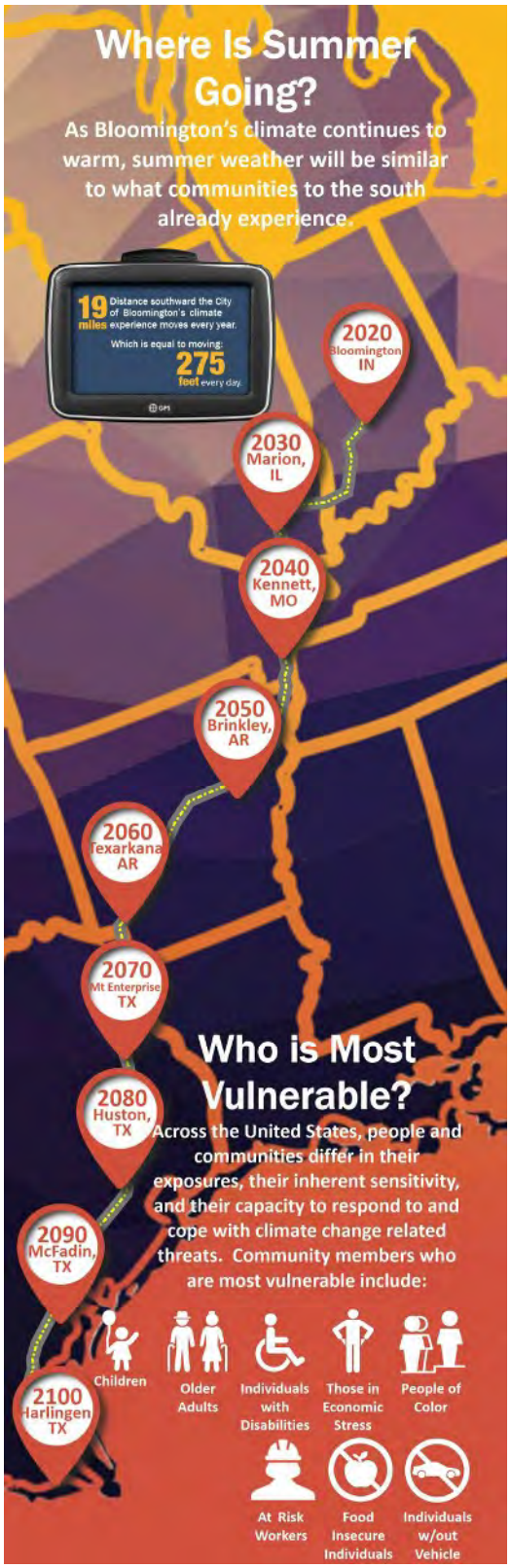
Heavier rains coupled with higher risk of surface drought conditions may significantly increase demand on stormwater management. The city's stormwater infrastructure may not be capable of handling the amount of runoff during more frequent heavy down pours, requiring resources to make needed upgrades..

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

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.

What is a Climate Action Plan (CAP)

Climate action plans are comprehensive road maps that outline the specific Strategies and Actions that a City will implement to reduce greenhouse gas emissions and build resilience to related climatic impacts. The Bloomington CAP addresses both climate mitigation and climate adaptation actions.

What is Climate Change Mitigation?

Climate Change Mitigation addresses the root causes of climate change through the reduction or prevention of greenhouse gas (GHG) emissions. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior.

What is Climate Change Adaptation?

Some impacts of climate change are now inevitable. Climate Change Adaptation seeks to lower the risks posed by these impacts. Both mitigation and adaptation are necessary, because even if emissions are dramatically decreased, adaptation will still be needed to deal with the global changes that have already been set in motion.

The Role of Cities in Climate Action

With a large majority of Americans living in urban areas, cities play a key role in addressing climate change. While each individual city's impact on global GHG emissions is relatively small, the leadership cities provide in motivating change can be extremely significant. According to a survey by the US Conference of Mayors, more than half (53%) had committed to reducing greenhouse gas emissions.

Types of Climate Actions

Leading by Example:

Actions the City can apply to city operations or facilities to illustrate actions others can take:

- Install solar on rooftops of public buildings
- Adopt net-zero energy standards for public facilities
- Convert city fleets to EVs

Advocating:

Encourage change in support of meeting CAP goals - these can include lobbying at State/Federal and educating public on actions they can take:

- Lobby for PACE financing legislation
- Promote utility rebate programs
- Provide Net Zero and Solar Ready Guides to Residents and Businesses

Require:

Actions the City can take to require actions within the private sector:

- Require energy efficiency and renewable energy within PUD ordinance
- Adopt an energy benchmarking ordinance
- Require solar pv feasibility assessment with all new building permits

Incentivize:

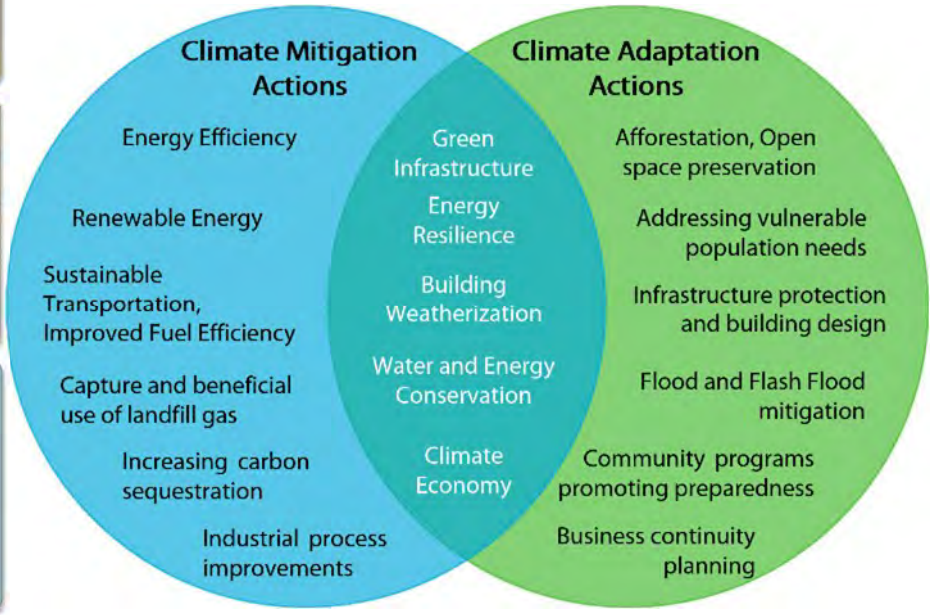
These can include direct economic incentives as well as actions which remove barriers:

- Expedite permitting for clean energy projects
- Offer Net Zero technical assistance
- Establish a Renewable Energy grant program for income qualified residents.

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 our collective climate challenge ahead. This 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.

Synergy of Mitigation and Adaptation Actions



Climate Action Plan Framework
This Climate Action Plan includes an implementation framework designed to achieve community-wide goals for greenhouse gas reduction and climate adaptation and resilience. This CAP is organized around a unifying framework organized by sector as illustrated to the right. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation. Sector actions have primary focus on Climate Mitigation, Climate Adaptation, or both.

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

Actions: are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and action.

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:

This sector area includes 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.

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

This sector area includes 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.

This sector includes the 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.

This sector area includes all solid waste generated by residents and businesses within the community. 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.

This sector area includes 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.

This sector area includes 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.

This sector area includes the 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 heat island impacts.

Saving our planet, lifting people out of poverty, advancing economic growth… these are one and the same fight. We must connect the dots between climate change, water scarcity, energy shortages, global health, food security, and women's empowerment. Solutions to one problem must be solutions for all .

Ban Ki-moon,
Secretary General,
United Nations

Introduction

Benefits of Climate Action

The strategies and actions contained in this plan seek to reduce Bloomington's dependence on non-renewable fossil fuels, prioritize sustainable uses of land and water, reduce waste, and support improved equity and livability. The actions outlined in this plan will reduce Bloomington's GHG emissions. In addition to reducing the community's contribution to climate change this plan strives to identify how climate change will increasingly impact the community. The CAP addresses next steps for Bloomington to adequately respond to climate change. If implemented successfully the CAP will enhance Bloomington's economic vitality, resilience, and viability as a healthy, livable city.

6 Ways Climate Action Can Be Good For Bloomington's Economy

1: **Bloomington can lower emissions while growing the economy.**
Since 2005, Bloomington's GDP has increased 59% while community wide GHG emissions have fallen over 18%.

2. Electricity from renewable sources is typically less expensive than fossil fuels.
The costs of renewable energy fallen significantly over the last decade and their portion of our energy mix has grown. According *The Coal Cost Crossover,* a study by Energy Innovation, it would be cheaper to replace 3/4ths of existing U.S. coal plants with wind and solar power than to keep them operating with coal.

3. Clean energy jobs already employ about 3.5 million Americans and growing.
The transition to renewable energy is a transition to local energy sources and infrastructure – and retention of more energy expenditures in the local economy. According to a study by the non-profit group MassSolar, every dollar invested in solar creates $1.20 in local economic benefits.

4. CAP focus areas can save Bloomington residents and businesses money .
Energy efficiency improvements, renewable energy adoption, and reduced single occupancy vehicle dependence strategies included in this plan can result in annual savings for Bloomington businesses and households.

5. Better planned, low-carbon cities are more productive.
According to a study by The Coalition for Urban Transitions, for every 1% increase in population density in US cities, medium and high-skilled wages increase 0.5% and carbon emissions decrease 0.2% per capita.

6. Without climate action, Bloomington will face increasing economic damage.
According to NOAA Records, extreme weather and climate disasters in Bloomington County have increased 7% in the last twenty years, causing an average of $714,150 in damages annually. According to a study by the University of California at Berkeley, climate impacts can be expected to increase agricultural damage, death rates, energy costs, and violent and property crime rates in the City of Bloomington. In addition, as annual average temperatures and the number of extreme heat days increase, economic productivity will decrease due to labor efficiency losses. These impacts can be used to establish an estimated minimum "Social Cost of Carbon" - a measure of the economic harm of those impacts from emitting one ton of carbon dioxide into the atmosphere.

See calculations on the following page for an estimated cumulative economic savings potential of successfully implementing the Climate Action Plan through 2030.

Types of Sustainability Action Benefits

Introduction

Estimated Economic Risk of Climate Change to Bloomington by 2100

(in today's dollars)

Annual % Change by Category:

Agriculture	Mortality	Energy	Productivity	Property Crime	Violent Crime
-35.6%	+3.7%	+11.7%	-5%	+.97%	+3.5%

= **$150,518,657**

Annual Cost Impact (in 2020 dollars)*

* Figure does not include increased healthcare costs due to increased illness and disease nor increased property damage due to increased extreme

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 busineses 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:

Estimated Economic Risk of Climate Change:		Current Annual Emissions:		Current Estimated Localized Social Cost of Carbon:
$150,518,657 Annual Cost Impact	÷	1,290,216 Annual Cost Impact	=	$116 Per Ton

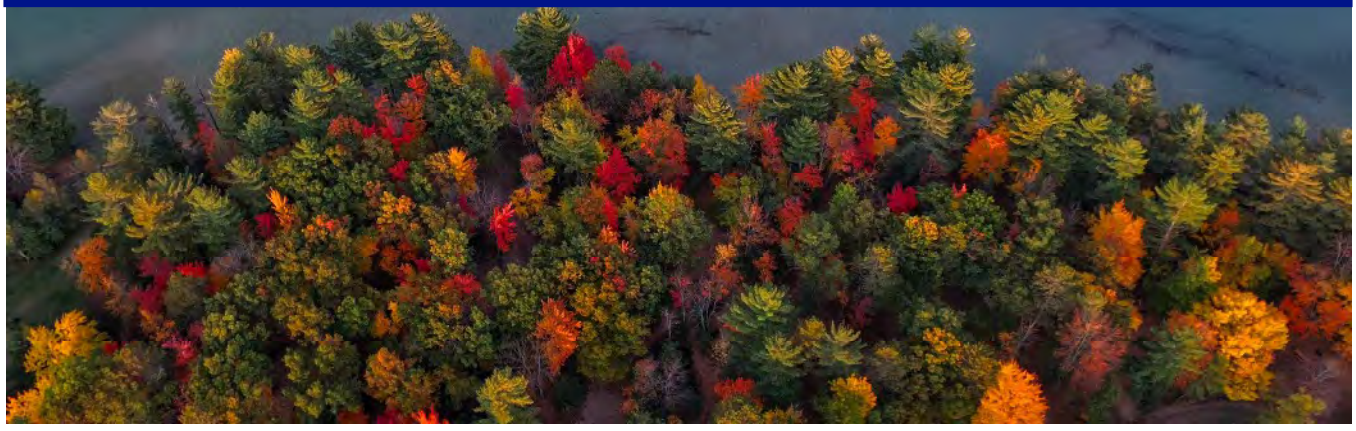
Cumulative Economic Savings Potential of Successfully Implementing the Bloomington Sustainability Plan Through 2030

Transportation Savings Potential:		Energy Efficiency and Renewable Energy Savings Potential:		Waste Reduction Savings:		Social Cost of Avoided Carbon:
$89,743,494	+	$62,250,090	+	$79,175,711	+	$150,263,165

Cumulative Community-Wide Savings Potential:

= **$381,432,460***

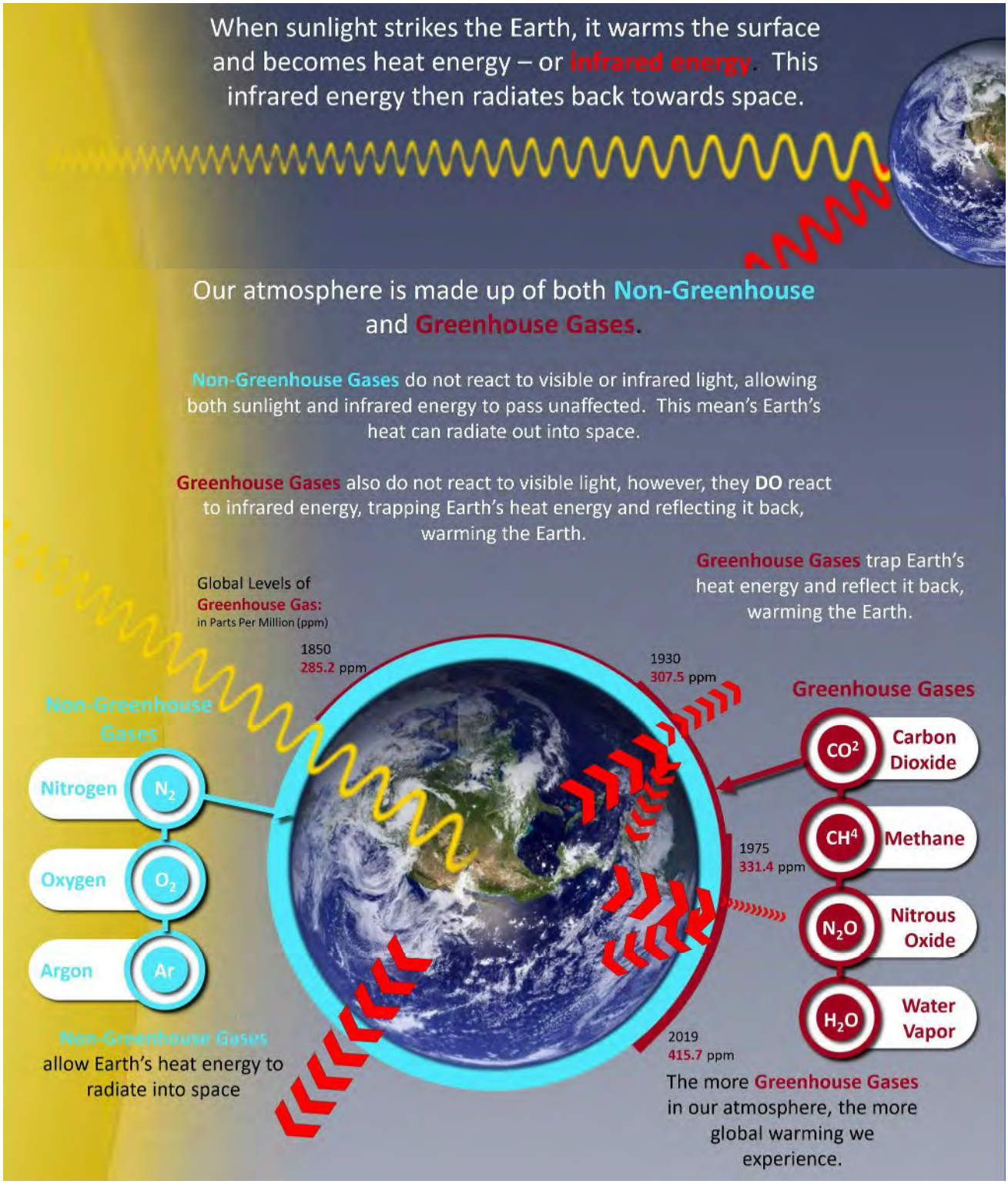
* Value does not include economic potential of job creation and new business potential represented in the Sustainability Plan actions.



Introduction

Greenhouse Gas Emissions (GHG) and Climate Change

The climate change we face today is caused by warming from greenhouse gases trapping infrared energy radiating from the earth. This is called the greenhouse effect. Greenhouse gases have been increasing in our atmosphere since the Industrial Revolution. Scientists attribute the global warming trend observed since the mid-20th century to human greenhouse gas (GHG) emissions which expand the "greenhouse effect" — warming that results when the atmosphere traps heat radiating from Earth toward space.



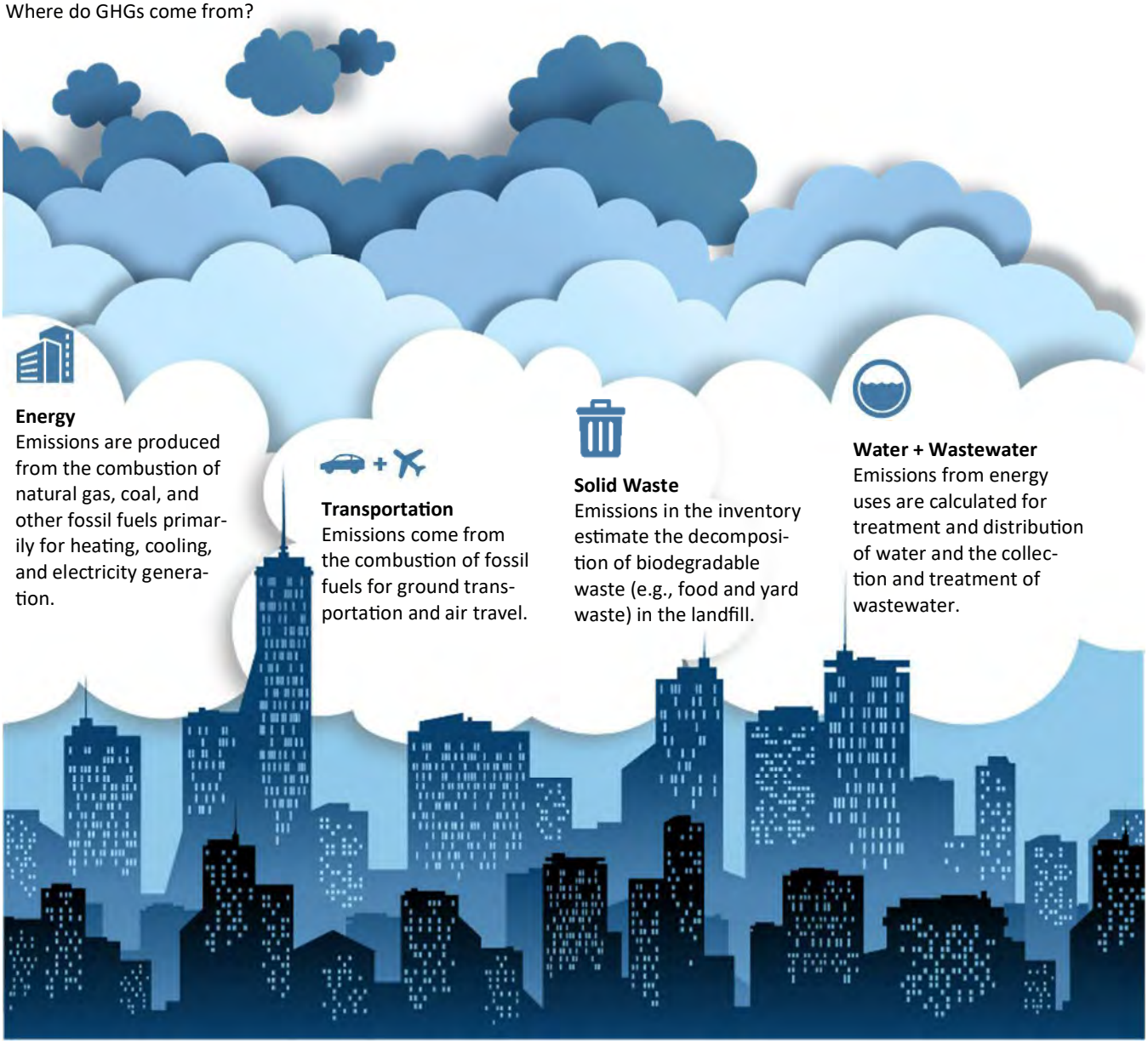
Introduction

What Are GHG's?

Greenhouse Gases (GHG) absorb radiation and trap heat in the Earth's atmosphere. They are the basis of the Greenhouse Effect. The more GHGs there are, the more heat that is trapped in our atmosphere, leading to Global Warming and Climate Change. The most common greenhouse gases include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).

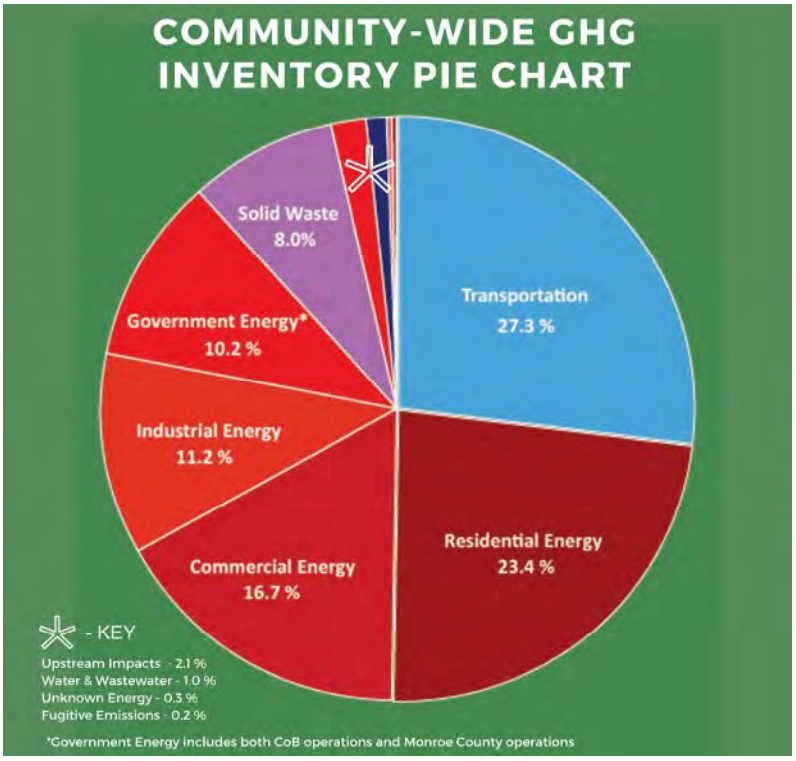
Greenhouse Gas Sectors

Where do GHGs come from?



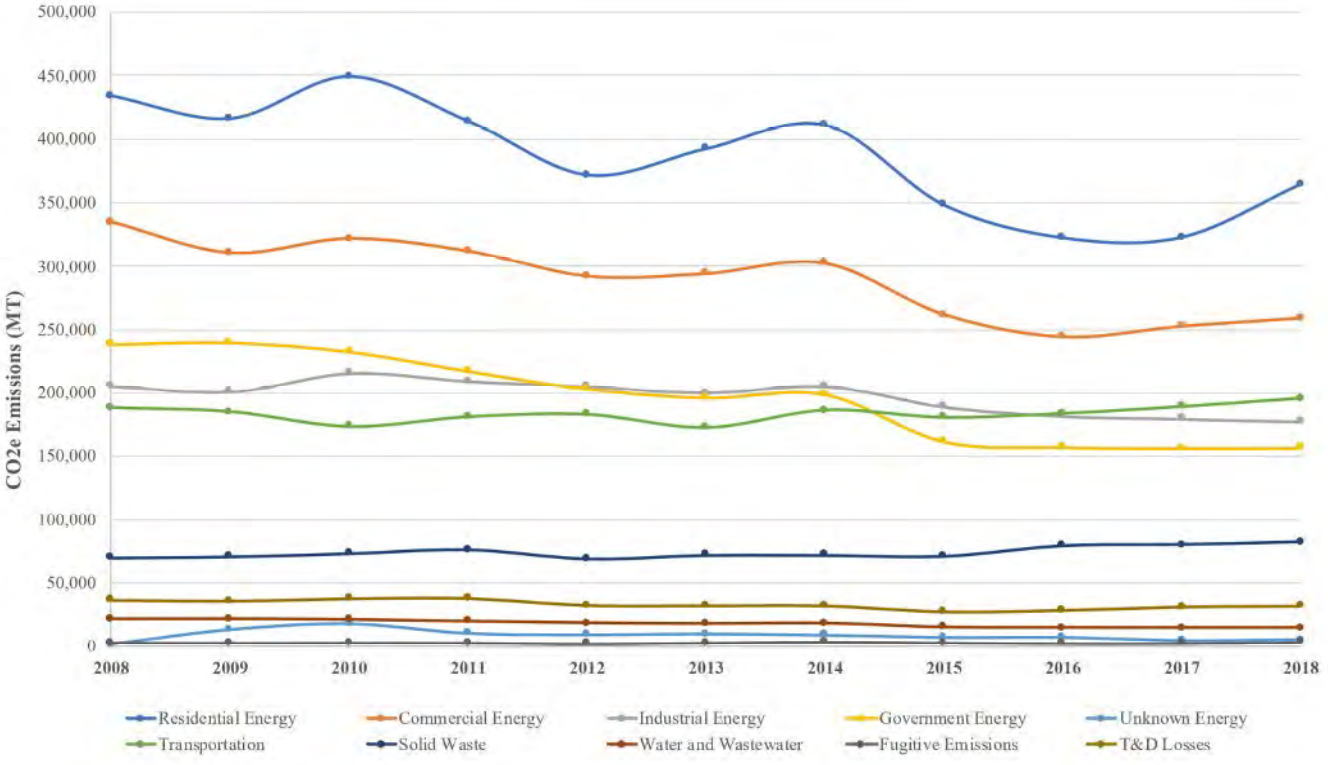
Introduction

Citywide GHG Emission 2018



(Graphic source: City of Bloomington 2018 GHG Inventory)

Citywide GHG Emission History 2008-2018



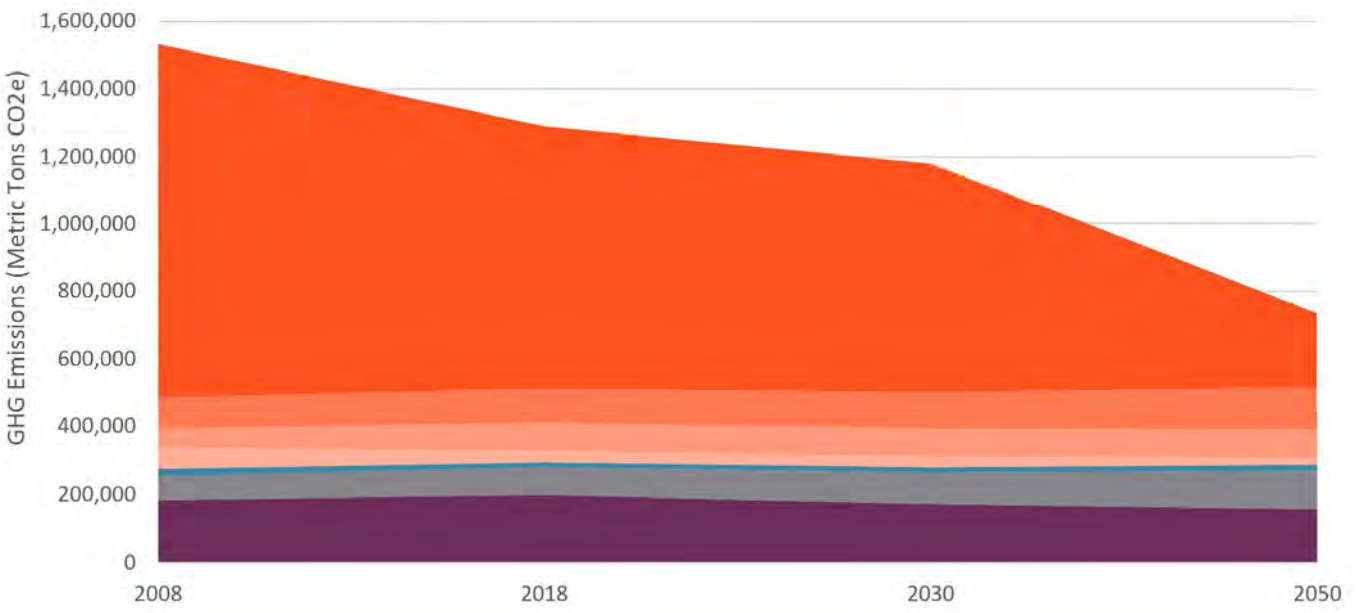
(Graphic source: City of Bloomington 2008-2018 GHG Backcast)

Introduction

Citywide GHG Emission Forecast

A GHG emission forecast supports GHG reduction planning efforts by anticipating what emissions may be like if actions are not taken. Emissions are typically forecast 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, 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.



Introduction

Sustainability Plan GHG Reduction Goal

The GHG emission reduction goals guiding this Sustainability Plan are to reduce community-wide GHG emissions 40% over the 2005 baseline by 2030, and then to achieve Carbon Neutral by 2050.

GHG Emission Reduction Goal in Global Context

Reviewing the City's Climate Action Plan emission reduction goal within a global context and GHG emission reduction recommendations formulated by the International Panel on Climate Change (IPCC) can help validate the appropriateness of the goal. The IPCC is the United Nation Environment Programme (UNEP) body for assessing the science related to climate change and providing support in climate action policy making. The scientific consensus of the international IPCC working groups is to reduce global GHG emissions as needed in order to limit global warming to 1.5°C. In addition, the Paris Agreement aims to limit global warming to 1.5 to 2 degrees C above pre-industrial levels, considered to be the threshold for dangerous climate change.

The UNEP Emissions Gap Report published in November 2019 calculates that by 2030, global emissions will need to be 25% lower than 2018 to put the world on the least-cost pathway to limiting global warming to below 2°C. To limit global warming to 1.5° C, the same report finds emissions would need to be 55% lower than in 2018 - an upward adjustment of earlier recommendations which suggested a 45% reduction.

Fair Share Citywide Emission Reductions To Meet Global Need

The concept of "Fair Share" has been introduced into international climate action discussions. Though there is no consensus on how "fair share" should be defined, the most common way of looking at the concept is a straight-line reduction economy-wide. This means that the share of emissions reductions for each jurisdiction (the City of Bloomington, the State of Indiana, the United States, etc) should match their share of global emissions - meaning if the US emits 25% of global emissions, the "fair share" of emissions reductions for the US would be 25% of the global emission reduction goals.

Based on a "Fair Share" model of GHG emission reduction, the City's goal of 40% below 2005 baseline by 2030 is compatible with the Paris Agreement and meets the threshold of required reductions to keep global warming below 2°C. The goal, however, is not compatible with a 1.5°C global warming pathway, as illustrated by the graphic to the right.

Climate Action Plan Approach to Emissions Reduction

This 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 should look towards increasing implementation goals for actions which illustrate success, modify goals for actions which may fall short of desired outcomes, and identifying additional action opportunities.

As a "living plan," the 2030 emission reduction goal should be seen as a guiding constant and recognition should be given that initial implementation actions may not yet fully achieve plan goals. Intermittent plan progress measurements and adjustments should identify additional actions, or increases in action implementation targets as needed to meet the ultimate 2030 GHG reduction goal.

2030 Citywide GHG Emissions Goal:

522,198
Metric Tons

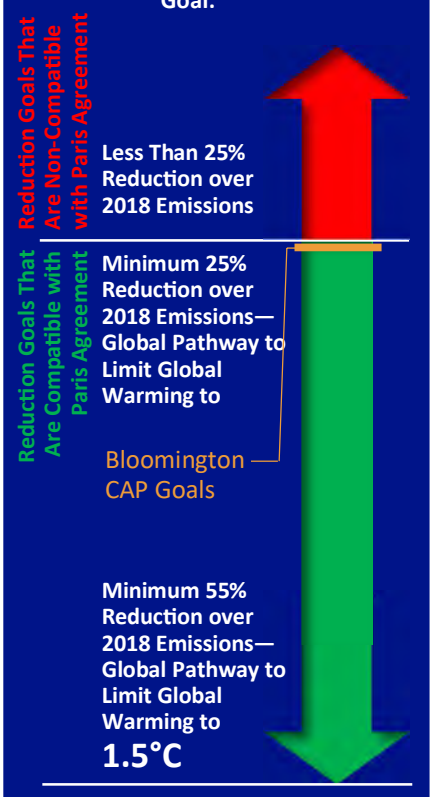
Global Emission Reduction To Limit Global Warming to 2°C:

555,670
Metric Tons
25% below 2018

Global Emission Reduction To Limit Global Warming to 1.5°C:

333,400
Metric Tons
55% below 2018

"Fair Share" Model Review of Sustainability Plan 2030 Goal:



Introduction

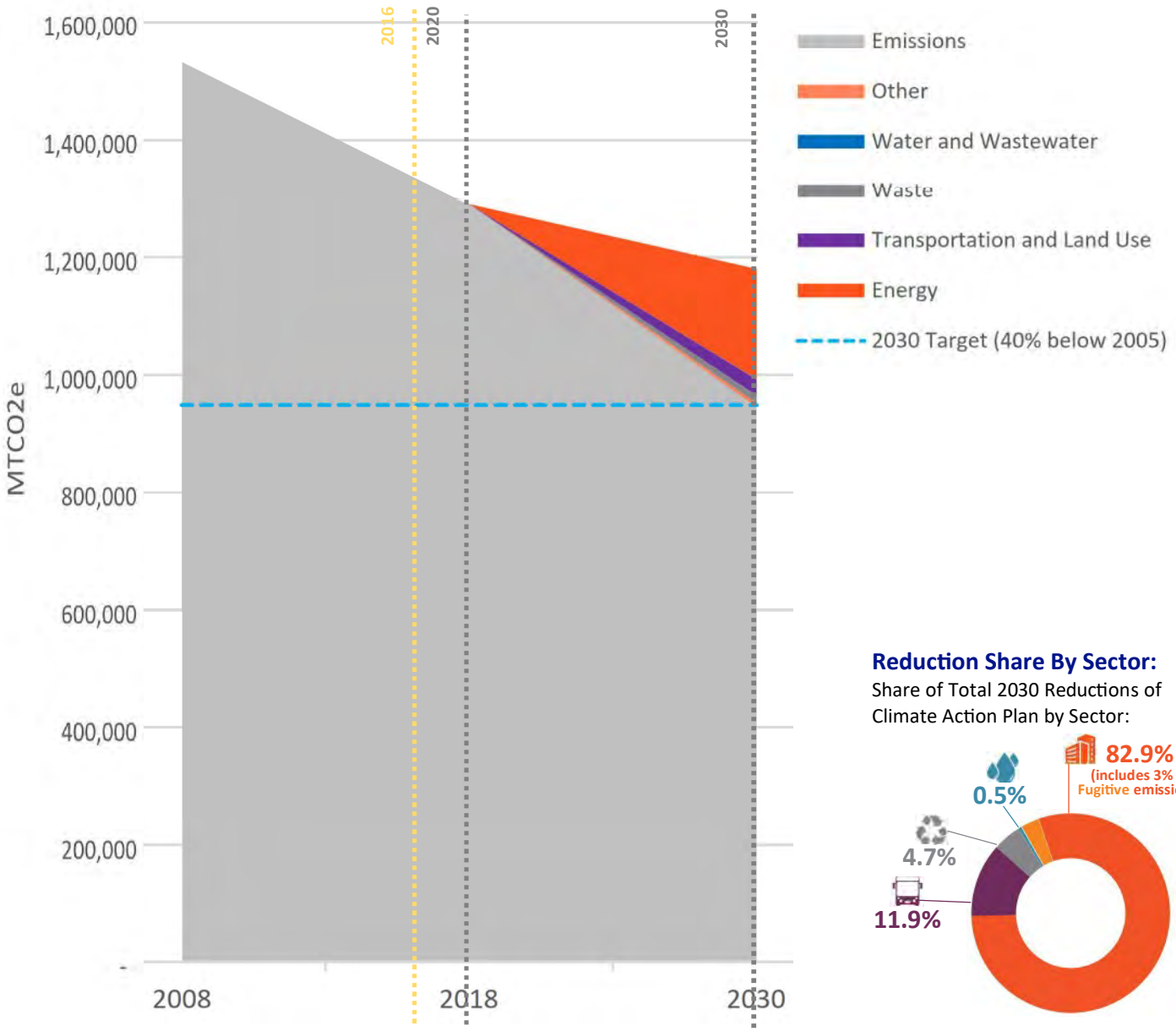
Estimated Citywide GHG Reductions Included in This Plan

Compared to the 2018 citywide GHG emissions, the total estimated emissions citywide reductions included in the initial implementation actions of this plan plus the projected Business-as-Usual (BAU) reductions are projected to total 344,735 metric tons annually (see page 1-13). These estimated reductions are projected to result in total citywide GHG emissions of 945,759 metric tons. The potential cumulative GHG emissions reductions over the 10 year implementation period are estimated at over 1,280,000 metric tons - an elimination of over **25.3 Billion** cubic feet of man made greenhouse gas atmosphere annually.

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 40.0% below 2005 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 Sustainability Plan actions and targets.



Reduction Share By Sector:

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

Section 02

Transportation and Land Use

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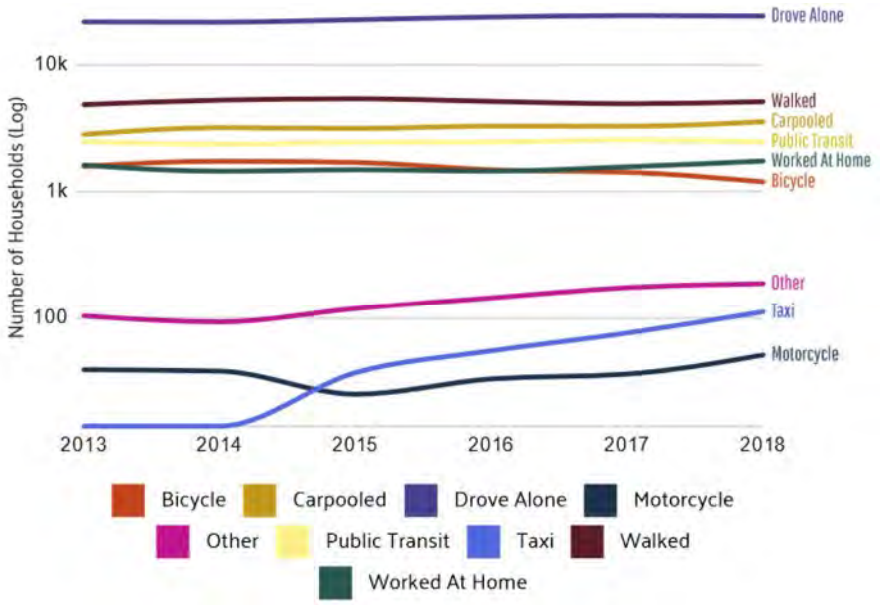
Transportation and Land Use

Why Transportation and Land Use Is Important

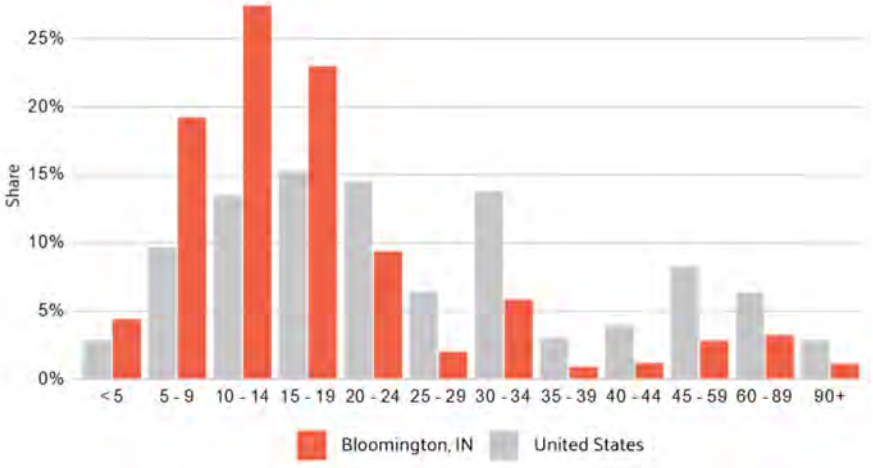
The design of a city can limit or expand the choices and opportunities available to its residents in where they live, how they travel and the impact of those decisions on the global environment. Transport systems - which includes private and public vehicles, trains, and planes - have significant impacts on the environment, accounting globally for 20% to 25% of world energy consumption and carbon dioxide emissions - in Bloomington transportation accounts for 27.3% of citywide GHG emissions (2018 GHG Inventory).

The transportation sector, which includes private and public vehicles, trains, and planes contribute 15.4% of citywide GHG emissions for the City of Bloomington. The majority (62.6%) of Bloomington residents drive to work alone and the remaining 37.4% walk (13.2%), carpool (9.21%), use public transit (6.42%), telework (4.51%), bicycle (3.1%) with the remaining 0.96% reporting "Other". Of the workforce in Bloomington, the average commute-to-work time is 16.1 minutes compared to the State of Indiana average of 23 minutes while only 1.08% have "super commutes" in excess of 90 minutes compared to 1.82% for the State of Indiana. 91.1% of Bloomington households (26,626 households) live within ½ mile of transit routes and 24.1% (7,031 households) live near rush-hour high frequency transit routes.

Commuter Transportation in Bloomington



Commute Time for Bloomington Workers



Continuing to improve the equity and sustainability of Bloomington's land use and transportation systems requires a focus on developing systems and networks that allow for greater choice in where residents live and work as well as how they commute. Implementation of Complete Streets and a connected system of transit, bike and pedestrian infrastructure along with emphasis on neighborhood design that supports density and walkability will help Bloomington reach its goal of a 40% reduction by 2030.

Climate Change Considerations

Climate Impacts

This sector impacts climate change through the combustion of fossil fuels (gasoline, aviation gas, propane) for on-road cars and trucks and off-road vehicles and equipment

Climate Hazards

Hazards to Transportation and Land Use include increased damage to roads and transportation infrastructure due to increased freeze and thaw cycles, flooding, and extreme weather and temperatures

Transportation and Land Use

Equity Considerations

- Increased opportunities for public transit and active transportation can help address health disparities for many at-risk populations.
- Affordable and reliable options for mobility for people with special transportation needs can significantly improve transportation equity. Populations with special transportation needs include older adults, youth, persons with disabilities, and persons with reduced incomes.
- Some neighborhoods in Bloomington have fewer housing and transportation options than others. This can limit people's choices in where they live and how they get to work or other activities. Households that rely on public transit service or who rent their home will be limited in where they can find housing that meets both needs.

Sector Goals

Goal T1

Decrease vehicle miles traveled (VMT) by 8% by 2030.

Goal TL2

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

Mode Shift Targets Supporting Sector Goals

	Bloomington Transit Use	Single Occupancy Vehicle Use	Carpool + Shared Mobility	Walk + Bike	Electric Vehicles
	+	-	+	+	+
Today	6.4%	62.6%	9.2%	16.3%	0.82% (Statewide)
2030 Targets	**9.4%**	**59.8%**	**11.2%**	**17.3%**	**10%**

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Transportation and Land Use section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Goal T1 Decrease vehicle miles traveled (VMT) by 8% by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy TL1-A:

Reduce single occupancy automobile use by 7%

Reported “drive alone” commuter transportation data—US Census, Annual VMT data reported

The local transportation system is planned, funded, built, and maintained by a combination of local, state, and federal organizations, including the Bloomington Monroe County Metropolitan Planning Organization (MPO). BMCMPO is a partnership of local governments and transportation service providers to execute federally funded transportation priorities outlined in the Transportation Improvement Program. MPO members include the City of Bloomington, Monroe County, the Town of Ellettsville, Indiana University, and the Bloomington Public Transportation Corporation (Bloomington Transit), and Area 10 Agency on Aging. Additionally funded transportation projects are also funded, planned, and executed by City of Bloomington.

Initial Actions

TL1-A-1 Update the City's Transportation Plan and Transportation Improvement Program to incorporate reductions in carbon emissions and vehicle-miles-traveled, improved bicycle, pedestrian and transit service standards, and a policy requiring project evaluation to include criteria on climate, equity, economic benefit, health, safety and cost effectiveness.

TL1-A-2 Establish a City employee Parking Cash Out benefit program to promote alternative commute options. (https://www.bestworkplaces.org/pdf/ParkingCashout_07.pdf https://www.boston.gov/transportation/parking-cash-out)

Strategy Expected Benefits

Strategy TL1-B:

Increase bicycle/ pedestrian commuting from 16.3% to 18.3% through infrastructure to encourage alternatives to vehicles.

Reported bike/walk commuter transportation data—US Census, Annual VMT data reported

The 237 miles of roadway within City limits is maintained by the City of Bloomington Public Works Street Division, with additional miles maintained Indiana Department of Transportation and the Monroe County Highway Department. For multimodal transportation, the Parks Department manages over 15 miles of recreational and multi-use paths. The City Trails and Trees bond passed by City Council in 2018 is adding over seven miles of new trails to the transportation system, including the 7line, RCA/ Powerline and a hiking loop at Griffy Lake

Initial Actions

TL1-B-1 Establish a stable funding source adequate to maintain and improve the existing transportation system and to invest in transportation capital projects and programs that reduce carbon emissions and improve equity.

TL1-B-2 Implement the Multimodal Projects recommendations included in the 2019 City of Bloomington Transportation Plan.

Strategy Expected Benefits

Goal T1 Decrease vehicle miles traveled (VMT) by 8% by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy TL1-C:

Increasing transit utilization by 5% through infrastructure and frequency investments.

Reported public transit commuter transportation data—US Census, Annual VMT data reported

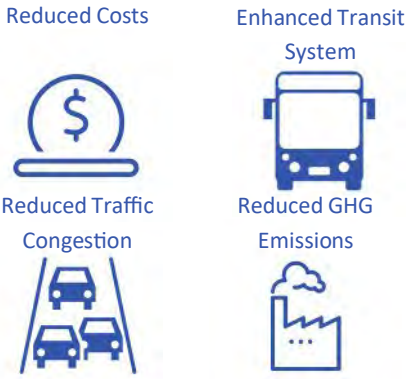
Bloomington Transit is the main local transit service in the City and operates 14 routes with a fleet of 49 buses (Transportation Plan, 2019). The Bloomington Transit Route Optimization Study indicated that increasing frequency, adding weekend service, and expanding service to the west side, to employment centers, housing complexes, and to Ivy Tech are top priorities for transit users. While existing services adequately meet rider's needs, some riders expressed dissatisfaction with service provision especially that the transit schedules did not align with or satisfy travel needs. Given the current street network, improvements to bicycle, pedestrian, bus, and other supported modes of non-automobile travel along the major N-S and E-W corridors through the center of Bloomington were identified in the Transportation Plan as high-priority for investment

Initial Actions

TL1-C- 1 Implement recommendations of the Bloomington Route Optimization Study

TL1-C- 2 Collaborate with Bloomington Transit to establish a Guaranteed Ride Home program as free reimbursement program for registered commuters

Strategy Expected Benefits



Strategy TL1-D:

Increase shared mobility utilization; target: increase shared mobility (carpooling) from 9.21% to 12.21% of commuters by 2030.

Reported "carpool" commuter transportation data—US Census, Annual VMT data reported

Shared mobility can broadly be as transportation services and resources that are shared among users, either concurrently or one after another. This broader definition includes micromobility (bikesharing, scooter sharing); automobile-based modes (carsharing, rides on demand, and microtransit); and commute-based modes or ridesharing (carpooling and vanpooling). According to the US Census, workers commuting via carpooling has remained consistently near the 9% level since 2013. Increased carpooling for individuals requiring similar commute routes directly reduces annual VMT and GHG emissions.

Initial Actions

TL1-D- 1 Outline clear policies for electric bikes, skateboards and scooters on city bike lanes, paths and trails. Establish a communication campaign to effectively reach users.

TL1-D- 2 Establish a subsidy / incentive for EV car sharing services with the goal of increasing car share coverage, particularly among vulnerable populations and those without current vehicle access. Qualifying programs must us plug in EV's or other no-carbon vehicle alternatives only.

Strategy Expected Benefits

Goal T1 Decrease vehicle miles traveled (VMT) by 8% by 2030

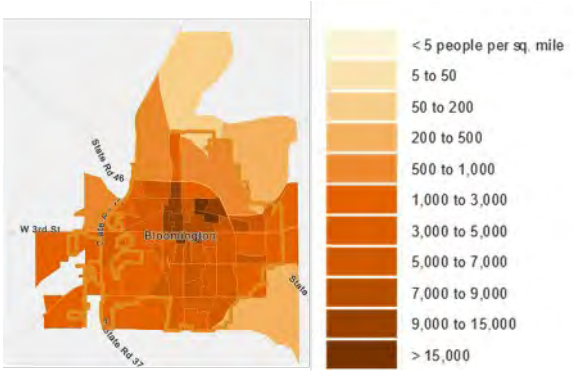
How We'll Get There | **How We'll Measure Progress**

Strategy TL1-E:

Encourage density and increase housing options and affordability; target: increase gross density by 3% by 2030.

Residential density in the City of Bloomington ranges from 700 people per square mile to over 19,300, with an average of approximately 3,600 people per square mile. When well planned, increased density means shorter commutes, increased "walkability" between home and a range of destinations, reinforced public transit corridor utilization, increased housing near jobs and community resources, and overall increased quality of life for residents.

Reported "carpool" commuter transportation data—US Census, Annual VMT data reported



Initial Actions

TL1-E- 1 Eliminate minimum parking requirements from Unified Development Ordinance and replace with a transportation reference guide for development that includes considerations for all modes. Allow developers to determine and defend their transportation needs.

Strategy Expected Benefits

Reduced GHG Emissions

Reduced Traffic Congestion

Strategy TL1-F:

Build Complete Streets; Target: 10% increase in complete street coverage by 2030.

Reported "carpool" commuter transportation data—US Census, Annual VMT data reported

Complete Streets are streets designed and operated to enable safe use and support mobility for all users of all ages and abilities and all modes of travel including pedestrians, bicyclists, scooter riders, public transportation riders, and drivers. Complete street strategies address a wide range of elements, such as sidewalks, bicycle lanes, bus lanes, public transportation stops, crossing opportunities, median islands, accessible pedestrian signals, curb extensions, modified vehicle travel lanes, streetscape, and landscape treatments.

Initial Actions

TL1-F- 1 Review, modify, and adopt a revised BMCBMO Complete Streets Policy to add criteria and review procedures for City funded projects. Include in the review and modification an assessment of national best practices in support of achieving the goals of the Climate Action Plan.

TL1-F- 2 Conduct a Sidewalk and Bike Path Quality Assesment and Master Plan to identify needs to accelerate bike paths, building sidewalks, crosswalks, and other walking infrastructure, particularly in high-need areas and areas serving vulnerable populations. Effort to include an implementation plan establishing annual increases in the total miles of sidewalks, on-road bicycle lanes and multi-use paths.

Strategy Expected Benefits

Reduced Costs

Improved Social Connectivity

Reduced GHG Emissions

Improved Quality of Life

Goal T1 Decrease vehicle miles traveled (VMT) by 8% by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy TL1-G:

Increase pedestrian access and safety.

Reported "carpool" commuter transportation data—US Census, Annual VMT data reported

Walking is a basic and common mode of transport in all societies around the world. Virtually every trip begins and ends with walking. Beyond the environmental and GHG emission reduction benefits, increased walking has well established health benefits such as increasing physical activity that may lead to reduced cardiovascular and obesity-related diseases. According to the World Health Organization "Pedestrian safety measures improve walking environments and contribute to urban renewal, local economic growth, social cohesion, improved air quality and reduction in the harmful effects of traffic noise."

Initial Actions

TL1-G-1 Implement improvement recommendations of the 2019 Transit Stop Safety and Accessibility Assessment.

TL1-G-2 Create and implement a 5 year transportation funding plan that matches the Metropolitan Transportation Plan and 2019 Transportation Plan.

Strategy Expected Benefits

Safer Streets

Improved Mobility

Strategy TL1-H:

Reduce commercial/industrial vehicle use by 5%

Reported commercial / industrial VMT data—US Census, Annual VMT data reported

Commercial and Industrial vehicle use makes up an estimated 10% of city-wide VMT. Utilizaiton of low-carbon goods movement alternatives and fleet utilization optemization can support the reduction of commercial vehicle miles traveled and increase commercial/industrial profitability.

Initial Actions

TL1-H-1 Establish an Electric Vehicle Suitability and Fleet Optimization Study incentivization utilizing fleet monitoring technology to assess fleets for alternative fuel suitability as well as identify fleet optimization management options for reduced VMT. (https://www.geotab.com/fleet-management-solutions/evsa/) Include City's fleet in program efforts. Goal: Achieve 6 fleet assessments annually.

Strategy Expected Benefits

Improved Air Quality

Reduced GHG Emissions

Strategy TL1-I:

Reduce citywide off-road and lawn equipment emissions to below 35,000 metric tons annually.

City electric off-road equipment adoption rate

Emissions from off-road equipment like construction and lawn equipment comprise a significant portion of fossil fuel consumption in Bloomington. Reduction of fossil fuel off-road equipment use is associated with improved emissions as well as improved air quality, particularly for the users of the equipment. https://www.edmunds.com/car-reviews/features/emissions-test-car-vs-truck-vs-leaf-blower.html

Initial Actions

TL1-H-1 Introduce a policy to replace City off-road and lawn equipment with electric and low-carbon fuel alternative options at the time of replacement with traditional internal combustion engine (ICE) as optional requiring proof of need. Establish emissions standards, testing and biofuel preference for any combustion vehicles remaining in the equipment fleet. Encourage County, School District, and Indiana University to implement similar policies.

Strategy Expected Benefits

Improved Air Quality

Reduced GHG Emissions

Goal TL2 Support and encourage electric vehicle adoption, achieve 30% of vehicles sold and 15% of VMT community-wide by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy TL2-A:

Transition City fleet to electric vehicle and alternative fuels (hybrid/ hybrid electric, plug in hybrid electric).

Reported "carpool" commuter transportation data—US Census, Annual VMT data reported

Adoption of electric and other alternative no-fossil-fuel vehicles is a core requirement of reducing GHG emissions associated with City operations. Beyond reduced emissions, electrification of municipal fleets have a number of benefits including improved air quality, decreased fuel costs, decreased maintenance requirements, and even improved driver safety.

Initial Actions

TL2-A-1 Introduce a policy to replace City fleet vehicles and buses with electric and hybrid options at the time of replacement, and require emissions standards, testing and biofuel preference for any combustion vehicles remaining in the fleet.

Strategy Expected Benefits

Reduced Costs

Reduced Pollution

Strategy TL2-B:

Support and encourage electric vehicle and alternative fuel (hybrid/ hybrid electric, plug in hybrid electric) vehicle adoption citywide.

Reported "carpool" commuter transportation data—US Census, Annual VMT data reported

Electric vehicles (EVs) are a critical component of meeting Bloomington's long-range emission reduction goals, in fact, meeting those goals will not be possible without a transition to alternative fuel vehicles. While no greenhouse gas emissions directly come from EV, short-term transition to EV's in Bloomington will have limited overall emissions decrease due to the relatively high emissions factor associated with Bloomington area electrical generation which is still significantly produced from fossil fuels. However, the GHG reduction benefits of EV's will continue to rapidly increase in the Bloomington area as electric grid goals are achieved. Additionally, other co-benefits of EV transition such as lowered vehicle operation costs and improved local air quality will be leveraged even in early transitions.

Initial Actions

TL2-B-1 Coordinate with Monroe County and State of Indiana to establish an annual auto registration reporting process to monitor the adoption rate of Electric Vehicles in the City.

TL2-B-2 Create an Electric Vehicle (EV) Action Plan to guide access to chargers on City property and citywide, explore alternative technologies like Smart cable technology and streetlight/ev charger integration, address barriers to charging for garage-free homes and rental properties, increase use of EVs in car sharing programs, assess options to lower EV and EV charger implementation costs, and recommend an EV charging amendments to the Unified Development Ordinance to support EV plan.

TL2-B-3 Support electric car charging station infrastructure in new commercial and multifamily housing during the initial construction phase by providing information on appropriate conduit and electrical panel considerations as a part of permit application process. Collaborate with electric utility to develop and provide information on utility, local, State, and Federal incentives supporting EV infrastructure.

Strategy Expected Benefits

Reduced Costs

Improved Air Quality

Reduced GHG Emissions

Reduced Pollution

Transportation and Land Use

Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as reduction of single-occupancy auto use, can save money for the community. The estimated community savings of the goals for this section include:

Goal TL1 Decrease VMT by 8%:

$69,318,961

(Based on AAA calculated auto use cost per mile and 2020 Bloomington Transit pass costs)

+

Goal TL2 Increase EV utilization to 15% of VMT

$20,424,533

(Based on AAA calculated auto use cost per mile and 2020 Bloomington Transit pass costs)

=

Estimated Cumulative Savings Potential

$89,743,494

$2,905

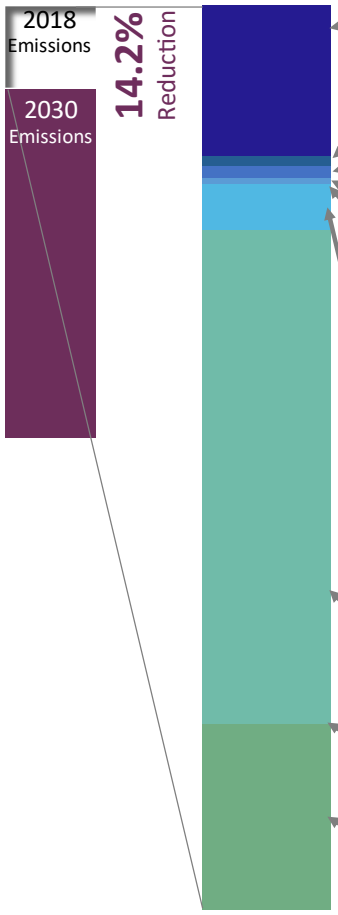
per household

Planned Transportation and Land Use GHG Emission Reductions

Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 28,037 metric tons (MT) by 2030 - a 14.2% reduction over 2018 levels.

This is equivalent to eliminating **550 million** cubic feet of man-made greenhouse gas atmosphere annually by 2030.



Individual Strategy Annual Emission Reductions by 2030

Strategy TL1-A:
Reduce single occupancy automobile use

Strategy TL1-B:
Increase bicycle/ pedestrian commuting

Strategy TL1-C:
Increasing transit utilization

Strategy TL1-D:
Increase shared mobility utilization

Strategy TL1-E:
Encourage density and increase housing options and affordability

Strategy TL1-F:
Build Complete Streets

Strategy TL1-G:
Increase pedestrian access and safety.

Strategy TL1-H:
Reduce commercial/industrial vehicle use

Strategy TL1-I:
Reduce citywide off-road and lawn equipment emissions.

Strategy TL2-A:
Transition City fleet to electric vehicle and alternative fuels

Strategy TL2-B:
Encourage electric vehicle and alternative fuel vehicle adoption citywide.

What You Can Do

- Take a walk, ride a bike, or take public transit. Leaving your personal vehicle behind when commuting or running errands can make a big difference for your carbon footprint and can also be a healthy and enjoyable alternative to driving.
- Commit to biking, walking, or taking public transit to work at least once a week.
- Avoid driving alone where possible. Ride transit, carpool, walk, and/or bike.
- If possible, telecommute or carpool to avoid transportation emissions.
- Purchase a fuel-efficient vehicle. When purchasing your next personal vehicle, consider more efficient alternatives such as hybrid or electric vehicles. Explore existing incentives to save money on purchasing an electric vehicle: https://www.duke-energy.com/energy-education/energy-savings-and-efficiency/electric-vehicles.
- Reduce your air travel; Consider alternative travel options that are less impactful.
- Replace your gas powered lawn and off-road equipment with electric.
- Buy carbon credits to offset your impact: Can't avoid the trip? Buy a credit to help mitigate the impact.
- Own a business? Explore how you can offer your employees mode-neutral commute incentives (https://www.vtpi.org/tdm/tdm8.htm)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Section 03

Energy and Built Environment

Click here to return to TOC


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Energy and Built Environment

Why Energy and Built Environment Is Important

Building construction and their operations can have extensive direct and indirect impacts on the environment, society, and economy. Buildings use significant resources (energy, water, raw materials, etc.), generate waste (occupant, construction, and demolition), emit potentially harmful atmospheric emissions, and fundamentally change the function of land, and the ability of that land to absorb and manage water.

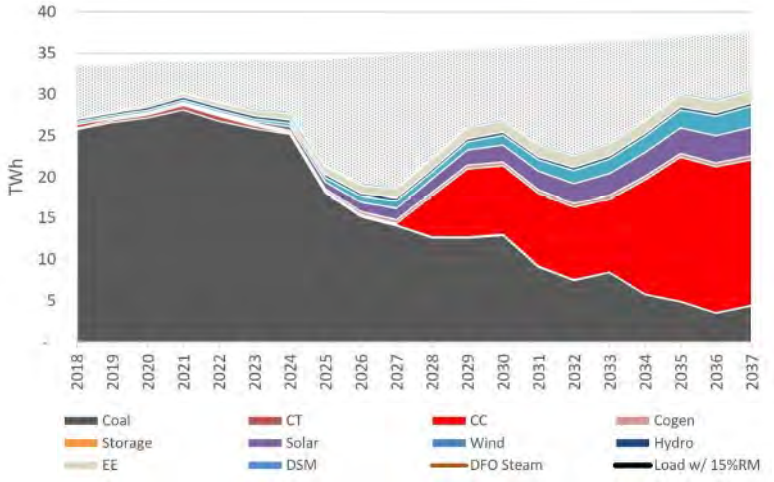
Building energy use is a major contributor to greenhouse gas (GHG) emissions. The Building Energy sector includes all residential, commercial, and industrial buildings. Greenhouse gas emissions from this sector come from **direct emissions** – from fossil fuels burned *on-site* for heating or cooking needs – as well as **indirect emissions** – from fossil fuels burned *off-site* in order to supply that building with electricity. Building design plays a large role in determining the future efficiency and comfort of facilities. Increasing energy efficiency can help reduce GHG emissions and result in significant cost savings for both homes and businesses. The Bloomington community can also achieve environmental, social, and economic benefits through enhancements to the built environment.

The Energy and Built Environment sector contributes 15.4% of citywide GHG emissions for the City of Bloomington. Within this sector, the share of residential consumption is 37.9%, commercial and government buildings is 43.7%, and industrial share is 18.4%.

2018 Bloomington Energy Sector Breakdown

The current fuel mix used to generate electricity by City of Bloomington's electricity utility, Duke Energy, is heavily coal based with over 61% derived from coal, 37% from natural gas, and less than 1% combined for hydro, wind, and solar. According to Duke Energy's 2018 Integrated Resource Plan, the projected energy mix of their portfolio is anticipated to decrease reliance on coal, with a significant increase in natural gas and some increase in solar and wind through 2037. This planned shift in energy portfolio will help contribute to Bloomington's GHG reduction goals, however, will not be enough to meet the reductions needed.

Duke Energy Portfolio Energy Mix Projection



Advancing significant GHG emission reductions in the Energy and Built Environment sector will require a focus on reduced coal and fossil fuel use in the generation of electricity and building heating systems. The success of Duke Energy reducing the use of fossil fuel use in the generation of grid electricity, increased implementation of distributed (on-site) renewable energy citywide, and improved energy efficiency will be key in Bloomington reaching its goal of a 40% reduction by 2030.

Climate Change Considerations

Climate Impacts

This sector impacts climate change through the combustion of fossil fuels (coal, natural gas, heating oil, propane) to generate electricity and heat/cool our buildings.

Climate Hazards

Hazards to Energy and Built Environment include damage to buildings and energy grid infrastructure from extreme weather and flooding, increased power outages, and increased energy demand and cost expenditure due to rising temperatures and weather variability.

Energy and Built Environment

Equity Considerations

- Often, families that live in properties that are not energy efficient are also those that can least afford high-cost utility bills. These households may lack the ability to pay for energy efficiency improvements or access renewable energy options.
- Renters of both single family homes as well as multi-family housing usually do not have the ability to implement energy efficiency measures to the buildings they live in to gain the benefits of energy efficiency. Energy efficiency retrofits are typically in the hands of the landlord while the costs associated with the resulting energy use are usually paid by the occupant.
- Families with fewer resources must dedicate a disproportionately larger share of their income towards energy costs. This energy access inequity exacerbates other vulnerabilities including exposure to heatwaves and other climate vulnerabilities. Families sometimes are forced to forego basic access to service altogether - an estimated 70 households in Bloomington go without heating fuel of any type.
- Air pollution, mainly from fossil energy use, disproportionately impacts low income and communities of color due to community locations and physical characteristics.

Sector Goals

Goal EB 1

Increase distributed renewable energy to 18% of citywide consumption by 2030

Goal EB 2

Increase energy efficiency citywide 16% for electricity and 2% for natural gas by 2030

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 3% by 2030

Energy Mix Targets Supporting Sector Goals

	Citywide Renewable Energy	Citywide Electricity Consumption	On-Site Fossil Fuel Consumption	Cleaner Electric Grid
	+	-	-	-
Today	0.43%	1,460 GHW	18.8 MTherms	0.53 mTons/MWH*
2030 Targets	10%	1,341 GWH	16.5 MTherms	0.35 mTons/MWH*

***mTons/MWH = Metric Tons of greenhouse gas emissions per megawatt hour of electricity generation. A reduction in this value reflects a reduction in the use of fossil fuel use at power plants for electricity generation.**

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Energy and Built Environment section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Goal EB1 Increase distributed renewable energy to 18% of citywide consumption by 2030 (estimated 170MW total installed capacity)

How We'll Get There | **How We'll Measure Progress**

Strategy EB1-A:

Increase solar on City facilities 20% by 2030

Total on-site renewable energy capacity installed, renewable energy credits (REC) purchsed

The City of Bloomington is a leader in on-site solar installations in the region with solar installed on 39 of the City's facilities and sites. City solar arrays generated 3 GWH of electricity in 2019, or approximately 70% of City building electricity consumption in 2018 or 10.8% of City operations electricity consumption in 2018 (including water and wastewater processing). Identifying additional solar installation potential, including ground mounted arrays, "carport" arrays, and remaining cost effective rooftop array locations can increase the City's renewable energy portolio. An increase of 20% on-site solar generation would result in 80% carbon-free City facility electric consumption.

Initial Actions

EB1-A-1 Continue implementation of building on-site renewable energy upgrades on city facilities, including piloting net zero energy retrofits. Conduct a detailed "Renewable Energy Master Plan" for all primary city facilities which have not yet already achieved renewable energy meeting 100% annual energy demand. Plan to incorporate strategies to address electricity storage, energy resilience, emergency operations, and provide an implementation plan to achieve on-site renewable energy target and outline options to achieve 100% renewable energy for all city facilities (on-stie and off site options).

EB1-A-2 Establish a policy which requires all new construction and significant renovation projects for City facilities to be constructed to meet "Solar Ready" requirements and to include a solar feasibility assessment and project option for inclusion of on-site solar. "Return on Investment" assessment to include a localized Cost of Carbon. See City's Solar Ready Guidelines: https://palebluedot.llc/bloomington-solar-ready-guide

Strategy Expected Benefits

Strategy EB1-B:

Support and accelerate installation of on-site solar PV citywide

Total citywide on-site renewable energy capacity installed.

Over 420 solar PV's are currently installed in Bloomington for a total of 5 megawatts (MW) in nameplate generating capacity (based on Solar Indiana Renewable Energy Network data February 2020). Residential arrays are 44%, government facility arrays are 39%, commercial and industrial arrays total 11.6%, and utility solar installations are 5.4% of the total existing installed capacity. Fewer than 1.5% of households and 1.75% of commercial/industrial establishments have on-site solar installed indicating significant opportunity for increasing on-site solar installations citywide.

Initial Actions

EB1-B-1 Identify the "Solar Top 50" commercial/industrial properties within the city and produce detailed solar feasibility assessments for each site. Assessments to include potential solar generation and economic performance and return on investment estimates, information on financing and ownership models, and next step resources. Provide solar assessment reports to properties and conduct an informational workshop to assist building owners and businesses in understanding the assessments and next step potential. "Solar Top 50" assessment effort could be repeated annually, particularly through 2025

Strategy Expected Benefits

Goal EB1 Increase distributed renewable energy to 18% of citywide consumption by 2030 (estimated 170MW total installed capacity)

How We'll Get There | **How We'll Measure Progress**

Strategy EB1-B:

Support and accelerate installation of on-site solar PV citywide (continued)

Total citywide on-site renewable energy capacity installed.

Initial Actions

EB1-B- 2 Sponsor a community-wide "Solarize" program for commercial and Industrial group purchase of Solar PV. Include an invitation to participate to all building sites included in the "Solar Top 50" feasibility effort. (goal, installed capacity equal to 1.8% of commercial/industrial sector electrical consumption annually) https://www.nrel.gov/docs/fy12osti/54738.pdf

EB1-B- 3 Continue to sponsor a community-wide "Solarize" program for residential group purchase of Solar PV. (goal, 250 homes installed annually) https://www.nrel.gov/docs/fy12osti/54738.pdf

EB1-B- 4 Partner on a county-wide solar strategy to expand solar, especially to low and moderate income households. (goal, 100 low income homes installed annually)

Strategy Expected Benefits

Strategy EB1-C:

Improve energy policy.

Reported “drive alone” commuter transportation data—US Census, Annual VMT data reported

According to the Department of Energy, complex or poorly-defined local government processes can add up to $2,500 to the cost of solar pv installations. Completing SolSmart designation can help municipalities simplify and making approval processes more efficient which, in turn, reduces costs for solar developers, installers, and City operations. In addition, policies which protect the ability of one property to continue to receive sunlight across property lines without obstruction from another’s property are critical to ensure long-term viability of solar resources for property owners.

Initial Actions

EB1-C- 1 Complete the SolSmart process to streamline permitting for renewable energy installations and assist in reducing solar project "soft costs" related to City solar processes. Achieve a Solsmart Gold rating by 2025

EB1-C- 2 Establish Solar Access Ordinance and policies which recognize changing conditions due to the proliferation of residential rooftop solar energy systems.

Strategy Expected Benefits

Goal EB2 Increase energy efficiency citywide 16% for electricity and 12% for natural gas by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy EB2-A:

Increase total City owned building electrical energy efficiency 16% for electricity and 12% for natural gas by 2030

Annual City operated facility elecricity and natural gas consumption reported.

The City of Bloomington facilities use approximately 4,550,000 kWh of electricity and 245,000 therms of natural gas annually. Executing energy efficiency improvements and exploring operational changes, particularly for "plug loads", can continue to improve the City's energy efficiency. Reducing City facility electricity consumption to 3,822,000 kWh and 206,000 therms could save up to 16% of the City's annual energy costs.

Initial Actions

EB2-A-1 Update the City's Green Building Program policy to include clear energy reduction requirements to be measured annually durring the building's operation (such as "achieving and maintaining a minimum ENERGY STAR rating of 75, and built to meet or exceed IGCC code"). Consider increasing the minimum LEED design standard to Gold. Invite County, School District, and other public agencies located within the City to participate in City's Green Building Program standards.

EB2-A-2 Establish a policy to require all primary City facilities to benchmark and disclose annual energy consumption. Invite County, School District, and other public agencies located within the City to participate in City's facilities benchmarking and disclosure effort.

EB2-A-3 Conduct a Building Energy Audit on all primary City owned facilities without energy audits conducted within last 5 years. Fully implement recommendations of these and previous audits. Prioritization should be given to the City's largest energy consuming sites.

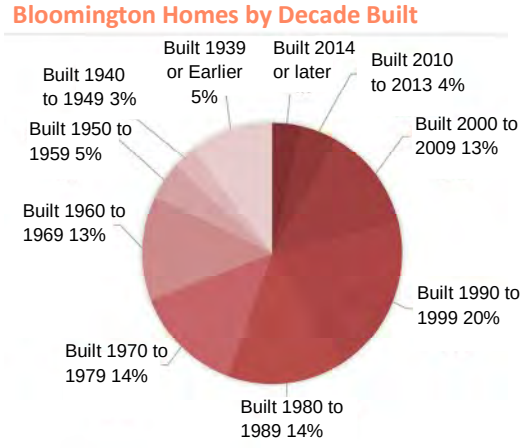
Strategy Expected Benefits

Strategy EB2-B:

Support and accelerate energy efficiency citywide.

Annual citywide elecricity and natural gas consumption reported.

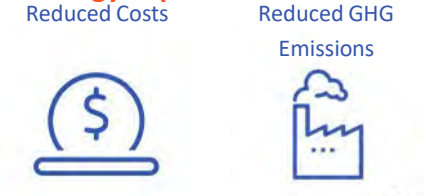
Compared to State of Indiana averages, electric consumption in Bloomington is 142% of the resideintial average (per household) and 87% of the commercial and industrial average (per job) while natural gas consumption is 76% of the residential average and 8% of the commercial and industrial average. The deviation from State averages in the residential sector may be a result of a higher-than state average for houses using electric heat (51.6% in Bloomington compared to 29.9% Statewide) while the difference in the commercial and industrial sector may be due to Bloomington's deviation from the State average share of types of employment - on a per capita basis Bloomington's commercial/government employment is 129% and industrial employment 25% State averages. Significant energy savings are likely possible in all sectors. According to the US Energy Information Administration, homes built after 2000 used 15% - 40% less energy than homes built before 1990. Nearly 60% of all homes in Bloomington were built prior to 1990.



Initial Actions

EB2-B-1 Adopt, implement, and promote a Commercial Building Energy Benchmarking and Disclosure ordinance for all public buildings and all commercial buildings 30,000 square feet and larger. https://www.energystar.gov/buildings/program-administrators/state-and-local-governments/see-federal-state-and-local-benchmarking-policies

Strategy Expected Benefits



Goal EB2 Increase energy efficiency citywide 16% for electricity and 12% for natural gas by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy EB2-B:

Support and accelerate energy efficiency citywide. (continued)

Annual citywide elecricity and natural gas consumption reported.

Initial Actions

EB2-B-2 Work with utilities to incentivize and promote replacement of inefficient equipment before end-of-life, and facilitate the bulk purchasing of efficient equipment. Goal: achieve 250 households replacing equipment annually

EB2-B-3 Establish an Energy Efficiency Upgrade cost sharing incentive program providing a 25% matching grant for qualified buildings and applicants. Target utilization by 60 businesses annually. Example program: http://www.minneapolismn.gov/environment/greencostshare http://www.minneapolismn.gov/www/groups/public/@health/documents/webcontent/wcmsp-221550.pdf

EB2-B-4 Work with partner organizations to promote building retrocommissioning and operation and maintenance practices that improve affordability, comfort, indoor air quality and energy efficiency in all commercial and multifamily buildings. Target 60 businesses commissioned annually

EB2-B-5 Collaborate with utilities, community partners, and rental property owners to promote and provide comprehensive audits followed by energy efficiency upgrades benefiting multifamily residents, with a particular focus on low-income communities. Target: Achieve 220 audits and upgrades annually.

Strategy Expected Benefits

Strategy EB2-C:

Increase net zero energy residential building stock to 1% of homes Citywide by 2030.

Annual citywide elecricity and natural gas consumption reported.

Net zero buildings are buildings with high energy efficiency that produce as much on-site renewable energy as they consume in a year. Net zero buildings tend to be high performance buildings that provide a higher level of occupant comfort and building health. According to a 2019 study by the Rocky Mountain Institute, net zero homes in the Indiana region average a return on investment of 12 years or less - after which they deliver "free" energy to their owners. As a part of this Climate Action Plan, a Net Zero Energy Guide and Solar Ready guide have been developed to assist Bloomington homeowners and commercial building owners in exploring and achieving a Net Zero building. (https://palebluedot.llc/bloomington-net-zero-energy-guide) (http://palebluedot.llc/bloomington-solar-ready-guide)

Initial Actions

EB2-C-1 Promote, provide and distribute the City's Net Zero Energy Building Guide document to local home shows or remodeler showcase events, designers, homebuilder associations, and realtors. (https://palebluedot.llc/bloomington-net-zero-energy-guide) Include the City's Net Zero Energy Building Guide and Solar Ready Guideline documents on the City's Design Guidelines webpage (https://bloomington.in.gov/utilities/review/design/manual)

EB2-C-2 Provide training on solar ready and net-zero strategies as found in the City's Net Zero Energy Building Guide and Solar Ready Guidelines to area builders with local builders association. Target 1% market coverage (130 homes) attending training annually. (https://palebluedot.llc/bloomington-net-zero-energy-guide) (http://palebluedot.llc/bloomington-solar-ready-guide)

Strategy Expected Benefits

Goal EB3 Support decarbonization of the local electricity grid

How We'll Get There | **How We'll Measure Progress**

Strategy EB3-A:

Support Duke Energy's grid emissions goal of 50% below 2005 levels by 2030.

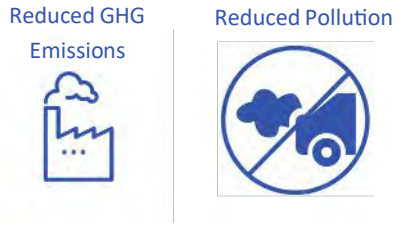
Reported annual electric grid GHG Emissions Factors.

The electric utility serving Bloomington, Duke Energy, has established a goal of reducing the GHG emissoins associated with their electricity 50% by 2030 and to achieve net zero by 2050. Implementation of this goal by Duke Energy is critical in achiving the overall GHG emission reduction goals represented in this Climate Action Plan - should Duke Energy not accomplish this grid emission goal it could mean additional GHG emissions of 520,000 metric tons or more annually. https://news.duke-energy.com/releases/duke-energy-aims-to-achieve-net-zero-carbon-emissions-by-2050

Initial Actions

EB3-A- 1 Collaborate with Duke Energy for the development of a pilot/ demonstration community solar project. Identify underutilized sites such as landfil, brownfield, superfund sites, or detention pond sites (for floating solar) and identify most advantageous site to develop and install pilot solar garden. Explore potential for cost benefits for low income subscribers with Renewable Energy Credits supporting Duke Energy's carbon reduction goals. (example projects at superfund sites: https://www.epa.gov/superfund-redevelopment-initiative/alternative-energy-superfund-sites)

Strategy Expected Benefits



Strategy EB3-B:

Advocate for stronger state policy.

Status of State energy efficiency and renewable energy policies

Surrounding states have shown that policies such as the allowance of Property Assisted Clean Energy (PACE) programs, and improved solar policies such as allowance of Power Purchase Agreements, Solar Lease agreements, virtual net metering, aggregated net metering, and community solar laws can help "level the playing field" for improved energy efficiency and renewable energy. Collaborations with other communities and non-profit groups to help educate and guide State leaders towards making improved policy decisions can play a critical role in meeting Bloomington's goals.

Initial Actions

EB3-B- 1 Collaborate with other communities, industry, and state agencies to support the State establishing the enabling legislation for Commercial Property Assessed Clean Energy (C-PACE) and Residential Property Assisted Clean Energy (R-PACE) financing

Strategy Expected Benefits

Goal EB4 Promote "fuel switching" to reduce on-site fossil fuel use in the building sector 3% by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy EB4-A:

Support and accelerate electrification of on-site fossil fuel combustion systems citywide

Reported Natrual Gas consumption citywide, US Census data on homes using electric fuel for heating

The reduction and elimination of on-site fossil fuel combustion community-wide is a critical long-term pathway towards GHG emission reductions. As the Bloomington area electric grid becomes cleaner (see goal EB3), the benefits of electrification will become more and more meaningful. According to US Census data, over 50% of Bloomington homes use electric heat, while technologies like conduction cook tops illustrate the effectiveness and improved safety of electricity in lieu of natural gas.

Initial Actions

EB4-A-1 Conduct an "Electrification Assessment and Action Plan" to outline actions and priorities for electrification of all City facilities to move towards zero on-site fossil fuel combustion. Work with regional energy partnerships to implement Plan for all City facilities. Include new and existing buildings, explore strategies to address electricity storage, and create a case study to highlight and share challenges, solutions, and lessons learned to share with the broader community.

Strategy Expected Benefits

Improved Air Quality

Reduced GHG Emissions

Strategy EB4-B:

Support and accelerate low/no carbon alternatives to on-site fossil fuel combustion

Reported Natural Gas consumption citywide, reported Renewable Natural Gas consumption citywide

Renewable Natural Gas, RNG, is natural gas derived from organic waste material found in daily life such as food waste, garden and lawn clippings, and animal and plant-based material. RNG is considered a carbon-neutral fuel because it comes from organic sources that once absorbed carbon dioxide from the atmosphere during photosynthesis. RNG has even greater benefits when it's produced from organic waste that would otherwise decay and create methane emissions. In addition, RNG utilization provides a beneficial pathway for waste streams. Although combustion of biofuels and RNG does emit CO2 they are considered low or no-carbon fuels. Burning fossil fuels releases carbon that has been locked up in the ground for millions of years, while burning biomass emits carbon that is part of the biogenic carbon cycle. In other words, fossil fuel use increases the total amount of carbon in the biosphere-atmosphere system while bioenergy systems operates within this system; biomass combustion simply returns to the atmosphere the carbon that was absorbed as the plants grew.

Initial Actions

EB4-B-1 Work with Vectren to establish an option for Renewable Natural Gas sourced from regional sources for residential and commercial customers. Program to include tracking for citywide natural gas reporting for GHG inventories. Achieve 1% use by 2030 (30 households and 6 businesses per year)

Strategy Expected Benefits

Improved Energy Resilience

Jobs / Economic Development

Goal EB5 Increase financing options for Energy Efficiency and Renewable Energy projects citywide.

How We'll Get There | **How We'll Measure Progress**

Strategy EB5-A:

Promote Equity in Energy and Resource Costs and Ownership

Reported Natrual Gas consumption citywide, US Census data on homes using electric fuel for heating

Low income communities are among the most vulnerable to the impacts of climate change, the most likely to struggle with housing cost burdens, and the most likely to struggle with energy insecurity - low-income families are adversely impacted by rising utility costs with the poorest families spending between 7.2% and 10% of their incomes on electricity, while the average household pays less than half of that amount, or only 3.5% of their income on electricity. Low income households are also nearly 3 times ore likely to rent rather than own their home (https://www.zillow.com/research/homeownership-by-income-9419/), meaning they have much less control over the energy efficiency of their home. In recent studies, ACEEE and EEFA found that 97 percent of the excess energy burdens within renter households could be eliminated by bringing their homes up to median efficiency standards while a 2015 study by the U.S. Department of Energy found that the value of energy upgrades is 2.2 times their cost. The less energy efficient a building is, the higher that value to cost ratio becomes. Supporting pathways to create equity in energy aliviates energy burdens for those that need relief the most as well as expands the market for energy efficiency and renewable energy investments.

Initial Actions

EB5-A-1 Promote the development of partnerships with low-income and supportive housing serving organizations, the County, and the Bloomington Housing Authority to ensure that efficiency and renewable programs, incentives, and practices, meet the specific needs of these populations.

EB5-A-2 Collaborate with Duke Energy and Vectren to increase energy efficiency funding options for families including low-interest financing, on-bill financing, Pay As You Save, and other programs as determined to be most effective.

EB5-A-3 Establish a Recover Forward energy fund to invest in energy efficiency and renewable energy projects with a focus on supporting improved equity in Renewable Energy and Energy Efficiency in the community.

EB5-A-4 Collaborate with partners such as Citizens Action Coalition to establish and regularly host utility bill clinics similar to those offered by Minnesota Citizens Utility Board (http://cubminnesota.org/) to help residents understand their bills, discuss energy savings options, and hear about rebate/incentive availability and clean energy options.

Strategy Expected Benefits

Energy and Built Environment

Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as reduction of electrical and natural gas use, can save money for the community. The estimated community savings of the goals for this section include:

Residential Energy Efficiency and Renewable Energy Savings:

$28,667,366
$927
per household

(Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

+

Commercial/Industrial Energy Efficiency and Renewable Energy Savings:

$33,582,724
$662
per job

(Based on current average energy rates applied to energy reductions and an estimated average 12 year ROI on solar)

=

Estimated Cumulative Savings Potential

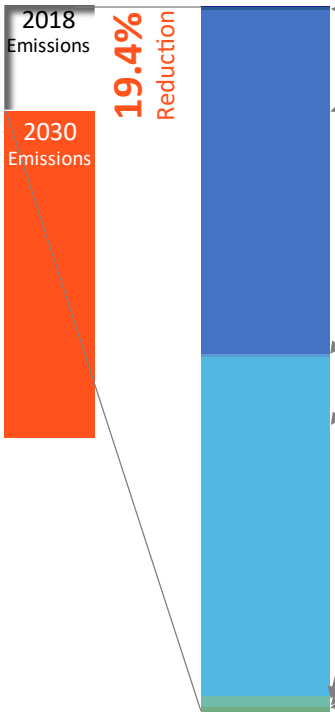
$62,250,090

Planned Energy and Built Environment GHG Emission Reductions

Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 186,891 metric tons (MT) by 2030 - a 19.4% reduction over 2018 levels.

This is equivalent to eliminating **3,667 million** cubic feet of man-made greenhouse gas atmosphere annually by 2030.



Individual Strategy Annual Emission Reductions by 2030

Strategy EB 1-A:
Increase solar on City facilities

Strategy EB 1-B:
accelerate on-site solar PV citywide

Strategy EB 1-C:
Improve energy policy.

Strategy EB 2-A:
Increase City building energy efficiency

Strategy EB 2-B:
Accelerate energy efficiency citywide.

Strategy EB 2-C:
Increase net zero building stock citywide

Strategy EB 3-A:
Support Duke Energy's grid emissions goal

Strategy EB 3-B:
Advocate for stronger state policy.

Strategy EB 4-A:
Accelerate electrification of systems

Strategy EB 4-B:
Accelerate low/no carbon alternatives

Strategy EB 5-A:
Promote Equity in Energy

What You Can Do

- Take advantage of rebates offered by Duke Energy and Vectren and weatherize your home to protect the interior from the elements (as well as reducing your energy bills!) https://www.duke-energy.com/find-it-duke/energy-efficient-rebates, https://www.vectren.com/savings/in-home/rebates).
- Replace your shingles with a "cool roof" that is lighter in color, reflecting away light in the summer time and reducing your cooling loads.
- Turn off lights and electronics when not in use - or even better, unplug them. Some electronics continue to use power, even when turned off.
- Switch your lightbulbs to more energy efficient LED lights.
- Turn your heat down and A/C up by two degrees, especially if you are not home or away on a trip.
- Reduce your water heater temperature to 130° F to save energy and money on heating water.
- Schedule a free Home Energy Assessment through IPL to learn of opportunities for energy efficiency and weatherization.
- Seal air leaks and properly insulate windows to save up to 20% on heating and cooling bills, while also increasing the comfort of your home.
- Think small before you rent or buy. Consider what size home or business you need, and consider downsizing to avoid having to spend more on energy.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Section 04

Waste Management

Click here to return to TOC

Waste Management

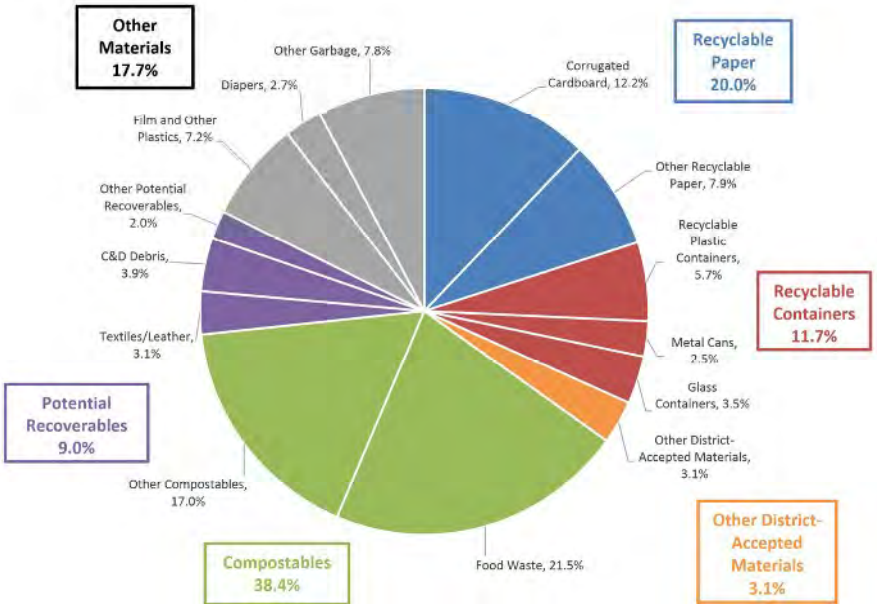
Why Waste Management Is Important

In Bloomington, solid waste contributed 6.3% of citywide greenhouse gas emissions in 2018. However, studies indicate that municipal solid waste sector has great potential to avoid emissions throughout the economy thanks to prevention and waste recovery. Landfills are the third largest anthropogenic (man-made) source of methane, accounting for approximately 11% of the estimated total global methane emissions.

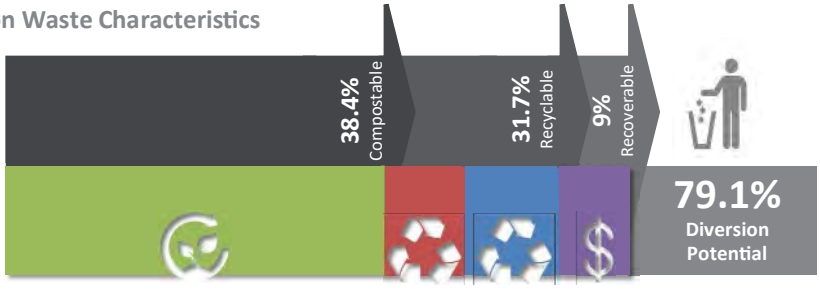
Habitat destruction, global warming, and resource depletion are some of the effects of our materials consumption. Recycling - converting discarded materials into new materials or putting them to beneficial use - is an important approach in mitigating these impacts and reducing the pollution caused by wasting. Recycling reduces the need for raw materials so that natural resources, and the environments in which they exist, can be preserved. Recycling creates manufacturing jobs, extends the value of materials, and conserves natural resources while reducing the need for landfill space.

Food discards and residuals that decompose in landfills release methane, a greenhouse gas that is at least 28 times more potent than carbon dioxide. This fact makes food wasting a significant contributor to solid waste greenhouse gas emissions. On the other end of the food supply chain, food production accounts for 26% of global emissions. In the United States, approximately 30% of the food produced is wasted - meaning nearly 8% of US emissions come from the production and distribution of wasted food.

Bloomington 2018 Mix Waste Characteristics (by weight)
Graphic Source: Monroe County Mixed Waste Processing Feasibility Study



Waste Diversion Potential Based on Waste Characteristics



Based on the mix waste characteristics, shown on the charts to the right, 38.4% of Bloomington waste (citywide private haulers) is compostable organics, 31.7% are recyclable materials, and 9% are potentially recoverable/reusable. Taken together, this indicates the waste stream has up to 79.1% which can be readily diverted to beneficial use.

Climate Change Considerations

Climate Impacts

This sector impacts climate change through combustion of fossil fuels in the collection and processing of materials, as well as the generation of methane from anaerobic decomposition of organic materials in land fills .

Climate Hazards

Hazards to the waste management system include damage to infrastructure from extreme weather and flooding.

Opportunities

As indicated in the Waste Diversion Potential diagram above, a significant portion of Bloomington's waste stream has the potential for being put to beneficial use while avoiding GHG emissions.

Waste Management

Equity Considerations

- Accessibility to recycling and composting programs may not be equally and readily available to all community residents and may also be impacted by other participation-related barriers, including awareness of programs, user fees, accessibility based on housing type, and language barriers.
- Populations that are situated very close to the landfill or composting facility may experience nuisance issues like bad odors and potential health issues unless mitigation actions are implemented.

Sector Goals

Goal WM 1

Increase landfill solid waste diversion by 30% by 2030 (26,500 ton reduction).

Goal WM 2

Educate, motivate, and empower the public to achieve waste reduction and diversion.

Solid Waste Targets Supporting Sector Goals

	Citywide Organics Diversion	Citywide Recyclables Diversion	Citywide Recoverable Material Diversion
Today (share of waste)	38.4%	31.7%	9%
2030 Targets	26.9%	22%	6.3%

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Waste Management section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Goal WM 1 Increase landfill solid waste diversion by 30% by 2030 (26,500 ton reduction)

How We'll Get There | **How We'll Measure Progress**

Strategy WM1-A:

Increase organics diversion by 30% by 2030 (from 38.4% of community mixed waste to 26.9%)

Reported organics processed at landfill, Waste mix reported by characteristics study

All organics collected at IU are hauled to Green Earth by JB Disposal Services. Yard waste generated by City Parks and Recreation, as well as organics collected from private residences and commercial customers is hauled by the private composting company, Earthkeepers, to Fable Farms. Compost drop off services are offered at one District owned facility for those with an Earthkeepers subscription. According to the 2018 Mixed Waste Processing Feasibility Study, most compostable waste is not being diverted from the landfill with the current system. Significant generators of food waste from non-residential sources in Bloomington include restaurants, grocery stores, food manufacturers, nursing homes, schools, and hospitals. Restaurants and grocery stores alone account for 93 percent of food waste from non-residential sources and represents a significant opportunity for improvement.

Initial Actions

WM1-A-1	Create a pilot "Food Scraps Bag" pilot program to test food scraps composting collection across resturant, commercial and residential customer base where food scrap bags are separated at landfil without separate compost bins and collection vehicles. https://cutt.ly/tfBf5Dj
WM1-A-2	Establish a “Towards Zero Waste Certification” program to provide education to food retailers and restaurants on strategies to reduce waste and to promote businesses successfully achieving certification levels. Target: 20 additional businesses enrolled annually https://carbonfreedining.org/ https://true.gbci.org/ https://www.crra.com/certification
WM1-A-3	Support edible food donation through coordination with the food bank and donations from City and community partner events. Explore expansion of effort by identifying food retailer and restaurant partners for increased participation and support.

Strategy Expected Benefits

Strategy WM1-B:

Increase recyclables diversion by 30% by 2030 (from 31.7% of city mixed waste to 22%)

Reported recyclable material processed at landfill, Waste mix reported by characteristics study

The District manages five drop-off recycling centers throughout the County for use by its residents, as well as a pay as you throw and hazardous waste recycling program. Private haulers, such as Republic, also provide recycling services and collect comingled recyclables from for delivery to a material recovery facility in Indianapolis to be sorted, baled, shredded or granulated for purchase from brokers or end-user purchasers. If materials are not loose, clean, dry, or appropriately sorted, that decreases the feasibility of the items being recycled. Recyclable containers (plastic, metal, and glass) and recyclable paper items make up 31.7% of communitywide waste stream indicating a significant opportunity for increased diversion of materials being landfilled and an opportunity for increased beneficial use.

Initial Actions

WM1-B-1	Ensure that recycling in schools, City buildings, public housing, and public spaces is fully implemented.
WM1-B-2	Conduct outreach to determine what assistance may be needed to increase recycling and composting.

Strategy Expected Benefits

Goal WM 1 Increase landfill solid waste diversion by 30% by 2030 (26,500 ton reduction)

How We'll Get There | **How We'll Measure Progress**

Strategy WM1-C:

Increase diversion of potential recoverables by 30% by 2030 (from 9% of city mixed waste to 6.3%)

Reported potential recoverable material processed at landfill, Waste mix reported by characteristics study

Potentially recoverable materials are materials that have the potential to be recovered or recycled, but are not currently collected for recycling at the District's collection centers or in the City's single stream recycling program. Some of these materials, such as textiles/leather and construction and demolition debris, would require source separation and/or additional processing to recover, rather than recovery through mixed waste processing. Outreach and partnering with waste sources (businesses, households, etc) to support the identification of recoverable materials and explore re-use and recycling pathways represent an opportunity to increase diversion of these materials.

Initial Actions

WM1-C- 1	Develop and fund a waste audit and diversion assistance program for businesses. Program to support businesses in establishing tracking and reporting waste streams, identify reduction, diversion, beneficial use opportunities, identification of potential financing sources, and connect businesses with energy audit and other resources in support of full CAP goals. Target: 60 business waste audits completed annually. Example programs: https://www.mnchamber.com/your-opportunity/waste-wise https://www.portland.gov/sustainabilityatwork
WM1-C- 2	Conduct a Beneficial Use Study to identify greatest beneficial use opportunities present in current City solid waste streams. Study to estimate potential return on investment and identify job and economic development potential associated with opportunities. Research/identify pilot project opportunities to explore capture of benefit.

Strategy Expected Benefits

Strategy WM1-D:

Support waste reduction through policy and operational refinements

Status of Zero Waste policy, PAYT trash rate establishment, Universal Waste Ordinance, and other policies supporting significant waste diversion.

According to a 2011 study ("Policy versus Practice in Municipal Solid Waste Diversion" Canadian Journal of Urban Research), municipalities typically do not pursue policies supporting aggressive landfill diversion and increased beneficial use of waste streams until their landfill capacities reach crisis levels. Establishing visionary policies and operational refinements to advance meaningful landfill diversion and beneficial use of waste streams, therefore, represents a significant environmental opportunity for Bloomington, as well as an opportunity to avoid long-term landfill capacity crisis and to model for other communities the benefit of visionary policy establishment in lieu of waste management by crisis management more frequently experienced by other communities.

Initial Actions

WM1-D- 1	Establish a Zero Waste policy for City operations that outlines increasing incremental annual waste reduction goals charting a path to Zero Waste. Policy to require that outside users of City facilities also follow Zero Waste policy and will modify the event permit application to require the inclusion of recycling and composting at events.

Strategy Expected Benefits

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

How We'll Get There | **How We'll Measure Progress**

Strategy WM2-A:

Create, implement, and promote public awareness and education campaigns.

Status of communication, marketing, and education campaigns

Landfill alternatives have many benefits including GHG emissions reductions, utilization of beneficial materials, and potential for economic development. If community residents and businesses do not properly utilize these diversion programs or limit their consumption of disposable goods, the programs developed will make far less of an impact than they are capable of. A focus on a robust, clear, and consistent message to support eduction, awareness, and mormotion of utilization of resources available can support achieving better success.

Initial Actions

WM2-A-1

Create a comprehensive communication campaign to provide standardized information and communications on waste reduction, recycling, and organics collection options to reach the residential sector. Example campaigns: City of Portland Be Cart Smart, City of Fayetteville Solid Waste Diversion and Recycling Education Plan: https://palebluedot.llc/bloomington-cap-policies

Strategy Expected Benefits

Reduced Costs

Improved Quality of Life

Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as reduction of electrical and natural gas use, can save money for the community. The estimated community savings of the goals for this section include:

Organics/Food Waste Diversion Savings:		Commercial/Industrial Energy Efficiency and Renewable Energy Savings:		Estimated Cumulative Savings Potential
$77,608,211 $913 per capita	+	$1,567,500	=	$79,175,711
(Value per ton diverted is average value for prevention and recovery strategies based on "A Roadmap To Reduce US Food Waste" by ReFED)		(Business waste savings based on MN WasteWise reported average business savings)		

Planned Energy and Built Environment GHG Emission Reductions

Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 11,085 metric tons (MT) by 2030 - a 13.6% reduction over 2018 levels.

This is equivalent to eliminating **218 million** cubic feet of man-made greenhouse gas atmosphere annually by 2030.

Individual Strategy Annual Emission Reductions by 2030

Strategy WM 1-A:
Increase organics diversion by 30%

Strategy WM 1-B:
Increase recyclables diversion by 30%

Strategy WM 1-C:
Increase diversion of potential recoverables by 30%

Strategy WM 1-D:
Support waste reduction through policy and operational refinements

Strategy WM 2-A:
Create, implement, and promote public awareness and education campaigns

What You Can Do

- Challenge yourself and your household to eliminate at least 30% of your food waste. Minimize your food waste by first eating what you already have in your fridge. Meal planning and making grocery lists can also reduce your food waste.
- Bring your own reusable produce and tote bags when grocery shopping to avoid using plastic bags.
- Challenge yourself and your household to increase your recycling capture by at least 30%. Minimize your food waste by first eating what you already have in your fridge. Meal planning and making grocery lists can also reduce your food waste.
- Make sure to wash and wipe dry your recyclable goods, so as to lower contamination in recycling streams.
- Avoid getting food “to-go” to prevent the use of Styrofoam containers, single-use plastics utensils and plastic bags.
- Purchase reusable goods like durable water bottles, cutlery, and to-go containers to avoid using single-use plastics.
- Never throw hazardous household waste, like batteries and chemicals, in the trash. Dispose of them in an environmentally responsible way.
- Buy gently used, second-hand clothing and avoid "fast fashion."
- Keep a bag in your car to collect trash and prevent littering.

Click here to return to TOC

Section 05

Water and Wastewater

Water and Wastewater

Why Water and Wastewater is Important

Water is at the core of climate change and sustainable development. Quality water is vitally important for socio-economic development, maintaining healthy ecosystems, and for human survival. Water is central to the production and preservation of a wide range of services benefiting people. Our processing of water is also linked to our greenhouse gas emissions. Water related energy use totals 13% of US electricity consumption and has a carbon footprint of at least 290 million metric tons. Meanwhile, wastewater treatment is responsible for 3% of global GHG emissions.

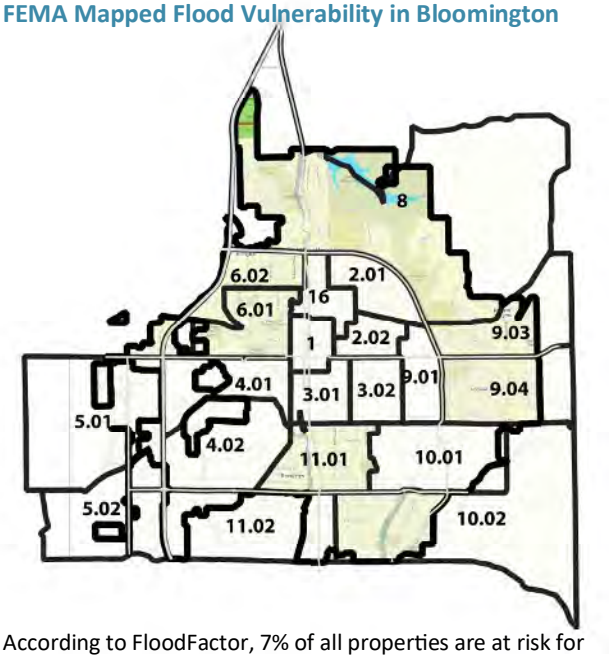
Water is also at the heart of adaptation to climate change - climate change, particularly in the Midwest will be closely linked to changes in precipitation including increased likelihood of drought combined with increased instance of heavy rain events, flooding, and flash flooding. On average across the Wabash River Basin, precipitation is projected to be 3% higher in the 2020s under a high-emissions scenario compared to the 1971-2000 average (FutureWater Indiana). Many impacts of climate change also increase stress on our water systems, increase water pollution potential, and place more risk on maintaining safe water resources. Water is an irreplaceable, critically important resource fundamental to the well-being of our communities. Water can only be considered renewable with high quality best water management practices in place.

According to "*Hoosiers' Health in a Changing Climate: A Report from the Indiana Climate Change Impacts Assessment*":

> The increased frequency and severity of precipitation, as well as the timing in the spring and winter, considerably increase the risk of flooding, especially in low-lying areas throughout the state. These flood events will be responsible for fatal and non-fatal injuries and waterborne disease. Heavy storms can cause storm drains and sewage pipes to overflow and residential stormwater management systems (e.g., sump pumps) to fail. Contact with stormwater/wastewater has been correlated with increased rates of gastrointestinal illnesses. Dampness in homes, schools and other buildings caused by flooding can increase mold growth and lead to higher rates of asthma and allergies.

The graphic to the right illustrates FEMA flood vulnerable areas (see Bloomington Climate Risk and Vulnerability Assessment). The Census Tracts with the highest impact sensitivities are highlighted. This graphic indicates that many of areas of higher flood risk appear in the tracts with the highest impact sensitivities. These sections may benefit from flood mitigation strategies.

FEMA Mapped Flood Vulnerability in Bloomington



According to FloodFactor, 7% of all properties are at risk for flooding or approximately 1,500 properties out of 21,330 assessed, by 2300 the number will increase to 1,543 properties.

The City of Bloomington Utilities department (CBU) provides water to all Bloomington residents and businesses and sells water wholesale to nine rural water cooperatives. CBU provides over 1.6 billion gallons of water to 25,299 water customers directly plus most of the remainder of Monroe County through wholesale customers and also serves 22,574 sewer customers and provide stormwater management services for the entire city of Bloomington. In 2018, the water and wastewater sector contributed 1.14% of citywide GHG emissions with water distribution responsible for 5,847 metric tons and wastewater treatment accounting for 8,904 metric tons.

Climate Change Considerations

Climate Impacts

This sector impacts climate change through fossil fuel use to generate the electricity required to process and distribute water.

Climate Hazards

Hazards to the water and wastewater system include damage to infrastructure from extreme weather and flooding. Citywide hazards include increased flooding and flash flooding potential.

Water and Wastewater

Equity Considerations

- Low-income neighborhoods frequently suffer more damage from flooding, according to studies by the National Academies of Sciences, Engineering and Medicine. The frequency and magnitude of heavy rain events is expected to increase as a result of a changing climate, making the future flooding impacts for at-risk neighborhoods potentially more acute
- Disadvantaged communities within cities often have denser populations, more impervious surfaces, and less open/green spaces. These areas can also be prone to flooding and sewer overflows. Stormwater management through the creation of open, green spaces serve to revitalize and promote health within these disadvantaged communities.

Sector Goals

Goal W1

Promote increased water conservation citywide.

Goal W2

Maintain source and drinking water quality through climate related challenges.

Goal W3

Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030.

Goal W4

Mitigate flood hazards and impacts.

Water and Wastewater Targets Supporting Sector Goals

	Citywide Water Consumption	Water+Wastewater Process Energy
Today (share of waste)	-	-
	1.27 Billion Gallons	24,436 MWH
2030 Targets	**1.23** Billion Gallons	21,992 MWH

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Water and Wastewater section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Goal W1 Decrease water consumption by 3% by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy W1-A:

Reported citywide water consumption

Promote increased water conservation citywide

Average per capita daily water consumption within the city was 96.2 gallons in 2016. The population of Bloomington and the surrounding area is anticipated to increase while water supplies are finite meaning wee have an obligation to use our limited resources responsibly. Prudent water use practices will help ensure that future generations have access to clean and abundant water sources, despite growing populations and the lack of new supplies. Reducing per capita water consumption by 3% will conserve over 38 million gallons annually.

Initial Actions

W1-A-1 Facilitate reduction of water use by top 20 customers. Request large institutions and businesses to identify specific opportunities for employees or customers to conserve water and incorporate water efficiency into internal operations

W1-A-2 Accelerate the installation of low-flow water fixtures in residential homes and expand the program to commercial businesses. Goal: achieve 100 households and 10 businesses upgraded annually

Strategy Expected Benefits

Reduced Costs

Improved Community Resilience

Strategy W1-B:

Reported citywide water consumption

Maintain and update city plans and standards in support water conservation goals

Reducing water consumption within City of Bloomington facilities supports citywide water conservation goals, provides opportunities to exhibit water conservation techniques, and will create operational cost savings for the City.

Initial Actions

W1-B-1 Evaluate the potential to update the City's Green Building Program to include installation of rainwater collection systems at City facilities for graywater uses, and investigate opportunities for graywater reuse at existing and new City facilities and properties. Implement grey-water systems identified capable of reducing energy/water demand in other areas (for example, watering urban tree canopy to reduce heat island effect and air conditioning needs)

Strategy Expected Benefits

Improved Community Resilience

Protected / Enhanced Ecosystems

Goal W2 Maintain source and drinking water quality through climate related challenges.

How We'll Get There | **How We'll Measure Progress**

Water quality as reported through annual drinking water quality reports.

Strategy W2-A:

Maintain source and drinking water quality through climate related challenges.

Bloomington has a surface water source for drinking water, Lake Monroe. The Monroe Water Treatment Plant filters and cleans the water for public distribution. The MWTP is operated by the City of Bloomington Utilities Department. The Water Treatment Plant is a conventional settling/filtration facility and has several stages of disinfection before the water is sent out into the distribution system. According to the 2020 Annual Drinking Water Quality report, Bloomington water is within required levels of all 12 water contaminate measures, 5 of which are at or below "ideal" levels. https://cutt.ly/zggXnII

Initial Actions

W2-A- 1 Strengthen riparian/stream/wetland protection in local ordinances and regulations where feasible

Strategy Expected Benefits

Reduced Pollution

Improved Community Resilience

Goal W3 Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030

How We'll Get There | **How We'll Measure Progress**

Reported energy consumption by City water and wastewater systems.

Strategy W3-A:

Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030

According to the 2018 GHG Inventory, processing and distributing water within the city of Bloomington consumed 10,984,760 kWh annually. Meanwhile, wastewater collection and treatment consumed 13,450,909 kWh. Reducing energy use associated with water and wastewater treatment by 10% will save over 2.4 million kWh annually.

Initial Actions

W3-A- 1 Promote measures that reduce the energy needed to heat, treat and transport water, including continued evaluation of new hydroelectric and photovoltaic opportunities.

Strategy Expected Benefits

Improved Energy Resilience

Reduced GHG Emissions

Goal W3 Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy W3-B:

Capture and use of wastewater energy potential

Status of biogas study.

As recommended by the City of Bloomington Waste To Energy Taskforce, the City should further investigate the potential of an aerobic digester wastewater-to-energy installation at the Dillman Road Wastewater Treatment Plant. As outlined in the Taskfrorce's findings, an aerobic digester on site could produce approximately 325 kW of electricity, which is about 36% of the plant's average electrical consumption.

Initial Actions

W3-B-1 Research into biogas opportunities at the City's wastewater treatment plant and explore opportunities for renewable natural gas development capacity.

Strategy Expected Benefits

Reduced Costs

Reduced GHG Emissions

Goal W4 Mitigate flood hazards and impacts

How We'll Get There | **How We'll Measure Progress**

Strategy W4-A:

Reported energy consumption by City water and wastewater systems.

Update design standards and plans for flood mitigation

According to "Hoosiers' Health in a Changing Climate: A Report from the Indiana Climate Change Impacts Assessment," Indiana will see an annual precipitation increase of 6-8% by 2050 with an increase in the likelihood of heavy downpours. Meanwhile, changes in precipitation patterns are projected to increase Indiana's drought potential severity index by 5% - meaning heavier rainfalls will likely be falling on harder ground more susceptible to increased water runoff and flash flooding. Maintaining community plans and design standards based on projected climate impacts will be key in minimizing flood hazard threats.

Initial Actions

W4-A-1 Review and update public infrastructure design standards and the City's Stormwater Management Plan to meet Climate Change projections for Bloomington.

W4-A-2 Perform a flood risk assessment using historical data and future precipitation forecasts to identify areas and critical infrastructure vulnerable to flooding

Strategy Expected Benefits

Improved Community Resilience

Strategy W4-B:

Reported energy consumption by City water and wastewater systems.

Increase green infrastructure capacities citywide

Green infrastructure strategies can build soil quality and improve the permeability (or absorbency) of the soil. The more permeable the surface, the less stormwater runoff there will be, reducing flood risks. Porous natural landscapes, such as meadows and forests, can soak up as much as 90 percent of the rain or snowmelt they receive. By reducing stormwater runoff and protecting floodplains, green infrastructure can help manage both localized and riverine floods.

Initial Actions

W4-B-1 Promote native landscaping, restore and conserve habitat; encourage rain gardens on private property, avoid turf grass, and convert City-owned space to include stormwater absorption features. Tree selection should consider those on the "Adaptive Planting List" which will thrive in our future local climate

Strategy Expected Benefits

Improved Community Resilience

Protected / Enhanced Ecosystems

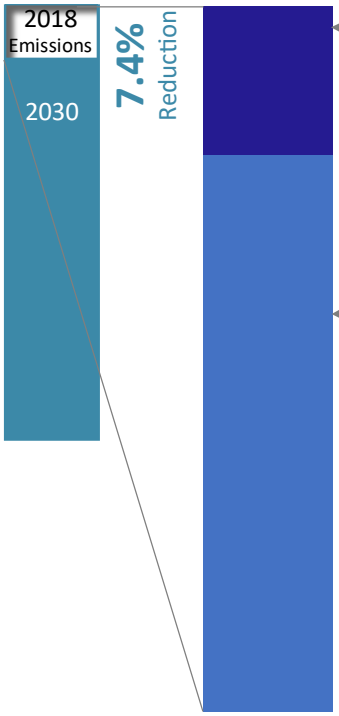
Water and Wastewater

Planned Energy and Built Environment GHG Emission Reductions

Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 1,090 metric tons (MT) by 2030 - a 7.4% reduction over 2018 levels.

This is equivalent to eliminating **21.4 million** cubic feet of man-made greenhouse gas atmosphere annually by 2030.



Individual Strategy Annual Emission Reductions by 2030

Strategy W1-A:
Promote increased water conservation citywide

Strategy W1-B:
Maintain and update city plans and standards in support water conservation goals

Strategy W2-A:
Maintain source and drinking water quality through climate related challenges

Strategy W3-A:
Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030

Strategy W3-B:
Capture and use of wastewater energy potential

Strstegy W4-A:
Update design standards and plans for flood mitigation

Strategy W4-B:
Increase green infrastructure capacities citywide

What You Can Do

- Trade your shower heads and faucets for low-flow, water-efficient options.
- Reduce or eliminate use of fertilizers and pesticides on lawns to protect surface water quality and ecosystem health.
- Purchase a State of Indiana DNR Environmental license plate, your money will go towards the protection of Indiana's land, waters and wildlife.
- Collect rainwater in rain barrels to water your lawn and/or plants.
- Convert lawn areas to native, drought resistant landscaping that does not require watering.
- Install a Smart Irrigation Meter to Prevent watering grass that doesn't need it.
- Pick up after your pets and don't blow grass and leaves into the street.

Section 06

Local Food and Agriculture

Click here to return to TOC


TOP FARM

Local Food and Agriculture

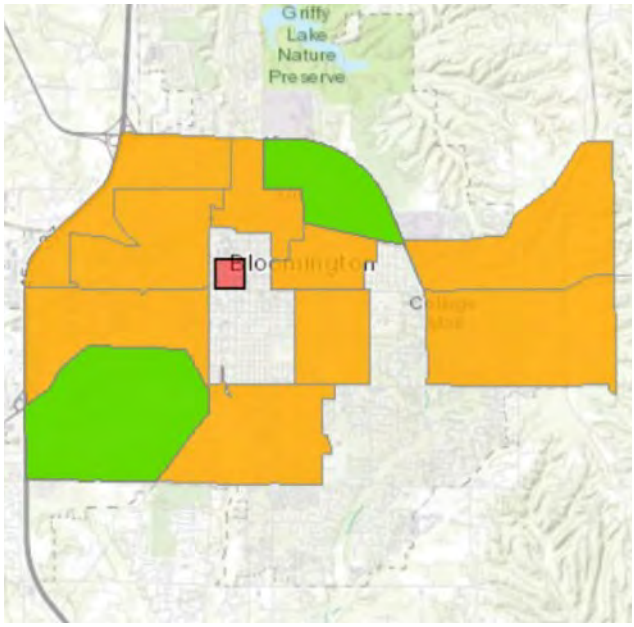
Why Local Food and Agriculture Are Important

Food and climate change are directly linked. For food or nutritionally insecure people, climate change is a threat multiplier. The extreme weather events, extreme temperature variations, changes in precipitation, changing soil temperatures and other climate impacts can impact crop yields as well as introduce interruptions in the current food processing and distribution system - disruptions that are likely to cause food availability or pricing fluctuations.

Many in Monroe County suffer from food insecurity, some Bloomington neighborhoods identified by the Bloomington Food Policy Council as being at particular risk for food insecurity included Crestmont, Reverend Butler, Walnut Woods, Maple Heights, and Broadview. Food insecurity continues to grow in the face of economic challenges with thousands of meals served every week from direct service providers in 2020.

On the map to the left, highlighted sections represent low-income census tracts at least 500 people or 33 % of residents are more than 1 mile (green sections) or 1/2 mile (orange) from the nearest supermarket (defined as a store containing all the major food departments necessary to provide full nutrition to a household) .

USDA Map of Potentially Food Insecure Census Tracts



Indiana is one of the most powerful agricultural states in the nation, ranked #10 in total production. However, more than 90% of the food consumed and processed in Indiana is imported from other states. Studies conducted by the Indiana State Department of Agriculture (ISDA) and the Indiana State Department of Health (ISDH) over the past eight years have outlined several reasons for this:

- a lack of agricultural diversity and midscale farms producing specialty crops in Indiana
- weak farm to buyer network connections
- lack of local or state policies that support purchasing of local food with public money
- few processing centers for value added food businesses

Though there are now three Farmer's Markets serving the Bloomington area, there are limited retail and institutional purchasing outlets as part of the local food system.

Strengthening local food sources can address both climate change relationships with food and also supports small business local economy. Studies have indicated that nearly 32 jobs are created for every $1 million in revenue generated by produce farms involved in a local food market, compared to only 10.5 jobs for those involved in wholesale channels exclusively. Healthy local food systems can also play a critical role in addressing food access vulnerability and food insecurity within neighborhoods of higher vulnerability. A robust local food system establishes additional supply chains and resilience to distribution disruptions, increasing overall community resilience.

Climate Change Considerations

Climate Hazards

Hazards to the local food and agriculture system include reduced crop quality and yield, vulnerability to pests and soil moisture as well as fluctuation in availability, food price volatility and change .

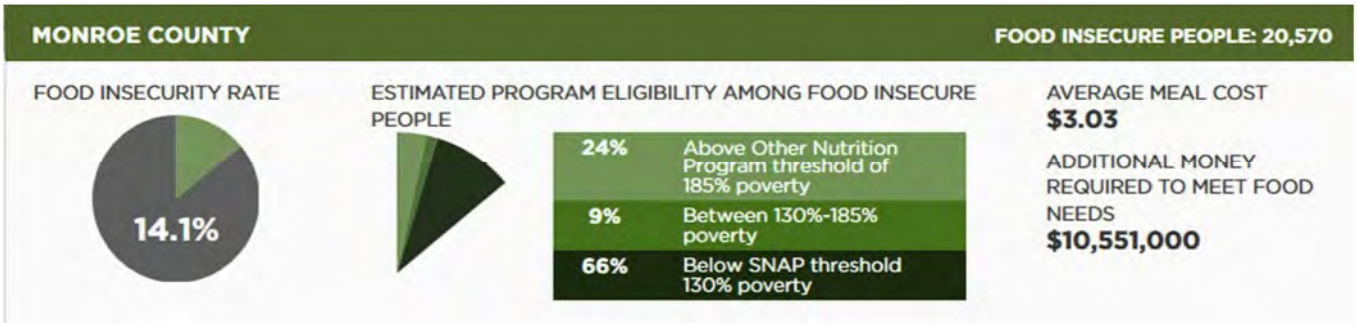
Opportunities

Increased capacity of local food and agriculture systems and improved farm-to-table approaches can reduce community food insecurity while creating local jobs and improved community resilience.

Local Food and Agriculture

Equity Considerations

- People in low-income neighborhoods may have limited access to full-service supermarkets or grocery stores - an area known as a "food desert". Over 14% of Monroe County households are food insecure – over 30% of those with incomes above assistance program thresholds.
- Studies have also shown that communities with fewer resources often have more outlets that promote unhealthy dietary behaviors such as fast food restaurants, and little access to affordable nutritious food. This condition is known as a "nutrition desert".



(Graphic source: Feeding America)

Sector Goals

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.

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Local Food and Agriculture section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Goal FA 1: Increase food and nutrition security citywide.

How We'll Get There | **How We'll Measure Progress**

Strategy FA1-A:

Address financial food insecurity

Food insecurity reported in City and County

75% of food insecure individuals in Monroe County are low income with 88% of those individuals below 135% poverty level, indicating a clear relationship between financial insecurity and nutrition insecurity in the community.

Initial Actions

FA1-A-1 Explore potential of collaborating with low cost produce providers to establish local food markets serving low income, vulnerable, and food insecure communities while addressing retail and commercial food waste. Potential partner: Daily Table https://dailytable.org/

Strategy Expected Benefits

Improved Community Resilience

Improved Community Equity

Strategy FA1-A:

Improve food access

Food insecurity reported in City and County

Individuals living with food insecurity are particularly vulnerable to impacts and risks of climate change. As indicated in the USDA Food Map, many sections of Bloomington have significant portions of the population who are economically stressed as well as having limited access to transportation and living 1/2 mile or further from a grocery store. Increasing food access will decrease food insecurity improve community resilience and adapative capacity to climate impacts.

Initial Actions

FA1-B-1 Conduct a detailed Food Security Assessment to determine food insecurity conditions within the City, areas with limited access to full service grocery stores and markets (particularly within areas of higher vulnerable populations), target areas within the City for improvement, and identify detailed strategies to increase food security within City.

Strategy Expected Benefits

Improved Community Resilience

Improved Community Equity

Goal FA 2: Increase local agricultural resilience to climate shocks

How We'll Get There | **How We'll Measure Progress**

Strategy FA2-A:

Provide information and promote climate responsive agriculture practices

Reported percentage of local food growers adopting climate adaptive strategies

According to research completed for "Estimating economic damage from climate change in the United States", a 2017 study completed by Solomon Hsiang and others from the University of California at Berkeley, agricultural yields are projected to decline with the increase of Global Mean Surface Temperature in addition to impacts related to precipitation changes. Although increased CO2 levels are anticipated to offset a portion of these yield loses, the impact for much of the United States will be a net negative. By 2100 the projected impact to the Monroe County economy is -35.6%. See the Bloomington Climate Risk and Vulnerability Assessment.

Initial Actions

FA2-A-1 Collaborate with the County, Indiana Unversity, Monroe County Farmer's Association, Indiana Grown, and local organic farmers associations to encourage adoption of strategies to increase soil health and increased carbon sequestration for Croplands and Grazing Lands. Tools: http://www.comet-farm.com/ GHG and Carbon Sequestration Ranking Tool: https://cutt.ly/Vf04djN

Strategy Expected Benefits

Protected / Enhanced Ecosystems

Improved Community Resilience

Goal FA 2: Increase local agricultural resilience to climate shocks

How We'll Get There | **How We'll Measure Progress**

Strategy FA2-B:

Support climate resilient agriculture through City plans and programs

Status of City plan and program development

Addressing agricultural resilience through community level planning provides opportunities to improve overall community resilience to climate change impacts and to guide long-term local food infrastructure to support communities in greatest need.

Initial Actions

FA2-B-1 Develop a comprehensive farmland conservation plan that prioritizes food production while taking into consideration other Bloomington greenspace and climate adaptation priorities. The plan could also include specific maps or areas prioritized for farmland conservation or identify those areas most at risk from development or climate change impacts. Program should focus on exploring increased local food-to-table, local food utilization, and local development of cultural food products in support of Bloomington area underserved communities.

Strategy Expected Benefits

Improved Community Resilience

Reduced Costs

Goal FA 3: Increase and stabilize local food market.

How We'll Get There | **How We'll Measure Progress**

Strategy FA3-A:

Increase local food supply

Status of Food Coordinator staff position; Status of urban agriculture orcinances

Strengthening local food sources can address both climate change relationships with food and also supports small business local economy. Studies have indicated that nearly 32 jobs are created for every $1 million in revenue generated by produce farms involved in a local food market, compared to only 10.5 jobs for those involved in wholesale channels exclusively. Healthy local food systems can also play a critical role in addressing food access vulnerability and food insecurity within neighborhoods of higher vulnerability.

Initial Actions

FA3-A-1 Continue funding for a municipality position to coordinate and facilitate food system solutions including adaptation and mitigation of climate change impacts. Tasks include education and training for residents and businesses, building relationships between food buyers and food businesses, and coordinating other actions in this section on Food Systems

FA3-A-2 Revise zoning ordinances to allow urban agriculture and clarify acceptability to remove barriers to front yard and rooftop vegetable gardens, edible landscaping and foraging. Proactively promote and educate the public on urban agriculture ordinances, options and approaches

Strategy Expected Benefits

Jobs / Economic Development

Improved Quality of Life

Strategy FA3-B:

Strengthen demand for local foods

Status of Local Food Procurement policies

Increased demand for locally produced food ensures the economic resilience of local producers, leverages the local job creation potential of local food systems, and supports improved nutrition for consumers while improving community resilience.

Initial Actions

FA3-B-1 Pass city policy to procure locally grown foods for events and other organized food catering at city-managed facilities. Coordinate with School District, Indiana University, County, and local hospitals to establish similar locally sourced foods procurement policies. Explore development of group purchasing and logistics agreements to increase efficiency of local farm-to-agency process. https://goodfoodpurchasing.org/

Strategy Expected Benefits

Improved Community Equity

Improved Quality of Life

What You Can Do

- Support your local community gardens - or even better, grow your own.
- Eat carbon-friendly. Animal products are extremely GHG-intensive to produce compared to plants. Eating less meat and dairy can make a big cut in food consumption emissions. Eating regionally-grown food that is suitable for the Indiana climate can also make a difference through reduced transportation-related emissions. A great place to start is with "Meatless Mondays" or one meat-free meal a day.
- Purchase locally-grown food, supporting local agriculture and minimizing energy spent transporting products.
- Support restaurants and grocery stores that use and sell locally-grown food.
- Buy food that is in season, minimizing the distance food must travel.
- Support your local farmers markets.
- Buy ethically grown and harvested food, like fair-trade coffee and chocolate.
- Plant fruit or nut bearing trees or shrubs that are well suited for our hardiness zone on your property.


Canon

Section 07

Health and Safety

Click here to return to TOC

Health and Safety

Why Health and Safety Are Important

There is a strong relationship between human health and environmental health. From the air we breathe to the water we drink and use, life here on Earth depends on the natural resources and the environment around us. This link between the environment and human health is a critical consideration of the impacts of climate change. As outlined in the City's Climate Risk and Vulnerability Assessment, changes in climate, such as higher average temperatures and increased storm frequency and intensity, can intensify public health stressors. These climate change impacts endanger public health and safety by affecting the air we breathe, the weather we experience, our food and water sources, and our interactions with the built and natural environments. As the climate continues to change, the risks to human health continue to grow.

In the same way local governments and the health care industry promotes healthy behaviors such as eating right and exercising; agencies should recognize the relationship between climate action, environmental stewardship and community health since the health of our environment affects public health.

A "Climate Risk" is the potential for negative consequences and outcomes for human health, systems, or communities. The most common way of evaluating the level of risk associated is "likelihood of Occurrence" x "Impact Level" or vulnerability. The chart below reviews the expected impacts, likelihood of occurrence, impact level based on Population vulnerability reviewed in the Bloomington Climate Risk and Vulnerability Assessment, potential timeframe, and resulting overall risk level for Climate Risks to Population (Health Impacts).

Climate Risks for Bloomington Populations

Health Impacts	Expected Impact(s)	Likelihood of Occurrence	Impact Level (Population Vulnerability)	Timeframe	Risk (Likelihood x Impact)	Impact-related indicators
Extreme Heat	Increased demand for cooling; heat stress and emergency visits, heat related health	Possible	High	Medium-term	High	Cooling Degree Days, days above 95
Flooding	damage to property; flood related health impacts; infrastructure impacts	Likely	High	Short-term	Very High	Flood events, flash flood occurances, wettest 5-day periods, number of heavy rain events, disaster declarations, change in NOAA storm
Drought	Damage to crop/tree/ecosystem, reduced drinking water source, increased flash flood potential due to decreased soil permeability	Possible	Moderate	Medium-term	Moderate	Consecutive days without rain, acquafer level, surface water condition, river flow
Air Quality Impacts	Increased particulate matter, increased ozone impacts, increased instances of asthma	Possible	High	Medium-term	High	Air quality index
Vector-Borne Diseases	Increased instances of lyme disease, encephalitis, heart worm, malaria, zika virus,	Likely	Moderate	Long-term	Moderate	Disease records
Nutrition Insecurity	Food price volitility/change, fluctuation in availability	Possible	Moderate	Medium-term	Moderate	Food price index, Foodshelf demand, % of school children qualifying for free and reduced lunch
Water Quanity/Quality Impacts	Water shortage, surface water quality impacts due to heat and stormwater runoff	Possible	Low	Long-term	Low	Acquafer health; Water quality test results
Water Borne Disease	Bacteria exposusure at infected surface water locations, contamination of drinking water due to flood	Unlikely	High	Medium-term	Low	flood events; algea blooms

Since 1998, extreme weather has cost Monroe County: **$714,150** Annually

Climate Change Considerations

Climate Hazards

Climate stressors include increases in the frequency and intensity of poor air quality days, extreme high temperature events, heavy rainfalls, extended pollen seasons, changed distribution of disease carrying pests .

Opportunities

Strategies which improve community connectedness, mobility, community resilience through healthy lifestyles frequently coincide with climate mitigation measures such as improved pedestrian safety and low income home weatherization.

Health and Safety

Equity Considerations

- Some populations, including aging adults, children, persons with disabilities, economically stressed, non-English speakers, homeless persons, and workers employed in climate exposed jobs are particularly vulnerable to extreme weather, natural disasters, and the health, supply chain, and economic impacts of climate change. Many of these individuals also have limited access to the information, services, and resources needed to ensure resilience in the face of these impacts.
- Areas within the city with increased flood risk, air quality impacts, compromised tree canopy coverage, and older housing stock with insufficient air conditioning are vulnerable environments within our cities with heightened exposure to climate change risks and compromised capacity to adapt.
- Vulnerable populations are disproportionately represented within the vulnerable environments of our cities and frequently lack resources to improve the adaptive capacity of their surroundings

Sector Goals

Goal HS1

Educate, engage, and empower the public for climate health and safety.

Goal HS2

Respond to climate risks and impacts.

Goal HS3

Prepare Bloomington for climate risks and impacts.

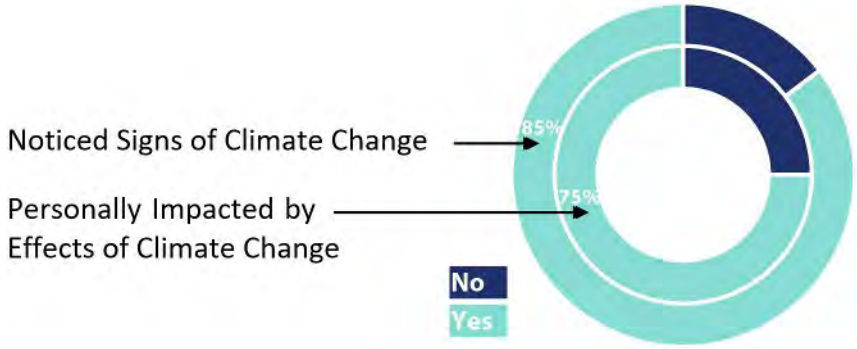
Vulnerable Population Risk Sensitivity Chart

	Extreme Heat	Flooding	Air Quality	Vectorborne Disease	Food Insecurity	Water Quality Impacts	Waterborne Disease	Power Failure
children	3,945		3,945	3,945			3,945	3,945
seniors	9,597	9,597	9,597	9,597	9,597			9,597
disabled	9,726	9,726	9,726		9,726			9,726
Low Income Individuals	13,032	13,032	13,032	13,032	13,032	13,032	13,032	13,032
Low Income Families	6,256	6,256	6,256	6,256	6,256	6,256	6,256	6,256
POC	17,738	17,738	17,738	17,738	17,738		17,738	17,738
Limited English	5,284	5,284	5,284	5,284	5,284		5,284	5,284
At Risk Workers	5,548	5,548	5,548	5,548			5,548	
No Car	3,577	3,577	3,577			3,577	3,577	
Total by category	**74,704**	**70,759**	**74,704**	**61,401**	**61,634**	**22,866**	**55,381**	**65,579**
Percentage of Vuln pop	105%	99%	105%	86%	87%	32%	78%	92%
Rank by Vuln	**2**	**3**	**1**	6	**5**	11	7	**4**
Percentage of Total Pop	76%	72%	76%	62%	63%	23%	56%	67%

Health and Safety

Climate Impacts Already Felt

Over **75%** of the 472 individuals responding to the City of Bloomington's 2020 Climate Action Plan Community Input Survey reported being personally impacted by the effects of Climate Change. The most noted personal impacts observed were Increased Air Conditioning Use, Increased Contact with Ticks and Mosquitos, Longer Allergy Season, Tree Loss Due to Storm Flooding or Drought, and Flooding/Flood Damage.

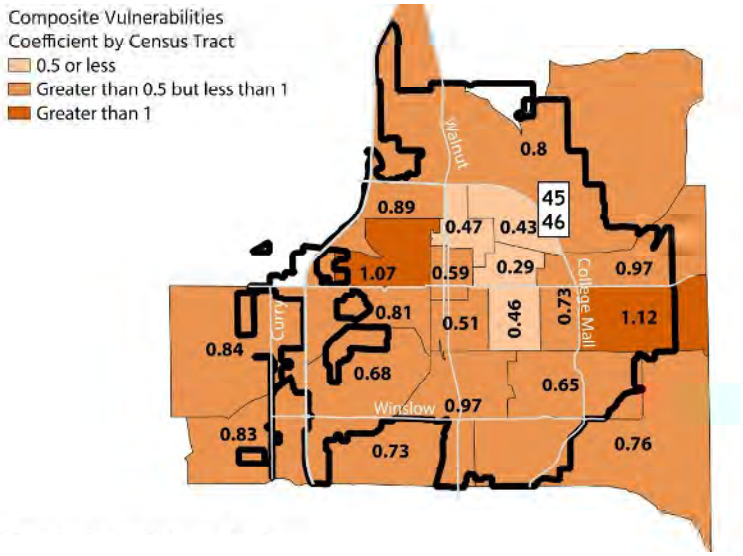


Mapping Vulnerable Populations in Bloomington

Composite Vulnerabilities
Estimated Population Count
Source: Census 2014-2018 ACS 5-Year Estimates

The map to the right illustrates the Vulnerability Coefficient for each Census Tract based on the charted information above. As outlined above, the Vulnerability Coefficient represents the ratio of total instances of population vulnerabilities to the total population within the census tract. The intent of this Vulnerability Coefficient is to identify the proportion of instances of vulnerability within their populations. Neighborhoods with high proportions of vulnerability are likely to have greater adaptation need than neighborhoods with low proportions of vulnerability.

See Bloomington Climate Risk and Vulnerability Assessment for more information



Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Health and Safety section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Goal HS1: Educate, engage, and empower the public for climate health and safety

How We'll Get There | **How We'll Measure Progress**

Strategy HS1-A:

Improve training to address risks exacerbated by climate change

Status of integration of climate change impact projections into training.

Hazard and risk identification supporting public safety, emergency management, and social services professional training has largely been based on historical occurrence. However, research indicates that climate change is affecting future patterns of natural hazards. These changes must be anticipated and integrated into how disaster mitigation, preparedness strategies, and training is developed.

Initial Actions

ES1-A-1 Ensure public safety staff are properly trained to recognize and respond to physical and behavioral signs of heat-related illness.

ES1-A-2 Strengthen emergency management capacity to prepare for and respond to the impacts of climate change.The City should prioritize capacity improvements such as training and equipment to address risks exacerbated by climate change - see the City of Bloomington Climate Risk and Vulnerability Assessment 2020. Emergency management should be equipped to address the possibility of multiple emergencies at the same time, such as the combination of extreme heat and power outage.

Strategy Expected Benefits

Improved Public Health

Improved Community Resilience

Strategy HS1-B:

Establish and expand public health communication campaigns

Status of communication campaign development and implementation

Successfully addressing climate change as a public health threat requires prevention strategies which can help influence people's behavior to help prevent and reduce the burden of climate change on human and other populations.

Initial Actions

ES1-B-1 Develop a communication campaign to reach those without access to internet or technology, limited English speakers, and individuals in hard to reach vulnerable populations.

Strategy Expected Benefits

Improved Community Equity

Improved Social Connectivity

Goal HS2: Respond to climate risks and impacts.

How We'll Get There | **How We'll Measure Progress**

Strategy HS2-A:

Assist the city's heat, flooding, and storm vulnerable population in preparing for and mitigating climate change impacts.

Shade trees installed; number of households receiving flood readiness assistance; number of households receiving weatherization improvements; number of households with air conditioning

By 2050, Monroe County can expect: 50 days of over 95 degrees (historical: 2 days) an average hottest day of the year of 107 degrees (historical: 97 degrees), an average coldest day of the year of 1 degree (historical: -5 degrees) An increase in spring rainfall of 16 percent above historical averages. The Vulnerable Population Risk Sensitivity Chart (see Bloomington Climate Risk and Vulnerability Assessment) illustrates the instances of vulnerability to each of these projected climate impacts by census tract. Significant portions of the population have a likely elevated sensitivity to the anticipated extreme heat and weather, flooding, and air quality impacts projected.

Initial Actions

ES2-A-1 Seek to reduce exposure to extreme heat and Improve stormwater damage by promoting, distributing, or providing installation assistance of shade trees targeted at community areas identified as having high heat island impact based on City's Citywide Ground Cover and Heat Island Assessment (see Greenspace section) and/or flash flood prone. Assistance should prioritize vulnerable populations.

ES2-A-2 Seek to reduce vulnerability to extreme precipitation and flooding by providing precipitation and flood readiness assistance for residents within flood and flash flood prone sectors and for vulnerable populations. Assistance may include on-site and on-line flood assessments and readiness improvements (e.g. https://www.cnt.org/tools/my-rainready-home-assessment-tool) as well as provision of education to residents on what actions they can take to reduce their risk to extreme precipitation events and flash flooding through communication campaign and/or development of an information hub with information, tools and resources.

Strategy Expected Benefits

Strategy HS2-B:

Establish a climate impacts mutual aid program

Status of mutual aid agreements addressing potential climate impacts

Projected climate change impacts for Bloomington include the potential for increased frequency and intensity of extreme weather events and increased flood hazard. Establishing mutual aid programs to address the specific response requirements these climate hazards represent (such as downed tree removal, storm debris removal, and flood response) can ensure a higher level of preparedness for extreme weather events and their aftermath.

Initial Actions

ES2-B-1 Coordinate with County, State, University of Indiana, surrounding communities, Red Cross, and utilities to establish a Mutual Aid and Response program. Program to focus on range of current and projected risks and hazards including flooding, extreme weather, storms, power outage, and emergency debris management.

Strategy Expected Benefits

Goal HS2: Respond to climate risks and impacts.

How We'll Get There | **How We'll Measure Progress**

Strategy HS2-C:

Establish and update plans to address climate risks and impacts.

Status of integration of climate change impact projections into community plans.

Maintaining community plans and design standards based on projected climate risks and impacts will be key in minimizing hazard threats to community health and safety.

Initial Actions

ES2-C-1 Coordinate with County, University of Indiana, Red Cross, and utilities to develop a debris management plan to support response to severe storm events and flooding. Explore potential of integrating HAND neighborhood clean up grants into plan.

Strategy Expected Benefits

Improved Community Resilience

Improved Social Connectivity

Goal HS3 Prepare Bloomington for climate risks and impacts

How We'll Get There | **How We'll Measure Progress**

Strategy HS3-A:

Strengthen community response capacity and support networks

Status of community network coverage for vulnerable populations; Implementation of monitoring program

The Vulnerable Population Risk Sensitivity Chart (see Bloomington Climate Risk and Vulnerability Assessment) illustrates the instances of vulnerability to each of these projected climate impacts by census tract. Significant portions of the population have a likely elevated sensitivity to the anticipated extreme heat and weather, flooding, and air quality impacts projected. Vulnerability to climate impacts can be lessoned through the improved social connectivity and support that can be provied through strengthened community networks focused on vulnerable community members.

Initial Actions

ES3-A-1 Enhance community networks and connections for those who require special attention, such as the elderly, homebound, disabled, isolated, or those likely to be in need of financial assistance during or after extreme weather events (heat, cold and heavy precipitation)

Strategy Expected Benefits

Improved Social Connectivity

Improved Community Equity

Strategy HS2-B:

Improve equity of climate adaptation measures.

Status of integration of climate change vulnerability into community plans, programs, and decisions.

Integration of climate change impacts and a recognition of the populations and neighborhoods most vulnerable to them into community plans, project approval processes, and program development is a critical requirement to effectively reducing climate change impacts for the portions of the community most likely to be affected.

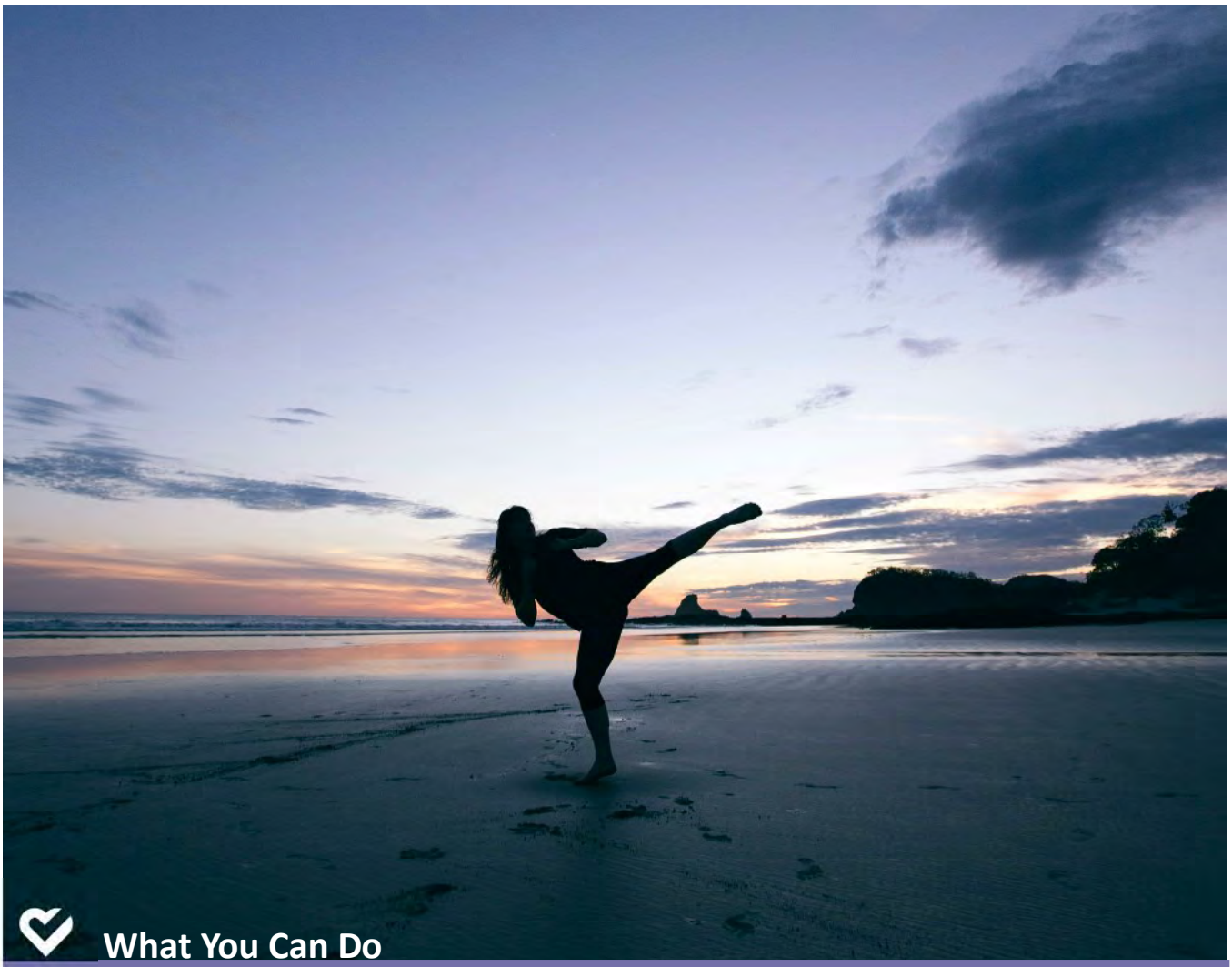
Initial Actions

ES3-B-1 Utilize current science, best practices and updated maps of flooding and flash flooding potential, micro heat island vulnerability, and populations most vulnerable to flooding and heat impacts to help inform decisions and priorities about projects, project approvals, and programs that help to cool the urban environment.

Strategy Expected Benefits

Improved Community Resilience

Improved Community Equity



What You Can Do

- Put together an emergency preparedness kit for your household by visiting Ready.Gov.
- Check in on the people in your life, especially the elderly and those experiencing mental health problems.
- Practice mindfulness by doing yoga, going for a walk or even just taking deep breaths, all of which have been linked to improved mental and physical health.
- Store your prescription drugs in a safe location, preventing them from falling into the wrong hands.
- Get involved with the Bloomington Community Emergency Response Team (CERT), Join your neighbors and receive training to prepare for potential disasters.
- Stay informed. Sign up for Monroe County Citizen Alert Notification, a free program from Monroe County that sends community alerts to your phone and email when you register online. https://cutt.ly/xgg3cBR
- Prepare your home for the extremes. Understand the risk of extreme weather, extreme temperatures, flooding or wildfire to your home, and take action to safeguard your home.

Section 08

Greenspace and Ecosystem Health

Click here to return to TOC

Greenspace and Ecosystem Health

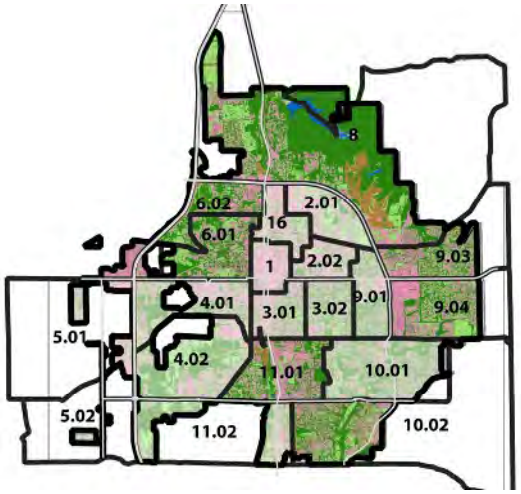
Why Greenspace and Ecosystem Health Are Important

Trees and natural ground covering play a central role in supporting community health, improving air and water quality, helping to reduce building energy use, and supporting climate mitigation. Recent studies have shown that sometimes, going to a park, or even looking a single tree can significantly improve a person's health and stress levels. Some doctors have started prescribing parks as a remedy to patients' health issues. Our understanding of the value of trees has been expanded to include mental and physical health benefits. Trees are critical in filtering air, removing harmful pollutants, such as Carbon Monoxide, particulate matter, and Ground-level Ozone - pollutants that can be toxic at high levels and which can cause asthma and other respiratory impacts.

Conversely, higher levels of impervious surfaces (pavement and buildings) within a community will increase the heat island of the community. Heat island, and micro heat island, refers to the phenomenon of higher atmospheric and surface temperatures occurring in developed areas than those experienced in the surrounding rural areas due to human activities and infrastructure. Increased heat indicies during summer months due to heat island effects effectively raise human discomfort and health risk levels in developed areas, especially during heat waves. Based on a 2006 study done by Minnesota State University and the University of Minnesota, the relationship between impervious surface percentage of a City and the corresponding degree of heat island temperature increase can be understood as a ratio.

Impervious Surface, Tree Canopy, and Heat Island

The City's average existing Tree Canopy coverage of 38% is above the national average, however, there are likely portions of the City which could benefit from increased tree canopy. The graphic to the right from the City's Urban Tree Canopy Assessment Summary Report illustrates the impervious land cover (pink) within the City. To highlight concentrations of vulnerable populations, the census tracts with the highest vulnerabilities (see Summary Chart of Vulnerabilities page 10-3) are shown with full color while all other census tracts have masked colors.



Areas which have higher concentrations of impervious surfaces are areas likely to experience micro climate heat island effects and would benefit from anti-heat island strategies particularly those in the tracts with the highest impact sensitivities.

According to the 2019 Bloomington Urban Tree Canopy Assessment Report

> The City of Bloomington's existing tree canopy is 38%; the possible tree canopy is 27%; and the preferred plantable area is 22%, making the maximum tree canopy attainable under current development conditions at 61% (Figure 10). Reaching the projected tree canopy potential of 61% will require the City of Bloomington to preserve all existing tree canopy while expanding the urban forest in designated preferred plantable areas.

Citywide Ground Cover

	Citywide Acres	
Existing Canopy	5,735.22	38.24%
Preferred Plantable	3,357.45	
Other Pervious Surfaces	718.57	22.38%
Impervious Surfaces	5,063.85	
Open Water	124.83	4.79%
		33.76%

Climate Change Considerations

Climate Hazards

Projected climate change impacts may cause forests to experience increased mortality and reduced productivity, more prevalent invasive species and disease all resulting in forest and tree loss, reduction in crop yield. Loss of greenspace, in turn, reduces carbon capture potential of green infrastructure.

Opportunities

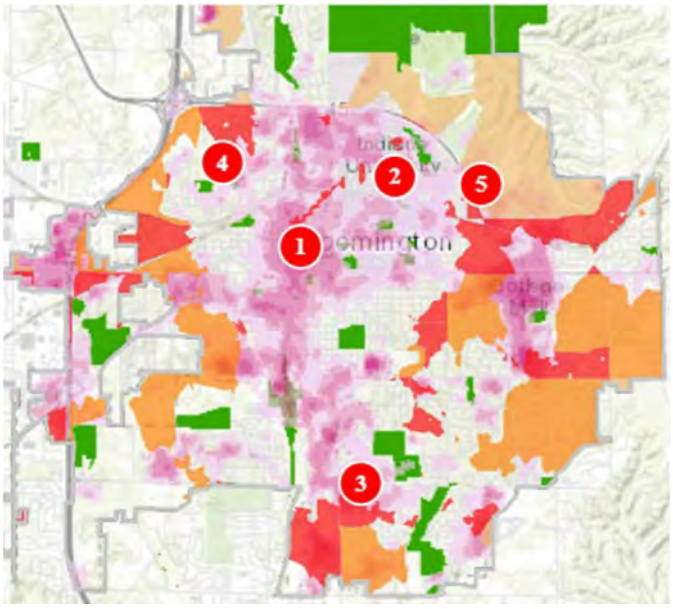
Many strategies within the Greenspace sector can advance community resilience and quality of life. Increased tree canopy, decreased impervious surfaces, and increased utilization of native grasses and plantings can reduce heat island experiences, energy consumption, stormwater runoff, and flood impacts.

Greenspace and Ecosystem Health

Greenspace Recommendations for Equity and Heat Island in Bloomington

The map to the right from the Trust for Public Land's ParkScore tool shows current and recommended park space throughout Bloomington. The green portions of the map illustrate existing parks with public access while areas with very high need for parks are shown in dark orange and areas with high or moderate need for parks are shown in tan.

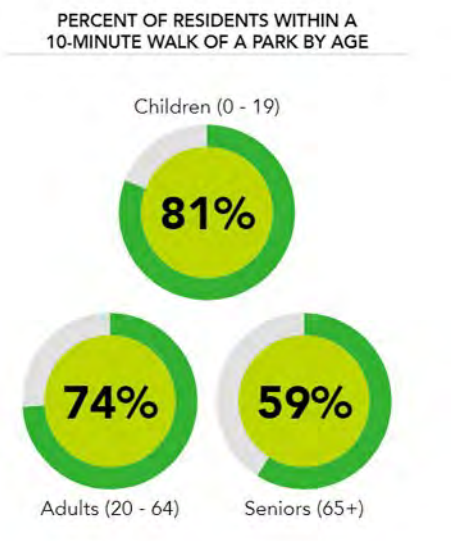
Pink sections of the map indicate areas with calculated heat island or micro heat island impacts (darker colors represent higher heat island impacts). The numbered red circles indicate locations ideal for new parks which would serve populations without public park access within a 10 minute walk that are also in an area with higher urban heat island impacts. The lower numbers represent higher priority locations.



(Graphic source: Trust for Public Land ParkScore)

Equity Considerations

- Lower income neighborhoods and neighborhoods with higher proportions of people of color regularly have lower tree canopy coverage; and the environmental, economic, and quality of life benefits trees support; than more affluent neighborhoods.
- "Heat islands" and "micro heat islands" are built up areas that are hotter than other nearby areas. This is caused by lack of adequate greenspace and healthy tree canopy coverage combined with too many hard surfaces like roads, parking lots, and hard building surfaces. Frequently neighborhoods with higher vulnerable populations have the highest heat island impacts.



(Graphic source: Trust for Public Land ParkScore)

Sector Goals

Goal G1
Increase quantity and quality of greenspace within the community.
Goal G2
Increase quantity and quality of climate adaptive native habitats.
Goal G3
Increase citywide tree canopy coverage by 3% by 2030.
Goal G4
Reduce stormwater and micro heat island impacts.

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Greenspace and Ecosystem Health section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Greenspace and Ecosystem Health

Goal G1: Increase quantity and quality of greenspace within the community.

How We'll Get There | **How We'll Measure Progress**

Strategy G1-A:

Establish city greenspace plans integrating findings and goals of Climate Action Plan

Status of integration of climate action plan findings and goals into community greenspace plans.

Integration of climate change impacts and a recognition of the populations and neighborhoods most vulnerable to them into community plans which guide greenspace preservation and develoment and ground cover conversion efforts to capture the benefitial climate adaptation and mitigation potential of community wide greenspace is a critical requirement to effectively reducing climate change impacts.

Initial Actions

G1-A-1 Complete a Land Conversion Opportunity Study. Analyze public and private property for unused turf and impervious areas, and create a Ground Cover Conversion Implementation plan by neighborhood/ census tract to convert targeted areas to native grasslands, wetlands, and shrub/forested areas. Identify incentive opportunities and establish an outreach campaign.

Strategy Expected Benefits

Strategy G1-B:

Improve the connectivity and functionality of greenspaces within the city.

Establishment and quality of pollinator and wildlife "corridors"; percentage of residents within a 10 minute walk of park and greenspace; implementation of climate best practices at City parks

Integration of climate change impacts and a recognition of the populations and neighborhoods most vulnerable to them into community plans which guide greenspace preservation and development and ground cover conversion efforts to capture the beneficial climate adaptation and mitigation potential of community wide greenspace is a critical requirement to effectively reducing climate change impacts.

Initial Actions

G1-B-1 Enhance the connectivity of greenbelt and habitat corridors across the community, including identification and improvement of "pollinator corridors" and "wildlife corridors".

Strategy Expected Benefits

Goal G2: Increase quantity and quality of climate adaptive native habitats

How We'll Get There | **How We'll Measure Progress**

Strategy G2-A:

Status of policy development

Create and expand native habitat policies and infrastructure.

Aligning City policies guiding utilization and maintenance of public facilities, parks, and right of ways with the goals of the climate aciton has immediate positive impacts advancing citywide goals and serve as examples and case studies to illustrate effective approaches for residents and businesses throughout the community.

Initial Actions

G2-A-1 Create a policy for the use of native plants in landscaping at City-owned properties, where suitable

Strategy Expected Benefits

Protected / Enhanced Ecosystems

Improved Community Resilience

Strategy G2-B:

Percentage of native species and pollinator friendly ground cover citywide

Increase the use of native species and pollinator restoration areas.

Native plant and tree species tend to be more drought resistant, increase development of soil organic material and health, and support biodiversity and pollinator health.

Initial Actions

G2-B-1 Install roadside climate adaptive native vegetation that creates effective barriers to prevent drifting of air pollutants to adjacent schools and residences/ parks. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6060415/

Strategy Expected Benefits

Protected / Enhanced Ecosystems

Improved Community Resilience

Goal G3: Increase citywide tree canopy coverage by 3% by 2030

How We'll Get There | **How We'll Measure Progress**

Strategy G3-A:

Establish city plans and policies in support of tree canopy goals

Status of policy and plan development and implementation

Increased tree canopy coverage improves soil health, pollution absorption, air quality, stormwater "uptake", and decreases stormwater runoff and micro heat island impacts. Conversion of impervious surfaces to green spaces utilizing native species, pervious paver systems, and "green roofs" can significantly reduce extreme heat experiences for vulnerable populations. Establishing policies and plans in support of tree canpy goals and outlining planting targets to achieve the goals is an effective path towards achieving the climate aciton plan greenspace goals.

Initial Actions

G3-A- 1 Conduct a Citywide Ground Cover and Heat Island Assessment. Assessment should include tree canopy, light impervious surface, dark impervious surface, grassland, and water coverage by census tract. Study should include heat island impact study to identify areas of high heat island contribution and impact. Findings of tree coverage, benefits, heat island impacts, and opportunities should be overlapped with vulnerable population mapping from the City's Climate Vulnerability Assessment. Study to establish specific goals of tree canopy coverage, by census tract, for reduction of dark impervious surfaces, and target "Heat Island Coefficient", and prioritized tree canopy goals based on need, potential, historic investment/benefit per household, and opportunity to positively impact vulnerable population. Study to identify specific citywide percentage coverage goals for forested and native planting ground cover. Study to priority areas for heat island mitigation based on need, potential, and impact on equity and vulnerable populations. Study should also evaluate opportunities to plant additional trees near city facilities to reduce heat island.http://palebluedot.llc/tree-canopy-assessments

Strategy Expected Benefits

Strategy G3-B:

Support and empower community partners, businesses and residents in meeting tree canopy goals

Establishment and utilization of incentives; citywide ground cover characteristics and tree cnopy coverage

Aligning the landscaping and greenspace maintenance actions of property owners and businesses citywide is critical to achieving citywide greenspace goals, particularly in sections of the city with high shares of vulnerable populations.

Initial Actions

G3-B- 1 Explore development of additional incentives for tree planting, particularly in targeted areas within the City as established by the Citywide Ground Cover and Heat Island Assessment.

Strategy Expected Benefits

Goal G4: Reduce stormwater and micro heat island impacts

How We'll Get There | **How We'll Measure Progress**

Strategy G4-A:

Reduce impervious surfaces

Status of policy development and implementation

Reduction of impervious surfaces, particiluarly in sections of the community with high existing impervious surface ground cover share, can significantly reduce stormwater runoff and micro heat island impacts. Consistently implementing green streets, living streets, or complete street policies will advance replacement of impervious surface with greenspace and pervious strategies.

Initial Actions

G4-A-1 Create a "Green Streets" policy (Green Streets are designs that reduce environmental impacts by reducing impervious surface, managing stormwater, and providing shade) or "Living Streets" policy (Living Streets combines the concepts of complete streets and green streets, and also puts additional focus on quality of life aspects for City residents) to guide current and future street construction, reconstruction, and maintenance projects within the City.

Strategy Expected Benefits

Strategy G4-B:

Increase water uptake capacity of greenspace

Status of policy development and implementation

Increasing soil capacities for water "uptake", particularly in sections of the city with high flood and flash flood risks, increases the capacity for stormwater management in place and reduces the risks or severity of flooding impacts. Utilization of best practices like biochar soil ammendments and soil profile rebuilding at building and road construction sites can improve the capacity of greenspace.

Initial Actions

G4-B-1 Implement policy requiring a biochar soil amendment for all City building and earth working construction sites. Encourage biochar soil amendment use for private sector construction and earth working construction sites. Biochar improves soil sequestration and builds carbon content of topsoil, and improves water retention and permeability characteristics.

G4-B-2 Implement a policy to require soil profile rebuilding at new tree installations at all City building project sites or compacted soil conditions to reduce erosion and runoff contaminated with fertilizers, increase soil carbon stores and support long-term soil building. Encourage soil profile rebuilding for private sector building project sites or compacted soil conditions. (https://www.urbanforestry.frec.vt.edu/SRES/)

Strategy Expected Benefits

What You Can Do

- Plant a rain garden with native plantings to absorb storm water and replenish our aquifers.
- Plant trees in your yard to provide shade and cooling in summer heat. Select climate adapted trees that don't interfere with power lines and preserve the trees you already have.
- Landscape with drought-resistant, native or well-adapted, non-invasive plants.
- Make your backyard a Certified Wildlife Habitat with the National Wildlife Federation www.nwf.org/garden-for-wildlife/certify
- Remove pavement and increase permeable surfaces, De-pave areas wherever possible to encourage stormwater infiltration onsite.
- Install bioswales/rain gardens or rainwater diversion systems to reduce impact on the storm-water system.
- Install a Green Roof (living roof) to reduce your energy consumption, decrease heat island impacts, and reduce stormwater runoff.

Click here to return to TOC

Section 09

Climate Economy

Climate Economy

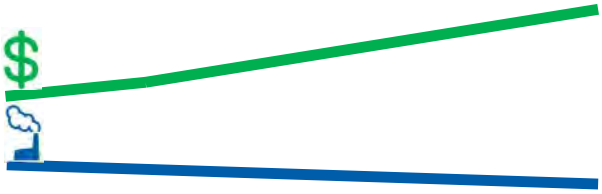
Why Climate Economy Is Important

Climate change and the economy are inexorably linked. Left unabated, the impacts of man-made climate change through the end of this century will cost the United States billions of dollars. According to a 2019 study by two EPA scientists, the difference in economic impact between the mid-range climate model and the high range climate model may account for as much as $224 billion in economic impact annually by 2090. According to a 2019 World Bank report on trends in carbon pricing, a carbon price range of $40-$80 per ton is necessary by 2020 to reach the goals set by the 2015 Paris Agreement, while other studies have placed the full cost of carbon at $200-$400 per ton. The calculations outlined in Section 1 of this plan estimate a conservative localized cost for carbon at over $116 per ton.

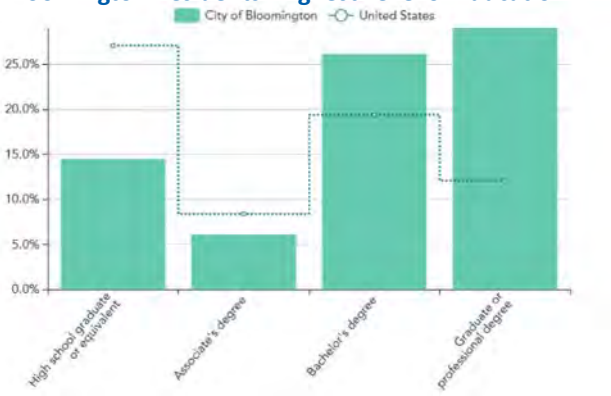
The economy is also directly linked to climate action as well. One common reason given by those who wish not to see action taken on climate change is that the economy will be damaged. Setting aside the avoidance of the future costs should we not act to mitigate climate change, evidence is building a clear case that acting on climate change, and reducing fossil fuel emissions can be done without weakening the economy. Since 2005, Bloomington has seen city-wide GHG emissions drop over 18% while during that same period the city's GDP has ***increased*** 59%.

Between 2018 and 2028, there are projected to be 8,936 new jobs annually in Monroe County, 8,455 projected to be replacement openings (Job Postings by County, IN Department of Workforce Development). Though higher-wage sectors of life sciences, technology and healthcare have potential as growing sectors, according to the Bureau of Labor Statistics, 89% of the jobs in the Bloomington MSA are in the following areas of employment: manufacturing; trade, transportation, and utilities; professional and business services; education and health services; leisure and hospitality; and government.

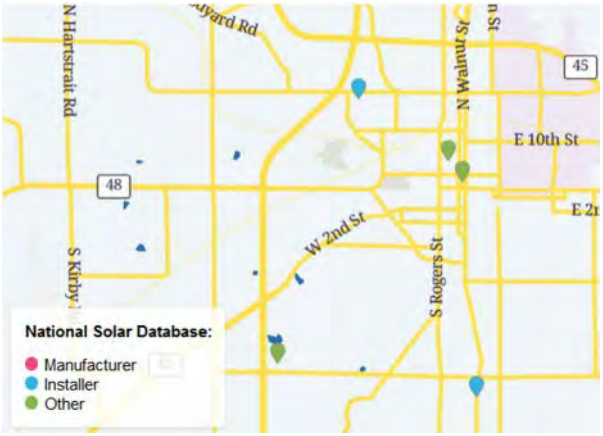
Bloomington GHG Emissions Compared to GDP



Bloomington Residents' Highest Level of Education



Bloomington Solar Businesses



Many of the climate actions included in this plan can reduce Bloomington's contributions to global greenhouse gas levels, deal with the risks posed by climate change, and achieve economic growth and opportunity. Transformative change is needed now in how we build our cities, produce and use energy, transport people and goods, and manage our landscapes. This change also represents opportunities to improve our quality of life, improve health outcomes, and provide opportunities for workfoce development, new job creation, and economic development.

Climate Change Considerations

Climate Hazards

In many sectors, climate change will impact water and energy consumption, resilience, and expenditures. Extreme weather and increasing variability in temperatures and precipitation may stress transportation systems. Increasing extreme weather hazards may threaten supply material and product supply chains.

Opportunities

Climate mitigation strategies like transformation of Bloomington's energy system, improvements to the energy efficiency of the city's building stock, enhancement of transportation alternatives, and the implementation of goals like tree canopy increases and reduction to impervious surfaces represent opportunities for the development of new businesses and job creation.

Climate Economy

Equity Considerations

- Economic impacts of climate change are inequitably felt. Low income individuals in our communities are especially prone to the impacts of climate change and bear a greatly disproportionate share of the costs.
- Income inequality is rising in the US, with September 2019 levels being the highest in 50 years. High inequality leads to lower life spans, increased instances of mental health issues, and increased obesity rates among other social impacts.

Sector Goals

Goal CE1

Build marketplace climate resilience.

Goal CE2

Attract, create, and support businesses that are committed to sustainability and climate goal.

Goal CE3

Develop new mechanisms for financing City climate action plan implementation.

Accomplishing The Goals

This Climate Action Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies established to meet 2030 goals and detailed Actions for implementation.

Strategies are specific statements of direction that expand on the climate action vision GHG reduction goals and guide decisions about future public policy, community investment, and actions. The following are the Strategies guiding the Climate Economy section and the initial actions for each. See **Section 10 Climate Actions and Implementation** for the full list of sector actions and implementation roles.

Click here for full list of sector actions

Goal CE1 Build marketplace climate resilience.

How We'll Get There

How We'll Measure Progress

Status of Climate Economic Impacts Study; Status of technical assistance program; Number of businesses engaged

Strategy CE1-A:

Evaluate climate risks to businesses.

Projected climate change impacts pose potential challenges to businesses in the form of supply chain interruptions, property damage from extreme weather, labor productivity impacts of extreme temperatures, and potential increased operational costs associated with increasing energy demands. Identificaiton of the risks by economic sector can support businesses in making appropriate plans to avoid or mitigate potential negative impacts.

Initial Actions

CE1-A-1 Conduct a planning effort focused on identifying economic vulnerabilities based on risks and hazards identified in this report and the City/ County emergency management response plan, particularly those affecting the city's vulnerable populations and small businesses Identify economic opportunities possible through the successful implementation of the CAP plan and achievement of its goals, especially those which can provide opportunity for the city's vulnerable populations. Identify economic resilience strategies and conduct outreach to industry groups and public-private partnerships to promote private sector investment addressing them. Strengthen public-private economic communications in support of strategies, especially with targeted group businesses (minority-owned, veteran owned, economically disadvantaged, etc). Possible example process: https://www.eda.gov/ceds/ Coordinate with the City of Bloomington's Recover Forward program

Strategy Expected Benefits

Goal CE1 Build marketplace climate resilience.

How We'll Get There | **How We'll Measure Progress**

Strategy CE1-B:

Accelerate the transition to a carbon free local economy.

Status of permitting process streamlining; Status of "Green contractor" resource/ database

Businesses which understand the need for addressing climate mitigation strategies and embrace the opportunities of improved energy efficiency and renewable energy will play a significant role in achieving the City's Climate Action Plan goals. These organizations will also benefit the most from the economic savings potential these strategies represent. Supporting that transition is key to helping Bloomington businesses leverage the advantages of climate action.

Initial Actions

CE1-B-1 Streamline and offer expedited permitting for renewable energy installations.

Strategy Expected Benefits

Improved Energy Resilience

Reduced GHG Emissions

Goal CE2: Attract, create, and support businesses that are committed to sustainability and climate goal.

How We'll Get There | **How We'll Measure Progress**

Strategy CE2-A:

Increase workforce development for the climate economy.

Status of job trainig and entrepreneurial program development; Number of residents trained and employed

Strengthening development of a worforce capable of participating in climate economy businesses such as renewable energy and building energy efficiency strategies is critical to supporting the development and expansion of these economic sectors and meeting the implementation goals of the Climate Action Plan. Focusing workfroce development and training on underserved and vulnerable populations within Bloomington will have the added benefit of improving the economic stability of those most vulnerable and improving equity.

Initial Actions

CE2-A-1 Establish a job training and entrepreneurial development program focused on serving vulnerable populations. Explore Operation Fresh Start as a model (http://www.operationfreshstart.org/)

Strategy Expected Benefits

Improved Community Equity

Jobs / Economic Development

Strategy CE2-B:

Support Climate Economy econmic development and new business creation.

Status of Clean Energy business incubator; Status of implementation of Renewable Energy Potentials Study recommendations; Number businesses and jobs created

Establishing an economic environment which encourages and supports entrepreneurs in identifying, launching, and growing businesses which support the transitions needed to successfully implement the Climate Action Plan can hasten the transition and maximize the economic potential for local job creation.

Initial Actions

CE2-B-1 Establish a Clean Energy business incubator to support the establishment of innovative energy efficiency and renewable energy business models within the community. Explore incorporation with the Ivy Tech Center.

Strategy Expected Benefits

Improved Community Equity

Jobs / Economic Development

Goal CE2: Attract, create, and support businesses that are committed to sustainability and climate goal.

How We'll Get There

How We'll Measure Progress

Strategy CE2-B:

Support Climate Economy econmic development and new business creation. (Continued)

Status of Clean Energy business incubator; Status of implementation of Renewable Energy Potentials Study recommendations; Number of clean energy and energy efficiency businesses and jobs in Bloomington

Initial Actions

CE2-B-2 Implement recommendations from the City of Bloomington Renewable Energy Potentials Study 2020. Prioritize utilization of local workfoce and local renewable energy companies.

Strategy Expected Benefits

Jobs / Economic Development

Reduced GHG Emissions

Goal CE3: Develop new mechanisms for financing City climate action plan implementation.

How We'll Get There

How We'll Measure Progress

Strategy CE3-A:

Leverage existing financing pathways.

Status of policy development; Status of identification of dedicated Climate Action implementation funding sources

Existing financing structures represent opportunities to establish dedicated financial pathways supporting successful Climate Action implementation.

Initial Actions

CE3-A-1 Establish a policy that savings generated by energy efficiency measures and renewable energy installations/agreements for City facilities and operations shall be used as a fund to support future energy efficiency and renewable energy projects in support of the CAP goals.

CE3-A-2 Establish a policy that designates City Electric and Natural Gas Franchise Fee Income as funding source for Climate Initiatives

Strategy Expected Benefits

Jobs / Economic Development

Reduced GHG Emissions

Strategy CE3-B:

Develop new financing pathways.

Status of identification of dedicated Climate Action implementation funding sources

New financing structures represent opportunities to establish dedicated financial pathways supporting successful Climate Action implementation.

Initial Actions

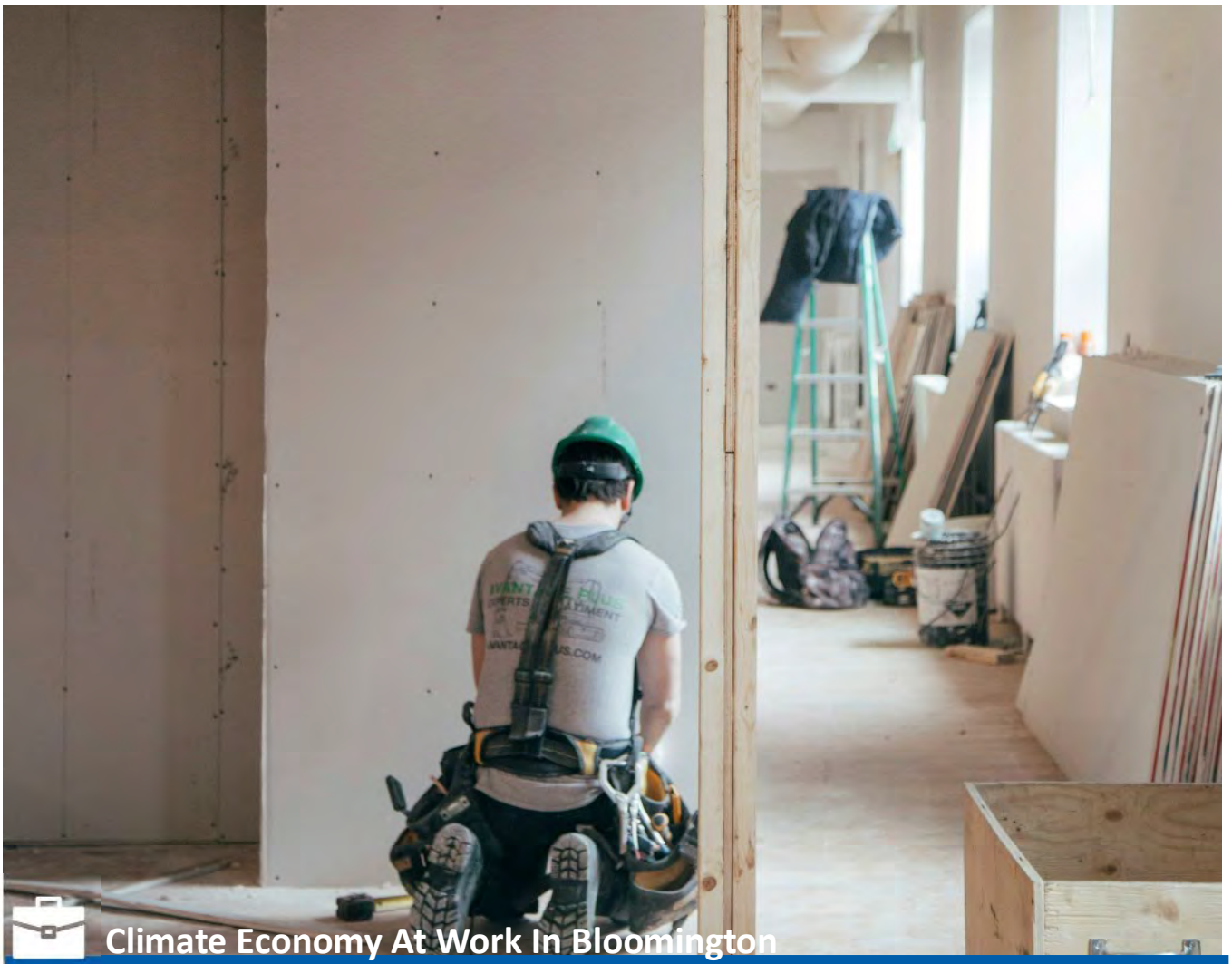
CE3-B-1 Adopt a "resilience penny" property tax increase of $0.01 per $100 of assessed value and dedicate additional funds for climate mitigation and climate adaptation strategies. Funds may be used directly, or may be used as a repayment source for a bond issue.

CE3-B-2 Explore the potential of developing a "Carbon Impact Fee" similar to the City of Watsonville CA. Additional funds raised to be used for Climate Mitigation and Adaptation implementation. Increased revenue to be used to fund Climate Mitigation and Adaptation implementation with a focus on the actions and strategies which increase the community's equity.

Strategy Expected Benefits

Jobs / Economic Development

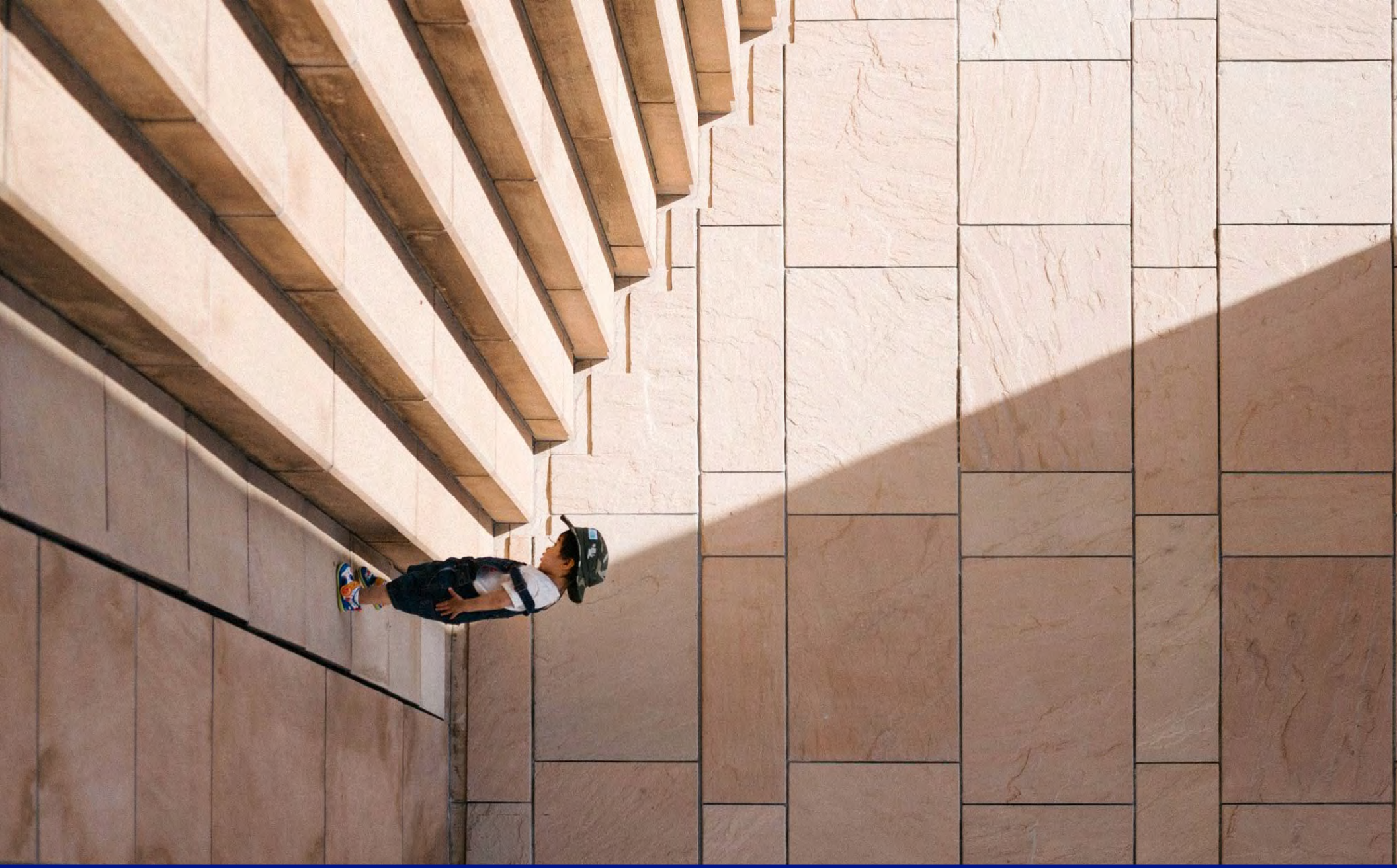
Reduced GHG Emissions



Climate Economy At Work In Bloomington

A number of businesses in Bloomington have demonstrated progress in centering their operations on promoting environmental well-being. Notable examples include:

- ***Manufacturing***- Cook Medical reduced landfilled waste from their Park 48 and Ellettsville facilities by 364,200 pounds in the last two years.
- ***Life sciences***- Catalent has committed to a 15% emissions decrease energy management program is in broad alignment with the ISO50001:2018 energy management standard and has completed water, energy, and waste audits.
- ***Health services***- IU Health system is building a system wide road map with have energy teams at each of its hospitals and is switching bulbs at facilities to LED lighting.
- ***Education***- Indiana University Bloomington has 9 LEED certified buildings and continues to reaffirm the commitment that all new construction receives a minimum LEED Gold certification or higher.
- ***Government***- City of Bloomington made a $17 million investment to install rooftop solar on 32 facilities, generating 5.71 GWh since 2018.
- ***Restaurant***- Lennie's received Bicycle Friendly Business certification in 2019, as well as the parent company One World Enterprise being recognized for "Governor's Award for Excellence in Recycling" from the State of Indiana
- ***Utilities***- Vectren, a CenterPoint Energy company, plans to close three coal-fired generating stations while adding renewable energy sources such as solar and wind in the next four years



Section 10

Climate Actions and Implementation

Click here to return to TOC

Implementation and Monitoring

The first few years after plan adoption are critical to its success. Establishing roles, both internal and external, and identifying funding will help establish the implementation phase of the plan and ensure the community is on track to achieve its goals. This plan includes robust goals for significant GHG emission reductions and addressing climate resilience. This vision require commitment and integration of the CAP into City operations, functions, and services.

Implementation is For Everyone

Implementation actions are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. Some actions will need to be led by City Council, city departments, and/or the business community; and there are some things that households and individuals can do to make an impact. While many actions will require City Council to amend a policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on ad feedback on those policies. Ultimately, achieving the visionary energy efficiency, renewable energy, alternative transportation, and climate resilience goals outlined in this plan will require engagement and a sense of responsibility not only by the City of Bloomington leadership and government, but by the community itself as well. It is critical for all to remain engaged and active, advancing and advocating for actions you feel are important.

General Implementation Recommendations

The following are foundational recommendations to support the long-range implementation of the CAP:

Building Internal Capacity

Continuing to build internal capacity will be important to help establish the CAP as a priority integral to internal operations as well as fostering connections to community partners, businesses, and individuals through outreach, education, special projects, and service delivery.

1. Establish clear guidance and direction for the participation in and support of the CAP implementation actions by all City of Bloomington departments.

2. Fund and support Sustainability staffing required to:
   - Facilitate discussion among large users to reduce emissions through business and industrial strategies.
   - Participate in technical resource programs as they are available through County, State, Federal, and non-profit provider partners.
   - Support City of Bloomington department managers and staff as they implement CAP actions within their service area or area of expertise.
   - Convene an internal City climate working group that meets regularly and provides updates on progress and success, identifies additional support or resources needed to advance actions of the CAP, and collaboratively discusses strategies for more complex challenges.
   - Ensure the establishment and maintenance of a City of Bloomington Climate Action webpage supporting CAP resources for the community.
   - Coordinate and organizing volunteer groups and events.
   - Engage city boards and commissions (e.g., Commission on Sustainability, Planning Commission, City Council Climate Action & Resilience Committee, etc.) to ensure the CAP is integrated into their work plans.

3. Review Climate Action Plan implementation progress and impacts on a regular basis (1-2 year cycle); adjust, add, and remove detailed CAP actions as appropriate based on implementation progress review. Review should include development of an updated community wide GHG inventory.

Implementation and Monitoring

External Support

City staff and elected officials will not be able to implement this plan without robust support from community members and coordination with jurisdictional, institutional, and organizational partners.

1. Establish the Commission on Sustainability as the main citizen-body to support the implementation of the CAP:
    - Form subcommittees that focus on particular areas of the CAP
    - Coordinate with City staff in all relevant departments to receive updates on City projects and progress

2. Establish jurisdictional partnerships that advance CAP strategies to advance and accelerate action. This can include government entities like Monroe County, the State of Indiana, conservation districts, utilities like Duke Energy and Vectren; institutions like Indian University; and community groups.

Funding

Funding the implementation of the CAP will require reallocation/reconsideration of existing City funds, raising new City funds, and identifying outside resources and funding opportunities. Some funds will need to be dedicated toward long-term support like staffing, while other funding will be on a project-by-project basis.

1. Maintain a budget and identify funding sources for staff dedicated to the implementation of the CAP.

2. Identify a budget necessary to support projects on an annual basis as per the detailed actions outlined in the Climate Economy and Climate Action Capacity sections of the plan and climate actions.

3. Utilize no-cost technical assistance offerings as available.

Climate Action Implementation Support Tools

To support the City in its initial implementation phase, the paleBLUEdot team has created a number of tools including:

Bloomington Climate Community Messaging Strategy
Bloomington Net Zero Energy Building Guide (https://palebluedot.llc/bloomington-net-zero-energy-guide)
Bloomington Solar Ready Guide (https://palebluedot.llc/bloomington-solar-ready-guide)
Example Climate Action Policies and Ordinances (https://palebluedot.llc/bloomington-cap-policies)

Climate Action and Implementation Plan

The following is the full detailed list of detailed Climate Actions and implementation details supporting the goals and strategies of each Climate Action section.

 Section 02 **Transportation and Land Use**

 Section 03 **Energy and Built Environment**

 Section 04 **Waste Management**

 Section 05 **Water and Wastewater**

 Section 06 **Local Food and Agriculture**

 Section 07 **Health and Safety**

 Section 08 **Greenspace and Ecosystem Health**

 Section 09 **Climate Economy**

Action Number Strategy Acton	Sector Goal / Strategy / Action	Priority 1 = year 1-3 2 = year 3-5 3= year 5-8	Implementation Primary Responsibility another agency, City Council, specific city department / staff role, businesses, or households/individuals	Supporting Responsibility another agency, City Council, specific city department / staff role, businesses, or households/individuals	Staff Position Responsible	Estimated Budget Need	Progress At Review
	Transportation and Land Use						
	Goal T1 Decrease vehicle miles traveled (VMT) by 8% by 2030						
	Strategy TL1-A: Reduce single occupancy automobile use by 7%						
TL1-A- 1	Update the City's Transportation Plan and Transportation Improvement Program to incorporate reductions in carbon emissions and vehicle-miles-traveled, improved bicycle, pedestrian and transit service standards, and a policy requiring project evaluation to include criteria on climate, equity, economic benefit, health, safety and cost effectiveness.	1	Planning & Transportation	MPO			
TL1-A- 2	Establish a City employee Parking Cash Out benefit program to promote alternative commute options. (https://www.bestworkplaces.org/pdf/ParkingCashout_07.pdf https://www.boston.gov/transportation/parking-cash-out)	1	City Council				
TL1-A- 3	Conduct a road pricing strategy study to explore options appropriate for the City of Bloomington that accurately capture the cost of driving and auto-centric infrastructure on city roads. Include a study on parking fees, demand-based fees, fee discounts for carpools and EV's and fuel efficiency charge options. Study should include national and international case studies and identify pilot projects for implementation.	2	Planning & Transportation	Public Works			
TL1-A- 4	Identify locations and partners to facilitate parking buyback programs for municipal and other employers in the city. (https://www.bestworkplaces.org/pdf/ParkingCashout_07.pdf https://www.boston.gov/transportation/parking-cash-out)	2	Planning & Transportation	MPO			
TL1-A- 5	Eliminate cars from high-density districts by creating car-free pedestrian zones, limiting vehicles on certain days of the week, and implementing congestion parking pricing. Establish implementation based on Kirkwood pilot project observations and recommendations.	2	Planning & Transportation	Engineering			
TL1-A- 6	Identify locations and partners to facilitate bike/walk commute, carpooling, EV ride share, and telecommuting options for municipal and other employers in the city.	3	Planning & Transportation	MPO			
	Strategy TL1-B: Increase bicycle/ pedestrian commuting from 16.3% to 18.3% through infrastructure to encourage alternatives to vehicles.						
TL1-B- 1	Establish a stable funding source adequate to maintain and improve the existing transportation system and to invest in transportation capital projects and programs that reduce carbon emissions and improve equity.	1	Planning & Transportation	MPO			
TL1-B- 2	Implement the Multimodal Projects recommendations included in the 2019 City of Bloomington Transportation Plan.	1	Planning & Transportation	MPO			
TL1-B- 3	Enhance bike and pedestrian travel options through creating protected bike lanes on key travel corridors and improved pedestrian efficiency through mobile route mapping. Conduct a study to identify and prioritize routes and establish an implementation plan and schedule.	2	Engineering	Planning & Transportation			
TL1-B- 4	Promote usage of the Sustainability Development Incentive: density bonuses or expedited review for development projects that have mixed-used zoning (residential, retail and office uses).	2	Planning & Transportation	Plan Commission			
TL1-B- 5	Provide additional earmarked funding and/or prioritization to projects with clear safety and VMT reduction goals. Accelerate Transportation Plan, priority bicycle network (5-7 year), pedestrian network, balancing work load and funding.	2	City Council	Planning & Transportation			
TL1-B- 6	Amend zoning code to allow and encourage "mini city centers" through the development of Neighborhood Commercial Districts and Neighborhood Corridor Commercial Districts in neighborhoods in order to create more walkable/bikeable communities. Districts should be prioritized in areas to maximize equity considerations and alternative transportation options and minimize community wide VMT.	2	Planning & Transportation	Plan Commission			
TL1-B- 7	Conduct a Pavement Conversion study to identify underutilized paved areas and identify incentivization and implementation plan to convert identified areas to sustainable green space, and/or pedestrian and biking paths and support space.	3	Planning & Transportation	Public Works			
	Strategy TL1-C: Increasing transit utilization by 5% through infrastructure and frequency investments.						
TL1-C- 1	Implement recommendations of the Bloomington Route Optimization Study	1	Bloomington Transit	Planning & Transportation			
TL1-C- 2	Collaborate with Bloomington Transit to establish a Guaranteed Ride Home program as free reimbursement program for registered commuters	1	Bloomington Transit	Planning & Transportation			
TL1-C- 3	Collaborate with Bloomington businesses to promote and expand on the Guaranteed Ride Home program, and expand participation in the Employer Sponsored Pass program for workplaces to purchase bus passes for employees, students, etc	2	Bloomington Transit	Planning & Transportation; Bloomington Chamber of Commerce;			
TL1-C- 4	Improve efficiency, convenience and reliability of bus service and infrastructure (dedicated lanes). Increase bus frequency, establish dedicated bus routes, and create high-frequency rapid transit in corridors to improve "time equity / parity" of the route transit time with what it would be to drive a car. Prioritization to be given on routes serving the city's many employment centers and areas with higher shares of vulnerable populations.	2	Bloomington Transit	Planning & Transportation			
TL1-C- 5	Implement a transit-oriented development (TOD) policy surrounding existing and planned transit stops and along primary transit corridors.	3	Planning & Transportation	Bloomington Transit			
	Strategy TL1-D: Increase shared mobility utilization; target: increase shared mobility (carpooling) from 9.21% to 12.21% of commuters by 2030.						
TL1-D- 1	Outline clear policies for electric bikes, skateboards and scooters on city bike lanes, paths and trails. Establish a communication campaign to effectively reach users.	1	Planning & Transportation	Parks & Recreation			
TL1-D- 2	Establish a subsidy / incentive for EV car sharing services with the goal of increasing car share coverage, particularly among vulnerable populations and those without current vehicle access. Qualifying programs must us plug in EV's or other no-carbon vehicle alternatives only.	1	Economic & Sustainable Development	Planning & Transportation			
TL1-D- 3	Establish a communication campaign to effectively reach users to promote eBike, skateboard and scooter policies and promote use.	2	Economic & Sustainable Development	Social Media Department			
TL1-D- 4	Establish a minimum of 2 EV car sharing locations in the City by 2023.	2	Economic & Sustainable Development	Planning & Transportation			
	Strategy TL1-E: Encourage density and increase housing options and affordability; target: increase gross density by 3% by 2030.						

TL1-E- 1	Eliminate minimum parking requirements from Unified Development Ordinance and replace with a transportation reference guide for development that includes considerations for all modes. Allow developers to determine and defend their transportation needs.	1	Planning & Transportation	Public Works			
TL1-E- 2	Conduct a Development Study to identify and prioritize available sites for redevelopment and in-fill development to advance City's walkability, bikeability, and transit utilization. Study should include a review of under utilized surface parking infrastructure capable of being redeveloped.	2	Economic & Sustainable Development	Planning & Transportation			
TL1-E- 3	Issue competitive redevelopment Request for Proposals based on findings and recommendations of Development Study to encouraging high quality mixed use redevelopment on redevelopment, infill properties and existing surface parking lots within downtown district. RFP's should focus on equity, affordability, livability, and compliance/support of Climate Action Plan goals.	2	Economic & Sustainable Development	Planning & Transportation			
TL1-E- 4	Implement form-based code along transportation corridors with goal of improved pedestrian experience (frequent access points, greenspace)	2	Planning & Transportation	Public Works			
TL1-E- 5	Establish an ordinance to require developers and landlords to "unbundle" parking from rent structures. Policy should focus on maintaining transit and transportation equity. Resource: https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/preliminary-investigations/final-pricing-parking-management-to-reduce-vehicles-miles-traveled-pi-a11y.pdf	2	City Council	Planning & Transportation			
TL1-E- 6	Improve the city's average Walkscore from 43 to 60 by 2030. Coolaborate with WalkScore for data analysis and identification of high-impact actions to increase score (https://www.walkscore.com/professional/research.php)	3	Planning & Transportation	Public Works			
	Strategy TL1-F: Build Complete Streets; Target: 10% increase in complete street coverage by 2030.						
TL1-F- 1	Review, modify, and adopt a revised BMCBMO Complete Streets Policy to add criteria and review procedures for City funded projects. Include in the review and modification an assessment of national best practices in support of achieving the goals of the Climate Action Plan.	1	MPO	Planning & Transportation			
TL1-F- 2	Conduct a Sidewalk and Bike Path Quality Assesment and Master Plan to identify needs to accelerate bike paths, building sidewalks, crosswalks, and other walking infrastructure, particularly in high-need areas and areas serving vulnerable populations. Effort to include an implementation plan establishing annual increases in the total miles of sidewalks, on-road bicycle lanes and multi-use paths.	1	Public Works	Planning & Transportation			
TL1-F- 3	Establish a method for projecting the lifecycle carbon emissions of land use and transportation investments associated with the City's Transportation Plan and Transportation Improvement Program, Including consideration of embodied energy, operations and maintenance (see City of Eau Claire WI Land Use Carbon Calculator).	2	MPO	Planning & Transportation			
TL1-F- 4	Adopt project review criteria for City transportation projects that align with and complement the MPO Complete Streets policy and prioritize low carbon modes of transportation, including, but not limited to pedestrians, bicyclists, and public transit infrastructure.	2	MPO	Planning & Transportation			
TL1-F- 5	Align City's Transportation Plan and Transportation Improvement Program regional mode share targets with carbon reduction targets and encourage the development of mode share targets specific to the varying community needs and transit infrastructure around the region.	2	Planning & Transportation	MPO			
TL1-F- 6	Explrore establising a tiered bike infrastructure improvement approach which include adding trees and green stormwater infrastructure whenever possible/ prioritized.	3	Public Works	Planning & Transportation			
	Strategy TL1-G: Increase pedestrian access and safety.						
TL1-G- 1	Implement improvement recommendations of the 2019 Transit Stop Safety and Accesibility Assessment.	1	Bloomington Transit	Public Works			
TL1-G- 2	Create and implement a 5 year transportation funding plan that matches the Metropolian Transportation Plan and 2019 Transportation Plan.	1	MPO	Bloomington Transit			
TL1-G- 3	Establish an implementation plan for the redesign of roads to be safer for people including road width reductions on all four-lane city streets as well as on multi-lane	2	Engineering	Planning & Transportation			
TL1-G- 4	Develop a Safe Routes To Schools Implemnetation Plan (SRTS) for all schools within the City. Plan implementation should focus on infrastructure and policy changes as well as education and encouragement.	2	Planning & Transportation	Engineering; Monroe County Community Schools			
TL1-G- 5	Prioritize transportation funding for Vision Zero engineering improvement projects paired with VMT reduction strategies to create safe streets for people walking, biking and riding transit.	2	Bloomington Transit	Public Works			
	Strategy TL1-H: Reduce commercial/industrial vehicle use by 5%						
TL1-H- 1	Establish an Electric Vehicle Suitability and Fleet Optimization Study incentivization utilizing fleet monitoring technology to assess fleets for alternative fuel suitability as well as identify fleet optimization management options for reduced VMT. (https://www.geotab.com/fleet-management-solutions/evsa/) Include City's fleet in program efforts. Goal: Achieve 6 fleet assessments annually.	1	Economic & Sustainable Development	Bloomington Chamber of Commerce, Public Works			
TL1-H- 2	Collaborate with the Bloomington Chamber of Commerce, Downtown Bloomington, community businesses, and Indiana University to conduct a study identifying the advantages/disadvantages, and lessons learned by businesses in the community related to use of video/remote meetings in lieu of business travel for meetings and events. Based on findings of the study, establish, distribute, and promote a "best practices" guide outlining the opportunities for operational savings and reduced vehicle use and encouraging effective, long-term increased remote meeting technologies	2	Economic & Sustainable Development	Bloomington Chamber of Commerce, Downtown Bloomington, Indiana University			
TL1-H- 3	Collaborate with partners including Indiana Railroad, Monroe County, and Bloomington Chamber of Commerce, and Indiana University to assess railroad infrastructure and Bloomington business community transportation needs, identify rail freight system and service improvments to increase utilization and encourage rail system owners to make improvements.	2	Economic & Sustainable Development	Indiana Railroad, Monroe County, Bloomington Chamber of Commerce, Indiana University			
	Strategy TL1-I: Reduce citywide off-road and lawn equipment emissions to below 35,000 metric tons annually.						
TL1-I- 1	Introduce a policy to replace City off-road and lawn equipment with electric and low-carbon fuel alternative options at the time of replacement with traditional internal combustion engine (ICE) as optional requiring proof of need. Establish emissions standards, testing and biofuel preference for any combustion vehicles remaining in the equipment fleet. Encourage County, School District, and Indiana University to implement similar policies.	1	Public Works				
TL1-I- 2	Develop an incentive program to convert fuel-burning lawn equipment such as gas-powered lawn mowers and blowers to electric. Coordinate with Duke Energy for support and identification of additional rebate programs to promote electric yard equipment.	2	Economic & Sustainable Development				
	Goal TL2 Support and encourage electric vehicle adoption, achieve 30% of vehicles sold and 15% of VMT community-wide by 2030						
	Strategy TL2-A: Transition City fleet to electric vehicle and alternative fuels (hybrid/ hybrid electric, plug in hybrid electric)						

TL2-A- 1	Introduce a policy to replace City fleet vehicles and buses with electric and hybrid options at the time of replacement, and require emissions standards, testing and biofuel preference for any combustion vehicles remaining in the fleet.	1	Public Works	Economic & Sustainable Development			
TL2-A- 2	Conduct a municipal fleet inventory and EV Impleentation plan. Effort to identify opportunities for electrifying, right-sizing, and improving overall efficiency of vehicles to meet CAP Goals. Include implementation recommendations to incorporate EVs through right-timing purchases with a planned vehicle-replacement schedule.	2	Public Works	Economic & Sustainable Development			
	Strategy TL2-B: Support and encourage electric vehicle and alternative fuel (hybrid/ hybrid electric, plug in hybrid electric) vehicle adoption citywide.						
TL2-B- 1	Coordinate with Monroe County and State of Indiana to establish an annual auto registration reporting process to monitor the adoption rate of Electric Vehicles in the City.	1	Planning & Transportation	Economic & Sustainable Development			
TL2-B- 2	Create an Electric Vehicle (EV) Action Plan to guide access to chargers on City property and citywide, explore alternative technologies like Smart cable technology and streetlight/ev charger integration, address barriers to charging for garage-free homes and rental properties, increase use of EVs in car sharing programs, assess options to lower EV and EV chargher implementation costs, and recommend an EV charging amendments to the Unified Development Ordinance to support EV plan.	1	Planning & Transportation	Economic & Sustainable Development			
TL2-B- 3	Support electric car charging station infrastructure in new commercial and multifamily housing during the initial construction phase by providing information on appropriate conduit and electrical panel considerations as a part of permit application process. Include information on utility, local, State, and Federal incentives supporting EV infrastructure. Collaborate with electric utility in the development of information.	1	Planning & Transportation	Duke Energy			
TL2-B- 4	Incentivize the purchase of electric vehicles through rebates on vehicles and/or residential chargers. Work with utility company on this program. Explore expansion of current Duke program: https://www.duke-energy.com/energy-education/energy-savings-and-efficiency/electric-vehicles/ev-initiatives	2	Economic & Sustainable Development	Duke Energy			
TL2-B- 5	Incentivize electric vehicle sales by providing low/no cost charging at city owned parking lots and working with employers to provide workplace charging and multi-family property owners to provide rental housing charging.	2	Public Works	Economic & Sustainable Development			
TL2-B- 6	Explore incentive opportunities to advance installation of EV infrastructure at workplace and multi-family locations.	2	Economic & Sustainable Development	Economic & Sustainable Development			

Action Number Strategy Acton	Sector Goal / Strategy / Action	Priority 1 = year 1-3 2 = year 3-5 3= year 5-8	Implementation Primary Responsibility another agency, City Council, specific city department / staff role, businesses, or households/individuals	Supporting Responsibility another agency, City Council, specific city department / staff role, businesses, or households/individuals	Staff Position Responsible	Estimated Budget Need	Progress At Review
	Energy and Built Environment						
	EB 1 Increase distributed renewable energy to 18% of citywide consumption by 2030 (estimated 170MW total installed capacity)						
	Strategy EB 1-A: Increase solar on City facilities 20% by 2030						
EB1-A- 1	Continue implementation of building on-site renewable energy upgrades on city facilities, including piloting net zero energy retrofits. Conduct a detailed "Renewable Energy Master Plan" for all primary city facilities which have not yet already achieved renewable energy meeting 100% annual energy demand. Plan to incorporate strategies to address electricity storage, energy resilience, emergency operations, and provide an implementation plan to achieve on-site renewable energy target and outline options to achieve 100% renewable energy for all city facilities (on-stie and off site options).	1	Economic & Sustainable Development	Controller			
EB1-A- 2	Establish a policy which requires all new construction and significant renovation projects for City facilities to be constructed to meet "Solar Ready" requirements and to include a solar feasibility assessment and project option for inclusion of on-site solar. "Return on Investment" assessment to include a localized Cost of Carbon. See City's Solar Reay Guidelines: https://palebluedot.llc/bloomington-solar-ready-guide	1	City Council	Economic & Sustainable Development			
EB1-A- 3	Study City facilities and potential partner entities to identify low-carbon district heating and cooling systems and Solar+Storage microgrid project options and select a project to implement as a pilot project by 2024.	2	Economic & Sustainable Development	Solar contractors			
	Strategy EB 1-B: Support and accelerate installation of on-site solar PV citywide						
EB1-B- 1	Identify the "Solar Top 50" commercial/industrial properties within the city and produce detailed solar feasibility assessments for each site. Assessments to include potential solar generation and economic performance and return on investment estimates, information on financing and ownership models, and next step resources. Provide solar assessment reports to properties and conduct an informational workshop to assist building owners and businesses in understanding the assessments and next step potential. "Solar Top 50" assessment effort could be repeated annually, particularly through 2025	1	Economic & Sustainable Development	Chamber of Commerce			
EB1-B- 2	Sponsor a community-wide "Solarize" program for commercial and Industrial group purchase of Solar PV. Include an invitation to participate to all building sites included in the "Solar Top 50" feasibility effort. (goal, installed capacity equal to 1.8% of commercial/industrial sector electrical consumption annually) https://www.nrel.gov/docs/fy12osti/54738.pdf	1	Solar installers	Economic & Sustainable Development			
EB1-B- 3	Continue to sponsor a community-wide "Solarize" program for residential group purchase of Solar PV. (goal, 250 homes installed annually) https://www.nrel.gov/docs/fy12osti/54738.pdf	1	Solar installers	Economic & Sustainable Development			
EB1-B- 4	Partner on a county-wide solar strategy to expand solar, especially to low and moderate income households. (goal, 100 low income homes installed annually)	1	Economic & Sustainable Development	Solar installers			
EB1-B- 5	Determine the true value and potential of customer-owned photovoltaics to the infrastructure, economics and renewable goals of the City. Analysis should include time of generation, capacity credit, distribution circuit support, customer characteristics, technical and market potential, resilience, etc. (Value of Solar study). Study results can be shared with community businesses and Bloomington Economic Development Corporation for information to advance solar awareness.	2	Economic & Sustainable Development	BEDC			
EB1-B- 6	Motivate and assist businesses throughout the community to install solar. Provide information on solar incentives, tools, and financing to businesses throughout the City.	2	Chamber of Commerce	BEDC			
EB1-B- 7	Establish a Solar Ready Ordinance to require all new residential and commercial buildings to be solar ready. See City's Solar Reay Guidelines: https://palebluedot.llc/bloomington-solar-ready-guide	2	City Council	Planning & Transportation			
EB1-B- 8	Promote, provide and distribute the City's Solar Ready Guide document to local home shows or remodeler showcase events, designers, homebuilder associations, and realtors (https://palebluedot.llc/bloomington-solar-ready-guide). Include the City's Solar Ready Guideline documents on the City's Design Guidelines webpage (https://bloomington.in.gov/utilities/review/design/manual)	2	Bloomington Home Show	Bloomington Realtors Association			
	Strategy EB 1-C: Improve energy policy.						
EB1-C- 1	Complete the SolSmart process to streamline permitting for renewable energy installations and assist in reducing solar project "soft costs" related to City solar processes. Achieve a Solsmart Gold rating by 2025	2	Planning & Transportation	Monroe County Building Department			
EB1-C- 2	Establish Solar Access Ordinance and policies which recognize changing conditions due to the proliferation of residential rooftop solar energy systems.	2	City Council	Planning & Transportation			
	EB 2 Increase energy efficiency citywide 16% for electricity and 12% for natural gas by 2030						
	Strategy EB 2-A: Increase total City owned building electrical energy efficiency 16% for electricity and 12% for natural gas by 2030						
EB2-A- 1	Update the City's Green Building Program policy to include clear energy reduction requirements to be measured annually durring the building's operation (such as "achieving and maintaining a minimum ENERGY STAR rating of 75, and built to meet or exceed IGCC code"). Consider increasing the minimum LEED design standard to Gold. Invite County, School District, and other public agencies located within the City to participate in City's Green Building Program standards.	1	City Council	Controller			
EB2-A- 2	Establish a policy to require all primary City facilities to benchmark and disclose annual energy consumption. Invite County, School District, and other public agencies located within the City to participate in City's facilities benchmarking and disclosure effort.	1	City Council	Controller			
EB2-A- 3	Conduct a Building Energy Audit on all primary City owned facilities without energy audits conducted within last 5 years. Fully implement recommendations of these and previous audits. Prioritization should be given to the City's largest energy consuming sites.	1	Public Works	ESD			
EB2-A- 4	Continue conversion of City streetlights and signals to LED. Complete 100% conversion by 2030	2	Public Works	ESD			

EB2-A- 5	Conduct an Occupancy and Plug Load Energy Efficiency Study of primary city owned facilities to identify plug load control strategies and establish a "Plug Load and Occupancy Energy Eficiency Guide" outlining operational practices to advance the City's energy efficency goals for City facilities. Provide training to all existing city employees and provide on-going training to all new city hires. https://sftool.gov/learn/about/426/plug-loads	2					
	Strategy EB 2-B: Support and accelerate energy efficiency citywide.						
EB2-B- 1	Adopt, implement, and promote a Commercial Building Energy Benchmarking and Disclosure ordinance for all public buildings and all commercial buildings 30,000 square feet and larger. https://www.energystar.gov/buildings/program-administrators/state-and-local-governments/see-federal-state-and-local-benchmarking-policies	1	City Council	ESD			
EB2-B- 2	Work with utilities to incentivize and promote replacement of inefficient equipment before end-of-life, and facilitate the bulk purchasing of efficient equipment. Goal: achieve 250 households replacing equipment annually	1	Duke Energy	Vectren			
EB2-B- 3	Establish an Energy Efficiency Upgrade cost sharing incentive program providing a 25% matching grant for qualified buildings and applicants. Target utilization by 60 businesses annually. Example program: http://www.minneapolismn.gov/environment/greencostshare http://www.minneapolismn.gov/www/groups/public/@health/documents/webcontent/wcmsp-221550.pdf	1	ESD	Chamber of Commerce			
EB2-B- 4	Work with partner organizations to promote building retrocommissioning and operation and maintenance practices that improve affordability, comfort, indoor air quality and energy efficiency in all commercial and multifamily buildings. Target 60 businesses commissioned annually	1	Builder's Association	Chamber of Commerce			
EB2-B- 5	Collaborate with utilities, community partners, and rental property owners to promote and provide comprehensive audits followed by energy efficiency upgrades benefiting multifamily residents, with a particular focus on low-income communities. Target: Achieve 220 audits and upgrades annually.	1	Duke Energy	ESD			
EB2-B- 6	Develop a "Green Roof" pilot project to exhibit heat island mitigation strategies and measure potential for effectiveness. Identify city building with low solar PV prioritization/feasibility for inclusion as cool roof pilot locaiton. Alternatively, pilot program could be advertized for submission by City of Bloomington residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential	2	Utilities	Planning & Transportation			
EB2-B- 7	Develop specific energy efficiency programs for hard-to-reach segments of multi-family and commercial properties (e.g., commercial rental, restaurants, large scale manufacturing, offices, affordable multifamily housing). Explore partnerships to include a job training component focused on providing training to low income community members in the program. Potential partners may include Monroe County and Bloomington WorkOne Center.	2	Monroe County Apartment Association	ESD			
EB2-B- 8	Enable institutions within each sector to learn about successful efficiency work through pilots, workshops, and case studies	2	Chamber of Commerce	ESD			
EB2-B- 9	Improve training, certification, and education opportunities for energy auditors and professionals involved in the disposal and use of refrigerants.	2	Ivy Tech	IU			
EB2-B- 10	With a focus on low income households and renters, engage residents on low cost ways to save energy and money, such as installing programmable thermostats. Pair eductional content with access to incentives and resources.	2	HAND	Housing Authority			
EB2-B- 11	Use a focused outreach program to contact local businesses to encourage participation in energy efficiency programs. Explore the development of an "Energy Reduction Top 50" energy efficiency assessment and recommendation program similar to the "Solar Top 50".	2	Chamber of Commerce	ESD			
EB2-B- 12	Develop a "Cool Roof" pilot project to exhibit heat island mitigation strategies and measure potential for effectiveness. Identify city building with low solar PV prioritization/feasibility for inclusion as cool roof pilot locaiton. Alternatively, pilot program could be advertized for submission by City of Bloomington residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential	2	Utilities	Planning & Transportation			
EB2-B- 13	Adopt, implement, and promote a Residential Energy Benchmarking and Disclosure or "Truth In Sale" ordinance for homes listed for sale. Examples include: http://www2.minneapolismn.gov/ccs/ccs_tish https://austinenergy.com/ae/energy-efficiency/ecad-ordinance/ecad-for-residential-customers	3	Monroe County Realtors Association	Housing and Neighborhood Development			
EB2-B- 14	Host a "data jam" session in support of Behcnmarking ordinances where building managers can enter energy with technical assistance providers present.	3	Mayor's Office	ESD			
EB2-B- 15	Develop a "Cool Pavement" pilot project to exhibit heat island mitigation strategies and measure potential for effectiveness. Identify city road or parking pavement location with high micro heat island potential for pilot project location. Alternatively, pilot program could be advertized for submission by City of Bloomington residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential	3	Public Works	Planning & Transportation			
	Strategy EB 2-C: Increase net zero energy residential building stock to 1% of homes Citywide by 2030.						
EB2-C- 1	Promote, provide and distribute the City's Net Zero Energy Building Guide document to local home shows or remodeler showcase events, designers, homebuilder associations, and realtors. (https://palebluedot.llc/bloomington-net-zero-energy-guide) Include the City's Net Zero Energy Building Guide and Solar Ready Guideline documents on the City's Design Guidelines webpage (https://bloomington.in.gov/utilities/review/design/manual)	1	Home Show	Plan Commission			
EB2-C- 2	Provide training on solar ready and net-zero strategies as found in the City's Net Zero Energy Building Guide and Solar Ready Guidelines to area builders with local builders association. Target 1% market coverage (130 homes) attending trainnig annually. (https://palebluedot.llc/bloomington-net-zero-energy-guide) (http://palebluedot.llc/bloomington-solar-ready-guide)	1	Builder's Association	Plan Commission			
EB2-C- 3	Utilize incentives, vacant City land, and current programs for pilots of net-zero buildings across different sectors. Explore option of issuing a competitive RFP for effective and innovative Net Zero pilot projects. Focus on "Net zero building in every neighborhood" to establish visibility of strategies within the community.	2	ESD	CDFI Friendly Bloomington			
	EB 3 Support decarbonization of the local electricity grid						
	Strategy EB 3-A: Support Duke Energy's grid emissions goal of 50% below 2005 levels by 2030						

EB3-A- 1	Collaborate with Duke Energy for the development of a pilot/demonstration community solar project. Identify underutilized sites such as landfil, brownfield, superfund sites, or detention pond sites (for floating solar) and identify most advantageous site to develop and install pilot solar garden. Explore potential for cost benefits for low income subscribers with Renewable Energy Credits supporting Duke Energy's carbon reduction goals. (example projects at superfund sites: https://www.epa.gov/superfund-redevelopment-initiative/alternative-energy-superfund-sites)	1	Duke	ESD			
EB3-A- 2	Collaborate with Duke Eergy to develop a pilot / demonstration solar lease program for photovoltaic on buildings connected via net metering open to Duke and third party vendors.	2	Duke	ESD			
	Strategy EB 3-B: Advocate for stronger state policy.						
EB3-B- 1	Collaborate with other communities, industry, and state agencies to support the State establishing the enabling legislation for Commercial Property Assessed Clean Energy (C-PACE) and Residential Property Assisted Clean Energy (R-PACE) financing	1	Legislature	Hoosier Environmental Council			
EB3-B- 2	Collaborate with other communities, industry, and state agencies to support the State in establishing policies and laws to expand the market for renewable energy, make it easier for large multi-family, commercial, and industrial customers to benefit from renewable energy (e.g. feed-in tariff, Power Purchase Agreements, Solar Lease agreements, roofspace rental, community solar, virtual net metering, aggregated net metering, etc.) Include inforamtion on current State of Indiana related regulations and cost and payback information.	2	Legislature	Hoosier Environmental Council			
EB3-B- 3	Collaborage with other communities, industry, and state agencies to support the State advancing increased energy efficiency building code requirements, establishing minimum energy performance requirements, net zero considerations and/or the establishment legislation enabling cities to establish "stretch codes" within their jurisdiction.	3	Legislature	Trade Associations			
	EB 4 Promote "fuel switching" to reduce on-site fossil fuel use in the building sector 3% by 2030						
	Strategy EB 4-A: Support and accelerate electrification of on-site fossil fuel combustion systems citywide						
EB4-A- 1	Conduct an "Electrification Assessment and Action Plan" to outline actions and priorities for electrification of all City facilities to move towards zero on-site fossil fuel combustion. Work with regional energy partnerships to implement Plan for all City facilities. Include new and existing buildings, explore strategies to address electricity storage, and create a case study to highlight and share challenges, solutions, and lessons learned to share with the broader community.	1	Public Works	Duke Energy			
EB4-A- 2	Deploy an incentive program for electrification. Work with Duke Energy or other regional partnerships to create financial incentives to electrify new and existing buildings. For example, rebates for panel upgrades, electric appliances, electric water heaters, Air Source Heat Pumps, and Ground Source Heat Pumps can encourage the transition to electric energy use in homes and businesses. Goal: Target 3% residential market conversion (90 households annually) and 3% commercial/industrial market conversion (an estimated 15 commercial businesses, 3 industrial businesses annually) by 2030. Collaborate with program partners to quntify potential cost savings of electrificaiton and provide ROI information to potential program participants	3	Duke Energy	ESD			
	Strategy EB 4-B: Support and accelerate low/no carbon alternatives to on-site fossil fuel combustion						
EB4-B- 1	Work with Vectren to establish an option for Renewable Natural Gas sourced from regional sources for residential and commercial customers. Program to include tracking for citywide natural gas reporting for GHG inventories. Achieve 1% use by 2030 (30 households and 6 businesses per year)	1	Vectren	ESD			
	EB 5 Increase financing options for Energy Efficiency and Renewable Energy projects citywide						
	Strategy EB 5-A: Promote Equity in Energy and Resource Costs and Ownership						
EB5-A- 1	Promote the development of partnerships with low-income and supportive housing serving organizations, the County, and the Bloomington Housing Authority to ensure that efficiency and renewable programs, incentives, and practices, meet the specific needs of these populations.	1	Housing Authority	HAND			
EB5-A- 2	Collaborate with Duke Energy and Vectren to increase energy efficiency funding options for families including low-interest financing, on-bill financing, Pay As You Save, and other programs as determined to be most effective.	1	Duke	Vectren			
EB5-A- 3	Establish a Recover Forward energy fund to invest in energy efficiency and renewable energy projects with a focus on supporting improved equity in Renewable Energy and Energy Efficiency in the community.	1	ESD	Council			
EB5-A- 4	Collaborate with partners such as Citizens Action Coalition to establish and regularly host utility bill clinics similar to those offered by Minnesota Citizens Utility Board (http://cubminnesota.org/) to help residents understand their bills, discuss energy savings options, and hear about rebate/incentive availability and clean energy options.	1	Citizens Action Coalition	Duke Energy			
EB5-A- 5	Create a coordinated "one-touch" program approach to expand low-income housing programs by layering healthy homes, lead abaitment, bill clinic, weatherization, and renewable energy programs	2	HAND	Utilities			
EB5-A- 6	Establish a Community Cost Share Fund for tax advantaged donations applied towards energy efficiency improvements and renewable energy projects for renters. Example program: https://www.como.gov/trust/share-the-light/	2	Community Foundation	City			
EB5-A- 7	Develop tools to finance energy efficiency and renewable energy retrofits for commercial and residential buildings that have low barriers to entry and limited risk for local government and that are broadly accessible to households and building owners, including rental properties, throughout the community. Potential tools may include Guaranteed Energy Savings program, Carbon Market funding, Mortgage-Backed Energy Efficiency and Renewable Energy Financing, and Municipal Energy Efficiency and Renewable Energy Revolving Loan, and Municipal rebates. Combine offerings with Duke Energy and Vectren incentive programs. Explore establishing a tiered incentive program with increasing incentvization for projects achieving 5%, 10%, 15%, and higher improved, measured energy efficiency over code requirements as well as an incentive add for low income beneficiaries. http://newbuildings.org/sites/default/files/EnergyEfficiencyFinancing_ModelsStrategies201110.pdf	2	Controller	ESD			
EB5-A- 8	Explore partnering City's investment and financing concepts with Indiana University to establish collaborative financing mechanisms, program, or implmentation strategy to advance equitable energy efficiency and renewable energy in the community.	2	IU	ESD			
EB5-A- 9	Evaluate the potential for a municipal or regional carbon tax or fee with dividents provided to lower income individuals. Funds to be used to support and promote energy efficiency and no/low carbon energy transitions for low income and vulnerable individials.	3	Controller	ESD			

EB5-A- 10	Establish a Renewable Energy TIFF Policy, requiring on-site renewable energy for all projects receiving TIF financing. Policy could also include the establishment of a Renewable Energy TIF District specifically identifying TIF financing potential for properties recieving redevelopment which include on-site renewable energy.	3	ESD	CDFI Friendly Bloomington			

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♻	**Waste Management**						
	Goal WM 1 Increase landfill solid waste diversion by 30% by 2030 (26,500 ton reduction)						
	Strategy WM 1-A: Increase organics diversion by 30% by 2030 (from 38.4% of community mixed waste to 26.9%)						
WM1-A- 1	Create a pilot "Food Scraps Bag" pilot program to test food scraps composting collection across resturant, commercial and residential customer base where food scrap bags are separated at landfil without separate compost bins and collection vehicles. https://cutt.ly/tfBf5Dj	1	Republic Services	Other private collectors			
WM1-A- 2	Establish a "Towards Zero Waste Certification" program to provide education to food retailers and restaurants on strategies to reduce waste and to promote businesses successfully achieving certification levels. Target: 20 additional businesses enrolled annually https://carbonfreedining.org/ https://true.gbci.org/ https://www.crra.com/certification	1	Economic & Sustainable Development	Chamber of Commerce; Bloomington Independent Restaurant Association;			
WM1-A- 3	Support edible food donation through coordination with the food bank and donations from City and community partner events. Explore expansion of effort by identifying food retailer and restaurant partners for increased participation and support.	1	Hoosier Hill Food Bank	Downtown Bloomington Inc			
WM1-A- 4	Partner with Monroe County Waste District to promote drop-off of compostable material.	2	Public Works	Monroe County Solid Waste District			
WM1-A- 5	Increase voluntary participation in commercial food scrap collection by identifying businesses that face barriers to participation and providing direct outreach and assistance.	2	Economic & Sustainable Development	Monroe County Solid Waste District			
WM1-A- 6	Establish an At-Home and Community Garden Composting program supporting the expansion of food waste diversion through at-home composting. Provide backyard composting workshops, tips, and resources. (https://www.bouldercounty.org/environment/composting/)	2	Parks & Recreation	Public Works			
WM1-A- 7	Based on results of the Food Scraps Bag pilot project, establish a policy or ordinance expanding or requiring in-trash food scrap composting based on results of pilot project. https://cutt.ly/tfBf5Dj	2	City Council				
WM1-A- 8	Close the loop on organics recycling; initiate a Compost Soil Amendment pilot project for use of compost as a soil amendment for public and private construction projects.	2	Public Works	Monroe County Solid Waste District			
WM1-A- 9	Based on Compost Soil Amendment pilot project results create a policy encouraging or an ordinance requiring use of compost soil amendments for all projects meeting appropriate threshold as supported by the pilot project.	3	Planning & Transportation	City Council			
	Strategy WM 1-B: Increase recyclables diversion by 30% by 2030 (from 31.7% of city mixed waste to 22%)						
WM1-B- 1	Ensure that recycling in schools, City buildings, public housing, and public spaces is fully implemented.	1	Public Works	Republic Services/ other private services			
WM1-B- 2	Conduct outreach to determine what assistance may be needed to increase recycling and composting.	1	Public Works	Monroe County Solid Waste District			
WM1-B- 3	Based on results of outreach, identify financial and other barriers to recycling and composting in multi-family buildings (e.g., different priorities between property management company and tenants, lack of knowledge of costs).	2	Public Works	Monroe County Solid Waste District			
WM1-B- 4	Incorporate criteria regarding recycled content and Extended Producer Responsibility into procurement guidelines for City purchasing.	3	Controller	Economic & Sustainable Development			
	Strategy WM 1-C: Increase diversion of potential recoverables by 30% by 2030 (from 9% of city mixed waste to 6.3%)						
WM1-C- 1	Develop and fund a waste audit and diversion assistance program for businesses. Program to support businesses in establishing tracking and reporting waste streams, identify reduction, diversion, beneficial use opportunities, identification of potential financing sources, and connect businesses with energy audit and other resources in support of full CAP goals. Target: 60 business waste audits completed annually. Example programs: https://www.mnchamber.com/your-opportunity/waste-wise https://www.portland.gov/sustainabilityatwork	1	Economic & Sustainable Development	Chamber of Commerce; Monroe County Solid Waste District			
WM1-C- 2	Conduct a Beneficial Use Study to identify greatest beneficial use opportunities present in current City solid waste streams. Study to estimate potential return on investment and identify job and economic development potential associated with opportunities. Research/identify pilot project opportunities to explore capture of benefit.	1	Public Works	Mayor's Office			
WM1-C- 3	Conduct a Phase 2 Waste-to-Energy Analysis to build on and proceed with further analysis of the waste-to-energy potential at wastewater treatment facilities as outlined in the recommendations of the 2020 Phase 1 Waste-to-Energy Analysis. Phase 2 analysis should identify pilot project(s) and an implementation schedule.	2	Utilities	Public Works			
WM1-C- 4	Establish a policy requiring the use of recycled asphalt, used roofing shingles, or other materials, particularly construction and demolition debris, in new streets.	2	Public Works	Engineering			
WM1-C- 5	Explore partnership with clothing reuse non-profits and businesses and a textile specialized recycling company to create a Clothing Reuse and Recycling pilot project to explore the potential of zero waste textiles within the City. Example clothing reues entities: https://www.goodwillindy.org/ https://sisterscloset.org/ Example recycling partners: http://atrscorp.com/ https://www.terracycle.com	2	Goodwill	Terracycle			
WM1-C- 6	Establish a policy or ordinance expanding or requiring textile reuse and recycling based on outcomes of the Clothing Reuse and Recycling pilot project. Example clothing reues entities: https://www.goodwillindy.org/ https://sisterscloset.org/ Example recycling partners: http://atrscorp.com/ https://www.terracycle.com	3	City Council	Monroe County Solid Waste District			
WM1-C- 7	Explore options to support, influence and increase the preservation, reuse, repurposing and retrofit of existing structures to reduce demolition waste, preserve the embodied energy and materials, while avoiding the energy usage related to demolition	3	Planning & Transportation	Housing & Neighborhood Development			
WM1-C- 8	Continue to support collaborative consumption community projects, such as neighborhood compost projects, tool libraries, and repair cafes through mini-grant programs.	3	Center for Sustainable Living	Economic & Sustainable Development			
WM1-C- 9	Provide event support for Fix It Fair at the Library and create a resource list for reuse.	3	Center for Sustainable Living	Economic & Sustainable Development			
WM1-C- 10	Research best practices for recycling hydrofluorocarbons (potent GHG used in refrigeration and air conditioning) and identify Hydrofluorocarbon Pilot Project to implement.	3	Monroe County Solid Waste District	Private Companies; Public Works			

WM1-C- 11	Based on best practice research and the Hydrofluorocarbon Pilot Project, recommend city policy or ordinance modifications.	4	City Council	Mayor's Office; Public Works; Monroe County Solid Waste District			
	Strategy WM 1-D: Support waste reduction through policy and operational refinements						
WM1-D- 1	Establish a Zero Waste policy for City operations that outlines increasing incremental annual waste reduction goals charting a path to Zero Waste. Policy to require that outside users of City facilities also follow Zero Waste policy and will modify the event permit application to require the inclusion of recycling and composting at events.	1	Public Works	Parks & Recreation			
WM1-D- 2	Study current best practices and most effective progressive Pay-As-You-Throw (PAYT) residential trash rates and implement a restructuring of City solid waste solid waste collection rates to promote solid waste diversion.	2	Public Works	Monroe County Solid Waste District			
WM1-D- 3	Explore the creation of a Universal Zero Waste Ordinance, requiring all property owners to provide recycling and compost collection services and requiring businesses to use these services. Example policy: https://bouldercolorado.gov/zero-waste/universal-zero-waste-ordinance	2	Public Works	Monroe County Solid Waste District			
WM1-D- 4	Increase recycling surcharge on landfill fees to develop more recycling programs	2	Public Works	Monroe County Solid Waste District			
WM1-D- 5	Conduct an optimization study to increase the efficiency of City solid waste collections and transfer routes and implement findings.	3	Public Works	Monroe County Solid Waste District			
	Goal WM 2 Educate, motivate, and empower the public to achieve waste reduction and diversion.						
	Strategy WM 2-A: Create, implement, and promote public awareness and education campaigns						
WM2-A- 1	Create a comprehensive communication campaign to provide standardized information and communications on waste reduction, recycling, and organics collection options to reach the residential sector. Example campaigns: City of Portland Be Cart Smart, City of Fayetteville Solid Waste Diversion and Recycling Education Plan: https://palebluedot.llc/bloomington-cap-policies	1	Public Works	Republic Services/ Ray's			
WM2-A- 2	Collaborate with Bloomington Chamber of Commerce, Downtown Bloomington, community businesses, and Indiana University to create a recycling marketing campaign and branding and provide reduce/recycle marketing and signage at storefronts, in parking lots, at point-of-sale, on websites, in local papers, on TV, etc. Campaign to standardize information and communication on solid waste, recycling, and organics options.	2	Indiana University	Chamber of Commerce			
WM2-A- 3	Coordinate with the Monroe County Community Schools to establish paths towards Zero Waste program. Program to include zero waste curricula and family content as well as zero waste strategies for school facilities. (https://www.ecocycle.org/files/Zero%20Waste%20A%20Realistic%20Approach%20Sustainability%20Program%20for%20Schools.pdf) (http://www.zerowastechallenge.org/curriculum.html)	3	Monroe County Community Schools	Republic Services/ Ray's			

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	Water and Wastewater						
	Goal W1 Decrease water consumption by 3% by 2030						
	Strategy W1-A: Promote increased water conservation citywide						
W1-A- 1	Facilitate reduction of water use by top 20 customers. Request large institutions and businesses to identify specific opportunities for employees or customers to conserve water and incorporate water efficiency into internal operations	1	Utilities				
W1-A- 2	Accelerate the installation of low-flow water fixtures in residential homes and expand the program to commercial businesses. Goal: achieve 100 households and 10 businesses upgraded annually	1	Utilities				
W1-A- 3	Develop a technical assistance and incentive program to encourage water conservation behavior and upgrades, such as use of drip irrigation and low-flow toilets	2	Utilities				
W1-A- 4	Implement a policy to require installation of rainwater colleciton systems and WaterSense water efficient fixtures and appliances at all City facility projects and all projects receiving $50,000 or more in City tax abatement, financing or funding. providing information and technical assistance.	2	ESD	Utilities			
W1-A- 5	Expand water conservation programs that focus on outdoor irrigation, which may also support better identification of water-related carbon sequestering opportunities such as using soil amendments, native grasses and proper tree watering	3	Utilities				
W1-A- 6	Expand water conservation outreach and incentive programs for residents and businesses	3	Utilities				
	Strategy W1-B: Maintain and update city plans and standards in support water conservation goals						
W1-B- 1	Evaluate the potential to update the City's Green Building Program to include	1	Utilities	Planning &			
W1-B- 2	Continue to plant more native and drought-resistant vegetation	2	Public Works	Parks and Recreation			
W1-B- 3	Update Unified Development Ordinance to encourage water conservation measures (e.g., grey water infrastructure, drought resistant landscaping) in new construction and renovations.	2	Planning & Transportation	Utilities			
	Goal W2 Maintain source and drinking water quality through climate related challenges.						
	Strategy W2-A: Maintain source and drinking water quality through climate related challenges						
W2-A- 1	Strengthen riparian/stream/wetland protection in local ordinances and regulations where feasible	1	Planning & Transportation				
W2-A- 2	Develop educational materials covering the link between water resources and climate change	2	ESD	Utilities			
W2-A- 3	Increase stream buffer requirements to provide additional flood water storage and mini-mize property damage due to erosion and flooding	3	Planning & Transportation	Utilities			
	Goal W3 Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030						
	Strategy W3-A: Reduce energy use associated with treating and transporting water and wastewater by 10% by 2030						
W3-A- 1	Promote measures that reduce the energy needed to heat, treat and transport water, including continued evaluation of new hydroelectric and photovoltaic opportunities.	1	Utilities				
W3-A- 2	Identify and support opportunities for residents and businesses - particularly those with significant hot water loads such aslaundromats and hospitals - to electriry water heaters or install solar thermal technology.	2	ESD	Utilities			
	Strategy W3-B:Capture and use of wastewater energy potential						
W3-B- 1	Research into biogas opportunities at the City's wastewater treatment plant and explore opportunities for renewable natural gas development capacity.	2	Utilities	ESD			
W3-B- 2	Following completion of study for retaining City wastewater treatment plant produced Renewable Natural Gas (RNG) and kWh for City heating and electrical needs implement recommendations of study	2	Utilities	ESD			
	Goal W4 Mitigate flood hazards and impacts						
	Strstegy W4-A: Update design standards and plans for flood mitigation						
W4-A- 1	Review and update public infrastructure design standards and the City's Stormwater Management Plan to meet Climate Change projections for Bloomington.	1	Utilities	Planning & Transportation			
W4-A- 2	Perform a flood risk assessment using historical data and future precipitation forecasts to identify areas and critical infrastructure vulnerable to flooding	1	Utilities	Planning & Transportation			
W4-A- 3	Continue to restore and maintain creeks to accommodate increased rain events. Review standards and ensure they include projected precipitation levels due to climate change. Creek restoration can reduce the likelihood and magnitude of flooding and support healthy habitat	2	Parks & Recreation	Utilities			
W4-A- 4	Determine stormwater volume requirements meeting anticipated future storm levels and identify stormwater management systems and infrastructure not capable of meeting projected needs. Prioritize upgrades required and implement. Integrate upgrades into already scheduled maintenance programs and budgets.	2	Utilities	Planning & Transportation			
W4-A- 5	Expand inclusion of green infrastructure in City's Stormwater Managment Plan. Target specific types of infrastructure to implement green infrastructure including: parking lots, alleys, parks, vacant lots, parkways, and grading near sidewalks. In addition, identify property owned by other public entities that have a high potential for improved ecological management to improve stormwater management functions.	2	Utilities	Public Works			

W4-A- 6	Modify water utility bills to provide education to residents on what actions they can take to reduce their risk to extreme precipitation events and flash flooding. Develop an information HUB with tools and resources (e.g. https://www.cnt.org/tools/my-rainready-home-assessment-tool)	2	Utilities	ESD			
W4-A- 7	Build more permeable parking lots and driveways and use more recycled materials with concrete	3	Planning & Transportation	Contractors			
	Strategy W4-B: Increase green infrastructure capacities citywide						
W4-B- 1	Promote native landscaping, restore and conserve habitat; encourage rain gardens on private property, avoid turf grass, and convert City-owned space to include stormwater absorption features. Tree selection should consider those on the "Adaptive Planting List" which will thrive in our future local climate	1	Parks & Recreation	Planning & Transportation			
W4-B- 2	Prioritize restoration types and areas to increase and improve stream and wetland protection and restoration; develop funding strategy.	2	Parks & Recreation	Soil & Water Conservation			
W4-B- 3	Leverage resources to support neighborhood green infrastructure grants and ongoing maintenance	2	Utilities	Council			
W4-B- 4	Incentivize and prioritize the development of "green infrastructure" such as parks, wetlands, riparian and wildlife corridors, natural drainage-ways, and low-impact development. Research green infrastructure implementation and long-term viability in local environment	2	Planning & Transportation	Parks & Recreation			
W4-B- 5	Increase the number of public and private use of raingarden and other infiltration projects	3	Parks & Recreation	Utilities			

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	Local Food and Agriculture						
	Goal FA 1: Increase food and nutrition security citywide.						
	Strategy FA 1-A: Address financial food insecurity.						
FA1-A- 1	Explore potential of collaborating with low cost produce providers to establish local food markets serving low income, vulnerable, and food insecure communities while addressing retail and commercial food waste. Potential partner: Daily Table https://dailytable.org/	1	Hoosier Hills Food Bank	Bloomington Winter Farmer's Market			
FA1-A- 2	Continue to provide enrollment assistance for participation in the Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) Program and other food assistance programs	2	SCCAP	Community & Family Resources			
FA1-A- 3	Work regionally to support and facilitate food donation programs. Food donation programs reduce the amount of healthy, safe food that goes to waste and redirects it to those in need.	2	IU Center for Rural Engagement	Purdue Extension			
	Strategy FA 1-B: Improve food access.						
FA1-B- 1	Conduct a detailed Food Security Assessment to determine food insecurity conditions within the City, areas with limited access to full service grocery stores and markets (particularly within areas of higher vulnerable populations), target areas within the City for improvement, and identify detailed strategies to increase food security within City.	1	Economic & Sustainable Development	Community & Family Resources Department			
FA1-B- 2	Develop an emergency food plan that includes a food needs assessment, scenarios for provisioning necessary food supplies durring a range of anticipated emergencies, and a distribution and public communication plan that takes into account those most at risk for food insecurity. Work with local retailers, producers, and warehouses to implement food provisioning scenarios.	2	County Emergency Management	County Health Department			
FA1-B- 3	Improve the availability of culturally appropriate food accessible to the City's populations of color, religeiously diverse, and limited english speakers. Explore opportunities to expand local development of these goods through engagement with local food producers and promote information on locations and price ranges of uncommon culturally important produce and food products.	2	Community & Family Resources	Purdue Extension			
	Goal FA 2: Increase local agricultural resilience to climate shocks						
	Strategy FA 2-A: Provide information and promote climate responsive agriculture practices						
FA2-A- 1	Collaborate with the County, Indiana Unversity, Monroe County Farmer's Association, Indiana Grown, and local organic farmers associations to encourage adoption of strategies to increase soil health and increased carbon sequestration for Croplands and Grazing Lands. Tools: http://www.comet-farm.com/ GHG and Carbon Sequestration Ranking Tool: https://cutt.ly/Vf04djN	1	Monroe County Soil & Water District	Purdue Extension			
FA2-A- 2	Develop and deliver educational materials for producers that will assist them in understanding the differences between normal weather fluctuations and long term climate change, as well as provide information on the agricultural crops, varieties, and methods most suitable for our area	2	Economic & Sustainable Development	Parks & Recreation			
FA2-A- 3	Encourage adoption of "Precision Farming" methods for adjusted field inputs to minimize negative impact potential of inputs like nitrogen. Methods include predictive approachs and control approaches. https://nifa.usda.gov/precision-agriculture-crop-production	2	Monroe County Soil & Water District	Purdue Extension			
	Strategy FA 2-B: Support climate resilient agriculture through City plans and programs						
FA2-B- 1	Develop a comprehensive farmland conservation plan that prioritizes food production while taking into consideration other Bloomington greenspace and climate adaptation priorities. The plan could also include specific maps or areas prioritized for farmland conservation or identify those areas most at risk from development or climate change impacts. Program should focus on exploring increased local food-to-table, local food utilization, and local development of cultural food products in support of Bloomington area underserved communities.	1	Monroe County/ Bloomington Planning Departments	Farmers			
FA2-B- 2	Work with Bloomington Water Utility and community partners to determine the feasibility of offering rebates or other incentives to farmers for irrigation water management equipment, water storage, reclaimed water, and conservation tillage equipment that saves potable water.	2	Utilities	Farmers			
	Goal FA 3: Increase and stabilize local food market.						
	Strategy FA3-A: Increase local food supply						
FA3-A- 1	Continue funding for a Municipality position to coordinate and facilitate food system solutions including adaptation and mitigation of climate change impacts. Tasks include education and training for residents and businesses, building relationships between food buyers and food businesses, and coordinating other actions in this section on Food Systems	1	Economic & Sustainable Devleopment	Chamber of Commerce			
FA3-A- 2	Revise zoning ordinances to allow urban agriculture and clarify acceptability to remove barriers to front yard and rooftop vegetable gardens, edible landscaping and foraging. Proactively promote and educate the public on urban agriculture ordinances, options and approaches	1	Planning & Transportation	Monroe County Planning Department			
FA3-A- 3	Based on market research and interviews conducted in 2019 USDA grant, complete a regional food system assessment to understand food and agriculture assets and supply chain bottlenecks. Identify potential markets for locally grown foods	2	Economic & Sustainable Devleopment	BEDC			
FA3-A- 4	Support existing school and community gardens and provide opportunities to expand community growing spaces with a focus on youth, immigrant, and low-income residents	2	Economic & Sustainable Devleopment	Monroe County School District			
FA3-A- 5	Support efforts to identify and increase utilization of shared food system assets such as shared food storage space, community commercial kitchens, group purchasing of growing equipment such as backyard greenhouses or hoop houses, and public-private	2	Economic & Sustainable Devleopment	CDFI Friendly Bloomington			
FA3-A- 6	Equitably promote educational opportunities for residents to gain skills in organic gardening, fruit production, food preservation and cooking and affordable, healthy eating.	2	Parks & Recreation	Monroe County Library			
FA3-A- 7	Develop entrepreneurial program for middle and high school parents to grow food and sell in marketplace.	3	Parks & Recreation	Economic & Sustainable Development			

	Strategy FA3-B: Strengthen demand for local foods						
FA3-B- 1	Pass city policy to procure locally grown foods for events and other organized food catering at city-managed facilities. Coordinate with School District, Indiana University, County, and local hospitals to establish similar locally sourced foods	1	Controller	Economic & Sustainable Development			
FA3-B- 2	Establish a policy to allow city facilities to be used as Community Supported Agriculture drop off sites and promote their use among local food producers and consumers.	2	Parks & Recreation	Farmers			
FA3-B- 3	Promote and expand public education campaigns to encourage purchasing and procuring locally grown and produced food at the individual and institutional level	2	Parks & Recreation	Economic & Sustainable Development			
FA3-B- 4	Expand Farmers Markets (particularly year-round market opportunities), local food hubs and marketing of locally produced and processed foods. Efforts to focus on increased community equity and food security among at-risk populations.	3	Parks & Recreation	Bloomington Winter Farmer's Market, People's Market			

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	Health and Safety						
	Goal HS1: Educate, engage, and empower the public for climate health and safety						
	Strategy HS1-A: Improve training to address risks exacerbated by climate change						
ES1-A- 1	Ensure public safety staff are properly trained to recognize and respond to physical and behavioral signs of heat-related illness.	1	Police	Fire			
ES1-A- 2	Strengthen emergency management capacity to prepare for and respond to the impacts of climate change.The City should prioritize capacity improvements such as training and equipment to address risks exacerbated by climate change - see the City of Bloomington Climate Risk and Vulnerability Assessment 2020. Emergency management should be equipped to address the possibility of multiple emergencies at the same time, such as the combination of extreme heat and power outage.	1	County Public Health	Police: Parks & Recreation			
ES1-A- 3	Provide guidance through resource material to social service providers so they are aware of best practices in treating client needs during an extreme heat event.	2	Emergency Management	COAD			
ES1-A- 4	Give city and county elected officials and staff tools (e.g. webinar trainings on emergency preparedness, facilitation guides, and other materials in multiple languages) to have dialogues about emergency preparedness within neighborhoods and to create local resilience strategies such as an Adopt-A-Neighbor campaign or hosting an OEM CERT-like training session in their community.	3	Council	County Council			
	Strategy HS1-B: Establish and expand public health communication campaigns						
ES1-B- 1	Develop a communication campaign to reach those without access to internet or technology, limited English speakers, and individuals in hard to reach vulnerable populations.	1	Community & Family Resources	Housing Authority			
ES1-B- 2	Increase public education and outreach about the basics of climate change and how it will affect the community	2	ESD	Mayor's Office			
ES1-B- 3	Expand visibility of the City Air Quality Index including particulate matter and pollen counts so that the public is aware of bad air quality days. Include strategies for coping with poor air quality days	2	IU	Mayor's Office			
ES1-B- 4	Collaborate with County Health, school district, University of Indiana, and local hospitals to establish a public communications campaign to build awareness of vector borne disease risks, avoidance, and actions. Campaign should be focused particulalary on those most vulenerable to exposure.	3	IU	Monroe County Health			
	Goal HS2: Respond to climate risks and impacts.						
	Strategy HS2-A: Assist the city's heat, flooding, and storm vulnerable population in preparing for and mitigating climate change impacts.						
ES2-A- 1	Seek to reduce exposure to extreme heat and imporove stormwater damage by promoting, distributing, or providing installation assistance of shade trees targeted at community areas identified as having high heat island impact based on City's Citywide Ground Cover and Heat Island Assessment (see Greenspace section) and/or flash flood prone. Assistance should prioritize vulnerable populations.	1	Parks & Recreation	Utilities			
ES2-A- 2	Seek to reduce vulnerability to extreme precipitation and flooding by providing precipitation and flood readiness assistance for residents within flood and flash flood prone sectors and for vulnerable populations. Assistance may include on-site and on-line flood assessments and readiness improvements (e.g. https://www.cnt.org/tools/my-rainready-home-assessment-tool) as well as provision of education to residents on what actions they can take to reduce their risk to extreme precipitation events and flash flooding through communication campaign and/or development of an information hub with information, tools and resources.	1	Emergency Management	Utilities			
ES2-A- 3	Seek to reduce exposure to extreme heat by targeting the distribution of energy-efficient, air conditioning in vulnerable populations with a prioritization in areas of high micro heat island impacts as identified in City's Citywide Ground Cover and Heat Island Assessment (see Greenspace section)	2	Shalom	Police			
ES2-A- 4	Improve the energy efficiency of homes, apartments and commercial buildings to keep interiors cool, improving the comfort and safety of occupants and reducing the need for summer air conditioning. Encourage the planting of trees and vegetation on the south and west sides of homes and buildings to reduce summer heat gain (mid-cost). Job creation opportunity	2	Duke	HAND			
ES2-A- 5	Collaborate with community partners to provide flood insurance education to home owners, particularly new home buyers and at-risk home owners. Education should include when insurance is recommended, purposes for flood insurance, and what is typically covered and not covered by insurance.	2	Insurance	Homeowner's Associations			
	Strategy HS2-B: Establish a climate impacts mutual aid program						
ES2-B- 1	Coordinate with County, State, University of Indiana, surrounding communities, Red Cross, and utilities to estabish a Mutual Aid and Response program. Program to focus on range of current and projected risks and hazards including flooding, extreme weather, storms, power outage, and emergency debris management.	1	Monroe County Emergency Management	IU			
ES2-B- 2	Organize a transportation-assistance program for individuals without access to vehicles. Explore partners such as Area 10 on Aging, Bloomington Transit, and local hospitals.	2	Area 10 on Aging	Bloomington Transit			
ES2-B- 3	Educate the public about the health risks of higher temperatures, develop strategies to check on individuals at greatest risk, and make options for cooling widely accessible.	3	Homeowner's Associations	COAD			
	Strategy HS2-C: Establish and update plans to address climate risks and impacts.						
ES2-C- 1	Coordinate with County, University of Indiana, Red Cross, and utilities to develop a debris management plan to support response to severe storm events and flooding. Explore potential of integrating HAND neighborhood clean up grants into plan.	1	County	Utilities			

ES2-C- 2	In alignment with the American Public Health Association Policy Number: 201711, City will engage County and State environmental offices and health departments and with the EPA regional office in assessing and remediating environmental justice concerns in Bloomington. Concerns to be assessed to include exposures to smog and toxic air pollutants and the disproportionate number of asthma cases among people of color. Assessment to prioritize review of exposures near public housing and schools in the vicinity of freeways, industrial facilities, and power plants. Impacts of land-use planning and infrastructure decisions on air pollution exposure to be reexamined.	2	ESD	Health Department			
ES2-C- 3	Collaborate with County to ensure Emergency Management Plans include current and projected climate change risks and hazards and prioritize and prepare for responses in the event of climate hazards and extreme weather events. See City of Bloomington Climate Risk and Vulnerability Assessment 2020.	2	County	Mayor's Office			
ES2-C- 4	In collaboration with County, develop a comprehensive heat response plan that incorporates most current climate change impact projections and combines individual strategies into an integrated approach. Coordinate with County to Include Response Plan on County's Public Health Preparedness webpage (https://www.co.monroe.in.us/topic/index.php?topicid=154&structureid=12).	2	IU	County			
	Goal HS3: Prepare Bloomington for climate risks and impacts						
	Strategy HS3-A: Strengthen community response capacity and support networks						
ES3-A- 1	Enhance community networks and connections for those who require special attention, such as the elderly, homebound, disabled, isolated, or those likely to be in need of financial assistance during or after extreme weather events (heat, cold and heavy precipitation)	1	Community and Family Resources	Emergency Mangement			
ES3-A- 2	Strengthen emergency management capacity to prepare for and respond to the impacts of climate change. The City should prioritize capacity improvements such as training and equipment to address risks exacerbated by climate change. Emergency management should be equipped to address the possibility of multiple emergencies at the same time.	2	Emergency Management	Health Department			
ES3-A- 3	Explore potential of developing an indoor air quality monitoring program. Program could include deploying a series of air quality monitoring stations at appropriately located public facilities, schools, senior living homes, group homes, and public housing facilities.	3	Health Department	HAND			
	Strategy HS3-B: Improve equity of climate adaptation measures.						
ES3-B- 1	Utilize current science, best practices and updated maps of flooding and flash flooding potential, micro heat island vulnerability, and populations most vulnerable to flooding and heat impacts to help inform decisions and priorities about projects, project approvals, and programs that help to cool the urban environment.	1	IU	City/ County			
ES3-B- 2	Ensure equitable implementation of grid resilience actions by partnering with high-risk neighborhoods and non-governmental organizations to develop resilience hubs—community facilities that offer power and other services during times of need. Establish criteria to screen and select locations for community microgrids to support grid and community resilience	2	Duke Energy	ESD			
ES3-B- 3	Seek to reduce vulnerability to mold and other flood related impacts by providing mold awareness and mitigation assistance for residents within flood and flash flood prone sectors and for vulnerable populations and within multi-family housing. Assistance may include establishing mold inspections for rental properties and/or residences in flood or flash flood prone areas of the city.	2	Health Department	HAND			
ES3-B- 4	Collaborate with County to establish/expand support of climate and extreme weather safe working conditions, extreme heat and heat stress education and general worker safety for individuals and jobs vulnerable to high heat.	3	Hazard Management	Worker's Unions			

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	Greenspace and Ecosystem Health						
	Goal G1: Increase quantity and quality of greenspace within the community.						
	Strategy G1-A: Establish city greenspace plans integrating findings and goals of Climate Action Plan						
G1-A- 1	Complete a Land Conversion Opportunity Study. Analyze public and private property for unused turf and impervious areas, and create a Ground Cover Conversion Implementation plan by neighborhood/census tract to convert targeted areas to native grasslands, wetlands, and shrub/forested areas. Identify incentive opportunities and establish an outreach campaign.	1	Parks & Recreation	Planning & Transportation			
G1-A- 2	Conduct a greenspace and preservation equity assessment to evaluate greenspace citywide and determine potential needs for expansion, purchase and preservation of greenspace based on quantified equity, environmental, economic beneifts, and Return on Investment based on life cycle costs of greenspace property ownership. Coordinate assessment with findings of the Citywide Ground Cover and Heat Island Assessment and Urban Forest Management Plan.	2	Planning & Transportation	Parks & Recreation			
G1-A- 3	Develop an incentive and assistance program to support the conversion unused turn and impervious areas in the city to sustainable green space as outlined in the City's Land Conversion Opportunity Study.	2	Planning & Transportation	ESD			
	Strategy G1-B: Improve the connectivity and functionality of greenspaces within the city.						
G1-B- 1	Enhance the connectivity of greenbelt and habitat corridors across the community, including identification and improvement of "pollinator corridors" and "wildlife corridors".	1	Planning & Transportation	Parks & Recreation			
G1-B- 2	Expand and connect green spaces so they are welcoming and within 10 minute walking distance of all residents, especially in underserved communities where there is a high level of impervious surfaces.	2	Parks & Recreation	Planning & Transportation			
G1-B- 3	Improve the ecological functionality of and resiliency of parks and open space through green infrastructure, best practices for stormwater management, and increased plant diversity and pollinator-friendly habitat.	3	Parks & Recreation	Utilities			
	Goal G2: Increase quantity and quality of climate adaptive native habitats						
	Strategy G2-A: Create and expand native habitat policies and infrastructure.						
G2-A- 1	Create a policy for the use of native plants in landscaping at City-owned properties, where suitable	1	Parks				
G2-A- 2	Establish and effectively manage native-habitat corridors along trails (Parks) and utility easement areas to restore and maintain landscape connectivity	2	Parks	Duke Energy			
G2-A- 3	Support seed banks to address shifts in habitats, microclimates, bioclimatic envelopes	3	Library	Parks			
	Strategy G2-B: Increase the use of native species and pollinator restoration areas.						
G2-B- 1	Install roadside climate adaptive native vegetation that creates effective barriers to prevent drifting of air pollutants to adjacent schools and residences/ parks. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6060415/	1	Parks				
G2-B- 2	Increase use and promotion of "no mow areas" with plantings of appropriate heights to ensure safety and visibility along roads and parking lots.	2	Planning & Transportation	Parks			
G2-B- 3	Promote "landscaping for absorption" practices for water prone residential and commercial landscapes. Strategies include native moisture tolerant perennial plantings and shrubs.	3	Planning & Transportation				
	Goal G3: Increase citywide tree canopy coverage by 3% by 2030						
	Strategy G3-A: Establish city plans and policies in support of tree canopy goals						
G3-A- 1	Conduct a Citywide Ground Cover and Heat Island Assessment. Assessment should include tree canopy, light impervious surface, dark impervious surface, grassland, and water coverage by census tract. Study should include heat island impact study to identify areas of high heat island contribution and impact. Findings of tree coverage, benefits, heat island impacts, and opportunities should be overlapped with vulnerable population mapping from the City's Climate Vulnerability Assessment. Study to establish specific goals of tree canopy coverage, by census tract, for reduction of dark imperviious surfaces, and target "Heat Island Coefficient", and prioritized tree canopy goals based on need, potential, historic investment/benefit per household, and opportunity to positively impact vulnerable population. Study to identify specific citywide percentage coverage goals for forsted and native planting ground cover. Study to priority areas for heat island mitigation based on need, potential, and impact on equity and vulnerable populations. Study should also evaluate opportunities to plant additional trees near city facilities to reduce heat island.http://palebluedot.llc/tree-canopy-assessments	1	Parks				
G3-A- 2	Develop an Urban Forest Management Plan to establish objectives and best management practices for the Municipality's urban forest and to identify appropriate canopy cover goals and establish an implementation plan to meet ground cover and tree canopy goals by neighborhood/census tract based on the Citywide Ground Cover and Heat Island Assesment and develop species diversity goals for the City. Recommended species should prioritize drought and flood resistant varieties and varieties likely to be resistive to changing climate and USDA Hardiness zones for City (see appendix 2 of City of Bloomington Climate Risk and Vulnerability Assessment). Species recommendation list to be distributed to and promote among residents, businesses, and contractors within the City.	2	Parks				
G3-A- 3	Continue to prioritize tree planting and maintenance on public property	3	Parks				
G3-A- 4	Enhance street scape plantings and tree canopies, especially in areas of high traffic volumes.	3	Parks				
	Strategy G3-B: Support and empower community partners, businesses and residents in meeting tree canopy goals						
G3-B- 1	Explore development of additional incentives for tree planting, particularly in targeted areas within the City as established by the Citywide Ground Cover and Heat Island Assessment.	1	Parks				

G3-B- 2	Develop educational and informational resources providing information on beneficial and climate adaptive tree species, "carbon gardening" strategies for ornamental gardens, and produce gardens, tree profile rebuilding, elimination of synthetic fertilizer and pesticide use, high mow deck settings, use of biochar amendments, polyculture lawn mixture and other beneficial greenspace practices included in this CAP.	2	Parks				
G3-B- 3	Create a communication campaign and educational content to increase opportunities for residents to learn about and take care of trees.	2	Parks				
G3-B- 4	Plant shade trees to limit the need for indoor cooling and reduce temperatures at parks, playgrounds, and other outdoor spaces. Collaborate with School District to include school properties.	3	Parks				
	Goal G4: Reduce stormwater and micro heat island impacts						
	Strategy G4-A: Reduce impervious surfaces						
G4-A- 1	Create a "Green Streets" policy (Green Streets are designs that reduce environmental impacts by reducing impervious surface, managing stormwater, and providing shade) or "Living Streets" policy (Living Streets combines the concepts of complete streets and green streets, and also puts additional focus on quality of life aspects for City residents) to guide current and future street construction, reconstruction, and maintenance projects within the City.	1	Planning	MPO			
G4-A- 2	Use green infrastructure such as bioswales, permeable pavement, other pervious surfaces to reduce flood risk and minimize sediment entry into creeks from trails and roads	2	Parks				
	Strategy G4-B: Increase water uptake capacity of greenspace						
G4-B- 1	Implement policy requiring a biochar soil amendment for all City building and earth working construction sites. Encourage biochar soil amendment use for private sector construction and earth working construction sites. Biochar improves soil sequestration and builds carbon content of topsoil, and improves water retention and permeability characteristics.	1	Planning				
G4-B- 2	Implement a policy to require soil profile rebuilding at new tree installations at all City building project sites or compacted soil conditions to reduce erosion and runoff contaminated with fertilizers, increase soil carbon stores and support long-term soil building. Encourage soil profile rebuilding for private sector building project sites or compacted soil conditions. (https://www.urbanforestry.frec.vt.edu/SRES/)	1	Parks				
G4-B- 3	Explore revegetation, tree preservation planting and maintenance, depaving and porous pavement, and green infrastructure like bioswales ecoroofs and site development performance standards in support of the City's Citywide Ground Cover and Heat Island Assessment, Land Conversion Opportunity Study, and Urban Forest Management Plan.	2	Planning	Parks			
G4-B- 4	Keep natural resource areas, especially urban streams, cooler by increasing the width of vegetated areas along streams and wetlands and maintaining tree canopy	2	MPO	Parks			
G4-B- 5	Transition maintenance of all city owned properties to Carbon Gardening practices including elimination of synthetic fertilizer and pesticide use, high mow deck settings, use of biochar amendments, and polyculture lawn mixture	2	Parks				

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	Climate Economy						
	Goal CE1 Build marketplace climate resilience.						
	Strategy CE1-A: Evaluate climate risks to businesses.						
CE1-A- 1	Conduct a planning effort focused on identifying economic vulnerabilities based on risks and hazards identified in this report and the City/County emergency management response plan, particularly those affecting the city's vulnerable populations and small businesses Identify economic opportunities possible through the successful implementation of the CAP plan and achievement of its goals, especially those which can provide opportunity for the city's vulnerable populations. Identify economic resilience strategies and conduct outreach to industry groups and public-private partnerships to promote private sector investment addressing them. Strengthen public-private economic communications in support of strategies, especially with targeted group businesses (minority-owned, veteran owned, economically disadvantaged, etc). Possible example process: https://www.eda.gov/ceds/ Coordinate with the City of Bloomington's Recover Forward program	1	ESD	BEDC			
CE1-A- 2	Collaborate with local and regional partners including the County, and Indiana University to establish a technical assistance or Climate Resilient Business concereige service and to work with businesses to assess their climate change vulnerability and plan for the future.	2	IU	Chamber			
CE1-A- 3	Support climate resilience of local economy by preparing water, road, utilities, and other public infrastructure for increased demands from climate change based on Bloomington Climate Risk and Vulnerability Assessment, Emergency Management Plan, and State climate change data and projections.	3	City	County			
	Strategy CE1-B: Accelerate the transition to a carbon free local economy.						
CE1-B- 1	Streamline and offer expedited permitting for renewable energy installations.	1	Planning	County Building			
CE1-B- 2	Provide assistance vetting contractors, offering energy, waste, and water audits, and EV readiness assessments to local businesses.	2	ESD	Chamber			
CE1-B- 3	Promote Bloomington as an environmentally friendly destination by highlighting the businesses that are taking steps to reduce resource consumption.	2	BEDC	ESD			
	Goal CE 2: Attract, create, and support businesses that are committed to sustainability and climate goal.						
	Strategy CE2-A: Increase workforce development for the climate economy.						
CE2-A- 1	Establish a job training and entrepreneurial development program focused on serving vulnerable populations. Explore Operation Fresh Start as a model (http://www.operationfreshstart.org/)	1	Parks	WorkOne; Building Associations			
CE2-A- 2	Develop job training programs focused on building resiliency- solar construction, weatherization, etc. Potential example program: Colorado solar training program. Potential partners: Solar For All, Ivy Tech Community College and local solar installers. Coordinate with the City of Bloomington's Recover Forward program.	2	Ivy Tech	WorkOne; Building Associations			
CE2-A- 3	Develop targeted programs to train residents of low and middle income communities for jobs in the green economy. Coordinate with Work One, Department of Workforce Develoment, Good Will Excel Center, Hoosier Hills Career Center, Ivy Tech, and Regional Opportunities Initiative.	2	Ivy Tech				
CE2-A- 4	Collaborate with the School District, local community colleges, unions, and employers to establish a Green Jobs apprenticeship and internship program and facilitate the hiring of graduates through the promotion and subsidized internship placement with local employers.	3	School districts				
	Strategy CE2-B: Support Climate Economy econmic development and new business creation.						
CE2-B- 1	Establish a Clean Energy business incubator to support the establishment of innovative energy efficiency and renewable energy business models within the community. Explore incorporation with the Ivy Tech Center.	1	ESD	BEDC			
CE2-B- 2	Implement recommendations from the City of Bloomington Renewable Energy Potentials Study 2020. Prioritize utilization of local workfoce and local renewable energy companies.	1	BEDC	ESD			
CE2-B- 3	Explore opportunities to broaden the City's economic base with diversification initiatives, such as targeting the development of emerging clusters or industries that (a) build on the region's unique assets and competitive strengths; and (b) provide stability during downturns that disproportionately impact any single cluster or industry	2	ESD	BEDC			
CE2-B- 4	Focus business development efforts on businesses that have lower impacts on natural resources. Example: Trades District Technology Center.	2	ESD	BEDC			
CE2-B- 5	Leverage city policy, purchasing, and regulation, and deepen local and regional partnerships including Indiana University to promote local research, development, and production of green technology and products.	2	IU	ESD			
CE2-B- 6	Establish a policy to prioritize use of local businesses for City financed energy efficiency and renewable energy projects, with special consideration given to businesses owned by women and minorities.	2	ESD	Controller			
CE2-B- 7	Consider climate change-related risks to local supply chains in implementation of the City's economic development strategy.	3	ESD	BEDC			
CE2-B- 8	Work with community businesses to explore the creation of an incentivized "buy local" campaign to enhance resilience of small local businesses.	3	Chamber	ESD			
	Goal CE 3: Develop new mechanisms for financing City climate action plan implementation.						
	Strategy CE3-A: Leverage existing financing pathways.						
CE3-A- 1	Establish a policy that savings generated by energy efficiency measures and renewable energy installations/agreements for City facilities and operations shall be used as a fund to support future energy efficiency and renewable energy projects in support of the CAP goals.	1	Controller	ESD			
CE3-A- 2	Establish a policy that designates City Electric and Natural Gas Franchise Fee Income as funding source for Climate Initiatives	1	Controller	Mayor's Office			

CE3-A- 3	Explore opportunities to utilize Tax increment Financing (TIF) to incentivize Mitigation and Adaptation actions. Options include the establishment of a Renewable Energy TIF district incentivizing on-site renewable energy utilization or a Net Zero TIF funding mechanism incentivising high energy efficiency and Net Zero buildings.	2	ESD	Controller			
	Strategy CE3-B: Develop new financing pathways.						
CE3-B- 1	Adopt a "resilience penny" property tax increase of $0.01 per $100 of assessed value and dedicate additional funds for climate mitigation and climate adaptation strategies. Funds may be used directly, or may be used as a repayment source for a bond issue.	1	Mayor's Office	City Council			
CE3-B- 2	Explore the potential of developing a "Carbon Impact Fee" similar to the City of Watsonville CA. Additional funds raised to be used for Climate Mitigation and Adaptation implementation. Increased revenue to be used to fund Climate Mitigation and Adaptation implementation with a focus on the actions and strategies which increase the community's equity. https://www.cityofwatsonville.org/DocumentCenter/View/198/Frequently-Asked-Questions-About-the-Carbon-Fund-Ordinance-PDF https://www.cityofwatsonville.org/DocumentCenter/View/3944/Carbon-Fund-Voluntary-Compliance-Worksheet?bidId=	1	Controller	Planning & Transportation			
CE3-B- 3	Explore Issuing “resilience bonds” that generate risk-reduction rebates from a city’s catastrophe insurance premiums to pay for resilience projects, prioritizing projects with high resilience, GHG mitigation, and climate adaptation potential.	2	Controller	CDFI Friendly Bloomington			

Click here to return to TOC

Section A1

GHG Forecast Assumptions

Bloomington Business as Usual GHG Methodology

Jen McGraw, Center for Neighborhood Technology

September 25, 2020

Bloomington GHG Emissions Today

Bloomington's 2008 and 2018 greenhouse gas (GHG) inventories as recorded in the ICLEI ClearPath online tool and shown in Table 1 are the starting point for projecting future communitywide emissions.[1] The largest share of GHG emissions today come from electricity use, followed by transportation and natural gas use.

Table 1. Bloomington GHG Inventories 2008 & 2018

	GHG Emissions ($MTCO_2e$)	
	Year	
Source	2008	2018
Electricity	1,045,212	777,859
Natural Gas	92,245	100,082
Other Industrial Energy	57,785	84,540
Transportation	184,030	198,141
Waste	69,899	81,786
Water & Wastewater	21,380	14,751
Other	61,567	33,334
Total	1,532,117	1,290,493

Business as Usual to 2050

Business as Usual (BAU) GHG emissions are modeled by applying demographic and other trend data to the emissions inventory to develop projected emissions levels that could occur in 2025, 2030 and 2050 without additional climate action in Bloomington. These years were chosen because they are the years of Bloomington's emissions reduction targets.

The BAU shows that the city's community-wide emissions footprint could fall to 677,164 metric tons of carbon dioxide equivalent ($MTCO_2e$) by 2050 (Figure 1 &

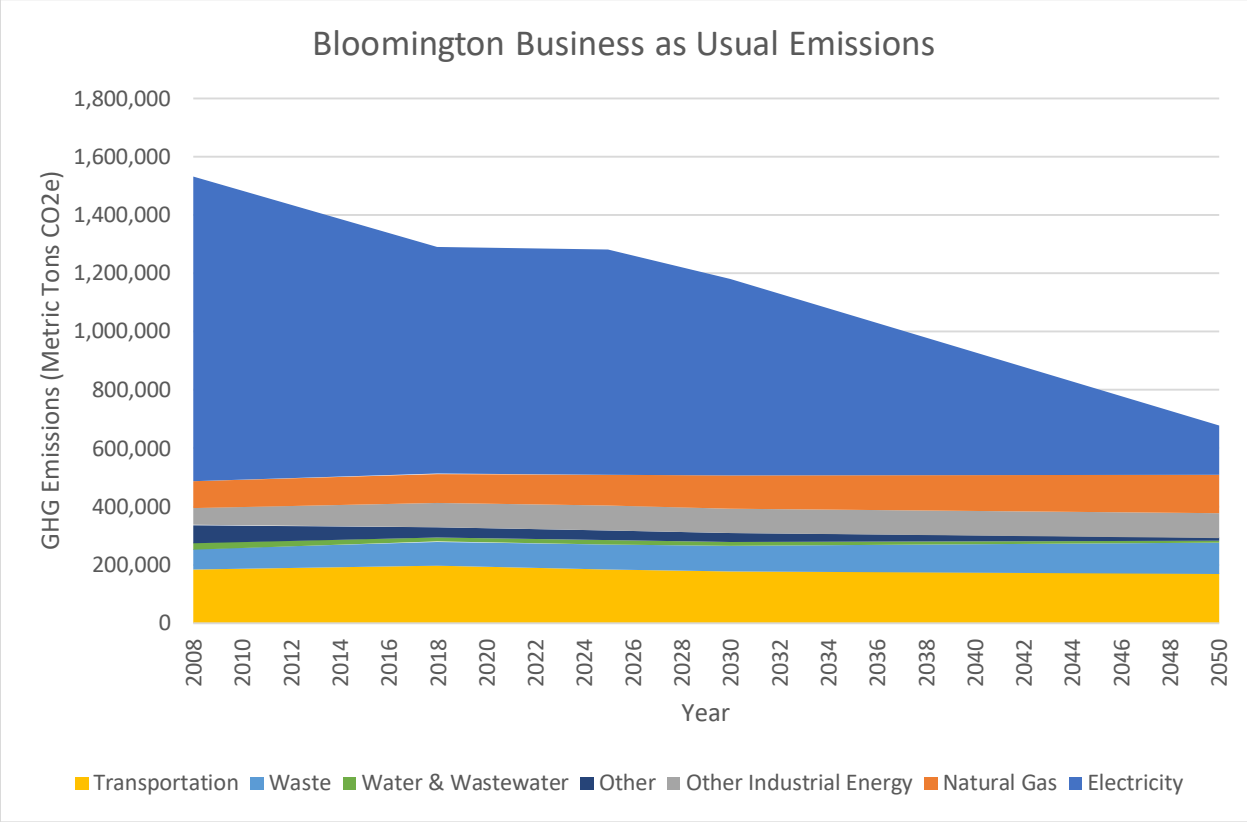
Table 2). This would be less than half of Bloomington's 2008 emissions. These changes come from a national move away from fossil fuels in the electricity grid, increased automobile and appliance efficiencies, and changes energy demand. These trends are due to technology improvements, corporate climate commitments, federal regulations, climate shifts, and other systemic changes. The projected emissions decrease will be important in supporting Bloomington's climate commitments, but Bloomington will not meet its stated goals without taking further action to reduce emissions.

The BAU projection is meant to be a guide for action planning by showing the general direction of emissions by sector. There is significant uncertainty in the BAU. Furthermore, the BAU is not a

[1] Bloomington ClearPath Account. Data accessed August 2020.

replacement for regular emissions tracking and program evaluation. As Bloomington implements climate action it should inventory emissions and make sure climate strategies are achieving intended savings.

Figure 1. Bloomington Business as Usual GHG Projection (MT CO_2e)



Electricity Carbon Intensity the Biggest Change

By far, the largest source of change in emissions in the BAU comes from the decarbonization of the electricity grid that serves Bloomington. As carbon-intensive sources of power, like coal, have been decommissioned the average GHG emissions associated with a kilowatt-hour (kWh) of electricity used in Bloomington has fallen in recent years. This is expected to continue if the major electricity supplier for the area, Duke Energy, meets its goals of cutting GHG emissions 50% below 2005 levels by 2030 and to "net zero" emissions by 2050.[2] This projected change in the electricity supply also impacts Bloomington's Water & Wastewater emissions, which include emissions associated with electricity to operate the water and wastewater systems.

Waste Emissions Largest Projected BAU Increase

[2] https://www.duke-energy.com/_/media/pdfs/our-company/climate-report-2020.pdf

The largest increase in GHG emissions in the BAU is from solid waste. Bloomington is projected to have significant population growth through 2050, so if waste generation and management practices are not changed the emissions from solid waste will grow too.

Table 2. Bloomington BAU GHG Emissions ($MTCO_2e$)

	Year			Change	Change	Share of Total Change
Source	2025	2030	2050	2008-2050	2008-2050	
Electricity	772,099	674,354	168,363	(876,849)	-84%	103%
Natural Gas	106,524	112,645	130,816	38,571	42%	-5%
Other Industrial Energy	84,540	84,540	84,540	26,755	46%	-3%
Transportation	185,255	176,704	170,720	(13,310)	-7%	2%
Waste	83,478	87,651	106,541	36,642	52%	-4%
Water & Wastewater	16,264	14,403	5,408	(15,972)	-75%	2%
Other	33,322	29,743	10,776	(50,791)	-82%	6%
Business as Usual Total	**1,281,481**	**1,180,041**	**677,164**	**(854,953)**	**-56%**	**100%**

Data and Assumptions

The assumptions for each projection by emissions source are described below.

Population

Bloomington is projected to see a 52% population growth between 2008 and 2050 to over 118,000 residents in the BAU scenario. This will impact the level of activity throughout the city. The BAU uses Bloomington's 2018 population of 86,522 and applies a 1% annual increase to that value. This is in line with recent growth and the average growth in Monroe County from STATS Indiana from 2000-2050.[3]

Electricity

The Bloomington GHG Inventory uses the grid average emissions factor from the US EPA's eGRID database for the RFC West subregion. As mentioned, the BAU incorporates Duke Energy's 50% reduction below 2005 by 2030 and net zero by 2050 climate goals. Net zero typically means that there are still some fossil fuel emissions in the system that are being offset some other way. The BAU assumes 10% of GHG emissions per kWh remaining in 2050 based on Duke Energy's plan to maintain 6% natural gas and 30% other energy sources.[4]

Table 3. Electricity Carbon Intensity

Year	2005	2008	2018	2025	2030	2050

[3] http://www.stats.indiana.edu/pop_proj/ An alternative method for projecting Bloomington's population would be a proportional value of the county projection. STATS Indiana projects a population of 180,159 residents for Monroe County in 2050, which if weighted proportionally to 2018 would mean 106,000 Bloomington residents in 2050. The BAU uses the higher number of 118,000 for the sake of capturing the full potential climate impact of population growth.

[4] https://www.axios.com/duke-energy-carbon-free-18a6b5b7-2829-4fe5-a445-e940edf26b76.html

Electricity Emissions Factor ($MTCO_2e$/kWh)	0.000703	0.000702	0.000532	0.000427	0.000351	0.000070
Change from 2005	0%	0%	-24%	-39%	-50%	-90%

As climate change increases high heat days in Bloomington the demand for air conditioning is expected to increase electricity use. This is measured in "cooling degree days", which are projected to rise 42% by 2050.[5] The BAU applies this change to 20% of the electricity activity to approximate the share of electricity use that may be for space cooling.

The electricity BAU projection incorporates the projected population growth for Bloomington. Combining these factors, the electricity demand in Bloomington is projected to increase from 1.5 million kWh in 2018 to 1.9 million kWh in 2030 and 2.4 million kWh in 2050, but emissions associated with this activity decline as the electricity grid becomes less carbon intensive.

Natural Gas

Climate change is anticipated to reduce the need for space heating in Bloomington. "Heating degree days" are projected to decline 14% by 2050. The BAU applies this change to 75% of the natural gas use to approximate the share of natural gas used for heating.[6]

The natural gas BAU estimate incorporates the projected population growth for Bloomington and total usage grows to 25 million therms by 2050. The carbon-intensity of natural gas stays constant through the BAU projection.

Other Industrial Energy

In the Bloomington GHG inventory "Other Industrial Energy" is energy used at the IU Central Heating Plant. As described in the 2018 GHG Inventory, emissions at this facility have decreased with fuel switching from coal to natural gas in recent years. The 2018 emission level is projected to stay flat through 2050 under BAU.

[5] See weighted mean of RCP 8.5 projections https://crt-climate-explorer.nemac.org/local-climate-charts/?county=Monroe%2BCounty&city=Bloomington%2C%20IN&fips=18105&lat=39.165325&lon=-86.52638569999999&zoom=7&nav=local-climate-charts&id=cdd_65f

[6] See weighted mean of RCP 8.5 projections https://crt-climate-explorer.nemac.org/local-climate-charts/?county=Monroe%2BCounty&city=Bloomington%2C%20IN&fips=18105&lat=39.165325&lon=-86.52638569999999&zoom=7&nav=local-climate-charts&id=cdd_65f

Transportation

Transportation emissions in the Bloomington GHG Inventory are comprised of gasoline and diesel use by on-road vehicle travel, transit vehicle fuel use, aviation emissions at the Monroe County Airport, and off-road activities, such as construction equipment.

Emissions from non-transit gasoline and diesel vehicles were 70% of Bloomington's transportation emissions in 2018. On-road vehicle miles traveled (VMT) in Bloomington grew were 293 million miles in 2018 and the BAU scenario applies the average annual population increase to this going forward, resulting in 415 million miles in 2050.

Vehicle efficiency has been improving nationwide, and the Energy Information Agency's Annual Energy Outlook (EIA AEO) projects that trend will continue. The BAU projection uses a weighted average fuel economy for gasoline passenger vehicles and diesel heavy trucks to estimate that fossil fuel vehicles on the road in 2050 will average 31.5 miles per gallon (mpg).[7] The carbon-intensity of gasoline and diesel fuel stay constant through the BAU projection.

In addition, national projections expect an increased uptake of electric vehicles in coming years. The Edison Electric Institute has estimated that electric vehicle will be 7% of all vehicles on the road in the country by 2030.[8] Sales of electric vehicles in Indiana have been lower than national averages to-date, so the BAU projection assumes a lower share of EVs in Bloomington—2% of vehicle miles traveled by 2025, 3.5% by 2030, and 9% by 2050.[9] The efficiency of electric vehicles is held constant at 30 kWh per 100 miles.[10]

The emissions associated with other transportation sources are held constant at 2018 levels. Taken together these trends result in a decrease in transportation-related emissions even as VMT grows in the city.

[7] https://www.eia.gov/outlooks/aeo/pdf/appa.pdf
[8] http://www.ehcar.net/library/rapport/rapport233.pdf
[9] https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/
[10] https://www.fueleconomy.gov/feg/PowerSearch.do?action=noform&path=1&year1=2019&year2=2020&vtype=Electric&pageno=4&sortBy=Comb&tabView=0&rowLimit=10 Efficiency of EVs will improve over coming years but will also be counter-weighted by the introduction of additional larger vehicle types.

Table 4. Transportation Emissions Projections

Year	2008	2018	2025	2030	2050
VMT	272,403,655	293,007,400	325,320,930	341,586,976	415,201,105
Average On-Road MPG	19.1	19.5	23.5	26.2	31.5
Gallons of Fuel (Gasoline & Diesel)	14,237,620	15,040,733	13,550,057	12,576,835	11,975,859
On Road Gas/Diesel Emissions ($MTCO_2e$)	130,093	138,553	124,821	115,856	110,320
Electric Emissions ($MTCO_2e$)			846	1,260	812
Other Emissions ($MTCO_2e$)	53,937	59,588	59,588	59,588	59,588
Total Transportation Emissions	**184,030**	**198,141**	**185,255**	**176,704**	**170,720**
Change from 2008	0%	8%	1%	-4%	-7%

Waste

Emissions associated with solid waste disposal and treatment are scaled based on population growth projections.

Water and Wastewater

In 2018, 88% of the emissions associated with water and wastewater are due to electricity use in the system. As discussed in the electricity section above, the decarbonization of the electricity grid is projected to eliminate many of these emissions. The BAU links future water and wastewater electricity use and wastewater N2O emissions to population growth in Bloomington. The net result is a 63% reduction in emissions from these sources to 5,408 $MTCO_2e$ in 2050.

Other Emissions

The fugitive emissions associated with natural gas and the transmission and distribution emissions associated with electricity were 3.26% and 3.87% respectively in 2018. The BAU project applies these same shares to natural gas and electricity going forward.

Click here to return to TOC

Section A2

Glossary of Terms

A

Activity Data

Data on the magnitude of a human activity resulting in emissions or removals taking place during a given period of time. Data on energy use, metal production, land areas, management systems, lime and fertilizer use and waste arisings are examples of activity data. (IPCC)

Aerosols

A collection of airborne solid or liquid particles, with a typical size between 0.01 and 10 micrometer that reside in the atmosphere for at least several hours. Aerosols may be of either natural or anthropogenic origin. Aerosols may influence climate in several ways: directly through scattering and absorbing radiation, and indirectly by acting as cloud condensation nuclei or modifying the optical properties and lifetime of clouds. (IPCC2)

Afforestation

Planting of new forests on lands that historically have not contained forests. (IPCC2)

Air Pollutant

Any man-made and/or natural substance occurring in the atmosphere that may result in adverse effects to humans, animals, vegetation, and/or materials. (CARB)

Anthropogenic

The term "anthropogenic", in the context of greenhouse gas inventories, refers to greenhouse gas emissions and removals that are a direct result of human activities or are the result of natural processes that have been affected by human activities. (USEPA2)

Atmosphere

The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1% volume mixing ratio) and oxygen (20.9% volume mixing ratio), together with a number of trace gases, such as argon (0.93% volume mixing ratio), helium and radiatively active greenhouse gases such as carbon dioxide (0.035% volume mixing ratio) and ozone. In addition, the atmosphere contains the greenhouse gas water vapor, whose amounts are highly variable but typically around 1% volume mixing ratio. The atmosphere also contains clouds and aerosols. (IPCC2)

B

Baseline Emissions

A baseline is a measurement, calculation, or time used as a basis for comparison. Baseline emissions are the level of emissions that would occur without policy intervention or without implementation of a project. Baseline estimates are needed to determine the effectiveness of emission reduction programs (also called mitigation strategies).

Base Year

The starting year for the inventory. Targets for reducing GHG emissions are often defined in relation to the base year.

Biogenic

Produced by the biological processes of living organisms. Note that we use the term "biogenic" to refer only to recently produced (that is non-fossil) material of biological origin. IPCC guidelines recommend that peat be treated as a fossil carbon because it takes a long time to replace harvested peat.

Biogeochemical Cycle

Movements through the Earth system of key chemical constituents essential to life, such as carbon, nitrogen, oxygen, and phosphorus. (NASA)

Biomass
Either (1) the total mass of living organisms in a given area or of a given species usually expressed as dry weight; or (2) Organic matter consisting of or recently derived from living organisms (especially regarded as fuel) excluding peat. Includes products, by-products and waste derived from such material. (IPCC1)

Biomass Waste
Organic non-fossil material of biological origin that is a byproduct or a discarded product. "Biomass waste" includes municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural crop byproducts, straw, and other biomass solids, liquids, and gases; but excludes wood and wood-derived fuels (including black liquor), biofuels feedstock, biodiesel, and fuel ethanol. Note: EIA "biomass waste" data also include energy crops grown specifically for energy production, which would not normally constitute waste. (EIA)

Black Carbon
Operationally defined aerosol species based on measurement of light absorption and chemical reactivity and/or thermal stability; consists of soot, charcoal and/or possible light absorbing refractory organic matter (Charlson and Heintzenberg, 1995, p. 401). (IPCC2)

C

Carbon Cycle
All parts (reservoirs) and fluxes of carbon. The cycle is usually thought of as four main reservoirs of carbon interconnected by pathways of exchange. The reservoirs are the atmosphere, terrestrial biosphere (usually includes freshwater systems), oceans, and sediments (includes fossil fuels). The annual movements of carbon, the carbon exchanges between reservoirs, occur because of various chemical, physical, geological, and biological processes. The ocean contains the largest pool of carbon near the surface of the Earth, but most of that pool is not involved with rapid exchange with the atmosphere. (NASA)

Carbon Dioxide (CO_2)
A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal anthropogenic greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1. (IPCC2)\

Carbon Dioxide Equivalent (CO_2e)
A metric used to compare emissions of various greenhouse gases. It is the mass of carbon dioxide that would produce the same estimated radiative forcing as a given mass of another greenhouse gas. Carbon dioxide equivalents are computed by multiplying the mass of the gas emitted by its global warming potential.

Carbon Disclosure Project (CDP)
An international organization that administers a platform for organizations and cities to publicly disclose their environmental impacts, such as climate risk. CDP is one of the approved disclosure platforms utilized by GCoM.

Carbon Emissions
The release of carbon dioxide into the atmosphere. Primary human sources of the release of carbon dioxide occur from burning oil, coal, and gas for energy use.

Carbon Equivalent (CE)
A metric measure used to compare the emissions of the different greenhouse gases based upon their global warming potential. Carbon equivalents can be calculated from to carbon dioxide equivalents by multiplying the carbon dioxide equivalents by 12/44 (the ratio of the molecular weight of carbon to that of carbon dioxide). The use of carbon equivalent is declining in GHG inventories.

Carbon Intensity
The amount of carbon by weight emitted per unit of energy consumed. A common measure of carbon intensity is weight of carbon per British thermal unit (Btu) of energy. When there is only one fossil fuel under consideration, the carbon intensity and the emissions coefficient are identical. When there are several fuels, carbon intensity is based on their combined emissions coefficients weighted by their energy consumption levels. (EIA)

Carbon Neutrality
For the purposes of the Plan, Carbon Neutrality refers to the point at which the organization / organization's net greenhouse gas emissions reach 0. This will likely be achieved through a combination of reducing emission sources and offsetting and sequestering any remaining emissions.

Carbon Sinks
A forest, ocean, or other natural environment viewed in terms of its ability to absorb carbon dioxide from the atmosphere.

Carbon Sequestration
This refers to the capture of CO_2 from the atmosphere and its long term storage in oceans (oceanic carbon sequestration), in biomass and soils (terrestrial carbon sequestration) or in underground reservoirs (geologic carbon sequestration).

Chlorofluorocarbons (CFCs)
Greenhouse gases covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Because they are not destroyed in the lower atmosphere, CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are being replaced by other compounds, including hydrochlorofluorocarbons and hydrofluorocarbons, which are greenhouse gases covered under the Kyoto Protocol. (IPCC3)

Circular Economy
An alternative to a traditional linear economy (make, use, dispose) in which an economy is a regenerative system where resource input and waste are minimized. This is achieved through long-lasting product design, repair, reuse, remanufacturing, and recycling. Circular economy strategies are often cited as systems level approaches to reducing waste generation through product and system design.

Climate
Climate in a narrow sense is usually defined as the "average weather" or more rigorously as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. (IPCC2)

Climate Adaptation or Resilience
The capacity of a natural environment to prevent, withstand, respond to, and recover from a disruption. The process of adjusting to new climate conditions in order to reduce risks to valued assets.

Climate Change
Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. (IPCC2)

Climate Hazard
An extreme climate event or condition that can harm human health, livelihoods, or natural resources. It can include abrupt changes to the climate system such as extreme precipitation, storms, droughts, and heat waves.

Climate Risk
The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability and hazard. (IPCC):

Climate Vulnerability
Is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity, and its capacity to adapt. Vulnerability = potential impact (sensitivity x exposure) – adaptive capacity (IPCC):

Climate Vulnerability Assessment
A report used to identify and define the risks posed by climate change and inform adaptation measures needed to combat climate change. Reports can be about a wide range of fields including food security, poverty analysis, and extreme weather events.

Cogeneration
Cogeneration is an industrial structure, installation, plant, building, or self-generating facility that has sequential or simultaneous generation of multiple forms of useful energy (usually mechanical and thermal) in a single, integrated system. (CARB)

Combined Heat and Power (CHP)
Combined heat and power is the simultaneous production of both electricity and useful heat for application by the producer or to be sold to other users with the aim of better utilisation of the energy used. Public utilities may utilise part of the heat produced in power plants and sell it for public heating purposes. Industries as auto-producers may sell part of the excess electricity produced to other industries or to electric utilities. (IPCC)

Community Solar
Solar facilities shared by multiple community subscribers who receive credit on their electricity bills for their share of the power produced. Community solar allows members of a community to share the benefits of solar power on their property without installing it on their own property. Electricity generated by the community solar farm typically costs less than the price from utility companies.

Consistency
Consistency means that an inventory should be internally consistent in all its elements over a period of years. An inventory is consistent if the same methodologies are used for the base and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks. (IPCC)

Continuous Emission Monitor (CEM)
A type of air emission monitoring system installed to operate continuously inside of a smokestack or other emission source. (CARB)

Criteria Air Pollutant
An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM10 and

PM2.5. The term "criteria air pollutants" derives from the requirement that the U.S. EPA must describe the characteristics and potential health and welfare effects of these pollutants. The U.S. EPA and CARB periodically review new scientific data and may propose revisions to the standards as a result. (CARB)

D

Deforestation

Those practices or processes that result in the change of forested lands to non-forest uses. This is often cited as one of the major causes of the enhanced greenhouse effect for two reasons: 1) the burning or decomposition of the wood releases carbon dioxide; and 2) trees that once removed carbon dioxide from the atmosphere in the process of photosynthesis are no longer present and contributing to carbon storage. (UNFCC)

Distillate Fuel Oil

A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation. (EIA)

E

Emissions

The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere. (USEPA1)

Emission Factor

A coefficient that quantifies the emissions or removals of a gas per unit activity. Emission factors are often based on a sample of measurement data, averaged to develop a representative rate of emission for a given activity level under a given set of operating conditions. (IPCC)

Emission Inventory

An estimate of the amount of pollutants emitted into the atmosphere from major mobile, stationary, area-wide, and natural source categories over a specific period of time such as a day or a year. (CARB)

Emission Rate

The weight of a pollutant emitted per unit of time (e.g., tons / year). (CARB)

Environmental Justice

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies

Estimation

Estimation is the assessment of the value of an unmeasurable quantity using available data and knowledge within stated computational formulas or mathematical models.

F

Fluorocarbons

Carbon-fluorine compounds that often contain other elements such as hydrogen, chlorine, or bromine. Common fluorocarbons include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). (UNFCC)

Flux
Either (1) Raw materials, such as limestone, dolomite, lime, and silica sand, which are used to reduce the heat or other energy requirements of thermal processing of minerals (such as the smelting of metals). Fluxes also may serve a dual function as a slagging agent. (2) The rate of flow of any liquid or gas, across a given area; the amount of this crossing a given area in a given time. (e.g., "Flux of CO2 absorbed by forests"). (IPCC)

Fossil Fuel
Geologic deposits of hydrocarbons from ancient biological origin, such as coal, petroleum and natural gas.

Fuel Combustion
Fuel combustion is the intentional oxidation of materials within an apparatus that is designed to provide heat or mechanical work to a process, or for use away from the apparatus. (IPCC)

Fugitive Emissions
Emissions that are not emitted through an intentional release through stack or vent. This can include leaks from industrial plant and pipelines. (IPCC)

G
Geologic Carbon Sequestration
It is the process of injecting CO_2 from a source, such as coal-fired electric generating power plant, through a well into the deep subsurface. With proper site selection and management, geologic sequestration could play a major role in reducing emissions of CO_2. Research efforts to evaluate the technical aspects of CO_2 geologic sequestration are underway. (USEPA4)

Global Warming
Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities. Also see Climate Change (USEPA1)

Global Warming Potential (GWP)
An index, based upon radiative properties of well-mixed greenhouse gases, measuring the radiative forcing of a unit mass of a given well-mixed greenhouse gas in the present-day atmosphere integrated over a chosen time horizon, relative to that of carbon dioxide. The GWP represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing thermal infrared radiation. The Kyoto Protocol is based on GWPs from pulse emissions over a 100-year time frame. (IPCC2)

GCOM Global Covenant of Mayors:
GCoM is the largest global alliance for city climate leadership, built upon the commitment of over 10,000 cities and local governments. The alliance's mission is to mobilize and support climate and energy action in communities across the world.

Greenhouse Effect
Trapping and build-up of heat in the atmosphere (troposphere) near the earth's surface. Some of the heat flowing back toward space from the earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the earth's surface. If the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will gradually increase. (UNFCC)

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories:
A robust, transparent and globally-accepted framework that cities and local governments can use to consistently identify, calculate and report on city greenhouse gas emissions.

Greenhouse Gas
Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrochlorofluorocarbons (HCFCs), ozone (O_3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). (UNFCC)

Green Infrastructure
An approach to managing precipitation by reducing and treating stormwater at its source while delivering environmental, social, and economic benefits. Stormwater runoff can carry trash, bacteria, and other pollutants and is a major cause of water pollution in urban areas.

Gross Domestic Product (GDP)
The sum of gross value added, at purchasers' prices, by all resident and non-resident producers in the economy, plus any taxes and minus any subsidies not included in the value of the products in a country or a geographic region for a given period, normally one year. It is calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources. (IPCC3)

H

Halocarbons
A collective term for the group of partially halogenated organic species, including the chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), halons, methyl chloride, methyl bromide, etc. Many of the halocarbons have large Global Warming Potentials. The chlorine and bromine-containing halocarbons are also involved in the depletion of the ozone layer. (IPCC2)

Hydrocarbons
Strictly defined as molecules containing only hydrogen and carbon. The term is often used more broadly to include any molecules in petroleum which also contains molecules with S, N, or O An unsaturated hydrocarbon is any hydrocarbon containing olefinic or aromatic structures. (IPCC)

Hydrofluorocarbons (HFCs)
Compounds containing only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are powerful greenhouse gases with global warming potentials ranging from 140 (HFC-152a) to 11,700 (HFC-23). (USEPA1)

I

ICLEI Local Governments for Sustainability:
A membership organization for local governments to pursue reductions in carbon pollution and improvements in advancing sustainable urban development. ICLEI's members and team of experts work together through peer exchange, partnerships and capacity building to create systemic change for urban sustainability.

Intergovernmental Panel on Climate Change
The IPCC was established jointly by the United Nations Environment Programme and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers. Leading experts on climate change and environmental, social, and economic sciences from some 60 nations have helped the IPCC to prepare periodic assessments of the scientific underpinnings for understanding global climate change and its consequences. With its

capacity for reporting on climate change, its consequences, and the viability of adaptation and mitigation measures, the IPCC is also looked to as the official advisory body to the world's governments on the state of the science of the climate change issue. For example, the IPCC organized the development of internationally accepted methods for conducting national greenhouse gas emission inventories. (USEPA1)

K

Kilowatt Hour (kWh):
A measure of electrical energy equivalent to a power consumption of 1,000 watts for one hour.

Kyoto Protocol
The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1997 in Kyoto, Japan, at the Third Session of the Conference of the Parties (COP) to the UNFCCC. It contains legally binding commitments, in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (most Organisation for Economic Cooperation and Development countries and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5% below 1990 levels in the commitment period 2008 to 2012. The Kyoto Protocol entered into force on 16 February 2005. (IPCC2)

L

Land Use and Land Use Change
Land use refers to the total of arrangements, activities and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction and conservation). Land use change refers to a change in the use or management of land by humans, which may lead to a change in land cover. Land cover and land use change may have an impact on the surface albedo, evapotranspiration, sources and sinks of greenhouse gases, or other properties of the climate system and may thus have a radiative forcing and/or other impacts on climate, locally or globally. (IPCC2)

LULUCF
Acronym for "Land Use, Land Use Change and Forestry", a category of activities in GHG inventories.

M

Megawatt Hour (MWH):
A measure of electrical energy equivalent to a power consumption of 1,000,000 watts for one hour.

Methane (CH_4)
A hydrocarbon that is a greenhouse gas with a global warming potential most recently estimated at 25 times that of carbon dioxide (CO_2). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, flooded rice fields, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion. The GWP is from the IPCC's Fourth Assessment Report (AR4).

Metric Ton
The tonne (t) or metric ton, sometimes referred to as a metric tonne, is an international unit of mass. A metric ton is equal to a Megagram (Mg), 1000 kilograms, 2204.6 pounds, or 1.1023 short tons.

Million Metric Tons (MMT)
Common measurement used in GHG inventories. It is equal to a Teragram (Tg).

Mitigation:
Actions taken to limit the magnitude or rate of long-term global warming and its related effects. Climate change mitigation generally involves reductions in human emissions of greenhouse gases.

Mobile Sources
Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes. (CARB)

Mode Share
The percentage of travelers using a particular type of transportation. Modal share is an important component in developing sustainable transport within a city or region because it reveals the level of utilization of various transportation methods. The percentage reflects how well infrastructure, policies, investments, and land-use patterns support different types of travel.

Model
A model is a quantitatively-based abstraction of a real-world situation which may simplify or neglect certain features to better focus on its more important elements. (IPCC)

Municipal Solid Waste (MSW)
Residential solid waste and some non-hazardous commercial, institutional, and industrial wastes. This material is generally sent to municipal landfills for disposal. (USEPA1)

N
Natural Sources
Non-manmade emission sources, including biological and geological sources, wildfires, and windblown dust. (CARB)

Net-zero Emissions (NZE)
Building A building or property that generates or offsets all energy consumed. If the City develops a NZE building code, this definition will have to be refined to provide additional guidance on calculating emissions and offsets to achieve net-zero emissions.

Nitrogen Fixation
Conversion of atmospheric nitrogen gas into forms useful to plants and other organisms by lightning, bacteria, and blue-green algae; it is part of the nitrogen cycle. (UNFCC)

Nitrogen Oxides (NO_x)
Gases consisting of one molecule of nitrogen and varying numbers of oxygen molecules. Nitrogen oxides are produced in the emissions of vehicle exhausts and from power stations. In the atmosphere, nitrogen oxides can contribute to formation of photochemical ozone (smog), can impair visibility, and have health consequences; they are thus considered pollutants. (NASA)

Nitrous Oxide (N_2O)
A powerful greenhouse gas with a global warming potential of 298 times that of carbon dioxide (CO_2). Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, manure management, fossil fuel combustion, nitric acid production, and biomass burning. The GWP is from the IPCC's Fourth Assessment Report (AR4).

O
Ozone (O_3)
Ozone, the triatomic form of oxygen (O_3), is a gaseous atmospheric constituent. In the troposphere, it is created both naturally and by photochemical reactions involving gases resulting from human activities (smog).

Tropospheric ozone acts as a greenhouse gas. In the stratosphere, it is created by the interaction between solar ultraviolet radiation and molecular oxygen (O_2). Stratospheric ozone plays a dominant role in the stratospheric radiative balance. Its concentration is highest in the ozone layer. (IPCC2)

Ozone Depleting Substances (ODS)
A compound that contributes to stratospheric ozone depletion. Ozone-depleting substances (ODS) include CFCs, HCFCs, halons, methyl bromide, carbon tetrachloride, and methyl chloroform. ODS are generally very stable in the troposphere and only degrade under intense ultraviolet light in the stratosphere. When they break down, they release chlorine or bromine atoms, which then deplete ozone. (IPCC)

P
Perfluorocarbons (PFCs)
A group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly CF_4 and C_2F_6) were introduced as alternatives, along with hydrofluorocarbons, to the ozone depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they are powerful greenhouse gases: CF_4 has a global warming potential (GWP) of 7,390 and C_2F_6 has a GWP of 12,200. The GWP is from the IPCC's Fourth Assessment Report (AR4).

Photosynthesis
The process by which plants take carbon dioxide from the air (or bicarbonate in water) to build carbohydrates, releasing oxygen in the process. There are several pathways of photosynthesis with different responses to atmospheric carbon dioxide concentrations. (IPCC2)

Point Sources
Specific points of origin where pollutants are emitted into the atmosphere such as factory smokestacks. (CARB)

Power Purchase Agreement (PPA)
A power purchase agreement (PPA), or electricity power agreement, is a contract between two parties; one party generates electricity (the seller) and the other party looks to purchase electricity (the buyer). Individual customers and organizations may enter into PPAs with individual developers or may join together to seek better prices as a group. PPAs can allow longer term commitments to renewable energy as well as a form of “direct” investing in new renewable energy generation.

Property-Assessed Clean Energy (PACE)
A program created for financing energy efficiency and renewable improvements on private property. Private property can include residential, commercial or industrial properties. Improvements can include energy efficiency, renewable energy and water conservation upgrades to a building.

Process Emissions
Emissions from industrial processes involving chemical transformations other than combustion. (IPCC)

R
Radiative Forcing
A change in the balance between incoming solar radiation and outgoing infrared (i.e., thermal) radiation. Without any radiative forcing, solar radiation coming to the Earth would continue to be approximately equal to the infrared radiation emitted from the Earth. The addition of greenhouse gases to the atmosphere traps an increased fraction of the infrared radiation, reradiating it back toward the surface of the Earth and thereby creates a warming influence. (UNFCC)

Reforestation
Planting of forests on lands that have previously contained forests but that have been converted to some other use. (IPCC2)

Regeneration
The act of renewing tree cover by establishing young trees, naturally or artificially - note regeneration usually maintains the same forest type and is done promptly after the previous stand or forest was removed. (CSU)

Renewable Energy
Energy resources that are naturally replenishing such as solar, wind, hydro and geothermal energy.

Renewable Energy Credits (RECs)
A market-based instrument that represents the property rights to the environmental, social and other non-power attributes of renewable electricity generation. RECs are issued when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource. The single largest category of reductions in Evanston's emissions has been through the purchase of RECs.

Residence Time
Average time spent in a reservoir by an individual atom or molecule. Also, this term is used to define the age of a molecule when it leaves the reservoir. With respect to greenhouse gases, residence time usually refers to how long a particular molecule remains in the atmosphere. (UNFCC)

Reservoir
Either (1) a component or components of the climate system where a greenhouse gas or a precursor of a greenhouse gas is stored; or (2) Water bodies regulated for human activities (energy production, irrigation, navigation, recreation etc.) where substantial changes in water area due to water level regulation may occur. (IPCC)

Respiration
The process whereby living organisms convert organic matter to carbon dioxide, releasing energy and consuming molecular oxygen. (IPCC2)

Retro-commissioning
The systematic process to improve an existing building's performance ensuring the building controls are running efficiently and balancing the designed use and the actual use of the building.

Ride-share
The practice of sharing transportation in the form of carpooling or vanpooling. It is typically an arrangement made through a ride-matching service that connects drivers with riders.

S
Scope 1:
Scope 1 includes emissions being released within the city limits resulting from combustion of fossil fuels and from waste decomposition in the landfill and wastewater treatment plant.

Scope 2:
Scope 2 includes emissions produced outside the city that are induced by consumption of electrical energy within the city limits.

Scope 3:
Scope 3 includes emissions of potential policy relevance to local government operations that can be measured and

reported but do not qualify as Scope 1 or 2. This includes, but is not limited to, outsourced operations and employee commute.

Short Ton
Common measurement for a ton in the United States. A short ton is equal to 2,000 lbs or 0.907 metric tons. (USEPA1)

Sink
Any process, activity or mechanism that removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol from the atmosphere. (IPCC2)

Social Cost of Carbon
The social cost of carbon is a measure of the economic harm from climate change impacts, expressed as the dollar value of the total damages from emitting one ton of carbon dioxide into the atmosphere.

Solar Radiation
Electromagnetic radiation emitted by the Sun. It is also referred to as shortwave radiation. Solar radiation has a distinctive range of wavelengths (spectrum) determined by the temperature of the Sun, peaking in visible wavelengths. (IPCC2)

Source
Any process, activity or mechanism that releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol into the atmosphere. (IPCC2)

Stationary Sources
Non-mobile sources such as power plants, refineries, and manufacturing facilities which emit air pollutants. (CARB)

Sulfur Dioxide (SO_2)
A compound composed of one sulfur and two oxygen molecules. Sulfur dioxide emitted into the atmosphere through natural and anthropogenic processes is changed in a complex series of chemical reactions in the atmosphere to sulfate aerosols. These aerosols are believed to result in negative radiative forcing (i.e., tending to cool the Earth's surface) and do result in acid deposition (e.g., acid rain). (UNFCC)

Sulfur Hexafluoride (SF_6)
A colorless gas soluble in alcohol and ether, slightly soluble in water. A very powerful greenhouse gas with a global warming potential most recently estimated at 22,800 times that of carbon dioxide (CO_2). SF_6 is used primarily in electrical transmission and distribution systems and as a dielectric in electronics. This GWP is from the IPCC's Fourth Assessment Report (AR4).

T

Terrestrial Carbon Sequestration
It is the process through which carbon dioxide (CO_2) from the atmosphere is absorbed by trees, plants and crops through photosynthesis, and stored as carbon in biomass (tree trunks, branches, foliage and roots) and soils. The term "sinks" is also used to refer to forests, croplands, and grazing lands, and their ability to sequester carbon. Agriculture and forestry activities can also release CO_2 to the atmosphere. Therefore, a carbon sink occurs when carbon sequestration is greater than carbon releases over some time period. (USEPA3)

Therm:
A unit of measure for energy that is equivalent to 100,000 British Thermal units, or roughly the energy in 100 cubic feet of natural gas. Often used for measuring natural gas usage for billing purposes.

Total Organic Gases (TOG)
Gaseous organic compounds, including reactive organic gases and the relatively unreactive organic gases such as methane. (CARB)

Transparency
Transparency means that the assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information. The transparency of inventories is fundamental to the success of the process for the communication and consideration of information. (IPCC)

Trend
The trend of a quantity measures its change over a time period, with a positive trend value indicating growth in the quantity, and a negative value indicating a decrease. It is defined as the ratio of the change in the quantity over the time period, divided by the initial value of the quantity, and is usually expressed either as a percentage or a fraction. (IPCC)

U
Urban Tree Canopy
Describes the makeup and characteristics of trees within the urban environment.

V
VMT Vehicle Miles Traveled:
A unit used to measure vehicle travel made by private vehicles, including passenger vehicles, truck, vans and motorcycles. Each mile traveled is counted as one vehicle mile regardless of the number of persons in the vehicle.

W
Water Vapor
The most abundant greenhouse gas; it is the water present in the atmosphere in gaseous form. Water vapor is an important part of the natural greenhouse effect. While humans are not significantly increasing its concentration, it contributes to the enhanced greenhouse effect because the warming influence of greenhouse gases leads to a positive water vapor feedback. In addition to its role as a natural greenhouse gas, water vapor plays an important role in regulating the temperature of the planet because clouds form when excess water vapor in the atmosphere condenses to form ice and water droplets and precipitation. (UNFCC)

Weather
Atmospheric condition at any given time or place. It is measured in terms of such things as wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. In most places, weather can change from hour-to-hour, day-to-day, and season-to-season. Climate in a narrow sense is usually defined as the "average weather", or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. A simple way of remembering the difference is that climate is what you expect (e.g. cold winters) and 'weather' is what you get (e.g. a blizzard). (USEPA1)

Z
Zero Emission Vehicles (ZEV)
A vehicle that does not emit harmful emissions during operation. Harmful emissions can have a negative impact on human health and the environment. Electric (battery-powered) cars, electric trains, hydrogen-fueled vehicles, bicycles, and carriages are considered to produce zero emissions.

Zero Waste
A cyclical system in which products are designed for reuse, which creates no waste. A zero waste system eliminates the volume and toxicity of waste and materials and conserves current resources through reuse.

Click here to return to TOC

Section A3

Supporting Research

Supporting Research

Climate Risk and Vulnerability Assessment

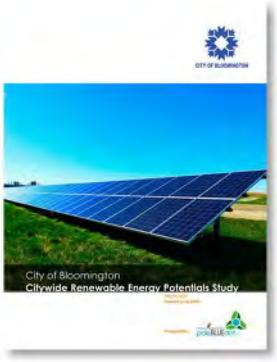
At the beginning of the Climate Action Planning effort, The paleBLUEdot team developed a Climate Risk and Vulnerability Assessment for the City of Bloomington. The assessment included the identification of vulnerable populations within the community and possible impacts and risks associated with projected climate change for the region. paleBLUEdot mapped the vulnerable populations within the City as well as existing City infrastructure and resources which may be capable of supporting climate adaptation strategies. These assessments provided a basis for understanding vulnerabilities and resources which supported the decision making process needed for identifying and prioritizing climate adaptation measures to be included in the final Climate Action Plan. The Assessment focused on City-Wide vulnerabilities with a particular focus on climate vulnerable populations to ensure all populations benefit from proposed implementation measures.

Broad Climate Change Impacts and Risk Factors

The paleBLUEdot identified and summarized the broad climate change metrics already experienced, projected climate change impacts, and risk factors at a regional level. Data on Midwest was collected from the US National Climate Assessment as well as Indiana University, Purdue University, and the University of Michigan Climate Center. State of Indiana specific data was collected and summarized from State and National agencies, and regional university data sources. In addition, detailed climate projections, based on National Center for Atmospheric Research, was developed for the City of Bloomington.

Click on the link below or scan the QR code to access the vulnerability assessment:
https://view.publitas.com/palebluedot/bloomington-climate-risk-and-vulnerability-assessment/

Renewable Energy Potentials Study



At the beginning of the Climate Action Planning effort, In support of development of effective renewable energy goalsetting and to establish strategies addressing renewable energy development, paleBLUEdot conducted a Community-Wide solar pv potentials study including economic and environmental benefits. Through study of community-wide potential, the City of Bloomington was provided data enabling the creation of near and long-term renewable energy targets and implementation strategies based on community specific opportunity. This effort included:

1) Collect city-wide satellite data (NREL, NOAA, and NASA data).
2) Determine building roof stock characteristics and solar suitable buildings, calculate total suitable areas by roof configuration/orientation.
3) Calculate total rooftop solar capacity and annual energy generation by roof configuration/orientation
4) Identify cost efficient annual energy generation potential.
5) Research solar market at national, State and regional levels. Identify low, medium, and high solar market absorption rates and city-wide solar pv goals.
6) Identify environmental and economic benefit of solar including economic development and job creation potential (NREL JEDI model)
7) Develop City-Wide Renewable Solar Energy Potentials report.

Click on the link below or scan the QR code to access the renewable energy study:
https://view.publitas.com/palebluedot/city-of-bloomington-renewable-energy-potentials-study/

Click here to return to TOC

Section A4

Bloomington Climate Infographics

Bloomington Climate Infographics

Below are infographics developed during the Climate Action Plan planning effort in support of the City's communications. Click on or scan the QR code to access the infographics.

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