GNARLY TREE SUSTAINABILITY INSTITUTE

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Carmel Climate Action Plan

CITY OF CARMEL, INDIANA

Acknowledgments

The Carmel Climate Action Plan would not have been possible without the crucial input from the Carmel community. The City of Carmel thanks all of those who contributed to this initiative.

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This Climate Action Plan was developed with support from ICLEI USA in partnership with the Indiana University Environmental Resilience Institute Resilience Cohort.

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Executive Summary

While a changing climate poses a serious threat to all life on our planet, the City of Carmel is prepared to address those challenges as they occur at the local level. The City of Carmel has a long-standing history of sustainability efforts and has made formal commitments to addressing global climate change, including joining the Global Covenant of Mayors, Resilient Communities for America, and the Mayors National Climate Action Agenda. Carmel, like the rest of the world, is already experiencing the effects of a changing climate including shorter winters, changing growing seasons, more days in the year with extreme heat, increased flooding, and extreme weather events.[1] The Intergovernmental Panel on Climate Change (IPCC) predicts effects will only worsen if global greenhouse gas (GHG) emissions are not significantly reduced.[2]

This Climate Action Plan (CAP) will serve as Carmel's guide towards achieving net zero GHG emissions by 2050, in line with its commitments under the Mayors National Climate Change Agenda, which aims to uphold the goals of the Paris Agreement at the municipal level. It builds on Carmel's already extensive sustainability work, including the Bike Carmel initiative, roundabout installation efforts, and parkland preservation (see Appendix B for a full list of existing initiatives). The CAP specifies strategies that target emission reductions in all areas of our community, while promoting continued development of Carmel as a dynamic and thriving city. The CAP will act as a living document, to be updated periodically over the next 30 years to reflect technological innovation and policy changes. The plan's strategies are separated into the following sectors:

- Public Education (PE)
- Energy and Built Environment (EB)
- Transportation (T)
- Water and Wastewater (WW)
- Solid Waste (SW)
- Local Food and Agriculture (FA)
- Greenspace (G)

The table below summarizes the climate change strategies included in the CAP, organized by sector. For each strategy, it identifies the relative scale of implementation costs (with a range of $ to $$$$ where "*" indicates some mandatory costs to private parties[3]), the relative scale of expected GHG reductions, co-benefits (public health, cost-savings, economic growth, improved quality of life, enhanced equity), and the approximate implementation time frame (short: 1-5 years, medium: 6-15 years, long-term: 16-30 years).

[1] For more information about the impacts of climate change on the state of Indiana, please see https://ag.purdue.edu/indianaclimate/

[2] For more information, please see the IPCC website at https://www.ipcc.ch/sr15/chapter/spm/

[3] In some cases, the costs will be incurred by the City directly but in others, mandatory programs will result in costs being incurred by private parties. For each strategy, the estimated cost magnitude reflects City costs plus any mandatory costs incurred by private parties above what they would incur in the absence of the strategy.

Strategy		Cost	GHG Reductions	Co-Benefits	Time Frame
Public Education Programs					
PE-1	Public Education about Impacts of Climate Change	$	Low	Enhanced Equity	Short
PE-2	Climate Vulnerability Assessment	$$	Low	Cost Savings, Quality of Life, Enhanced Equity	Short
PE-3	Sustainable Business Certification Program	$	Medium	Cost Savings, Economic Development	Short
PE-4	City of Carmel Sustainability Committee	$	Low	Cost Savings, Quality of Life	Short
Energy and Built Environment					
EB-1	Municipal Energy Efficiency Evaluation and Upgrades	$$$	Medium	Cost Savings	Short
EB-2	Municipal Energy Benchmarking and Disclosure Program	$	Medium	Cost Savings	Short
EB-3	Commercial Energy Benchmarking and Disclosure Program	$	Medium	Cost Savings	Short
EB-4	Green Building Best Practices Education for Commercial and Municipal Construction	$	Medium	Cost Savings, Quality of Life, Economic Development	Short
EB-5	Green Building Policy for Commercial and Municipal Construction	$$$*	High	Cost Savings, Quality of Life, Economic Development	Medium
EB-6	Residential Energy Conservation Measures	$	High	Cost Savings, Economic Growth	Short
EB-7	SolSmart Designation, Solar Education, and Solar Group Purchase Program	$	High	Cost savings, Economic Growth	Short
EB-8	Advocate for Renewable Energy	$	Medium-High	Economic Growth	Short
EB-9	Identify Barriers to Existing Energy Efficiency Programs	$	Medium	Cost Savings, Enhanced Equity	Medium
EB-10	Energy Efficiency Grant Program	$$	Medium	Cost savings, Enhanced Equity	Medium

Strategy		Cost	GHG Reductions	Co-Benefits	Time Frame
Transportation					
T-1	Implement Planning and Development Policies that Encourage Multi-Modal Transportation and Walkability	$$$$*	High	Public Health, Economic Development, Quality of Life, Enhanced Equity	Long
T-2	Commuter Line Feasibility Study	$$	Medium	Public Health, Quality of Life, Enhanced Equity	Short
T-3	Promote Electric Vehicle (EV) Leasing and Purchasing	$$	Medium	Public Health	Short
T-4	City EV and Hydrogen Fleet Purchasing and Retrofit Policy	$$	Medium	Public Health	Short
T-5	No-Idling Policy Technical Assistance	$	Low	Cost Savings, Public Health	Short
T-6	Expand Promotion of Bicycles as Alternative Mode of Transportation	$	Low	Quality of Life, Public Health	Short
T-7	Municipal Bikeshare Program	$	Low	Quality of Life, Public Health	Short
Water and Wastewater					
WW-1	Residential Low-Flow Water Appliance Retrofit Program	$$	Medium	Quality of Life, Cost Savings, Enhanced Equity	Medium
WW-2	Stormwater and Household Water Efficiency Education	$	Low	Cost Savings, Enhanced Equity	Short
WW-3	Consideration of Reclaimed Water System for City Greenspace	$$$	Medium	Cost Savings	Medium
Solid Waste					
SW-1	Waste Feasibility Study	$$	Medium	Quality of Life	Short
SW-2	Municipal Food Waste Composting	$	Low	Quality of Life	Short
SW-3	Food Composting Pilot Programs	$$	Low	Quality of Life	Medium
SW-4	Backyard Compost Bin Voucher Program	$	Low	Quality of Life, Cost Savings	Short
SW-5	Increase Recycling Rate and Reduce Contamination Rate	$$*	Medium	Quality of Life	Short
SW-6	Zero-Waste Events Policy	$*	Low	Quality of Life	Short

Strategy		Cost	GHG Reductions	Co-Benefits	Time Frame
Local Food and Agriculture					
FA-1	Promote and Expand Food Donation Program	$	Low	Quality of Life, Enhanced Equity	Short
FA-2	Local Food Purchasing Program	$	Medium	Public Health, Quality of Life, Economic Growth	Long
FA-3	Promote Local Food Purchasing	$	Low	Public Health, Quality of Life, Economic Growth	Short
FA-4	Community Orchard Pilot Program	$$	Low	Quality of Life, Public Health, Enhanced Equity	Long
FA-5	Community and Residential Garden Education Program	$	Low	Quality of Life, Public Health, Enhanced Equity	Medium
FA-6	Ensure All Residents Have Access to Gardening Space	$$	Low	Quality of Life, Public Health, Enhanced Equity	Medium
FA-7	Evaluate Farmers Market Potential for Accessibility and Expansion	$	Low	Quality of Life, Public Health	Short
Greenspace					
G-1	Rain Garden Location Identification and Installation	$$	Low	Quality of Life, Public Health	Medium
G-2	Environmental Protection and Revegetation Policy	$*	Low	Quality of Life, Public Health	Short
G-3	Native and Drought-Resistant Landscaping	$	Low	Quality of Life, Public Health	Medium
G-4	Increase Number of Trees Planted Annually	$	Low	Public Health, Quality of Life, Enhanced Equity	Short
G-5	No Gasoline Powered Mowing Policy	$$	Medium	Public Health	Medium

1. Introduction and Background

Cities around the world are creating local solutions to address our changing climate and adapt to its effects. Given the localized impacts of a changing climate, it is important for cities and communities to develop strategies to adapt to and mitigate climate change that are specific to their needs. CAPs are long-term strategic plans developed by cities and other entities to specify emission reduction targets and specific actions to reach those targets.

This CAP represents a major step in Carmel's journey towards climate action. The plan outlines 42 strategies across seven sectors which, when implemented, are designed to help Carmel reach its goal of achieving net zero GHG emissions by 2050, in line with the 2015 Paris Agreement objectives. The implementation of this plan is also an opportunity to enhance public health and equity in the community by increasing food access, greenspace, and programs that improve the affordability of renewable energy and energy efficiency retrofits for individuals and businesses alike. At the same time, many of the strategies will help Carmel increase its climate resilience, help residents and local businesses achieve long-term cost savings, and yield other important co-benefits including economic growth and improved quality of life for residents.

Successful implementation of this CAP will require cross-sectoral partnerships and collaboration among city and community leaders. Given its strong passion of maintaining a healthy and thriving city, Carmel is equipped with the tools to ensure it can play an active role in limiting the impacts of a changing climate.

1.1 What is Climate Change?

The Earth's atmosphere creates a phenomenon known as the greenhouse effect (Figure 1). Gases occurring naturally in our atmosphere, called GHGs, such as carbon dioxide (CO_2), methane (CH_4), water vapor (H_2O), and ozone (O_3) absorb the sun's radiation, which keeps the Earth at a livable temperature, similar to a blanket keeping us warm at night. Life on our planet would be impossible without the greenhouse effect. However, starting several hundred years ago, humans started engaging in certain activities – burning fossil fuels for transportation and increasing energy use, clearing large portions of land for agriculture, among many other activities – that release GHGs into the atmosphere. Today, our daily behaviors such as driving, doing laundry, powering our homes, and flying all result in human made GHG emissions. Even food and products we use and often throw away, particularly the processing of meat and dairy, also result in GHG emissions.[4]

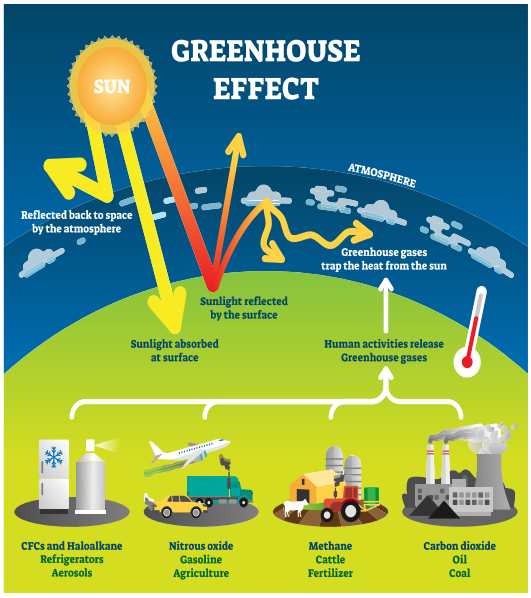

Figure 1: Greenhouse Effect
Source: Shutter Stock

These human made GHG emissions are making Earth's "blanket" thicker, meaning the more GHGs in the

[4] Project Drawdown, n.d. *Plant Rich Diets*, https://www.drawdown.org/solutions/plant-rich-diets ; Project Drawdown, n.d., *Reduced Food Waste*, https://www.drawdown.org/solutions/reduced-food-waste

atmosphere, the more solar radiation is being absorbed. As a result, Earth's average temperature has already increased by slightly more than 1 degree Fahrenheit and is projected to continue unless we significantly reduce GHG emissions at a global scale.[5]

1.2 Climate Change in Carmel

According to the Indiana Climate Change Impacts Assessment, Indiana is already experiencing the impacts of a changing climate. For instance, since 1895, Indiana average annual temperatures increased 1.2°F and the state's average temperature is projected to increase by 5 to 6°F by 2050 compared to the state's average temperature from 1971 to 2000.[6] In Hamilton County, it is projected that by the 2050s, there will be an average of ~40 days in the year with temperatures above 95°F compared to only four days per year during the 1971 to 2000 period (Figure 2). Additionally, by the 2050s, the average hottest day of the year is predicted to have increased from 94° F to 105° F.[7]

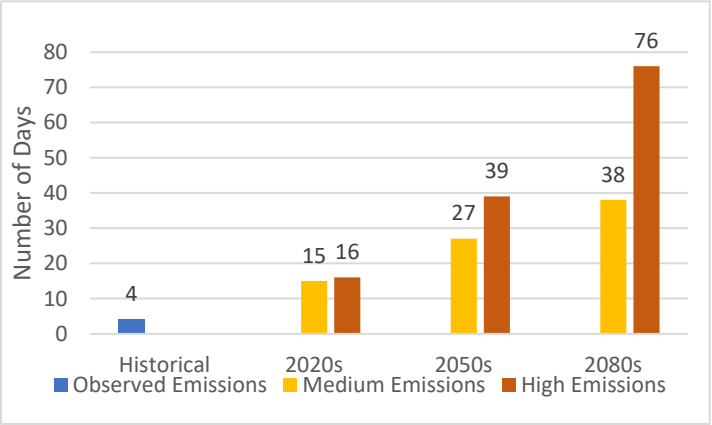

Figure 2: Anticipated Number of Days Per Year Above 95 Degrees F in Hamilton County, Indiana*

Based upon: Indiana Climate Change Impacts Assessment, https://ag.purdue.edu/indianaclimate/indiana-climate-report/

**Based on best available data for nearby Marion County, Indiana*

"Historical" is an average for the period 1915 to 2013. "2020s" represents the average 30-year future period 2011 to 2040. "2050s" represents the average 30-year period 2041 to 2070. "2080s" represents the 30-year period 2071 to 2100.

There will also be impacts in the winter, which will become milder. By the 2050s, the coldest day of the year in Hamilton County will increase from -10° F to -1° F.[8] As the climate warms, rain will replace much of the snow typically falling from November to March.

Overall, if emissions remain unchecked globally, Indiana's summer weather will start to feel more like that of, while winters will more closely resemble current conditions on the east coast of the United States (Figure 3).

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[5] NASA Earth Observatory, 29 January 2020, World *of Change: Global Temperatures*,https://earthobservatory.nasa.gov/world-of-change/decadaltemp.php

[6] M. Widhalm, A. Hamlet, K. Byun, S. Robeson, M. Baldwin, P. Staten, C. Chiu, J. Coleman, E. Hall, K. Hoogewind, M. Huber, C. Kieu, J. Yoo, and J. Dukes, 2018, *Indiana's Past & Future Climate: A Report from the Indiana Climate Change Impacts Assessment*, https://doi.org/10.5703/1288284316634

[7] Purdue Climate Change Research Center, n.d. *Hamilton County: State of the Climate*, https://ag.purdue.edu/indianaclimate/wp-content/uploads/2019/01/ClimateFacts_Hamilton_03262018_reduced.pdf

[8] Purdue Climate Change Research Center, n.d. *Hamilton County: State of the Climate*, https://ag.purdue.edu/indianaclimate/wp-content/uploads/2019/01/ClimateFacts_Hamilton_03262018_reduced.pdf

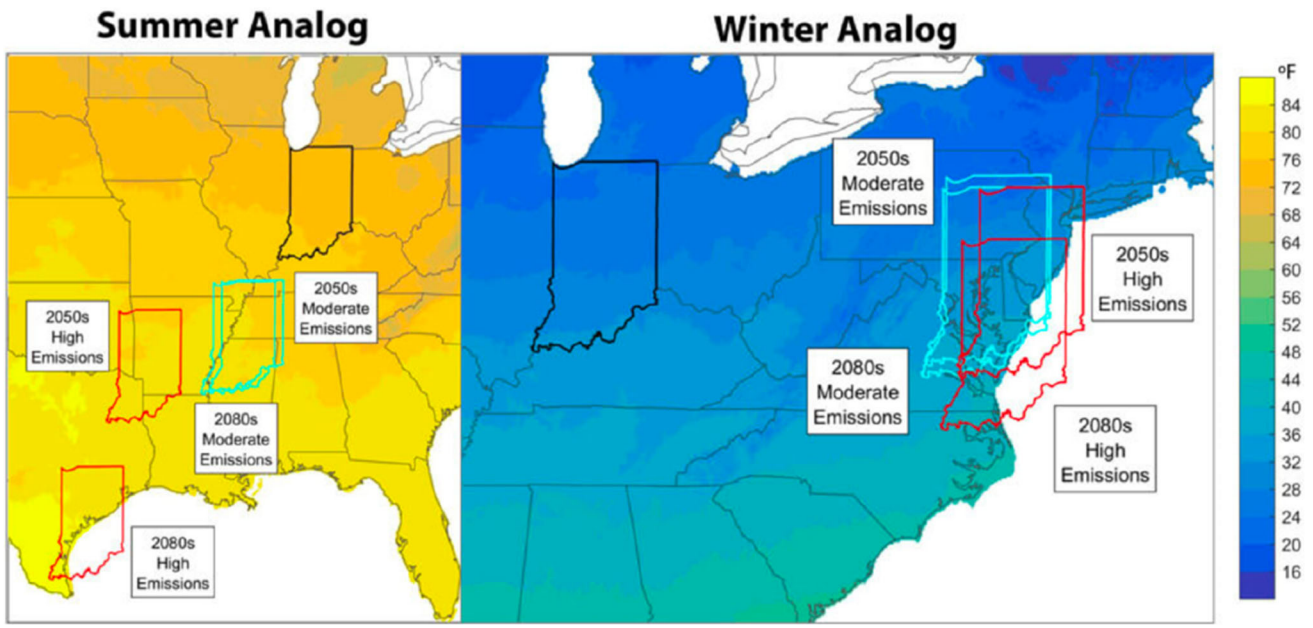


Figure 3: Depiction of Indiana Summer and Winter Climates Under Future Emissions Scenarios

Under moderate emissions increases:

- Indiana summers will become warmer, more closely resembling Kentucky and Tennessee by the 2050s and Alabama by the 2080s
- Indiana winters will become milder, more closely resembling that of Maryland and Virginia by the 2080s

Under high emissions increases:

- Indiana summers will become much warmer, more closely resembling Arkansas by the 2050s and Texas by the 2080s
- Indiana winters will become much milder, more closely resembling that of Virginia and North Carolina by the 2080s

Projections are based on statewide averages for temperature and precipitation.

Source: Indiana Climate Impacts Assessment, https://ag.purdue.edu/indianaclimate/indiana-climate-report/

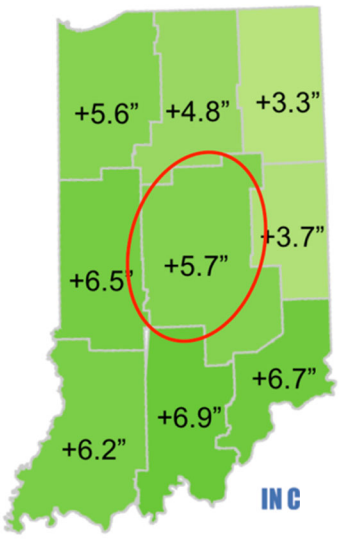


Figure 4: Anticipated Change in Annual Average Precipitation for Hamilton County

Average change in precipitation is based on linear trend between 1895 to 2016

Source: Indiana Climate Change Impacts Assessment, https://ag.purdue.edu/indianaclimate/indiana-climate-report/

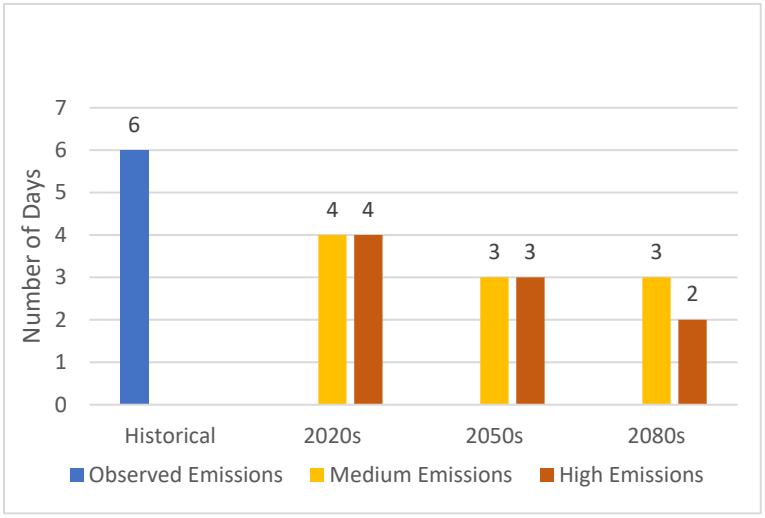


Figure 5: Anticipated Number of Days Per Year With More Than Two Inches Snow in Hamilton County, Indiana*

Based upon: Indiana Climate Change Impacts Assessment, https://ag.purdue.edu/indianaclimate/indiana-climate-report/

**Based on best available data for nearby Marion County, Indiana*

“Historical” is an average for the period 1915 to 2013. “2020s” represents the average 30-year future period 2011 to 2040. “2050s” represents the average 30-year period 2041 to 2079. “2080s” represents the 30-year period 2071 to 2100.

Indiana has already started experiencing more rainfall than in the past. Annual precipitation has increased by 5.7 inches per year on average since 1895 (Figure 4). In Hamilton County, average rainfall is projected to increase by 16 percent by the 2050s compared to average values from 1971 to 2000.[9] This is in part due to more snowfall being replaced by rainfall each year because of warmer winter temperatures (Figure 5). See Figure 6 for additional impacts that Indiana communities will experience as a result of climate change.

[9] Purdue Climate Change Research Center, n.d. *Hamilton County: State of the Climate*, https://ag.purdue.edu/indianaclimate/wp-content/uploads/2019/01/ClimateFacts_Hamilton_03262018_reduced.pdf

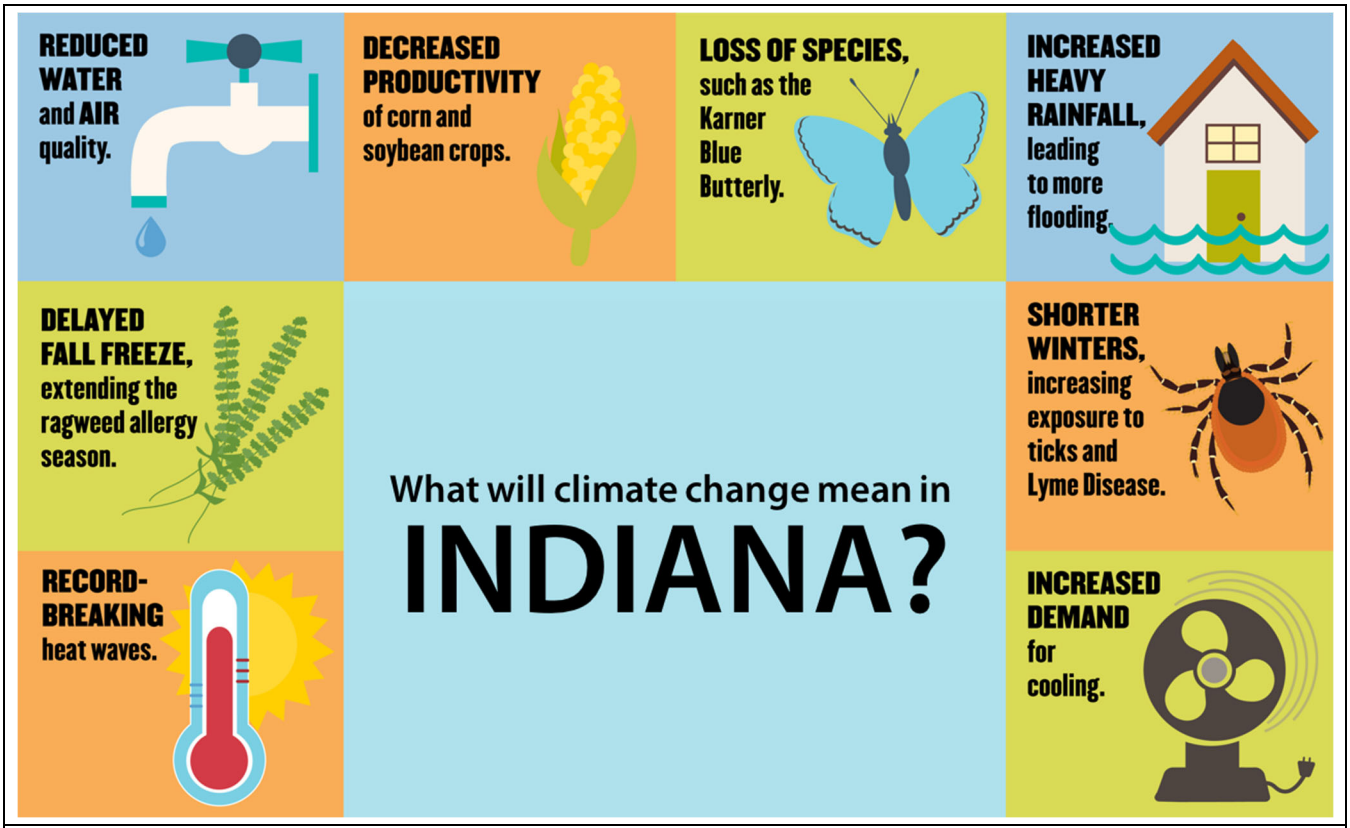


Figure 6: Overview of climate change impacts in Indiana
Source: Purdue Climate Change Research Center

1.3 Climate Change Adaptation Versus Mitigation

Some effects of a changing climate are inevitable. Adapting to a changing climate means a city or community implements measures to help residents withstand and become resilient to these impacts. Mitigation, on the other hand, is the process of actively preventing or reducing GHGs from being emitted into the atmosphere to reduce climate change. This CAP is primarily focused on climate mitigation; however, some actions such as better stormwater management, tree planting, and a climate vulnerability assessment will help the community adapt to a changing climate.

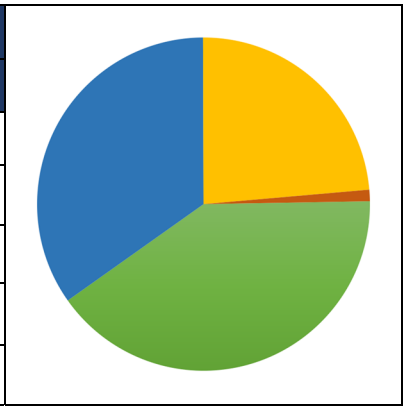
2. Emissions Baseline and Goals

Carmel conducted community-level GHG emissions inventories for the years 2015 and 2018 using ICLEI USA's ClearPath accounting tools.[10] This inventory is described in detail in a separate report, *2015 and 2018 Inventories of Community and Government Operations Greenhouse Gas Emissions*; key results are summarized here. Additionally, because some of the GHG emissions reductions goals use 2005 emissions as a baseline (see further discussion below), Carmel also used ClearPath to develop an emissions back-cast for 2005.

Based on the 2018 inventory, total GHG emissions in the City of Carmel were approximately 1.260 million metric tons. Table 1 summarizes the results by sector (more detail is provided in Table 2 below). Transportation, including on-road and off-road vehicles, accounts for the single largest source of GHG emissions in Carmel, followed by residential energy and then commercial and industrial energy. Waste and wastewater account for a small share of overall emissions.

Table 1: Carmel 2018 Emissions by Sector

Sector	Emissions	
	(Tons CO_2e)	Percent
Transportation	509,967	40
Residential Energy	438,183	35
Commercial/Industrial Energy	298,301	24
Waste and Wastewater	13,968	1
Total	1,260,419	100



The 2018 estimated emissions represent an increase of less than 1 percent over the 2015 estimated emissions of 1.257 million metric tons, even as population increased by more than six percent over the same period (from 92,747 in 2015 to 98,347 in 2018). Another useful way to look at the GHG emissions is in terms of annual emissions per person (i.e., per capita emissions). The 2018 emissions estimate equates to per-capita emissions of 12.8 metric tons, which is a decrease from the 2015 per-capita emissions of 13.6 metric tons.[11]

While Table 1 breaks out emissions by sector, it is also useful to examine the baseline emissions in other ways to identify potential areas where emission reductions may be achieved. For example, combining residential, commercial, and industrial energy shows that stationary energy accounts for almost 60 percent of total estimated emissions. Grid electricity provided by Duke Energy and AES Indiana (formerly known as IPL) and consumed by residents and businesses in Carmel accounts for 45 percent of total emissions, with the remaining emissions in that sector (about 14 percent of total emissions) being from natural gas

[10] ICLEI, n.d., *Clear Path*, https://icleiusa.org/clearpath/

[11] A review of other municipal-level GHG inventories[11] suggests that Carmel's per capita emissions are consistent with those of other similarly situated cities including Boulder, Colorado and Bloomington, Indiana (both 14.4); Kansas City, Missouri (18.2); Iowa City, Iowa (13.5); and Lakewood, Colorado (10.9).

combustion by households and businesses. This suggests that in addition to reducing energy consumption in Carmel households and businesses, changes to the underlying energy source mix in grid-supplied electricity can significantly impact Carmel's emissions over time.

On-road transportation is another important contributor to Carmel's total GHG emissions, with gas vehicles emitting 24 percent of total emissions and diesel vehicles emitting another 9 percent.[12] This suggests that measures to reduce emissions from these vehicles and gradually shift to hybrid or electric vehicles will have substantial impacts on the City's emissions.

Carmel has established ambitious GHG reduction goals consistent with the Mayors National Climate Change Agenda, which committed to uphold the Paris Agreement emission reduction goal of 45 percent relative to 2005 by 2035. Additionally, the City aims to achieve net zero emissions by 2050, which is in line with the Paris Agreement as well as Duke Energy's stated emission reduction goals (which provides the majority of grid electricity to Carmel). Table 2 shows Carmel's 2018 calculated emissions as well as two different 2050 scenarios: business-as-usual with no additional strategies to reduce GHG emissions, and the net zero goal whereby Carmel implements initiatives across the community to achieve substantial reductions.[13] Note that the projections under both scenarios assume straight-line emissions trajectories where emissions quantities change by the same amount each year between 2018 and 2050.

Table 2: Carmel's Projected GHG Emissions to 2050 under Business-as-Usual and Net Zero Goal

Sector	2018 Calculated Emissions	Projected Emissions			Compound Annual Growth
		2030	2040	2050	
Business-as-Usual Scenario					
Residential Electricity	289,652	332,736	373,497	419,250	1.2%
Commercial Electricity	270,525	310,764	348,832	391,564	1.2%
Industrial Electricity	7,950	9,133	10,251	11,507	1.2%
Residential Natural Gas	148,531	170,624	191,526	214,988	1.2%
Commercial Natural Gas	19,826	22,775	25,565	28,697	1.2%
On-Road Transportation (Gasoline)	301,152	345,976	388,386	435,994	1.2%
On-Road Transportation (Diesel)	112,127	128,805	144,584	162,296	1.2%
Solid Waste Generation	12,960	15,047	17,041	19,299	1.2%
Water/Wastewater Treatment (not incl. energy)	1,008	1,158	1,299	1,458	1.2%
Off-Road Vehicles	96,688	111,029	124,592	139,811	1.2%
Total	**1,260,419**	**1,448,049**	**1,625,575**	**1,824,864**	**1.2%**

[12] The remaining transportation sector emissions, about 8 percent of total emissions, are attributable to off-road vehicles.

[13] Note that the "net zero" emissions goal for 2050 means that remaining emissions are offset by natural sequestration (by trees and other vegetation) within the community, so total emissions are not zero.

Sector	2018 Calculated Emissions	Projected Emissions			Compound Annual Growth
		2030	2040	2050	
Net Zero Goal Scenario					
Residential Electricity	289,652	181,153	90,738	322	-19.1%
Commercial Electricity	270,525	169,191	84,745	300	-19.2%
Industrial Electricity	7,950	4,972	2,491	9	-19.1%
Residential Natural Gas	148,531	92,913	46,564	215	-18.5%
Commercial Natural Gas	19,826	12,402	6,216	29	-18.5%
On-Road Transportation (Gasoline)	301,152	189,354	96,188	3,023	-13.4%
On-Road Transportation (Diesel)	112,127	70,393	35,615	837	-14.2%
Solid Waste Generation	12,960	8,157	4,154	151	-13.0%
Water/Wastewater Treatment (not incl. energy)	1,008	635	323	12	-12.9%
Off-Road Vehicles	96,688	60,571	30,473	375	-15.9%
Total	**1,260,419**	**789,739**	**397,506**	**5,273**	**-15.7%**

As demonstrated by the table, very meaningful reductions will need to be achieved within Carmel to meet the ambitious net zero emissions goal. The remainder of this document describes strategies that the City will implement over the short and long term to help meet this challenge.

3. Plan Development

The City of Carmel began its climate action planning process when it joined Indiana University's 2019 Resilience Cohort led by the Environmental Resilience Institute (ERI). In 2019, an Indiana Climate Fellow, supported by ERI and the City, conducted a GHG emissions inventory for the years 2015 and 2018, which established the baseline emissions for the City. Carmel then joined the 2020 Resilience Cohort where the same Indiana Climate Fellow conducted community and stakeholder engagement and began drafting the CAP. This stakeholder engagement is summarized in this chapter and described in more detail in Appendix A.

Carmel collected community and stakeholder input on climate action strategies from May to October of 2020. The 2020 ERI Climate Fellow conducted three community workshops, two youth climate workshops, and four stakeholder meetings. Due to the COVID-19 pandemic, all engagement was conducted virtually using Zoom. Overall, these workshops revealed that Carmel community members who attended the meetings are concerned about climate change and are making efforts to reduce their carbon footprints. Waste reduction and diversion and energy conservation were the two activities that the majority of workshop participants are already engaging in. Residents who attended the workshops supported strategies that would provide incentives to homeowners and businesses, as well as strategies that require the adoption of regulations and polices.

During the last two community workshops, the focus was narrowed to sector-specific solutions the community would support. The full results of the Zoom poll surveys may be found in Appendix A.

- For the energy sector, the most frequently recommended initiatives were renewable energy procurement at the local government and community level (67 percent) and requiring home builders to consider renewable and alternative energy in the planning and designing of new buildings (66 percent).
- For the transportation sector, the most frequently recommended initiatives were increasing electric vehicle infrastructure (56 percent) and developing off-road bike lanes (52 percent).
- For the waste sector, the most frequently mentioned initiative was offering curbside compost pickup available to all residents and businesses (62 percent).
- For the water sector, the most frequently recommended initiatives were encouraging developers to implement rainwater capture systems (76 percent) and implementing water conservation technology such as grey water capture (59 percent).

The Indiana Climate Fellow completed their fellowship in December 2020 and the City subsequently engaged Gnarly Tree Sustainability Institute (GTSI) to write the CAP in close collaboration with City staff. In March and April of 2021, GTSI gathered feedback from City department heads during five separate meetings on their past, current, and planned future efforts to reduce GHG emissions. Building upon existing climate efforts in Carmel and community and stakeholder feedback, GTSI developed a comprehensive list of existing climate strategies in Carmel (see Appendix B), which forms the foundation for additional strategies identified in this CAP. Stakeholders then reviewed and provided feedback on the proposed strategies, and their feedback was incorporated into the CAP.

4. Climate Strategies

This chapter itemizes the climate strategies that the City of Carmel will implement pursuant to this CAP. The strategies are broken out by sectors, including public education (PE), energy and the built environment (EB), transportation (T), water and wastewater (WW), solid waste (SW), local food and agriculture (FA), and greenspace (G). Within each sector, the City has identified three to ten strategies that will contribute to meaningful GHG emissions reductions in line with achieving net zero emissions by 2050.

In this chapter, the strategies are presented as a table (see template or "key" below) with a brief description of what it will entail as well as identification of the implementation lead and key partners within the government and community. Additionally, each table identifies the relative scale of implementation costs and GHG reductions and indicates the implementation time frame.

<table>
<tr><td rowspan="4">[description, including whether it builds on any existing strategies]
Implementation lead: the entity that will "own" the initiative (can be a City department, local organization, or business)
Potential partners: entities who will help the lead in implementing the action (can be a City department, local organization, or business)</td><td>Estimated Cost (scale of $ to $$$$); "*" indicates some mandatory costs to private parties[14]</td></tr>
<tr><td>GHG reductions (scale: low, medium, high)</td></tr>
<tr><td>Co-benefits indicates other aspects of our community that will benefit from the climate strategy (including (Public Health, Cost Savings, Economic Growth, Quality of Life, Enhanced Equity); see below for a detailed description of each co-benefit.</td></tr>
<tr><td>Implementation Time Frame (scale: Short term: 1-5 years; Medium term: 6-15 years; Long term: 16-30 years)</td></tr>
</table>

Each strategy table additionally identifies co-benefits that will be realized within Carmel as a result of the strategy's implementation. These include the following co-benefits categories:

- **Public Health**: Many of the strategies in this plan will improve overall health in the Carmel community. For instance, reducing emissions from motor vehicles will reduce air pollution, thereby lowering the risk of health problems associated with poor air quality. Also, improving access to local, fresh produce, and enhanced opportunities for walking and biking will improve overall physical health.
- **Cost Savings**: Strategies that increase energy efficiency, result in appliance retrofits, and promote group purchasing of solar will save a significant amount of long-term costs associated with using less efficient appliances and non-renewable energy. Also, replacing car trips with walking, biking, or public transportation can result in reduced transportation costs.
- **Economic Growth**: Implementing climate strategies will result in a cleaner, more beautiful city, which will attract new businesses to the area. For example, high urban tree canopy coverage (the

[14] In some cases, the costs will be incurred by the City directly but in others, mandatory programs will result in costs being incurred by private parties. For each strategy, the estimated cost magnitude reflects City costs plus any mandatory costs incurred by private parties above what they would incur in the absence of the strategy.

layer of tree leaves, branches, and stems that provide tree coverage of the ground when viewed from above), enhances the economic viability of a given area by attracting new businesses and residents.[15]

- **Quality of Life**: Increased access to local foods, personal cost-savings, and increased physical activity from reduced car trips, are just some of the ways the implementation of CAP strategies will improve the overall quality of life in Carmel. Many other facets of the CAP will improve the overall livability of Carmel.
- **Enhanced Equity**: Enhancing social equity is an important factor associated with addressing climate change. Low-income communities and people of color are more likely to be adversely impacted by climate change, which is why it is important to ensure all community members benefit from the actions in this CAP.

Each of the sections additionally includes identification of actions that members of the Carmel community can take to reduce their individual impact, including hyperlinks to helpful resources (see Appendix C for the full web addresses for all linked resources).

This CAP will act as a living document, to be updated periodically over the next thirty years to reflect technological innovation and policy changes. As such, some of the strategies identified here may evolve or become more detailed in future iterations, and responsibilities for implementation may shift. The City of Carmel is committed to implementing all of the strategies in this CAP, even while recognizing that some of them may need further development along the way.

Public Education (PE)

A key component to successful implementation of a climate action plan is ensuring greater awareness of climate change and other sustainability issues. The strategies in this sector highlight different methods of educating the public, including businesses and City employees.

Carmel already has numerous public education initiatives as well as several nonprofits that aim to involve the community in sustainability initiatives. For instance, the Carmel Green Initiative works to "promote and support the City of Carmel's commitment to reducing our impact on the environment and meeting the climate challenge." Helping Ninjas is another nonprofit that seeks to engage youth in different environmental initiatives while also growing their social and interpersonal skills. The City of Carmel also has its Bike Carmel initiative, which promotes bicycling by holding bike-centered events throughout the year. Finally, the Hamilton County Soil and Water Conservation District runs the Backyard Conservation Program, which educates the public on how to create and preserve wildlife habitats in backyards, conserve water, and protect watersheds while connecting residents to nature.

The strategies identified in this section will help Carmel's residents and businesses gain a better understanding of climate change and what they can do to help mitigate their own GHG emissions.

[15] D.J, Nowak, A. R. Bodine, R.E. Hoehn, A. Ellis, S. Hirabayashi, R. Coville, D.S.N. Auyeung, N.F. Sonti, R. A. Hallett, M. L. Johnson, E. Stephan, T. Taggart, and T. Endreny, 2018, *The urban forest of New York City*, https://doi.org/10.2737/NRS-RB-117

PE- 1: Public Education about Impacts of Climate Change

Develop climate education programs appropriate for Carmel students, adult residents, and businesses. **Implementation lead**: Earth Charter Indiana, Environmental Resilience Institute, Carmel Green Initiative **Potential partners:** City of Carmel Community Relations and Economic Development Department (CRED), Carmel Clay Parks and Recreation (CCPR)	Cost: $ GHG reductions: Low Co-benefits: Enhanced Equity Time frame: Short Term

PE- 2: Climate Vulnerability Assessment

Complete Hoosier Resilience Index assessment and climate vulnerability assessment to better understand the impacts of climate change on Carmel and to inform future cost-benefit analyses of proposed climate strategies and projects. The assessment will enable Carmel to plan for the specific climate impacts the city will experience to adapt to the impacts of climate change. **Implementation lead**: City of Carmel Department of Community Services (DOCS) **Potential partners:** Environmental Resilience Institute	Cost: $$ GHG reductions: Low Co-benefits: Cost Savings, Quality of Life, Enhanced Equity Time frame: Short Term

PE- 3: Sustainable Business Certification Program

This program will provide local businesses with resources to adopt sustainability practices. After completing a multi-week course, businesses will receive a certificate and a sticker they can place in their window to signal that they are working towards sustainability. Businesses will also have the option to participate in optional activities, including disclosure of their building energy usage on an annual basis and using energy usage data to determine energy efficiency measures. **Implementation lead**: OneZone Chamber of Commerce **Potential partners:** City of Carmel CRED	Cost: $ GHG reductions: Medium Co-benefits: Cost Savings, Economic Development Time frame: Short Term

PE- 4: City of Carmel Sustainability Committee

The City will create a sustainability committee with representatives from each department. The committee will establish and communicate internal sustainability efforts such as a municipal composting program. The committee will also create challenges and programs to incentivize departments to meet environmental goals. Department representatives will be charged with educating their respective department on sustainable practices. **Implementation lead**: City of Carmel Human Resources Department, DOCS, and Utilities **Potential partners:** CCPR	Cost: $ GHG reductions: Low Co-benefits: Cost Savings, Quality of Life Time frame: Short Term

What You Can Do

- Learn more about climate change and climate justice. Check out these books and documentaries:
  - Project Drawdown
  - *Climate Action Challenge: A Proven Plan for Launching Your Eco-Initiative in 90 Days* by Joan Gregerson
  - *David Attenborough: A Life on Our Planet* – on Netflix
- Join local and state organizations in their efforts to address climate change, such as:
  - Carmel Green Initiative
  - Earth Charter Indiana
  - Helping Ninjas Inc.
  - Carmel Clay Schools Green Team
  - Indiana Forest Alliance

Energy and Built Environment (EB)

Emissions from the built environment are either direct (emitted on-site, such as using a gas stove or water heater) or indirect (fossil fuels burned offsite, such as transporting construction materials or electricity usage from the electric grid). In Carmel, commercial and residential building energy use accounts for almost 60 percent of total GHG emissions (see Chapter 2), which indicates that there is great opportunity to reduce emissions in the sector.

The City of Carmel is already making strides in improving energy efficiency and energy conservation practices in municipal facilities. For example, the Fire Department has completed numerous building projects including a new maintenance and training center and a fire station that utilize energy and water efficient practices such as low-flow toilets and urinals. Additionally, the City is in the process of creating an energy benchmarking program that will require large municipal buildings to publicly report energy usage on an annual basis. The City is also working with developers to encourage adoption of energy efficiency and renewable energy practices in municipal buildings. The Department of Community Services also has a green building checklist it provides to developers to raise awareness about less carbon-intensive building practices. Also, the Redevelopment Department requires developers to add solar to their new properties.

This section specifies ten strategies ranging from energy efficiency upgrades in households to streamlining the solar permitting process for residents and businesses. The majority of these actions will result in cost savings for the entire community as residents and businesses save on utility bills.

EB- 1: Municipal Energy Efficiency Evaluation and Upgrades

The City will undergo a comprehensive evaluation of all existing municipal buildings for potential energy efficiency upgrades such as more efficient HVAC, replacing faucets and toilets with low flow, solar potential, and energy saving technology for computers. **Implementation lead**: City of Carmel Administration and Utilities **Potential partners:** TBD	Cost: $$$ GHG reductions: Medium Co-Benefits: Cost savings Time Frame: Short term

EB- 2: Municipal Energy Benchmarking and Disclosure Program

All municipal buildings will be required to report their energy usage on an annual basis. This strategy will increase transparency, raise awareness about building energy consumption, and ultimately result in cost-savings. This strategy expands on existing city efforts to establish such a program. **Implementation lead:** City of Carmel Administration **Potential partners:** Duke Energy, CenterPoint Energy, AES Indiana	Cost: $ GHG reductions: Medium Co-Benefits: Cost savings Time Frame: Short term

EB- 3: Commercial Energy Benchmarking and Disclosure Program

All commercial buildings may voluntarily report their energy usage on an annual basis. This strategy will increase transparency, raise awareness about building energy consumption, and ultimately result in cost-savings. This strategy expands on existing city efforts to establish such a program. **Implementation lead:** City of Carmel DOCS **Potential partners:** OneZone, Duke Energy, CenterPoint Energy, AES Indiana	Cost: $ GHG reductions: Medium Co-Benefits: Cost savings Time Frame: Short term

EB- 4: Green Building Best Practices Education for Commercial and Municipal Construction

Create and disseminate educational materials regarding green building principles, including LEED (Leadership in Energy and Environmental Design)[16] green building principles for commercial developers. Utilize educational resources to encourage developers to seek LEED certification and to dispel any misconceptions regarding the cost of certification. Enlist the support of local businesses with LEED certified buildings to share their experiences. **Implementation lead**: City of Carmel DOCS **Potential partners**: OneZone, Indiana Builders Association, Indiana Chapter of USGBC, Regions Branch Bank (LEED 2009 Gold, certified in 2012), Indiana Design Center	Cost: $ GHG reductions: Medium Co-benefits: Cost Savings, Quality of Life, Economic Development Time frame: Short term

EB- 5: Green Building Policy for Commercial and Municipal Construction

After educating developers and City departments on the LEED certification process for five years (under Strategy EB-3), establish standards for new construction requiring commercial developers and the City to be at least LEED Silver. For the City, this builds on the existing green building/renovation checklist. **Implementation lead**: City of Carmel DOCS and Redevelopment Department **Potential partners**: Indiana Builders Association, Indiana Chapter of USGBC, Regions Branch Bank (LEED 2009 Gold, certified in 2012)	Cost: $$$* GHG reductions: High Co-benefits: Cost Savings, Quality of Life Time frame: Medium term

EB- 6: Residential Energy Conservation Measures

<u>Home renovations:</u> Implement a residential energy conservation education initiative intended to improve efficiency in existing Carmel housing. The initiative will provide residents, especially homes or apartments undergoing renovations, with educational materials that specify energy efficiency improvements; a list of contractors and vendors; and existing state, federal, and utility energy efficiency incentives. <u>New home construction:</u> Similar to renovators, homebuilders will be provided with educational materials that provide options for renewable energy and sustainable building materials prior to new construction. These education materials will help support solar and other renewable energy companies. This strategy expands upon Strategy 7.1 from the Comprehensive Plan, which calls for the encouragement of durable materials and construction methods that prolong the life of buildings. **Implementation lead**: City of Carmel CRED, DOCS **Potential partners**: Indiana Homebuilders Association	Cost: $ GHG reductions: High Co-benefits: Cost Savings, Economic Growth Time Frame: Short term

EB- 7: SolSmart Designation, Solar Education, and Solar Group Purchase Program

SolSmart provides cities with technical assistance to ensure they are offering residents streamlined, easy-to-understand information about solar installations. Receiving a gold designation will expand Carmel residents access to solar resources. As part of this initiative, the City of Carmel will develop solar education programs, organize group purchases of solar panels, and work with Home Owners Associations to ensure their covenants allow for solar installations. **Implementation lead**: City of Carmel DOCS **Potential partners**: Indiana University Environmental Resilience Institute, Hamilton County Solar Co-op, and Solarize Indiana	Cost: $ GHG reductions: High Co-benefits: Cost Savings, Economic Growth, Enhanced Equity Time frame: Short Term

EB-8: Advocate for State Renewable Energy

Encourage local electricity providers to further transition to clean renewable energy. Join with Indiana cities in advocating for the state legislature to enact additional renewable energy policies. Policies such as tax breaks, loans, and/or rebates, will encourage individuals, non-profits, businesses, and industry to adopt renewable energy practices. **Implementation lead**: City of Carmel DOCS department **Potential partners**: Carmel Green Initiative, Earth Charter Indiana	Cost: $ GHG reductions: Medium-High Co-benefits: Economic Growth Time Frame: Short

EB- 9: Identify Barriers to Existing Energy Efficiency Programs

The City will identify barriers for business and household participation in existing federal and utility weatherization and energy efficiency programs. **Implementation lead**: City of Carmel DOCS department **Potential partners**: Duke Energy, AES Indiana, CenterPoint Energy, City of Carmel CRED, Hand, Inc., Carmel Green Initiative	Cost: $ GHG reductions: Medium Co-benefits: Cost Savings, Enhanced Equity Time frame: Medium term

[16] LEED is the world's most widely used green building rating system led by the US Green Building Council and is designed to help buildings achieve high-performance while remaining energy efficient and powered by low- or no-carbon energy.

EB- 10: Energy Efficiency Grant Program

Once barriers to existing energy efficiency programs are identified (under Strategy EB-9), the City will partner with the Carmel Green Initiative and Hand, Inc. to support the potential creation of a grant program to help residents and businesses overcome cost barriers that existing programs cannot currently cover. The grant money would fund energy efficiency projects and upgrades including lighting, HVAC, heat pumps, insulation, and ductwork. The purpose of this strategy is to accompany existing rebates Duke Energy, AES Indiana, and CenterPoint Energy currently offer to alleviate cost burden. **Implementation lead**: City of Carmel DOCS department **Potential partners**: City of Carmel Utilities, Duke Energy, CenterPoint Energy, AES Indiana, Carmel Green Initiative, Hand, Inc.	Cost: $$ GHG reductions: Medium Co-benefits: Cost Savings, Enhanced Equity Time frame: Medium term

What You Can Do

- Take a look at Duke Energy's Clean & Smart opportunities page, which lists numerous ways to incorporate energy efficiency into your lifestyle.
- If you own your home, complete a Duke Energy free home energy assessment to see how to save energy and what appliance upgrades you may need.
- Enroll in Duke Energy's Power Manager Program and Flex Savings Options pilot program, which helps save energy during peak energy periods by lowering your hot water heater and A/C's energy usage.
- If you own your home, make sure it is well-sealed, insulated, and weatherized. Take advantage of Duke Energy's rebates for undertaking these initiatives.
- Install solar on the roof of your home or business! Attend a Solarize Hamilton County information session to learn the benefits of installing solar panels on your home and to get a group purchase discount if you choose to go solar.
- Air dry your clothes instead of using a clothes dryer (or reduce the frequency you use your clothes dryer).
- Install a smart thermostat in your home, which uses smart technology to regulate temperatures that are ideal to your preferences and that save energy.
- Use your dishwasher on the eco setting (with no pre-rinse or heated dry) to save water instead of hand washing your dishes or use the double basin method to hand wash your dishes if you don't have a dishwasher.
- Install low-flow toilets, shower heads, and faucets in your home.
- Make a habit of unplugging electronic devices when not in use.

Transportation (T)

The United States is a car-centric country, where many individuals utilize private vehicles as their primary form of transportation. The American Public Transportation Association estimates that the average household spends 16 cents of every dollar on transportation, which is the largest expenditure after housing costs.[17] Not only is transportation via a private vehicle costly, but it emits a significant amount of GHG emissions and local air pollutants such as particulate matter, volatile organic compounds (or VOCs), nitrous oxides (NOx), carbon monoxide, and sulfur dioxide (SOx), contributing to climate change and decreasing air quality. In Carmel, transportation accounted for about 40 percent of total GHG emissions, so meaningful reductions in this sector will be critical to meeting overall emission reduction goals, enhancing air quality, and improving human health.

Carmel has long encouraged biking and walking as transportation options, particularly in the central core. Also, the City of Carmel Comprehensive plan includes numerous policies related to sustainable transportation. For example, the plan calls for a commuter line feasibility study and construction of an intercity bus or trolley system. The City actively encourages biking by prioritizing the installation of bike lanes, expanding its extensive bike path system, and hosting bike-centered events through the *Bike Carmel* initiative. Carmel also has over 125 roundabouts installed throughout the city, which help reduce vehicle emissions associated with idling at stoplights. Moreover, the remaining stoplights in the city are all powered by LEDs. Carmel was also awarded a grant in early 2021 to install two EV chargers.

Looking forward, the strategies in this section are focused on promoting electric vehicles (EVs) as an alternative to fossil fuel-based cars, exploring opportunities for public transportation, and promoting biking and walking as alternatives to driving.

T- 1: Implement Planning and Development Policies that Encourage Multi-Modal Transportation and Walkability

<table>
<tr><td rowspan="4">Utilize transit-oriented development and planning strategies, such as mixed use housing, Complete Streets policy, and zoning changes to ensure every Carmel resident is adjacent to a sidewalk, multi-use path, or public transportation and a neighborhood support center (corner store). Proximity to alternative modes of transportation will encourage all residents to transition to low or no-carbon transportation, lower air pollution from cars, improve public health, and enhance pedestrian and bike safety. Moreover, this strategy will ensure all Carmel residents will have access to transportation alternatives. Creating neighborhood support centers will reduce the need for short car trips to the grocery store or pharmacy. This strategy aligns with numerous policy objectives (2.5, 4.5, 5.4, 5.5, 6.6, 7.3) in the Carmel Comprehensive Plan.
Implementation lead: City of Carmel DOCS, Engineering, and Street departments
Potential partners: Carmel Redevelopment Commission, CCPR</td><td>Cost: $$$$*</td></tr>
<tr><td>GHG reductions: High</td></tr>
<tr><td>Co-Benefits:
Public Health, Economic Development, Quality of Life, Enhanced Equity</td></tr>
<tr><td>Time Frame: Long-term</td></tr>
</table>

[17] American Public Transportation Association, n.d., *Public Transportation Facts*, https://www.apta.com/news-publications/public-transportation-facts/

T- 2: Commuter Line Feasibility Study

Following Council approval, a commuter line feasibility study will assess the feasibility of an intra-county transit system and an expansion of the Indianapolis Red Line to Carmel. A transit system will promote use of public transportation over commuting by private vehicles, provide low-cost transportation for individuals who do not own a vehicle, and improve air quality from reduced vehicle emissions. This strategy builds upon the Comprehensive Plan recommendation of research for the establishment of a commuter line as well as the existing efforts from the Department of Community Services to draft a study. **Implementation lead**: City of Carmel DOCS **Potential partners**: Central Indiana Regional Transportation Authority, IndyGo	Cost: $$ GHG reductions: Medium Co-Benefits: Public Health, Quality of Life, Enhanced Equity Time Frame: Short-term

T- 3: Promote Electric Vehicle (EV) Leasing and Purchasing

The City will promote EV leasing and purchasing by providing the public with educational resources, installing EV charging stations in City-owned parking lots, garages, and Central Core parking, and requiring all new commercial construction to include at least one EV charging station. Increasing the number of EVs on the road will reduce GHG emissions and improve air quality. This strategy expands upon existing efforts to encourage EVs, such as the grant the City received in 2020 to install two EV chargers in the Central Core. **Implementation lead**: City of Carmel CRED, DOCS **Potential partners**: Carmel Redevelopment Commission, Novo Development Group, Environmental Resilience Institute	Cost: $$ GHG reductions: Medium Co-Benefits: Public Health Time Frame: Short-term

T- 4: City EV and Hydrogen Fleet Purchasing and Retrofit Policy

An EV and hydrogen fleet purchasing and retrofit policy will advance the current hybrid vehicle purchasing policy by encouraging the City to retrofit existing vehicles with hydrogen technology and requiring that new vehicles purchased are EV, when appropriate. This policy will enable the City to set a positive example and encourage residents and businesses to purchase EVs or adopt similar policies. **Implementation lead**: All City of Carmel departments with fleets **Potential partners**: AlGalCo, Climate Mayors EV Purchasing Collaborative, CCPR	Cost: $$ GHG reductions: Medium Co-Benefits: Public Health Time Frame: Short-term

T- 5: No-Idling Policy Technical Assistance and Education

No-idle policies[18] reduce ambient air pollution by requiring people to turn off their ignition instead of idling at wait areas or in parking lots. Reducing idling will save individuals money on fuel, reduce citywide emissions, and improve overall public health. The City will partner with local schools, hospitals, and other entities that are frequented by young people and individuals who are at higher risk for respiratory effects from poor air quality first to implement no-idling policies. In addition, the City will educate its employees and the public on the cost savings, emissions reductions, and cost savings associated with emissions reductions. **Implementation lead**: City of Carmel CRED **Potential partners**: Local Hospitals, Carmel Clay Schools	Cost: $ GHG reductions: Low Co-benefits: Cost Savings, Public Health Time frame: Short term

T- 6: Expand Promotion of Bicycles as Alternative Mode of Transportation

This strategy will expand the efforts of the *Bike Carmel* initiative by facilitating partnerships with local employers to create commuter bicycling incentive programs, encouraging bike racks for existing buildings, and hosting additional bicycle-centered events. In addition, the City will continue to expand the local path network. **Implementation lead**: City of Carmel CRED, DOCS **Potential partners**: Bikeshare companies	Cost: $ GHG reductions: Low Co-benefits: Quality of Life, Public Health Time frame: Short term

T- 7: Municipal Bikeshare Program

The City will purchase 5 to 10 bicycles (majority regular with perhaps one e-bike) and establish a bike check-out program for employees to use bikes to commute to meetings or other nearby appointments. This strategy expands upon the efforts of the Redevelopment Department, DOCS, and Engineering, which have their own bikeshare initiative. **Implementation lead**: City of Carmel CRED and Human Resources **Potential partners**: DOCS, Bikeshare company	Cost: $ GHG reductions: Low Co-benefits: Quality of Life, Public Health Time frame: Short term

[18] Access a sample of a no idling policy for schools at https://www.michigan.gov/documents/deq/deq-aqd-IdleReductionFactSheet_251101_7.pdf

What You Can Do

- Look into purchasing or leasing an electric vehicle when shopping for a new car.
- Work from home when possible.
- Start a carpool with work colleagues or with other parents when driving your kids to school. Make use of the Central Indiana Regional Transportation Authority (CIRTA) Commuter Connect to establish carpools.
- Ride a bike, scooter, e-bike, or walk on your shorter trips (3 miles or less).
- Strategize how you can combine your trips when you drive (ex: going to the grocery store, hardware store, and Target in one run).
- Use public transportation when possible, including the Hamilton County Express and Prime Life Enrichment Transportation.

Water and Wastewater (WW)

Clean water is essential for life all on earth. The pumping, distribution, heating, and treatment of our water and wastewater generates GHG emissions. According to the Energy Information Administration, in Indiana the energy to heat our water is most often generated from burning coal.[19] Therefore, it is important that we reduce unnecessary water consumption in our homes and businesses. Lifestyle adjustments like getting a low-flow showerhead and curtailing water use by taking shorter showers can reduce emissions associated with water use. While a relatively small portion of Carmel's overall emissions come from water and wastewater use and treatment (See Chapter 2), there are numerous ways to easily reduce emissions from home and business use while also saving money. For example, according to the EPA, if just one out of 10 households in Indiana replaced its older, inefficient toilets with WaterSense labeled models, it would save U.S. residents 2.5 billion gallons of water and $15 million in water bills annually.

Carmel Utilities already promotes several initiatives and programs that conserve water and reduce emissions. For instance, the City of Carmel Water and Sewer Utility currently uses anaerobic digestors to break down organic materials and uses 50 to 60 percent of the biogas generated from the process to heat sludge during wastewater treatment and for other minor uses. In 2021, Carmel Utilities began using two solar arrays with almost 3,000 solar panels to power the City's water plant and save about $1.8 million in future energy costs. The City also has a stormwater fee for all properties in Carmel, which creates a dedicated source of funding for projects related to improve stormwater infrastructure. The Parks and Recreation Department has a reclaimed water system that collects stormwater, greywater, and water from splash pads at its facilities through bioswales. There are also several rain gardens on municipal properties that help retain rainwater to prevent runoff.

The strategies included here build on those existing measures to further reduce the magnitude and impact of water use, stormwater control, and wastewater treatment. Additionally, these measures have a large number of co-benefits associated with them and will generally improve the quality of life and reduce living expenses in the community.

[19] U.S. Energy Information Administration, n.d., *Indiana State Profile and Energy Estimates*, https://www.eia.gov/state/index.php?sid=IN

WW- 1: Residential Low-Flow Water Appliance Retrofit Program

This program will offer rebates for the installation of low-flow toilets, showerheads, faucets, and smart irrigation controllers for Carmel residents, starting with rental properties. **Implementation lead**: Carmel Green Initiative and Hand, Inc. **Potential partner**: City of Carmel Utilities	Cost: $$ GHG reductions: Medium Co-benefits: Quality of Life, Cost Savings, Enhanced Equity Time frame: Medium term

WW- 2: Stormwater and Household Water Efficiency Education

Expand water efficiency education program and incorporate into existing stormwater and household water education efforts. This strategy corresponds with Comprehensive Plan Objective 7.4 to encourage use of water-saving devices. **Implementation lead**: City of Carmel Utilities (for household water component), Department of Storm Water Management (for stormwater component) **Potential partners**: White River Alliance, EPA WaterSense Program, CCPR	Cost: $ GHG reductions: Low Co-benefits: Cost Savings, Enhanced Equity Time frame: Short term

WW- 3: Consideration of Reclaimed Water System for City Greenspace

The City will consider implementing reclaimed water systems to water grass and for landscaping at city-owned parks (where this is not already being done). **Implementation lead**: City of Carmel Engineering Department, CCPR **Potential partners**: Local businesses and hospitals	Cost: $$$ GHG reductions: Medium Co-benefits: Cost Savings Time frame: Medium term

What You Can Do

- Check out the Clear Choices Clean Water website, which provides tips on water conservation and efficiency measures you can take.
- Replace your toilets, faucets, and showerheads with low-flow options. If you are building your home, select the low-flow options over other models. Check out this list of EPA WaterSense labeled products, which will help you conserve water and money.
- Turn your water heater down to 120°F.
- Use your dishwasher on the eco setting (with no pre-rinse or heated dry) to save water instead of hand washing your dishes or use the double basin method to hand wash your dishes if you don't have a dishwasher.
- If you own your home, sign up for Duke's Free Home Energy Assessment and receive an energy efficient showerhead (in addition to LED bulbs).
- Go through this checklist to detect water leaks in your home or apartment.
- Sign up to get a rain barrel at a reduced price through the City's Rain Barrel Cost Share Program.

Solid Waste (SW)

Globally, almost 50 percent of waste is organic (food or yard/green waste) or biodegradable.[20] When food waste ends up in a landfill, it doesn't have the right conditions (heat, microbes) to break down properly, which results in methane emissions, which are approximately 34 times more potent than carbon dioxide over a century in terms of heat absorption capability.

One way to combat this problem is to divert organic waste from landfills by composting. Rather than releasing methane, composting sequesters carbon by converting food waste and other organic material (yard clippings etc.) into stable, nutrient-rich soil. Reducing other kinds of waste, like construction material, will also reduce the need (and energy used) to extract, process, and transport raw materials for use in everyday products.

Carmel currently offers City-serviced recycling and household hazardous waste disposal to all residents. Carmel and Hamilton County also offers expanded household hazardous waste disposal services along with e-waste recycling. Residents are also able to sign up for composting services offered by several local composting businesses.

The strategies itemized below are primarily focused on reducing the quantity of solid waste disposed of in landfills by the City of Carmel, which will reduce methane emissions.

SW- 1: Waste Feasibility Study

The City will consider conducting a waste feasibility study to determine main sources of waste in Carmel and identify potential alternative waste streams, waste reduction strategies, and determine the future of recycling and composting in Carmel. **Implementation lead**: City of Carmel Utilities, Hamilton County Solid Waste Management District **Potential partners**: Consultants to conduct the study	Cost: $$ GHG reductions: Medium Co-benefits: Quality of Life Time frame: Short term

SW- 2: Municipal Food Waste Composting

The City will create a composting program at municipal facilities, starting at City Hall before expanding to all City-owned buildings. The City will partner with a local composting company to facilitate weekly compost pickup. This program will enable the City to set a positive example for the rest of the Carmel community. **Implementation lead**: Republic Services, City of Carmel Utilities **Potential partners**: Local Composting Company such as Earth Mama or Re317	Cost: $ GHG reductions: Low Co-benefits: Quality of Life Time frame: Short term

[20] Project Drawdown, n.d., *Composting*, https://www.drawdown.org/solutions/composting

SW- 3: Food Composting Pilot Programs

The City will partner with the Hamilton County Solid Waste District to set up a pilot composting program in Carmel Clay schools, businesses, and non-profits. Implementing pilot programs first will help determine necessary logistics and public education needed to create an effective city-wide composting program. After evaluating the pilot program, the City can potentially implement city-wide programs. **Implementation lead**: City of Carmel Utilities, Hamilton County Solid Waste Management District **Potential partners**: Local Composting Company such as Earth Mama or Re317, Neighborhood associations, Carmel Clay Schools, CCPR, IU Health	Cost: $$ GHG reductions: Low Co-benefits: Quality of Life Time frame: Medium term

SW- 4: Backyard Compost Bin Voucher Program

This program will provide residents with low-cost backyard compost bins along with a free education course on backyard composting. A portion of the education will include how to properly compost yard waste either via City yard waste pickup or via backyard composting. **Implementation lead**: Hamilton County Soil and Water Conservation District **Potential partners**: Company that manufactures compost bins, Plots to Plates, Master Gardeners Association	Cost: $ GHG reductions: Low Co-benefits: Quality of Life, Cost Savings Time frame: Short term

SW- 5: Increase Recycling Rate and Reduce Contamination Rate

Increase recycling rate and reduce contamination rate by implementing a public education program in partnership with local waste disposal companies. Also, require commercial property owners to offer recycling by 2025 and ensure assistance is provided to help reach compliance. **Implementation lead**: City of Carmel DOCS, Utilities **Potential partners**: Republic Waste, Hamilton County Solid Waste Management District	Cost: $$* GHG reductions: Medium Co-benefits: Quality of Life Time frame: Short term

SW- 6: Zero-Waste Events Policy

Establish a policy that requires all public, City-run events to be zero-waste. This will include compostable and recyclable materials only and incorporating zero-waste practices such as water-bottle refill stations. **Implementation lead**: City of Carmel CRED, DOCS **Potential partners**: Republic Waste, Carmel Green Initiative, CCPR	Cost: $* GHG reductions: Low Co-benefits: Quality of Life Time frame: Short term

What You Can Do

- Check out the Hamilton County Household Hazardous Waste page that includes a list of acceptable hazardous household waste items for recycling as well as electronic waste (e-waste), and paper shredding days.
- Compost in your backyard or sign up for a composting pickup service like Earth Mama Compost.
- Check out the Indiana Recycling Coalition's Food Scrap initiative for more information.
- Watch this video to learn more about composting as a climate solution.
- Reduce food waste by following these tips.
- Learn how to read recycling labels.
- Check out the City of Carmel Trash and Recycling Program page if your home is serviced by the City.
- Learn about Republic Services' recycling best practices.
- Watch The Story of Plastic documentary to learn about the history and current state of recycling.
- Shop second-hand.
- Reduce single-use plastics by:
    - Buying in bulk at the grocery store.
    - Replacing single-use plastic items with reusable ones, such as water bottles, coffee mugs, grocery bags, produce bags, straws, utensils (when getting carry-out), glass reusable food containers, reusable wax wrap to replace plastic wrap or reusable storage bags.
    - Bringing your own to-go container when you go out to eat to carry home leftovers.
    - Saying no to straws, to-go utensils, and napkins when ordering takeout.
- Read 101 Ways to Go Zero Waste by Kathryn Kellogg or check out her website to learn about ways to avoid single-use plastic.

Local Food and Agriculture (FA)

At the individual and community level, eating locally sourced, plant-rich diets can have a substantial impact on your carbon footprint. Locally grown and produced food is usually less processed and has a higher nutritional value because it is consumed much sooner after harvest, so it has the potential to increase public health.[21] Also, increasing access to local food will lower emissions associated with transporting food from farm to fork. Community gardens and backyard gardening can further reduce emissions while educating the public on food cultivation.

Carmel has a robust community garden network operated by the Hamilton County Soil and Water Conservation District, where residents can maintain their own garden plots. The Carmel Schools Green Team also has a community garden program, Plots to Plates, which includes demonstration gardens and

[21] Purdue University, n.d., *Seasonal Eating*, https://www.purdue.edu/dffs/localfood/resources/

gardening courses offered by the Master Gardeners of Hamilton County. The Carmel Farmers Market is also widely frequented by the Carmel community, with over 95,000 attendees annually.

The strategies in this section build upon this foundation to encourage even more local food growing and consumption of locally sourced food products, to reduce the impacts of our community's diet on the environment, including through GHG emissions. All of these strategies also have significant co-benefits on public health, equity, and our community's quality of life.

FA- 1: Promote and Expand Food Donation Program

Expand existing food donations programs to include excess food from catering, prepared foods, and produce from grocery stores to food banks and pantries. Promote the program to raise awareness across restaurants in Carmel. This program will reduce food waste and provide food to food insecure Carmel residents. **Implementation lead**: City of Carmel CRED **Potential partners**: Bread of Life Pantry, Carmel Friends Church Food Pantry, Carmel United Methodist Food Pantry, Merciful Help Center's Food Pantry, Starbucks	Cost: $ GHG reductions: Low Co-benefits: Quality of Life, Enhanced Equity Time frame: Short term

FA- 2: Local Food Purchasing Program

Facilitate creation of local food purchasing program with local farmers in the region and schools, restaurants, hospitals, and other local employers, by connecting local farmers to the community to set up a partnership. This program will increase access to fresh, locally grown food and will lower emissions by reducing the number of miles food travels from farm to fork. **Implementation lead**: City of Carmel CRED **Potential partners**: Indiana Farm Bureau, Carmel Clay Schools, IU Health, OneZone Chamber of Commerce	Cost: $ GHG reductions: Medium Co-benefits: Public Health, Quality of Life, Economic Growth Time frame: Long term

FA- 3: Promote Local Food Purchasing

Encourage residents to participate in community sourced agriculture (CSA) programs such as subscription services specifically for "ugly" produce, Market Wagon, Carmel Farmers Market, or other local suppliers. **Implementation lead**: City of Carmel CRED, Hamilton County Soil and Water Conservation District **Potential partners**: Indiana Farm Bureau	Cost: $ GHG reductions: Low Co-benefits: Public Health, Quality of Life, Economic Growth Time frame: Short term

FA- 4: Community Orchard Pilot Program

The City will either partner with a local non-profit or take the lead on this initiative to create a small community orchard (10-20 trees). The orchard will serve an educational purpose of teaching residents how to grow apples and other fruits and will encourage residents to grow their own food. The orchard will enhance community involvement with volunteers to help maintain the trees and lead educational programs. The community orchard will reduce milage food travels from orchard to fork. **Implementation lead**: Carmel Clay Parks and Recreation Department, City of Carmel Urban Forestry Department, Carmel Urban Forestry Committee **Potential partners**: Carmel Green Initiative, Hamilton County Soil and Water Conservation District (HCSW), Plots to Plates, Master Gardeners Association	Cost: $$ GHG reductions: Low Co-benefits: Quality of Life, Public Health, Enhanced Equity Time frame: Long term

FA- 5: Community and Residential Garden Education Program

Hamilton County Master Gardeners Association (HCMGA) offers educational opportunities to residents interested in growing their own food and would take the lead on this program. The City will partner with them to provide resources and promotional material to expand HCMGA's existing gardening programs. **Implementation lead**: Hamilton County Soil and Water Conservation District (HCSW), Hamilton County Master Gardeners Association **Potential partners**: City of Carmel DOCS, CRED, CCPR	Cost: $ GHG reductions: Low Co-benefits: Quality of Life, Public Health, Enhanced Equity Time frame: Medium term

FA- 6: Ensure All Residents Have Access to Gardening Space

The City will evaluate the current community garden network in Carmel and the potential for expansion. The goal is to ensure all Carmel residents (both homeowners and renters) have access to either community or backyard gardening space, gardening tools, and education resources, if desired. **Implementation lead**: City of Carmel DOCS **Potential partners**: Plots to Plates Program, Hamilton County Garden Network, CCPR	Cost: $$ GHG reductions: Low Co-benefits: Quality of Life, Public Health, Enhanced Equity Time frame: Medium

FA- 7: Evaluate Farmers Market Potential for Expansion

The Carmel Farmers Market has been running for 22 years and reaches 95,000 people per year; however, residents may still experience barriers to attending the market such as lack of transportation, high prices, or vendors not accepting SNAP benefits. The farmers market will be evaluated to understand its current reach and identify solutions to existing barriers for some residents. **Implementation lead**: Carmel Farmers Market (IU Health North Hospital) **Potential partners**: City of Carmel CRED	Cost: $ GHG reductions: Low Co-benefits: Quality of Life, Public Health Time frame: Short term

What You Can Do

- Incorporate more plant-based protein into your diet. You can start with meatless Mondays and expand from there. Better yet, go vegetarian or vegan for an even more substantial reduction to your carbon footprint.
- Shop at the Carmel Farmers Market.
- Shop for locally sourced food.
- Sign up for a Community Sourced Agriculture program.
- An easy way to ensure your food is local, look for the Indiana Grown label on food products at the grocery store.
- Eat at restaurants that source their food locally.
- Get a plot at a local community garden. Check out The Hamilton County Garden Network website for a list of community gardens in Carmel.
- Get involved in the Carmel Fire Department's Community Assistance Program, which donates food to families in need.
- Subscribe to a food subscription service that delivers "ugly" produce right to your door such as Imperfect Foods. This helps prevent the perfectly delicious produce from going to waste.

Greenspace (G)

Urban greenspace such as street trees, parks, and rain gardens have a multitude of climate benefits. For instance, trees sequester carbon via photosynthesis and improve air quality, which reduces the risk of respiratory issues.[22] Shading from trees can lower local air temperatures and can therefore reduce the likelihood of heatstroke and other heat-related illnesses.[23] Planting native and drought-resistant trees, shrubs, and plants will also reduce the cost of lawn maintenance and avoid GHG emissions from mowing and leaf-blowing. Additionally, greenspace has a multitude of human health benefits, such as reducing stress, anxiety, and depression while increasing worker productivity. High urban tree canopy cover (a measure of the layer of tree leaves, branches, and stems that provide tree coverage of the ground when viewed from above) is also shown to ensure economic vitality in a given area by attracting new businesses and residents.[24] Urban tree canopy covers can also significantly decrease building energy costs and runoff.[25]

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[22] K. Schwarz, M. Fragkias, C.G. Boone, W. Zhou, M. McHale, J.M. Grove, J. O'Neil-Dunne, J.P. McFadden, G.L. Buckley, D. Childers, L. Ogden, S. Pincetl, D. Pataki, A. Whitmer, and M.L. Cadenasso, 2015, *Trees Grow on Money: Urban Tree Canopy Cover and Environmental Justice*, *PLOS ONE*, *10*(4), e0122051. https://doi.org/10.1371/journal.pone.0122051

[23] S.J. Livesley, E.G. McPherson, and C. Calfapietra, 2016, The Urban Forest and Ecosystem Services: Impacts on Urban Water, Heat, and Pollution Cycles at the Tree, Street, and City Scale, *Journal of Environmental Quality*, *45*(1), 119–124. https://doi.org/10.2134/jeq2015.11.0567

[24] J.F. Dwyer, , G.E. McPherson, ., H.W. Schroeder, and R.A.Rowntree, 1992, Assessing the benefits and costs of the urban forest,*Journal of Aboriculture*, *18*(5), 8. https://www.fs.fed.us/psw/publications/mcpherson/psw_1992_mcpherson002.pdf

[25] D.J, Nowak, A. R. Bodine, R.E. Hoehn, A. Ellis, S. Hirabayashi, R. Coville, D.S.N. Auyeung, N.F. Sonti, R. A. Hallett, M. L. Johnson, E. Stephan, T. Taggart, and T. Endreny, 2018, *The urban forest of New York City*, https://doi.org/10.2737/NRS-RB-117

The City of Carmel prioritizes maintaining plentiful greenspace. For instance, a substantial portion of the 550 acres of City-managed parkland is preserved as natural areas. The Parks and Recreation Department also has ongoing conservation education programs such as volunteer opportunities for residents and an adopt-a-park program. To reduce emissions associated with greenspace maintenance, the Street Department is in the process of replacing a portion of their propane motors with electric ones.

The strategies included in this section are aimed at enhancing all of the benefits of greenspace for Carmel residents as well as increasing the sequestration of GHGs to offset our community's remaining emissions after implementation of all of the other reduction strategies of this CAP.

G- 1: Rain Garden Location Identification and Installation

The City will create a public reporting system and/or conduct a geospatial study of existing data to determine where the urban heat island effect most impacts Carmel residents. Utilize this data to identify locations for rain gardens to mitigate urban heat island effect impacts. Rain gardens also help reduce stormwater runoff and provide habitat space for pollinators. **Implementation lead**: City of Carmel Engineering Department, Urban Forestry Department **Potential partner**: CCPR	Cost: $$ GHG reductions: Low Co-benefits: Quality of Life, Public Health Time frame: Medium term

G- 2: Environmental Protection and Revegetation Policy

Establish a policy that encourages new construction and redevelopment to protect and enhance the environmental amenities (trees, streams, wildlife) surrounding the property and reduce unnecessary tree removal. Adding more greenspace around buildings can help add shaded space and reduce air pollution by sequestering carbon. **Implementation lead**: City of Carmel Redevelopment Department, DOCS **Potential partners:** TBD	Cost: $* GHG reductions: Low Co-benefits: Quality of Life, Public Health Time frame: Short term

G- 3: Native and Drought-Resistant Landscaping

As climate change progresses, Indiana will experience prolonged drought periods. Converting a portion of City- and Parks-owned grassy area to native and drought-resistant plants will reduce watering, mowing, and yearly replanting needs. Less mowing will also reduce costs and lower GHG emissions associated with lawn equipment. This strategy aligns with Objective 6.3 of the Comprehensive Plan; encourage high quality and well-designed landscaping to help beautify the City and promote healthful environments. This strategy also expands upon the Carmel Clay Parks & Recreation's existing efforts to plant native and perennial plants when possible. **Implementation lead**: CCPR and City of Carmel Street Department **Potential partners:** TBD	Cost: $ GHG reductions: Low Co-benefits: Quality of Life, Public Health Time frame: Medium term

G- 4: Increase Number of Trees Planted Annually

Carmel has been a certified Tree City USA since 1994. This strategy will ensure that Carmel maintains its status as a Tree City USA and further increase tree canopy coverage each year, which has a multitude of social and ecosystem benefits. Conduct an inventory of the City of Carmel to locate planting sites that could benefit from more trees. Target those areas first for tree plantings. **Implementation lead**: City of Carmel Urban Forestry Department **Potential partners:** TBD	Cost: $ GHG reductions: Low Co-benefits: Public Health, Quality of Life, Enhanced Equity Time frame: Short term

G- 5: No Gasoline Powered Mowing Policy

This strategy encourages the replacement of gasoline powered lawn mowers and other City-owned yard equipment with electric equipment when gasoline powered equipment is retired. Replacing this equipment will improve air quality and set the example for the rest of the Carmel community to adopt similar practices. This strategy expands upon the existing Street Department effort to replace a portion of their propane mowers with electric ones. **Implementation lead**: City of Carmel Street Department, CCPR **Potential partners:** TBD	Cost: $$ GHG reductions: Medium Co-benefits: Public Health Time frame: Medium term

What You Can Do

- Plant shade trees in your yard. Check out this guide for where to plant trees to maximize shading. Here are some tips for correctly planting trees.
- Replace some, if not all of the grass in your yard with native, drought-resistant plants. See these tips for native plant landscaping.
- Sign up to get your lawn classified as a Certified Wildlife Habitat to make your yard a haven for native plant and animal species.
- Replace your lawn mower with an electric one.
- Volunteer with the Carmel Clay Parks & Recreation.

5. Next Steps

The City of Carmel is equipped with the tools to mitigate climate change and achieve its net zero emissions goal by 2050. With teamwork and strong community participation, successful implementation of the CAP will create long-lasting change for Carmel.

The City recognizes that actions beyond those named in the CAP will be needed to achieve and exceed our climate action goals. This CAP was developed with realistic climate strategies that account for the current social and economic conditions faced in the wake of the COVID-19 pandemic. To achieve net neutrality by 2050, the City plans to revisit this plan and its greenhouse gas emissions inventory bi-annually to update and strengthen its strategies in the intervening years.

Within six months of City Council passing this Climate Action Plan, a Climate Action Leadership Committee will be established. The Leadership Committee is charged with creating and executing a strategic plan of prioritized projects, along with providing resources and guidance. The Leadership Committee should consist of high-ranking representatives from key stakeholder groups including the Office of the Mayor, City Council, Department of Community Services, Engineering Department, Utilities Department, Carmel Clay Parks & Recreation, Carmel Clay Schools, and aligned non-profit organizations. Updates on the Climate Action Plan will be provided to City Council on a regular basis.

The City will hire a full-time sustainability coordinator in the Department of Community Services (DOCS) with the primary responsibility of implementing the CAP and related sustainability initiatives. The sustainability coordinator will ensure that implementation is carried out in a timely manner to meet Carmel's ambitious emissions reduction goals. The sustainability coordinator will also be in charge of evolving the plan to ensure strategies meet and exceed the City's goals.

The City will also create an online dashboard to track CAP implementation progress over the next 30 years, which will serve to increase transparency and keep the community informed on plan progress. The dashboard will also include educational resources and volunteer opportunities for residents to get involved in CAP projects.

Furthermore, the City plans to join with other Indiana cities in advocating for greater renewable energy policies, expanding solar tax credits, and reinstituting net metering.

Appendix A. Stakeholder Engagement Process

Between May and October 2020, an Indiana Climate Fellow as a part of the Environmental Resilience Institute Resilience Cohort conducted a series of virtual meetings, surveys, and polls to engage with a variety of stakeholders in its climate planning processes. This first round of stakeholder engagement included three community workshops, two youth-centered town halls, and four stakeholder meetings with the purpose of receiving feedback from the community regarding the CAP's development.

During March and April 2021, the City organized five meetings with department heads to gather information on existing efforts to reduce GHG emissions. The GTSI team also inquired about willingness to engage in certain sustainability projects related to the specific department. GTSI incorporated internal stakeholder feedback into a CAP strategies memo, which City departments reviewed and provided further feedback on. This feedback has been incorporated into the CAP to ensure all strategies listed are actionable and accomplishable for Carmel.

A.1 Community Workshop Series

The Climate Fellow organized and facilitated three community workshops during the week of May 11, 2020. The workshops held on May 13, May 14, and May 17 were announced in a City press release on May 11, 2020. The City partnered with a local nonprofit, Carmel Green Initiative, to promote the workshops via their social media channels. In addition, direct email invitations were sent to stakeholders with virtual flyers and description sheets attached. Stakeholders were encouraged to use these documents as additional promotional material to post on their social media accounts.

A total of 35 people attended the community workshops. Attendees included representatives of local businesses, environmental nonprofits, city and county government agencies, elected officials, churches, and schools.

To register for the workshop, participants were asked to complete a Google survey, which asked for basic demographic information and gauged their level of concern and interest about climate change. The results of this pre-workshop survey included:

- 100 percent of the survey participants indicated they are familiar with the concepts and background of climate change;
- 91 percent of respondents indicated that climate change poses a threat to the local community; and
- 77 percent of respondents indicated they had been personally impacted by climate change.

When asked to indicate the aspects of the Carmel CAP that were most important to them, the top five most frequently mentioned priorities were sustainability (86 percent), energy efficiency (80 percent), greenhouse gas emissions reductions (77 percent), environmental stewardship (54 percent), resilience (46 percent), social prosperity (46 percent), and community empowerment (46 percent). Workshop registrants offered a variety of explanations for attending the community workshops; generally, explanations offered were related to a desire to contribute to planning efforts and to effect change (46 percent of respondents) or a desire to learn (34 percent of respondents).

Among survey respondents who provided demographic information, 58 percent of the individuals identified as female, and 42 percent identified as male, which is roughly consistent with the Carmel population as a whole. The age of workshop participants was roughly consistent with the population of Carmel as a whole, although individuals between the ages of 55-74 were overrepresented at the workshops

relative to the Carmel population. The initial survey results suggested community workshop participants were knowledgeable about climate change and concerned about its impacts on the community.

Each session had the same format with the purpose of educating the community about the CAP's development and assessing what the community values and priorities were regarding climate action. Each workshop began with a presentation containing information about climate change, including information on the enhanced greenhouse effect, statewide and local climate impacts, background information on a climate action planning and the Carmel greenhouse gas inventory results. The Climate Fellow also asked workshop participants to respond to four Zoom poll questions. The first poll asked participants to indicate what environmental stewardship activities they already take part in at their home or business. This was a multiple-selection question where participants could select as many responses as applied to them. The results of the first poll are shown in Table 3.

Table 3: "What activities do you already take part in at home or in your business?"

Climate Action	Workshop 1	Workshop 2	Workshop 3	Overall
Waste reduction and diversion (e.g., recycling and composting)	94%	93%	93%	93%
Energy conservation (e.g., LED lighting, energy efficient practices, renewable energy procurement, etc.)	100%	87%	87%	91%
Sustainable transportation (e.g., walking/biking when possible, fuel-efficient vehicles, electric vehicles, etc.)	76%	60%	73%	70%
Sustainable food procurement (e.g., meat-reduced diets, local food purchasing, etc.)	76%	53%	60%	63%
Water efficiency (e.g., rain barrels, efficient appliances, etc.)	65%	60%	60%	62%

As Table 3 shows, waste reduction and diversion and energy conservation were the two activities that the majority of workshop participants are already engaging in. Sustainable food procurement and water efficiency practices were less commonly practiced by workshop participants.

The second community workshop poll question asked: "What are your top considerations in regard to pursuing sustainable initiatives?" This was also a multiple-selection question and allowed participants to select more than one answer. The results are shown in Table 4.

Table 4: "What are your top considerations in regard to pursuing sustainable initiatives?"

Initiative Consideration	Workshop 1	Workshop 2	Workshop 3	Overall
Cost (e.g., "how will we pay for it?")	31%	50%	57%	46%
Urgency (e.g., "bold action is needed now.")	81%	56%	79%	72%
Feasibility (e.g., "implementation of these initiatives may be challenging.")	69%	61%	93%	74%

Initiative Consideration	Workshop 1	Workshop 2	Workshop 3	Overall
Limitation of Free Choice (e.g., "I don't want to feel forced by policies/regulations.")	6%	11%	7%	8%
Importance (e.g., "I don't understand why these actions are necessary.")	6%	17%	36%	20%

"Urgency" and "feasibility" were the two top considerations for workshop participants, whereas "limitation of free choice" and perceived "importance" were the lowest concerns with regards to pursuing sustainable initiatives. These poll results indicate that participants are more concerned about climate strategies that can quickly and reasonably reduce GHG emissions.

The third poll question asked: "In your opinion, how can the City of Carmel best support community initiatives?" Participants were asked to select their top three choices. This question was posed differently in the first workshop than it was for the final two workshops. Table 5 shows results for the first workshop and Table 6 through Table 9 show the results for the last two workshops, which asked for topic-specific responses.

Table 5: "In your opinion, how can the City of Carmel best support community initiatives?" [Workshop 1]

Initiative	Percent Support
Providing incentives to homeowners and businesses	70%
Adopting Regulations and Policies	52%
Setting the example by implementing initiatives at local government level first	40%
Create opportunities to make sustainable actions a part of Carmel community culture	40%
Engage with the business community and encourage sustainable business actions	34%
Create programs for all community members to learn about climate change and how to make sustainable choices	32%
Providing climate change and sustainability education in local schools	24%
Create outreach campaigns that align closely with the values of the Carmel community	12%

The majority (70 percent) of participants indicated that providing incentives to homeowners and businesses is an important way for Carmel to support community initiatives. Adopting regulations and policies (52 percent), setting a positive example (40 percent), and creating opportunities to make sustainable actions part of Carmel culture (40 percent) were the next most frequently supported actions in Workshop 1.

During the last two workshops, the workshop focus was narrowed to sector-focused solutions the community would support the most. The results of the Zoom poll surveys may be found in Table 6 through Table 9.

- For the energy sector (Table 6), the most frequently recommended initiatives were renewable energy procurement at the local government and community level (67 percent) and requiring home builders to consider renewable and alternative energy in the planning and designing of new buildings (66 percent).

- For the transportation sector (Table 7), the most frequently recommended initiatives were increasing electric vehicle infrastructure (56 percent) and developing off-road bike lanes (52 percent).
- For the waste sector (Table 8), the most frequently mentioned initiative was offering curbside compost pickup available to all residents and businesses (62 percent).
- For the water sector (Table 9), the most frequently recommended initiatives were encouraging developers to implement rainwater capture systems (76 percent) and implementing water conservation technology, such as grey water capture (59 percent).

Table 6: "In your opinion, how can the City of Carmel best support community initiatives in terms of energy reduction and efficiency?" [Workshops 2 and 3]

Action	Percent Support
Renewable energy procurement at local government and community level	67%
Require homebuilders to consider renewable and alternative energy in the planning and designing of new buildings to enable low-cost future installation	66%
Education and assistance on how to access renewable energy options for homeowners/businesses	37%
Offer free or reduced-cost building inspections and permit fees for new home construction and home retrofits that attain State Building Code energy performance standards or better	34%
Encourage landowners to plant trees or otherwise shade the south side of their homes	21%

Table 7: "In your opinion, how can the City of Carmel best support community initiatives in terms of transportation?" [Workshops 2 and 3]

Action	Percent Support
Increase electric vehicle infrastructure	56%
Develop off-road bike lanes	52%
Implement public transit	41%
Decrease the amount of parking available at locations easily accessible by public transportation, biking, and walking	10%
Provide more bike safety education for the community	9%

Table 8: "In your opinion, how can the City of Carmel best support community initiatives in terms of solid waste reduction?" [Workshops 2 and 3]

Action	Percent Support
Offer curb-side compost pickup available to all residents and businesses	62%
Support non-profit, private and charity sectors that take leftovers or unsold produce from businesses to be used in other locations, such as food banks	37%
Education on how to reduce waste and divert properly	30%

Action	Percent Support
Implement a community-wide waste tracking program to develop a baseline of waste volumes, composition, and diversion rates	24%
Ban yard trimmings from city waste stream	17%

Table 9: "In your opinion, how can the City of Carmel best support community initiatives in terms of water conservation?" [Workshops 2 and 3]

Action	Percent Support
Encourage developers to implement rainwater capture systems	76%
Implement water conservation technology, such as grey water capture	59%
Education on water efficiency and how to reduce water consumption in homes and businesses	24%
Retrofit water appliances to be more efficient (i.e., showers, toilets, etc.)	21%
Partake in residential rain barrel incentive program (currently offered by the City of Carmel)	14%

A.2 Youth Climate Townhalls

Since children will be most adversely impacted by climate change, the City wanted to ensure young people would be represented in the CAP development. Two youth town halls were led by the City of Carmel Climate Fellow in partnership with Helping Ninjas, a local youth-centered environmental group on July 28, 2020 - one for children ages 12 and younger and the other for ages 13 and older. The Climate Fellow emailed several local organizations to promote the townhalls and included a virtual flyer and written content for the organizations to share on their social media channels.

12 and Younger Townhall

Approximately four individuals attended the 12 and younger meeting and were posed one poll question in the form of a series of "When I Grow Up…" prompts in which the youth attendees selected yes, maybe, or no to a range of activities they would be interested in participating in when they grow up (e.g., plant trees, recycle and compost, etc.).

100 percent of respondents indicated that when they are adults, they would likely engage in the following activities:

- Plant trees and flowers in their yard
- Recycle and compost
- Talk to their peers and community leaders about "standing up for our planet!"
- Visit parks and appreciate nature
- Teach others about what they have learned about caring for our environment

75 percent indicated they would likely engage in the following activities, while the remainder said no or maybe:

- Walk or bike to reduce car use
- Drive an electric vehicle
- Use a rain barrel

Less than 75 percent indicated they would likely engage in the following activities:

- Use solar panels on their home
- Grow food in a backyard garden

13 and Older Townhall

Eleven individuals attended the 13 and older group and were posed one poll question: "How do you practice sustainability?" The question was presented in a multiple-selection format and attendees could select as many answers as applied to them. Table 10 shows a breakdown of their responses.

Table 10: "How do you practice sustainability?"

Answer choice	Percent of attendees
Waste reduction and diversion	82%
Volunteering for my community	73%
Working with parents, schools, and leaders to make our planet better	73%
Educating myself and learning more about these topics	73%
Sustainable food	55%
Water efficiency	55%
Sustainable transportation	55%
Energy conservation	45%

At the end of the 13 and up townhall, the Climate Fellow posed a question in the Zoom chat inquiring about what the focus of the City of Carmel CAP should be and responses varied from renewable energy/solar, recycling, sustainable food sources, conservation, and wiser consumer choices.

The poll results from both townhalls indicate that the youth who attended are well aware of environmental issues and are already engaging in sustainability-related activities in their daily lives. Given that the workshop was run in partnership with an organization that specifically works with young people who are concerned about the environment, the poll results are not necessarily representative of the entire youth population in Carmel.

As demonstrated by these youth townhalls, when considering initiatives, it is important that the City of Carmel involve interested youth where possible as there is a clear interest in community engagement in all sectors of sustainability among Carmel youth.

A.3 Stakeholder Meetings

The City of Carmel Climate Fellow organized and facilitated four virtual stakeholder meetings from October 8 - October 15, 2020. A total of 25 stakeholders participated in the stakeholder meetings.

Participants included representatives of City departments and commissions, including Planning and Zoning, Utilities, Parks and Recreation, Building and Code Services, Urban Forestry, Community Services, Transportation, and the Human Relations Commission. Several local environmental and social organizations participated in the meetings as well, including Helping Ninjas, Carmel High School Green Action Club, OneZone, Carmel Clay Schools Green Team, and Carmel Against Racial Injustice. A representative from the local utility provider, Duke Energy also participated in one meeting.

Each meeting was conducted using a similar format. The Climate Fellow began each stakeholder meeting with a presentation on basic information on climate change drivers, statewide and local climate impacts, a summary of the Carmel GHG inventory results, and updates on CAP progress. Stakeholders were also posed two poll questions at the beginning of each meeting.

The cumulative poll results from the stakeholder meetings indicate that most stakeholders (76 percent) view Carmel as a sustainability leader. Stakeholders noted that Carmel is particularly a leader at the state level but has room for improvement when compared to the United States as a whole, especially in sustainable energy and transportation. Participants in the stakeholder meetings indicated the best ways that the City can support community sustainability initiatives are by "providing incentives to homeowners" (70 percent) and setting the example at the local government level (60 percent). Complete responses to each question are summarized in Table 11 and Table 12.

Table 11: "Please rate your personal response to the following statement: Carmel is a leader in sustainability efforts"

Answer	Percentage
1 – Strongly disagree	0%
2 – Disagree	12%
3 – Neutral	12%
4 – Agree	56%
5 – Strongly agree	20%

Table 12: "In your opinion, how can the City of Carmel best support community initiatives?"

Answer	Percentage
Providing incentives to homeowners	70%
Setting the example by implementing initiatives at local government level first	60%
Adopting regulations and policies	55%
Providing climate change and sustainability education in local schools	30%
Engage with the business community and encourage sustainable business	30%
Create opportunities to make sustainable actions a part of Carmel community culture	20%
Create programs for all community members to learn about climate change and how to make sustainable choices	15%

Following the presentation and initial polling questions, the Climate Fellow facilitated a discussion and posed the following questions in each meeting:

- What is your vision for a more sustainable Carmel?
- If you could choose one initiative/focus for Carmel's Climate Action Plan, what would it be?
- What barriers or resources are necessary in realizing your sustainability vision for Carmel?

Afterwards, the Climate Fellow showed stakeholders CAP case studies from Evanston, IL and Indianapolis, IN and asked them for their thoughts regarding how each of these case studies might be relevant to Carmel. She then showed stakeholders proposed Carmel emissions reduction goals along with potential climate actions for transportation, energy, solid waste, water/wastewater, and miscellaneous actions and asked for participants' initial thoughts. Finally, she asked for feedback on the proposed actions and gave space for attendees to share any final comments, suggestions, and questions.

Some priorities discussed during the stakeholder meetings included have City leadership set the tone for the rest of the community, the role of education in bringing climate action to the forefront, focusing on strategies for the transportation and energy sectors which are the biggest contributors to greenhouse gas emissions, ensuring that all community members benefit from the CAP, engaging the entire business community – from small businesses to large corporations, sustained and inclusive community engagement, establishing realistic goals, and coordinating planning efforts with Duke Energy.

Some specific initiatives discussed during the stakeholder meetings included regulation to manage energy usage, increasing usage of clean and renewable energy, requirements for energy efficiency and renewable energy usage in city buildings, extension of the Red Line and other mass transit options, residential composting, and creation of a sustainability curriculum for Carmel schools. Some potential barriers to action discussed were funding, political will, convincing community members of the climate challenge, and addressing GHG emissions associated with business travel to Carmel.

Key quotes and statements made by stakeholder meeting participants that express priorities that the City should consider and/or pursue are itemized below, as well as key takeaways from the stakeholder meetings as documented by session facilitators.

Quotes and Statements

- "Carmel is not doing everything in their power…they must be a leader at the local government level…city leadership sets the tone for the rest of the community."
- "[The most important piece] is education about protecting our environment…[and] bringing this issue to the forefront."
- "[When creating actions, it is essential to] focus on the biggest contributors, such as transportation and energy."
- "[It is essential to prioritize] implementing regulation to effectively manage energy use."
- "[The success of actions are dependent on] funding and political will of residents."
- "100% renewable electricity supply is a great goal for Carmel."
- "[In the transportation conversation, we must] take into account how we have more people commuting in than out as a result of the many business headquarters here."

- "[For business community engagement], working with small businesses (their organizations and employees), as well as larger corporations, is key."
- "Hurdle: convincing people that there is a problem but by doing this, sustainability then becomes a priority."
- "Electricity must be clean."
- "Set realistic goals, communicate to the public, make sustainability a priority…establish sustainability as prominent value."
- "Making sure that all members of the community will benefit from this by engaging with them and gathering feedback."
- "I'd like to see all new City buildings be required to meet certain energy efficiency goals or renewable energy goals."

Key Stakeholder and Community Interests

- Extending the Redline and other local/regional mass transit options.
- Focusing on energy reduction, efficiency, and procurement from renewable sources.
- Promoting composting programs in residential areas.
- Working with small businesses, organizations and employees, as well as larger corporations.
- Implementing classes, curriculum, or discussion surrounding sustainability at Carmel's schools.
- Based on youth responses, students are aware of the issues, but have to take initiative as far as getting involved.
- Carmel Clay Schools investment in solar energy.
- Ensuring that community education, outreach, and engagement is a priority of the plan.
- Commercial energy decreased between 2015 and 2018 -- what is the Carmel business community doing that can translate to the residential level?
- The greatest asset: schools and having conversations with school administrators.
- Changing the culture -- getting the school district more involved in sustainability efforts.
- Being intentional with diversity, inclusion, representation, and equity.
- Staying updated with Duke (as well as other energy providers) as far as their initiatives and future goals that translate to Carmel's energy procurement. For example, at the stakeholder session, a Duke representative shared insight on the Integrative Resource Plan (IRP) and their corporate goals of 50 percent reduction by 2030 and net zero by 2050 and how Duke is open to every possibility/alternative to help them reach those goals.
- Sustainability as a priority at the local government which then translates to the community.
- There was an overall general interest in renewable energy procurement, education and assistance on procuring renewable energy options, as well as education on waste reduction and proper diversion.

Appendix B. Existing Climate Strategies in Carmel

This appendix itemizes our understanding of the City of Carmel's and Hamilton County's existing strategies that already contribute to improved sustainability and reduced GHG emissions. In some cases, the CAP strategies may build upon or expand existing strategies.

- **Sustainability recognition program for businesses and organizations:** The Carmel Green Award recognizes Carmel organizations for environmentally friendly practices.
- **Carmel Clay Schools Green Team:** The Carmel Clay Schools Green Team is a nonprofit comprised of parent representatives from each Carmel Clay school that meets monthly to share ideas and support environmentally friendly practices and sustainability efforts at each school.
- **Carmel Green Initiative**: According to their website, the "Carmel Green Initiative is a coalition of citizens and community groups who promote and support the City of Carmel's commitment to reducing our impact on the environment and meeting the climate challenge."[26] The organization's goal is to reduce energy usage and increase efficiency, promote renewable energy, and educate the public on sustainability efforts.
- **Helping Ninjas, Inc.**: Helping Ninjas is a student-led nonprofit that works to engage youth in different ways to help the planet while enhancing their social and interpersonal skills.
- **Initiatives on energy efficiency and renewable energy in buildings**: Objectives 2.1 and 7.1 of the Comprehensive Plan are to explore use of alternate sources of energy such as active solar and commit to high architectural energy efficient and environmental design standards for all municipal buildings and facilities, respectively. Additionally, the City is in the process of creating an energy benchmarking program that will require large buildings to publicly report energy usage on an annual basis. The Fire Department has completed numerous building projects including a new maintenance and training center and a fire station, that all utilize energy and water efficient practices such as low-flow toilets and urinals. The Brookshire Golf Course utilized LEED building principles but did not undergo LEED certification due to costs of project certification. In early 2021, the Information Technology Department upgraded their cooling equipment to become more energy efficient and effective.
- **Green Building Checklist and encouraging sustainable construction materials:** The Department of Community Services has a Green Building Checklist it shares with developers, who choose green building practices they are able to implement in their projects. Furthermore, Strategy 7.1 of the Comprehensive Plan calls for the encouragement of durable materials and construction methods that prolong the life of buildings.
- **Ongoing LED installation on all municipal properties**: A 2010 executive order (JB-2010-2) called for all failing bulbs to be replaced with LED lighting. All streetlights, holiday lights, and lights in city-operated buildings are already, or in the process of, being converted to LED.
- **Parks and Recreation Monon Community Center:** In constructing the Monon Community Center, the Parks department took extra steps to ensure the building incorporated energy efficiency

[26] Carmel Green Initiative, n.d., *About Carmel Green Initiative*, http://carmelgreen.org/index.php?option=com_content&view=article&id=13&Itemid=2

and other sustainability best practices. Many building materials were sourced locally, and they utilized bamboo flooring, which is a renewable resource. Also, the HVAC system is energy efficient.

- **Water and Wastewater Utility Solar Projects:** Water and Sewer Utility has a 1-megawatt solar project that is partially online. Part of the project is located at the main water treatment facility and the other is on Hazel Dell Parkway. They also have another solar project that will generate ¾ of a megawatt, which will power the water distribution building. That project is slated to be online by 2024. A third solar project will cover between two and three parking garages and is still in the planning phase.
- **Municipal hybrid fleet purchasing policy:** The City has a hybrid fleet purchasing policy that requires all new City vehicles purchased be hybrid when feasible.
- **Promoting use of hybrid and electric vehicles**: By December 2021, the Police Department plans to have replaced 2/3 of its fleet with hybrid vehicles. The City has also installed two electric vehicle charging stations at downtown parking garages and plans to install more EV charging stations in the future. In early 2021, the City was awarded an $18,000 grant from the Indiana Department of Environmental Management to install two new EV level 2 charging stations.[27]
- **No idling policy for City employees**: In 2008, the City implemented a no-idling policy for all city employees. The Police Department emphasizes the no-idling policy and many of its hybrid fleet vehicles shut down automatically during idling.
- **Objective to construct intracity public trolley or bus system and commuter line**: The Comprehensive Plan calls for a low-cost intra-city bus or trolley system, which will enable residents and visitors alike to access local amenities without needing a private vehicle. A trolley system can attract tourists to Carmel, which will boost the local economy, while reducing air pollution. The Comprehensive Plan also calls for the development of a commuter line, similar to a light rail or people-mover system that goes directly to downtown Indianapolis.
- **Other relevant Comprehensive Plan Transportation Strategies**: The following strategies from the Comprehensive Plan call for the enhancement of sustainable transportation, promotion of alternative forms of transportation such as biking and walking, and creation of neighborhood support centers to centralize community resources.
    - Objective 2.5: Enhance a bicycle- and pedestrian-connected community through expanded installation of multi-use paths, sidewalks, bike lanes, and off-street trails. It is well established that many of the moderate-sized leading-edge cities in our nation are bicycle and pedestrian friendly communities. Carmel believes that the further establishment of bicycle and pedestrian facilities will result in increased mobility, further enhance quality of life, and be greatly appreciated by Citizens.
    - Objective 4.5: Consider and encourage "third places" (informal meeting places or the social surroundings which are separate from the two usual environments of home and workplace) and neighborhood support centers as building blocks for neighborhoods. Every trip to the store should not be a mandatory drive in a car. Residents should be able to access daily goods and services by walking or bicycling, thereby having the opportunity to conserve energy, improve health, and protect the environment. The City should embark on a "corner

[27] City of Carmel, 8 January 2021, Carmel Receives EV Charging Station Grant, https://www.carmel.in.gov/Home/Components/News/News/6378/25

store" initiative to define the best locations and distribution of neighborhood support centers.

- Objective 5.4: Enhance the Monon Greenway to support and further encourage its use as a non-motorized commuter route by widening and separating bicyclists and pedestrians in the most heavily used areas. Also, actively plan and implement a system of feeder/branch trails and paths to allow more convenient and safe connection to nearby residential and employment areas.
- Objective 5.5: Adapt the Monon Greenway and adjacent development between City Center and the Arts and Design District into an urban trail destination with its own character and sense of place.
- Objective 6.6: Enable healthy choices through the use of innovative design and planning. For instance, provide pedestrian access to parks, recreation, schools, the workplace and amenity centers so that people do not have to use their cars. Also, designing structures to capture natural light and air enhances healthy lifestyles.
- Objective 7.3: Develop a bicycle network to allow non-vehicular trips to be made

- **Expansion of roundabouts and multi-modal trails**: The City of Carmel Engineering Department has plans for $60 million in capital infrastructure projects. These funds are spent to continue the expansion of the city's 140 roundabouts by continuing the conversion of traditional intersections to reduce emissions from idling. These capital projects are also being used to expand the city's multi-modal infrastructure. In addition, the Engineering Department works with private developers in Carmel to ensure they build pedestrian facilities near their buildings to complement city investments nearby.
- ***Bike Carmel*** **Initiative**: The *Bike Carmel* initiative promotes bicycling with various bike-centered events throughout the year, such as Family Fun Rides and Coffee of the Monon. The *Bike Carmel* initiative also promotes the Monon Greenway and the Carmel Access Bikeway, which is a network of bike paths and trails throughout Carmel.[28]
- **Fuel Efficient Vehicles and Equipment:** The Street Department, the Parks and Recreation Department, the Fire Department, and the Police Department have all started transitioning their vehicles and equipment to more fuel-efficient vehicles.
- **Enhanced wastewater treatment effectiveness**: The Water and Sewer Utility uses anaerobic digestors and reuses 50-60 percent of gas to heat sludge and for other minor uses. They are currently working to find other ways to use excess gas such as to power vehicles or to put back in the pipeline. The Comprehensive Plan also calls for the master plans of sanitary sewer districts to be combined to increase wastewater treatment effectiveness.
- **Reclaimed water system:** The Parks and Recreation Department has a reclaimed water system that collects greywater, stormwater, and water from splash pads, via bioswales, which is eventually emptied into a lagoon.
- **Rain gardens on municipal properties**: There are rain gardens on several municipal properties, which help retain stormwater using nature based solutions.

[28] City of Carmel, n.d., Bike Carmel, https://www.carmel.in.gov/living/fun-things-to-do/bike-carmel

- **Stormwater fee**: The City of Carmel Engineering Department charges a fee to all properties (residential and non-residential) in Carmel. The fee creates a dedicated source of funding for City drainage projects, storm sewer maintenance, storm water program, and new storm sewer construction.[29]
- **Hamilton County Soil and Water Conservation District Backyard Conservation Program:** The Hamilton County Soil and Water Conservation District Website provides significant resources on conservation practices through their Backyard Conservation Program.
- **City promotion of water saving devices:** The Comprehensive Plan Objective 7.4 calls for the City to "encourage the use of water-saving devices and request that citizens reduce water consumption by proper ("smart") lawn sprinkling and exploring alternative landscapes which require less water."
- **Recycling and Lend-A-Bin Program**: Through its contract with Republic Services, the City offers a curbside residential waste and recycling program to all residents. All city buildings and sponsored events also offer recycling. The Carmel Green Initiative also runs the Lend-A-Bin program where people can rent recycling bins for events.
- **Paperless City departments:** Many City departments including the Police Department, Department of Community Services, and Street Department have transitioned away from paper systems to electronic systems.
- **Plots to Plates Community Garden program:** This program, spearheaded out of Carmel Schools Green Teams, is a 98-plot community garden.[30] Each 4' x 15' plot can be rented for $15/year. The community garden includes demonstration gardens, including a rain garden, pollinator garden, compost system, and a water catchment system with rain barrels that are maintained by Master Gardeners. In addition, Master Gardeners help with public education efforts by assisting with school field trips and regular events. Excess food is donated to the Merciful Help Center and the Carmel United Methodist Church Food Pantry.
- **The Hamilton County Garden Network:** The Hamilton County Garden Network (HCGN) is an initiative of the Hamilton County Soil and Water Conservation District that encourages sharing of gardening knowledge within the community. The HCGN Website maintains a list of all community gardens in Hamilton County, including six in Carmel: Carmel Woods Community Garden, Carmel United Methodist Church Food Pantry Garden, the Gleaning Garden, Plots to Plates, St. Christopher's Crops, and Inglenook Cottages Community Garden. The Gleaning Garden, Carmel United Methodist Church, Plots to Plates, and St. Christopher's Crops donate excess food to local food pantries.
- **Parkland preservation**: A significant portion of the 550 acres of City-managed parkland is preserved as natural areas.[31] Carmel Clay Parks and Recreation maintains numerous public parks, and it was the first park system in the state to be certified as habitat and wildlife friendly by the Indiana Wildlife Federation. Carmel Clay Parks and Recreation maintains 15 public parks with 4 greenways with many planned upgrades for 2021. Furthermore, native and drought-resistant

[29] City of Carmel, n.d. *Storm Water Fee*, https://carmel.in.gov/department-services/storm-water-management/storm-water-fee

[30] Purdue University Extension, n.d., *Carmel Clay Community Garden Plots to Plates*, https://hcmga.org/public-education/carmelclay-community-garden-plots-to-plates

[31] Carmel Clay Parks and Recreation, n.d. *Parks and Greenways*, https://www.carmelclayparks.com/parks-greenways/#trails

plantings are emphasized in these public parks. They are also in the process of mapping habitat zones using Geographic Information System (GIS). Also, 11.5 acres of the Brookshire Golf Course is designated naturalized land, which is used as buffers, wildlife refuge, and carbon sequestration. Additionally, a portion of the 11.5 acres is designated wetlands.

- **Food donation programs:** There are multiple programs that facilitate donations of excess food from catering, prepared foods, and produce from grocery stores to food banks and pantries. This program reduces food waste and provides food to food insecure Carmel residents. Bread of Life Pantry, Carmel Friends Church Food Pantry, Carmel United Methodist Food Pantry, Merciful Help Center's Food Pantry, and Second Helpings are all active in Carmel.
- **Carmel Clay Parks and Recreation conservation education and planning**: CCPR incorporates education at their parks, promotes the importance of natural resources, as well as conservation practices. They offer after school programming, volunteer opportunities, and have an adopt-a-park program. CCPR also has numerous internal plans to help maintain natural resources.
- **Street Department Mower Replacement:** The Street Department is currently working to replace a portion of their propane mowers with electric ones.
- **Formal Commitments to addressing climate change:** The City of Carmel joined the Global Covenant of Mayors, Resilient Communities for America, and the Mayors National Climate Action Agenda.
- **Street Trees.** Based on its street tree inventory, Carmel has 31,000 street trees planted in its corporate boundary. Each year, the City Council appropriates $195,000 for new plantings.

Appendix C. URLs for Listed Resources

Public Education

- Project Drawdown: https://www.drawdown.org/
- Carmel Green Initiative: http://carmelgreen.org/index.php?option=com_content&view=article&id=13&Itemid=2
- Earth Charter Indiana: https://www.earthcharterindiana.org/
- Helping Ninjas Inc.: https://helpingninjas.com/
- Indiana Forest Alliance: https://indianaforestalliance.org/

Buildings and Energy

- Duke Energy's Clean & Smart opportunities page: https://www.duke-energy.com/home/smart-energy
- Duke Energy's Power Manager Program: https://www.duke-energy.com/home/products/power-manager
- Duke Energy's Flex Savings Options pilot program: https://www.duke-energy.com/info/unindexed/rates/inflexoption
- Solarize Hamilton County: https://carmelgreen.org/index.php?option=com_content&view=article&id=366:solarize-hamilton-county-2019-&catid=25:cgi-evemts&Itemid=40
- The two-basin method of washing dishes: https://news.umich.edu/fighting-climate-change-at-the-sink-a-guide-to-greener-dishwashing/

Transportation

- CIRTA Commuter Connect: https://commuterconnect.us
- Hamilton County Express: https://www.cirta.us/county-connect/transportation-resources/hamilton-county-express/
- Prime Life Enrichment Transportation: https://primelifeenrichment.org/transportation/

Water and Wastewater

- Clear Choices Clean Water website: https://clearchoicescleanwater.org/#how-it-works-1
- EPA WaterSense labeled products: https://www.epa.gov/watersense/watersense-products
- Duke's Free Home Energy Assessment: https://www.duke-energy.com/home/products/home-energy-house-call
- Checklist to detect water leaks: https://www.epa.gov/sites/default/files/2017-02/documents/ws-ourwater-detect-and-chase-down-leaks-checklist.pdf
- Carmel Rain Barrel Cost Share Program: https://carmel.in.gov/government/departments-services/engineering/storm-water-management

Solid Waste

- Hamilton County Household Hazardous Waste page: https://www.hamiltoncounty.in.gov/262/Household-Hazardous-Waste
- Earth Mama Compost: http://earthmamacompost.com/
- Indiana Recycling Coalition's Food Scrap initiative: https://indianarecycling.org/food-waste-composting/
- Video about composting as a climate solution: https://outrider.org/climate-change/articles/backyard-composting-large-climate-solution/
- Tips to reduce food waste: https://www.fda.gov/food/consumers/tips-reduce-food-waste
- Learn how to read the recycling labels: https://how2recycle.info/
- The City of Carmel Trash and Recycling Program page: https://carmel.in.gov/department-services/utilities/trash-recycling-program
- Learn Republic Services' recycling best practices: https://recyclingsimplified.com/
- Watch The Story of Plastic documentary: https://www.storyofstuff.org/movies/the-story-of-plastic-documentary-film/how-to-watch/
- Read 101 Ways to Go Zero Waste by Kathryn Kellogg: https://www.amazon.com/101-Ways-Go-Zero-Waste/dp/168268331l/ref=as_li_ss_tl?ie=UTF8&linkCode=sl1&tag=goizerwas-20&linkId=64d1fb658a2a77ab9e441c62f19c9c5a&language=en_US
- Kathryn Kellogg's website: https://www.goingzerowaste.com/

Local Food and Agriculture

- Carmel Farmers Market: https://www.carmelfarmersmarket.com/
- Community Sourced Agriculture program list website: https://www.localharvest.org/search.jsp?map=1&lat=39.867992&lon=-86.10802&scale=9&ty=6&zip=46220
- Indiana Grown: https://www.indianagrown.org/
- The Hamilton County Garden Network website: https://www.hamcogardennetwork.org/
- Carmel Fire Department's Community Assistance Program: https://www.carmel.in.gov/department-services/fire/department-activities-events/community-assistance-program

Greenspace

- Guide for where to plant trees to maximize shading: https://www.arborday.org/trees/climatechange/summershade.cfm
- Tips for correctly planting trees: https://www.extension.purdue.edu/extmedia/fnr/fnr-433-w.pdf
- Tips for native plant landscaping: https://www.almanac.com/why-more-gardeners-are-growing-native-plants
- Certified Wildlife Habitat classification website: https://www.nwf.org/Garden-for-Wildlife/Certify
- Volunteer page for the City of Carmel Parks and Recreation Department: https://www.carmelclayparks.com/volunteer/