Clearwater Greenprint 2.0

Competitive.
Vibrant.
Green.

CLEARWATER
SUSTAINABILITY & RESILIENCY

Credits and Acknowledgements

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2018 Greenhouse Gas inventory assistance from ICLEI, Local Governments for Sustainability.
Front cover image provided by the Spring Branch Neighborhood and Park Association.

Table of Contents

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Green Glossary

Affordable Housing	housing in which the occupant pays no more than 30% of their gross income in housing costs
Biomass	plant or animal material that is used to produce energy
Bioswale	ground channels that are typically vegetated and designed to gather and transfer stormwater runoff while removing debris and pollution from the water
Brownfield	previously developed land, usually with prior industrial uses, that is not currently in use and may be contaminated with potentially hazardous waste
Bus Rapid Transit (BRT)	a bus-based public transportation system that has been designed to improve the reliability of bus services.
Climate Adaptation	as defined by the Intergovernmental Panel on Climate Change (IPCC), it is the process of adjusting to an actual or expected climate and its effects with the ultimate goal of moderating or avoiding harm
Climate Change	a long-term change in average global or regional climate patterns. This term specifically refers to the change noted in the late 20th century and scientific projections of continued change in the future. Climate Change is largely attributed to the increased levels of atmospheric greenhouse gases due to human activity
Climate Mitigation	the act of limiting the magnitude or rate of climate change, generally done by reducing greenhouse gas emissions from human activity
Compostable	materials that can break down naturally into organic matter to create nutrient-rich soil
Complete Street	streets designed and operated to prioritize safety, comfort, and access to destinations for all people who use the street, especially people who have experienced systemic underinvestment or whose needs have not been met through a traditional transportation approach
Congestion	an excess number of vehicles on a portion of roadway at a particular time that results in slower than normal flow of traffic
Critical Infrastructure	the physical and digital systems and assets that are so vital to the community that their incapacity or destruction would have a debilitating impact on physical or economic security or public health or safety
Energy Efficiency	technology that reduces the energy needed to produce a desired effect
Environmental Justice (EJ)	as defined by the Environmental Protection Agency, it is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies

Equity	shared economic, legal, environmental, and developmental rights of access to collective resources amongst all people within a society
Food Security	the state of having reliable access to affordable, nutritious, and sufficient food
Foodshed	a geographic area that produces the food for a specific population
Fossil fuels	fuels created by the anerobic breakdown of dead organisms that release energy when combusted, these include fuels such as gasoline, oil, and coal
Gentrification	a process in which lower-income areas of a community experience an increase in middle class to wealthy land buyers who renovate homes and businesses, resulting in an increase in property values and the displacement of lower income residents who have historically lived or owned land in the area of interest
Greenhouse Gas Emissions (GHGs)	any gas that is capable of absorbing heat energy from earth surface and readmitting that heat back to earth's surface, creating a "greenhouse effect". The most common greenhouse gases include carbon dioxide, methane, nitrous oxide, and fluorinated gases.
Greenspace	an area within an urban environment that is mostly vegetation (such as grass, trees, wildflowers, shrubs, etc.) and is set apart for ecological, recreational, or aesthetic purposes
Greyfield	land that contains a large structure, like a shopping mall or commercial facility, that has been abandoned
Invasive Species	an organism that is introduced to a new area and causes ecological harm within its new environment
Livability	all of the factors that comprise a community's quality of life, which may include both the built and natural environments as well as economic prosperity, social stability and equity, educational opportunity, and cultural, entertainment and recreation possibilities
Local Food	food that is produced within a short distance of where it is consumed
Municipal	relating to a local governing body such as city, town, or village
Native Plant	a plant species that is indigenous to a specific area, meaning it has occurred naturally in that area for a long time
Ocean-friendly	an item or business that reduces or eliminates the use of single use plastics such as plastic bags, Styrofoam, plastic straws, and so on
Organic Waste	material that naturally breaks down and comes from a plant or animal
Photovoltaic (PV) Systems	systems that collect and concentrate sunlight to produce the heat needed to generate electricity
Public Transit	a system of transportation available to the general public in which groups of people travel on established routes and schedules

Public-private Partnerships	a cooperative arrangement between two or more organizations within the public and private sectors, usually between a governing body and a business, that works to complete a project or provide services to a community
Recycling	the process of collecting and processing materials that would otherwise be thrown away and turning them into new products benefiting the community and the environment
Re-commissioning	a structured process of testing a facility's systems and equipment to ensure they are functioning efficiently
Redevelopment	the process of changing a property or an area of a city by replacing old structures (such as buildings, roads, etc.) with new ones
Remediation	the removal of contaminants from soil, groundwater, sediment, or another environmental substance
Renewable Energy	energy from a source that is not depleted when used (such as wind or solar power)
Resilience	the ability of a piece of infrastructure, system, environment, or community to sustain or recover its essential functions when presented with a disruption
Retrofit	the process of modifying something after it has been constructed
Sea Level Rise	a global phenomenon in which global warming causes an increase in volume and quantity of water in the world's oceans. Thought it occurs globally, symptoms of sea level rise can vary based on geographic location
Sequester (carbon)	the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils
Solid Waste	a waste type that consists of everyday items discarded by the public, also called garbage or trash
Stormwater	surface water that is produced in excess due to heavy rainfall
Sustainability	meeting current needs without compromising the ability of future generations to meet their own needs
Trip	a one-way person movement by a mechanized mode of transport
Triple Bottom Line	a measurement of the financial, social, and environmental performance of an organization
Urban Agriculture	the process of growing, processing, and distributing food within or near highly populated areas
Vehicle Miles Traveled (VMT)	a measurement of the amount of travel all vehicles within a specific geographic region performed within a given time period (generally one year)
Vulnerability Assessment	the process of defining identifying, classifying, and prioritizing different parts of a system that may be adversely affected during a hazardous event
Wastewater	water that was previously used in a home, business, or industrial facility

Executive Summary

In 2011, Clearwater Greenprint was adopted through the help of many residents, businesses, and city staff members. Clearwater Greenprint creates a vision to make the city of Clearwater a vibrant community for current residents and future generations. In 2021, Clearwater Greenprint 2.0 was published to advance that vision.

While this Executive Summary provides a quick overview of the contents of the Clearwater Greenprint, it cannot be substituted for the main document.

- Defines sustainability, resilience, adaptation, mitigation, and other pertinent terms, and discusses their relevance to the document
- Communicates results of the 2010 and 2019 Greenhouse Gas Inventories
- Includes projections for business-as-usual emissions and emissions with interventions by Duke Energy
- Defines overarching Goals and Objectives for the city of Clearwater to mitigate climate change impacts, actualize adaptation measures, and improve local resilience
- Defines Target Timelines for more specific reductions toward accomplishment of overarching Goals and Objectives
- Provides reader-friendly Strategies toward compliance with Target Timelines
- Expounds on specific actions and identifies assumptions and limitations associated with accomplishment of Strategies in Implementation and Measurement Methodologies
- Sources input on relative cost and benefit from staff
- Gauges staff's perception of specific actions' efficacy

Notes on Document Structure

Clearwater Greenprint 2.0 document is comprised of a hierarchy of four components: goals, objectives, targets, and strategies.

- Goals and Objectives are defined in section 2 titled, "Welcome to Clearwater Greenprint 2.0,"
- Targets are provided in section 3, titled, "Target Timelines," and
- Strategies are outlined in sections 5-12 and elaborated on further in **Appendix II.**

Refer to Figure 1.1 to the right which breaks down the overall document structure.

Appendix II specifies actions to be carried out in order to achieve each Strategy. It also suggests methods for measuring progress through identification of technical standards and weighs the costs and benefits associated with the attainment. An excerpt from **Appendix II** is shown in Figure 1.2 showing the cost/benefit comparison matrix and the Implementation and Measurement Methodologies for each Core Topic Strategy.

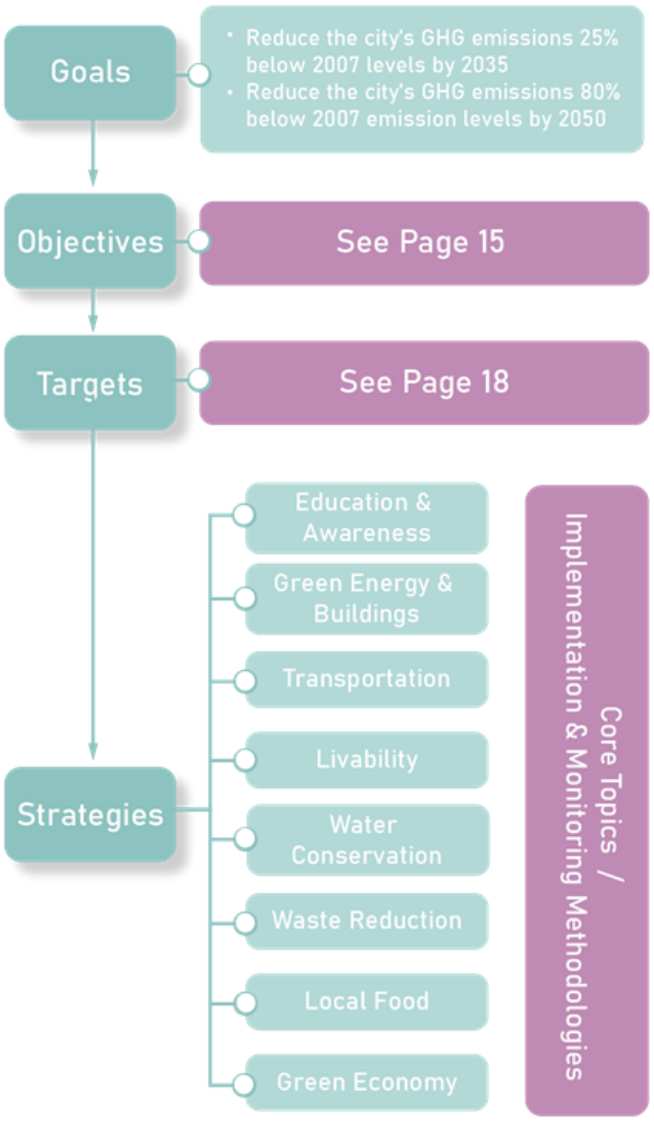
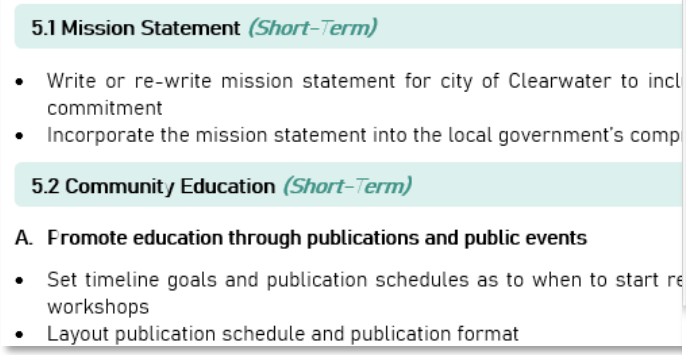


Figure 1.1.- Detailed Document Hierarchy Chart



5.1 Mission Statement *(Short-Term)*

- Write or re-write mission statement for city of Clearwater to incl commitment
- Incorporate the mission statement into the local government's comp

5.2 Community Education *(Short-Term)*

A. **Promote education through publications and public events**

- Set timeline goals and publication schedules as to when to start re workshops
- Layout publication schedule and publication format

Figure 1.2.- Excerpt from Appendix II

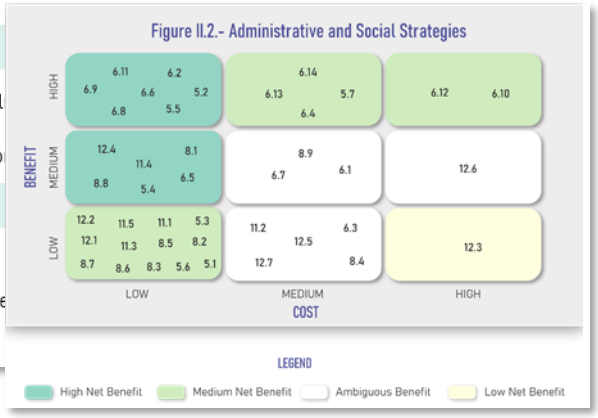


Photo Credit: Paul Sacca

Welcome to Clearwater Greenprint 2.0

A community plan for sustainability

What is Sustainability?

Sustainability means different things to different people. Some people might think of recycling, and others might think of solar panels or growing their own organic food. What is sustainability, really?

The United Nations defined the word sustainability in 1987 as the ability to, *"meet the needs of the present without compromising the ability of future generations to meet their own needs."* In essence, sustainability is about helping the people of today and people of tomorrow meet their needs. Sustainable communities work with and within nature. They use resources that can be renewed, and attempt to reduce waste, reuse materials, and find ways to safely return resources back to the environment. Sustainable communities also make plans and decisions that balance the three parts of a **triple bottom line**: economic prosperity, environmental quality, and human quality of life.

If we think about sustainability in terms of a triple bottom line, we realize that it is not an unfamiliar concept. For most of our history, humans have lived in a way that had minimal impact on the world's natural resources. However, over the course of the last century, we have caused large-scale declines in the quality of water, air, and soil, and devastated animal and plant species worldwide. Since communities depend on natural resources to maintain a prosperous economy and good quality of life, working hard to preserve the integrity of the environment helps ensure our communities' continued prosperity.

Why Sustainability?

Recent human actions such as unchecked pollution and mass deforestation have negatively impacted the climate and degraded natural ecosystems causing high rates of species extinction, global temperature increase, rising seas, and dying coral reefs. Scientists expect Americans to experience more severe heat waves, droughts, flooding, wildfires, and hurricanes in the future if we continue with current trends in fossil fuel usage. Studies show that these impacts will afflict our economy, strain our natural resources, and worsen inequalities for many Americans. These are only a fraction of the negative impacts stemming from **climate change**, but they speak to the urgency of countering its effects.

Despite all this, we have only recently begun to take action. Thankfully, local governments and community residents can contribute to a solution to the climate change problem by building low-carbon communities which are not dependent on carbon intensive resources. Cities use 75% of the world's energy and produce 80% of the world's **greenhouse gas emissions**. Though this fact may not seem like a positive thing at first, it means that the collective actions of cities, including the city of Clearwater, will result in an appreciable reduction in the world's greenhouse gas emissions. The city of Clearwater has an opportunity to set an example for other cities and have a positive impact on the world.

Sustainability isn't just about the planet, it's about people. Sustainable communities are stronger communities. In addition to addressing climate change, being a sustainable community has other important benefits such as:

1. Saving Money

The city of Clearwater spent over seven million dollars in 2018 on energy to power buildings and streetlights. Many of the measures in Greenprint 2.0 "pay for themselves" quickly by reducing direct costs, such as fuel or energy used, as well as indirect costs such as maintenance. For instance, a "right-sized" vehicle fleet is less expensive to purchase and fuel, while also being less costly to maintain. Encouraging **energy efficiency**, **public transit** use, building improvements, and other measures will also result in lower energy and water bills for residents and employers. The economy benefits by reducing the amount of money each person spends on energy and water. This money can instead be used at local businesses, supporting the city of Clearwater's economy.

Acting now will also save on runaway costs on climate change—especially in the long term. These costs range from infrastructure damage in extreme storms and pest control, to industry losses, particularly for industries that depend on environmental conditions, such as tourism.

2. Creating Jobs

New green sectors such as sustainable tourism, green construction, and **urban agriculture** provide additional job opportunities in growing economic sectors. These activities can spur business and job growth through the design, manufacturing, and installation of energy efficient technologies, presenting a special opportunity to reinvest in the local economy and generate green jobs. For example, a 2019 Environmental Entrepreneurs' report estimated that the solar industry employed nearly 335,000 workers. Solar professions within the United States have increased 167% over the past decade according to the National Solar Jobs Census and Florida leads the nation for the number of jobs added.

3. Improving Public Health

Our health improves with cleaner air and water and more time spent outside engaging in physical activities such as walking and biking. Sustainable changes, including using different modes of transportation, helps clean the air and improve public health by reducing

vehicle emissions. Improvements that promote alternative transportation also give Clearwater residents more options for getting around. When combined with other activities like **redevelopment** of underutilized properties, these improvements create more vibrant, livable community with shorter commute times and more opportunities for active transport.

Sustainable changes create equitable access to amenities for residents living in low-income areas across the country. Many of these low-income areas lack the trees and greenery that create shade and improve the appearance of more affluent neighborhoods. Residents of these low-income areas also have a higher likelihood of living in or near areas covered in dark surfaces. The overabundance of blacktop causes residents to suffer more from summer heat, leading to higher health costs.

What is Resilience?

Community **resilience** is defined as, *"a measure of the sustained ability of a community to utilize available resources to respond to, withstand, and recover from adverse situations."* Therefore, a resilient community is one that can face a challenge and still retain its essential function. "Sustainability" and "resilience" are qualities of a community that complement each other. While sustainability focuses on having a brighter future, resilience is all about adapting to the different stressors we face now. Whether it's a natural disaster, **sea-level rise** or a drastic change in economy, a resilient community is one that can anticipate and positively adapt to changing conditions.

Why Resilience?

1. Creating Proactive Communities

Resilience transforms reactive communities into proactive communities. Rather than solely developing plans to deal with the aftermath or a natural disaster or economic downturn, resilient communities develop measures to prevent massive disruptions from harming its people and systems. While Clearwater Greenprint 2.0 focuses on resilience through the lens of **climate adaptation**, resilience is a practice that can be implemented in all aspects of an organization.

2. Promoting Energy Stability

The farther energy travels from its source, the more energy that is wasted. Most electrical power in Clearwater is currently supplied by Duke Energy. The closest energy source for Clearwater is a fossil fuel power plant approximately 15 miles away near Holiday. This creates an opportunity to improve energy efficiency by generating more energy locally. **Renewable energy** can be generated in many ways including through the power of the sun, wind, and water. Installing solar panels on homes and businesses reduces energy waste since energy generated does not need to travel far from its source before it is used. Renewable energy is also a sustainable solution to the problem of meeting energy needs in times when energy is in high demand or unavailable from far away powerplants. This means

that on hot summer days, and in the aftermath of major storms, renewable energy can keep lights on and air conditioning running within the homes, businesses, and municipal facilities of Clearwater.

3. Ensuring Food Security

Like energy, transportation of food over long distances results in waste and negative environmental impacts. Currently, nearly all of Clearwater's food is imported from elsewhere. The city's resiliency can be improved by producing more food locally to reduce inefficiencies caused by transporting food over long distances. Local food production also protects against service disruptions caused by a variety of factors, including the effects of climate change, economic change and political conflict.

4. Establishing Economic Security

The Fourth National Climate Assessment estimates the costs of climate change in the United States could total more than $2 trillion a year by the end of this century. Much of this cost results from the damage intense storms and flooding are expected to inflict on infrastructure and private property.

Adopting resilient solutions saves cities a significant amount of money on future energy, water, and infrastructure needs. This is due to the increased ability of these systems to adapt or withstand future climate stressors, which are events, trends or conditions that result from climate change that can magnify hazards. Resilient communities face fewer system failures and costly repairs. Innovative cooling technologies and adaptions further cut energy bills while the benefits these innovations bring to health and **livability** are expected to compound over time.

While cities drive the national economy, small businesses drive the local economy. Small businesses make up 99.7% of all US employers. Small businesses are threatened by the effects of climate change and the increasing number of disaster events. Small firms are especially challenged by disaster events, as the U.S. Chamber of Commerce notes that 43% of small businesses do not recover from natural disasters.

Let's Learn from Each Other

The complex problems of climate change affect each municipality differently. Therefore, detailed insights about current conditions and prospective solutions from citizens and stakeholders is critical in the process of identifying and implementing effective measures for adaptation and mitigation. Clearwater can provide invaluable guidance on the concrete impacts of proposed remedies—parsing out measures that will provide the greatest benefit from those that can only offer marginal relief.

Figure 2.1 The impact of local actions

Where Are We Coming From?

Clearwater Greenprint was adopted in 2011 through the collaboration of residents, businesses, and the City. Clearwater Greenprint creates a vision to make Clearwater a vibrant community for everyone who lives here now and for generations to come.

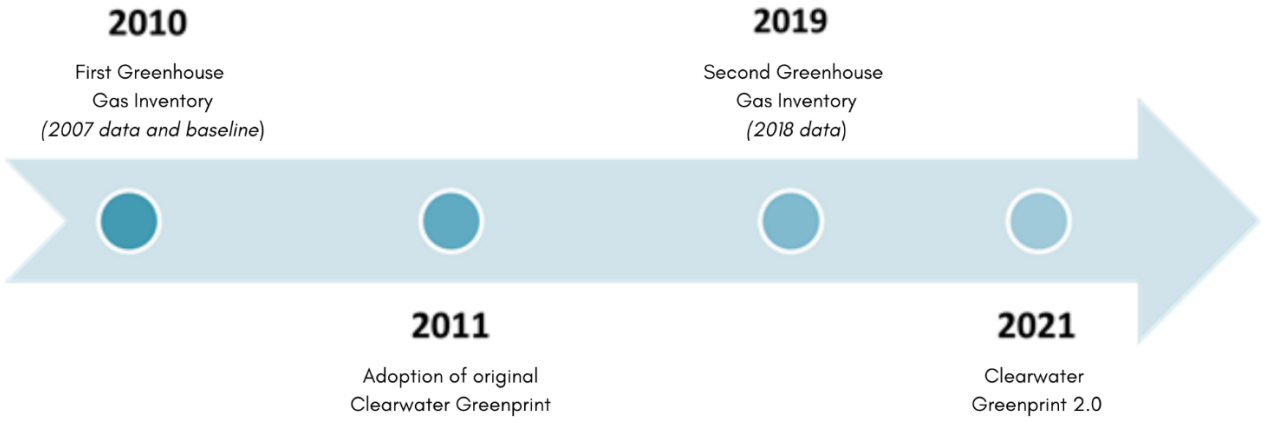


Figure 2.2.- Clearwater Greenprint timeline graphic

Reducing the city's greenhouse gas emissions was determined to be the number one goal of Clearwater Greenprint. Why? Because The current over-abundance of greenhouse gases in the atmosphere caused by human activity is a major contributor to climate change and closely related to other environmental concerns within the city of Clearwater. Large amounts of greenhouse gases in the atmosphere are known to worsen sea-level rise, drought, flooding and so on. It is critical that we reduce our greenhouse gas emissions to ensure that Clearwater remains a great place to live, work and visit.

Measuring Our Greenhouse Gas Emissions (GHGs)

In addition to being caused by human activities, climate change also occurs because of the earth's natural cycles. For example, the amount of the best-known greenhouse gas, Carbon Dioxide (CO_2), in the northern hemisphere changes from one season to the next as plants undergo cycles of growth. Despite this, scientists have observed an enduring upward trend in greenhouse gases that are attributed solely to ongoing human activities such as the burning of fossil fuels, commercial animal agriculture, and land development. In fact, about half of all carbon dioxide emitted between 1750 and 2010 occurred in the last 40 years. Therefore, even though the natural greenhouse effect is needed to keep the earth warm, the consensus among publishing climate scientists (97% in agreement according to the National Aeronautics and Space Administration) is that the accelerated rate at which humans are producing GHGs causes global warming and climate change.

The 2014 Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), was written by a panel of hundreds of climate experts and scientists and was approved by a team of external reviewers. The report states unambiguously that anthropogenic (human-made) GHG emissions are causing global climate change. For this reason, the city of Clearwater is joining an increasing number of local governments committed to addressing climate change at the local level.

The city of Clearwater recognizes the risk climate change poses to its residents and business owners. The city is actively acting to reduce the GHG emissions, or "carbon footprint", of both its government operations and the community at-large through innovative programs laid out in Clearwater Greenprint. Furthermore, it is recognized that Clearwater needs to address existing climate risks, such as sea level rise and temperature increase, and adapt its systems and infrastructure to new conditions.

With more than 80% of Americans living in urban areas, cities play a powerful role in addressing climate change. Adjusting the design of cities—how we use our land, how we design our buildings, how we get around—greatly impacts the amount of energy we use and the volume of GHG emissions we produce. Cities such as Clearwater can demonstrate that it is possible to dramatically reduce GHG emissions while creating vibrant and prosperous places to live by making appropriate and manageable adjustments.

The city of Clearwater first began monitoring its GHG emissions in 2007. It conducted a follow-up study in 2018. The following subsections summarize the results of both studies and compare city emissions levels over the span of approximately 10 years.

2007 GHG Emission Levels

The city took its first step in improving its carbon footprint in 2011 by calculating its community-wide GHG emissions. The study was based off of the city's 2007 GHG levels.

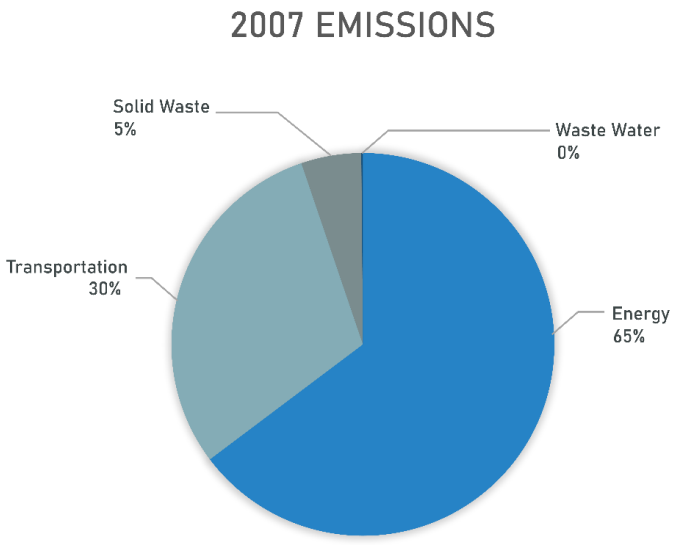


Figure 2.3.- 2007 Emissions chart

In 2007, city-wide greenhouse gas emissions totaled 1,295,619 metric tons of carbon dioxide equivalent ($MTCO_2e$). Emissions from energy consumption and transportation fuels were the largest contributors to the city-wide greenhouse gas inventory (65% and 30%, respectively). **Solid waste** contributed 5% while the city's water and waste-water operations accounted for 0.1% of emissions. The average GHG emissions per capita was 11.72 $MTCO_2e$ based on the city's 2007 population of 110,469. Based on these 2007 levels, GHG emissions were forecasted for 2035. It was projected that if city continued with "business as usual", city-wide emissions would grow by 4% to 1,347,443 $MTCO_2e$ by 2035.

Initial Clearwater Greenprint Goals

The City established two emission reduction goals based on the GHG inventory results:

1. Reduce city-wide greenhouse gas emissions 10% below 2007 levels by the year 2020
2. Reduce city-wide greenhouse gas emissions 25% below 2007 levels by the year 2035

The original Clearwater Greenprint was created to reach these emission reduction goals. The plan included real strategies that the city, businesses and local residents could bring into their daily lives to reduce greenhouse gas emissions. These strategies were selected to help create a sustainable community by making buildings and transportation systems more energy-efficient, maintaining a healthy local economy, creating "green" jobs, reducing waste, and encouraging shoppers and restaurants to buy locally grown foods.

Since 2011, the city has made significant progress towards its initial sustainability goals. Many of the original Clearwater Greenprint Plan strategies have been completed or are in progress. A Sustainability Coordinator was hired to facilitate fulfillment of the Greenprint strategies and ensure that the city's sustainability goals are reached. In 2021, Clearwater Mayor Frank Hibbard signed on as a Climate Mayor. The Climate Mayors group is a network of U.S. mayors who work together to address climate change by creating meaningful actions in their own communities.

Figure 2.4. Climate Mayors logo

2018 GHG Emission Levels

A second GHG inventory was conducted in 2019 using 2018 data to track the City's progress toward its 2020 climate goals. According to the inventory, the community-wide GHG emissions for 2018 were 1,128,690 $MTCO_2e$, 12.9% below its 2007 levels. Together, we achieved our first goal!

Like 2007, emissions from energy use and transportation fuels continued to be the largest contributors to the city-wide GHG inventory. However, emissions from energy consumption decreased from 65% in 2007 to 59% in 2018, while emissions from transportation fuels increased from 30% to 38%. This is thought to be a result of Duke Energy increasing its reliance upon renewable energy and natural gas which decreased emissions for the city of

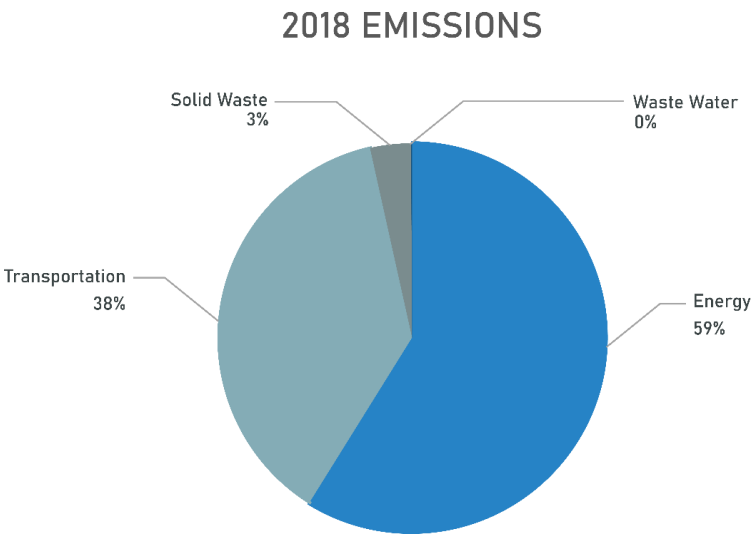


Figure 2.5.- 2018 Emissions chart

Clearwater. Solid waste emissions were reduced from 5% of the 2007 inventory to 3.3% of the 2018 inventory. The city's waste-water operations continued to have a marginal effect on the city's total emissions, reducing from 0.13% of the 2007 inventory to 0.12% of the 2018 inventory.

Where Are We Going?

Based on the city's population of 116,478 in 2018, average GHG emissions per person were 9.69 $MTCO_2e$. Based on the 2018 levels, Clearwater's community-wide emissions were forecasted for the next three decades.

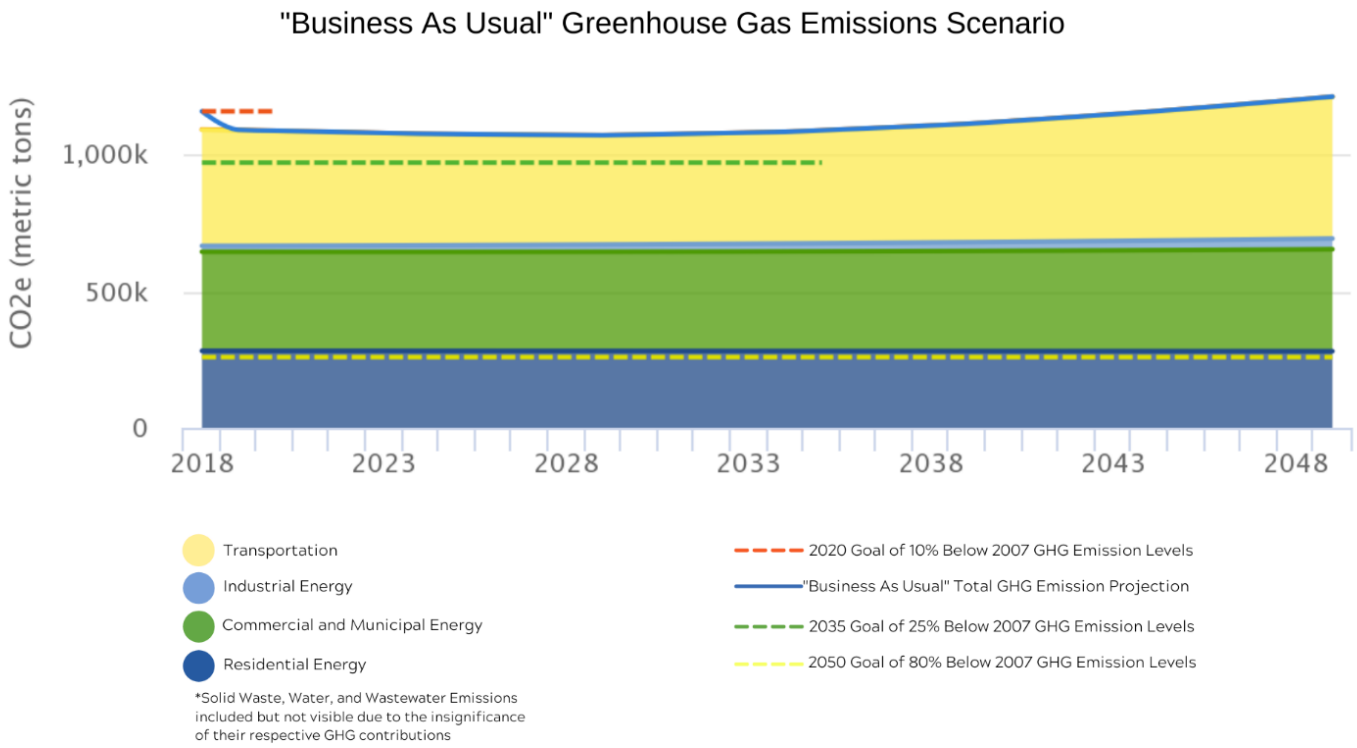


Figure 2.3.- Clearwater Business as Usual / Duke Renewable Energy & Carbon Neutral Goals Not Included; Projected CO_2e Values

Under this "business as usual" scenario, in which Clearwater does not make or experience any major changes to its emissions, the community's total greenhouse gas emissions would stand at nearly 1.1 million $MTCO_2e$ by 2035, increasing to over 1.2 million $MTCO_2e$ by 2050. This is largely due to the increased number of miles traveled by automobile per person.

However, in 2019 Duke Energy announced its goal of becoming carbon neutral by 2050. To achieve carbon neutrality, the utility company will shift its electricity energy sources away from coal and towards lower-carbon energy solutions. If this goal was to be achieved by Duke Energy, Clearwater's greenhouse gas emissions would fall to roughly 972,000 $MTCO_2e$

in 2035 and further to 823,000 $MTCO_2e$ in 2050. This decrease would occur even if the city did not pursue further greenhouse gas reduction measures of its own.

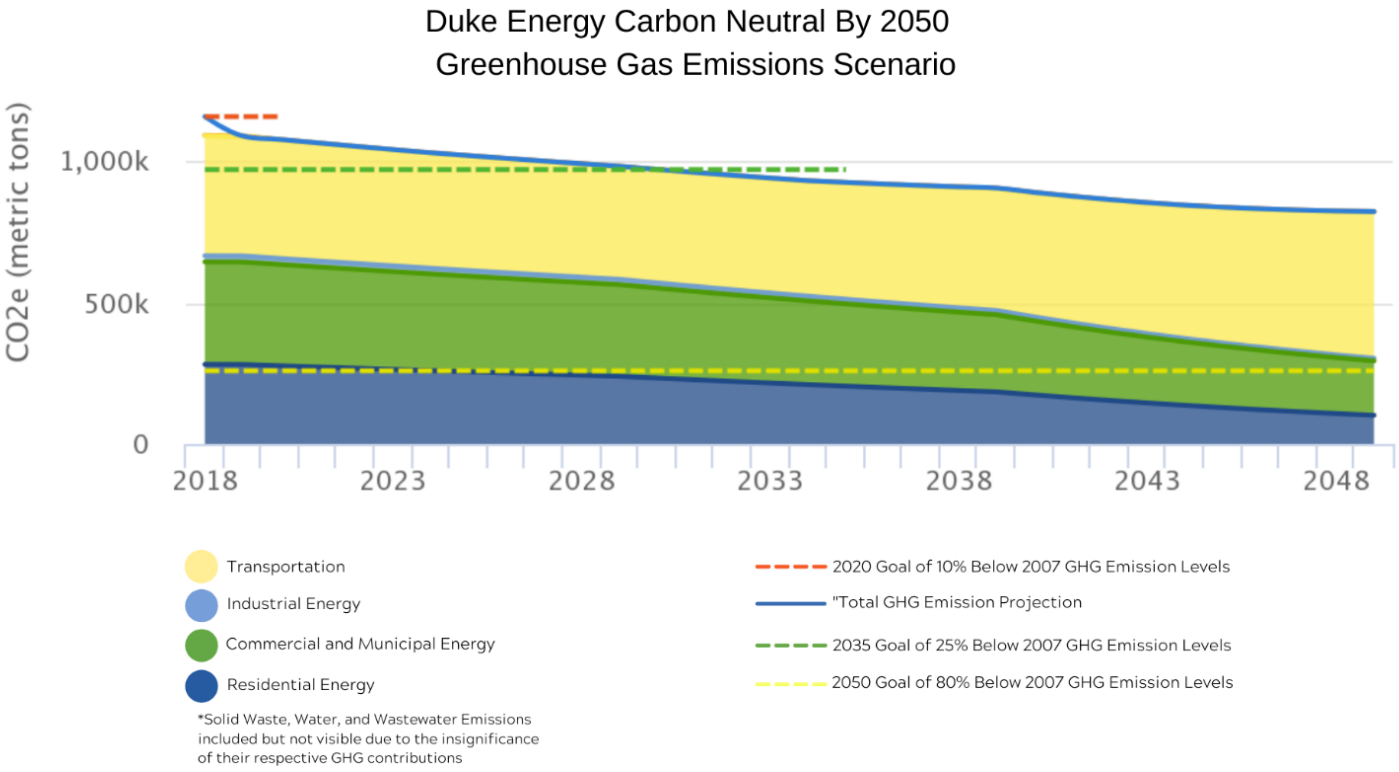


Figure 2.4.- Clearwater Business as Usual / Duke Renewable Energy & Carbon Neutral Goals Included; Projected CO_2e Values with Reductions Applied

In December of 2015, 197 countries, including the United States signed onto the historic Paris Climate Agreement. The overarching goal of this international climate accord is to limit global warming to well below 2° Celsius compared to pre-industrial levels. Though the United States temporarily withdrew from the agreement in 2020, the nation rejoined in 2021. In the years since the announcement to withdraw from the accord, local implementation of the Paris Climate Agreement has been a focus for local governments nationwide—including the city of Clearwater. The decision to rejoin the accord bolsters the city's ongoing GHG reduction efforts and opens the door to opportunities for much-needed federal aid. With new, more ambitious GHG reduction goals, Clearwater Greenprint 2.0 is anticipated to reduce community-wide greenhouse gas emissions to under 260,000 $MTCO_2e$ by 2050.

Envision Our Future

Clearwater Greenprint 2.0 has two overarching Goals:

- Reduce the city's GHG emissions 25% below 2007 levels by 2035 and;
- Reduce the city's GHG emissions 80% below 2007 emission levels by 2050

And also seeks to accomplish the following Objectives:

- Transform Clearwater into a community where people walk, bike, take transit, or carpool for most **trips** in a safe, accessible and affordable transportation network.
- Make Clearwater a leader in clean and local renewable energy opportunities.
- Transform our buildings into high-performing places to live, work, learn and play.
- Inspire community action and ensure **environmental justice** and **equity** as we transition to a lower carbon, more sustainable community.
- Create a thriving urban agriculture community in order to increase the local knowledge and abundance of healthy, sustainable food.
- Become a leader in sustainable, smart transportation through innovative partnerships, policies, programs and technology.
- Understand potential climate-related risks and mitigate these risks while preparing our community to chronic and extreme weather events.

The following lists the targets Clearwater Greenprint aims for in order to maintain a competitive, vibrant, and green Clearwater for future generations, while improving the quality of life for those who live here today.

Often, world problems can seem so daunting. But positive change is possible. And maybe it's not from one person doing a big thing but from many people doing small things. Chinese philosopher, Lao Tzu, stated *"a journey of a thousand miles begins with a single step"*. Greenprint invites you to find your "single step" and run with it. We are each essential to creating a sustainable city. Together, we can go far.

Photo Credit: City of Clearwater

Learn More About Climate Change and GHG Mitigation Benefits:

	Climate Change Impacts	Cho, R. (2019, June 20). How climate change impacts the economy. EI State of the Planet. https://blogs.ei.columbia.edu/2019/06/20/climate-change-economy-impacts/. Diffenbaugh, N. S., & Burke, M. (2019). Global warming has increased global economic inequality. *Proceedings of the National Academy of Sciences*, *116*(20), 9808–9813. https://doi.org/10.1073/pnas.1816020116
	Benefits of Energy Efficiency	Florida Public Service Commission. (2004, June 8). 105 Causes of High Utility Bills - Florida Public Service Commission. http://www.psc.state.fl.us/Publications/CausesOfHighBill. Weisbrod, G., & Reno, A. Economic Impact of Public Transportation Investment. American Public Transportation Association. Report available online at http://onlinepubs.trb.org/onlinepubs/tcrp/docs/TCRPJ-11Task7-FR.pdf
	Public Health Benefits	United States Environmental Protection Agency. (2021, February 5). Progress Cleaning the Air and Improving People's Health. https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health. Harvard Health Publishing - Harvard Medical School. (2010, July). A prescription for better health: go alfresco. Harvard Health Letter - A prescription for better health: go alfresco. https://www.health.harvard.edu/newsletter_article/a-prescription-for-better-health-go-alfresco.
	Food Import Environmental Impacts	Hannah Ritchie (2020). Environmental impacts of food production. OurWorldInData.org. https://ourworldindata.org/environmental-impacts-of-food. Rosenthal, E. (2008, April 26). Environmental Cost of Shipping Groceries Around the World. The New York Times. https://www.nytimes.com/2008/04/26/business/worldbusiness/26food.html.
	Duke Energy Climate Report	*Duke Energy 2020 Climate Report*. (2020). Retrieved February 22, 2021, from Duke Energy website: https://www.duke-energy.com/_/media/pdfs/our-company/climate-report-2020.pdf

Target Timelines

2025

- 10% reduction in energy use in city buildings
- Institutionalized climate adaptation as a citywide priority through formal adoption by ordinance
- Regional, state, and national climate adaptation partnerships in government and in the private sector
- Three new urban agriculture programs/centers available for the community

2030

- 20% reduction in energy use in city buildings
- 20% of electricity from renewable energy sources
- 5% of workers carpool to work
- 5% of workers bike to work
- 5% of workers walk to work
- 10% of workers use public transit
- 5% of workers telecommute
- Energy efficient building regulations are created and enforced for new construction
- 30% of new housing units within 1/4 mile of high-frequency transit designated affordable
- Food outlets located within a 15 minute walk of every resident sell fresh produce
- Miles of bike lane per resident in low-income neighborhoods are equal to that in higher income neighborhoods
- 20% reduction in energy costs to low-income residents
- Roof-top solar is installed on homes of 1,000 low and moderate income residents
- An emergency cooling center is located within a 10 minute walk in low-income neighborhoods
- 20% of workers use public transit

2050

- 90% of existing municipal buildings completed energy efficiency improvements in accordance with Recommissioning Plan and Energy Policy requirements
- 15% of workers bike to work
- 15% of workers walk to work
- Advocate for 100% carbon free public transportation
- 50% of all residents' light-duty vehicles are electric
- 100% of city's light-duty vehicles are electric or fueled by carbon-free fuel
- 50% of city's heavy-duty and freight trucks are electric or carbon-free
- Lower levels of heat-related illness and death are observed in 2050 than in 2018
- Reliability and affordability of potable water is maintained through water conservation, efficiency, and independence

How to read Clearwater Greenprint 2.0

Clearwater Greenprint 2.0 takes advantage of common-sense approaches and policies that our local government is uniquely positioned to implement – actions that can reduce energy use and waste, create local jobs, improve air quality and benefit Clearwater for years to come.

Document Structure

The diagram shown below outlines the document structure of Clearwater Greenprint 2.0. Some of the components of the plan, namely goals and targets have already been defined. Core Topics and Strategies are defined in the sections below.

Figure 3.5.- Document hierarchy diagram

Core Topics

Clearwater Greenprint 2.0 contains the same eight topics found in the original Clearwater Greenprint plan. These eight topics were identified as areas in which the city can achieve greenhouse gas reductions and cost savings:

- Education and Awareness,
- Green Energy & Buildings,
- Transportation,
- Livability,
- Water Conservation,
- Waste Reduction,
- **Local Food**, and
- Green Economy.

Strategies

The Clearwater Greenprint 2.0 includes measurable and achievable strategies that the city, businesses, and residents can incorporate into their daily lives to accomplish each target outlined in the previous section. In this document, strategies provide the foundation for addressing **sustainability** issues over a 30-year planning period and beyond. The strategies focus on actions that can be implemented at the local level over the span of 0-5 years (short-term), 6-10 years (medium-term) and 11-30 years (long-term). The Clearwater Greenprint 2.0 is intended to be a framework for specific action with built-in flexibility for timing and emphasis. Each Strategy corresponds to a Core Topic. For example, the "Community Education" Strategy is presented under the "Education and Awareness" Core Topic.

Green Glossary

Each of us has a different level of understanding and exposure when it comes to the environment, sustainability, and government functions. In order to make Clearwater Greenprint 2.0 accessible to everyone, a Green Glossary is provided at the beginning of the document. Words in green can be found there with an explanation.

Mitigation and Adaptation

The city of Clearwater is already experiencing effects of **climate change**. The 2020 Atlantic hurricane season was the busiest ever recorded with 31 tropical cyclones. The same year, the state of Florida experienced record-breaking temperatures for six months of the same year. Water levels in Tampa Bay have also increased nearly eight inches over the last 60 years.

Reducing community GHG emissions is **climate mitigation**, meaning it will reduce the negative impacts of climate change in the future. Clearwater Greenprint 2.0 also considers **climate adaptation**, the need to address the climate hazards that Clearwater already experiences in order to make the city resilient. Climate adaptation is a form of risk management. Current hazards, like increased heat, sea levels and precipitation levels, are magnified by climate change and the city needs to plan accordingly. As such, Clearwater Greenprint 2.0 proposes climate change mitigation strategies that support adaptation and avoid those that may contribute to anticipated climate change impacts.

Equity and Inclusion

Equity and inclusion components are interwoven throughout this document. Low-income populations, communities of color, people with disabilities, elders, refugees, immigrants, and other frontline communities often bear the brunt of climate impacts. Even worse, these communities often go without the necessary infrastructure and support systems to manage climate impacts and frequently do not receive any of the benefits of a clean and sustainable future. Inequity correlates with greater vulnerability to physical challenges, making many in Clearwater disproportionately at risk from the impacts of natural disasters and climate

change. Creating a resilient community entails addressing the social inequities that cause disparities in health outcomes, income, educational attainment, and more.

Emissions Reduction Potential

Calculating expected GHG emissions reductions for each mitigation strategy requires making assumptions about degree of implementation, technology, and individual behavioral changes several years into the future. Since the desired GHG emissions reductions have yet to occur, other measurable factors are used to predict their outcomes. The strategies discussed in this report are the predictive factors, and the symbols shown below represent their respective impacts on GHG reductions and Target Timeline items. The symbols distinguish between strategies with low potential impact, medium potential impact, and high potential impact on the Clearwater's GHG reduction goals. Strategies with an unknown impact are assigned their own symbol as well. This "unknown potential impact" symbol is used in cases where is difficult to gauge how certain tactics, like education and the localization of resources, will be embraced and acted upon.

Low Potential Impact

Medium Potential Impact

High Potential Impact

Unknown/Undefined Potential Impact

Learn More!

Interested in learning more about the topics covered in this document? Try clicking on the **green leaves** scattered throughout this document. The leaf will take you to an article or website with more background information. Links are indexed by subject matter topic at the end of each report section.

Strategy Status Indicators

Clearwater Greenprint 2.0 includes a combination of existing policies and programs as well as new ideas based on best practices locally and nationwide. The document notes whether a Strategy is currently ongoing, in-progress or not yet started. There are a few Strategies from the first Clearwater Greenprint plan that are no longer goals. These strategies will be listed in **Appendix IV** alongside an explanation as to why they are no longer included in the city's plan.

Not Started

In Progress

Strategy has been completed or is ongoing

Evaluation of Strategies and Their Benefits

In addition to measuring the GHG reduction potential, each Strategy is also marked for other benefits that may be experienced from implementing each Strategy. These benefits include public health, equity and justice, jobs and prosperity, environmental conservation, and **resilience**. The symbols below indicate the co-benefits each Strategy are likely to generate (if any).

Supports jobs and prosperity

Advances equity, inclusion, and justice

Improves local environmental conservation initiatives

Improves public health

Increases community resilience


Photo Credit: City of Clearwater

Education and Awareness

Photo Credit: City of Clearwater

It's going to take the entire community to create a sustainable, vibrant Clearwater. Raising community awareness with compelling and useful information about the importance of **sustainability** is vital. In addition to understanding the benefits of sustainability on Clearwater's environment, it is important to demonstrate that sustainability will result in improved human health and happiness, economic advancement, and a greater sense of community overall.

To achieve this awareness, the city will create and provide information to educate and involve Clearwater citizens in green best practices and programs. The city will incorporate Clearwater Greenprint 2.0 strategies and initiatives into its ongoing communications activities, creating opportunities to encourage responsibility and foster participation in making Clearwater a sustainable community. Opportunities for education and awareness can be realized by creating venues for different groups to work together. These include neighborhood associations, organizations, schools, businesses, utilities, and government agencies.

Photo Credit: Maranda Douglas

Education and Awareness – Strategies

Section	Strategy Name	Strategies
5.1	Mission Statement	A. Write or re-write mission statement for city of Clearwater to include environmental commitment. B. Incorporate the mission statement into the local government's comprehensive plan.
5.2	Community Education	A. Promote education through publications and public events. B. Provide pertinent local GIS and other data online.
5.3	Community Outreach	A. Develop new events that engage the community in sustainability through fun and innovative activities. B. Continue to host an annual sustainability conference.
5.4	Youth Programs	A. Continue youth education programs to educate students about resource conservation. B. Further current efforts by coordinating with the Pinellas County School Board.
5.5	Municipal Staff Education	A. Organize ongoing educational workshops and presentations to keep staff and elected officials up to date on sustainability initiatives and opportunities. B. Integrate sustainable practices into daily operations and serve as ambassadors and educators about city sustainability programs and projects in daily interactions with the public.

5.6	Continuous Reporting	A. Continuously measure, evaluate, and address both mitigation and adaptation progress in accordance with ICLEI Local Governments for Sustainability, USA Five Milestones for Climate Mitigation and Adaptation.
5.7	Resilience Planning and Outreach	A. Form a Resilience Committee comprised of city staff and community partners. B. Initiate a vulnerability assessment throughout the Clearwater area to identify the factors most at risk to climate change stressors. C. Formulate a Climate Action Plan to address each of the vulnerabilities identified and further direct the city's resilience work.

Photo Credit: City of Clearwater

5.1.- Mission Statement

A. Write or re-write mission statement for city of Clearwater to include environmental commitment.
B. Incorporate the mission statement into the local government's comprehensive plan.

The city of Clearwater is committed to accomplishing the strategies outlined in this document. In recognition of the fact that that other municipalities throughout the State of Florida have done the same, the city's mission statement and comprehensive plan will be revised to formalize this commitment.

5.2.- Community Education

A. Promote education through publications and public events.
B. Provide pertinent local GIS and other data online.

In early 2020, a Sustainability & Resilience webpage was created to inform the public about the city's sustainability goals and progress. This website also functions as a resource center, where Clearwater residents, businesses, and tourists can learn how to become more sustainable in their own lives.

The city will promote education through its publications and public events. A quarterly report about the city's sustainability progress will be available online and will be promoted through the city's email and social media accounts. The city will also create an annual workshop series that covers each of the Greenprint topic areas and will involve various staff and community members who are experts in each focus.

Photo Credit: City of Clearwater

5.3.- Community Outreach

A. Develop new events that engage the community in sustainability through fun and innovative activities.
B. Continue to host an annual sustainability conference.

Engagement is at the core of education. The city is committed to developing new events that engage the community in sustainability in fun and innovative ways. Examples include art contests, speaker and film series, and neighborhood campaigns.

In 2019, the city held its first sustainability conference. Created in partnership with the Clearwater Neighborhoods Coalition and Suncoast Sierra Club, the conference was titled "Building Better Neighborhoods Through Sustainability: A Toolkit for Positive Change". Topics included **energy efficiency** for the home, Florida-friendly landscaping, waste reduction, composting, and **ocean-friendly** lifestyle practices. The conference was well received, and the city intends to make this an annual event.

Figure 1.- Recycling education center at 2020 SeaBlues Festival

Figure 2.- 2019 Sustainability Conference

5.4.- Youth Programs

A. Continue youth education programs to educate students about resource conservation.
B. Further current efforts by coordinating with the Pinellas County School Board.

A successful education initiative must also engage Clearwater youth. Various departments, like the Public Utilities and Solid Waste/Recycling departments, have programs to educate students about resource conservation. The city will further this effort by coordinating with the Pinellas County School Board to create a School Sustainability Committee.

5.5.- Municipal Staff Education

A. Organize ongoing educational workshops and presentations to keep staff and elected officials up to date on sustainability initiatives and opportunities.
B. Integrate sustainable practices into daily operations and serve as ambassadors and educators about city sustainability programs and projects in daily interactions with the public.

The city will organize educational workshops and presentations to keep decisionmakers up to date on sustainability initiatives and opportunities as well as to keep City Council members connected to the Greenprint 2.0 goals, strategies, and initiatives. Designated city staff will pursue ongoing education and will maintain certifications pertaining to green project design. In addition, staff will integrate sustainable practices into daily operations while serving as ambassadors and educators for city sustainability programs and projects through their interaction with the public.

Clearwater staff will also be encouraged to engage personally with the city's sustainability efforts. Specifically, they will be encouraged to use fewer single-use plastics through distribution of reusable water bottles to all employees, and review Clearwater's commitment to the environment during new employee orientation.

5.6.- Continuous Reporting

A. Continuously measure, evaluate, and address both mitigation and adaptation progress in accordance with ICLEI Local Governments for Sustainability, USA Five Milestones for Climate Mitigation and Adaptation

Sustainability is an ongoing process. Communities must celebrate their successes while continuing to pursue further emission reductions and **resilience** improvements. While Clearwater has already begun to reduce GHG emissions and climate risk through a variety of actions, it must continuously measure, evaluate, and address both mitigation and adaptation progress. Thankfully, two approaches to achieve this ongoing work have been

developed by the International Council for Local Environmental Initiatives (ICLEI). These are known as the Five Milestones for **Climate Mitigation** and Adaptation.

Figure 1 Five Milestones for Climate Mitigation

Figure 2 Five Milestones for Climate Adaptation

Furthermore, tracking the success of existing and future green initiatives is a vitally important component of Clearwater Greenprint. To lead by example, the city will continue to highlight its green initiatives and report the associated benefits. Environmental, economic, and social metrics will be collected and reported. The benefits, costs, and lessons learned of the various efforts will be shared with the Clearwater community as well as other local governments through the Sustainability & Resilience website. Furthermore, the city will commit to conducting a GHG inventory every two years to assess progress.

5.7.- Resilience Planning and Outreach

A. Form a Resilience Committee comprised of city staff and community partners.
B. Initiate a vulnerability assessment throughout the Clearwater area to identify the factors most at risk to climate change stressors.
C. Formulate a Climate Action Plan to address each of the vulnerabilities identified and further direct the city's resilience work.

COBENEFITS:

Becoming a resilient community requires **climate adaptation** measures. According to the Fourth National Climate Assessment, climate adaptation has five general stages:

1. Awareness,
2. Assessment,
3. Planning,
4. Implementation, and
5. Monitoring and Evaluation.

The city will begin with Stage 1 and form a Resilience Committee to increase resilience planning and awareness throughout Clearwater. The committee will be comprised of city staff and community partners, such as teachers, neighborhood leaders, artists, and financial and insurance industry representatives who can explain financial risks. The committee will be responsible for creating an educational outreach and communications program to raise awareness of climate change risks and emergency preparedness in our residents and business owners.

The Resilience Committee will also be responsible for initiating **vulnerability assessments** throughout the Clearwater area to identify the factors most at risk to climate change stressors. From these assessments, a Climate Action Plan will be pursued to address these vulnerabilities and further direct the city's resilience work. This plan could be included as a section in the next Clearwater Greenprint edition.

Learn More About Topics in Education and Awareness:

	Employee Education and Emissions Reduction	U.S. Energy Information Administration - About 13% of U.S. electricity generating capacity can switch between natural gas and oil (2020, February 2). Retrieved January 28, 2021, from https://www.eia.gov/todayinenergy/detail.php?id=42776 Clean Energy Solutions Center: Natural Gas Fuel Switching. (n.d.). Retrieved January 28, 2021, from https://cleanenergysolutions.org/resources/technology/natural-gas-fuel-switching

Photo Credit: City of Clearwater

Green Energy and Buildings

Photo Credit: Dondi Guiterrez

Most buildings in Clearwater were built during a time when electricity was cheap and abundant and less was known about the potential environmental impacts. Today, the effects of conventional energy sources on our global and local environments is better understood. Reducing the amount of energy used through efficiency improvements to existing buildings and the development of new buildings to high-performance standards, coupled with shifting to renewable energy sources, is now recognized as one of the most important actions needed to create a more sustainable community and future.

Electricity continues to be the biggest contributor to our community-wide GHG emissions, with most of that electricity being used for the lighting, heating and cooling of buildings. Clearwater purchases all electricity from Duke Energy, a private utility company. As of 2017, Duke Energy relied on **fossil fuels** (i.e., coal and natural gas) to generate 61.7% of the electricity it produced. Nuclear energy accounted for 33.7% of the remaining electricity, while wind and solar accounted for 3.9%.

Making a positive impact on the city's energy use is a community effort and will require the participation of residents, businesses, and institutions alike. Each can reduce energy use by implementing such measures as attic insulation, duct leak repair, replacing incandescent light bulbs with LED light bulbs and upgrading air conditioning units, windows, and appliances to more efficient ones.

In addition to reducing the amount of energy used, it is also important to find opportunities for renewable energy. Without action, the community will continue to rely on fossil fuels, leading to significant increases in energy costs and GHG emissions over the next 25 years. With Clearwater being a mostly developed city, the potential for renewable energy expansion will rely on the installation of smaller systems distributed across the city as opposed to large-scale centralized plants.

PACE - Energy Finance Program

Resource Conservation Program

Incentives for Upgrades

Performance Standards

Natural Gas Expansion

Local Power Generation

Renewable Energy Challenge

Renewable Energy Finance

Energy-Efficient Streetlights

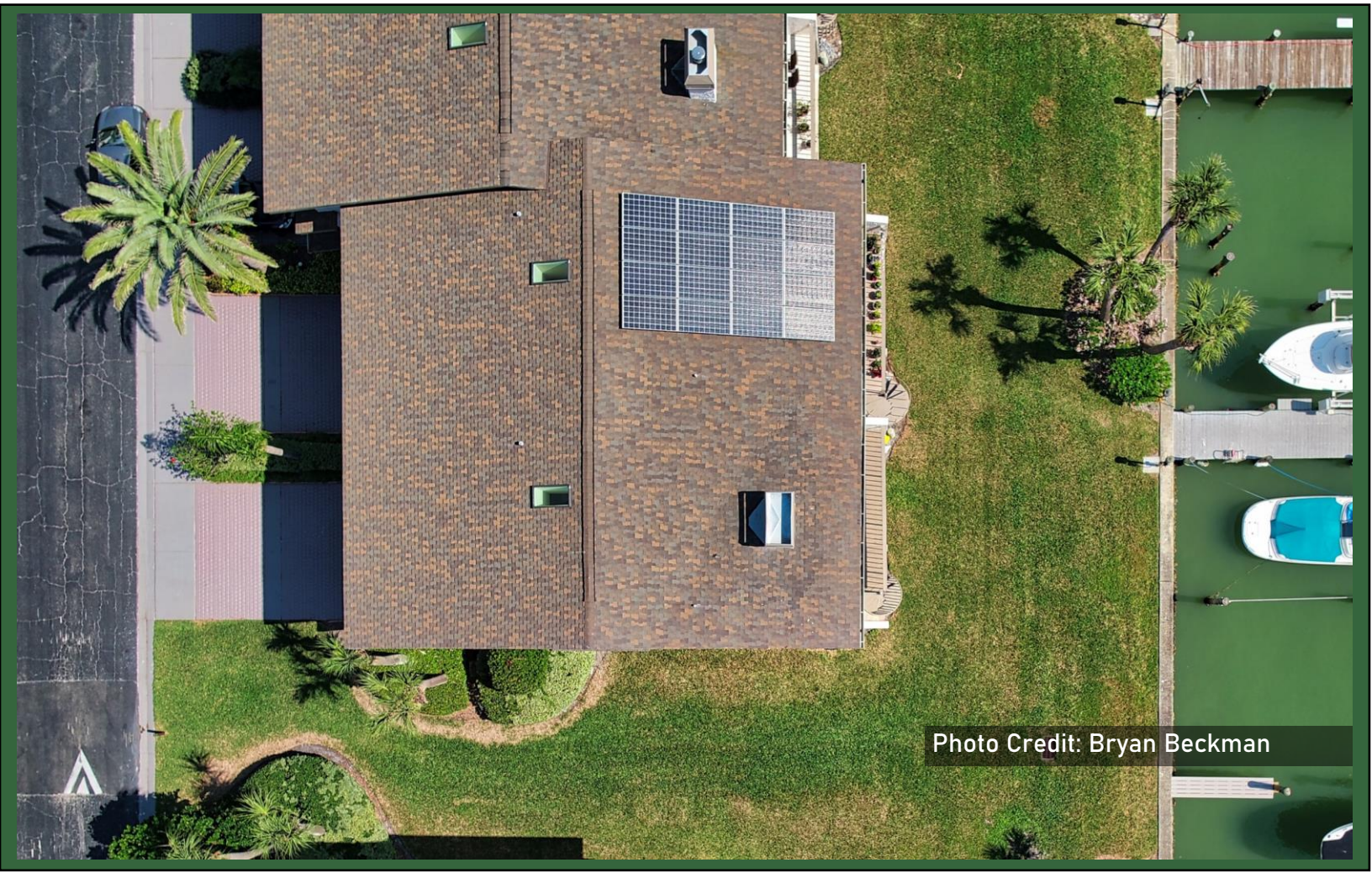
Municipal Energy Management Program and Policy

Municipal Re-Commissioning Plan

Municipal Performance Standard

Phase-Out of Environmentally Harmful Refrigerants

Resilient Infrastructure



Green Energy and Buildings – Strategies

Section	Strategy Name	Strategies
6.1	PACE - Energy Finance Program	A. Partner with public and private organizations to establish an energy finance program.
6.2	Resource Conservation Program	A. Develop and implement a program the performs comprehensive energy evaluations, recommends conservation practices and upgrades, provides basic information on financing options, and measures the environmental and economic benefits after implementation.
6.3	Incentives for Upgrades	A. Implement a "feebate" program.
6.4	Performance Standards	A. Encourage and assist developers in incorporating green building practices and standards into their design, construction, maintenance, and operations plans. B. Encourage the use of national building performance standards.
6.5	Natural Gas Conservation	A. Continue offering programs by Clearwater Gas System to increase the number of residents and businesses using natural gas to power appliances in place of alternatives that produce more emissions upon combustion.
6.6	Local Power Generation	A. Request proposals from private companies to design, build, install and operate small-scale energy generation facilities that can utilize available resources to generate electricity and/or heat.

6.7	Renewable Energy Challenge	A. Preparation of a marketing and outreach campaign challenging property owners to install renewable energy technologies. B. Support code changes that remove obstacles to installing renewable energy systems. C. Provide information to assist residents with purchasing renewable energy equipment. D. Include information about local, state, and federal incentives, economic and environmental benefits, contact information for local contractors, financing options. E. Create a website that allows the Clearwater community to submit property information and view addresses where renewable energy systems have been installed.
6.8	Renewable Energy Finance	A. Investigate financing mechanisms for expanding renewable energy generation. B. Launch a solar co-op program in which residents can coordinate bulk purchase of PV systems for reduced price.
6.9	Energy-Efficient Streetlights	A. Request conversion of all Duke Energy-owned electric streetlights to LED.
6.10	Municipal Energy Management Program and Policy	A. Partner with a third-party company to create an energy savings program including staff training and web-based energy consumption tracking, and benchmarking for municipal buildings.
6.11	Municipal Re-Commissioning Plan	A. Establish a re-commissioning plan to inspect, test, and make proper adjustments at regularly scheduled intervals to optimize the performance of its buildings and equipment. B. Create an LED lightbulb conversion program for city buildings.

		C. Train key staff that do not have the appropriate skills to test the equipment. D. Identify any environmentally harmful refrigerants in its operations and phase them out as part of its re-commissioning process (see Green Energy and Buildings Strategy #11).
6.12	Municipal Performance Standard	A. Build all new municipal facilities to a nationally recognized high-level performance standard (e.g., Leadership in Energy and Environmental Design, Florida Green Building Coalition, and Energy Star).
6.13	Resilient Infrastructure	A. Existing and new infrastructure complies with comprehensive resilience guidelines and the recommendations provided by the Tampa Bay Regional Resiliency Coalition. B. Prioritize resilience upgrades in capital and operational budgets. C. Create educational materials and events for the public to improve the adaptive capacity of their own buildings, structures, and properties. D. Explore grant opportunities for municipal photovoltaic and energy storage for critical building infrastructure (e.g., emergency shelters, schools, cooling centers, and nursing or assisted-living homes) to protect vulnerable populations and reduce GHG emissions.

6.1.- PACE – Energy Finance Program

A. Partner with public and private organizations to establish an energy finance program.

Many properties in Clearwater can reduce energy use significantly through minor improvements, such as adding insulation, high-efficiency appliances (e.g., water heater) and high-efficiency lighting. Properties can also generate a percentage of their electricity use through installation of renewable energy systems. This includes solar and geothermal systems which run on thermal energy found below the earth's surface. While basic **energy efficiency** improvements are the most economical way to reduce energy use, property owners may be discouraged by up-front investment costs.

The city will partner with public and private organizations to establish an energy finance program that provides commercial property owners with long-term, low-interest loans for energy improvements. The program would target older, inefficient commercial and industrial buildings and prioritize retrofits that result in cost savings that exceed, or at least offset, the original investment. Loan payments will be assessed to the property tax bill (e.g., Property Assessed Clean Energy) so that the loan is assigned to the property instead of the property owner.

6.2.- Resource Conservation Program

A. Develop and implement a program the performs comprehensive energy evaluations, recommends conservation practices and upgrades, provides basic information on financing options, and measures the environmental and economic benefits after implementation.

Commercial and industrial properties are responsible for more than half of the electricity use in the city. With the help of private companies and educational organizations, the city will develop and implement a program that performs comprehensive energy evaluations, recommends conservation practices and upgrades, provides basic information on financing options, and tracks the environmental and economic benefits after implementation. Program

partners, such as local vendors and utilities, could offer discounted products to incentivize improvements that increase resource conservation.

6.3.- Incentives for Upgrades

A. Implement a "feebate" program.

Major renovations on commercial buildings in Clearwater provide a great opportunity to improve existing buildings with **energy efficiency** improvements. To encourage both improvements on existing buildings and building preservation, the city will implement a "feebate" program, a self-financing system of fees and rebates that would reward developers that renovate buildings to a nationally recognized high-performance standard using fees charged to developers that do not.

6.4.- Performance Standards

A. Encourage and assist developers in incorporating green building practices and standards into their design, construction, maintenance and operations plans.
B. Encourage the use of national building performance standards.

During **redevelopment** projects, the city will work with and encourage developers to incorporate green building practices and standards into their design, construction, and maintenance and operation plans. For example, a builder could construct solar-ready homes to facilitate installation of solar panels by the property owner. The city will encourage the use of national building performance standards, such as Leadership in Energy and Environmental Design (LEED), Florida Green Building Coalition and Energy Star.

6.5.- Natural Gas Conservation

A. Continue offering programs by Clearwater Gas System to increase the number of residents and businesses using natural gas to power appliances in place of alternatives that produce more emissions upon combustion.

Natural gas generally emits less CO_2 during combustion than coal, gasoline, and propane. Lower CO_2 emissions and widespread availability makes natural gas comparatively less environmentally harmful, and therefore, a preferable substitute where there isn't sufficient infrastructure to support emission-free energy generation and distribution. Clearwater Gas System launched several programs to increase the number of residents and businesses that use natural gas to power appliances (e.g., water heaters and ranges). Clearwater Gas System will continue to offer these programs to provide natural gas as an alternative to standard electricity. It is worth noting that natural gas is itself a GHG and still produces CO2 upon combustion. Consequently, campaigns promoting use of natural gas will be paired with educational materials promoting energy efficiency and conservation.

6.6.- Local Power Generation

A. Request proposals from private companies to design, build, install and operate small-scale energy generation facilities that can utilize available resources to generate electricity and/or heat.
B. Set municipal renewable energy targets

COBENEFITS

On average, Clearwater receives 361 days of sunshine each year. That sunshine can be captured and used to generate energy through installation of **photovoltaic (solar) systems**.

The city also has the potential to generate energy from a variety of local sources, including **biogas** from wastewater treatment facilities and **biomass** (i.e., yard and food waste). The city will request proposals from private companies to design, build, install and operate small-scale energy technologies that can utilize available resources to generate electricity and/or heat energy. The most viable technologies will generate energy at a competitive rate for the city while also reducing other sources of GHG such as those from **solid waste** and biogas.

6.7.- Renewable Energy Challenge

A. Preparation of a marketing and outreach campaign challenging property owners to install renewable energy technologies.
B. Support code changes that remove obstacles to installing renewable energy systems.
C. Provide information to assist residents with purchasing renewable energy equipment.
D. Include information about local, state, and federal incentives, economic and environmental benefits, contact information for local contractors, financing options.
E. Create a website that allows the Clearwater community to submit property information and view addresses where renewable energy systems have been installed.

COBENEFITS

There is ample space for installing renewable energy systems (e.g., **photovoltaic systems** and **geothermal**) on already existing residential, commercial, industrial and city properties. The city will prepare a marketing and outreach campaign to challenge property owners to install renewable energy technologies. As part of the challenge, the city will strive to meet the goal by purchasing and installing renewable energy systems that are economically viable and that have the quickest return on investment.

To assist residential, commercial, and industrial property owners in meeting the challenge, the city will support code changes that remove obstacles to installing renewable energy systems and provide information to assist the consumer in purchasing renewable energy equipment. Information may include local, state, and federal incentives, local contractors, economic and environmental benefits of the technology, potential ways to finance the systems and a website that allows the Clearwater community to view and post where installations have been made.

6.8.- Renewable Energy Finance

A. Investigate financing mechanisms for expanding renewable energy generation.
B. Launch a solar co-op program in which residents can coordinate bulk purchase of PV systems for reduced price.

Aside from energy finance programs (Green Energy & Buildings Strategy #1), there are other public and private financing tools that can be used to lower up-front costs of renewable energy systems for property owners. The city will investigate various financing mechanisms for expanding renewable energy generation and share its findings with the community at large. Some financing mechanisms include clean renewable energy bonds, power purchase agreements, net metering, and bulk purchasing of renewable energy.

The United States Internal Revenue Service administers the Clean Renewable Energy Bond program which provides funding to public organizations for renewable energy projects. Power Purchase Agreements are agreements between power producers and customers in this case, for the purchase of renewable energy. Net metering is a system in which solar panels or other renewable energy generators are connected to a public utility power grid and surplus power is transferred onto the grid allowing customers to offset the cost of power drawn from the utility.

In 2020, the city enrolled in Duke Energy's Clean Energy Connection program. The program will enable the city to receive 40% (11,284 kW) of its annual municipal electricity consumption from Duke's solar systems starting in 2022.

The city also partnered with Solar United Neighbors (SUN), a non-profit that enables residential groups to purchase photovoltaic systems at lower prices. By participating in the SUN Greater St. Pete Solar Co-op program, interested Clearwater residents joined with other Pinellas County residents to organize and purchase **photovoltaic systems** in bulk. This enables each household to receive the system at a significant reduction in price. The city will continue partnering with SUN to enable future solar co-ops across Clearwater.

Another option that is available to residents is the Solar and Energy Loan Fund (SELF). SELF is a nonprofit organization that provides loans, project management and contractor vetting for home improvement options that improve energy efficiency, water conservation and storm preparedness. The organization prioritizes low- and moderate-income neighborhoods to achieve positive environmental impacts while reducing the costs of home ownership. The city will work to publicize the availability of SELF programs at events and in its publications.

6.9.- Energy-Efficient Streetlights

A. Request conversion of all Duke Energy-owned electric streetlights to LED.

Compared to conventional lighting, light emitting diode (LED) lighting can reduce energy use by 50% and requires less maintenance. Since 2015, the city has converted over 11 thousand streetlights to LED bulbs. All traffic signals, including pedestrian signals, now use LED lighting as well. With support from local governments such as Pinellas County and St. Petersburg, Clearwater will approach Duke to request conversion of the electric utility's streetlights to LED lighting for lights that have yet to be converted.

6.10.- Municipal Energy Management Program & Policy

A. Partner with a third-party company to create an energy savings program including staff training and web-based energy consumption tracking, and benchmarking for municipal buildings.
B. Develop a formal energy management policy for city buildings and operations.

Behavior change can go a long way when it comes to saving energy. The city will work with a third-party company to create an energy savings program for its facilities. This program will include staff training, web-based energy tracking of individual buildings and energy benchmarking. From this program, the city will develop a formal energy management policy for city buildings and operations with the intent to reduce electricity intensity (kilowatt-hours per square foot) an additional 10% below our 2019 levels by 2025. The policy will set reduction targets and dates, standardize operation practices (e.g., thermostat set points), establish energy benchmarking protocol and specify acceptable and prohibited equipment use and purchases. Best practices and results will be shared with the business community to expand the **energy efficiency** practices city-wide.

6.11.- Municipal Re-commissioning Plan

A. Establish a re-commissioning plan to inspect, test, and make proper adjustments at regularly scheduled intervals to optimize the performance of its buildings and equipment.
B. Create an LED lightbulb conversion program for city buildings.
C. Train key staff that do not have the appropriate skills to test the equipment.
D. Identify any environmentally harmful refrigerants in its operations and phase them out as part of its re-commissioning process (see Green Energy and Buildings Strategy #11)

COBENEFITS

The city has made investments in **energy efficiency** upgrades of its buildings and has been able to save hundreds of thousands of dollars in energy and operational costs. Through these upgrades, the city is expected to continue saving money, with an expectation that these upgrades could create millions of dollars in savings over the next six years. However, the full energy savings will not be achieved without ongoing maintenance of the equipment.

The city will establish a **re-commissioning plan** to inspect, test and make proper adjustments at regularly scheduled intervals to optimize the performance of its buildings and equipment. An LED light bulb conversion program will be created for city buildings in order to strategically change out energy-wasting light bulbs and quantify the resulting energy savings on a building-by-building basis. Where necessary, the city will provide training to key staff that currently do not have the appropriate skills to test the equipment.

In addition, certain chilling appliances have a high impact on the climate due to the refrigerants they use. These refrigerants are powerful GHGs called hydrofluorocarbons (HFCs). HFCs are short-lived pollutants, but they have a heat-trapping impact on global warming that's thousands of times more powerful than that of carbon dioxide. Appliances such as chillers, refrigerators, freezers, ice makers, dehumidifiers and air conditioners likely contain HFCs. Unfortunately, as the world gets hotter, demand for air conditioning increases. In fact, by 2050, Florida is projected to experience some of the highest frequencies of extreme heat in the nation. Thankfully, HFC substitutes, like propane and ammonia, are available. The city will identify any environmentally harmful refrigerants in its operations and phase them out as part of its re-commissioning process (Green Energy and Buildings Strategy #11).

6.12.- Municipal Performance Standard

A. Build all new municipal facilities to a nationally recognized high-level performance standard (e.g., Leadership in Energy and Environmental Design, Florida Green Building Coalition, and Energy Star).

The city will lead by example by building all new municipal facilities to a nationally recognized, high-level performance standard such as LEED, Florida Green Building Coalition or Energy Star. Within a chosen standard, the city will prioritize energy and water efficiency as well as waste reduction features.

6.13.- Resilient Infrastructure

A. Existing and new infrastructure complies with comprehensive resilience guidelines and the recommendations provided by the Tampa Bay Regional Resiliency Coalition.
B. Prioritize resilience upgrades in capital and operational.
C. Create educational materials and events for the public to improve the adaptive capacity of their own buildings, structures, and properties.
D. Explore grant opportunities for municipal solar photovoltaic and energy storage for critical building infrastructure (e.g., emergency shelters, schools, cooling centers, and nursing or assisted-living homes) to protect vulnerable populations and reduce GHG emissions.

COBENEFITS: 

Existing city facilities and infrastructure may need to be retrofitted extensively in order to withstand local **climate change** impacts. The **vulnerability assessment**, outlined in item 5.7(c) of the Resilience Planning and Outreach Strategy, will provide a greater understanding of the projected climate change impacts and risks, as well as the city infrastructure that is most vulnerable. The city will aim to have both existing and new buildings and infrastructure comply with comprehensive **resilience** guidelines and the recommendations provided by the Tampa Bay Regional Resiliency Coalition. The city will also routinely update its design criteria and community development code to further advance this shift towards resilience.

The city will also prioritize resilience upgrades in its capital and operational budgets in order to reduce the long-term risk and negative economic impact of climate change.

Finally, the city will create educational materials and events for the public to improve the adaptive capacity their own buildings, structures, and properties. Information such as FEMA flood zone identification, hurricane preparedness, living shoreline or sea wall installation, sea level rise projections and more will be provided in an understandable and reoccurring manner. To protect vulnerable populations while reducing GHG emissions, the city will also explore grant opportunities to add photovoltaic and energy storage for critical building infrastructure, including emergency shelters, schools, cooling centers and nursing or assisted-living homes.

Learn More About Green Energy and Building:

	Renewable Energy Financing	*Guide to Purchasing Green Power* (Rep.). (2018, September). Retrieved February 21, 2021, from United Stated Environmental Protection Agency website: https://www.epa.gov/sites/production/files/2016-01/documents/purchasing_guide_for_web.pdf
	Fuel Switching	U.S. Energy Information Administration - About 13% of U.S. electricity generating capacity can switch between natural gas and oil (2020, February 2). Retrieved January 28, 2021, from https://www.eia.gov/todayinenergy/detail.php?id=42776 Clean Energy Solutions Center: Natural Gas Fuel Switching. (n.d.). Retrieved January 28, 2021, from https://cleanenergysolutions.org/resources/technology/natural-gas-fuel-switching
	Building Energy Benchmarking	Benchmarking. (n.d.). Retrieved January 28, 2021, from https://www.energystar.gov/partner_resources/residential_new/program_reqs/mfhr/benchmarking
	Extreme Heat in Florida	*Killer Heat in the United States Climate Choices and the Future of Dangerously Hot Days* (Rep.). (2019, July). Retrieved February 22, 2021, from Union of Concerned Scientists website: https://www.ucsusa.org/sites/default/files/attach/2019/07/killer-heat-analysis-full-report.pdf

Transportation

Photo Credit: City of Clearwater

Transportation is a key sustainability issue for the city of Clearwater, as the combustion of fuels for transportation is the second-largest contributor to the city's **greenhouse gas emissions**. The ability to travel easily and affordably using multiple types of transportation is also essential to a healthy local economy. Therefore, providing safe, convenient, and affordable transportation options for residents, workers, and visitors is an important component of the city's sustainability plan. Having true transportation choices requires continued investment in "**complete streets**," which accommodate pedestrians, bicyclists, transit, and cars; and in designing communities that make these transportation options possible.

Clearwater is a largely developed community and most of the major streets in the city have been widened to the maximum extent. This means that new street widening projects to accommodate greater traffic flow are not possible in most areas. With this constraint in mind, we will need alternatives to automobile travel to meet the travel demands that come with increasing population. The pattern and design of our urban places should better support walking, **transit,** and bicycling. At the same time, the design and function of our street network needs to be rearranged to achieve a balance that meets the needs of all.

In addition to promoting alternatives such as public transit, bicycling and walking, the city will prepare for the next major shift in the automobile industry: the electrification of vehicles. Electric vehicles have no direct emissions and are three to six times more energy efficient than a car that runs on gasoline. In addition to their lack of GHGs, switching to electric vehicles decreases the pressure for offshore drilling in the search of oil and results in healthier environments for people by decreasing air pollution. Improvements in the production of electric vehicles over the years have made them increasingly efficient and affordable.

Vehicle Mile Reduction

Complete Streets Policy

Local Transit Improvement

Low Emission Vehicles

Municipal Fleet Conversion

Congestion Management

Municipal Telecommuting Policy

Healthy Street Design

Transportation – Strategies

Section	Strategy Name	Strategies
7.1	Vehicle Mile Reduction	A. Launch a VMT reduction campaign. B. Reduce city-wide VMT by 10%. C. Launch an internal VMT reduction program for employees.
7.2	Complete Streets Policy	A. Complete actions outlined in the Complete Streets Plan B. Healthy street design is local government policy..
7.3	Local Transit Improvement	A. Continue to advocate for more funding to increase bus and trolley stops on existing routes. B. Collaborate with the Pinellas Suncoast Transit Authority (PSTA) to improve bus scheduling. C. Explore and encourage alternative forms of public transportation (e.g., Bus Rapid Transit, carpool, car share, bike share, scooter share, and ferry services).
7.4	Low Emission Vehicles	A. Support construction of infrastructure for low-to-zero emission vehicles. B. Continue to install public EV charging stations. C. Change the Community Development Code to require charging stations for electric vehicles for new development and adopt "EV ready" policies. D. Host a minimum of one event per year at which the public is encouraged to try an electric vehicle. E. Partner with an organization such as the Sierra Club or Southern Alliance for Clean Energy to create an event that encourages residents and businesses to shift to hybrid electric vehicles.

7.5	Municipal Fleet Conversion	A. Adopt a Green Fleet Policy to govern use and procurement of fleet vehicles. B. Investigate financing mechanisms to offset cost of fleet conversion (e.g., vehicle leasing and federal tax credit). C. Increase the share of municipal light-duty vehicles running on alternative fuels.
7.6	Congestion Management	A. Manage traffic congestion by considering alternative intersection designs. B. Continue to include roundabouts in new road construction projects. C. Consider use of other congestion management practices.
7.7	Municipal Telecommuting Policy	A. Increase the alternative work schedule and telecommuting opportunities available to city workforce. B. Encourage virtual meetings in lieu of in-person meetings requiring travel by automobile whenever possible.

Photo Credit: Bryan Beckman

7.1.- Vehicle Mile Reduction

A. Launch a VMT reduction campaign.
B. Reduce city-wide VMT by 10%.
C. Launch an internal VMT reduction program for employees.

COBENEFITS

Success in meeting the city's GHG reduction goals will require each of us to commit to reducing the amount of driving we do. The city will promote this change by initiating a **vehicle miles traveled** (VMT) reduction campaign. This campaign will educate residents with the aim of reducing city-wide VMT by 10%. By setting a challenge to reduce VMT by 10%, businesses and residents who participate will consciously consider the amount of driving they do and take specific steps to reduce it. The city will promote a web based VMT reduction challenge tool that will track goals and results and encourage individuals and businesses to develop their own VMT reduction plans. The city will also lead by example through an internal VMT reduction program for their employees, which will require a shift in how employees get to work and conduct city business.

7.2.- Complete Streets Policy

A. Complete actions outlined in the Complete Streets Plan.
B. Healthy street design is local government policy

COBENEFITS

Streets are a vital part of livable, attractive communities. Everyone, regardless of age, ability, income, race or ethnicity, should have safe, comfortable and convenient access to community destinations and public places—whether walking, driving, bicycling or taking public transportation. The city has a long-standing commitment to pedestrian and bicycle-friendly infrastructure, which reduces transportation-related GHG emissions, reduces traffic congestion, promotes a healthier lifestyle for Clearwater residents, and creates community cohesion. Providing sidewalks, trails, and bike lanes along city streets is a matter of policy for the city.

According to Smart Growth America, Complete Streets are, "*designed and operated to prioritize safety, comfort, and access to destinations for all people who use the street, especially people who have experienced systemic underinvestment or whose needs have not been met through a traditional transportation approach*". The city has made significant progress on its **complete streets** efforts since City Council approved the original Greenprint in 2011. Multiple trails were constructed to connect larger trails, and trail users can now travel all the way from Tampa to Clearwater Beach. A transportation planner position was created in 2016 to focus on the future of the city's transportation and a Complete Streets Advisory Committee was also established to review future plans.

Many residents from the Skycrest Neighborhood worked with city staff to secure a state grant for the Skycrest Complete Streets project in 2018. The intent of the project is to balance accessibility for all modes of transportation, enhance safety, and to encourage economic revitalization and reinvestment along Drew Street and surrounding neighborhoods. Most recently, Clearwater's city council approved the Complete Streets Implementation Plan to achieve appropriate, active, and safe streets. Such streets can occur by analyzing the types of land uses (residential, commercial, industrial, public, and so on) within an area and understanding how the surrounding streets can be re-designed to meet the mobility needs of people who use them.

According to the article, "Street Design Guidelines for Healthy Neighborhoods", by Dan Burden of Walkable Communities, Inc., healthy streets are, *"networks of roadways and connector trails in communities designed primarily for use by people, not just motorized vehicles."* Such streets are designed for motorists to feel comfortable operating at low speeds. Low traffic volume and low noise, easy access, and multiple routes to destinations are also features. Pedestrian and bicycle movements are favored." The city of Clearwater will implement healthy street design principles as part of local government policy. The city will also consider the 12 Steps of Walkable Communities according to the Florida Department of Transportation Pedestrian and Bicycle Program and the Street Design Guidelines for Healthy Neighborhoods from Walkable Communities, Inc. in formulating new strategies and policy, and in daily operations.

7.3.- Local Transit Improvement

A. Continue to advocate for more funding to increase bus and trolley stops on existing routes.
B. Collaborate with the Pinellas Suncoast Transit Authority (PSTA) to improve bus scheduling.
C. Explore and encourage alternative forms of public transportation (e.g., Bus Rapid Transit, carpool, car share, bike share, scooter share, and ferry services).

COBENEFITS 

Improving the **transit** system will give residents, employees, and visitors access to jobs, services and tourist destinations. In 2017, the city partnered with the Pinellas Suncoast Transit Authority (PSTA) to construct the Clearwater Beach Transit Center. The center added a bus bay, multiple covered pedestrian waiting areas, and new stops for riders making connections along the beach. Most notably, the Clearwater Beach Transit Center included Pinellas county's first queue-jump, signal prioritization which allows buses to pull ahead of traffic to shorten travel times. The city also funds additional trolley services during the time period in which most schools have spring break in order to reduce the amount of congestion to and from the beach. Most recently, the city is working with the Florida Department of Transportation and the PSTA to form a Memorial Causeway Busway Plan to improve traffic flow to Clearwater Beach.

The PSTA has also made significant advancements in its ability to keep passengers informed about real-time bus schedules and wait times. Both a website and a downloadable phone application are available to improve user experience and increase ridership. The city has and will continue advocating for more funding to increase bus and trolley stops on existing routes, which will improve ridership by increasing convenience. The city can also work with the PSTA to prevent poor scheduling of buses and require a minimum amount of wait time between buses.

Public **transit** has also evolved beyond what was envisioned at the time Clearwater Greenprint was first created. Public **transit** now includes **Bus Rapid Transit**, carpooling, car share systems (i.e. Uber, Lyft, etc.), zip cars, bike share, and scooters. Water transportation with ferry services, like the Clearwater Ferry, have also become a possibility. The city will explore and further encourage these initiatives.

7.4- Low Emission Vehicles

A. Support construction of infrastructure for low-to-zero emission vehicles.
B. Continue to install public EV charging stations.
C. Change the Community Development Code to require charging stations for electric vehicles for new development and adopt "EV ready" policies.
D. Host a minimum of one event per year at which the public is encouraged to try an electric vehicle.
E. Partner with an organization such as the Sierra Club or Southern Alliance for Clean Energy to create an event that encourages residents and businesses to shift to hybrid electric vehicles.

COBENEFITS 

The city will create an environment where low-to-zero emission vehicles have infrastructure that supports them. This includes opportunities for different fueling, parking, and operational needs. High fuel efficiency combustion engine vehicles of all kinds have a place in the future community vehicle fleet mix. This includes high fuel efficiency cars, hybrid vehicles, electric vehicles, motorcycles, mopeds, scooters, and golf carts.

Electric driving requires a shift in how we fuel our vehicles as fueling can take place at home, in the community, or along our highways. Perceived lack of charging stations is cited as one of the top barriers to electric vehicle ownership. Therefore, increasing awareness and access to charging infrastructure is one of the best things the community can do to encourage electric vehicle use. The city will continue installing public EV charging equipment and will adopt policies to encourage private investment in charging infrastructure.

The city will also adopt "EV ready" policies and changes to the Community Development Code that include charging stations for electric vehicles in new developments. The city will also aim to hold at least one event each year that encourages the public to try an electric vehicle. Multiple organizations, including the Sierra Club and Southern Alliance for Clean Energy can assist in creating an educational and engaging event. Through readiness, the city will provide residents and local businesses encouragement to shift to hybrid and electric vehicles and lower their transportation related GHGs.

7.5- Municipal Fleet Conversion

A. Adopt a Green Fleet Policy to govern use and procurement of fleet vehicles
B. Investigate financing mechanisms to offset cost of fleet conversion (e.g., vehicle leasing and federal tax credit)
C. Increase the share of municipal light-duty vehicles running on alternative fuels.

Over the last ten years, a number of vehicles within the city's fleet, including 70 garbage and recycling trucks, have been converted to run on compressed natural gas instead of conventional gasoline. While natural gas does produce GHG emissions, current energy-use models find it to produce 6-11% less emissions than gasoline.

The city will continue to improve the sustainability of its municipal fleet by adopting a Green Fleet Policy to govern its vehicle purchases and driving practices. As part of this policy, the city will create a vehicle replacement procedure to replace all light duty vehicles with alternative fuels as replacement is needed. This will also require that the city install EV charging stations at key places in order to allow its electric vehicles to charge. The city will investigate the use of certain financing mechanisms, such as vehicle leasing, to participate in the federal tax credit available on electric vehicles.

7.6.- Congestion Management

A. Manage traffic congestion by considering alternative intersection designs.
B. Continue to include roundabouts in new road construction projects.
C. Consider use of other congestion management practices.

COBENEFITS 

Projects that reduce **congestion** and idling have a significant effect on GHG emissions from vehicles. Since the first version of Greenprint, multiple intelligent transportation systems (ITS) and advanced traffic management systems (ATMS) have been installed around the city to improve congestion, and pedestrian signals have been installed at key intersections. Furthermore, all ATMS facilities have dynamic message signs (DMS) that relay real-time

information to travelers, allowing drivers to prepare for road closures, accidents, or emergency news.

The city can further manage traffic congestion by considering alternative intersection designs. Continuing to include roundabouts in new road construction projects can have multiple benefits including the reduced frequency and severity of crashes, reduced traffic delays, increased traffic capacity, reduced long-term operational costs, and reduced emissions and noise. To date, there are 34 roundabouts throughout the city. Additional congestion management practices include: ITS technology that includes real-time congestion and auto travel information; transit trip planning; mobile ticketing; bike/car sharing; and vanpooling technology.

7.7.- Municipal Telecommuting Policy

A. Increase the alternative work schedule and telecommuting opportunities available to city workforce
B. Encourage virtual meetings in lieu of in-person meetings requiring travel by automobile whenever possible

With transportation being a large and increasing contributor to our city-wide GHG emissions, the city will lead by example in reducing vehicle miles traveled within city boundaries by using alternative work schedules and increasing telecommuting opportunities within its workforce. It will also encourage virtual meetings, rather than in-person meetings that require driving, wherever possible. The city will develop a Telecommuting Policy to establish alternative work schedule options and define eligible positions and candidates.

REPLACE WITH BETTER CITY PHOTO OF MURAL

Learn More About Transportation:

	Complete Streets	What are Complete Streets? Smart Growth America. (2020, December 2). https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/what-are-complete-streets/. Complete Streets. U.S. Department of Transportation. (2015, August 24). https://www.transportation.gov/mission/health/complete-streets.
	Electric Vehicles	Hofstatter, T., Krawina, M., Muhlreiter, B., Pohler, S., & Tschiesner, A. (2020, November 6). Reimagining the auto industry's future: It's now or never. McKinsey & Company. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/reimagining-the-auto-industrys-future-its-now-or-never.
	Fleet Replacement and Energy Efficiency	US Department of Energy. Strategies for Fleet Managers to Conserve Fuel. Alternative Fuels Data Center: Strategies for Fleet Managers to Conserve Fuel. https://afdc.energy.gov/conserve/behavior_strategies.html.
	Electric Vehicle Adoption	Linke, R. (2017, August 3). The real barriers to electric vehicle adoption. https://mitsloan.mit.edu/ideas-made-to-matter/real-barriers-to-electric-vehicle-adoption. Egbue, O., & Long, S. (2012). Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions. Energy Policy, 48, 717–729. https://doi.org/10.1016/j.enpol.2012.06.009
	Healthy Street Design	Burden, D., Wallwork, M., Sides, K., Trias, R., & Rue, H. (1999). Street design guidelines for healthy neighborhoods (pp. 1-15). Sacramento, Calif: Center for Livable Communities. Report available online at http://onlinepubs.trb.org/onlinepubs/circulars/ec019/ec019_b1.pdf


Photo Credit: Paul Sacca

Livability

The city of Clearwater was shaped during a time when fuel was cheap and abundant and driving was the primary mode of transportation. These conditions resulted in important destinations such as workplaces, homes, schools, and commercial centers being built far apart from one another. Clearwater's sprawling development pattern contributes to residents' heavy dependence on personal automobiles for travel. Because most of Clearwater is already developed, the city must look towards improving vacant or underutilized properties to make it easier to access resources and promote growth. Creating conditions that enable sustainable growth requires thoughtful consideration of the relationships between how a property is used and the transportation options available to the surrounding community.

Many areas in the city are either stable in **redevelopment** or are attracting new building development at a very slow rate. Where redevelopment is not occurring, buildings will need to be maintained, repurposed, or **retrofitted**. This will ensure that quality housing, jobs, goods and services are available throughout the community. Improving existing buildings was identified as one of the biggest long-term challenges facing the city in the original Clearwater Greenprint plan. That challenge continues to exist. There has been an increasing rate of building obsolescence due to rapid residential and commercial growth using infrastructure that regularly needs to be replaced. These buildings require a large amount of ongoing maintenance and energy to operate. The present and future owners of Clearwater's existing buildings will be challenged to invest enough money to successfully maintain the building frame while upgrading the infrastructure inside to be more energy efficient.

In addition to challenges in the existing building stock, there are demographic trends that need to be considered when designing a sustainable approach to land use. According to United States Census Bureau estimates, Pinellas County was one of only two counties in Florida that did not increase in permanent population from 2000 to 2010. Permanent population consists of those residents who live in the county year-round. However, other local projects from the Pinellas County planning agency and Forward Pinellas anticipate some population growth in the decades to come. This growth is not expected to be as large as what is expected in other neighboring counties with more vacant land.

There is also the potential for change in the retired population that moves to the area. Clearwater will continue to attract new retirees over time, but it will most likely be a population of retirees with less spending money than past generations. If the retiree migration rate declines over time, that population will need to be replaced to keep the local

economy growing and strong. As a result, there is a need to attract different demographics to the city including young and working-aged people to the city.

In light of this information, the city will need to find a balance between encouraging high quality, energy-efficient development and maintaining an economic environment that is attractive to developers to create new homes and jobs. At the same time, the city will need to incentivize reuse and revitalization of the existing structures so they can remain usable over the long term. Finally, the city has the opportunity to improve quality of life and mitigate **greenhouse gas emissions** by improving or transforming land area that is currently underutilized. The city will continue to increase the tree canopy through its own plantings and by encouraging plantings on private property. It will also continue to seek opportunities to create and maintain areas for recreational purposes and protect environmental resources.

Ultimately, the city wishes to create a **livable** neighborhood, or one that is pleasant, safe, affordable, and supportive of its members. Such a neighborhood may include attractive pedestrian-oriented streets with low traffic speed and congestion as well as affordable, sustainable housing that is within reasonable distance to employment opportunities that offer living wages.

Development Incentives

Property Revitalization

Diverse Housing Options

Greenspace Expansion

Urban Tree Program and Canopy Target

Environmental Conservation

Integrated Pest Management

Energy Efficient Streets and Parking

Environmental Justice

Photo Credit: Kathleen Beckman

Livability – Strategies

Section	Strategy Name	Strategies
8.1	Development Incentives	A. Continue to provide for mixed-use development in livable, transit-oriented neighborhoods. B. Improve regulation, investment, and incentives that will fulfill residents' household and transportation needs.
8.2	Property Revitalization	A. Encourage restoration and reuse of buildings as an alternative to demolition. B. Maintain the historic designation process to ensure that historically significant properties and neighborhoods remain stable, well-maintained, and available for long-term use. C. Continue to implement a brownfield program and identify incentives such as tax credits for brownfield and greyfield development. D. Consider partnership with an educational institution or non-profit organization to demonstrate the benefits of compost in a pilot program or through a publication.
8.3	Diverse Housing Options	A. Continue to cultivate a self-sustaining community and local economy to reduce VMT and increase accessibility.
8.4	Greenspace Expansion	A. Support and expand the community's capacity to manage, develop, and enhance greenspace for natural habitat, recreation, gardening, and outdoor education activities.

8.5	Urban Tree Program and Canopy Target	A. Continue to host an annual tree giveaway. B. Develop a program to educate community members on the benefits of planting trees and recognize residents and businesses that participate. C. Assess current tree canopy and set an increased canopy goal based on assessment results. D. Create an implementation plan to increase tree canopy coverage. E. Require mitigation for consumption of natural habitat or resources. F. Enact and enforce a tree preservation or land-clearing ordinance. G. Pilot a forest carbon sequestration project on municipal land which will sequester carbon to offset a portion of the community's annual GHG emissions. H. Develop the planting program under an existing urban forestry project protocol to allow for recording and reporting the results of the program.
8.6	Environmental Conservation	A. Become a certified community under National Wildlife Federation Wildlife Habitat Program. B. Enact a sea turtle ordinance. C. Create an endangered lands conservation/purchasing program. D. Promote eco-literacy.
8.7	Integrated Pest Management	A. Create an IPM plan address invasive species and problematic insects at city-owned properties. B. Provide the public with educational materials concerning invasive species identification and IPM best practices. C. Consider partnership with an educational institution (e.g., Saint Petersburg College of the University of South Florida) to develop an IPM plan and subsequent educational outreach.

8.8	Energy Efficient Streets and Parking	A. Develop street design standards that maximize energy efficiency and minimize heat.
8.9	Environmental Justice	A. Explore options for preventing excessive levels of pollution and mitigate environmental and other impacts such as noise, odor, and traffic in low-income communities and communities of color. B. Include potential environmental and public health impacts of land use decisions into planning and zoning activities. C. Prioritize affordable housing for historically displaced groups to prevent green gentrification. D. Consider measures to ensure that rent in improved neighborhoods remains affordable and savings from energy efficiency improvements are passed on to tenants. E. Assess current city zoning and land use policies to determine where environmental justice criteria can be incorporated.

Photo Credit: Dondi Gutierrez

8.1.- Development Incentives

A. Continue to provide for mixed-use development in livable, transit-oriented neighborhoods
B. Improve regulation, investment, and incentives that will fulfill residents' household and transportation needs

COBENEFITS

The city has continued to provide for mixed-use development in livable, transit-oriented neighborhoods. Mixed-use development is development that consolidates commercial, residential, or industrial spaces on a single property. In 2012, the city's Planning and Development department worked with a consultant to create US 19 Corridor Redevelopment plan. This plan focused on increasing the density of available commercial and residential buildings in order to allow for greater transportation options. In essence, the plan intends to bring a "live, work, and play" element to an area that previously experienced only heavy commuting traffic. Following this plan, amendments to the city's Comprehensive Plan occurred in 2016 to support the new zoning district and development standards.

The areas identified in the original Clearwater Greenprint document have not been formally established as Energy Conservation Areas; however, each of the identified areas have been included in the Citywide Design Structure as Activity Centers and Redevelopment Corridors. The city will work to improve regulation, investment, and incentives that will fulfill residents' household and transportation needs.

Photo Credit: Maranda Douglas

8.2.- Property Revitalization

A. Encourage restoration and reuse of buildings as an alternative to demolition
B. Maintain the historic designation process to ensure that historically significant properties and neighborhoods remain stable, well-maintained, and available for long-term use
C. Continue to implement a brownfield program and identify incentives such as tax credits for brownfield and greyfield development
D. Consider partnership with an educational institution or non-profit organization to demonstrate the benefits of compost in a pilot program or through a publication

COBENEFITS

A sustainable urban environment has a variety of building types, sizes, and ages. This variability allows buildings to be reused for different purposes over the course of their life. New buildings should be designed with flexible space to maximize the potential for reuse in the future. Designing buildings that can be used for many potential purposes reduces vacancy. It also reduces the need for costly demolition. In addition to economic benefits, reducing construction and demolition waste greatly reduces the amount of garbage generated by the city, as both practices make up a large percentage of the waste stream. Restoration and reuse of building materials prevent this waste.

The city will encourage restoration and reuse of buildings rather than demolition. If demolition is needed, the city will look to deconstruct buildings, reusing or **recycling** the building's materials wherever possible. The city will also maintain the **historic designation** process, which helps ensure certain properties and neighborhoods are stable, maintained, and available for long term use. The city will continue to implement its **brownfields** program and identify incentives, such as tax credits, for brownfield and **greyfield** development. These are properties that have a degree of hazardous waste or abandoned buildings on them and are difficult to sell as a result. Financial incentives will offset some of the cost of **remediation** and promote reuse of these usable but sometimes abandoned lands.

When **remediation** is needed, the city will look towards adding compost as an amendment to disturbed land. In addition to preventing food waste from being discarded as trash, compost has a remediating quality for soil. It increases the needed beneficial micro-biotic life within soil, retains water, and allows the ground to **sequester** carbon. This reduces GHG emissions in the atmosphere. The city will consider working with an educational institution or non-profit organization to demonstrate the benefits of compost in a pilot program site or publication.

8.3.- Diverse Housing Options

A. Continue to cultivate a self-sustaining community and local economy to reduce VMT and increase accessibility

COBENEFITS

Available housing choices must have a range of prices to attract residents in all life stages and income levels. Affordable, energy-efficient, and location-ideal housing will increase the chances that Clearwater will continue to maintain and attract a diverse population. Monitoring and working toward creating the right mix of housing type and cost will create a balance of housing supply to jobs. This balance will reduce the need for Clearwater residents to commute outside the city to work. Reducing the distance residents drive to work not only reduces the city's GHG emissions from fuel, it also creates a more affordable and enjoyable living experience for Clearwater residents.

The city has created plans, known as the Consolidated Plan and Local Housing Assistance Plan, with policies that support a variety of housing types and prices. Furthermore, two new districts have been created to encourage further diversity of housing type and redevelopment within Clearwater's downtown and U.S. Highway 19 areas. The city will continue to create a more self-sustaining community and local economy that will reduce the need for driving while increasing convenience and accessibility to employment.


Photo Credit: Maranda Douglas

8.4.- Greenspace Expansion

A. Support and expand the community's capacity to manage, develop, and enhance greenspace for natural habitat, recreation, gardening, and outdoor education activities

COBENEFITS 

Maintaining passive parks with minimal recreation opportunities (i.e.. walking, biking only) and maximize natural **greenspace** and ecosystem function is a win-win. Our community benefits by having access to much needed natural landscape while providing ecosystem relief in a highly urbanized region.

The city is continuing with its goals of preserving and expanding greenspace. In February 2019, Moccasin Lake Nature Park reopened after renovations and is now home to a butterfly garden and multiple **native plant** installations. By offering hiking trails and nature classes, the center is a beautiful resource for those interested in learning more about Florida's natural ecosystems and wildlife. Clearwater's Coachman Ridge Park also underwent renovations that were needed to allow greater **stormwater** flow from the city's new Solid Waste Transfer Station. The Parks & Recreation department and Engineering department updated the park by increasing the number of trees from 300 to 1,911.

Clearwater Greenies, a component of the city's Parks and Recreation Department, hosts a number of beach, park, and neighborhood cleanup projects throughout the year. The department also offers Adopt-A-Trail, Adopt-A-Park, Adopt-A-Street, and Adopt-A-Waterway programs for citizens and businesses. In 2018, over a thousand hours were spent beautifying spaces and removing litter from areas within Clearwater.

The city will continue to support and expand the community's capacity to manage, develop, and enhance greenspaces for natural habitat, recreation, gardening, and outdoor education opportunities. This includes improving and maintaining public property, creating public-private partnerships to transition underutilized land to these uses and enabling and encouraging these uses on private property through public policies and programs. Enhancing and expanding greenspace will result in better stormwater management, higher carbon sequestration, and a better quality of life for residents.

8.5.- Urban Tree Program and Canopy Target

A. Continue to host an annual tree giveaway
B. Develop a program to educate community members on the benefits of planting trees and recognize residents and businesses that participate
C. Assess current tree canopy and set an increased canopy goal based on assessment results
D. Create an implementation plan to increase tree canopy coverage
E. Require mitigation for consumption of natural habitat or resources
F. Enact and enforce a tree preservation or land-clearing ordinance
G. Pilot a forest carbon sequestration project on municipal land which will sequester carbon to offset a portion of the community's annual GHG emissions
H. Develop the planting program under an existing urban forestry project protocol to allow for recording and reporting the results of the program

COBENEFITS 

For Arbor Day 2019, the city celebrated its 37th year as a Tree City USA by giving away thousands of young trees to residents. This tree giveaway is an annual tradition. The city will continue its legacy as a Tree City by developing a program to educate community members on the benefits of planting trees and recognize residents and businesses that participate. The city will consider piloting a forest carbon sequestration project on **municipal** land, which along with other existing landscape installations will sequester carbon to offset a portion of the community's annual GHG emissions. Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in **biomass** (trunks, branches, foliage, and roots) and soils. The sequestration of carbon in forests and wood products helps to offset sources of carbon dioxide to the atmosphere, such as fossil fuel emissions. The planting program should be developed under an existing urban forestry project protocol to allow for recording and reporting the results of the program.

The city will also assess its current tree canopy and set an increased canopy goal based on that assessment. The project will look at the three Ps of natural resource management (Possible, Potential, and Preferable), **GIS** methodology, and the Forest Opportunity Spectrum (FOS) for goal setting. From this goal, an implementation plan to increase the city's tree canopy will be established. Local ordinances, regulations, and the city's Comprehensive Plan will be updated as needed to accommodate the tree canopy goal. The city will maintain its current tree canopy through a tree preservation and protection ordinance requiring property

owners to apply for permit and compensate the city when removing trees from the public right of way and apply for a permit for certain clearing activities on private property to the extent permitted by law.

It's important to note, however, that canopy size is just one of many criteria to consider when evaluating urban trees. For instance, a robust tree canopy comprised of largely **invasive species** is not desirable. Age and species diversity, condition of trees and equitable distribution across income levels, to name a few, should also be considered in any future targets.

8.6.- Environmental Conservation

A. Become a certified community under the National Wildlife Federation Wildlife Habitat Program
B. Adopt a sea turtle ordinance
C. Create an endangered lands conservation/purchasing program
D. Promote eco-literacy

COBENEFITS

The city will create programs to increase awareness of our region's plants and animals and the importance of preserving our natural resources. These initiatives could build on existing partnerships with local organizations such as the Clearwater Marine Aquarium, the Florida Native Plant Society, the Audubon Society, the Tampa Bay Estuary Program, and others. These programs will further assist already existing efforts to raise public awareness of Clearwater's green spaces and trees, including existing nature preserves such as Moccasin Lake Nature Park.

The city of Clearwater will become a certified community under the National Wildlife Habitat Program. As part of this undertaking, the city will take the National Wildlife Foundation Mayor's Monarch Pledge which involves committing to create habitat for the monarch butterfly and pollinators and educating residents. The city will also create and participate in programs that increase awareness of our region's plants and animals and the importance of preserving our natural resources. These initiatives include creation of an endangered lands conservation and purchasing program and could build on existing partnerships with local organizations. These programs will further assist already existing efforts to raise public awareness of Clearwater's green spaces and trees, including existing nature preserves such as Moccasin Lake Nature Park. To support program participation and creation, the city of Clearwater will draft and adopt regulations as necessary. For instance,

the city has adopted language in Section 3-1302(D) of the City of Clearwater Community Development Code which protects sea turtle nesting areas through lighting regulations.

8.7.- Integrated Pest Management

A. Create an IPM plan address invasive species and problematic insects at city-owned properties
B. Provide the public with educational materials concerning invasive species identification and IPM best practices
C. Consider partnership with an educational institution (e.g., Saint Petersburg College of the University of South Florida) to develop an IPM plan and subsequent educational outreach

COBENEFITS

Integrated Pest Management (IPM), is a practice used to remove organisms that are causing harm to a desirable plant, ecosystem, or structure. IPM is designed to solve these problems while minimizing risks to people and the environment. IPM provides long-term pest prevention, using natural control methods and only uses pesticides if no other option is effective. IPM pest control materials are selected to affect a specific target organism without harming surrounding organisms. Furthermore, the pest control materials are applied in a manner that minimizes risks to human health.

The city will create an IPM plan to alleviate city-owned properties of invasive species and problematic insects. The plan will provide guidance on non-native, invasive plants and species, as well as a detailed plan for removal and/or management of such species. The plan will emphasize non-toxic options and consider potential expansion of invasive species due to **climate change**. Educational materials about invasive species identification and best IPM removal practices will be provided to the public. Working with an educational institution, like Saint Petersburg College of the University of South Florida, should be considered for both the development of an IPM plan and the work of providing public education.

Photo Credit: Spring Branch Neighborhood and Park Association

8.8.- Energy-efficient Streets and Parking

A. Develop street design standards that maximize energy efficiency and minimize heat

COBENEFITS 

Energy-efficient street design reduces the amount of heat absorbed by streets, which translates into cooler neighborhoods and less air conditioning use in buildings and cars. Energy-efficient streets are often oriented to protect and enable solar access, and are narrower, better shaded, and constructed with cool paving materials. Tactics include utilizing shade from tree canopies and using cool pavements that enhance water percolation or reflect the sun's energy rather than absorb it. Shading streets and other paved surfaces will minimize the pavement's exposure to the sun thereby reducing ambient neighborhood temperatures by as much as 10°F. This, in turn, reduces the cooling loads in buildings. The city will develop street design standards that maximize energy-efficiency and minimize heat.

8.9.- Environmental Justice

A. Explore options for preventing excessive levels of pollution and mitigate environmental and other impacts such as noise, odor, and traffic in low-income communities and communities of color
B. Include potential environmental and public health impacts of land use decisions into planning and zoning activities
C. Prioritize affordable housing for historically displaced groups to prevent green gentrification
D. Consider measures to ensure that rent in improved neighborhoods remains affordable and savings from energy efficiency improvements are passed on to tenants
E. Assess current city zoning and land use policies to determine where environmental justice criteria can be incorporated

COBENEFITS 

The U.S. Environmental Protection Agency defines **environmental justice** as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies."

In promoting environmental justice, the city will actively explore how it can prevent excessive levels of pollution and mitigate environmental and other impacts like noise, odor, and traffic in low-income and communities of color. This can be achieved by assessing current city zoning and land use policies to determine where environmental justice criteria can be incorporated. The city will also include the potential environmental and public health impacts of land use decisions into planning and zoning activities.

In an effort to prevent green **gentrification**, a phenomenon in which the addition of parks, better **transit** options, and health measures push people out of newly improved neighborhoods, the city will prioritize affordable housing for historically displaced groups. Measures will be considered as to how the city can ensure rent in improved neighborhoods remains affordable and savings from energy-efficiencies can be passed along to tenants.

Learn More About Livability:

	Building Resilience and Efficiency	*U.S. Climate Resilience Toolkit*. U.S. Climate Resilience Toolkit | U.S. Climate Resilience Toolkit. https://toolkit.climate.gov/. Office of Energy Efficiency & Renewable Energy. Why Energy Efficiency Upgrades. https://www.energy.gov/eere/why-energy-efficiency-upgrades.
	Population	Pinellas County. *Demographics*. Pinellas County, Florida - Planning - Demographic Reports and Data. http://www.pinellascounty.org/plan/demographics.htm .
	Adaptive Reuse	Florida Housing Coalition. (2020). *Eyesore to Asset: Building Housing Affordability + Sustainable Communities*. Retrieved from https://www.flhousing.org/wp-content/uploads/2020/05/Fannie-Mae-SCIC-Guidebook-04.2020-1.pdf

	Environmental Cost of Demolition	Clark, D. (2008, April 1). *Adapting an Older Building for a New Use*. Buildings. https://www.buildings.com/articles/34689/adapting-older-building-new-use. Grimmer, A. E., Hensley, J. E., Petrella, L., & Tepper, A. T. (2011). *The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Building*. National Parks Service. https://www.nps.gov/tps/standards/rehabilitation/sustainability-guidelines.pdf.
	Reuse of Building Materials	Environmental Protection Agency. (2020, November 12). *Sustainable Management of Construction and Demolition Materials*. Environmental Protection Agency. https://www.epa.gov/smm/sustainable-management-construction-and-demolition-materials#:~:text=Demolition%20represents%20more%20than%2090,materials%20in%20the%20C%26D%20debris.
	Housing Diversity	Chakraborty, A., & McMillan, A. (2018). Is Housing Diversity Good for Community Stability?: Evidence from the Housing Crisis. *Journal of Planning Education and Research*. https://doi.org/10.1177/0739456x18810787
	Demographics and Growth	Mackres, E. (2020, February 13). *4 Surprising Ways Energy-Efficient Buildings Benefit Cities*. World Resources Institute. https://www.wri.org/blog/2016/05/4-surprising-ways-energy-efficient-buildings-benefit-cities#:~:text=Energy%2Defficient%20buildings%20reduce%20indoor,better%20ventilation%20than%20traditional%20buildings.&text=Efficient%20buildings%E2%80%94those%20that%20make,vital%20to%20achieving%20sustainable%20development. *Why is affordable housing important?* Habitat for Humanity. https://www.habitat.org/stories/reinforcing-importance-of-our-work.

	Parks	D., & Schwartz, R. *The Roles of an Urban Parks System*. World Urban Parks. Report available online at https://www.worldurbanparks.org/images/Documents/The-Roles-of-an-Urban-Parks-System.pdf Levitz, D. (2014). *The role of Parks in Shaping Successful Cities*. National Recreation and Parks Association and American Planning Association. Report available online at https://planning-org-uploaded-media.s3.amazonaws.com/publication/download_pdf/Role-of-Parks-Shaping-Successful-Cities.pdf
	Carbon Sequestration	*Carbon Sequestration*. UC Davis Science and Climate. (2020, May 13). https://climatechange.ucdavis.edu/science/carbon-sequestration/.
	Integrated Pest Management	Eileen Buss and Adam G. Dale. (2020, November 23). *Landscape Integrated Pest Management*. EDIS New Publications RSS. https://edis.ifas.ufl.edu/in109.
	Energy Efficient Street Design	New York State Energy Research and Development Authority. (2002). (rep.). *NYSERDA How-to Guide to Effective Energy-Efficient Street Lighting for Planners and Engineers*. Retrieved from https://www.rpi.edu/dept/lrc/nystreet/how-to-planners.pdf
	Sustainable Streetscape Design	Environmental Protection Agency. (2019, September 6). *Heat Island Cooling Strategies*. Heat Islands - Heat Island Cooling Strategies. https://www.epa.gov/heatislands/heat-island-cooling-strategies. Rehan, R. M. (2013). Sustainable streetscape as an effective tool in sustainable urban design. *HBRC Journal*, *9*(2), 173–186. https://doi.org/10.1016/j.hbrcj.2013.03.001
	Public Health, Planning and Zoning	Zoning, equity, and public health. (2001). *American Journal of Public Health*, *91*(7), 1033–1041. https://doi.org/10.2105/ajph.91.7.1033

Water Conservation

Water has economic, social, and political implications that make it a unique and challenging natural resource to manage. Our habits, practices, and expectations about the availability of freshwater threaten long term enjoyment of this vital resource. Clearwater residents use approximately 11.2 million gallons of drinking water every day. Around 80% of this water is pumped from city-owned and operated groundwater wells. The remaining water is supplied by water purchased from Pinellas County Utilities. While vital to the community, the water treatment process requires a large amount of energy. Transporting and treating water is the highest energy user and **greenhouse gas emissions** source of all the **municipal** operations.

Water use and the energy demand associated with it can be reduced through behavioral change. There are many behavior-related conservation strategies that can be implemented as first steps toward achieving a more sustainable water resource management system. These types of strategies simply require awareness of the issue and the corrective action, along with personal or organizational desire to be part of the solution. Although Clearwater residents use significantly less water per capita per day (81 gallons) than the national average (88 gallons), water conservation measures can still result in savings. Beyond behavioral changes, there is the installation of water-saving devices in homes and businesses. These low-cost investments produce long-term savings, especially when coupled with reduced need for hot water, which requires a significant amount of energy to produce.

Limiting water used for irrigation is essential to reducing water use. Though it requires some knowledge, planning, and investment, landscaping can be designed to use small amounts of water and irrigation systems can be configured to operate only where and when needed. By watering lawns and gardens more efficiently, the U.S. Environmental Protection Agency estimates that Florida residents could save 46 million gallons of water each day, or the daily amount needed to supply every household in Tampa.

As a coastal community, it is also important to consider potential impacts from the forecasted **sea level rise** in Clearwater; among them, flooding and reduced access to drinking water.

Water Conservation

Waterwise Landscapes

Low Impact Development

Water Conservation – Strategies

Section	Strategy Name	Strategies
9.1	Water Conservation	A. Continue to encourage water conservation in homes, businesses and industries. B. Continue to consider changes to water use regulations and fees on an annual basis. C. Encourage residents and businesses to adopt water conservation standards such as Florida Water Star for existing and new construction. D. Consider developing year-round water restrictions that are more stringent than Southwest Florida Water Management District restrictions.
9.2	Waterwise Landscapes	A. Use code-based incentives (e.g., accelerated site plan review time) to encourage community members to create landscapes at the same time as new development or redevelopment that integrate water saving measures. B. Promote and facilitate neighborhood-based projects that train residents on Florida-Friendly landscaping practices. C. Partner with neighborhoods and local organizations to recognize existing Florida-Friendly yards and highlight effective and affordable xeriscaping techniques.
9.3	Low Impact Development	A. Identify and prioritize potential retrofits to city buildings for rainwater capture. B. Create guidance for private property owners to develop and implement rainwater collection plans. C. Increase awareness of co-benefits of low-impact development. D. Consider installations that capture, retain and treat stormwater runoff from parking lots, driveways and roads.

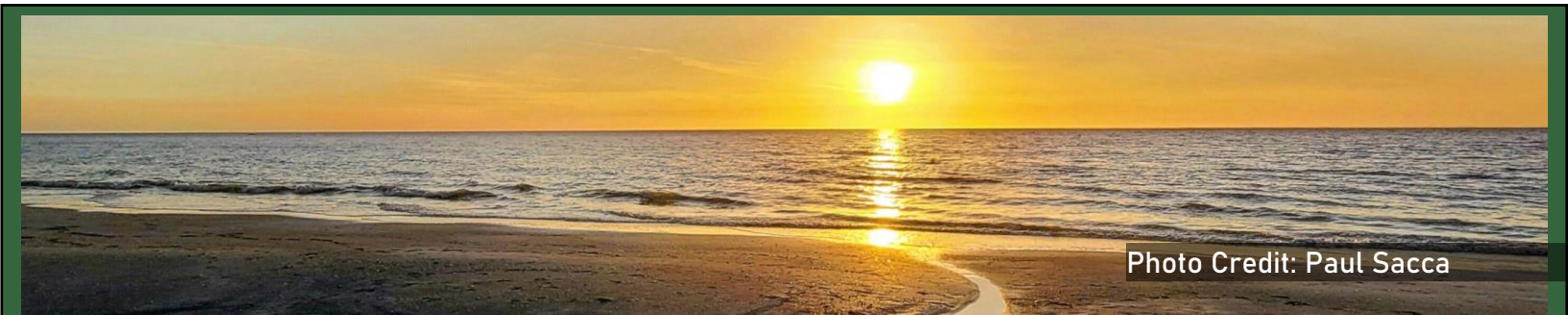


Photo Credit: Paul Sacca

9.1.- Water Conservation

A. Continue to encourage water conservation in homes, businesses and industries.
B. Continue to consider changes to water use regulations and fees on an annual basis.
C. Encourage residents and businesses to adopt water conservation standards such as Florida Water Star for existing and new construction.
D. Consider developing year-round water restrictions that are more stringent than Southwest Florida Water Management District restrictions.

COBENEFITS

The city has and will continue to encourage water conservation in Clearwater homes, businesses, and industries. The city's Public Utilities department actively educates community members about the availability of water-saving devices such as low-flow toilets and high-efficiency irrigation systems. These devices have been popular in the region and have resulted in significant water savings over the last decade. As a result, the city has a very low usage of water per person. Since the first Clearwater Greenprint plan, the city has continued to progress completing each of the reclaimed water services identified in its Water Supply & Treatment Master Plan.

On an annual basis, the city will continue to consider changes to water use regulation and fees. The assessment will include continued evaluation of options to revise rates for promotion of water conservation. The city will encourage residents and businesses to adopt water conservation standards such as Florida Water Star for existing and new construction and will consider developing

Figure 1.- Painted rain barrels (XXXX)

year-round water restrictions that are more stringent than Southwest Florida Water Management District restrictions.

9.2.- Waterwise Landscapes

A. Use code-based incentives (e.g., accelerated site plan review time) to encourage community members to create landscapes at the same time as new development or redevelopment that integrate water saving measures.
B. Promote and facilitate neighborhood-based projects that train residents on Florida-Friendly landscaping practices.
C. Partner with neighborhoods and local organizations to recognize existing Florida-Friendly yards and highlight effective and affordable xeriscaping techniques.

COBENEFITS

The city will use code-based incentives (e.g. accelerated site plan review time) to encourage community members to create landscapes at the same time as new development or redevelopment that integrate water saving measures such as Florida-Friendly Landscaping principles. Along with incentives, the city will promote and facilitate neighborhood-based projects that train residents on Florida-Friendly landscaping practices. The city will partner with neighborhoods and local organizations to recognize existing Florida-friendly yards and highlight effective and affordable xeriscaping techniques. Community members also have access to rainwater collection and water conservation workshops through Pinellas County.

9.3.- Low Impact Development

A. Identify and prioritize potential retrofits to city buildings for rainwater capture.
B. Create guidance for private property owners to develop and implement rainwater collection.
C. Increase awareness of co-benefits of low-impact development.
D. Consider installations that capture, retain and treat stormwater runoff from parking lots, driveways and roads.

COBENEFITS

Low Impact Development (LID) is a design approach that emphasizes conservation and use of on-site natural features to protect water quality. Collecting rainwater is a great example of LID. By collecting and using rainwater, we can greatly reduce the use of treated water for landscape irrigation. Rainwater collecting systems, especially from roof areas, are easy to install and there are a variety of sizes and styles of rain barrels and cisterns for rainwater storage. Other examples of LID include **bioswales**, rain gardens, green roofs, and more.

The National Resource Defense Council analyzed 17 LID case studies comparing the cost of LID and conventional **stormwater** management practices. In most cases, LID methods were both economically and environmentally beneficial, with capital cost savings ranging from 15 to 80%.

Since Clearwater Greenprint was first created, the city has incorporated LID elements into its Stormwater Drainage Criteria Manual and the development standards it uses for the US 19 and Downtown zoning districts. The Cleveland Streetscape Phase III design will also incorporate LID practices such as integrating stormwater detention into vegetated street areas so that it can be stored temporarily until it can drain naturally instead of diverting it directly into the city's stormwater system.

Looking forward, the city will identify and prioritize potential **retrofits** to city buildings for rainwater capture. Additionally, the city will create guidance for private property owners to develop and implement rainwater collecting plans with a goal of capturing runoff from at least 10% of impervious surfaces, or surfaces that prevent the entry of water (e.g., asphalt, concrete, brick, and stone). The focus of the efforts should be on roof area, but might include installations that capture, retain and treat stormwater runoff from parking lots, driveways and roads. Rainwater collecting systems, in combination with reuse of greywater, which is relatively clean wastewater from baths, sinks or washing machines, will reduce demand for and expense of piped water for landscape irrigation.

As part of the overall sustainable water resources program, integrating LID principles into building and site designs, such as bioswales, rain gardens, and other vegetated areas, will go a long way toward raising awareness of water resource issues. LID also has many non-water saving benefits, including conserving **greenspace** and stormwater retention. The city will work to increase awareness of these co-benefits.

Learn More About Water Conservation:

	Importance of Water Conservation	*Conservation*. United States Department of Agriculture. https://www.usda.gov/topics/conservation. *Manage Every Drop*. American Water Works Association Resources and Tools. https://www.awwa.org/Resources-Tools/water-knowledge/water-conservation.

		Water Conservation. Pinellas County Florida - Utilities - Water Conservation. https://www.pinellascounty.org/utilities/water-conservation.htm.
	Florida Friendly Landscapes	Florida Friendly Landscaping Program, UFIFASFFL *Florida-Friendly Landscaping™ Program*. Florida Friendly Landscaping. https://ffl.ifas.ufl.edu/.
	Environmentally Friendly Street Design	*Benefits of Low Impact Development: How LID Can Protect Your Community's Resources*. United Stated Environmental Protection Agency. (2012, March). https://www.epa.gov/sites/production/files/2015-09/documents/bbfs1benefits.pdf.

Photo Credit: Kathleen Beckman

Waste Reduction

Clearwater's garbage is collected, transported, then processed at the Pinellas County Waste-to-Energy Facility in St. Petersburg, Florida. While the waste-to-energy process reduces the amount of solid waste deposited in landfills and generates electricity, it also produces **greenhouse gas emissions** from the burning of plastics, tires, and other carbon-based waste materials. 90% of the garbage created in the county is burned through waste-to-energy while 10% is landfilled. The landfilling of material also creates methane, a harmful GHG when produced in excess.

In 2018, Clearwater residents and businesses generated 6.6 million tons of garbage and recycled 9.6 thousand tons of plastic containers, glass bottles, metal cans, mixed paper, and newspaper. Additionally, 3.7 thousand tons of yard waste was collected and repurposed.

Both businesses and consumers can have a large impact on **waste reduction**. Business can make products using less toxins and packaging while increasing their use of packaging that is recyclable or **compostable**. Consumers can better manage their waste by reusing items, **recycling** properly, composting, and correctly disposing of electronics and other hazardous waste.

We should all do our best to avoid products that generate large amounts of waste and choose to reuse items rather than placing them in the trash. Further sustainable practices include composting at home, recycling properly, and buying products that are made of material that was previously recycled.

Yard Waste Collection

Recycling Program Expansion

Backyard Composting Program

Commercial Composting

Trash to Trends Event

Municipal Waste Reduction Policy

Waste Reduction – Strategies

Section	Strategy Name	Strategies
10.1	Yard Waste Collection	A. Continue to offer yard waste collection to residents, encourage more households to participate, and investigate opportunities for collection of other organic waste such as food waste for composting.
10.2	Recycling Program Expansion	A. Continue to offer recycling services to residents and businesses.
10.3	Backyard Composting Program	A. Continue the virtual Clearwater Creates Compost course and complete an annual compost bin giveaway day
10.4	Commercial Composting	A. Develop a pilot composting program to divert food scraps from landfills and demonstrate the viability of a city-wide program.
10.5	Trash to Trends Event	A. Organize an annual community event for swapping reusable goods to divert reusable goods from the solid waste stream.
10.6	Municipal Waste Reduction Policy	A. Adopt formal waste reduction policy and goals that address ocean-friendly recycling and printing practices. B. Consider development of standards for events held on municipal sites to reduce waste generation, consumption of single-use plastics, and increase recycling by thousands of eventgoers per year.

Photo Credit: City of Clearwater

10.1.- Yard Waste Collection

A. Continue to offer yard waste collection to residents, encourage more households to participate, and investigate opportunities for collection of other organic waste such as food waste for composting.

In 2010, the city started a residential yard waste program to divert yard waste (i.e. leaves, grass clippings, branches) away from the county waste-to-energy facility and landfill. Instead, the yard debris material was collected and sent to a company that repurposes it into mulch or fuel. The program has reduced operating hours and **solid waste** disposal fees paid by the city's Solid Waste and Recycling department. The city will continue to offer yard waste collection to residents, encourage more households to participate, and investigate opportunities for collection of other **organic waste** such as food waste for composting.

10.2.- Recycling Program Continuation

A. Continue to offer recycling services to residents and businesses.

The city expanded previous recycling options to include more types of plastic as well as glass. It also launched a single-stream recycling program in 2013 to make recycling more convenient and provided 90-gallon barrels to every single-family home. In the fiscal year that extended from 2016 to 2017, almost 14 thousand tons of material was recycled as opposed to the 6,000 tons in 2009.

In January of 2018, China, which traditionally was the largest importer of the world's recycling - receiving over 30% of all global material, announced that it would not accept any recycling that contained more than 0.05% contamination. In regard to recycling, contamination is anything that is not recyclable – this includes plastic bags, food waste, containers with liquid, Styrofoam, fabric, hoses, wood, paint, scrap metal, etc.

An audit of Clearwater's recycling stream was also conducted in 2018 and found that the city's recycling ranged from 25-30% contamination. This is a trend that can be seen across the United States, with many cities having a similar contamination rate in their recycling. Contamination can create very hazardous working conditions, as plastic bags and electronics can cause fires in our facilities. Contamination can also cause an entire load of true recyclables to be rejected by the city's processors and then it all must be disposed of as trash. Furthermore, contamination also makes recycling programs costly.

China's essential closure as a market, in addition to improper recycling practices across the U.S., has made recycling very expensive for cities - even more so than taking the material to a landfill or waste-to-energy facility. As a result, cities around the country have decided to end their recycling programs. Fortunately, the city of Clearwater remains committed to offering a recycling program to its residents and businesses. The city is actively focusing on improving the quality of its recycling and is educating the public about what is accepted in the city's program. Focusing on waste reduction, first and foremost, is the best course of action – with proper composting and recycling being used as secondary practices to repurpose valuable material.

10.3.- Backyard Composting Program

A. Continue the virtual Clearwater Creates Compost course and complete an annual compost bin giveaway day

Organic waste, like food scraps and yard trimmings, release methane when placed within the oxygen-free conditions of a landfill. Methane is an incredibly potent GHG. In 2018, methane produced roughly 9.5% of all human made U.S. GHG emissions. While that percentage is small, methane has a global warming factor that is 25 times greater than carbon dioxide over a 100-year period.

In an effort to reduce food waste as well as methane generation, the city launched an online "Create Compost" course in late 2020 that encourages people to learn to compost in their backyard. Program participation was incentivized by providing a starter composting bin to residents who enroll in the program and live within City of Clearwater limits.

10.4.-Commercial Composting

A. Develop a pilot composting program to divert food scraps from landfills and demonstrate the viability of a city-wide program.

With the help of local organizations, the city will develop a pilot composting program to divert food scraps from the landfill and demonstrate the viability of a city-wide program. The pilot program will initially target the commercial sector, with preference for high volume generators of food waste including hospitals, schools, hotels, and restaurants for on-site or collection composting programs. Information on participation rates, challenges, benefits, and costs will be tracked and monitored. If demonstrated that the program's economic, environmental and social benefits outweigh the costs, the study may be expanded to collecting and processing food waste from select neighborhoods in the residential sector.

10.5.-Trash to Trends Event

A. Organize an annual community event for swapping reusable goods to divert reusable goods from the solid waste stream.

Similar to websites like FreeCycle and Craigslist that provide a platform for giving away or exchanging used goods, the city will organize an annual community event for swapping reusable goods. The event, like the Clearwater Community Swap held in downtown in 2010, would serve to divert reusable goods from the solid waste stream and could be combined with an educational and awareness campaign on waste reduction practices.

10.6.-Municipal Waste Reduction Policy

A. Adopt formal waste reduction policy and goals that address ocean-friendly recycling and printing practices.

B. Consider development of standards for events held on municipal sites to reduce waste generation, consumption of single-use plastics, and increase recycling by thousands of eventgoers per year.

COBENEFITS

At present, the city promotes payment of bills online. Moving forward, where possible, the city will also transmit important billing documents on recycled paper. Furthermore, the city offers recycling at many of its facilities and has transitioned to paperless (i.e., electronic) systems in most of its departments. In 2018, the Clearwater City Council also unanimously passed Resolution 18-08 to encourage Clearwater businesses to adopt **ocean-friendly** practices. Ocean-friendly businesses choose reusable, paper-based biodegradable, compostable or recyclable materials instead and maintain a clean recycling program. Ocean-friendly practices include not using plastic bags, plastic straws, plastic utensils, Styrofoam, and balloons.

The city's next step will be to adopt a formal waste reduction policy and goals that address ocean-friendly, recycling, and printing practices. Also, standards for events held on **municipal** sites will be developed to reduce waste generation and use of single use plastics as well as increase recycling by thousands of event goers in Clearwater each year. Guidelines for this municipal waste reduction policy will be outlined under the city's Green Procurement Policy (Green Economy strategy #8).

Learn More About Livability:

	Waste Generation	Environmental Protection Agency. *Municipal Solid Waste*. EPA. https://archive.epa.gov/epawaste/nonhaz/municipal/web/html. *Waste Reduction*. Florida Department of Environmental Protection. https://floridadep.gov/waste/waste-reduction.

	Recyclable Material	*Residential Recycling: City of Clearwater, FL*. Residential Recycling | City of Clearwater, FL. https://www.myclearwater.com/government/city-departments/solid-waste-general-services-department/recycling-services/single-stream-recycling.
	Cost of Recycling	Corkery, M. (2019, March 16). *As Costs Skyrocket, More U.S. Cities Stop Recycling*. The New York Times. https://www.nytimes.com/2019/03/16/business/local-recycling-costs.html
	Global Warming Potential	Environmental Protection Agency. (2020, September 9). *Understanding Global Warming Potentials*. EPA. https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.

Photo Credit: Beth Davis


Photo Credit: City of Clearwater

Local Food

Pinellas County is largely developed with only a few small farms within its boundaries. As a result, most food consumed by Clearwater residents comes from other counties, states, and even countries. Transporting this food from far-away locations requires fuel and accounts 14% of the total energy used to get food from farm to market.

A sustainable community provides healthy food for its people. The quality of food, health, and the natural environment are interconnected. The availability of healthy foods directly influences what people eat and therefore their physical well-being. **Local foods** are transported shorter distances from farm to consumer tables, ensuring fresher foods while reducing **greenhouse gas emissions**. Local foods also tend to be less processed and require less refrigeration, which also reduces GHG emissions. Local foods are generally fresher than foods transported long distances. Most locally-produced food also uses fewer toxic chemicals, which can impact community health and the natural environment. Eating a diet that is also rich in plants has a lower carbon footprint and conserves more water than diets with higher amounts of meat.

While younger generations have grown up without great awareness of where their food comes from, there are many people in Clearwater that have substantial knowledge about small-scale food production that could provide guidance for community gardening. This presents a significant opportunity for learning, experimenting, and knowledge sharing within the community and even bridging cultural and generational divides. Growing food also brings about a greater knowledge of Clearwater's seasons, soil, and wildlife. This knowledge adds to a greater sense of place and care for our land.

Urban Agriculture Task Force

Local Food Production

Urban Agriculture

Community Garden Grant Program

Climate-Friendly Food Policy

Local Food – Strategies

Section	Strategy Name	Strategies
11.1	Urban Agriculture Task Force	A. Organize and facilitate a task force to assist in developing and implementing recommendations for expanding local food production. B. Develop partnerships among non-profits, ministries, neighborhood associations, and private interests to increase local food production and commerce, funding opportunities, and pooling of resources. C. Leverage partnerships to obtain grant funding for planning and project start-up activities.
11.2	Local Food Production	A. Define "local" in the context of food production and the community's needs. B. Develop a "foodshed program", "Buy Fresh Buy Local", in collaboration with regional partners to increase availability of local foods.
11.3	Urban Agriculture	A. Conduct an inventory of public and semi-public lands that would be suitable for food production for pilot projects. B. Amend the Community Development code to allow and support community gardens and other forms of urban agriculture.
11.4	Community Garden Grant Program	A. Create a Community Garden Grant Program.
11.5	Climate-Friendly Food Policy	A. Encourage staff and residents to a eat plant-rich meal at least once a week. B. Integrate climate-friendly food procurement guidelines into the Green Procurement Policy. C. Consider a resolution in support of "Meatless Mondays".

Photo credit: Kathleen Beckman

11.1.- Urban Agriculture Task Force

A. Organize and facilitate a task force to assist in developing and implementing recommendations for expanding local food production.
B. Develop partnerships among non-profits, ministries, neighborhood associations, and private interests to increase local food production and commerce, funding opportunities, and pooling of resources.
C. Leverage partnerships to obtain grant funding for planning and project start-up activities.

COBENEFITS 

A new task force organized and facilitated by the city will assist in developing and implementing recommendations for expanding local food production. The task force will develop partnerships among non-profits, ministries, neighborhood associations and private interests to increase local food production and commerce, funding opportunities, and pooling of resources. Partnerships will increase opportunities for grant funding for planning and project start-up activities. The task force could create an educational campaign to bolster awareness and use of existing initiatives that promote local food consumption.

11.2.- Local Food Production

A. Define "local" in the context of food production and the community's needs.
B. Develop a "foodshed program", "Buy Fresh Buy Local", in collaboration with regional partners to increase availability of local foods.

COBENEFITS 

The Urban Agriculture Task Force should define what is "local" in the context of food production and the community's needs and develop a "**foodshed**" program in collaboration with regional partners to increase the availability of local foods. A "Buy Fresh Buy Local"

program will serve as a model program for strengthening local and regional markets. It will identify and highlight local growers, exposing them to the local Clearwater market. It will also provide general information on the benefits of locally sourced food. The program would create multiple food growing, processing, storing, and selling opportunities, increase awareness, and provide linkages between farmers, consumers and organizations. Developing more local food systems will also serve to create greater **resilience** throughout our community by increasing **food security**.

11.3.- Urban Agriculture

A. Conduct an inventory of public and semi-public lands that would be suitable for food production for pilot projects.
B. Amend the Community Development code to allow and support community gardens and other forms of urban agriculture.

COBENEFITS 

The city will conduct an inventory of public and semi-public lands that would be suitable for food production for the purpose of identifying sites for food production pilot projects. The city will amend the Community Development Code to allow and support community gardens and other forms of **urban agriculture**. Amendments will address hydroponics or other food production facilities in existing and new buildings.

11.4.- Community Garden Grant Program

A. Create a Community Garden Grant Program.

COBENEFITS 

Getting outside and gardening has known physical, mental, and emotional health benefits. Participating in a community gardens can multiply these benefits. From a **sustainability** perspective, community gardens are great because they increase our community's access to fresh and local produce, improving Clearwater's carbon footprint by decreasing the travel distance food takes from farm to table. This close proximity also helps to encourage a more resilient food system. Community gardens go even further to enable additional social benefits, as they encourage neighbors to get to know one another and support a sense of place and pride within our community.

To support Clearwater's existing community gardens and encourage new community gardens to develop, the city of Clearwater will create a Community Garden Grant Program. The mission of the Program will be to advance the city's sustainability goals by supporting the creation or development of community gardens within city limits.

11.5.- Climate-Friendly Food Policy

COBENEFITS

A. Encourage staff and residents to a eat plant-rich meal at least once a week.
B. Integrate climate-friendly food procurement guidelines into the Green Procurement Policy.
C. Consider a resolution in support of "Meatless Mondays."

U.S. citizens consume roughly 2.6 times more meat than the global per person average. Greenhouse gas emissions from agriculture have increased by 10.1% since 1990 and animal agriculture is now responsible for more than half of all food related greenhouse gas emissions. Alternatively, diets that are plant-rich, meaning they include more vegetables, fruits, and grains, have lower emissions than diets that mostly derived from animal products. There are also additional health benefit for plant-rich diets, including reducing the risk of heart disease and diabetes.

As large population centers, cities and counties have a critical role to play. By reducing the amount of animal products purchased with **municipal** funds and serving more plant-rich options on city property and events, we can reduce our indirect greenhouse gas emissions and water footprints, all while offering healthier food. The city of Clearwater will consider a resolution in support of "Meatless Mondays" and will encourage staff and residents to eating more plant-rich meals at least once a week. The city will also integrate climate-friendly food procurement guidelines in its Green Procurement Policy (Green Economy strategy #8).

Learn More About Local Food:

	Meatless Mondays	Editorial Board. (2019, September 22). *Give Up Meat (for a Day, at Least)*. Bloomberg.com. https://www.bloomberg.com/opinion/articles/2019-09-22/meatless-mondays-small-diet-changes-have-big-climate-effects. Schiermeier, Q. (2019, August 8). *Eat less meat: UN climate-change report calls for change to human diet*. Nature News. https://www.nature.com/articles/d41586-019-02409-7.
	Benefits of Gardening	Soga, M., Gaston, K. J., & Yamaura, Y. (2017). Gardening is beneficial for health: A meta-analysis. *Preventive Medicine Reports*, *5*, 92–99. https://doi.org/10.1016/j.pmedr.2016.11.007 Wang, D., & MacMillan, T. (2013). The Benefits of Gardening for Older Adults: A Systematic Review of the Literature. *Activities, Adaptation & Aging*, *37*(2), 153–181. https://doi.org/10.1080/01924788.2013.784942
	Low Meat Diet Health Benefits	Mayo Foundation for Medical Education and Research. (2020, August 20). *It's time to try meatless meals*. Mayo Clinic. https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/meatless-meals/art-20048193.

Photo Credit: Dondi Gutierrez

Green Economy

Photo Credit: City of Clearwater

"Greenwashing" is a new phenomenon in which a product or business is advertised as being better for the environment than it really is. As a result, it can be confusing when trying to choose the best item to purchase or business to support. Many people want to support a business that is doing something good for the world, but these businesses can be difficult to identify. Many businesses would consider more sustainable products and practices if they were provided with direction and shown that "going green" is a good financial decision.

A green economy fosters businesses that help protect, restore, and enhance our natural environment. By supporting green businesses, Clearwater's economy can thrive and prosper while achieving community goals of generating less waste and pollution, saving energy, restoring green spaces, growing food locally, and conserving water. Green businesses could include companies that develop **renewable energy** or alternative fuels, grow organic produce locally, make products from recycled materials, implement resource conservation practices, or choose to avoid single-use plastics. Traditional companies that modify their practices to be more resource efficient, such as builders who learn to use energy-efficient, environmentally sustainable materials and construction practices, could also meet the definition of green business.

Green Business Database

Best Practices Sharing

Green Job Development

Green Guide

Regional Partnerships

Municipal Green Revolving Fund

Green Purchasing Policy

Green Economy – Strategies

Section	Strategy Name	Strategies
12.1	Green Business Database	A. Develop a database of green businesses and the number and types of green jobs within the city. B. Establish criteria for classifying green businesses and jobs, allowing for flexibility as new developments in green industry and business practices arise.
12.2	Best Practices Sharing	A. Recognize businesses that have received LEED, FGBC, Florida Green Lodging Program, and Ocean Friendly certifications on the city website.
12.3	Green Job Development	A. Become a member of Florida Local Environmental Resource Agencies (FLERA). B. Connect unemployed and underemployed people to local green job opportunities. C. Partner with existing institutions and organizations like St. Petersburg College and CareerSource Pinellas to offer workforce training programs in green job skills.
12.4	Green Guide	A. Partner with tourism-based businesses and other local tourism agencies to create a green guide that promotes local businesses that commit to green practices. B. Increase participation in green business designation programs by the hospitality industry (e.g., the Florida Green Lodging Program).
12.5	Regional Partnerships	A. Continue to partner with local and regional organizations and focus on devising new strategies to attract green businesses to the area. B. Leverage economic development centers to spur local economic development in the green business sector.
12.6	Municipal Green Revolving Fund	A. Develop a municipal GRF to fund sustainable projects and uphold cost-effective services.

12.7	Green Purchasing Policy	A. Develop a "Green Purchasing Policy" to encourage the purchase of environmentally preferable products that mitigate the city's environmental impact. B. Create procedures to help departments make the most sustainable purchases possible.

Photo Credit: Matt Overdeer

12.1.- Green Business Database

A. Develop a database of green businesses and the number and types of green jobs within the city.
B. Establish criteria for classifying green businesses and jobs, allowing for flexibility as new developments in green industry and business practices arise.

COBENEFITS

The city will develop a database of all green businesses including the number and types of green jobs in Clearwater. The city will need to establish criteria for classifying green businesses and jobs, allowing for flexibility as new developments in green industry and business practices arise. This data can be collected through surveys, online business searches, and phone interviews with the development community and industry organizations. Clearwater can use the business tax receipt application and renewal process to facilitate data collection.

12.2.- Best Practices Sharing

A. Recognize businesses that have received LEED, FGBC, Florida Green Lodging Program, and Ocean Friendly certifications on the city website.

COBENEFITS

The city Sustainability & Resilience website will recognize businesses that have received green certifications from Leadership in Energy and Environmental Design (LEED), the Florida Green Building Coalition (FGBC), the Florida Green Lodging Program, and Ocean Allies certified Ocean Friendly. The city will also develop a system to recognize and profile other businesses that are taking steps to become more sustainable and resource efficient

without pursuing certifications. The profiles will highlight best practices and the environmental, economic, and social benefits of different companies' efforts.

12.3.- Green Job Development

A. Become a member of Florida Local Environmental Resource Agencies (FLERA).
B. Connect unemployed and underemployed people to local green job opportunities.
C. Partner with existing institutions and organizations like St. Petersburg College and CareerSource Pinellas to offer workforce training programs in green job skills.

COBENEFITS 

In conjunction with generating green jobs locally, the city will also work to connect people who may be unemployed or underemployed to these new opportunities. The city will partner with existing institutions and organizations, like St. Petersburg College and CareerSource Pinellas, to offer workforce training programs in green job skills, such as renewable energy, energy efficiency, waste reduction, food production, and green building. The program will be implemented in tandem with programs and initiatives that are available in Clearwater to ensure that training results in job placement.

12.4.- Green Guide

A. Partner with tourism-based businesses and other local tourism agencies to create a green guide that promotes local businesses that commit to green practices.
B. Increase participation in green business designation programs by the hospitality industry (e.g., the Florida Green Lodging Program).

COBENEFITS 

Many businesses in Clearwater rely on tourism, including local hotels, restaurants, real estate rentals, tour operators, and visitor travel outlets. People now want to spend money

at businesses that align with their personal values. As a result, the city will partner with these tourism-based businesses and other local tourism agencies to create a green guide that promotes local businesses that have made a commitment to green practices. This partnership can also create participation in green business designation programs for the hospitality industry, such as the Florida Green Lodging Program, and for other types of businesses that qualify under programs such as Pinellas County's Green Business Partnership. The city may choose to create its own designation criteria or registration program in implementing this strategy.

12.5.- Regional Partnerships

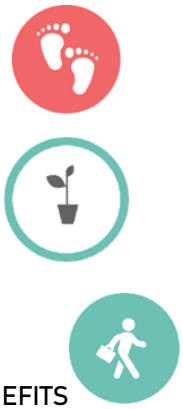
A. Continue to partner with local and regional organizations and focus on devising new strategies to attract green businesses to the area.
B. Leverage economic development centers to spur local economic development in the green business sector.

COBENEFITS

Economic development centers can be leveraged to spur local economic development in the green business sector. Collaborations are being developed at many levels in the Tampa Bay region, from local municipalities, including the city, up to regional levels like the Tampa Bay Partnership which encompasses eight counties.

In 2015, Clearwater Business SPARK was formed to provide a variety of services to developing businesses, including educational resources, mentoring programs, and networking opportunities. The city's Economic Development department also directs businesses and entrepreneurs to additional facilities and programs, such as the Tampa Bay Innovation Center (TBIN). TBIN is committed to cultivating entrepreneurs and developing technology startups. Other regional organizations include the Tampa Bay Entrepreneur Center, Tampa Bay Wave, USF Connect, and Pasco SmartStart. The city will also become a member of Florida Local Environmental Resource Agencies (FLERA), an organization formed in the 1960s that aims to enhance communication, education, and advocacy for Florida local environmental protection efforts. The city will continue to partner with local and regional organizations and will focus on devising new strategies to specifically attract green businesses to the area.

12.6.- Municipal Green Revolving Fund



COBENEFITS

A. Develop a municipal GRF to fund sustainable projects and uphold cost-effective services.

A Green Revolving Fund (GRF) is an internal funding pool that is reserved for financing energy efficiency improvements, renewable energy projects, and other **sustainability** projects that produce a cost savings. A portion of those savings are then used to replenish the fund and enable an organization to reinvest in future sustainable projects that produce similar savings. Thus, a revolving source of capital is generated to facilitate more green projects and financial savings. The city will develop a **municipal** GRF to fund sustainable projects and uphold cost-effective services. The Better Buildings Solution Center, a program of the U.S. Department of Energy, offers a number of tools and example programs that the city can use to form its own GRF.

12.7.- Green Purchasing Policy

A. Develop a "Green Purchasing Policy" to encourage the purchase of environmentally preferable products that mitigate the city's environmental impact.
B. Create procedures to help departments make the most sustainable purchases possible.

In order to ensure that the city is purchasing goods and services that best align with the city's environmental values and sustainability goals, the city will develop a Green Purchasing Policy to encourage the purchasing of environmentally preferable products that improves the city's overall impact on the environment. Preferred products or services are those that have the most positive effect on human health and the environment when compared with competing products or services that serve the same purpose. When considering a product, the entire life cycle of that product should be assessed. In addition to this policy, the city will create procedures to help departments make the most sustainable purchases.

Learn More About Green Economy:

	Business Case for Sustainability	Whelan, T., & Fink, C. (2017, June 1). The Comprehensive Business Case for Sustainability. https://hbr.org/2016/10/the-comprehensive-business-case-for-sustainability.
	Impact of Personal Values on Purchasing Patterns	Vinson, D. E., Scott, J. E., & Lamont, L. M. (1977). The Role of Personal Values in Marketing and Consumer Behavior. *Journal of Marketing*, *41*(2), 44–50. https://doi.org/10.1177/002224297704100215 Chaudhry, D. A., & Follow. (2014, September 8). *Does Culture Influence Our Consumer Behavior? If so, How?* LinkedIn. https://www.linkedin.com/pulse/20140908174823-354556068-does-culture-influence-our-consumer-behavior-if-so-how/.

Photo Credit: City of Clearwater


Photo Credit: Jorge Rivas

Concluding Remarks

Clearwater's most important assets are its people.

Residents, visitors, business owners, and city staff - each have a role to play in making Clearwater a thriving sustainable community for all.

On our journey towards sustainability, we will each learn about and experience new technologies, world events, and perspectives. Changes will happen and our community must remain adaptable and innovative. The Clearwater Greenprint 2.0 is a living document, intended to grow and change to meet the needs of the city as a whole. The city is committed to monitoring Strategy progress and updating the plan to reflect advancements and additions, but it will need your help to succeed.

How to make an impact:

1. **VISIT OUR WEBSITE**, myclearwater.com/sustainability, to find additional resources to live a more sustainable lifestyle.
2. **STAY INFORMED** and sign up to be notified of news and events by joining the city's email list.
3. **SHOW UP** to city meetings and events. Participating in City Council meeting or learning more at a city-sponsored educational event can greatly support the city's sustainability efforts.
4. **SIGN UP** to volunteer with a local non-profit organization or to join a city clean-up event.
5. **START A CONVERSATION** about sustainability with your family and friends. Increasing the awareness in our community is one of the greatest things we can do to make a difference.


Photo Credit: City of Clearwater

Appendix I.- Strategies No Longer Included

Waste Reduction – Pay-As-You-Throw

A Pay-As-You-Throw program was considered by the Solid Waste/Recycling department to reduce the amount of material sent to the Pinellas County Waste-to-Energy facility and landfill. It was decided that a more effective method of reducing waste would be to implement a single-stream recycling program. This decreased the need to collect garbage from twice a week to once a week. The city has seen 20% reduction in trash production since the program was introduced.

Commercial Recycling

Since the first edition of Clearwater Greenprint in 2011, the city of Clearwater's Solid Waste and Recycling Department has provided education to commercial businesses in the forms of waste audits, educational posters, and presentations. This Clearwater Greenprint also suggested that the city should propose an ordinance to mandate recycling by commercial establishments. However, the global recycling market is vastly different than it was 10 years ago and mandating commercial recycling is not feasible for the city at this time. To re-establish robust and secure recycling programs, the city is focusing on improving the quality of its residential and commercial recycling programs rather than solely the quantity of materials at this time.

Appendix II.- Implementation & Measurement Methodologies

Purpose

This appendix presents Implementation and Measurement Methodologies for tracking progress on Strategies. It also details other technical information gathered and used throughout the report alongside assumptions made in the measurement of Clearwater Greenprint 2.0 Strategies. Each Strategy's Implementation and Measurement Methodologies is assigned a timeframe for completion based on the section 3, Target Timelines.

Assumptions

During the creation of Clearwater Greenprint 2.0, Clearwater staff serving on the Sustainability and Resilience Committee were asked to fill out a short survey to better understand the city's priorities and capacities for improving Clearwater's response to climate change in the next 30 years.

The survey consisted of the following questions:

1. Which of these activities do you think will have the greatest positive impact on the city of Clearwater? (Choose your Top 3)
2. Using the scale below, rate the cost and benefit of public outreach and education activities related to sustainability.
3. Using the scale below, rate the cost and benefit of training certain staff on sustainable practices.
4. Using the scale below, rate the cost and benefit of updating codes and other regulating documents (not including implementation).
5. Using the scale below, rate the cost and benefit of upgrading, rehabilitating, or replacing any municipal infrastructure or equipment to a more energy efficient or environmentally friendly standard.
6. Using the scale below, rate the cost and benefit of coordinating programs and outreach in collaboration with local and regional agencies/organizations.
7. Using the scale below, rate the cost and benefit of applying for and managing grants.
8. Please select the primary activity you are involved in.

Staff's responses to these questions are summarized in Table II.1 and Figure II.1 below. Staff's input and budget documentation were used to estimate the costs and benefits of strategies based on their Core Topics.

The Implementation and Implementation and Measurement Methodologies contained in this report are based on the following overarching assumptions:

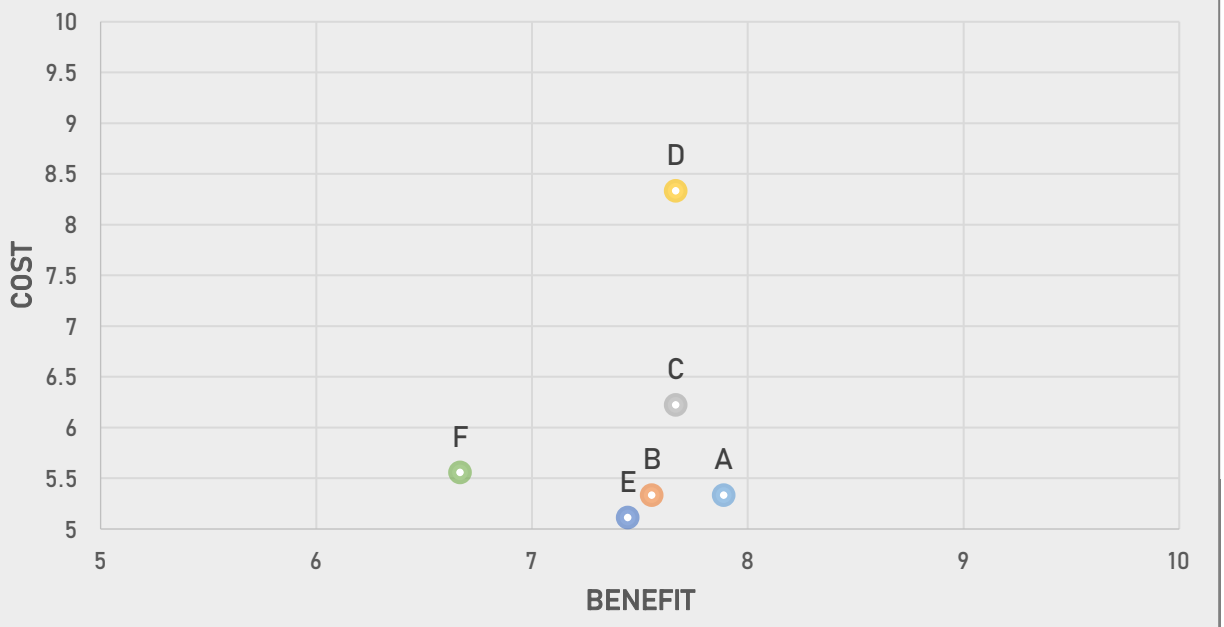
- Annual budget allocations to various departments will remain the same,
- The relative cost and benefit rating assigned by staff to each action reflects the typical scope for their department or division, and
- Staff will review the recommendations contained in this Appendix and draft a final budget for the accomplishment of the monitoring methodologies contained within this report.

In addition to the foregoing assumptions and limitations, Implementation and Measurement Methodologies outlined in all Core Topics may necessitate legal review which should occur prior to any budgetary appropriations, applications for grant funding, or any similar expenditure associated with the recommendations set forth in this document. To ensure the health and safety of city staff and attendees, all activities involving gatherings of people described in this document will abide by pertinent health advisories in effect in addition to applicable state, local, territorial, or tribal health and safety laws, rules, and regulations.

Table II.1.- Top Priority Areas Ranked by Vote Count

Priority Area	Rank	Count
Public Outreach and Education	1	7
Green Energy and Buildings	2	6
Transportation and Accessibility	3	6
Planning and Building	4	3
Water Conservation	5	3
Waste Reduction	6	1
"Green" Economic Development	7	1
Easy Access to Food Locally	8	0

Figure II.1.- Average Cost/Benefit for Each Activity Type



A — Public outreach and education activities related to sustainability.

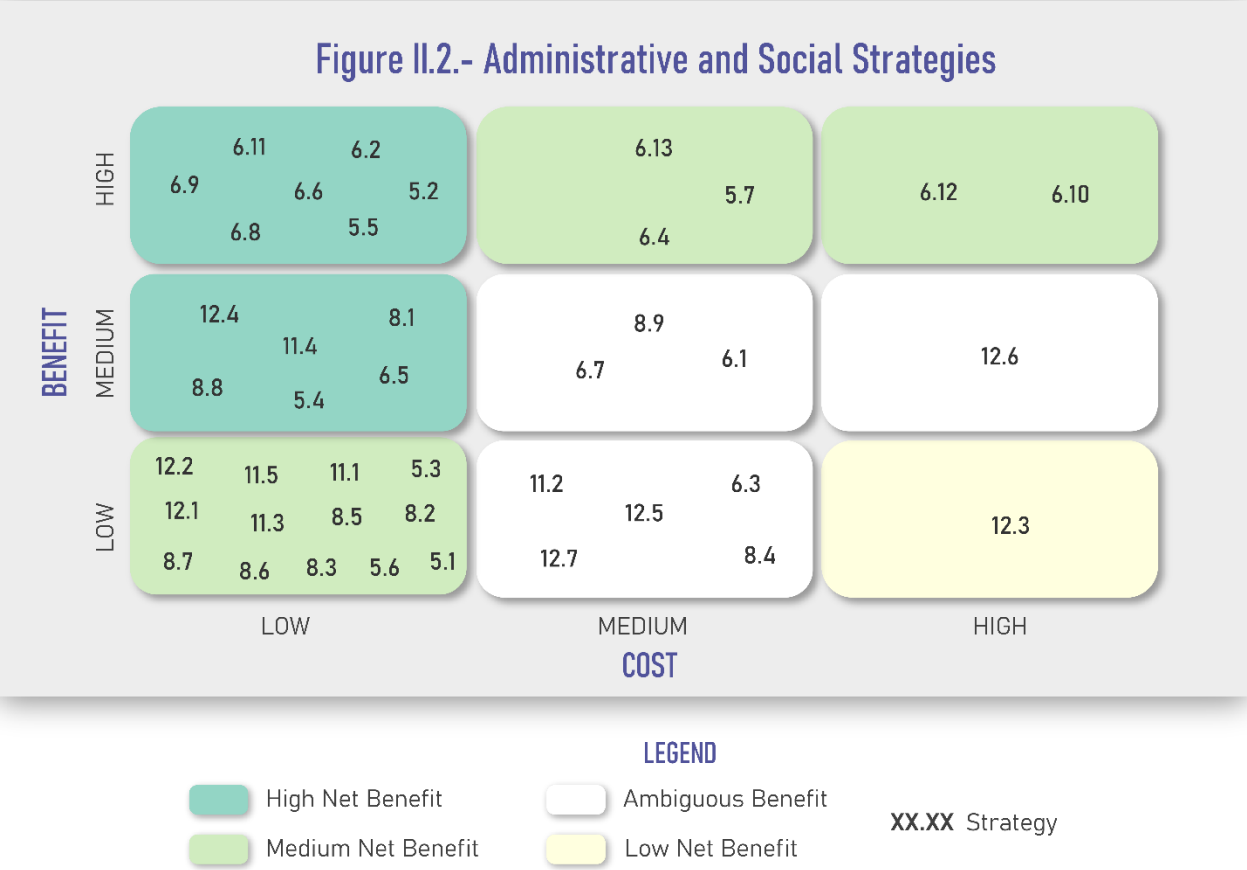
B — Training certain staff on sustainable practices.

C — Updating codes and other regulating documents (not including implementation).

D — Upgrading, rehabilitating, or replacing any municipal infrastructure or equipment to a more energy efficient or environmentally friendly standard.

E — Coordinating programs and outreach in collaboration with local and regional agencies/organizations

F — Applying for and managing grants.



Education and Awareness

The following section provides the Implementation and Measurement Methodologies for Education and Awareness Core Topic Strategies. Categorization of the relative cost and benefit of the Education and Awareness Core Topic Strategies is provided in **Figure II.2.- Administrative and Social Strategies**. Strategies in this graphic represent a grouping of Strategies considered to be within similar range of cost to implement. In addition to Education and Awareness, the graphic includes strategies from Green Energy and Buildings, Livability, Local Food, and Green Economy.

Strategies within the Education and Awareness Core Topic are largely limited by budgetary allocation and staff hours and consist of programming and data management. The proposed strategies assume the city of Clearwater's willingness to establish programs, create and maintain databases, launch information collection campaigns, and take other necessary measures to implement the actions described in this section. Feasibility of implementation would be established after budget and hour allocation is determined by staff. Once this occurs, metrics such as number of attendees, number of registrants, attendee demographics, number of downloads, clicks, or website traffic may be used to gauge the success of activities.

5.1 Mission Statement *(Short-Term)*

- Write or re-write mission statement for city of Clearwater to include environmental commitment.
- Incorporate the mission statement into the local government's comprehensive plan.

5.2 Community Education *(Short-Term)*

A. Promote education through publications and public events

- Set timeline goals and publication schedules for commencement of reports and conduct workshops.
- Layout publication schedule and publication format.
- Workshops should be held online, quarterly, covering a two-year schedule. Upon completion, the workshop cycle should repeat.

B. Provide pertinent local GIS and other data online

- Develop and maintain a geographically referenced databases of buildings (including building age), gas transmission lines, wastewater lines, and septic tank locations.
- Use these data to inform and direct implementation programs.

5.3 Community Outreach *(Short-Term)*

A. Develop new events that engage the community in sustainability through fun and innovative activities

- New events shall occur no less than two times per year.

B. Continue to host an annual sustainability conference

- The conference shall be held annually.

5.4 Youth Programs *(Short-Term)*

A. Continue youth education programs to educate students about resource conservation

- Earmark funding for course/program design and implementation for youth education programming.

B. Further current efforts by coordinating with the Pinellas County School Board

- Work with Pinellas County or draft and present an ordinance to be ratified by the School Board directing creation of a School Sustainability Committee.
- Include purpose and direction on how the Committee will make changes in curriculum or after school programming.

5.5 Municipal Staff Education *(Short-Term)*

A. Organize ongoing educational workshops and presentations to keep staff and elected officials up to date on sustainability initiatives and opportunities

- Integrate programming with Strategy 5.1 and use the same materials and metrics with some modification to limit duplication of efforts.

B. Integrate sustainable practices into daily operations and serve as ambassadors and educators about city sustainability programs and projects in daily interactions with the public

- Designate staff to spend at least one hour per month participating in these activities.
- Appropriate staff will complete one continuing education unit (CEU)-approved course in green buildings on a bi-annual basis.
- Provide re-usable mugs or water bottles to all employees.
- Include the city's commitment to the environment in new employee orientation.

5.6 Continuous Reporting *(Short-Term)*

A. Continuously measure, evaluate, and address both mitigation and adaptation progress in accordance with ICLEI Local Governments for Sustainability, USA Five Milestones for Climate Mitigation and Adaptation

- Prepare a reporting calendar schedule and incorporate it into the Strategy 5.1 reporting schedule.

5.7 Resilience Planning and Outreach *(Short-Term)*

A. Form a Resilience Committee comprised of city staff and community partners

- The Resilience Committee shall be comprised of representatives from departments involved in planning and zoning, utilities, and transportation.

B. Initiate a vulnerability assessment throughout the Clearwater area to identify the factors most at risk to climate change stressors

- Coordinate this strategy with Strategy 5.1. and report on committee structure as well as the communications program within one year following establishment.

C. Formulate a Climate Action Plan to address each of the vulnerabilities identified and further direct the city's resilience work

- The Sustainability and Resilience Committee will assess risks using climate change data sources such as IPCC sea level rise scenarios and advanced hurricane planning incidence and intensity under climate change/global warming scenarios.
- The city of Clearwater will develop digital mapping and modeling capability either in-house or through an outside consultant to assess risk in 1-2 years.
- In the 1-2 years adoption of Clearwater Greenprint 2.0, the city of Clearwater will develop a Climate Action Plan.

Green Energy & Buildings

The following section provides the Implementation and Measurement Methodologies Green Energy and Building Core Topic Strategies. Refer to **Figure II.2.- Administrative and Social Strategies** for the categorization of the relative cost and benefit of each Green Energy and Buildings Core Topic Strategy. The Green Energy and Buildings Implementation and Measurement Methodologies pivots on several assumptions, mainly that the approval process for each project is informed by its financial feasibility ("project pro-forma") as well

as fiscal impact analyses under two conditions: one with the proposed climate change mitigation measure and one without. Furthermore, it is assumed that prior to undertaking other actions, the city of Clearwater will first conduct an inventory of municipal buildings and assess their conditions, and that the city has agency to make improvements to the municipal buildings they seek to retrofit. Additionally, following completion of the building inventory, the city will set targets for retrofits or new construction and assign specific costs.

Costs and subsequent budgetary appropriations may be based on a wide variety of metrics including the following publicly available data sources:

- Pinellas County Property Appraiser Records,
- U.S. Census Data, and
- American Community Survey Estimates.

6.1 PACE – Energy Finance Program *(Short-Term)*

A. Partner with public and private organizations to establish an energy finance program

- Form a special district or financing district to enable Property Assessed Clean Energy program (PACE) partnerships on non-residential properties.
- Staff will use the U.S. Census-based residential characteristics inventory to assess costs and average level of energy efficiency upgrades needed per residential unit.
- Staff will set the financial amount the city will provide to seed and support building rehabilitation finance.

6.2 Resource Conservation Program *(Short-Term)*

A. Develop and implement a program that performs comprehensive energy evaluations, recommends conservation practices and upgrades, provides basic information on financing options, and measures the environmental and economic benefits after implementation

- Coordinate with electric and water utilities to enhance, supplement existing programs.
- Measure monthly kilowatt hours (KwH) or gallons per day (GPD) usage before and after conservation implementation at the user level.
- Track historic usage and set future consumption targets.

6.3 Incentives for Upgrades *(Short-Term)*

A. Implement a "feebate" program

- Coordinate this Strategy with Strategies 6.1 and 6.2.
- Track, measure, and record annual funding occurring in the feebate program.

6.4 Performance Standards *(Short-Term)*

A. Encourage and assist developers in incorporating green building practices and standards into their design, construction, maintenance, and operations plans

- Strengthen, enhance, update, and upgrade Comprehensive Plan and land development regulations applicable to new construction.

B. Encourage the use of national building performance standards

- Provide funding and PACE options for retrofits in redevelopment.

6.5 Natural Gas Conservation *(Short-Term)*

A. Continued offering of programs by Clearwater Gas System to increase the number of residents and businesses using natural gas to power appliances

- Provide funding incentives for new hookups.
- Update digital system maps for gas availability.
- Determine program for system expansion if warranted.
- Determine if there are efficiency ratings and retrofit standards and potential for existing gas appliances similar to home heating A/C units.
- Provide natural gas conservation tips to customers.

6.6 Local Power Generation *(Medium-Term)*

A. Request proposals from private companies to design, build, install and operate small-scale energy generation facilities that can utilize available resources to generate electricity and/or heat

- Enable zoning laws to allow small scale solar facilities on site, or integrated with new construction.
- Identify suitable sites of 400 acres to accommodate small scale solar plants.

6.7 Renewable Energy Challenge *(Short-Term)*

A. Preparation of a marketing and outreach campaign challenging property owners to install renewable energy technologies

- Coordinate implementation with Strategy 5.1 and 6.1.

B. Support code changes that remove obstacles to installing renewable energy systems

- Identify code-based obstacles.
- Validate obstacles with energy providers.
- Develop a plan to revise municipal codes.

C. Provide information to assist residents with purchasing renewable energy equipment

- Identify renewable energy equipment suppliers.
- Verify and certify suppliers through Chamber of Commerce
- Help fund an information program and include verified suppliers in workshop and outreach presentations.

D. Include information about local, state, and federal incentives, economic and environmental benefits, contact information for local contractors, financing options

- See Strategy 6.7.C.

E. Create a website that allows the Clearwater community to submit property information and view addresses where renewable energy systems have been installed

- Obtain client lists from local renewable energy suppliers.

6.8 Renewable Energy Finance *(Short-Term)*

A. Investigate financing mechanisms for expanding renewable energy generation

- Coordinate with Strategy 6.1 and include information in Strategy 5.1.

B. Launch a solar co-op program in which residents can coordinate bulk purchase of PV systems for reduced price

- Identify sites for a solar plant with grid access for existing or new development.

6.9 Energy Efficient Streetlights *(Short-Term)*

A. Request conversion of all Duke Energy-owned electric streetlights to LED

- Negotiate a municipal rate reduction or rebate to finance LED streetlight conversion.
- Coordinate with Clearwater-owned public lighting.

6.10 Municipal Energy Management Program and Policy *(Short-Term)*

A. Partner with a third-party company to create an energy savings program including staff training and web-based energy consumption tracking, and benchmarking for municipal buildings

- Develop public database of municipal buildings to provide comprehensive energy consumption data.

B. Develop a formal energy management policy for city buildings and operations

- Within 1-3 years of commencement, conduct engineering assessment of all municipal buildings to evaluate energy savings potential from windows, insulation, lighting, ventilation, temperature, plant/AC efficiency ratings/harmful refrigerant use, and water usage.
- Design comprehensive custom energy management program.
- Create an Energy Manager position to administer the formal energy management policy and related municipal programs such as that described in Strategy 6.12.

6.11 Municipal Re-Commissioning Plan *(Short-Term)*

A. Establish a re-commissioning plan to inspect, test, and make proper adjustments at regularly scheduled intervals to optimize the performance of its buildings and equipment

- Coordinate with Strategy 6.10.

B. Create an LED lightbulb conversion program for city buildings

- Inventory all light fixtures in all city buildings by indicating the type of bulb or fixture.

C. Train key staff that do not have the appropriate skills to test the equipment

- Design a preventative maintenance program to replace existing non-LED bulbs (and fixtures if necessary) with LEDs.
- Estimate the total cost of replacement and track total cost saving from reduced operational costs following LED installation for 10 years.

D. Identify any environmentally harmful refrigerants in its operations and phase them out as part of its re-commissioning process (see Green Energy and Buildings Strategy #11)

- Coordinate implementation with Strategy 6.10.

6.12 Municipal Performance Standard *(Short-Term)*

A. Build all new municipal facilities to a nationally recognized high-level performance standard (e.g., Leadership in Energy and Environmental Design, Florida Green Building Coalition, and Energy Star)

- Update and modernize building code standards. Include resiliency and performance standards which may exceed national standards due to specific local conditions such as humidity, sun, or salt.

6.13 Resilient Infrastructure *(Short-Term)*

A. Existing and new infrastructure complies with comprehensive resilience guidelines and the recommendations provided by the Tampa Bay Regional Resiliency Coalition

- Coordinate implementation with Strategy 6.10.

B. Prioritize resilience upgrades in capital and operational budgets

- Estimate capital cost of resilience upgrades.
- Estimate damage avoidance over 20 years and operational efficiency cost savings from resilience upgrades.

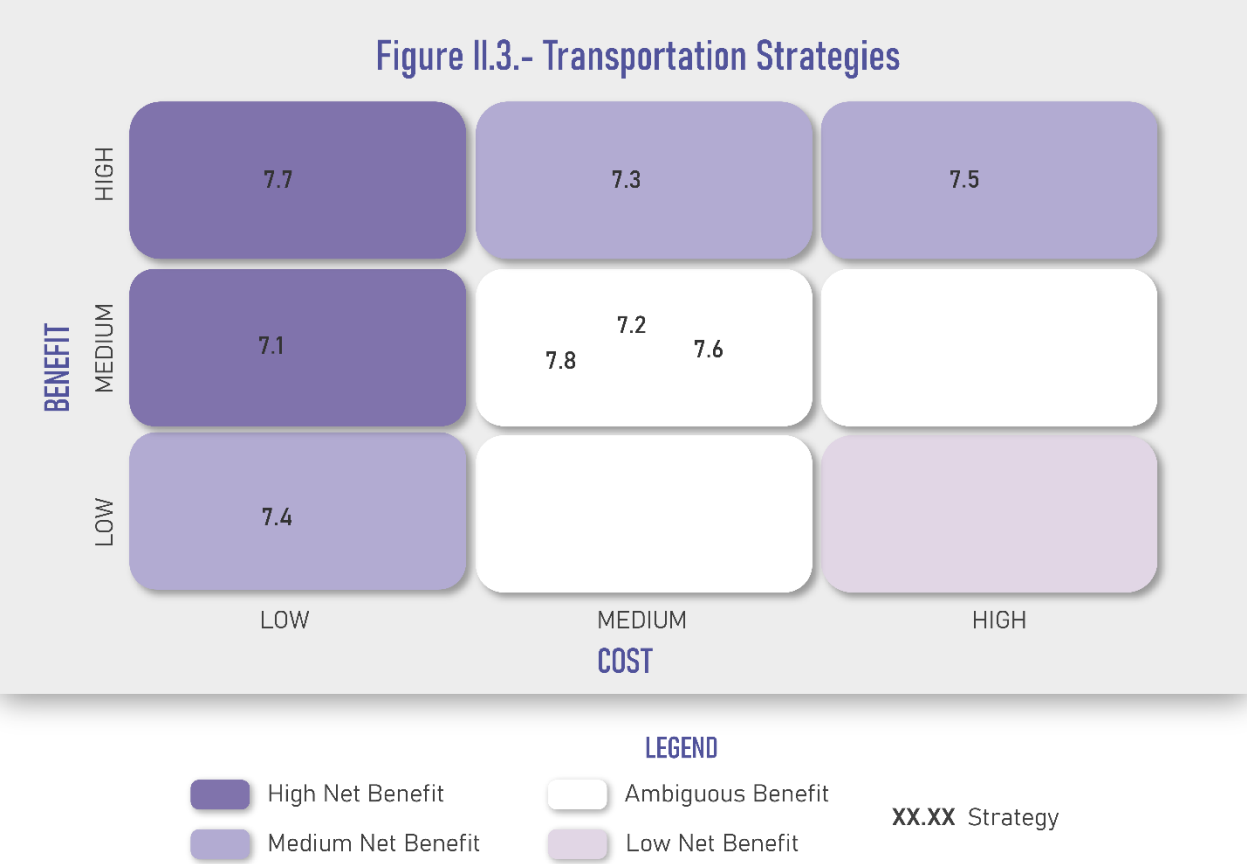
C. Create educational materials and events for the public to improve the adaptive capacity of their own buildings, structures, and properties.

- Coordinate with Strategies 5.1 and 5.2.

D. Explore grant opportunities for municipal photovoltaic and energy storage for critical building infrastructure (e.g., emergency shelters, schools, cooling centers, and nursing or assisted-living homes) to protect vulnerable populations and reduce GHG emissions

- As part of any update to the city's Comprehensive Plan, identify two medium to large scale inundation, drainage, and flood water storage projects which will protect surrounding structures from floods; storage projects may be passive recreational areas when dry.

Figure II.3.- Transportation Strategies



Transportation

The following section provides the Implementation and Measurement Methodologies for Transportation Core Topic Strategies. Categorization of the relative cost and benefit of the Transportation Core Topic Strategies is provided in **Figure II.3.- Transportation Strategies**. For Implementation and Measurement Methodologies in this Core Topic it is assumed that sufficient permissions to alter county, state, and federal roads will be attained from the appropriate governing agencies and that work carried out will be consistent with other governing documents, including the city's existing Complete Streets Plan. Major limitations to implementation of Strategies within this Core Topic are eliciting widespread behavioral change for use of alternative modes of transportation to achieve Vehicle Miles Travelled (VMT) reduction targets, and anticipated major structural changes, including adoption of electric vehicles, remote work, or autonomous vehicles. These changes affect the goals identified by Clearwater Greenprint 2.0 in many ways, including by reducing gas tax revenue used for roadway infrastructure improvements, and changing the metrics (e.g., VMT) by which greenhouse gas emissions are typically measured.

7.1 Vehicle Mile Reduction *(Short-Term)*

A. Launch a VMT reduction campaign

- Build a representative database of total VMT over time on municipal streets based on summation of selected municipal traffic counts.
- Illustrate average annual VMT growth rates.
- Undertake program of study to reduce annual VMT growth.
- Adopt strategies; implement plan.
- Measure and track annual change in VMT.

B. Reduce city-wide VMT by 10%

- Specify how VMT is calculated from mass transit or carpool modes as well as reductions due to trends in remote work.

C. Launch an internal VMT reduction program for employees

- Specify employee rules and standards for work from home. Reference San Mateo County's Office of Sustainability "Telework & Flex-Schedules Toolkit" as a resource for support and guidance.
- Build out IT capacity to support remote work.

7.2 Complete Streets Policy *(Short-Term)*

A. Complete actions outlined in the Complete Streets Plan.

B. Healthy street design is local government policy

- Implement the 12 Steps of Walkable Communities per Florida Department of Transportation Pedestrian and Bicycle Program.
- Implement Strategies identified in the Street Design Guidelines for Healthy Neighborhoods from Walkable Communities, Inc.

7.3 Local Transit Improvement *(Short-Term)*

A. Continue to advocate for more funding to increase bus and trolley stops on existing routes

- Develop a plan for bus/trolley improvement needs and opportunities. Assign funding requirements. Develop a cost share funding plan to build out improvements over a 10-year time frame.

B. Collaborate with the Pinellas Suncoast Transit Authority (PSTA) to improve bus scheduling

C. Explore and encourage alternative forms of public transportation (e.g., Bus Rapid Transit, carpool, car share, bike share, scooter share, and ferry services)

- Enhance mobility-related zoning and municipal codes to accommodate alternative modes of transportation regarding parking and land use.
- Implement a mobility impact fee to replace transportation impact fees through year five of implementation.

7.4 Low Emission Vehicles *(Short-Term)*

A. Support construction of infrastructure for low-to-zero emission vehicles

- Develop charging station installation fees to assess total program costs to provide for EV fleet.

B. Continue to install public EV charging stations

C. Change the Community Development Code to require charging stations for electric vehicles for new development and adopt "EV ready" policies

- Determine the percentage of residents driving electric/hybrid or low emissions vehicles.

D. Host a minimum of one event per year at which the public is encouraged to try an electric vehicle

- Partner with nearby auto sales dealerships or the Southern Alliance for Clean Energy for an electric vehicle test drive event.

E. Partner with an organization such as the Sierra Club or Southern Alliance for Clean Energy to create an event that encourages residents and businesses to shift to hybrid electric vehicles

- Coordinate implementation with Strategies 5.1 and 5.2.

7.5 Municipal Fleet Conversion *(Medium-Term)*

A. Adopt a Green Fleet Policy to govern use and procurement of fleet vehicles

- Assign Green Fleet program development to the Fleet Manager.
- Develop the Green Fleet Policy within two years of the Greenprint 2.0 plan adoption.
- The Green Fleet Policy or Program will include the following: Inventory of fleet, identification of repair/replace cycle, development of fleet replacement costs, and identification of time frames for replacement.
- Coordinate with the current policy study being undertaken by the city.
- Fleet transition should be completed by 2035 or 2050 per the current assessment.

B. Investigate financing mechanisms to offset cost of fleet conversion (e.g., vehicle leasing and federal tax credit)

- Within three years following adoption of Clearwater Greenprint 2.0, identify replacement cost and review finance options with Financial Advisor.

C. Increase the share of municipal light-duty vehicles running on alternative fuels

- All municipal light-duty vehicles will run on alternative fuels by 2040.

7.6 Congestion Management *(Medium-Term)*

A. Manage traffic congestion by considering alternative intersection designs

- Coordinate implementation with Strategies 7.1, 7.2, and 7.3.

B. Continue to include roundabouts in new road construction projects

- Coordinate implementation with Strategies 7.1, 7.2, and 7.3.

C. Consider use of other congestion management practices

- Coordinate implementation with Strategies 7.1, 7.2, and 7.3.

7.7 Municipal Telecommuting Policy *(Short-Term)*

A. Increase the alternative work schedule and telecommuting opportunities available to city workforce

- Coordinate implementation with Strategy 7.1.
- Support alternative work schedule and telecommuting opportunities by expanding IT capability to include secure remote access for employees to internal city networks.

B. Encourage virtual meetings in lieu of in-person meetings requiring travel by automobile whenever possible

- State policy requires some public meetings to be in-person only; lobby to update the state mandate for in-person meetings.

Livability

The following section provides the Implementation and Measurement Methodologies for Livability Core Topic Strategies. Categorization of the relative cost and benefit of the Livability Core Topic Strategies is provided in **Figure II.2.- Administrative and Social Strategies**. Similar to the Green Energy and Buildings Core Topic area, Strategies within the Livability Core Topic area pivot on the assumption that the approval process for each project is informed by its financial feasibility ("project pro-forma") as well as fiscal impact analyses under two conditions: one with the proposed climate change mitigation measure and one without. In addition to this, it is also assumed that the city will measure equity and inclusion.

Though this consideration applies to all Strategies within the Clearwater Greenprint 2.0, issues of equity and inclusion are particularly relevant for those of the Livability Core Topic area. This is because most of the area's Strategies involve improvements that typically occur in small geographic areas (e.g., new construction and building retrofits) and are likely to affect historically under-resourced populations. To measure equity, the city will define measures that quantify the qualitative aspects of livability. To this end, factors such as aesthetics, and emotion may be monitored by way of routine survey of the city's stakeholders (e.g., residents, workers, and business-owners). Surveys may ask stakeholders to rate their levels of satisfaction with city services, or the physical condition of the built environment.

8.1 Development Incentives *(Short-Term)*

A. Continue to provide for mixed-use development in livable, transit-oriented neighborhoods

- Coordinate implementation with Strategies 5.6, 6.4, 6.6, 6.8, and 6.12.

B. Improve regulation, investment, and incentives that will fulfill residents' household and transportation needs

- Coordinate with Strategy 6.1 and evaluate and specify finance mechanism such as revolving loan or letter of credit support amounts city will provide.

8.2 Property Revitalization *(Short-Term)*

A. Encourage restoration and reuse of buildings as an alternative to demolition

- Strengthen and update local codes to shift redevelopment toward these goals.
- Where demolition is unavoidable, encourage deconstruction of buildings and subsequent reuse and recycling of building materials.

B. Maintain the historic designation process to ensure that historically significant properties and neighborhoods remain stable, well-maintained, and available for long-term use

- Measure potential savings from historic designation.
- Consider conducting a cost benefit analysis through literature search or direct analysis to determine if there are property value increases due to historic designation and carbon footprint savings from rehabilitation vs demolition and reconstruction.
- Conduct pro-forma analysis and fiscal impact analysis to determine profitability and fiscal revenue conditions of proposed project.
- Employ Public Private Partnership (P3) mechanisms to help assure minimum profitability standards to help assure project financial viability.
- Employ tax increment financing (TIF) capture, synthetic sales tax, or other mechanisms to help offset costly capital requirements; thereby helping assure project financial viability.

C. Continue to implement a brownfield program and identify incentives such as tax credits for brownfield and greyfield development

- Coordinate implementation with Strategy 6.1.

D. Consider partnership with an educational institution or non-profit organization to demonstrate the benefits of compost in a pilot program or through a publication

- Identify 10 pilot compost sites and provide bins, scales and operational instruction to weigh and measure compost material by volume to illustrate weight and volume metrics of landfill savings per home.
- Track data and report in educational outreach events.
- Pursue financial incentives to offset some of the cost of brownfield remediation and promote reuse of land.
- Where remediation is needed, consider the addition of compost as an amendment to disturbed land.

8.3 Diverse Housing Options *(Short-Term)*

A. Continue to create a self-sustaining community and local economy to reduce VMT and increase accessibility

- Inventory vacant land and target areas for mixed use options as part of any future updates to the city's Comprehensive Plan.

8.4 Greenspace Expansion *(Short-Term)*

A. Support and expand the community's capacity to manage, develop, and enhance greenspace for natural habitat, recreation, gardening, and outdoor education activities

- Incentivize or supplement beach renourishment.
- Improve and maintain public property.
- Create P3s to transition underutilized land to greenspace.
- Encourage provision of greenspace on private property through public policy and programs.

8.5 Urban Tree Program and Canopy Target *(Short-Term)*

A. Continue to host an annual tree giveaway

- Create partnership with the Audubon Society, Arbor Day Foundation, or other similar organizations to create a tree inventory for a tree giveaway program.

B. Develop a program to educate community members on the benefits of planting trees and recognize residents and businesses that participate

- Coordinate implementation with Strategy 5.1.

C. Assess current tree canopy and set an increased canopy goal based on assessment results

- Coordinate and review tree policy with Pinellas County.

D. Create an implementation plan to increase tree canopy coverage

- See Strategy 8.5.F below.

E. Require mitigation for consumption of natural habitat or resources

- Identify active land bank mitigation sales in Florida.
- Engage in transfer and sale program with existing mitigation land banks; obtain cost of land bank mitigation credits.
- Review city land development code and based on review, amend code to require mitigation as part of the development code.

F. Enact and enforce a tree preservation or land-clearing ordinance

- Hire a municipal arborist to manage the tree inventory and the preservation, recommendation of mitigation and maintain GHG mitigation and carbon sequestration data.

G. Pilot a forest carbon sequestration project on municipal land which will sequester carbon to offset a portion of the community's annual GHG emissions

- Calculate GHG savings per 1,000, 5,000, and 10,000 trees.
- Consider differences in tree species and growing zones.
- Develop a planting program under an existing urban forestry project protocol to allow for recording and reporting the results.

8.6 Environmental Conservation *(Short-Term)*

A. Become a certified community under National Wildlife Federation Wildlife Habitat Program

- Take the National Wildlife Federation Mayor's Monarch Pledge

B. Enact a sea turtle ordinance

C. Create an endangered lands conservation/purchasing program

- Coordinate with Strategies 8.3 and 11.3 to identify and evaluate lands with high environmental or conservation value.

D. Promote eco-literacy

- Create programs to increase awareness of regional flora and fauna as well as the importance of natural resource preservation.
- Build on existing partnerships with local organizations (e.g., the Clearwater Marine Aquarium, Florida Native Plant Society, Audubon Society, and Tampa Bay Estuary Program).
- Coordinate implementation with Strategies 5.1, and 8.5.

8.7 Integrated Pest Management *(Short-Term)*

A. Create an IPM plan address invasive species and problematic insects at city-owned properties

- Provide guidance on non-native, invasive plants and species as well as a detailed plan for removal and/or management of such species.
- Emphasize non-toxic options and consider potential expansion of invasive species due to climate change.
- Coordinate implementation with the University of Florida IFAS Extension Office.

B. Provide the public with educational materials concerning invasive species identification and IPM best practices

C. Consider partnership with an educational institution (e.g., Saint Petersburg College of the University of South Florida) to develop of an IPM plan and subsequent educational outreach

8.8 Energy Efficient Streets and Parking *(Short-Term)*

A. Develop street design standards that maximize energy efficiency and minimize heat

- Coordinate with any future amendments to the city's Comprehensive Plan's Transportation Element.
- Document cost differentials for capital and maintenance, changes in materials use, cost offsets with embedded solar panels, or integrated traffic flow technology.

8.9 Environmental Justice *(Short-Term)*

A. Explore options for preventing excessive levels of pollution and mitigate environmental and other impacts such as noise, odor, and traffic in low-income communities and communities of color

B. Include potential environmental and public health impacts of land use decisions into planning and zoning activities

- Conduct literature review and analysis of issues and costs surrounding environmental justice.
- Identify applicable concerns in Clearwater within 1 year of authorization.

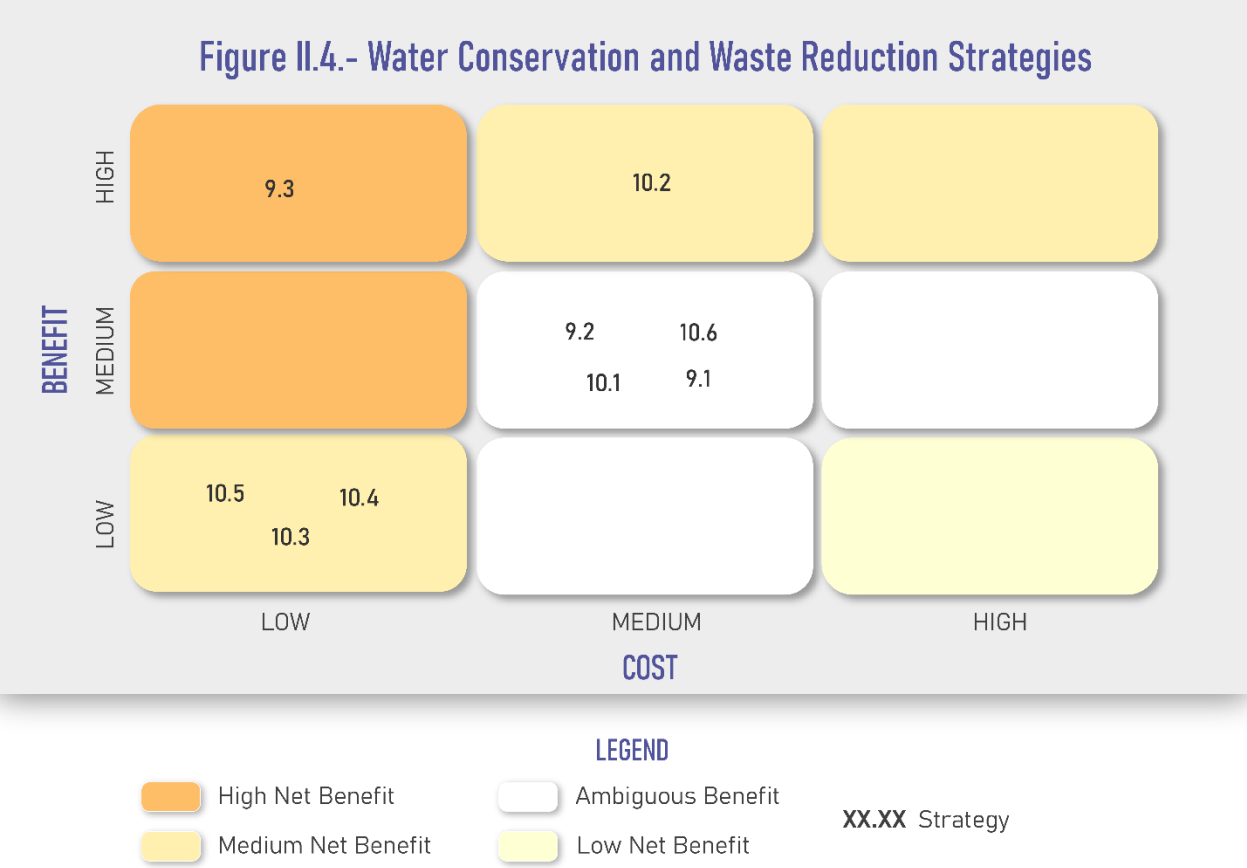
C. Prioritize affordable housing for historically displaced groups to prevent green gentrification

- Develop Environmental Justice plan 2-3 years following authorization.

D. Consider measures to ensure that rent in improved neighborhoods remains affordable and savings from energy efficiency improvements are passed on to tenants

- Allocate up to $250,000-$400,000 over the span of two years to undertake zoning and land use code updates in transportation, energy, development, reuse, and environmental justice.
- Coordinate updates to land use and zoning regulations with Strategies 6.4, 6.14, 7.3, and 8.3.

E. Assess current city zoning and land use policies to determine where environmental justice criteria can be incorporated



Water Conservation

The following section provides the Implementation and Measurement Methodologies for the Water Conservation Core Topic Strategies. Categorization of the relative cost and benefit of the Water Conservation Core Topic Strategies is provided in **Figure II.4.- Water Conservation and Waste Reduction Strategies**. For Implementation and Measurement Methodologies in this Core Topic it is assumed that sufficient permissions to alter water utility infrastructure have been obtained from the Southwest Florida Water Management District (SWFWMD) or other regulating entity. Any improvements are presumed to be based on gathered data as well as the project pro-forma and fiscal impact analysis.

9.1 Water Conservation *(Short-Term)*

A. Continue to encourage water conservation in homes, businesses and industries

- Coordinate with Florida Department of Environmental Protection (FDEP), and the SWFWMD to establish new rules, determine consumption rates, water use per capita, and water sources for the city.

- Coordinate regulatory costs and compliance thresholds with water utility.
- Prepare finance plan for consumption compliance.

B. Continue to consider changes to water use regulations and fees on an annual basis

- Inventory residential plumbing conditions based on US Census data.
- Coordinate with Strategy 6.1 to measure average plumbing requirements for existing inventory of structures.
- Continue to evaluate rate restructuring options to promote water conservation.

C. Encourage residents and businesses to adopt water conservation standards such as Florida Water Star for existing and new construction

- Coordinate implementation with Strategy 5.1.

D. Consider developing year-round water restrictions that are more stringent than Southwest Florida Water Management District restrictions

9.2 Waterwise Landscapes *(Short-Term)*

A. Use code-based incentives (e.g., accelerated site plan review time) to encourage community members to create landscapes at the same time as new development or redevelopment that integrate water saving measures

- Promote widespread adoption of Florida Friendly Landscape Principles.

B. Promote and facilitate neighborhood-based projects that train residents on Florida-Friendly landscaping practices

- Coordinate and incorporate information on best practices with Strategy 5.1.

C. Partner with neighborhoods and local organizations to recognize existing Florida-Friendly yards and highlight effective and affordable xeriscaping techniques

- Coordinate and incorporate information on best practices with Strategy 5.1.

9.3 Low-Impact Development *(Short-Term)*

A. Identify and prioritize potential retrofits to city buildings for rainwater capture

- Conduct engineering conditions inventory of municipal buildings – coordinate with Strategies 6.10 and 9.1.

B. Create guidance for private property owners to develop and implement rainwater collection plans

- Rely on existing rainwater harvesting programs such as that implemented in Santa Fe, New Mexico.

C. Increase awareness of co-benefits of low-impact development

- Incorporate concepts into Strategy 5.1.

D. Consider installations that capture, retain and treat stormwater runoff from parking lots, driveways and roads

Waste Reduction

The following section provides the Implementation and Measurement Methodologies for the Waste Reduction Core Topic Strategies. Categorization of the relative cost and benefit of the Waste Reduction Core Topic Strategies is provided in **Figure II.4.- Water Conservation and Waste Reduction Strategies**. For Implementation and Measurement Methodologies in this Core Topic, it is assumed that sufficient permissions to establish or alter recycling and waste disposal service agreements have been obtained from pertinent regulating entities. Any improvements are presumed to be based on gathered data as well as the project pro-forma and fiscal impact analysis.

10.1 Yard Waste Collection *(Short-Term)*

A. Continue to offer yard waste collection to residents, encourage more households to participate, and investigate opportunities for collection of other organic waste such as food waste for composting

- Institute a survey of the number of pickups per month, per season.
- Gather dump statistics for the monthly weight of yard waste collected to determine household participation rates.

10.2 Continuation of Recycling Program *(Short-Term)*

A. Continue to offer recycling services to residents and businesses

- Continue the City's existing recycling program.
- Focus on waste reduction and promote composting.
- Determine efficiencies and service expansion opportunities.
- Enable customers to make online bill payments or utilize recycled paper.

10.3 Backyard Composting Program *(Short-Term)*

- Continue providing access to the virtual Clearwater Creates Compost course
- Hold an annual compost bin pick up event for residents

10.4 Commercial Composting *(Short-Term)*

A. Develop a pilot composting program to divert food scraps from landfills and demonstrate the viability of a city-wide program

- Target the city's commercial sector initially with preference for high-volume generators of food waste (e.g., hospitals, schools, hotels, and restaurants) for on-site or collection composting programs.
- Monitor participation rates, challenges, benefits, and costs.
- Consider expanding the study to collecting and processing food waste from select neighborhoods in the residential sector.
- Determine food scrap versus vegetable/non-meat composting requirements.
- Identify compost dump sites for site development or contract with an existing facility.
- Maintain a monthly data base with material tonnage.

10.5 Trash to Trends Event *(Short-Term)*

A. Organize an annual community event for swapping reusable goods to divert reusable goods from the solid waste stream

- Coordinate implementation with Strategy 5.1.

10.6 Municipal Waste Reduction Policy *(Short-Term)*

A. Adopt formal waste reduction policy and goals that address ocean-friendly recycling and printing practices

- Build a database tracking all waste by type, volume and weight based on waste removal services estimates under current contract.
- Determine average monthly levels.
- Set waste reduction targets and strategies by type and measurement.

B. Consider development of standards for events held on municipal sites to reduce waste generation, consumption of single-use plastics, and increase recycling by thousands of eventgoers per year

- Estimate the cost of waste removal, recycle value of waste material, and value of waste savings.

Local Food

The following section provides the Implementation and Measurement Methodologies for the Local Food Topic area Strategies. Refer to **Figure II.2.- Administrative and Social Strategies** for the categorization of the relative cost and benefit of each Green Energy and Buildings Core Topic Strategy. The Local Food Implementation and Measurement Methodologies assume that the approval process for each project is informed by the project pro-forma as well as fiscal impact analysis. Similar to the Livability Core Topic area, measurement of equity is a primary consideration of this topic area. To this end, measurement of access to quality local food is assumed. Access may be measured through a variety of means, and data on the subject may be obtained from the following public and open-source data sources:

- United States Department of Agriculture Economic Research Service (refer to the Food Access Research Atlas)
- Property Appraiser Records
- U.S. Census Data
- American Community Survey Estimates
- Open Street Map

11.1 Urban Agriculture Task Force *(Short-Term)*

A. Organize and facilitate a task force to assist in developing and implementing recommendations for expanding local food production

- Create an educational campaign organized by the task force to bolster awareness and use of existing initiatives that promote local food consumption.
- Within the first year of Strategy implementation, create an Urban Agriculture Task Force.
- Within the second year of Strategy implementation, develop a local farm to table plan.

B. Develop partnerships among non-profits, ministries, neighborhood associations, and private interests to increase local food production and commerce, funding opportunities, and pooling of resources

C. Leverage partnerships to obtain grant funding for planning and project start-up activities

11.2 Local Food Production *(Short-Term)*

A. Define "local" in the context of food production and the community's needs

- See Strategy 11.1.

B. Develop a "foodshed program", "Buy Fresh Buy Local", in collaboration with regional partners to increase availability of local foods

- Identify sites for a municipal farm and local farmers market.
- Inventory and prepare a database of local growers and food producers.
- Coordinate implementation with Strategy 5.1 and the local University of Florida IFAS Extension Office.

11.3 Urban Agriculture *(Short-Term)*

A. Conduct an inventory of public and semi-public lands that would be suitable for food production for the purpose of identifying sites for food production pilot projects

- Coordinate with Strategies 6.4, 8.3 and 8.9 as part of any future updates to the city's Comprehensive Plan.

B. Amend the Community Development Code to allow and support community gardens and other forms of urban agriculture

- Incorporate hydroponics or other types of food production facilities into new and existing buildings.
- Undertake the amendment as part of municipal code evaluation and update.
- Coordinate with considerable code review and updates in Strategies 6.4, 6.7, 6.12, 7.3, 7.4, 8.1, 8.5, 8.9, 9.2, and 9.3.

11.4 Community Garden Grant Program *(Short-Term)*

A. Create a Community Garden Grant Program

- Coordinate implementation with Strategies 5.1 and 5.2.
- Consider co-locating community gardens with farmer's market locations.
- Following the launch of the program in 2020, track stakeholders and provide staff assistance/guidance help with grant applications.

11.5 Climate Friendly Food Policy *(Short-Term)*

A. Encourage staff and residents to eat a plant-rich meal at least once a week

B. Integrate climate-friendly food procurement guidelines into the Green Procurement Policy

C. Consider a resolution in support of "Meatless Mondays"

Green Economy

The following section provides the Implementation and Measurement Methodologies for the Green Economy Core Topic area Strategies. Refer to **Figure II.2.- Administrative and Social Strategies** for the categorization of the relative cost and benefit of each Green Economy Core Topic Strategy. The Green Economy Implementation and Measurement Methodologies assume that the approval process for each project is informed by the project pro-forma as well as fiscal impact analysis. It should be noted that prior to commencement of work, a formal definition of "green jobs" should be established by staff; in the process, a distinction should be made between "green jobs" and "green industry." Actions to promote green jobs should be based on a database generated based on staff's definition.

12.1 Green Business Database *(Short-Term)*

A. Develop a database of green businesses and the number and types of green jobs within the city

- Collect data through surveys, online business searches, and phone interviews with the development community and industry organizations.
- Consider using the Business Tax Receipt application and renewal process to facilitate data collection.
- Use municipal business license records to expand data fields to classify business by green criteria.
- Update business license application to institutionalize collection of data.

B. Establish criteria for classifying green businesses and jobs, allowing for flexibility as new developments in green industry and business practices arise

- Research a paradigm for classification green jobs.
- Develop a detailed database of green jobs from NAICS data and municipal occupational/business licenses data.
- Add classification fields to business license forms.

12.2 Best Practices Sharing *(Short-Term)*

A. Recognize businesses that have received LEED, FGBC, Florida Green Lodging Program, and Ocean Friendly certifications on the city website

- Develop a system for recognizing and profiling other businesses that take steps to become more sustainable and resource efficient without pursuing costly certifications.
- Highlight best practices and the environmental, economic, and social benefits of different companies' efforts.
- Coordinate implementation with Strategy 5.1.

12.3 Green Job Development *(Short-Term)*

A. Become a member of Florida Local Environmental Resource Agencies (FLERA)

B. Connect unemployed and underemployed people to local green job opportunities

- Using the green business database, classify job opportunities within companies by degree of green character.

C. Partner with existing institutions and organizations like St. Petersburg College and CareerSource Pinellas to offer workforce training programs in green job skills

- Consider a green jobs tax credit to incentivize employers to create green jobs.
- Implement this program in tandem with programs and initiatives already available in Clearwater to ensure that training results in job placement.
- Promote green job opportunities in existing workforce training.

12.4 Green Guide *(Short-Term)*

A. Partner with tourism-based businesses and other local tourism agencies to create a green guide that promotes local businesses that commit to green practices

- Highlight high-scoring companies with green jobs from municipal license database.

B. Increase participation in green business designation programs by the hospitality industry (e.g., the Florida Green Lodging Program)

- Create designation criteria or registration program for green businesses.
- Coordinate implementation with Strategy 12.1.

12.5 Regional Partnerships *(Short-Term)*

A. Continue to partner with local and regional organizations and focus on devising new strategies to attract green businesses to the area

- Define green business characteristics.
- Identify resources needed to accommodate green business (i.e., land, workforce, infrastructure, and utilities).
- Coordinate implementation with Strategy 12.1.

B. Leverage economic development centers to spur local economic development in the green business sector

- Target development of necessary resources to support business attraction.

12.6 Municipal Green Revolving Loan Fund *(Short-Term)*

A. Develop a municipal GRF to fund sustainable projects and uphold cost-effective services

- Determine the purpose and use of revolving loan funds, namely development, redevelopment, retrofit, business methods and process, materials usage, transportation, and utilities.
- Leverage the U.S. Department of Energy's Better Buildings Solution Center program to offer tools and example programs for creation of a GRF.

- Determine any capital needs or funding volume.
- Identify a revenue source.
- Earmark revenue source and budget funds.

12.7 Green Purchasing Policy *(Short-Term)*

A. Develop a "Green Purchasing Policy" to encourage the purchase of environmentally preferable products that mitigate the city's environmental impact

- Consider the entire lifecycle of products in purchasing decisions.
- Evaluate and rank all municipal purchases for green alternatives.
- Calculate the cost differential in buying green.
- Calculate the social/environmental cost savings of green products to offset direct cost of buying green, if any.

B. Create procedures to help departments make the most sustainable purchases possible

Appendix III.- Climate Change Science

The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report affirms that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level."[i] Researchers have made progress in their understanding of how the Earth's climate is changing in space and time through improvements and extensions of numerous datasets and data analyses, broader geographical coverage, better understanding of uncertainties and a wider variety of measurements.[ii] These refinements expand upon the findings of previous IPCC Assessments – today, observational evidence from all continents and most oceans shows that "regional changes in temperature have had discernible impacts on physical and biological systems."

The Fifth Assessment asserts that "it is *extremely likely* that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcings together. Globally, economic and population growth continued to be the most important drivers of increases in CO2 emissions from fossil fuel combustion. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions".

In short, the Earth is already responding to climate change drivers introduced by mankind.

Temperatures and Extreme Events are Increasing Globally

Surface temperature is projected to rise over the 21st century under all assessed emission scenarios. It is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea level to rise. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions.[iii]

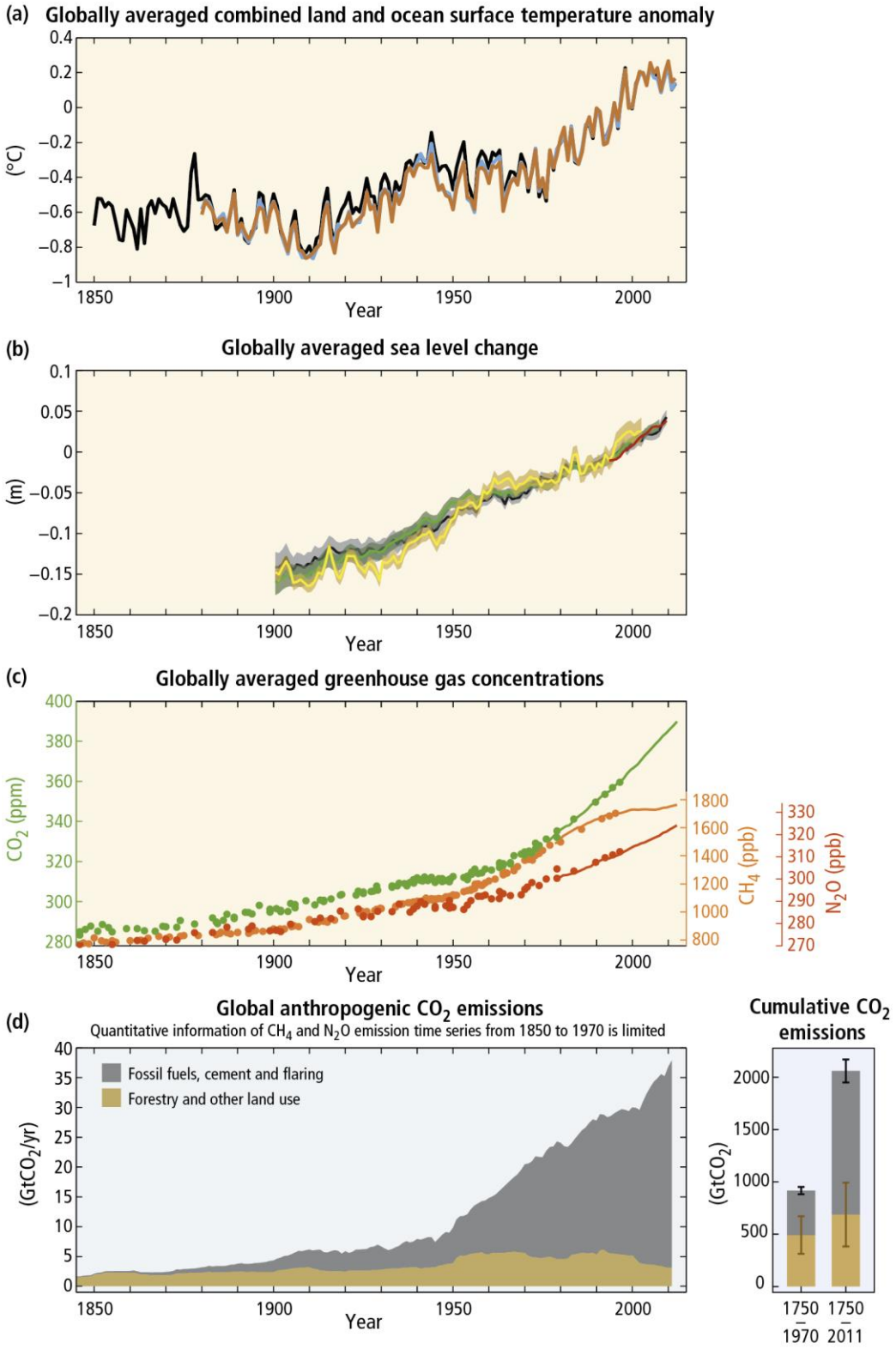


Figure 1 Observations and other indicators of a changing global climate system[iv]

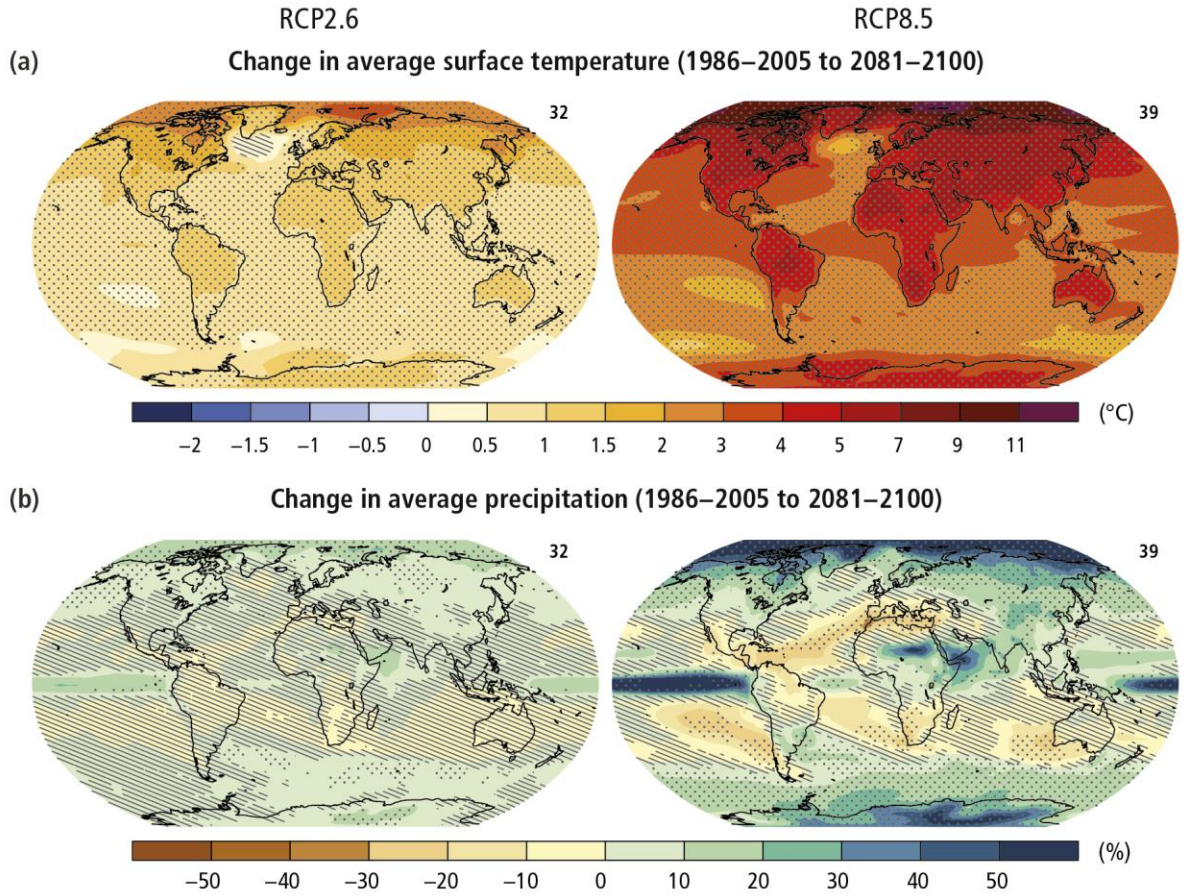


Figure 2 Change in average surface temperature (a) and change in average precipitation (b) based on multi-model mean projections for 2081–2100 relative to 1986–2005 under the RCP2.6 (left) and RCP8.5 (right) scenarios.

Climate Risks

Climate change is projected to undermine food security. Due to projected climate change by the mid-21st century and beyond, global marine species redistribution and marine biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services. For wheat, rice and maize in tropical and temperate regions, climate change without adaptation is projected to negatively impact production for local temperature increases of 2°C or more above late 20th century levels, although individual locations may benefit. Global temperature increases of ~4°C or more above late 20th century levels, combined with increasing food demand, would pose large risks to food security globally. Climate change is projected to reduce renewable surface water and groundwater resources in most dry subtropical region, intensifying competition for water among sectors.

Until mid-century, projected climate change will impact human health mainly by exacerbating health problems that already exist. Throughout the 21st century, climate change is expected to lead to increases in ill-health in many regions and especially in

developing countries with low income, as compared to a baseline without climate change. Health impacts include greater likelihood of injury and death due to more intense heat waves and fires, increased risks from foodborne and waterborne diseases and loss of work capacity and reduced labor productivity in vulnerable populations. Risks of undernutrition in poor regions will increase. Risks from vector-borne diseases are projected to generally increase with warming, due to the extension of the infection area and season, despite reductions in some areas that become too hot for disease vectors.

In urban areas climate change is projected to increase risks for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges. These risks are amplified for those lacking essential infrastructure and services or living in exposed areas. Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in the production areas of food and non-food crops around the world.

Climate change is projected to increase displacement of people. Populations that lack the resources for planned migration experience higher exposure to extreme weather events, particularly in developing countries with low income. Climate change can indirectly increase risks of violent conflicts by amplifying well-documented drivers of these conflicts such as poverty and economic shocks.[v]

Regional and Local Impacts

Because the impacts of climate change vary geographically. The Tampa Bay region is frequently ranked as an area with the most vulnerability to climate change risks. These risks include increased intensity of extreme weather events, heat, precipitation, sea level, and vector-borne diseases.

Numbers in ovals (Figure 3) indicate regional totals of climate change publications from 2001 to 2010, based on the Scopus bibliographic database for publications in English with individual countries mentioned in title, abstract or key words (as of July 2011). These numbers provide an overall measure of the available scientific literature on climate change across regions; they do not indicate the number of publications supporting attribution of climate change impacts in each region. Studies for polar regions and small islands are grouped with neighboring continental regions.[vi]

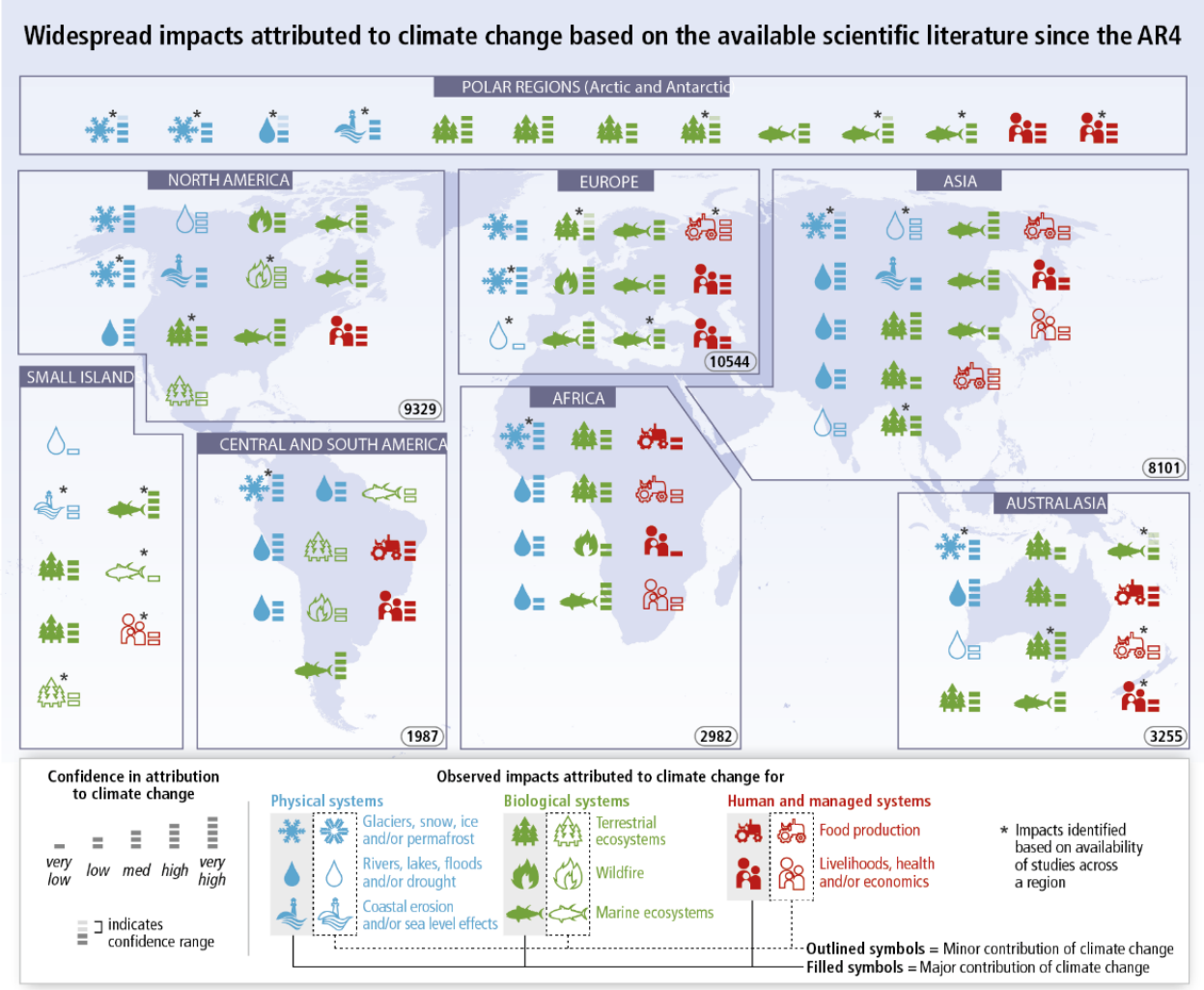


Figure 3 Climate impacts around the world. Symbols indicate categories of attributed impacts, the relative contribution of climate change (major or minor) to the observed impact and confidence in attribution.

Greenhouse Gas Emissions Must be Reduced

Limiting risks across Reasons For Concern (a) would imply a limit for cumulative emissions of CO2 (b) which would constrain annual GHG emissions over the next few decades (c). Panel A reproduces the five Reasons For Concern. Panel b (Figure 4) links temperature changes to cumulative CO2 emissions (in GtCO2) from 1870. They are based on Coupled Model Intercomparison Project Phase 5 simulations (pink plume) and on a simple climate model (median climate response in 2100), for the baselines and five mitigation scenario categories (six ellipses). Panel c shows the relationship between the cumulative CO2 emissions (in GtCO2) of the scenario categories and their associated change in annual GHG emissions by 2050, expressed in percentage change (in percent GtCO2-eq per year) relative to 2010. The ellipses correspond to the same scenario categories as in Panel b, and are built with a similar method.[vii]

The recent and massive buildup of greenhouse gases in our atmosphere is conceivably even more extraordinary than changes observed thus far regarding temperature, sea level, and snow cover in the Northern hemisphere in that current levels greatly exceed recorded precedent going back much further than the modern temperature record.

Anthropogenic greenhouse gas emissions have increased since the pre-industrial era driven largely by economic and population growth. From 2000 to 2010 emissions were the highest in history. Historical emissions have driven atmospheric concentrations of carbon dioxide, methane and nitrous oxide to levels that are unprecedented in at least the last 800,000 years, leading to an uptake of energy by the climate system.[viii]

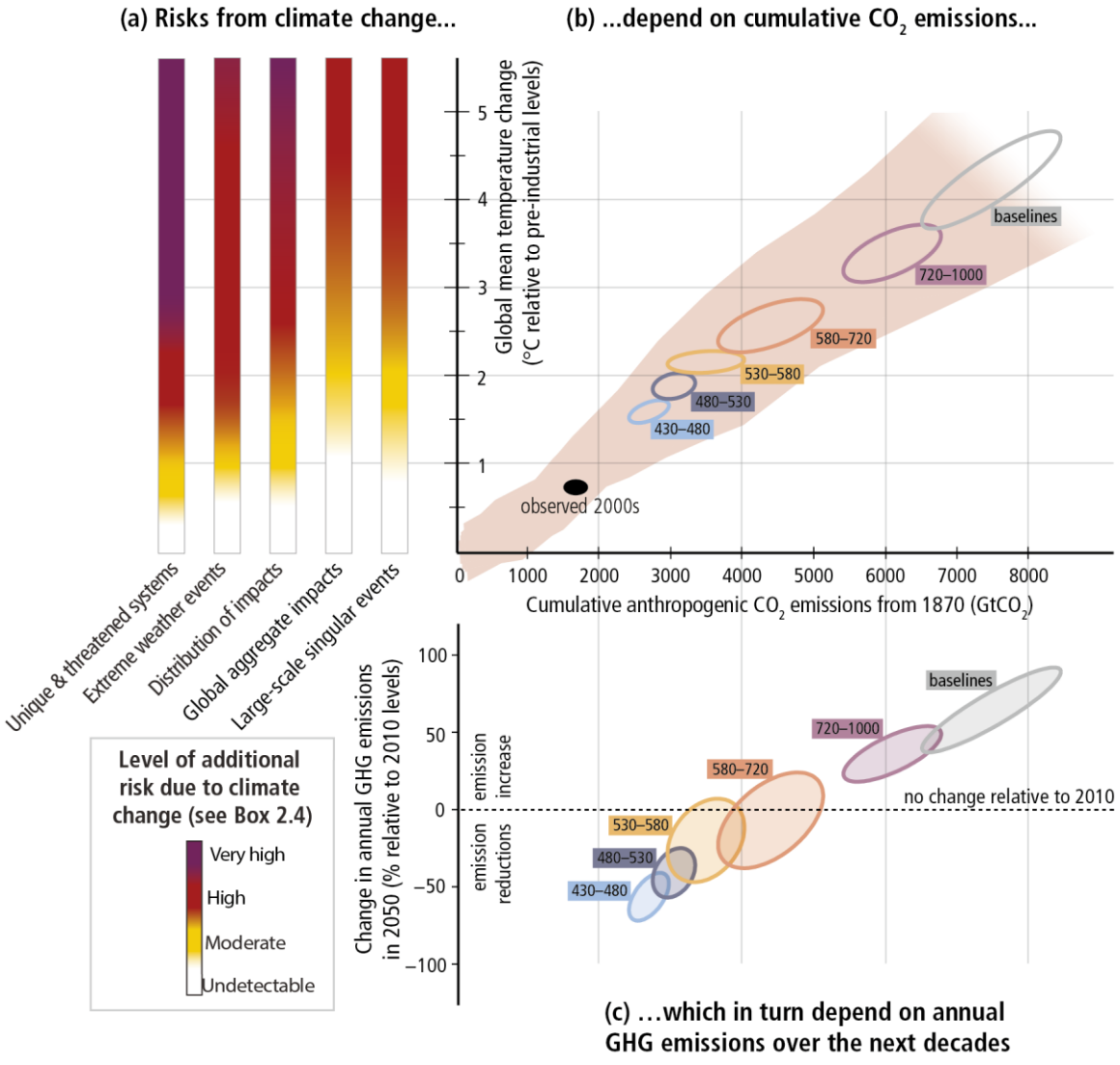


Figure 4: The relationship between risks from climate change, temperature change, cumulative carbon dioxide (CO2) emissions and changes in annual greenhouse gas (GHG) emissions by 2050.

In response to the problem of climate change, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, and waste diversion, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts. While this Plan is designed to reduce overall emissions levels, as the effects of climate change become more common and severe, local government adaptation policies will be fundamental in preserving the welfare of residents and businesses.

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[i]. IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K Pachauri, and L.A. Meyer (eds.)]. Geneva, Switzerland, 151 pp

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