

MAY 2021

CITY OF GOSHEN

CLIMATE ACTION PLAN FOR GOVERNMENT OPERATIONS



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ACKNOWLEDGEMENTS

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This plan was developed with support from the Resilience Cohort, a program offered by the Environmental Resilience Institute (ERI). ERI is an initiative of Indiana University as a part of the Environmental Grand Challenge.



This plan was developed with support from ICLEI USA in partnership with the Resilience Cohort.

ABBREVIATIONS

ABBREVIATION	TERM
BAU	business-as-usual
CAP	climate action plan
CO ₂ e	carbon dioxide equivalent
EPA	Environmental Protection Agency
EV	electric vehicle
g	gram
GHG	greenhouse gas emissions
GW	gigawatt
GWh	gigawatt hours
GWP	global warming potential
HVAC	heating, ventilation, and air conditioning
kg	kilogram
kW	kilowatt
kWh	kilowatt hour
l	liter
lb	pound
LED	light-emitting diode
LEED	Leadership in Energy & Environmental Design
LFG	landfill gas
LGOP	Local Governmental Operations Protocol
CH ₄	methane
MG	million gallons
MMBTU	million British thermal units
MT	metric ton
MTCO ₂ e	metric tons of carbon dioxide equivalent
MW	megawatt
NIPSCO	Northern Indiana Public Service Organization
N ₂ O	nitrous oxide
ppm	parts per million
PV	photovoltaic
SMP	sustainability master plan
VFD	variable frequency drives
WCP	water conservation plan

To Members of Goshen City Council and the Goshen Community,

Almost 200 years ago, Goshen was founded with a name many people recognized as synonymous with prosperity and abundance. Situated in a landscape of rich soils, vibrant forests, and plentiful water, Goshen thrived. Today, we continue to thrive, mixing industrial ingenuity with digital dynamism while growing quality of life rooted in our natural setting.

There are challenges which our community has to face. Climate change is a challenge unlike any other. It is unique because it is so large – climate affects nearly every aspect of our lives, in subtle ways and obvious ways – and because it is widespread, affecting nearly every place on earth differently. We face the dual challenge of mitigating these changes (lessening their impacts) and adapting to these changes.

We are working hard to understand how the changing climate will affect us and how we should prepare. This Local Government Operations Climate Action Plan for the City of Goshen is our first attempt to name the challenge before us and describe how we want to meet the challenge. We know that our understanding of the climate challenge will change over time, requiring that our responses also change and adapt. This fluid reality may be one of the most difficult dynamics of climate change. For that reason, it is important to understand that this Climate Action Plan is a living document intended to be reviewed and revised.

The challenges in this document are real, and we intend to move our operations to net zero emissions by 2035: from reimagining the way we manage grounds and landscaping to shifting our vehicles away from fossil fuels toward electricity; from auditing and inventorying the

energy we use in our offices and buildings, to investing in solar and renewable energy; from planting and caring for trees, to finding humane operating efficiencies. Making these adaptations will stretch us and require patience and creativity. Above all, it will take all of us working together to build a city government that does three essential tasks: 1) operate with fiscal responsibility, 2) tend a healthy and sustainable ecosystem, and 3) care equitably for our employees and our residents.

This Climate Action Plan for Goshen’s government operations is our opportunity to respond to our youth, who asked us in the 2019 Youth Environmental Resolution to “work to achieve carbon neutrality by 2035 and take all appropriate actions to do so”. We want to engage this Climate Action Plan for ourselves, and especially for those who come after us. With this plan, we seek to demonstrate that meeting the challenges of climate change will ensure that Goshen continues to be a place of prosperity and abundance. We will ensure the sustainability of both our community and our budgets. We will ensure our great-great-grandchildren have a community they are proud to call home.



A handwritten signature in blue ink, appearing to read 'JPM', with a long horizontal line extending to the right.

Mayor Jeremy P. Stutsman

(This letter was appropriately finalized on Thursday, April 22, 2021, Earth Day)

MAYOR STUTSMAN AND KID MAYOR CANDIDATES



RESOLUTION 2021-15

City of Goshen Government Operations Climate Action Plan

WHEREAS the City of Goshen Common Council adopted Resolution 2019-19 which called for, *inter alia*, City government operations to achieve a net-zero carbon dioxide emissions goal by 2035 and to create a Climate Action Plan for the City of Goshen.

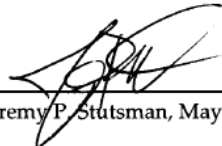
WHEREAS the City of Goshen Environmental Resilience Department has developed a Government Operations Climate Action Plan (a copy of which is attached hereto) that includes nine major carbon dioxide emission reduction strategies.

WHEREAS the City of Goshen seeks to build a city government that: 1) operates with fiscal responsibility, 2) tends a healthy and sustainable ecosystem, and 3) cares equitably for its employees and city residents.

NOW, THEREFORE, BE IT RESOLVED by the Goshen Board of Public Works and Safety that the City of Goshen Government Operations Climate Action Plan is hereby found to contain worthy goals and strategies to reduce the carbon dioxide emissions by the City's government operations.

BE IT FURHTER RESOLVED that the Goshen Board of Public Works and Safety hereby adopts the provisions of the City of Goshen Government Operations Climate Action Plan.

PASSED and ADOPTED by the Goshen Board of Public Works and Safety on 24 MAY 2021.



Jeremy P. Stutsman, Mayor



Michael A. Landis, Board Member



Mary Nichols, Board Member



ELKHART RIVER

EXECUTIVE SUMMARY

CITY OF GOSHEN LOCAL GOVERNMENT OPERATIONS CLIMATE ACTION PLAN

THE 2021 GOSHEN CLIMATE ACTION PLAN FOR LOCAL GOVERNMENT OPERATIONS IS THE CITY'S FIRST ATTEMPT TO REDUCE ITS IMPACT ON THE GLOBAL CLIMATE CRISIS.

Greenhouse gases (GHGs) are essential to life on Earth. These gases provide a shield from the sun's radiation, and they help the Earth retain some of that heat, allowing the planet to exist at a temperature suitable for life to thrive. However, human activity – specifically the releasing of ancient carbon dioxide into the atmosphere by burning fossil fuels – is contributing greenhouse gases at an increasing rate. As a result, the Earth is warming faster than it would naturally, which poses hazards to all life on Earth.

A 2020 study of Goshen's greenhouse gas emissions calculated that 9,396 metric tons of carbon dioxide equivalents were released into the atmosphere by government operations in 2019.

The 2021 Goshen Climate Action Plan for Local Government Operations is the City's first attempt to reduce its impact on the global climate crisis. This plan is also an

attempt to curb the climate change impacts that threaten the City and local community. At its heart, this plan is offered as a map toward equity for all of Goshen's residents, now and into the future, human and non-human alike. Seeking a more fully humane community is in the deepest interest of all.

To achieve these goals, the Environmental Resilience Department presents nine major Emission Reduction Strategies. Each strategy comprises unique programs and goals that will need implementation. After implementation, monitoring efforts should occur to evaluate this plan's efficacy. When sections of this plan appear to be lacking or ineffective, the City should alter its course of action to achieve more desirable outcomes. The sum of these efforts combined with added efforts in future revisions are expected to achieve net-zero emissions by 2035 and increase resiliency across the City and community.

NET-ZERO BY 2035

The Youth Environmental Resolution (i.e., Resolution No. 2019-19) asks for creation of a Climate Action Plan and reduction of emissions to net-zero by 2035. The resolution is non-binding but was passed with bi-partisan support, 6-0, in April 2019. The unique nature of the resolution – crafted and submitted by Goshen high school students and supported by other youth and children of the Goshen community – fills it with an extra-legal urgency and gravity.

Resolution No. 2019-19 also calls for setting short term benchmark goals to track progress towards the main target. By the end of 2026, the City will aim for a 30% reduction of electricity consumption in buildings, a 20% reduction in natural gas consumption in buildings, and 25% reduction in gasoline consumption by the City's fleet.

EMISSIONS REDUCTION STRATEGIES



CITY ANNEX BUILDING

STRATEGY #1 ENERGY MANAGEMENT OF BUILDINGS

A fundamental component of reducing emissions is to reduce energy consumption. The energy used to power government operations (lights, air conditioners, heaters, printers, computers) originates from electricity and natural gas. Energy consumption, consequently, results in the emission

of greenhouse gases. Reducing energy can reduce emissions.

Reducing energy also has monetary benefits. Initial research indicates that the City can expect to save \$65,000 per year in Buildings & Facilities. These anticipated savings result from the goals below.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Conduct energy audits on all City buildings and facilities by 2024.
- **GOAL 2:** Develop a heating and cooling policy relevant to each City operated building by 2022.
- **GOAL 3:** Evaluate landscaping around City buildings and, where needed, develop a plan to maximize shade production.
- **GOAL 4:** Design new facilities with efficient building and energy systems.
- **GOAL 5:** Explore telecommuting and alternative work schedules to reduce resource consumption.



STRATEGY #2 SOLID WASTE MANAGEMENT

The City of Goshen generates two primary forms of solid waste: trash generated by City employees throughout the workday and green waste (leaves and brush) picked up curbside and composted or chipped at the Goshen Environmental Center. The decomposition of these products either in a landfill or in a composting pile generates carbon dioxide.

Lifetime emissions of any product include creating, collecting, or extraction of raw materials, fabrication,

transportation, use, and disposal of a product. Using less can reduce all of these emissions, but reducing one or more of the components in the lifetime emissions sequence can make a difference. An example of this is when the City purchases items made locally, there is a reduction in lifetime emissions. When green waste is composted on the property where it is generated, there are no emissions generated to take it to the Environmental Center.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Review Green Waste processes to innovate reductions in GHG emissions.
- **GOAL 2:** Stock reusable plates and cutlery; buy 20% or better post-consumer or biodegradable food service items when possible.
- **GOAL 3:** Evaluate and implement compost opportunities.
- **GOAL 4:** Develop and adopt policy for waste management protocol, including for regular waste and “universal” waste (e-waste, fluorescent bulbs, etc.).
- **GOAL 5:** Evaluate consumable products using financial and environmental cost-benefit analyses.
- **GOAL 6:** Evaluate current waste removal and recycling contracts for best management practices.



CITY OF GOSHEN PUBLIC EV CHARGING STATION

STRATEGY #3 SUSTAINABLE TRANSPORTATION

Many greenhouse gases are emitted from typical transportation activities. The largest percentage of Goshen's government transportation emissions come from heavy equipment, large trucks, and police operations, with smaller

emission amounts from other regular operations. These combined activities resulted in 1,505 MTCO_{2e}. Increasing sustainable transportation is crucial to reducing Goshen's government emissions.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Fund the adoption of energy efficient light-duty vehicles (including hybrid-electric and electric) to reduce emissions by 25% by 2026.
- **GOAL 2:** Develop and implement gasoline emissions reduction strategy for each Department, resulting in emissions reduction of 25% or mean fuel economy of 27 mpg by 2026.
- **GOAL 3:** Develop strategic plan for municipal fleet electric vehicle charging stations.
- **GOAL 4:** Develop an education and awareness campaign to encourage employee bicycle commuting.
- **GOAL 5:** Work to achieve "Silver Status" as a Bicycle Friendly Community.



STORM DRAIN ART

STRATEGY #4 SUSTAINABLE INFRASTRUCTURE

Pursuing emission reduction goals reveals complex hurdles that require new or improved infrastructure. These supporting systems (roads, streetlights, stormwater, wastewater, and water infrastructure) require on-going maintenance and replacements. A changing climate will require revisions of

policies and standards, such as designing to heavier spring rainfall loads and increase in freeze-thaw events during the winter. Introduction and maintenance of green infrastructures – designed to take advantage of natural systems - will help mitigate impacts from increased precipitation and heat.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Convert more than 95% of streetlights, parking lights, and traffic signals to LED by 2025.
- **GOAL 2:** Evaluate and revise development standards to meet the challenges of climate change impacts.
- **GOAL 3:** Develop and train a green infrastructure maintenance crew.
- **GOAL 4:** Increase the miles of “Complete Streets” to increase safe, low-emissions, high access travel.



UTILITY PROCESSES

STRATEGY #5 UTILITY PROCESSES

The Goshen Water and Wastewater Utility utilizes electricity and natural gas to pump groundwater for water treatment and distribution of drinking water throughout the City and collect and process wastewater. The Utility generates fifty-eight (58) percent of all MTCO₂ emissions in government operations, with most of that energy used to power pumps.

The Utility uses approximately 7,345,718 kWh of electricity and 156,108 therms of natural gas annually,

generating 5,480 MTCO₂ emissions.

Currently, the WWTP is undergoing expansion and efficiency improvements. As a result of those improvements, the wastewater treatment plant is expected to save 1,321,000 kWh annually, equating to 858 MTCO₂. That is a twenty-one (21) percent reduction in emissions at the wastewater treatment plant and a 9.1% reduction of MTCO₂ in overall city emissions.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** continue to encourage and support professional learning opportunities, evaluating new strategies and knowledge sharing.



MONARCH BUTTERFLY CATERPILLAR

STRATEGY #6 SUSTAINABLE LAND USE THROUGH RESILIENT ECOSYSTEMS AND BIODIVERSITY

Protecting and enhancing ecosystems will be a critical factor in the natural environment's success in and around Goshen. Yet, this task is complex and must go beyond individual species to have a meaningful impact. Supporting ecosystems and biodiversity at large will

ensure Goshen continues to enjoy the intrinsic value and economically measurable benefits that the natural environment provides. Preserving floodplain and wetlands and adopting a flood resilience plan responsive to climate science are critical characteristics of sustainable land use.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Develop or update long-term land-use plans for city-owned property.
- **GOAL 2:** Incorporate Canopy Goal objectives and apply appropriate tree maintenance practices on all City properties and rights-of-way.
- **GOAL 3:** Develop City-wide landscape maintenance policies on fertilizer, irrigation, mowing, and other practices, aimed at best sustainable use.
- **GOAL 4:** Incorporate longer-term climate projections as part of land use planning.
- **GOAL 5:** Collaborate with specialists to develop and implement a flood resilience plan.
- **GOAL 6:** Preserve, enhance and acquire existing floodplain.



ELKHART COUNTY COURTHOUSE, DOWNTOWN GOSHEN

STRATEGY #7 TREE CANOPY

Urban forestry is the practice of managing and caring for tree populations in urban settings to improve the built environment. The Goshen Urban Tree Canopy Goal (2019) spelled out an ambitious goal for the City to increase its urban

forest from 22% ground cover to 45% by 2045. Similarly, the goal intends to diversify the City's tree species and adapt to climate change.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Develop an internal policy to protect current city-owned forests.
- **GOAL 2:** Update Urban Tree Canopy Assessment every 5 years.
- **GOAL 3:** Collaborate with landowners to promote long-term protection of forested land.
- **GOAL 4:** Update Tree Ordinance, including policy in support of the Canopy Goal.



SOLAR PANELS AT GOSHEN HIGH SCHOOL

STRATEGY #8 SUSTAINABLE ENERGY

Another key component to reducing emissions from local government operations is to invest in sustainable energy sources. Currently, the City acquires most of its energy from NIPSCO. However, NIPSCO's energy production will continue to generate greenhouse gas emissions for 35% of the energy supplied beyond its commitment to convert to clean energy. By making sustainable energy investments, the City can develop greater energy source diversity and increase its

long-term sustainability while reducing emissions. Converting to clean energy also can result in cost savings as well.

This would allow the City to directly invest in renewable energy. The addition of approximately 5 megawatts of alternative (solar) energy generation would meet the electricity needs of the City if that electricity could be net metered. By making these investments, the City will reduce emissions and save money.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Develop a 5-year plan to begin incorporating energy generation at select sites.
- **GOAL 2:** Identify buildings and properties that could be used for renewable energy installation.
- **GOAL 3:** Evaluate investing public funds in local renewable energy projects (such as Solar United Neighbors)



TOUR OF THE WASTEWATER TREATMENT PLANT

STRATEGY #9 EDUCATION

Since education is essential to this plan’s ability to achieve its desired results, professional development will play a foundational role in meeting Net Zero Emissions by 2035. Every employee must understand why the City initiated a Climate Action Plan to reduce emissions. Furthermore,

voluntary meetings focused on environmental topics can provide an additional opportunity to educate employees and the community. The latter can help reduce emissions and build a more resilient Goshen.

SUMMARY OF THE PROGRAM AND GOALS

- **GOAL 1:** Develop and implement employee training on green infrastructure, low-impact development, and climate change mitigation and adaptation practices.
- **GOAL 2:** Involve front-line employees in problem-solving processes related to the reduction of GHG emissions.
- **GOAL 3:** Provide flexible hours for employees to participate in educational programs such as Indiana Master Naturalists, Tree Stewards, etc.

CLIMATE ACTION PLAN

INTRODUCTION

INTRODUCTION

EMISSIONS TELL US WHERE WE NEED TO SEARCH FOR BETTER, COST-SAVING OPERATING OPTIONS. REDUCING EMISSIONS WILL SAVE THE CITY MONEY.

AARON SAWATSKY KINGSLEY

If there ever was such a thing as an “old normal,” we won’t be going back to it. The new normal is one of change and adaptation. On the one hand, cultural and technological change is something that we have become fairly used to over the twentieth century and into the twenty-first century. On the other hand, large-scale changes, which we don’t have much control over, and which require difficult choices, are not a part of our preferred reality.

Climate change is a large-scale set of forces that will increasingly require difficult decisions from us during this century. Anticipating the impacts of climate change ahead of time, doing what we can to mitigate those impacts now, and setting into motion adaptations to those impacts, will allow us to keep open the broadest set of decisions in the future. This Government Operations Climate Action Plan for the City of Goshen is designed to give us the best options.

In 2019, the Youth Environmental Resolution was unanimously adopted by the Common Council in a 6-0 vote. While non-binding, the Resolution called for, among other things, government operations to achieve a net-zero emissions goal by 2035 and to create a Climate Action Plan for the City of Goshen.

This plan is the result of the

insistence and aspirations of Goshen’s youth. Goshen completed its first greenhouse gas emissions inventory in 2019 (assessing 2017 data) and the second inventory in 2020 (assessing 2019 data). This emissions data forms the Climate Action Plan’s backbone – it tells us where we are currently, which informs what we need to do to meet our goal: net-zero emissions by 2035.

In 2019, City government operations emitted 9,396 metric tons of carbon dioxide equivalents (MTCO_{2e} – an equation used to express the heat-trapping potential of different greenhouse gases in terms of carbon dioxide, the most plentiful of these gases). This number is maybe interesting to compare to other communities, but ultimately each community is unique, and comparisons are relatively meaningless. However, it is meaningful to us in Goshen in that it tells us what our emissions are, and because of the inventory detail, we know where they are coming from.

This detail is laid out carefully in the following document, but the highlights are these: Water and Wastewater Utility Processes - 5,480 MTCO_{2e}; Buildings and Facilities - 1,410 MTCO_{2e}; Vehicle Fleet - 1,505 MTCO_{2e}; Environmental Center operations – 349 MTCO_{2e}; Street Lighting – 652 MTCO_{2e}.

These emissions cost us money in at least two broad categories. Emissions

cause and exacerbate climate change which can cost us money in the form of the many economic disruptions it creates, from weather disasters to crop failure to environmental degradation to human distress and violence. Emissions also cost us money because they directly reflect the energy we buy and use (electricity, natural gas, gasoline, diesel, etc.), especially the inefficient ways we use it. Emissions tell us where we need to search for better, cost-saving operating options. Reducing emissions will save us money.

Not all of the emissions from our government operations can be easily reduced. The largest portion of our emissions – Water and Wastewater Utility Processes (58%) – is a very tricky set of emissions. Water and wastewater have to be treated, no way around that. While we are finding ways to reduce energy consumption in significant ways related to these essential operations, water and wastewater treatment will likely always be a large source of our emissions.

The Climate Action Plan lays out goals and strategies for reducing various sectors of our emissions. All of these reductions will take effort, cooperation, willingness to adapt, and funding. Cost-benefit analyses show that spending money to reduce emissions ultimately saves us real dollars in fuel costs. For example, an analysis of a \$5000 investment in energy-saving

GOSHEN MILLRACE



retrofits at the Rieth Interpretive Center could save \$4,700 annually in energy costs. Upgrading the boiler-heating system at the Police Department will yield a \$30,180 savings over the 20 year lifetime of the new unit. Investment in cleaner electric and hybrid-electric vehicles has similar returns.

This Climate Action Plan proposes that by 2026, we aim to reduce our government operation emissions by 40%. While the strategies outlined below can help us achieve this first step in our overall goal of net-zero emissions, this document does not dictate the process that “should” be implemented to reach the goal. It is up to the various Departments to choose

their path to GHG reduction. Likewise, it is up to the Mayor to support these efforts and the Goshen City Council to provide appropriate funding levels to enable Departments to reach those goals. Furthermore, it is important to note that we are at the beginning of a long process; as we work to reduce emissions and increase efficiencies, we will discover trends and technologies which this Plan could not anticipate.

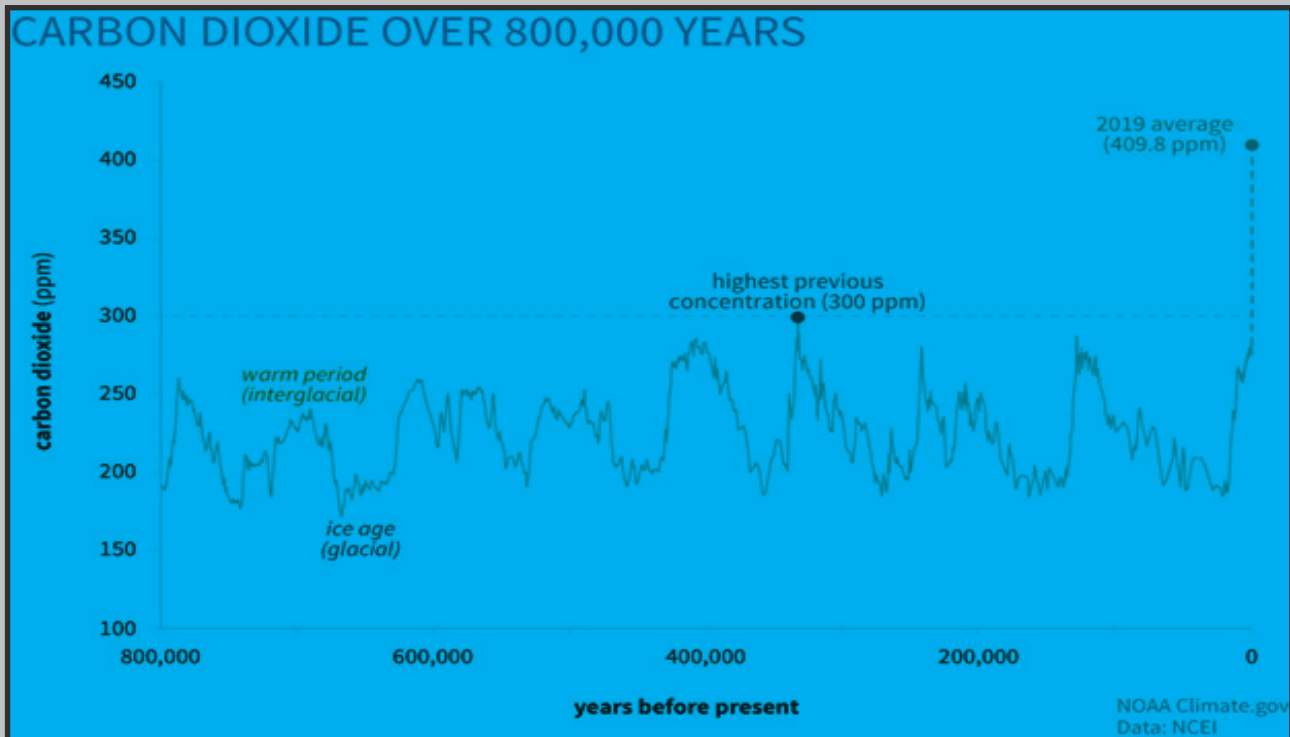
It’s also important to note that the primary supplier of electricity and natural gas for our operations, NIPSCO, is in the process of eliminating its coal-generators and replacing them with 65% renewable energy generation. These changes alone

will reduce our emissions by close to 40% by 2028. This is a significant development, making our task, in some ways easier.

However, this news should not make us complacent. The work which is in front of us, in many ways, is to reduce the most pernicious, most difficult sets of emissions, such as those generated by cleaning our water and wastewater. To that end, this document will need to be a living and breathing document, reviewed and updated regularly, along with our emissions inventories. As stated above, adapting to change is our new normal, and even this Climate Action Plan will have to reflect this reality.

INTRODUCTION TO CLIMATE CHANGE

THE LAST TIME THE ATMOSPHERIC CO₂ AMOUNTS WERE AS HIGH AS 400 WAS MORE THAN 3 MILLION YEARS AGO, WHEN THE TEMPERATURE WAS 3.6°-5.4°F HIGHER THAN DURING THE PRE-INDUSTRIAL ERA, AND SEA LEVEL WAS 50-80 FEET HIGHER THAN TODAY.



Carbon is essential to life on Earth. Carbon is an element that is required to form complex molecules and DNA. All living things and those made from previously living things are all made from carbon, prompting the phrase “carbon life-form.” We build homes, power our vehicles, clothe ourselves with carbon; we even eat carbon. Although carbon is integral to life on the planet, the modern human relationship with carbon goes well beyond life-sustaining uses.

Carbon atoms are continually moving from the atmosphere to Earth and then back into the atmosphere in a carbon cycle process. Surface carbon moves in a relatively fast cycle (over a period of decades or centuries); rock-bound and deep-ocean bound carbon moves in a much slower cycle (100 thousands to 100 millions of years). Carbon in the slow cycle is often trapped in the decomposed bodies of ancient lifeforms, and may be transformed into such fossil fuels as coal, oil, and natural gas through a combination of pressure, heat, and epoch-scale periods of time.

Carbon in our atmosphere is part of the surface carbon cycle. It exists in the atmosphere in the form of carbon dioxide. Along with water vapor and other trace gases, carbon dioxide absorbs heat that would otherwise be lost into space, allowing the Earth to hold a steady 60-degree average temperature instead of near zero. It is for this reason that these gases are termed “greenhouse gases” (GHGs) – their ability to insulate and stabilize temperature is similar to the function of a greenhouse. The balance these GHGs provide has enabled the relatively moderate climate of the 20th century and the climate that life on Earth has adapted to over at least the last 800,000 years.

MONA LOA OBSERVATORY, MONA LOA, HAWAII



The surface carbon cycle has maintained a balance of 200-300 ppm CO₂ in the atmosphere for the last 800,000 years, based on the measurement of air bubbles trapped in mile-thick ice cores and other evidence. Even during the ice age cycles of the past one million years, carbon dioxide never exceeded 300 ppm. To add perspective to these measurements, before the industrial revolution began in the mid-1700s, the global average amount of carbon dioxide was about 280 ppm.

The burning of fossil fuels (from the slow carbon cycle) is causing a rapid rise in carbon dioxide in the atmosphere as it is added to the surface carbon cycle. Fossil fuels like coal and oil contain ancient carbon that plants pulled out of the atmosphere through photosynthesis millions of years ago. As humans burn fossil fuels, large amounts of carbon stored in the ground over millions of years are being converted to atmospheric carbon dioxide in a span of a few hundred years. While plants, such as trees, and oceans are able to absorb some of this newly re-introduced carbon dioxide, significant amounts of it concentrate in our atmosphere.

As carbon dioxide concentrations increase in our atmosphere, the greenhouse heat-trapping capacity of the atmosphere also increases. This increase in heat is compounded by the fact that a warmer atmosphere also holds more water vapor. Water vapor further amplifies heat and produces larger precipitation events (<https://www.earthobservatory.nasa.gov/features/CarbonCycle/page1.php>). Large precipitation events can result in flooding.

In 1958, the United States began atmospheric carbon observations at the the Mauna Loa Volcanic Observatory (<https://www.esrl.noaa.gov/gmd/ccgg/trends/mlo.html>). In that year, the global atmospheric carbon dioxide concentration had risen to 315 ppm. In 2014, the global daily average carbon dioxide concentration surpassed 400 ppm for the first time on record.

Given the current trends, Climatologists estimate if fossil fuels continue to meet the bulk of global energy demand, atmospheric carbon dioxide concentration is projected to exceed 900 ppm by the end of this century. The last time the atmospheric CO₂ amounts were as high as 400 was more than 3 million years ago, when the temperature was 3.6°–5.4°F higher than during the pre-industrial era, and sea level was 50–80 feet higher than today.

GOSHEN EXPERIENCES HISTORIC FLOODING

In February 2018, after receiving over 5 1/2 inches of rainfall in two days, the Elkhart River rose to 12.53 feet, 6.53 feet above the flood “action” stage. The City of Goshen experienced the largest flood in recorded history, causing several injuries, extensive property damage, and displaced businesses that resulted in a local state of emergency declaration.

While flooding is not new to the City, this event was the worst on record. Rain events in Indiana are becoming heavier and with greater intensity, on average. The reality of increased flooding illustrates just one example of the impacts a changing climate can have on communities across the Midwest.

Elkhart County is expected to see the number of extreme heat events (highs 90°F or greater and nights with lows 68°F or greater) per year increase. Between 1971 and 2000, Elkhart county experienced 21 extreme heat events per year, on average. Yet, by the 2050s, Elkhart County will see between 58 and 72 extreme heat events per year, on average (Environmental Resilience Institute 2020). Further evidence of this is observable by assessing recent years’ heat events. For example, in 2019, Goshen experienced 26 extreme heat waves, and in 2020, it experienced at least 29 (National Centers for Environmental Information 2020).

These extreme heat waves have profound impacts. As the Indiana Climate Change Impacts Assessment describes,

extreme heat can lead to an increased number of heat-related illnesses, hospitalization, and medical costs. Likewise, extreme heat reduces crop yields, essentially counteracting improved harvests from longer growing seasons. Longer growing seasons “also increase (the) growth of less desirable plants like ragweed and create favorable conditions for some invasive species.” Furthermore, reducing cold temperatures means potential disease-carrying mosquitoes, ticks, and forest pests will expand their range and remain active for longer portions of each year (Purdue Climate Change Research Center 2018).

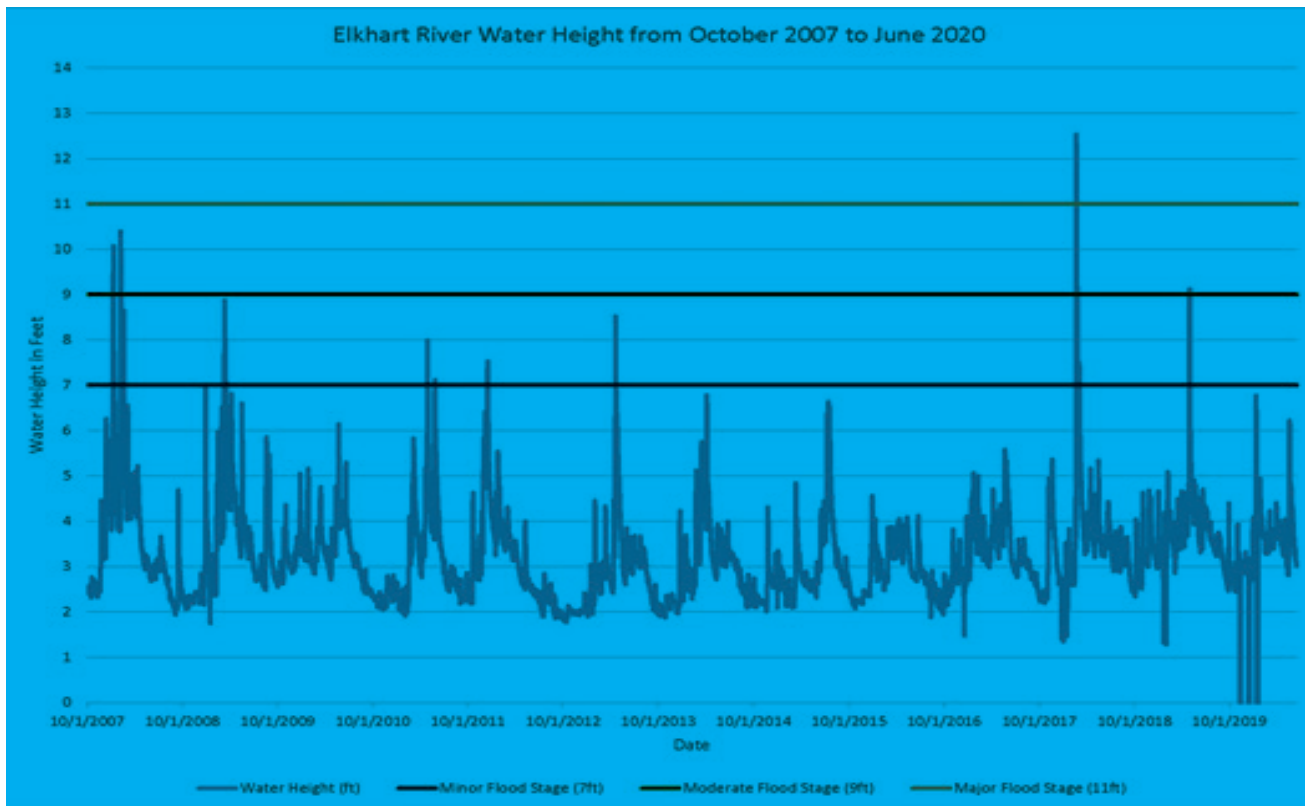
As temperatures increase, the number of extreme precipitation events per decade (daily precipitation of two inches or greater) will increase in Elkhart County from ten events per decade to eleven or twelve per decade by the 2050s (Environmental Resilience Institute 2020). Yet, while this increase alone is not staggering, the change in timing warrants greater attention. The Purdue Climate Change Research Center (2018) finds that “winters and springs are likely to be much wetter by mid-century, while expected changes in summer and fall precipitation are less certain.” Extreme precipitation events in late winter and early spring increase Goshen’s flood risk when soils are likely saturated or frozen, meaning less water infiltrates the ground and more becomes runoff.

2018 FLOODING ON PIKE STREET, GOSHEN, INDIANA



PHOTOGRAPHER: ANDREW KAUFFMAN

WATER HEIGHT AND FLOOD STAGES ON THE ELKHART RIVER 2007-2019



WHEN THE WATER RISES IN GOSHEN

In 2018, Goshen firefighters went door to door in the middle of the night to rescue residents from the rising flood waters.

When the Elkhart River rises above five feet, outlying areas including ditches and streams (including Rock Run Creek, Horn and Leedy Ditch, East Wilden) begin flooding.

The Elkhart River officially reaches flood stage at 6 feet: it overflows its banks to inundate the wetlands between the Goshen Dam pond and the Elkhart River, a large part of Shanklin Park, and Mullet Park.

As the Elkhart River reaches eight feet, Rogers Park and Oakridge Park become inundated. Creekside Estates Mobile Home Park begins to flood; flooding now begins to affect businesses and close roads.

At nine feet, the flooded river cuts off access to Trinity Square businesses, such as Kroger.

In 2018, the river rose to inundate Kroger Grocery, Linway Plaza and homes on Denver Avenue and Huron Street. Four of the five bridges were inundated, effectively cutting the city in half. Goshen firefighters went door to door in the middle of the night to rescue residents from the rising flood waters.

GOSHEN TAKES ACTION ON CLIMATE CHANGE

Soon after the 2018 flood, Mayor Stutsman established the Mayor’s Environmental Advisory Committee to guide on environmental issues. Around the same time, Goshen High School students spearheaded the Youth Environmental Resolution (2019-19), which called for a climate action plan. Recognizing a need to focus on climate issues in great detail, the City acted to support the measure, including establishing a new department – the Department of Environmental Resilience – to pioneer this plan.

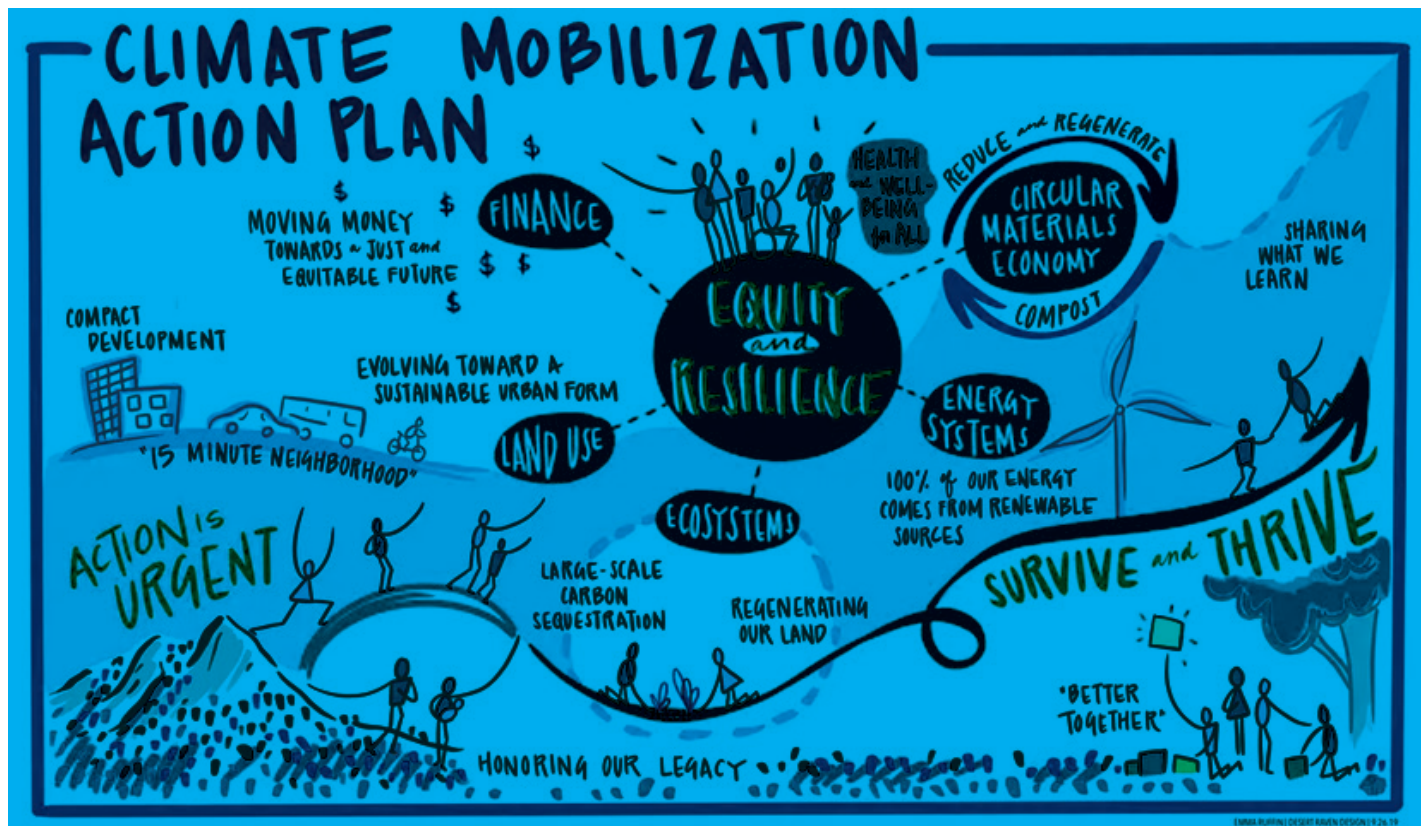
In the Spring of 2019, by a vote of 6 to 0, the Common Council and Mayor Stutsman passed the non-binding resolution to create and implement a Climate Action Plan by 2021.

In the Summer of 2019, the City partnered with I.U.’s Environmental Resilience Institute to collect and analyze energy consumption data, leading to the first-ever emissions inventory of 2017 of both the community and city government data.

In the fall of 2019, the Mayor, supported by City Department Heads, proposed the Department of Environmental Resilience.

January 2020, the Environmental Resilience Department began operations, with the first major project being to develop a Climate Action Plan for Goshen City Government Operations. Again, the City partnered with I.U.’s Environmental Resilience Institute to work through the process of the creation of a Climate Action Plan.

Throughout 2020, the Environmental Resilience Department worked with other Departments to compile data, update emissions calculations, develop realistic strategies, and sought feedback from employees, Department Heads, the Mayor’s Environmental Action Committee, and the I.U. Environmental Resilience Institute to generate a plan for reducing emissions from city operations.

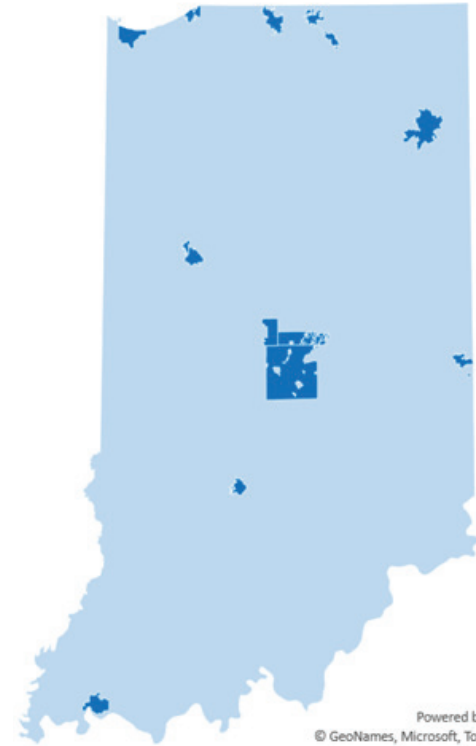


MAKING PLANS IN THE STATE OF INDIANA

Climate Action Planning and the active reduction of emissions has become a global operation of global proportions in an attempt to avoid the worst of these impacts.

By improving preparedness, planning for impacts, and reducing the emission of heat-trapping gases, the City (referring to the local government) is working toward a resilient future. While the City is a regional leader, it is not alone in its efforts in Indiana. Fifteen other municipalities are working on developing and implementing climate action. Indianapolis, South Bend, Bloomington, and Zionsville have already published climate action plans.

- Bloomington
- Carmel
- Elkhart
- Evansville
- Fishers
- Fort Wayne
- Gary
- Goshen
- Indianapolis
- Lafayette
- Michigan City
- Richmond
- South Bend
- West Lafayette
- Zionsville



NET-ZERO BY 2035

The 2021 City of Goshen Operations Climate Action and Mitigation Plan aims to develop emissions reduction goals projected five years forward to 2026, where tested practices currently exist that will allow the City to reduce emissions in a logical, pragmatic approach. These goals will be the first step in moving toward the overarching goal of net-zero government operations emissions by 2035. The Climate Action Plan will serve as a living document. It will need to be revised and updated to incorporate new strategies as new insights technologies become available and as new practices are adopted.

In developing this plan, the Department of Environmental

Resilience compiled many forms of data (such as energy and fuel use records) with other Departments’ assistance. It then used real-world scenarios to develop strategies to reduce greenhouse gases in City operations.

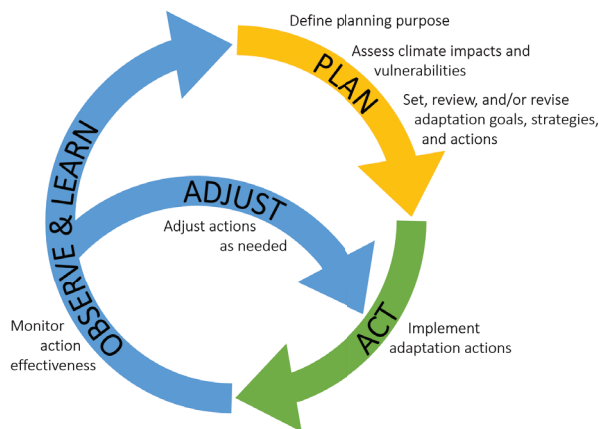
Where strategies exist to reduce greenhouse gases, the Environmental Resilience Department has proposed a proportionate goal as a part of a multi-step process to attain net-zero emissions

for City operations by 2035. In some cases, there were no obvious or proven solutions to reducing GHGs; therefore, more in-depth review will be needed.

The Department of Environmental Resilience is committed to supporting other Departments through this process. The Department has established target goals for multiple categories that will be important to achieve if the City is to reach net-zero by 2035.

It is important to note that this document does not dictate the process to be implemented to reach the goal. Instead, the document outlines possible paths City Departments can take in choosing the best routes to GHG emissions reduction. The Mayor’s support and Goshen City Council funding approval will be needed to meet each Department’s goals. Support from elected officials will be critical as City policies, practices, and standards are adapted to meet the Climate Action Plan’s goals.

Climate Change Adaptation Cycle

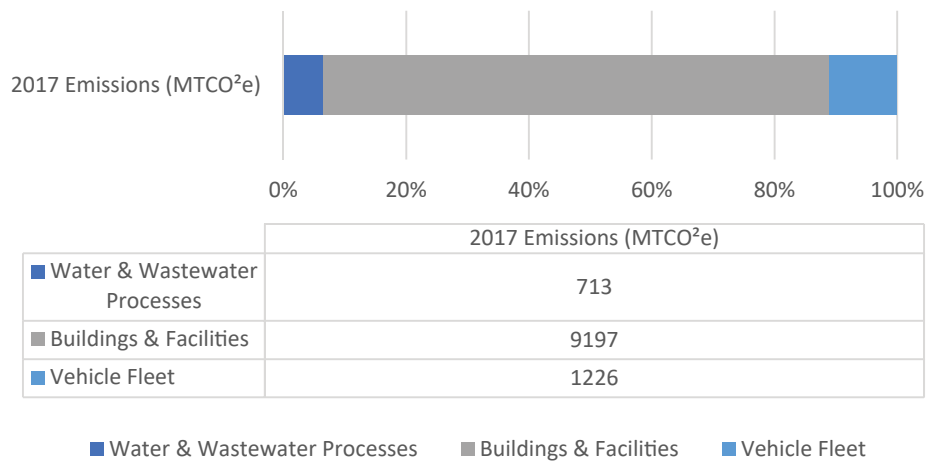


THE INVENTORY

The Climate Action Plan is being written with the benefit of having two separate inventories in two different years. Having two inventories has enabled both comparison and improvement based on experience. The Department had the opportunity to learn and improve the second inventory and set up the data for long-term monitoring.

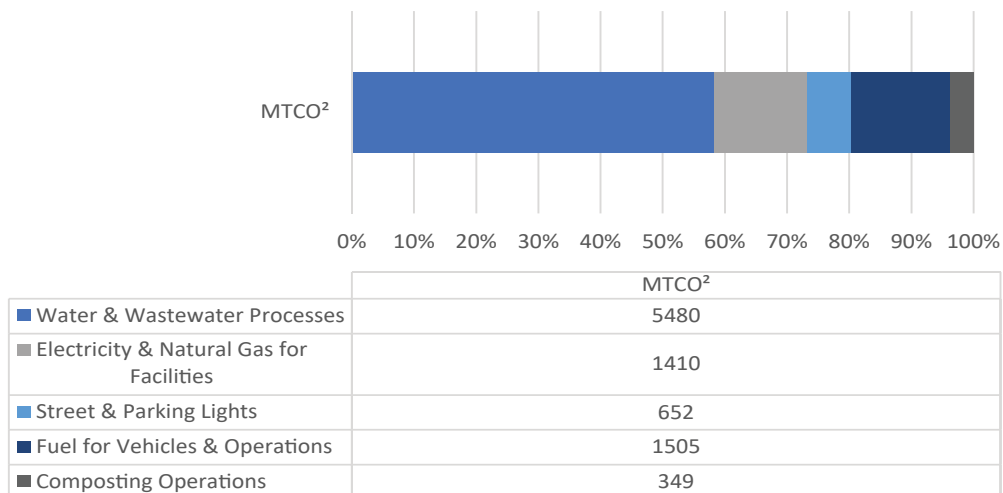
2017 INVENTORY

2017 MTCO₂e Goshen Government Emissions



2019 INVENTORY

Emissions



The 2017 inventory of Goshen Government Operations was the first study of the Goshen City government’s emissions. It measured 11,136 metric tons of carbon dioxide equivalents (MTCO_{2e}). Carbon Dioxide Equivalent includes all greenhouse gases but reports their warming potential in terms of carbon dioxide, the most common greenhouse gas. Table 1 illustrates the emissions sectors and activities. Of this, total electricity use contributed 73 percent of emissions, natural gas at 9 percent, emissions from the vehicle fleet in gasoline and diesel use totaled 11 percent, and wastewater treatment effluent comprised the remaining 7 percent of emissions. The determination was made to include solid waste emissions, a contracted service that includes Goshen residential waste, in the Community inventory. The inventory did not include emissions from the environmental center or flared methane at the wastewater treatment facility.

The 2017 emissions inventory provided a solid starting point for identifying local government emissions; though it did not provide a detailed accounting of energy usage over time, energy costs, or a system to continue to track both emissions and costs, it laid the foundation for building an even more robust inventory.

The 2019 inventory includes an accounting of all City energy accounts and purchases and tracking of materials and services and assets that contribute to emissions both positive and negative. This allowed the identification of emissions by energy type, source, user, and expenses and provided a way to track each variable.

Between the two inventories, there was a difference in total emissions. A significant reduction in emissions of 1,739 MTCO_{2e} is recorded over the two inventory years. This reduction is due to NIPSCO’s efforts to decarbonize their power generation by increasing their percentage of clean energy over coal power plants. Other more minor differences occurred when categorizing emissions and choosing which emissions should be included in the survey for Government Operations versus those that would be considered Community emissions.

In both the 2017 and 2019 inventories, the City followed the Local Government Protocol to quantify and report greenhouse gas emissions developed in partnership and adopted by the California Air Resources Board, California Climate Action Registry, ICLEI Local Governments for Sustainability, and the Climate Registry. The protocol provides a structure for determining which GHG emissions would be characterized as “Government Operations” and which would be “Community” emissions.

WHAT DOES A METRIC TON OF CO₂ ACTUALLY LOOK LIKE?

WITH ENVIRONMENTAL AWARENESS BECOMING PERSVASIVE IN BUSINESS YOU HAVE PROBABLY HEARD COMPANIES REPORTING THEIR CARBON FOOTPRINT BY NUMBER OF METRIC TONS BUT WHAT DOES THAT ACTUALLY MEAN?

- 8.12 METER CUBE**
At standard pressure and 15 °C the density of carbon dioxide gas is 1.87 kg/m³. One metric ton of carbon dioxide gas occupies 534.8 m³
- 1 HOT AIR BALLOON**
1 metric ton of CO₂ is roughly the size of an AX-03 hot air balloon. This size of air balloon is able to fit one passenger in the carriage.
- 3500 BATHTUBS**
The capacity of a typical bathtub is 0.16 Cubic Meters.
- 75,000 BASKETBALLS**
A NBA official ball, manufactured by Spalding, is a Size 7 ball and measures about 0.0071042167287 cubic meters
- 1 TREE**
It takes a single tree roughly 40 years in order to absorb 1 metric tons of CO₂

SOURCE:AMERICAN SOLAR ENERGY SOCIETY

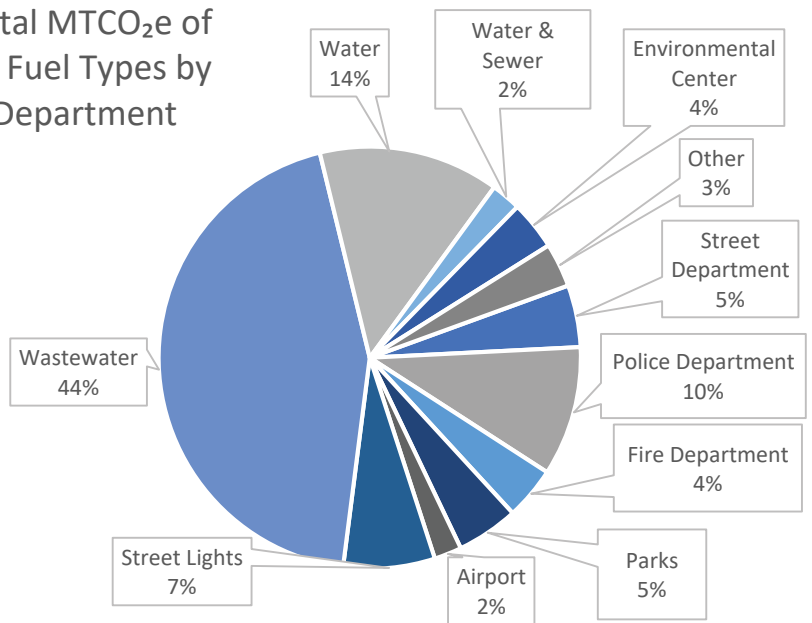
DISTRIBUTION OF ENERGY AND EXPENSES

CITY OF GOSHEN
2019 ENERGY EXPENSES

The City spends approximately \$1.8 million annually on energy; these purchases generated approximately 9,396 MTCO₂e in 2019. That includes electricity and natural gas utilized in city facilities (Buildings and Facilities – 15%), the processing, distribution, and collection of water and wastewater (Water Utility and Wastewater Utility combined – 58%), fuel for operations (Vehicle Fleet - 16%), composting operations at the Goshen Environmental Center (Environmental Center - 4%), and Electricity for street and parking lights (Street Lights - 7%).

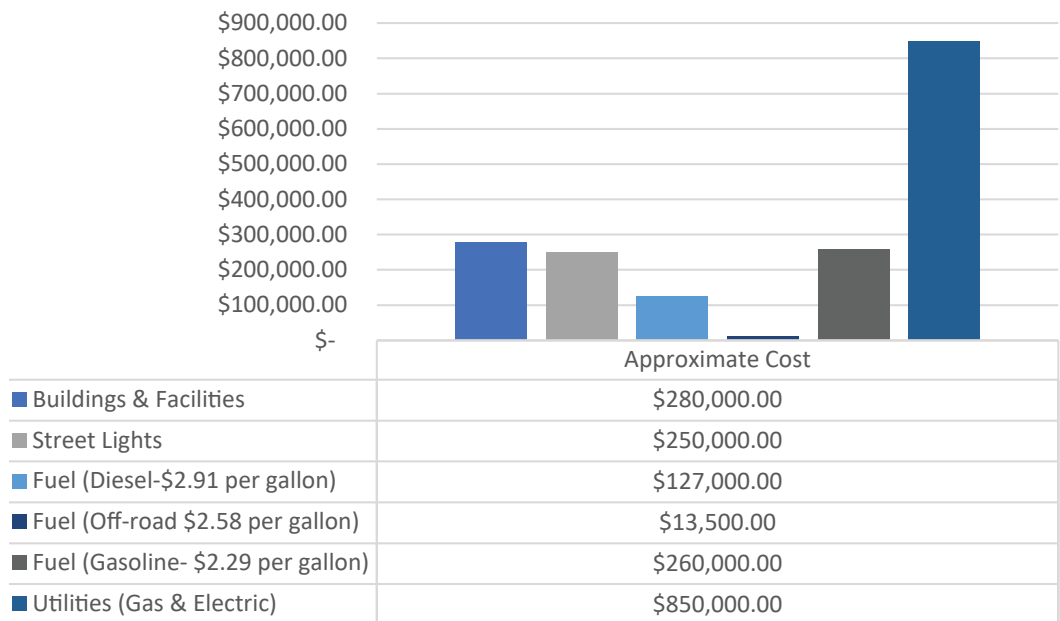
TOTAL EMISSIONS FROM CITY OPERATIONS

Total MTCO₂e of All Fuel Types by Department



BREAKDOWN OF ENERGY AND EXPENSES

Breakdown of Annual Energy Costs



EMISSIONS FORECAST

BUSINESS AS USUAL AND STRATEGIC REDUCTIONS FORECAST SCENARIOS

The 2019 inventory was then used to create a Business as Usual (BAU) graph to trend the GHG emissions for the City if the City did nothing to reduce GHG emissions. The BAU graph accounts for significant GHG reductions that NIPSCO is undertaking as it converts to green power generation. That reduction affects GHG emissions until 2028.

As a part of standard operations, the City’s energy consumption and GHG emissions do not stay constant. Factors such as growth, changing temperatures, changing city policies all affect GHG emission trends.

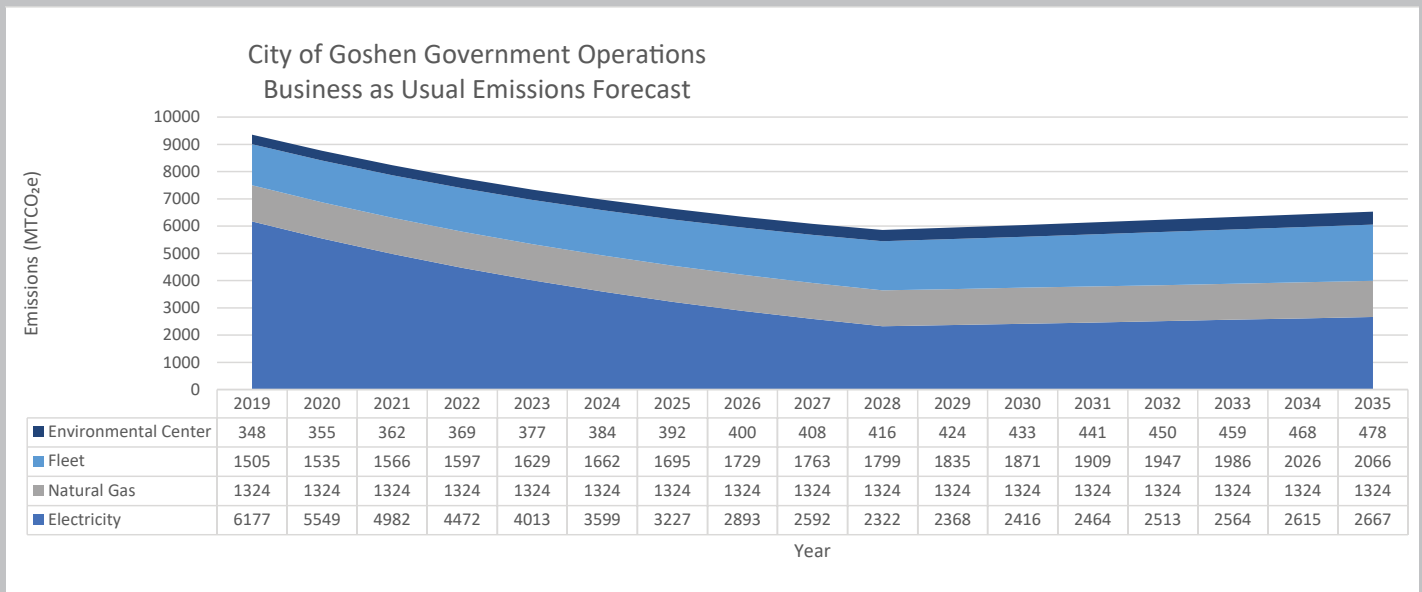
The electricity consumption, City Fleet, and the Environmental Center were all increased by 2% per year to reflect these trends. The natural gas consumption has remained relatively constant and was not increased in the BAU model. Based on NIPSCO’s reductions and the City’s energy trends,

the lowest GHG emissions will occur in 2028 and will begin trending upward.

If NIPSCO’s decarbonization of electrical power is evaluated without increases due to BAU, NIPSCO will decrease GHG emissions from electricity usage from 6,177 MTCO_{2e} in 2019 to 1,968 MTCO_{2e} in 2028. That is a 68% decline in GHG emissions from electricity. This number does not take into account the growth forecast model.

A second forecast was created taking into account proposed 2026

EMISSIONS IN A BUSINESS AS USUAL SCENARIO

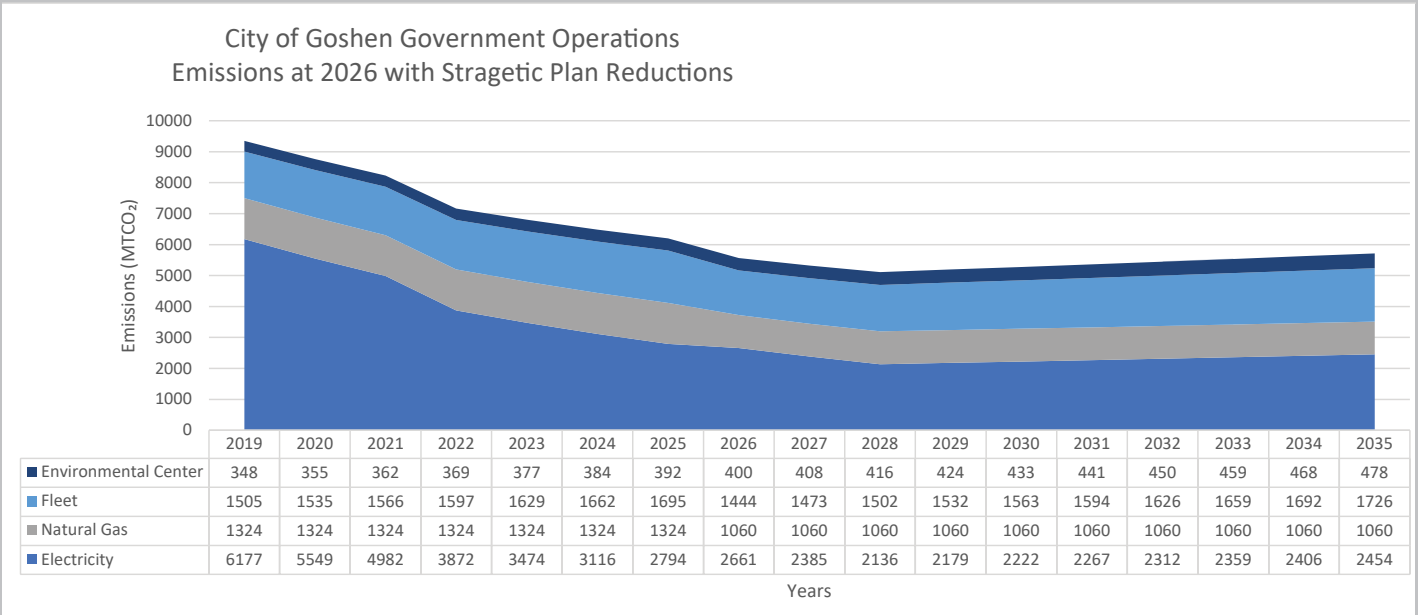


benchmark reductions in this Climate Action Plan. These benchmarks are comprised of a 30% reduction in electric consumption in buildings, 20% reduction in natural gas in buildings, and 25% reduction in gasoline consumption across the

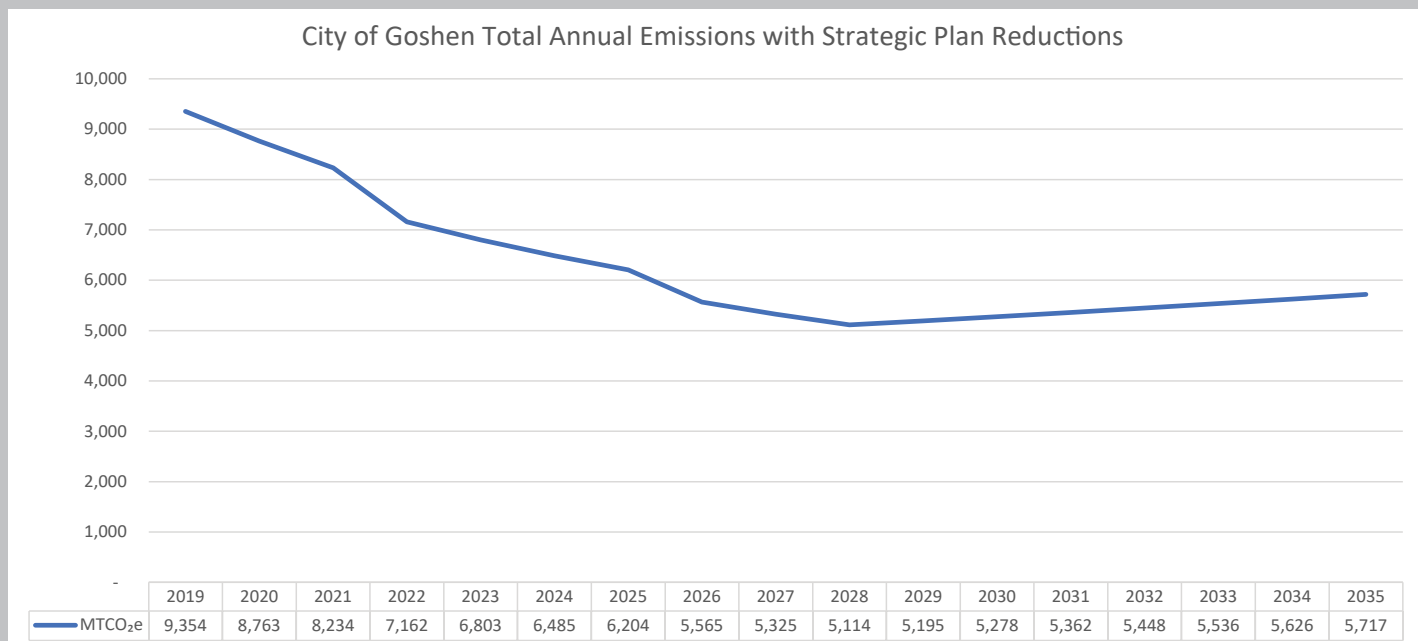
vehicle fleet. The current wastewater energy efficiencies under construction now are factored in also as a 2022 drop in electricity. The NIPSCO emissions reductions are also factored into this forecast.

Similar to the BAU graph, emissions in the second forecast begin to rise again after 2028. This indicates that further reductions will need to be in place by or before that date in order to remain on schedule for a target of zero emissions by 2035.

BREAKDOWN EMISSIONS WITH PLANNED REDUCTIONS



TOTAL EMISSIONS WITH PLANNED REDUCTIONS



MITIGATION AND ADAPTATION

Mitigation actions reduce emissions to help reduce climate changes.

Adaptation actions help the City and its residents adapt to a changing climate. Both activities are essential in building a resilient Goshen.



Mitigation is action aimed at reducing the impacts of climate change. The primary impacts of climate change are increases in temperature and increasingly unpredictable precipitation – periods of heavy precipitation resulting in possible flood scenarios, and periods of drought. Mitigative efforts seek to directly and indirectly reduce the greenhouse gas emissions that human activity produces, which are causing changes in our climate, resulting in temperature and precipitation impacts.

Mitigation is the adoption of technologies and behaviors that reduce greenhouse gas emissions. Sustainable energy production through solar and wind generation is mitigation; driving an electric vehicle is mitigation; refusing plastic packaging is mitigation. These are just a few examples of technologies and behaviors that mitigate climate change impacts.

Adaptation refers to actions which are intended to help us live with the impacts of climate change. Since a certain amount of temperature rise is projected to manifest over the coming decades due to the large amount of greenhouse gas emissions already concentrated in our atmosphere, we can predict that our cities and towns will become warmer than in the past, our waterways will experience more flooding, and there will be changes in the flora and fauna that live in our ecosystems.

Adaptive actions help us prepare for these changes by recognizing that old patterns and habits may no longer serve us well. Capturing and holding more stormwater on site is

adaptation; identifying community cooling centers is adaptation; low water-input landscaping (xeriscaping) is adaptation; moving structures out of floodways is adaptation. These are a few examples of actions that help us adapt to climate change impacts.

Some actions blend mitigation and adaptation very seamlessly. In order to cool urban settings, tree planting, from homes and neighborhoods to parking lots and commercial/industrial districts, is an important adaptive strategy. But trees also double as a mitigation strategy because of their ability to sequester carbon dioxide, removing it from the atmosphere. Properly insulating buildings so that they use less energy

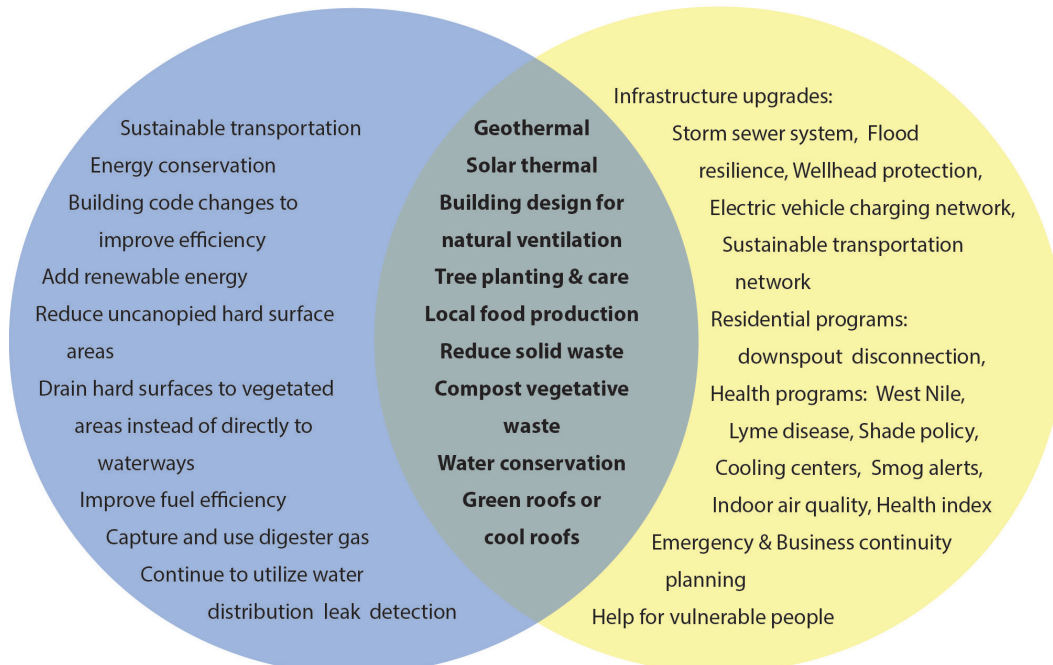


to stay warm in the winter and cool in the summer is an obvious way to mitigate emissions. But insulating is also a critical adaptive strategy, helping to manage life with rising summer temperatures.

Most of the proposed strategies in Goshen’s government operations climate action plan are intended to reduce emissions toward the stated goal of net-zero emissions by 2035, and are therefore mitigative. There are some which are clearly adaptive as well, and some which blend both adaptation and mitigation, such as the Canopy Goal and flood preparation. By identifying and adopting both mitigation and adaptation strategies, the climate action plan strengthens our current and future resilience.

MITIGATION

ADAPTATION



EMISSIONS REDUCTION STRATEGIES

The work of inventorying our energy consumption and the associated emissions, and then proposing reductions against projected consumption is sobering. The Climate Action Plan's stated 5-year benchmark goals for 2026 (30% reduction of electricity consumption in buildings, 20% reduction in natural gas consumption in buildings, and 25% reduction in gasoline consumption by the City's fleet) will net only about 746 fewer MTCO₂e than a do-nothing, business-as-usual approach. With the proposed reductions, in addition to the reduced emissions from NIPSCO's electric generation, the overall emissions reduction in government operations is about 45% – from 9,396 MTCO₂e to 5,114 MTCO₂e – by 2028.

On the surface this looks encouraging. However, NIPSCO's reductions make up the majority of these decreases (3,536 MTCO₂e) over the same period. Furthermore, looking at the projections, the City's emissions begin to climb again by 2029 in spite of the first round of reductions. Taken together, this means that while the initial proposals are good, they are not nearly good enough to set the City on the path to the larger stated goal of net-zero emissions by 2035. Solar energy production is the best bet – and it is a good one – to reduce operational electric emissions in a significantly meaningful way. The technology exists (along with the solar hours), as well as the facilities (Wastewater Treatment Plant) which could receive solar installations that result in critical electric

emissions reductions and long-term cost-savings. Solar energy is not a silver bullet, but investing in solar has never been more profitable.

The emissions reductions strategies which follow are challenging. They include the initial 2026 benchmarks. They also include strategies which can – if implemented with sustained effort, cooperation and funding, not to mention careful monitoring – propel the City toward zero emissions. This work comes with a hefty financial cost. If the City understands that this is the right thing to do, it will make the adjustments to operations, to behaviors, and to culture in order to meet the challenge. Understanding the necessity of the work is the essential ingredient.

The overall emissions reductions in government operations is about 45%. NIPSCO's reductions make up the majority of these decreases.



REDUCTION STRATEGIES CRITERIA



- 1 Develop reduction targets for emissions categories where there is a clear path for success through technology or behavior change, relative ease of implementation, positive cost-benefit ratio, and presumption of City and personnel discipline to accomplish the work.
- 2 Determine emissions categories that will require additional data and develop a timeline for accumulating the data and working to create site-specific strategies and their corresponding cost-benefit ratio.
- 3 Determine which emissions categories or strategies should be re-evaluated later due to unclear paths to success. These include lack of available technology, current projection yields high cost and low benefit, perceived difficulty in developing buy-in for behavior changes, or other obstacles.
- 4 Identify strategies to anticipate and lessen local climate change impacts on people, living things, properties, and operations based on information from Indiana’s Universities and Climate Change scientists.

STRATEGY #1 ENERGY MANAGEMENT OF BUILDINGS AND FACILITIES

Energy Management is a fundamental component of all climate action plans. The City of Goshen utilizes electricity and natural gas for heating and cooling buildings, powering lights, equipment, computers, and the processes involved with drinking water treatment and distribution and wastewater collection and treatment. In 2019, the City used almost 2.5 million kWh of electricity powering city facilities and outdoor lighting, such as street lights and parking lights. That equated to emissions totaling 1,421.7 MTCO₂. Approximately fifteen percent of those emissions were generated by City facilities, ten percent by street lights, and seventy-five percent by utility processes.

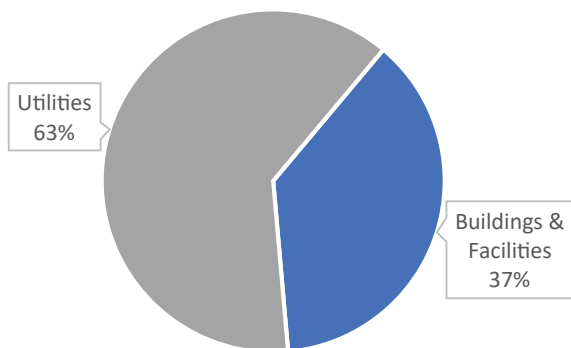
The City has been converting lighting to LED for several years. Beginning in 2020, NIPSCO began converting NIPSCO owned street lights to LED which will also save the City money. That savings is not included in the estimates in this section. The CAP recommends a review of street lighting policies and accounts to better evaluate long term plans and savings in this area.

A 2015 energy report conducted by the U.S. Department of Energy (DOE) concluded that commercial buildings could reduce their energy consumption by twenty-one (21) percent if they employed all “energy star” equipment. They could reduce their consumption by forty-seven (47) percent if buildings utilized best and cost-effective technologies and fifty-nine (59) percent savings if all equipment operating at its theoretical efficiency limit.

Some city buildings have already had some upgrades completed, such as Central Garage, the Annex Building, City Hall, and Central Fire Station; however, building efficiency in almost all cases can be improved. Reductions in energy consumption result in cost savings and reduced emissions. The goal for emissions reduction in City buildings is thirty (30) percent in electricity and a twenty (20) percent in natural gas by 2026. Reductions at this level generally require only small investments or behavior change and net a larger financial reward. The savings from these reductions would result in upwards of \$65,000 annually. A case study on the Reith Center can be found on the Environmental Resilience Page of the website.

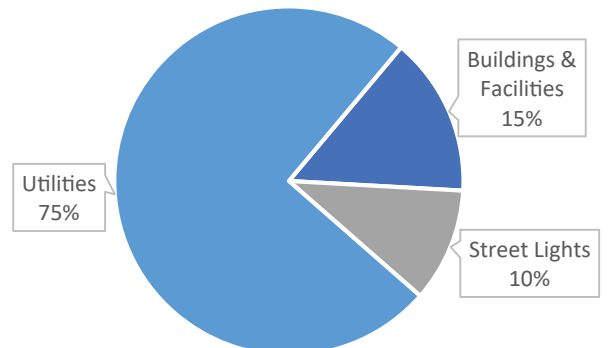
2019 GAS EMISSIONS

2019 City of Goshen Natural Gas Emissions in MTCO₂e



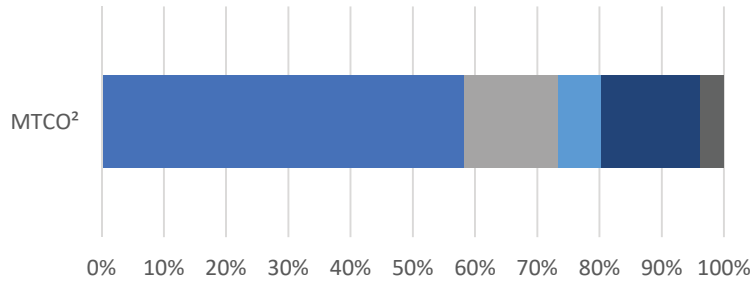
2019 ELECTRICITY EMISSIONS

2019 City of Goshen Electricity Emissions in MTCO₂e



2019 GOSHEN GOVERNMENT EMISSIONS

2019 City of Goshen Government Operations Emissions



	MTCO ²
Water & Wastewater Processes	5480
Electricity & Natural Gas for Facilities	1410
Street & Parking Lights	652
Fuel for Vehicles & Operations	1505
Composting Operations	349

The savings from these reductions would result in upwards of \$65,000 annually. Reductions at this level generally require only small investments or behavior change to net a larger financial reward.

REITH INTREPRETATIVE CENTER



STRATEGY #1 ENERGY MANAGEMENT

Co-Benefits																	
Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Reduce GHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality	Improve Government Resilience	Suggested Responsibility	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans			
Energy Management	Increase Efficiency of Building Systems and Technologies and Reduce resource consumption (energy & water) Electricity 30%, Natural Gas 20%, Water 30% by 2026.	1.1 1.2 1.3 1.4 1.5 1.6	Perform energy consumption and water audit within each building/facility to determine the efficiency of components, appliances, mechanicals, envelope tightness and evaluate workspace concerns. Generate a work plan for improvements to maximize return on investments based on available budgets and working toward Climate Action Plan goals.	1st - 3rd Years	✓	✓			✓	Environmental Resilience: compiling information from a multi-department effort (Engineering, Building, Etc.) to provide coordination, develop reports, summarize presented strategies, track progress. A management team could provide overall financial review and leadership toward the adoption of practices.	variable	Regular annual maintenance	\$65,000 +	Goshen Comprehensive Plan 2025, C-1: Provide and Maintain Excellent Public Facilities, NE-8: Encourage Sustainable Living and Business Practices, E-6: Encourage business practices that have positive social impacts on the community, E-7: Encourage Sustainable Living and Business Practices,			
			Develop mechanisms for all departments and/or building managers to be aware of and responsible for energy consumption and resulting costs.	2nd - 4th years	✓				✓				Staff Time		Can save up to 10% on energy costs		
			Develop a heating and cooling policy relevant to each specific building. Replace thermostats with "smart" thermostats (appropriately managed) where applicable.	2nd - 3rd Years	✓						✓		Staff Time		Staff Time		
			Establish city-wide employee teams will participate with feedback and champion improvements to their workplace operations.	Quarterly	✓						✓	Environmental Resilience with assistance from all Departments	Staff Time		Staff Time		
			Evaluate landscaping around city buildings and, where needed, develop a plan to co-plant fast-growing with slow-growing trees (tree shepherding) to maximize shade production to meet canopy goals and realize energy savings.	1st Year - On-going	✓						✓	Environmental Resilience: consultation with Facility Managers	Minimal		Regular annual maintenance	Can save up to 50% on summer cooling costs	
			Evaluate and adopt, if & where feasible, alternative work schedules to improve facility efficiency, including open hours, workplace schedules, in-person and online services to balance openness, accessibility, efficiency, costs, etc. Explore remote-work options and remove barriers to remote-work where needed, such as digitizing records.	Annual Review	✓						✓	All Departments	undetermined		undetermined	undetermined	





WASTEWATER TREATMENT PLANT

STRATEGY #2

SOLID WASTE MANAGEMENT

In 2019, residential trash picked up at the curb equaled over one ton per household at a cost of \$1.4 million.

The City of Goshen generates two primary forms of solid waste: trash generated by City employees throughout the workday and green waste (leaves and brush) picked up curbside and composted or chipped at the Goshen Environmental Center. The decomposition of these products either in a landfill or in a composting pile generates carbon dioxide.

The emissions generated from operations at the Goshen Environmental Center total 349 MTCO₂e. These emissions are a natural process of decomposition. As any living thing decomposes it will

generate carbon dioxide. The reason that these emissions are included in the CAP is that the material is quantified and placed on public property where it is stored and turned as it develops into a viable product for reuse.

The waste from City operations is co-mingled with the community's residential waste when picked up and taken to the landfill. As the owner, the Elkhart County Landfill reports the emissions from landfilled waste annually to the Indiana Department of Environmental Management (IDEM).

The City has significant influence over the community's waste generation

by managing the contract for waste pickup, prompting the Environmental Resilience Department to include the solid waste data in this report. However, the overall emissions count is not included as a part of the overall Government Operations emissions. This area of emissions is significant, totaling 8,292 MTCO₂e and will be addressed in both the Government Operations Climate Action Plan and a Community Climate Action Plan should that be developed in the future.

ELKHART COUNTY LANDFILL



COMMUNITY RESIDENTIAL SOLID WASTE

In 2019, the contracted waste hauler picked up 11,824 tons of solid waste from approximately 10,600 households and from some government operations. It is estimated that approximately 3.7% of solid waste was due to City Operations. City operations generated approximately 425 tons, and residents generated 11,398 tons, over one ton per household (ton equals 2,000 lbs).

Disposal costs were \$1.3 million for 2019, up from \$809,000 in 2015, with a 15% increase in tonnage per household during that time.

Some material is being diverted from the landfill. There are five drop-

off recycling centers in Goshen placed there by the Elkhart County

Currently approximately 1,140 households pay for private curbside recycling. Those households capture approximately 456,000 pounds of material annually that can be sold and reused as a part of the local economy.

Based on national statistics and the number of local dropoff sites, an additional ten percent of households also may be contributing to dropoff recycling sites diverting an additional 425,000 pounds, making the total solid waste diverted approximately 881,000 pounds. This is an important number when looking at the total landfilled

amount of 12,694 tons (25,388,000 pounds) in 2020. If the solid waste numbers are combined, the Goshen community reclaimed just 3.4% of the material entering the landfill.

Typical municipal residential solid waste is 48% recyclable or 12,186,240 lbs of the possible 25,388,000 pounds. Reducing solid waste entering the landfill by 48% would save almost \$675,000 and divert 12,186,240 pounds of material into the local and regional economy. It would also cut solid waste emissions in half.

GOSHEN SOLID WASTE STATISTICS

Solid Waste Statistics City of Goshen											
Year	*Residential Households	Total Tons per Year Collected	Charges per ton		Total Charges per year	Total Tons Broken down by Customer -See tabs			lbs per household per year	\$ per household per year	Percentage change in weight by per household
			Pickup and Transport	Landfill Tipping Fees		Utility Tons	Civil City Tons	Residential Tons			
2021	10,706										
2020	10,646	12,694	\$ 92.15	\$ 18.60	\$ 1,405,861	203	254	12,237	2,299	\$ 127.17	7%
2019	10,600	11,824	\$ 92.15	\$ 18.60	\$ 1,309,508	189	236	11,398	2,151	\$ 118.97	15%
2018	10,553	10,242	\$ 92.15	\$ 18.60	\$ 1,134,302	164	205	9,873	1,871	\$ 103.51	-1%
2017	10,513	10,377	\$ 62.99	\$ 18.60	\$ 847,329	166	208	10,003	1,903	\$ 77.62	4%
2016	10,473	9,937	\$ 62.99	\$ 18.60	\$ 810,792	159	199	9,579	1,829	\$ 74.55	0%
2015	10,433	9,924	\$ 62.99	\$ 18.60	\$ 809,745	159	198	9,567	1,834	\$ 74.74	3%
2014	10,393	9,602	\$ 62.99	\$ 18.60	\$ 783,451	154	192	9,256	1,781	\$ 72.59	2%
2013	8,710	9,428	\$ 62.99	\$ 18.60	\$ 769,253	151	189	9,089	2,087	\$ 85.05	



SOLID WASTE MANAGEMENT

SOLID WASTE GOALS

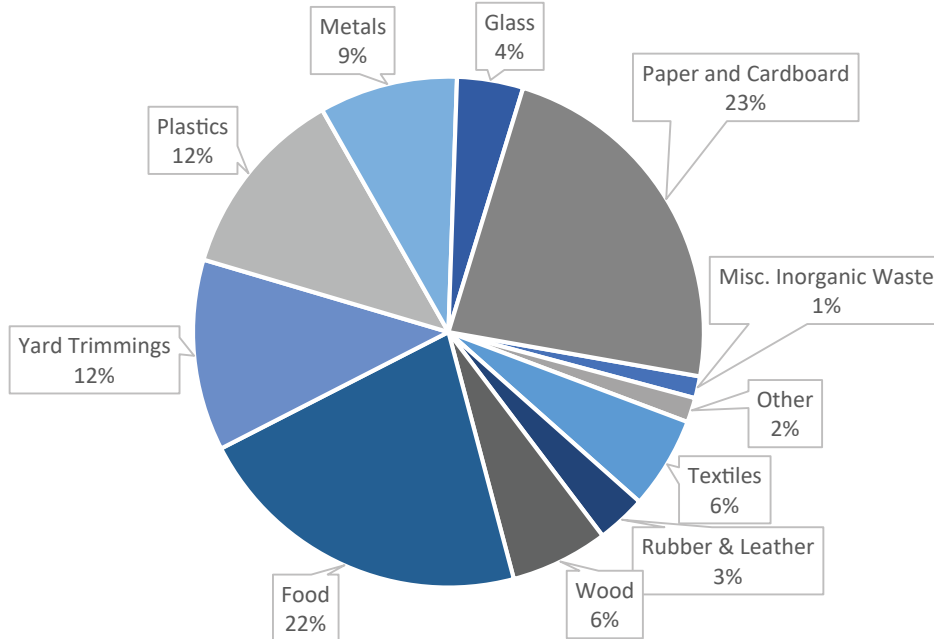
The City is working on specific goals to reduce the trash in City operations. Solid waste characterization and audit studies will need to be developed for City operations in the future but are not yet prioritized in the specified strategies due to a lack of poor existing metrics.

Also, the City will be developing a public education campaign on the topic of solid waste. The campaign will inform on how solid waste impacts our community and our local budget. It will also highlight recycling is an essential part of our local economy that not only diverts material from the landfill but reclaims a valued commodity for


use in local and regional businesses, supporting jobs and products made in Indiana. The education campaign will also highlight local businesses that provide products that reduce waste, provide less packaging, and open up new choices for persons wanting to reduce their volume of landfilled trash.

TYPICAL MUNICIPAL SOLID WASTE

Goshen Solid Waste Estimated Tonnage by Material 2019
based on EPA Facts & Figures percentages



STRATEGY #2 SOLID WASTE MANAGEMENT

		Co-Benefits																
Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Reduce GHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality	Improve Government Resilience	Suggested Responsibility	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans				
Solid Waste Management 	Review practices and promote innovation to reduce GHG when providing services for Green Waste.	2.1	Review Green Waste processes and methods and look for ways to innovate that will reduce GHGs and improve systems, including employee communication.	Annual Review	✓				✓	Engineering and Street Departments	to be determined	to be determined	to be determined	Goshen Comprehensive Plan 2025, C-8 Efficient & Effective Street Department Services, NE-7 Use best practices to reduce and dispose of solid waste.				
					✓				✓	Could be someone in the building or a team that looks to continue to improve practices around recycling. Maybe a team would meet quarterly.	Minimal	Minimal	Minimal	Reduction of solid waste entering landfill.	Goshen Comprehensive Plan 2025, NE-7 Use best practices to reduce and dispose of solid waste			
					✓				✓	Invite multi-department participation in brainstorming and policy development to determine City needs and values.	Creation of Training materials or posters	Would require centralized purchasing, lack storage and dedicated staff.	to be determined	to be determined		to be determined		
					✓				✓		✓	✓	✓					
					✓				✓									
					✓				✓									
		2.2	Stock & increase the use of reusable dishware & silverware. Buy 20% post-consumer waste or greater when possible (no Styrofoam or non-biodegradable products).	1st Year - On-going	✓			✓	✓									
		2.3	Evaluate (survey need) and implement compost (organics waste) opportunities across applicable municipal departments.	2nd Year - On-going	✓			✓	✓									
	Improve efficiency and reduce waste	2.4	Develop and adopt a city-wide policy that outlines waste management protocols for government operations including regular waste and "universal" (e-waste, fluorescent bulbs, etc.) waste.	1st Year	✓			✓	✓									
		2.5	Evaluate consumable products by Financial and Environmental CBAs, develop an "approved" list used for most purchasing, and streamline on a city-wide basis.	2nd Year	✓			✓	✓									
		2.6	Evaluate current waste removal and recycling contracts regarding best management practices.	2nd Year - On-going	✓				✓									

STRATEGY #3 SUSTAINABLE TRANSPORTATION

The 2019 inventory of Goshen’s governmental operations reveals approximately sixteen percent of the City’s emissions are from the direct burning of fossil fuels, gasoline, diesel, and off-road diesel in transportation and equipment. The total emissions from fossil fuel combustion in governmental operations are second

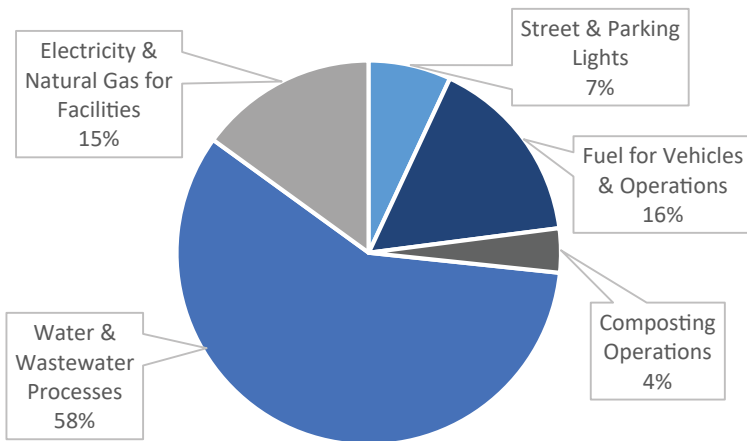
only to the emissions generated in water and wastewater processing operations.

The City’s vehicle fleet includes passenger vehicles such as sedans and SUVs, light-duty and heavy-duty trucks, and off-road equipment such as loaders, mowers, and generators. While acknowledging that this is

a substantial source of emissions, it is critical to understand that the City’s work necessitates vehicles and equipment. Approaching net-zero will require a plan that reduces fleet emissions and still maintains City services. It will also require additional regulation and substantial investment by the vehicle industry.

FLEET EMISSIONS

MTCO² Generated by City Operations



FUEL USAGE

Fuel Type	Gallons	MTCO ₂
Gasoline	113,159	1,003.7
Diesel	43,774	445.6
Off-road Diesel	5,254	53.5

FUEL ECONOMY

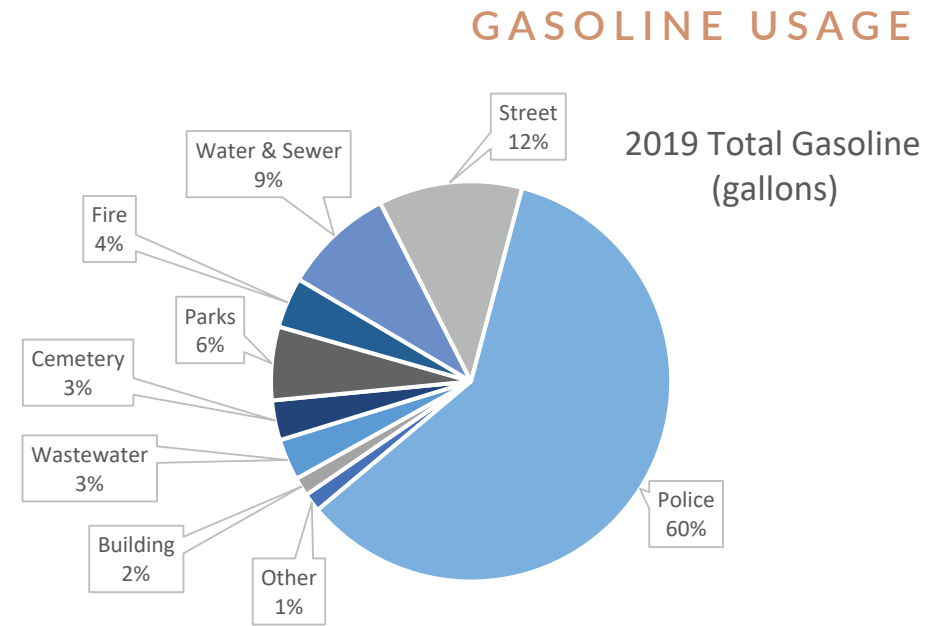
Breakdown of Gasoline - Powered Fleet					
Vehicle Description	Number of Vehicles	Highest MPG	Lowest MPG	Median MPG	Median Vehicle Year
All Vehicles	175	54	5	18	2015
Sedans	60	54	16	19	2012
SUVS	43	44	14	19	2016
Lgt Trucks	31	24	13	19	2011

Fuel efficiency has not been supported in federal regulations with regard to heavy-duty trucks as compared to passenger vehicles. This will restrict success reducing emissions in vehicles classified as heavy-duty which are critical to the City's operations.

The City used approximately 162,000 gallons of fuel in 2019. Gasoline made up the majority of those gallons at seventy percent. Diesel use was twenty-seven percent, and off-road diesel was just three percent.

The gasoline-powered vehicles consist of sedans, SUVs, light-duty trucks (F150s), and heavy-duty trucks (F250s, F350s, F550s). The diesel-powered vehicles consist of heavy-duty trucks (fire trucks, ambulances, International and Volvo trucks, sewage vacuum trucks, sweepers, and others). Off-road equipment would include equipment such as loaders, bobcats, and mowers. These distinctions are essential to understand as fuel use is examined.

There are options in reducing emissions from the vehicle fleet. These options also provide long-term costs savings to the City. The three most apparent options are:



- Drive less. Some departments can combine trips or consider utilizing active transportation methods. Planning driving routes and organization of tasks can also reduce driving.
- Increase the fuel economy of vehicles in the fleet. The mean for all city vehicles was 18 miles/gallon and sedans and SUVs were 19 miles/gallon, and
- Transition to vehicles that use a fuel type that releases fewer

emissions, such as electric.

The first option in reducing emissions is merely driving fewer miles. This can be done through department policy or encouraging behavior changes, such as allowing or incentivizing employees to combine trips and rideshare. This also includes remedies such as an idling policy, proposed by the Fleet Manager in 2019, to reduce wasted fuel from vehicles sitting with the engine running. Reducing miles can



be an opportunity to experiment with greener transportation, such as bicycling and walking. Not all departments can employ this strategy, and those that can, typically cannot in all situations. Still, a successful walking and bicycling program could equate to a small but relevant percentage.

Increasing fuel economy is another effective way to reduce emissions and fuel consumed. The City has successfully used hybrids, both Toyota and Ford, for the Building and Engineering Departments for a decade. Utilizing hybrids in departments where the vehicles are driven the largest miles per year would positively impact fuel consumption.

Current United States fuel economy standards for 2022 are 50.24 mpg (small footprint passenger vehicles), 37.59 mpg (larger passenger vehicles), 40.31 mpg (smaller footprint light-trucks), 26.02 mpg (larger light-trucks). These are the average automaker fleet economy targets. They include all vehicles in the manufacturer's fleet and both city and highway mileage. These targets do not reflect the current fuel economy of the City's fleet due in part to the age of the fleet but also due to the traditional evaluation criteria used to purchase vehicles, including;



CITY EMPLOYEE USING AN E-BIKE

- Municipalities have traditionally given preference to American made vehicles;
 - Fuel efficient vehicle options on the market have lagged, especially for police vehicles, which comprised the bulk of the gasoline fleet emissions;
 - Adoption of new technology requires both drivers and technical support to adapt or add additional training;
 - New technologies can be expensive, require additional equipment, new maintenance requirements, or have a stigma of being unproven technology; and
 - Budget considerations.
- Sedans are the largest group of vehicles in the fleet; however, they are

the oldest with the exception of light trucks according to the calculated median of 2012. The Median fuel economy for all vehicles is a mere 18 mpg (City). This fuel economy is not atypical for American municipal fleets. Buying vehicles with a strong emphasis on fuel economy requires a significant culture shift for many Americans.

For example, the 2019 inventory had seven 2019 Dodge Chargers, with a fuel economy of just 19 mpg for city mileage (30 mpg highway). Transitioning appropriate police vehicles to hybrid and fully electric as technologies advance can significantly reduce fleet-related emissions.

STREET DEPARTMENT STREET SWEEPING



STRATEGY #3 SUSTAINABLE TRANSPORTATION

Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Co-Benefits				Suggested Responsibility	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans	
					Reduce GHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality						Improve Government Resilience
Sustainable Transportation	Reduce passenger vehicle emissions by 25% or increase mean fuel economy to 27 mpg per City Department by 2026 (passenger vehicles) Sustainable Transportation	3.1	Fund the adoption of light-duty vehicles to replace poor energy performers and reduce emissions by 25% from gasoline powered fleet by 2026. Continue to incorporate hybrid and EV alternatives.	1st Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Fleet Manager and Department Heads	\$ 250,000	\$ 250,000	\$ 75,000		
		3.2	Facilitate the development and implementation of a gasoline emissions strategy by each Department to reduce emissions by 25% or increase Department mean fuel economy to 27 mpg for passenger vehicles by 2026	1st Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Departments work with the Fleet Manager to develop strategies. Each Department's plan to increase fuel economy and reduce emissions responsibility of Department Head.	Staff Time	Staff Time	Reduce expense of gasoline. Health benefits through better air quality.		
		3.3	Evaluate and replace appropriate gasoline-only Police vehicles with hybrid and electric vehicles as technology improves.	1st Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Fleet Manager and Police Department					
		3.4	Educate and Demonstrate to Departments and employees new innovations on the market as they become available or viable options.	1st Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Fleet Manager with assistance as needed	\$ 500	\$ 500	500	Create a culture of proactive and participating employees.	
		3.5	Develop a strategic plan for municipal fleet charging stations, including a few community access (early adoption only) to become EV sustainable in government operations.	1st Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Representatives of various Departments led by the Fleet Manager and coordinated by Environmental Resilience	Staff Time	Staff Time	Staff Time	Grant money could be used to fund.	
		3.6	Develop an education and awareness campaign to promote bicycling and identify and eliminate barriers, where possible, to employees bicycling to work.	2nd Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Could develop an employee represented "Active Transportation" committee comprised of representatives of various Departments and coordinated by Environmental Resilience	\$ 1,500	\$ 1,500	\$ 1,500	Bicycle and Pedestrian Master Plan Elkhart and Goshen 2017, MACOG Active Transportation Plan, Uncommonly Great Goshen Comprehensive Community Vision	
		3.7	Develop guidance to allow & encourage bicycling as a commuting option during the workday (where applicable), including bike storage infrastructure.	2nd Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Health Insurance savings directly or indirectly, Healthy & Fit Employees.	\$ 1,000	\$ 1,000	2,000		
		3.8	Start a pilot program to provide "fleet" bikes at appropriate City buildings to reduce miles driven using motorized vehicles.	2nd Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	All Departments	\$ 10,000	\$ 10,000	\$ 2,000		
		3.9	Continue to work to achieve the goals of Goshen's Bicycle and Pedestrian Plan. Work to achieve "Silver" status as a Bicycle Friendly Community.	1st Year - On-going	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		to be determined	to be determined	to be determined		

STRATEGY #4 SUSTAINABLE INFRASTRUCTURE

Climate changes will also affect infrastructure demands and maintenance practices. According to Purdue University Indiana Climate Change Impact Assessment, Indiana has already warmed 1.2°F, and that warming is accelerating, with an expected 5-6°F increase by mid-century and consistently more warming by the end of the century.

The number of extreme heat events (defined as a high of 90° F or more, combined with a low of 68° or more) is projected to rise from an average of twenty-one currently to between fifty-eight and seventy-two events per year.

The State will also see a continued increase in rainfall intensity and average annual rainfall. Annual average rainfall has increased by 5.6 inches since 1895, and more rain is falling in higher intensity downpours.

These changes will add heat stress to infrastructures such as roads, sidewalks, and bridges. Increased rainfall will bring a greater likelihood of flooding, especially localized flooding on streets where water pools before entering storm sewers. Additional rainfall and increased intensities will test sewer capacities and increase pollution from urban and agricultural runoff.

Increased heat and stormwater will

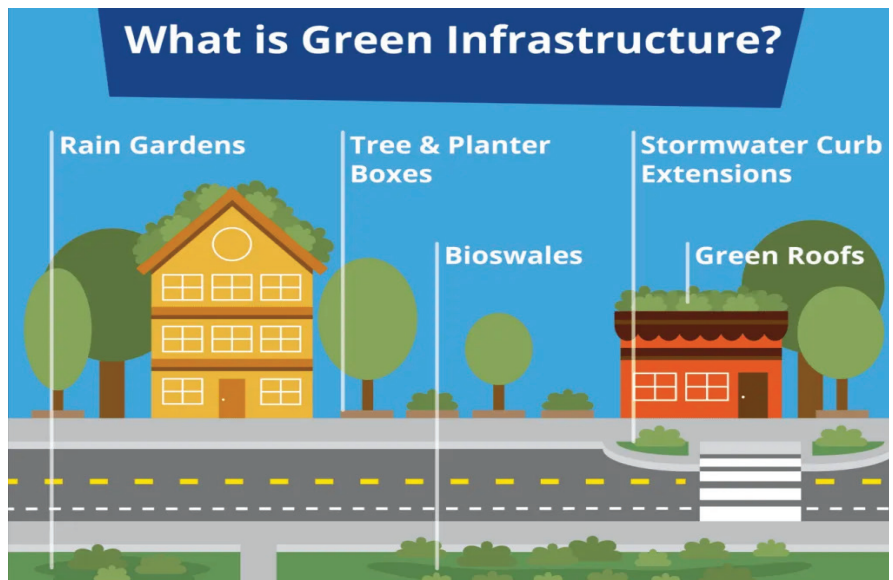
create an opportunity for constructing green spaces to dissipate urban heat sinks and absorb rain events. Such green infrastructure provides value by reducing load within built stormwater systems and by providing ambient cooling.

Training city staff to care for green infrastructure will represent a new and critical capacity for the City to accept. As with other important infrastructure (streets, for example), techniques, skills, and schedules for maintenance of green infrastructure will need to be developed and deployed in order for these nature-based systems to work as effectively as possible.


The City can continue to look for ways to complement a variety of emission-cutting behaviors by

looking for opportunities for “road diets” – shrinking the size of our roadways. Doing so reduces material and maintenance costs (and associated emissions), reduces traffic emissions, and can increase non-motorized transportation.

Balancing infrastructure (including green infrastructure) and utility needs will be an ongoing point of discussion. Increasing the number of trees in the community is a vital part of adapting to climate change, and yet street right-of-way – a prime site for trees – is increasingly crowded with other infrastructural needs. State legislation, as well as local interest, will play a part in the manner in which sustainable infrastructure is created.



STRATEGY #4 SUSTAINABLE INFRASTRUCTURE

Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Co-Benefits				Suggested Responsibility	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans
					Reduce CHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality					
Infrastructure 	Reduce energy and emissions from street lights or eliminate where feasible.	4.1	Convert > 95% of street and parking lights & traffic signals to LED technology by 2026.	1st - 5th Year	✓	✓		✓	to be determined	Staff Time	to be determined		
		4.2	Identify, map & evaluate possible reductions or eliminations, incl. the number of parking lamps on public properties.	2nd - 3rd Year	✓			✓	to be determined	to be determined	\$200+ annually per LED pole eliminated		
	Review infrastructure standards and maintenance practices every three years to reflect current mitigation practices.	4.3	Evaluate and revise standards where climate change projections, such as increased winter freeze/thaw and higher intensity rainfall, create weaknesses in infrastructure. Consider revisions to require reasonable emissions reductions and low impact measures to adapt to climate impacts.	3rd - 5th Year	✓			✓	Engineering & Street Departments	to be determined	to be determined		
	Develop capacity to maintain green infrastructure.	4.4	Develop and deploy maintenance skills, techniques and schedules for green infrastructure installations across the city.	3rd - 5th Year	✓			✓	Representatives of various Departments coordinated by Environmental Resilience				
	Develop a culture of walking and biking as proven by the use of walking areas and local surveys.	4.5	Increase the number of miles of "Complete Streets" to enable safe, convenient, and efficient travel and access for users of all ages and abilities regardless of their mode of transportation.	On-going	✓			✓	Representatives of various Departments coordinated by Environmental Resilience	to be determined	to be determined	Quality of Place	

STRATEGY #5

UTILITY PROCESSES

The Utilities are in a constant state of innovation due to the frequency of new regulations and the need to provide ongoing upgrades.

The Goshen Water and Wastewater Utility consume electricity and natural gas to pump groundwater for water treatment and distribution of drinking water throughout the City and collect and process wastewater. These Utilities generate fifty-eight (58) percent of all the MTCO₂ emissions in Goshen's government operations, with most of that energy used to power pumps and heat water.

The combined Utilities use approximately 7,345,718 kWh of electricity and 156,108 therms of natural gas annually, generating 5,545 MTCO₂ emissions (not including emissions related to nitrous oxide, currently under review). The Wastewater Treatment Plant (WWTP) is the primary user of energy, with the wastewater treatment process at sixty-two percent of electricity and seventy percent of natural gas.

The Utilities are consistently in a state of innovation due to the frequency of new regulations and the need to provide ongoing upgrades to maintain the Utilities as critical infrastructure in the community. These needs are balanced with the necessity to provide clean drinking water and wastewater services to the community at an affordable cost.

These needs have resulted in consistent upgrades and efficiency improvements over the years, such as the stormwater detention facility and adoption of Supervisory Control and Data Acquisition systems. Upgrades to the facilities are expensive,

and as of 2021, it is hard to identify more upgrades that could yield significant energy and emissions savings with an adequate payback timeline.

Currently, the WWTP is undergoing expansion and efficiency improvements, set for completion in December, 2021. With these improvements, the wastewater treatment plant is expected to reduce energy consumption by 1,321,000 kWh annually, equating to 858 MTCO₂. This is a twenty-one percent reduction in emissions from the WWTP and a 9.6% reduction of MTCO₂ in overall City government emissions.

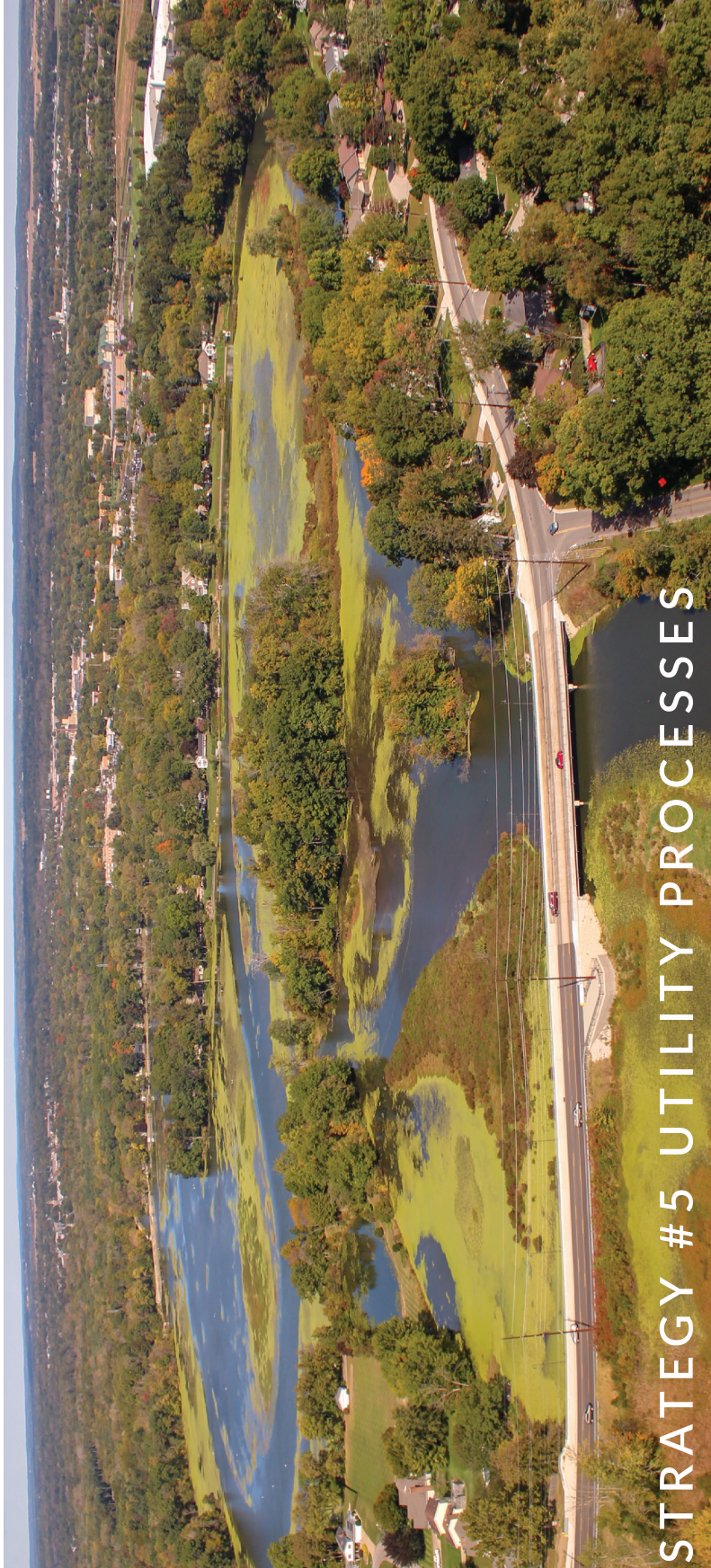
Beyond these current improvements, and some speculation about the ability to co-generate electricity from WWTP methane, the City's best option for mitigating Utility emissions may be through offsets, such as construction of solar

arrays which either directly benefit Utility facilities, or which directly benefit other City operations. While there is significant cost involved in such construction, solar is nevertheless a sound investment in the near and long term. Even in a more extended return-on-investment scenario, solar energy production benefits can be considered a worthy deposit on social and ecological health.

The critical nature of the water and wastewater utilities to the basic health and well-being of the Goshen community, combined with the facts that they a) require an extraordinary amount of energy to function and b) are an essential safeguard of ecosystem integrity, make them in many ways the centerpiece of any meaningful work toward City government emissions reductions.

WASTEWATER TREATMENT TOUR





STRATEGY #5 UTILITY PROCESSES

Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Co-Benefits				Suggested Responsibility (implementation, enforcement, monitoring, etc.)	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans
					Reduce GHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality					
Utility Processes	Offset energy consumption through solar installation.	5.2	Explore solar energy production options at WWTP and Water utility with the intent to fund as offset against current energy usage.	On-going	✓	✓		✓	Utility and Engineering Department, coordinated by Environmental Resilience.				
	Reduce maintenance costs and emissions	5.3	Introduce pollinator-friendly native plantings in various mower-intensive sites.	On-going	✓	✓	✓	✓	Utility Department				
	Review Utility Processes & Energy Usage every 5 years for efficiency	5.1	Continue to encourage and support professional learning opportunities, evaluating new strategies, and knowledge sharing with other communities.	On-going	✓	✓		✓	Utility Department		on-going	on-going	

STRATEGY #6

SUSTAINABLE LAND USE THROUGH RESILIENT ECOSYSTEMS AND BIODIVERSITY

Only a small amount of the 3.5 million gallons per day of groundwater pumped out of the ground for drinking water will return to the earth as groundwater.

LAND MANAGEMENT

Land Management encompasses all of the naturally occurring animate and inanimate members of our ecosystem. These occupants of the ecosystem play critical roles in the health of Goshen's human economy. Learning new ways to live with and appreciate these non-human members of our community is necessary for our social systems' ongoing health and wealth. Land management, in the context of this Climate Action Plan, means developing better ways for people to live within our means and encouraging our ecosystem to expand and flourish.

An essential part of better land management will be a comprehensive inventory of City-owned land. Such an inventory will describe how the land is currently used, what the land type is, what kinds of flora and fauna are present, how vegetation is currently managed, and what kind of long-range plans exist for the land. With such an inventory completed, current management practices can be compared to best sustainable management practices, and a plan developed to move land management in a direction that increasingly limits emissions and other pollutants, conserves water, and increases biodiversity and canopy. Our goal will be to work towards mowing less, installing

and managing more native grasses, forbs, and trees, and using less fertilizers and irrigation.

Preserving floodplain and adopting a flood resilience plan which is responsive to climate science are key characteristics of sustainable land use in Goshen. A Flood Resilience Plan commissioned in late 2020 will set the stage for ongoing discussion and progress toward key goals, such as

enhancing floodway property already managed by Goshen Parks and developing an efficient process for purchasing vulnerable floodway real estate when available. Incorporating Goshen's Urban Tree Canopy Goal of 45 percent tree-shade by 2045 will also play an important role in land management decisions on city property. More details of this plan are outlined in the Tree Canopy section.

PRESCRIBED BURN AT GOSHEN COLLEGE



WATER CONSERVATION

Land management in Goshen will require the conservation of such natural phenomena as groundwater, surface water (i.e. rivers, creeks, ditches), trees, healthy soil, and clean air. Drinking water in Goshen is sourced from groundwater. The Water Utility's average production is 3.5 million gallons per day, with a maximum production capacity of about 10 million gallons per day. Only a very small amount of that water will become groundwater again. Remaining water returns to the atmosphere through evaporation, becoming a part of a living organism, being aspirated into the air, or flowing to the wastewater treatment plant and then the Elkhart River. Groundwater is recharged by precipitation, but only about one-quarter of all rainwater will become groundwater. Reducing the consumption of water preserves groundwater stores. Saving water also reduces energy use and emissions.

Protecting ground- and surface water from pollution is an important aspect of conserving our water. Urban pollution typically comes in the form of phosphorus, nitrates, and soil sediment. (Industrial pollutants can present different toxins). The primary sources are vegetative (yard) waste, soil runoff, and fertilizer, none of which are so different from agricultural pollution except in concentrations: urban areas are connected to storm sewers. Storm sewers carry yard waste, soil, and fertilizer from all over the City and deposit them into the waterways in a potent mix. Once in our waterways, these pollutants can manifest long-lasting consequences for humans and non-humans alike. Freshwater is likely to be an increasingly precious resource in this century. We live in a region that has abundant freshwater access at the current moment. Planning for its continued safety and abundance will be critical as human populations shift due to climate change.


GOSHEN MUNICIPAL WATER TOWER



POLLINATOR PLANTINGS COULD BE A LAND MANAGEMENT TOOL FOR REDUCING MOWING AND DEVELOPING POLLINATOR CORRIDORS IN THE CITY



STRATEGY # 6 SUSTAINABLE LAND USE

Emissions Category		Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Co-Benefits				Suggested Responsibility (implementation, enforcement, monitoring, etc.)	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans		
Wildlife Habitats & Species Diversity	Land use and Maintenance Practices 	Reduce resources used in maintenance while still providing for local "green" spaces and habitat. Evaluate bi-annually.	6.1	Develop a plan to implement "most resilient" conservation practices for City-owned and maintained vegetated spaces.	2nd - 3rd year and on-going	Reduce GHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality	Improve Government Resilience	To be determined. Based on "changes" made to land use.	Annual maintenance lower than manicured / mowed lawns	Protection of species and ecosystem diversity	Purdue University Extension		
			6.2	Incorporate Canopy Goal objectives and apply appropriate tree maintenance on City properties and rights-of-way	1st Year - on-going						Minimal	Tree Maintenance, possible utility costs.	Energy, stormwater retention.			
			6.3	Develop city-wide maintenance policies on fertilizer, irrigation, mowing, prescribed burning, salting, and other maintenance practices that meet the needs of different property types and "uses." Review Noxious Weed ordinance.	2nd Year and on-going						Staff Time	less annual maintenance costs	\$ personnel, equipment (mowing), fertilizer, and watering.			
	Wildlife Habitats & Species Diversity	Protect ecosystems, habitats, and species diversity.		6.4	Develop a plan to monitor and publicly share the quality of water, land, and air resources. Including developing a comprehensive list of local & migratory flora & fauna, including invasives (air, water, & land), identify their habitats, food sources, stressors. Species diversity gains & losses can act as an indicator of land, air, water health.	2nd - 5th Year						to be determined	to be determined	Promote Goshen, create a better quality of place.	Goshen Master Plan 2019-2023, Resource Strategies, Goshen Comprehensive Plan 2025 2025, C-12, NE-1, NE-2, NE-3, NE-4	
				6.5	Identify, map, and grade existing ecosystems on public lands. Evaluate habitat diversity, duplication, and connectivity to support species survival.	2nd - 5th Year						to be determined		Protection of species and ecosystem diversity		
				6.6	Incorporate longer term climate projections as a part of City-owned land use planning and development. Explore the use of existing ordinances to further align private development with climate projections.	1st - 2nd Year, 5 year reviews						Staff Time	Staff Time	Practices provide habitat for species that are struggling to survive, including bees & butterflies.		Environmental Resilience Institute, Comprehensive Plan 2025, NE-8
	Flood Resilience	Enhance Flood Resilience to reduce losses from flooding.		6.7	Develop updated research to support existing science-based policies that are currently successful in other communities.	2nd Year, 5 year reviews						Staff Time	Staff Time		Professional Consulting Services, Goshen Comprehensive Plan 2025, C-10, C-11, NE-1, NE2, NE 3, NE-5, NE-6	
				6.8	Collaborate with specialists to develop and implement flood resilience plan including smart growth approaches, specific land-use policies, and a process to audit, update and revise the City's plans, policies, and regulations.	1st Year and on-going						\$ 50,000	to be determined	Reduced flooding, improved infrastructure		
				6.9	Preserve, enhance, and acquire existing floodplain	On-going						as appropriate, to be determined	as appropriate, to be determined	Reduced flooding, improved infrastructure		



STRATEGY #7

TREE CANOPY

The sugar maple has thrived in the Goshen area, but Goshen will increasingly be on the southern fringe of this tree's ideal habitat as climate changes

The 2019 Goshen Urban Tree Canopy Goal will increase our urban forest from twenty-two percent coverage (2013 data) to forty-five percent by 2045. Urban forest management will care for this increasing population of trees to improve the built environment. Additionally, the City intends to diversify tree species in order to reflect the changing migratory patterns of trees in the Goshen region due to a changing climate. An example of this is the sugar maple. This tree species has thrived in the Goshen area, but Goshen will increasingly be on the southern fringe of this tree's ideal habitat as the climate changes.

Adopting policies and practices to support the canopy goal on City-owned property can have a two-fold impact on our Climate Action Plan and the emissions it seeks to reduce. First, increased tree canopy can directly reduce emissions by lowering energy consumption, especially in summer months when air-conditioning is employed. Trees can also reduce winter heating needs by blocking freezing windchills. Goshen's public tree inventory calculates that public trees saved \$408,000 in energy consumption costs in 2020. Additionally, tree canopy captures significant amounts of precipitation, keeping more than 16 million gallons of stormwater (2020) out of our sewer system, some of which would be treated, causing the release of emissions. Secondly, trees offset greenhouse gases: by sequestering greenhouse gases, trees allow the City to deduct emissions from the total gases that are released into the

atmosphere. Greenhouse gas emissions are a product of the activities that support Goshen's essential services. The City cannot realistically achieve Net Zero Emissions by 2035 without offsetting some of those emissions. Our inventoried public trees (roughly 14,000) offset 1207 MTCO₂e in 2020 – 80 percent of 2019 Goshen City government-operated vehicle emissions (1505 MTCO₂e). This is a significant contribution to our overall goal of achieving zero emissions. As the City leads the canopy goal effort toward 45 percent city-wide, we can continue to plant and

care for trees to increase the important emissions offset which they contribute.

Achieving 45% canopy will require substantial planting in private property beyond the jurisdiction of the City. Nevertheless, the City will need to play its part in planting trees where feasible. With potential state-level legislation, a growing issue is continued crowding of rights-of-way with various underground infrastructure (water, sewer, gas, electricity, telecom). Such crowding becomes prohibitive for trees and other green infrastructure. This is an issue which the

SNOWY OWL LIKE THE ONE THAT VISITED THE GOSHEN AIRPORT IN DECEMBER 2020.



TREE CANOPY

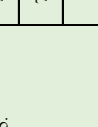
City may need to address in order to accomplish the aims of the Canopy Goal.

It is important to recognize that while an increase in tree canopy will provide substantial benefits, there is also some increase in cost. More trees will produce

more leaves and debris over the years. Goshen residents have an important opportunity to assist the City toward the combined goals of the Canopy Goal and the Climate Action Plan by willingly adopting a culture of on-site leaf management (mulching,

composting, etc) where possible, as well as woody debris management. Doing so will reduce the labor and emissions associated with this task. The City can engage the community on this and other related Canopy issues.

STRATEGY # 7 TREE CANOPY

Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Co-Benefits						Suggested Responsibility	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans
					Reduce GHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality	Improve Government Resilience	Environmental Resilience with others					
Urban Forestry 	Urban Forestry - Increase the Tree Canopy to 45% by 2045.	7.1	Develop an internal policy to protect current city-owned forests.	1st Year	✓	✓	✓	✓	✓	Environmental Resilience with others	Discussion as a part of flood resilience plan development		Goshen Comprehensive Plan 2025, NE-4: Maintain, grow and promote Goshen's urban forest program. Goshen Parks Master Plan 2019-2023, Urban Forestry Division. Goshen Urban Tree Canopy Goal 2019		
		7.2	Update Urban Tree Canopy Assessment every five years to track progress toward 45% goal and to monitor the integrity of existing forested land. Maintain public tree inventory.	1st Year	✓	✓	✓	✓	✓	Environmental Resilience	Environmental Resilience Staff Time	15,000 \$		3,000.00	
		7.3	Collaborate with landowners, promote long-term protection of forested land.	1st Year	✓	✓	✓	✓	✓	Environmental Resilience	Environmental Resilience Staff Time				Community benefits in stormwater retention, lower energy costs, improved quality of life, lower ambient temperatures.
		7.4	Identify, map, and grade city-owned forested land.	1st - 2nd Year	✓	✓	✓	✓	✓			to be determined		to be determined	
		7.5	Identify needs and opportunities to increase acreage of forested land.	On-going	✓	✓	✓	✓	✓	Environmental Resilience with others					
		7.6	Update the tree ordinance including policy in support of the canopy goal.	1st Year	✓	✓	✓	✓	✓		Can be done as part of flood resilience plan development.				

STRATEGY #8

SUSTAINABLE ENERGY

By making investments in green energy, the City can develop greater energy independence and offset a portion of its own emissions.

Developing the City's own sustainable energy source will be an important component to attaining some energy independence from both the purchase and delivery of energy through market fluctuation and long-term increases in the cost of that energy. By making sustainable energy investments, the City can develop greater energy independence and offset a portion of its own emissions.

Currently, the City acquires over 99% of its energy from NIPSCO. NIPSCO is aggressively working toward generating sixty-five (65) percent of its electricity from renewable sources by


2028. Solar has become cost-effective and NIPSCO is currently interested in making large investments in clean energy sources. The City's government operations could meet its electricity needs with the addition of approximately 5.5 megawatts of energy generation if that electricity could be net metered. Given the current regulatory environment and the cost-benefit of large solar installations, now is a favorable time to invest in energy infrastructure.

The City could also look to develop community partners in the shared investment of energy projects.





STRATEGY # 8 SUSTAINABLE ENERGY

Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Co-Benefits				Suggested Responsibility	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans	
					Reduce GHG	Improve Quality of Life & Workplace	Improve Wildlife Habitat	Improve Water Quality						Improve Government Resilience
Sustainable Energy 	Evaluate options for developing local, sustainable energy supply to increase energy independence and reduce emissions.	8.1	Based on available solar footprint and energy consumption, identify buildings and properties that could be used for renewable energy installation. Develop a cost-benefit analysis for best scenario properties that can be used as a starting point if funding is available.	2nd year - Review Annually	✓	✓	✓	✓	✓	Cost and return on investment to be determined. Many large solar investments are becoming an 8-10 year payoff.	0	0	0	Goshen Comprehensive Plan 2025 - NE-8: Encourage sustainable living and business practices
		8.2	Develop a 5-year plan to incorporate energy generation at select sites.	2nd Year	✓	✓	✓	✓	✓	0	0	0	0	
		8.3	Evaluate Investing public funds in local renewable energy projects	3rd Year	✓	✓	✓	✓	✓	0	0	0	0	

STRATEGY #9

EDUCATION

The question will be, are we willing to form a different view and establish new practices to save money, reduce energy consumption, and reduce emissions?

Effective employee education is vital to the City's success in meeting emissions reduction targets. Many of the policies and behaviors that will reduce emissions are not currently a part of American cultural norms. The program's success depends on employees' and leaders' ability to objectively look at policies and practices with a critical eye and separate norms from factual information to determine best practices that both get the job done and are good for the environment, which sustains our community.

For example, many can probably agree, given adequate information, that lawn care practices which resemble vacuuming and cleaning a living room are not healthy for the living residents


or the visitors to the lawn. The question will be, are we willing to form a different view and establish new practices to save money, reduce energy consumption, and reduce emissions?

Emissions reduction is often a solitary job with one small success by one individual employee at a time. That makes it critical for every employee to understand why their participation in this Climate Action Plan is necessary to achieve emissions reductions. It will be the efforts of many people that equate to success. As we are willing to try new things, take the small steps, and then work into larger ones, the City will succeed.

WASTEWATER TREATMENT TOUR

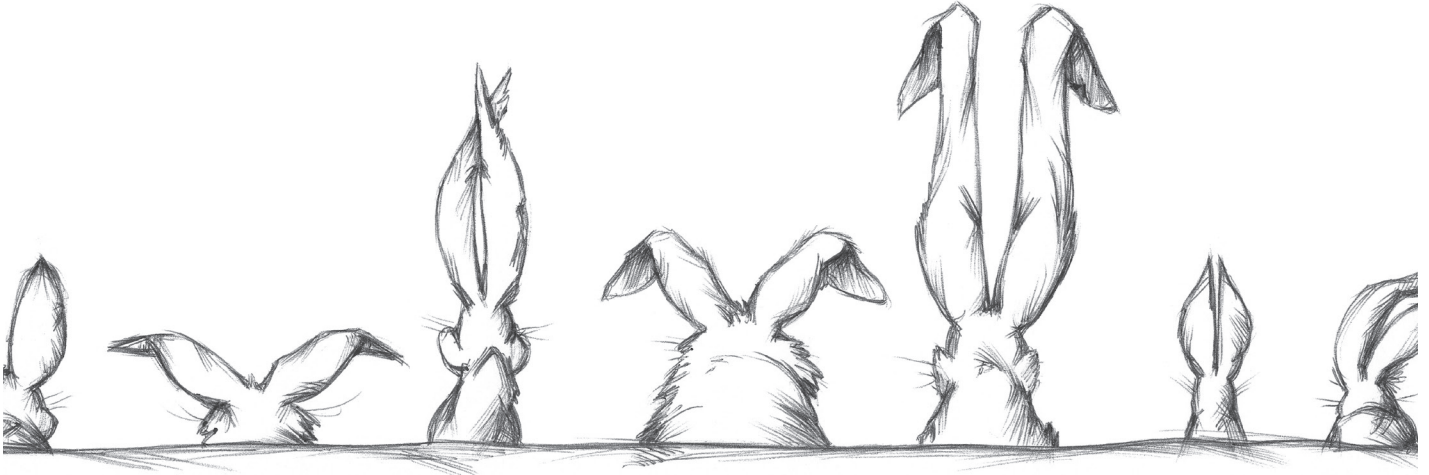




Emissions Category	Target Goals	Action #	Actionable Items (not all-inclusive)	Review Timeline	Co-Benefits	Suggested Responsibility	Initial Investment	Additional Annual Investment	Annual Savings	Related Community Plans
Education	<p>Develop eco-literacy across all city staff. Work to ensure employees can identify emissions reduction strategies and their benefits.</p> 	9.1	<p>Develop and implement employee training on green infrastructure, low-impact development, climate action mitigation, and adaptation practices. Implement pre and post surveys, when possible.</p>	1st Year and on-going	<p>Reduce GHG</p> <p>Improve Quality of Life & Workplace</p> <p>Improve Wildlife Habitat</p> <p>Improve Water Quality</p> <p>Improve Government Resilience</p>	<p>Environmental Resilience with assistance and participation from all Departments</p>	Staff time	\$1,500	Employee Development	<p>Goshen Comprehensive Plan 2025, C-5: Expand Opportunities for lifelong learning</p>
		9.2	<p>Include front line employees in problem solving processes involving reduction of GHG and development and implementation of mitigative practices.</p>	1st Year and on-going	<p>✓</p>		0	0	Employee Development	
		9.3	<p>When appropriate, provide flexible hours to allow employees to participate in other environmental education programs, such as Indiana Master Naturalists, 1st Year Master Gardeners, Tree Stewards, etc. Create guiding policy on what kinds of education are sanctioned.</p>	1st Year	<p>✓</p>		0	0	Employee Development	
		9.4	<p>Continue employee newsletters promoting environmental and climate awareness. Develop other media sources (video) for internal awareness raising.</p>	1st Year and on-going	<p>✓</p>				Employee Development	

EQUITY

Climate change will impact all of us in Goshen, but it will especially affect those already the most vulnerable and underserved.



One of the most important aspects and outcomes of creating and following a climate action plan is equity.

Equity is a term that sounds a lot like “equality” and certainly has a similar aim, but equity has to do with the structures and systems that allow equality to either flourish or fail. An oversimplified example might be to imagine that all the households in Goshen are allocated an equal amount of clean water each day – this sounds fair; but there is an equity problem because not all households have the same number of residents, meaning that some people actually receive more clean water and some receive less. Of course, we intend to solve this problem by allowing each household to pay an equal rate for as much water as they need. What if there is an equity issue regarding the funds necessary to pay for equal access to clean water?

Our government operations climate action plan seeks to move us towards equity – that is, towards operations that benefit all people in an equitable fashion. That’s a really high bar, and just like many of the goals in this plan, equity will not be

met quickly or necessarily with ease. This is in part because we are used to thinking about “equal” – which is a lot easier to measure and distribute than equity. Equity means putting the resources where they are most needed, which does not always mean equal distribution. For example, flood relief funds should go to those who experience flood damage, not to those who are high and dry.

How might a focus on equity within the context of this climate action plan change the nature of our government operations? If cost savings and reduction in greenhouse gas emissions are the metrics of success for our plan, then equity – an appropriate distribution of resources – should become an instinctive partner in working toward that success. In fact, there are ways in which we do this instinctively already – sharing equipment, sharing work hours, sharing funds, even sharing sick hours. We should understand that reducing our energy consumption, for instance, is part of what it means to equitably distribute resources appropriately: energy which we don’t use saves us money; the money can be used effectively for some

other service; the energy can be used effectively for some other service; the other service benefits a broader swath of our public in incremental (but accumulative) ways; the service itself can be targeted equitably, brought to residents whose need is greatest; the reduced emissions from lower energy consumption incrementally (and accumulatively) reduce the impacts of climate change, in Goshen and far away, which further conserves an array of resources, which can be equitably allocated.

Climate change will impact all of us in Goshen, but it will especially affect those already the most vulnerable and underserved – the people for whom equity matters most. At its heart, responding to climate change is about equity. The essential mission of the City is to serve our residents well. This climate action plan will help us do so by allocating our resources in an increasingly equitable manner to offer optimal services that build quality of life for all of us.