Alachua County, FL

2019 Inventory of Community and Government Operations Greenhouse Gas Emissions

March 2022

Produced by ICLEI - Local Governments for Sustainability USA

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Executive Summary

The Alachua County Board of County Commissioners (County) acknowledges the global climate emergency and the impacts and risks. The climate crisis includes increased frequency and intensity of severe weather events, such as flooding, drought, wildfires, and severe storms.

Because of this, On November 5, 2019, the County moved to create a Citizen Climate Advisory Committee to assist in developing a Climate Action Plan and other climate strategies and policies. The County recognizes the importance of building a climate-resilient and adaptive community that will positively impact the health and well-being of all and will offer protection from potential adverse consequences of climate change to people ecosystems, and the economy.

To quantify the impacts of our actions, the County has requested an updated baseline inventory of greenhouse gas (GHG) emissions. Along with completing a climate vulnerability analysis, the County will be able to identify and quantify mitigation targets and strategies that achieve our climate mitigation goals.

This report provides estimates of greenhouse gas emissions resulting from activities in Alachua County as a whole in 2019, and emissions specifically from the county's government operations.

Key Findings

Total 2019 communitywide emissions were 4,253,781 Metric Tons Carbon Dioxide Equivalent (MT CO2e). The most significant contributor is Transportation & Mobile Sources with 39% of emissions. The next largest contributors are Process & Fugitive Emissions (21%) and
Commercial Energy (20%). Actions to reduce emissions in these sectors will be a vital part of a climate action plan. Solid Waste, Residential Energy, Industrial Energy, and Water & Wastewater were responsible for the remaining ~20% of emissions.

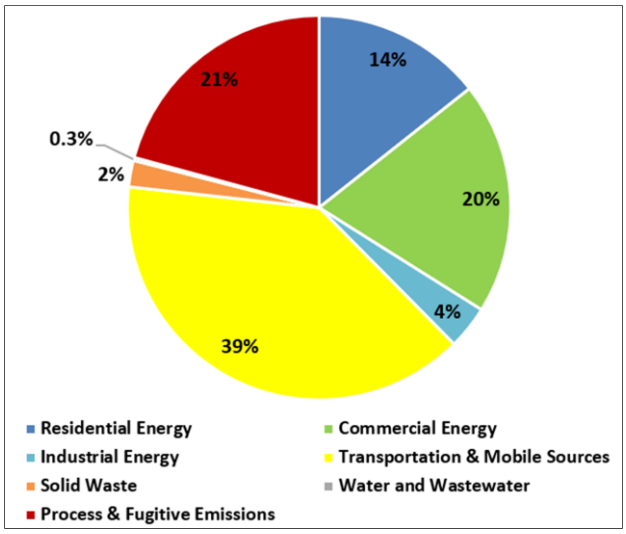

Figure 1. Communitywide Emissions by Sector

Total 2019 local government operation emissions were 19,952 MT CO2e. Building & Facilities account for the majority (53%) of these emissions. The next most significant contributor is Vehicle Fleet (25%), followed by employee commute (20%). Actions to reduce emissions from these sectors will be a vital part of any future climate action plan developed by Alachua County. Water and Wastewater, Solid Waste, and Fugitive emissions were responsible for the remainder (~2%) of local government operations emissions.

The Inventory Results section of this report provides a detailed profile of emissions sources within Alachua County, information that is key to guiding local reduction efforts. These data will also provide a baseline against which the County will compare future performance and demonstrate progress in reducing emissions.

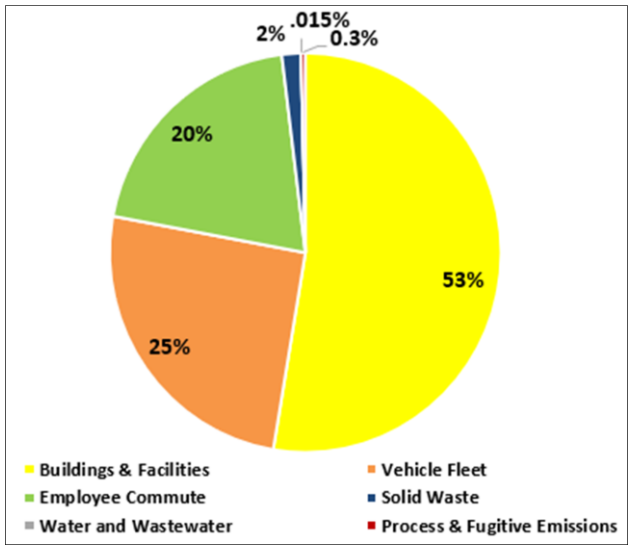

Figure 2. Government Operations Emissions by Sector

Introduction to Climate Change

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities increase the concentration of greenhouse gases and change the global climate. The most significant contributor is the burning of fossil fuels for transportation, electricity generation, and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise. Global climate change influences seasonal patterns and intensifies weather events, threatening the safety, quality of life, and economic prosperity of communities everywhere[1]. Many regions are already experiencing the consequences of global climate change, and Alachua County is no exception.

"Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. (high confidence) Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts (high confidence), but these emissions alone are unlikely to cause global warming of 1.5°C (medium confidence). Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C (high confidence). These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options (high confidence)." [2]

[1] International Panel on Climate Change. 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.)]. IPCC, Geneva, Switzerland, 151 pp. Retrieved from https://www.ipcc.ch/report/ar5/syr/

[2] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield

According to the 2018 Fourth National Climate Assessment, the Southeastern United States is exceptionally vulnerable to climate change compared to other regions. Florida's vibrant and diverse population is at risk as temperatures climb. With increasing temperatures, the elderly, low income residents, outdoor workers and other vulnerable populations will experience the greatest threat to heat-related illnesses and hospitalizations. Increased heat also influences vector-borne disease, impacting a greater range of the general population.

Additional to Alachua County's population, its infrastructure, cultural resources, and critical industries are all at risk of climate change impacts. Due to increased flood frequency and intensity, the private sector will experience decreased property values while cultural and critical infrastructure losses may be difficult to quantify. These impacts have already been seen as multiple 500-year rainfall events (events expected only to occur once every 500 years) have occurred, causing billions of dollars in property damage and loss of life. The impacts from disastrous hurricanes have also been seen recently, as Hurricane Elsa displaced many Alachua County residents in the summer of 2021[3].

Flooding and altering seasonal climates will not only impact infrastructure but ecosystems and rural livelihoods. These changes are projected to highlight vulnerabilities of these natural and work environments, causing disruptions in the daily lives of Alachua County residents.

Many communities in the United States have started to take responsibility for addressing climate change at the local level. Reducing electricity and fossil fuel use in the community can have many benefits in addition to reducing greenhouse gas emissions. More efficient energy use decreases utility and transportation costs for residents, businesses, and the municipality. Retrofitting homes, businesses, and government buildings to be more efficient creates local jobs. In addition, money not spent on energy is more likely to be spent at local businesses and add to the local economy. Reducing fossil fuel use improves air quality, and increasing opportunities for walking and bicycling improves residents' health.

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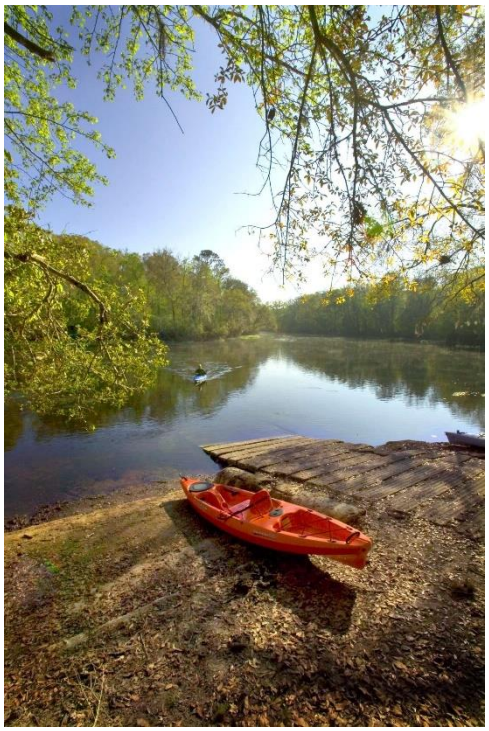

(eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.

[3] https://alachuacounty.us/news/article/pages/Tropical-Storm-Elsa-Update-4-Weather-Update-and-Sandbag-Information.aspx

Greenhouse Gas Inventory as a Step Toward Carbon Neutrality

Facing the climate crisis requires the concerted efforts of local governments and their partners, which are closest to their community members and are dealing with the impacts of climate change.

Cities, towns, and counties are well placed to define coherent and inclusive plans that address integrated climate action — climate change adaptation, resilience, and mitigation. Existing targets and plans need to be reviewed to bring in the necessary level of ambition and outline how to achieve net-zero emissions by 2050 at the latest. Creating a roadmap for climate neutrality requires Alachua County to identify priority sectors for action while considering climate justice, inclusiveness, local job creation, and many other impacts that can also deliver on sustainable development.

To complete this inventory, ICLEI utilized tools and guidelines, which provide authoritative direction for greenhouse gas emissions accounting and defines climate neutrality as follows:

> *The targeted reduction of greenhouse gas (GHG) emissions and GHG avoidance in government operations and across the community in all sectors to an absolute net-zero emission level at the latest by 2050. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes.*

Alachua County will need to set a clear goal and advance rapidly following a holistic and integrated approach to achieve ambitious emissions reduction and more toward climate neutrality. The opportunity for our community is that climate action can also lead to a wide range of co-benefits, such as by creating socio-economic opportunities, reducing poverty and inequality, and improving the health of people and nature.

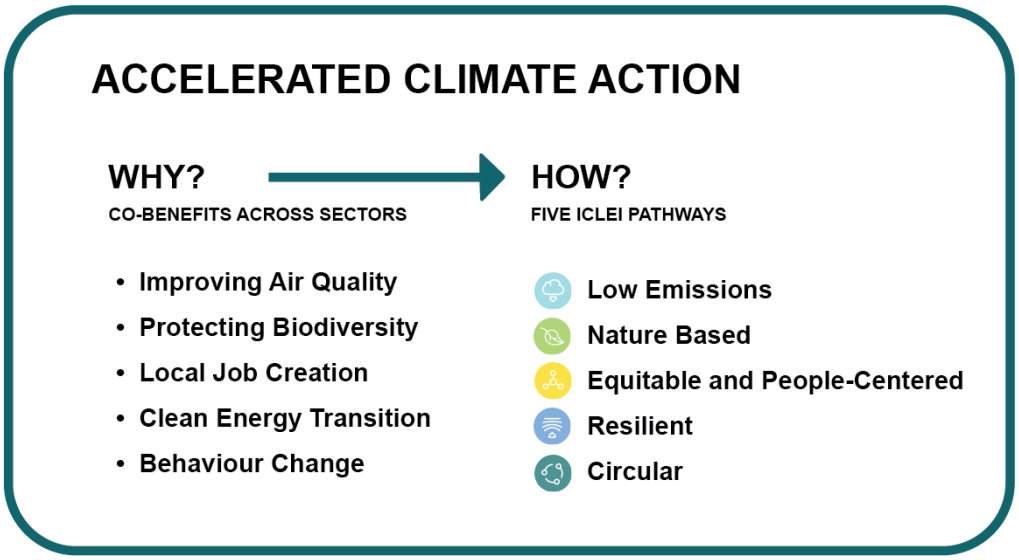

Figure 3. The How & Why of Accelerated Climate Action

ICLEI Climate Mitigation Milestones

In response to the climate emergency, 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 in reducing greenhouse gas emissions within their boundaries and influencing regional emissions through partnerships and advocacy. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for providing emergency services and the mitigation of natural disaster impacts.

ICLEI provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along Five Milestones, also shown in Figure 4:

1. Conduct an inventory and forecast of local greenhouse gas emissions;
2. Establish a greenhouse gas emissions Science Based Target[4];
3. Develop a climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.

This report represents the completion of ICLEI's Climate Mitigation Milestone One and provides a foundation for future work to reduce greenhouse gas emissions in Alachua County.

Figure 4. ICLEI Climate Mitigation Milestones

[4] Science-Based Targets are calculated climate goals, in line with the latest climate science, that represent your community's fair share of the ambition necessary to meet the Paris Agreement commitment of keeping warming below 1.5°C. To achieve this goal, the Intergovernmental Panel on Climate Change (IPCC) states that we must reduce global emissions by 50% by 2030 and achieve climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%.

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. This report presents emissions from both the Alachua County community as a whole and operations of the Alachua County government. The government operations inventory is mostly a subset of the community inventory, as shown in Figure 5. For example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles.

Figure 5. Relationship of Community and Government Operations Inventories

As local governments continue to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. This inventory uses the approach and methods provided by the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (Community Protocol) and the Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions (LGO Protocol), both of which are described below.

Three greenhouse gases are included in this inventory: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Many of the charts in this report represent emissions in "carbon dioxide equivalent" (CO_2e) values, calculated using the Global Warming Potentials (GWP) for methane and nitrous oxide from the IPCC 5th Assessment Report.

Table 1. Global Warming Potential Values (IPCC, 2014)

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO_2)	1
Methane (CH_4)	28
Nitrous Oxide (N_2O)	265

Community Emissions Protocol

Version 1.2 of the U.S. Community Protocol for Accounting and Reporting GHG Emissions[5] was released by ICLEI in 2019, and represents a national standard in guidance to help U.S. local governments develop effective community GHG emissions inventories. It establishes reporting requirements for all community GHG emissions inventories, provides detailed accounting guidance for quantifying GHG emissions associated with a range of emission sources and community activities, and provides a number of optional reporting frameworks to help local governments customize their community GHG emissions inventory reports based on their local goals and capacities.

The community inventory in this report includes emissions from the five Basic Emissions Generating Activities required by the Community Protocol. These activities are:

- Use of electricity by the community
- Use of fuel in residential, commercial, and industrial stationary combustion equipment
- On-road passenger and freight motor vehicle travel
- Use of energy in potable water and wastewater treatment and distribution
- Generation of solid waste by the community

Because this inventory was also built in accordance to the GHG Protocol for Cities (GPC Basic),

the community inventory also includes the following activities:

- Aviation travel
- Off-road transportation travel/mobile sources
- Freight rail travel
- Landfill gas flaring
- Wastewater treatment
- Fugitive emissions from natural gas leakage

This inventory also includes:

- Industrial process emissions
- Estimated emissions from livestock (as information only)
- Emissions and removals from forests and trees outside of forests (as information only)

Local Government Operations (LGO) Protocol

In 2010, ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) released Version 1.1 of the LGO Protocol[6]. The LGO Protocol serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. The purpose of the LGO Protocol is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory.

[5] ICLEI. 2012. US Community Protocol for Accounting and Reporting Greenhouse Gas Emissions. Retrieved from http://www.icleiusa.org/tools/ghg-protocol/community-protocol

[6] ICLEI. 2008. Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions. Retrieved from http://www.icleiusa.org/programs/climate/ghg-protocol/ghg-protocol

Source
Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere

Activity
The use of energy, materials, and/or services by members of the community that result in the creation of GHG emissions.

The following activities are included in the LGO inventory:

- Electricity and natural gas consumption from county buildings & facilities
- Vehicle fleet travel
- Equipment usage
- Employee commute
- Waste generation
- Water/Wastewater energy usage
- Wastewater Treatment
- Fugitive emissions from natural gas leakage

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to greenhouse gas emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by "sources" located within the community boundary, and 2) GHG emissions produced as a consequence of community "activities".

By reporting on both GHG emissions sources and activities, local governments can develop and promote a deeper understanding of GHG emissions associated with their communities. A purely source-based emissions inventory could be summed to estimate total emissions released within the community's jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective on the efficiency of the community, even when the associated emissions occur outside the jurisdictional boundary. The division of emissions into sources and activities replaces the scopes framework that is used in government operations inventories, but that does not have a clear definition for application to community inventories.

Base Year

The inventory process requires the selection of a base year with which to compare current emissions. Both greenhouse gas emissions inventories utilize 2019 as the baseline year, because it is the most recent year for which the necessary data are available.

Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data

and emission factors. To calculate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

Most emissions sources in this inventory are quantified using calculation-based methodologies. Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see appendices for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh of electricity). For this inventory, calculations were made using ICLEI's ClearPath tool.

Community Emissions Inventory Results

The total communitywide emissions for the 2019 inventory are shown in Table 2 and figure 6.

Table 2. Communitywide Emissions Inventory

Sector	Fuel or source	2019 Usage	Usage unit	[Baseline Year] Emissions ($MTCO_2e$)
Residential energy	Electricity	1,182,196,949	kWh	569,786
	Natural Gas	7,419,955	Therms	39,464
	Propane (LPG)	16,767	MMBtu	1,066
	Kerosene	1,390	MMBtu	105
Residential energy total				**610,421**
Commercial energy	Electricity	1,617,540,775	kWh	784,486
	Natural gas	8,763,541	Therms	46,610
	Propane	2,905	Gallons	16
Commercial energy total				**831,112**
Industrial energy	Electricity	177,669,641	kWh	90,930
	Natural gas	12,644,209	Therms	67,109
	Distillate Fuel Oil No. 2	49,584	Gallons	507
Industrial energy total				**158,546**
On-road transportation[7]	Gasoline	2,529,426,114	Vehicle Miles Traveled (VMT)	1,055,367
	Diesel	269,850,241	Vehicle Miles Traveled (VMT)	398,563
Public Transit	Diesel	1,020,233	Gallons	10,418
	Gasoline	126,089	Gallons	1,111
Aviation	Jet A (Jet Kerosene)	3,826,419	Gallons	37,433
	Aviation Gasoline	152,802	Gallons	1,274
Off-Road	Diesel	-	-	75,858
	Gasoline	-	-	49,684
	Other Fuels	-	-	5,607
Freight Rail	Diesel	2,878,260	Gallons	29,650
Transportation total				**1,664,965**

[7] VMT does not consider EV or other alternative vehicles due to the lack of localized data.

Solid Waste	Waste Generated	195,880	Tons	83,886
	Compost	1,916	Tons	133
	Landfill Gas Flaring	2,677,793	Cubic Feet/Day	10,246
Solid waste total				**94,265**
Water and wastewater	Wastewater Treatment Process	238,202	Service Population	552
	Effluent Discharge	576	Daily Nitrogen Load	437
	Septic Systems	82,023	Service Population	9,966
	Wastewater Treatment Process	238,202	Service Population	552
Water and wastewater total				**10,955**
Process & Fugitive Emissions	Fugitive Emissions From Natural Gas Distribution (GRU)	20,491,542	Therms	3,555
	Industrial Process Emissions: Argos Cement LLC- Cement Production	-	-	879,962
Process & Fugitive total				**883,517**
Total community-wide emissions				**4,253,781**

Figure 6 shows the distribution of communitywide emissions by sector. Transportation is the largest contributor, followed by Process and Fugitive Emissions and Commercial Energy.

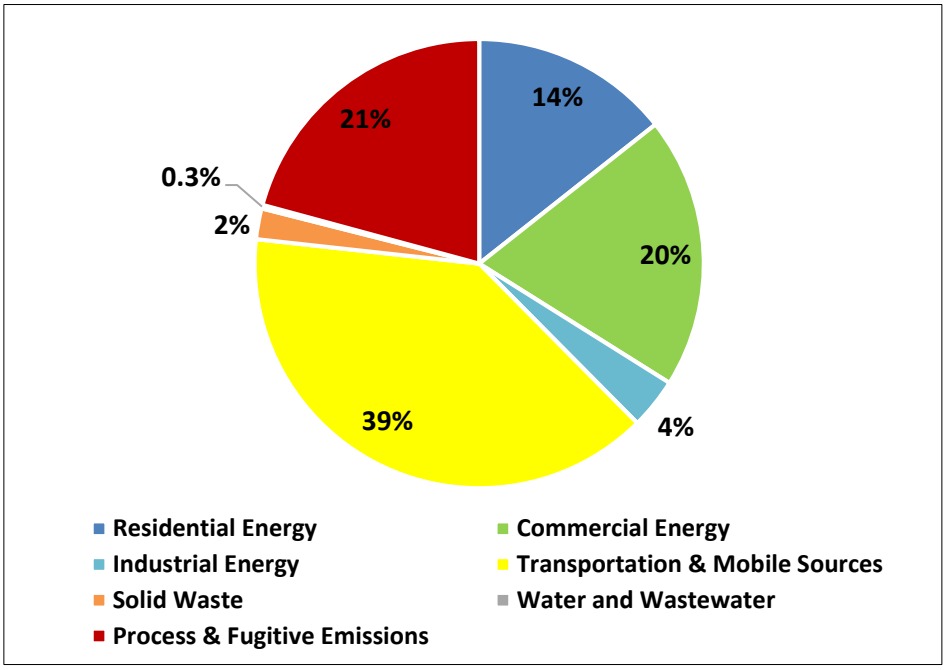

Figure 6. Communitywide Emissions by Sector

Comparison of Communitywide Inventories

Table 3. 2009 and 2019 Primary Communitywide Emissions Comparison

Sector	Fuel or source	2009 Activity (MMBtu)	2019 Activity (MMBtu)	2009 Emissions (MT CO_2e) (AR5[8])	2019 Emissions (MT CO_2e) (AR5)	Percent Change in Emissions (%)
Residential	Electricity	4,071,149	4,034,802	717,118	569,786	-21%
	Natural Gas	1,140,170	741,996	60,687	39,464	-35%
Commercial	Electricity	1,072,964	5,520,617	1,005,475	784,486	-22%
	Natural Gas	992,364	876,354	52,820	46,610	-12%

[8] 2009 emissions converted to AR5 Global Warming Potentials

Industrial	Electricity	979,865	606,381	171,944	90,930	-47%
	Natural Gas[9]	227,799	1,264,420.90	12,100	67,109	455%
On-road Transportation	Gasoline	19,379,042	14,904,430	1,672,355	1,055,367	-37%
	Diesel	3,724,949	5,386,031	272,717	398,563	46%

Comparison Discussion

The above table compares 2009 and 2019 activity (MMBtu) and emissions (MT CO_2e). When comparing inventories ten years apart, it must be recognized that the data collection and the inventory process have changed. Most notably, data collection methodologies have become more accurate and GHG inventory protocols have been updated. The various patterns and outliers displayed in the above table might be partly or entirely based on the aforementioned inventory changes.

When looking at the table we can see that all primary GHG emissions declined from 2009, except for Industrial Natural Gas and On-road Diesel. These declines may be the result of improved electricity, stationary combustion, and mobile combustion efficiency. The increase in solar energy and the reduction in the grid electricity emissions intensity are also contributing factors to the decline of electricity emissions.

Next Steps

The inventory results should be used to focus and prioritize actions to reduce emissions. Based on the inventory results, the following areas have the greatest potential for emissions reduction:

- On-road transportation
    - Vehicle electrification- Transition from internal combustion engine vehicles (passenger, transit fleets, municipal fleets, etc.) to electric-powered
    - Land use/infrastructure planning- Improving infrastructure to incentivize public transit usage, walking, and biking (e.g. the Bus Rapid Transit Plan[10])
    - Work with communities to expand public transportation options
- Community electricity use
    - Increase and promote building energy efficiency and related programs

[9] 2009 inventory captured facility-specific natural gas consumption, 2019 inventory captured utility-reported natural gas consumption

[10] Transportation Planning

    - Increase distributed renewable energy (solar)
- Community stationary fuels use
    - Electrify building heating- Convert gas-powered heating applications (e.g., water heaters) to electric-powered
- Solid waste
    - Improve recycling and composting programs to reduce organic waste content in waste streams

Completion of another GHG inventory in two to five years is recommended in order to assess progress resulting from any actions implemented. Since Alachua County and Gainesville will pursue Climate Action Efforts side by side, ICLEI recommends that the county and city greenhouse gas mitigation work to be done in the same year so data can be compared and tracked together.

The detailed methodology section of this report, as well as notes and attached data files in the ClearPath tool provided to the Alachua County, will be helpful to complete a future inventory consistent with this one.

Government Operations Emissions Inventory Results

Government operations emissions for 2019 are shown in Table 4 and Figure 7.

Table 4. Local Government Emissions Inventory

Sector	Fuel or source	2019 Usage	Usage unit	2019 Emissions ($MTCO_2e$)
Buildings & Facilities	Electricity	16,334,864	kWh	8,360
	Natural Gas	399,205	Therms	2,123
	Propane	2,905	Gallons	16
Buildings & Facilities total				**10,499**
Vehicle Fleet	Gasoline (off-road)	2,259	Gallons	20
	Diesel (off-road)	68,104	Gallons	701
	Gasoline (on-road)	2,860,983	Vehicle Miles Traveled	1,470

	Diesel (on-road)	1,357,203	Vehicle Miles Traveled	2,857
Vehicle Fleet total				**5,048**
Employee Commute	Gasoline	8,784,996	Vehicle Miles Traveled	3,911
	Diesel	46,089	Vehicle Miles Traveled	27
	Electric	68,947	Vehicle Miles Traveled	12
	Hybrid	182,603	Vehicle Miles Traveled	67
Employee Commute total				**4,017**
Solid Waste	Waste generation	738	Tons	316
Solid Waste Total				**316**
Water and wastewater	Wastewater Treatment Electricity	291	kWh	.11
	Wastewater Treatment Process	1,200	Service Population	2.7825
	Effluent Discharge	0.007	Daily Nitrogen Load	.005
Water and Wastewater total				**2.9**
Process & Fugitive Emissions	Fugitive Emissions from Natural Gas Distribution	399,205	Therms	69
Process & Fugitive Emissions total				**69**
Total Government Operation Emissions				**19,952**

Figure 7 shows the distribution of emissions among the four sectors included in the inventory. Buildings & Facilities represented the majority of emissions, followed by Vehicle Fleet and Employee Commute.

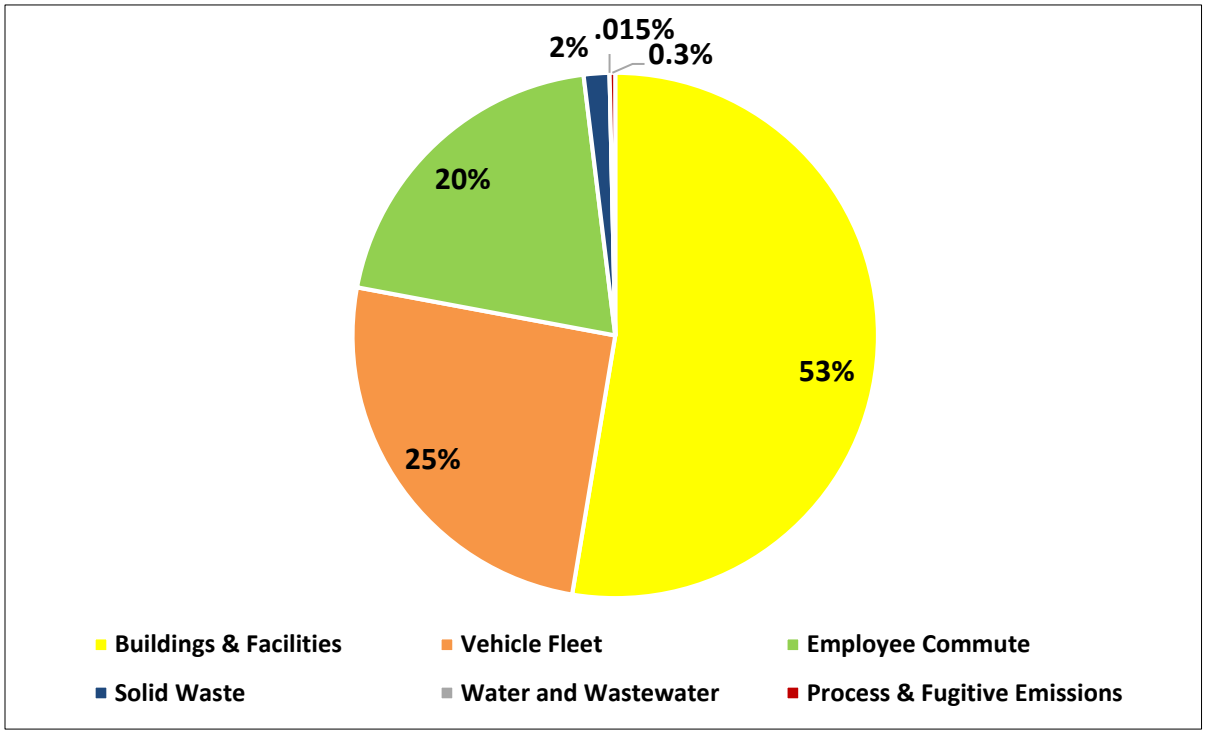

Figure 7. Local Government Operations Emissions by Sector

Comparison of Local Government Operations Inventories

Table 5. 2009 and 2019 Primary Government Operations Emissions Comparison

Sector	Fuel or source	2009 Activity (MMBtu)	2019 Activity (MMBtu)	2009 Emissions (MT CO_2e) (AR5[11])	2019 Emissions (MT CO_2e) (AR5)	Percent Change in Emissions (%)
Buildings and Facilities	Electricity	67,514	55,750	12,252	8,360	-32%
	Natural Gas	30,353	39,921	1,780	2,123	19%
	Propane	280	264	18	16	-12%

[11] 2009 emissions converted to AR5 Global Warming Potentials

Fleet	Gasoline	59,507	20,772	4,762	1,470	-69%
	Diesel	31,968	38,596	2,580	2,857	11%
	Off road Gasoline	353	282	28	20	-29%
	Off road Diesel	8,736	9,401	561	701	25%

Comparison Discussion

The above table compares 2009 and 2019 primary government operations activity (MMBtu) and emissions (MT CO_2e). When comparing inventories ten years apart, it must be recognized that the data collection and the inventory process have changed. Most notably, data collection methodologies have become more accurate and GHG inventory protocols have been updated. The various patterns and outliers displayed in the above table might be partly or entirely based on the aforementioned inventory changes.

When looking at the table we can see that changes in primary GHG emissions varied greatly across the buildings and fleet sectors. The declines may be the result of improved electricity, stationary combustion, and mobile combustion efficiency. The increase in government solar energy and the reduction in the grid electricity emissions intensity are also contributing factors to the decline of electricity emissions.

Next Steps

The inventory results should be used to focus and prioritize actions to reduce emissions. Based on the inventory results, the following areas have the greatest potential for emissions reduction:

- Buildings and Facilities
    - Increase distributed renewable energy (solar) on government owned buildings/facilities
    - Building energy benchmarking and energy efficiency programs
    - Electrification of building heating- Convert gas-powered heating applications (e.g., water heaters) to electric-powered
- Vehicle Fleet
    - Electrification of vehicle fleets- Transition from internal combustion engine vehicles to electric-powered
    - Audit fleet operation to reduce unnecessary trips/fuel consumption
- Employee Commute
    - Improve work-from-home/hybrid working options
    - Improve access and incentives for employee public transit, walking, and biking options
- Solid Waste
    - Improving waste diversion using composting and recycling

Conclusion

This inventory marks completion of Milestone One of the Five ICLEI Climate Mitigation Milestones. ICLEI recommends the follow steps: forecast emissions, set an emissions-reduction target, and build a robust climate action plan that identifies specific quantified strategies that can cumulatively meet that target. The IPCC's most recent literature and study recommend that the world reach carbon neutrality between 2040 - 2050. It is even more imperative that countries set targets that are ambitious enough to limit the accumulation of carbon between now and mid-century. To achieve this goal, the Intergovernmental Panel on Climate Change (IPCC) states that we must reduce global emissions by 50% by 2030 on the way to climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%. Community education and building partnerships will be instrumental components of our climate efforts.

ICLEI recommends Alachua County to pursue next steps of the Climate Mitigation process. This process includes:

1. Developing a Business-as-Usual Emissions 2030/2050 forecast
2. Adopt a Science Based Target (reduction target)
3. Initiating Climate Action Planning
4. Developing and implementing a Climate Action Plan

Science-Based Target

To support the bold climate action of Alachua County, ICLEI has calculated the county's Science-Based Targets[12]:

Per-Capita SBT: 62.8%

Absolute SBT: 59%

Science-Based Targets are climate goals in line with the latest climate science. They represent the county's fair share of the ambition necessary to meet the Paris Agreement commitment to keep warming below 1.5°C.

Outlook

The County recognizes that science requires ambitious targets that incorporate a fair share consideration of our historic contributions to global GHGs. This understanding means the County should identify strategies that go well beyond 50% reduction by 2030 – in line with SBT reduction. ICLEI recommends this as key consideration as target development and climate action is initiated.

This report and the results of the 2019 greenhouse gas inventories will be used in conjunction with the City of Gainesville's report and results as joint climate action planning efforts are prioritized.

[12] Science-Based Targets Network

Appendix: Methodology Details

Energy

The following tables shows each activities, related data sources, and notes on data gaps.

Table 6. Energy Data Sources

Activity/Source	Data Source	Data Gaps/Assumptions/Notes
Communitywide		
Residential, Commercial, and Industrial Electricity	• Gainesville Regional Utilities • City of Newberry • Duke	• (GRU) Multi-family residential was classified as residential • (GRU) Commercial electricity is General Service Non-Demand and General Service Demand • (GRU) Any electricity used by transit vehicles was included as commercial • (GRU) Wastewater/water treatment facilities were reported based upon billing classification • All University of Florida consumption included in Duke report data • (GRU) Industrial electric is General Service Large Demand (aka Large Power) • (GRU) Hospitals are billed General Service Large Demand (electric) • (Residential) Clay Electric consumption was estimated using an average electricity intensity per household (calculated form GRU and Newberry data) multiplied by serviced households • (Residential) Because Central FL Electric Coop, City of Alachua, and FPL did not provide data, the missing data was calculated using an estimated household count multiplied by the average electricity intensity per household • (Commercial) Because Central FL Electric Coop, City of Alachua, and FPL did not provide data, missing data was estimated by calculating a difference

		between total commercial electricity consumption and acquired commercial electricity consumption. • (Industrial) Based on the utility service territories and utility-provided data, it is assumed all industrial electricity consumption has been captured
Residential, Commercial, and Industrial Natural Gas	• Gainesville Regional Utilities • University of Florida	• (GRU) Multi-family residential was classified as residential • (GRU) Commercial natural gas is Small Commercial Firm and General Service Commercial Firm • (GRU) Usage associated with agricultural buildings was included as commercial • (GRU) Any natural gas used by transit vehicles was included as commercial • (GRU) Industrial natural gas is Large Volume Service • (GRU) Hospitals are billed Large Volume Service (gas) • (UF) Natural gas categorized as Industrial is the conversion equivalent of steam directly purchased by UF from Duke Florida • (UF) Natural gas purchased directly from GRU for on-campus use is not presented here because of double counting potential
Residential Kerosene/Fuel Oil and Propane	Energy Information Administration & U.S. Census Bureau	This record uses regional household energy use averages and census household counts
Municipal Propane	Alachua County	• Data was disaggregated by utility • Data for AmeriGas represented more than 365 days, data was scaled down using an average daily energy usage
Industrial Distillate Fuel Oil No. 2	EPA FLIGHT	N/A
Electricity Generation	EPA FLIGHT	• All electricity generation emissions are assumed to be captured within calculations using electricity consumption and emissions factors
Local Government Operations		
Electricity	Alachua County	• Data was disaggregated by utility • Some data represented more than 365 days, data was scaled down using an average daily energy usage

Natural Gas	Alachua County	• Data for GRU represented more than 365 days, data was scaled down using an average daily energy usage
Propane	Alachua County	• Data was disaggregated by utility • Data for AmeriGas represented more than 365 days, data was scaled down using an average daily energy usage

Table 7. Emissions Factors for Electricity Consumption

Emissions Factor	CO2 (lbs./MWh)	CH4 (lbs./GWh)	N2O (lbs./GWh)
Gainesville Regional Utilities	1134	125	7[13]
FRCC All (FRCC) eGRID 2019	861.028	55	7
Florida Power and Light	665	55[13]	7[13]
Duke Energy Florida	1007	41	6

To learn more about emissions factors, please view the "Quantification Methods" section.

[13] This emissions factor is sourced from the eGRID 2019.

Transportation

Table 8. Transportation Data Sources

Activity/Source	Data Source	Data Gaps/Assumptions/Notes
Communitywide		
Vehicle Miles Travelled	Google Environmental Insights Explorer	• VMT provided from Google EIE[14] represents all on-road private vehicles • Data does not include Gainesville Regional Transit System activity
Transit Ridership	Gainesville Regional Transit System	N/A
Aviation	Gainesville Regional Airport	GRA provided consumption but could not provide travel bounds
Off-Road	EPA National Emissions Inventory	The NEI does not provide N2O emissions for Off-Road
Freight Rail	Eastern Regional Technical Advisory Committee	N/A
Local Government Operations		
Government Vehicle And Equipment Fleet	Department of Public Works	• 21 vehicles had hours tracked, rather than mileage • Mileage for the 21 vehicles was estimated based on an average Miles Per Gallon
Employee Commute	382 Alachua County Employees	To collect Employee Commute data, Alachua County staff were surveyed to determine their commute mileage, vehicle type and fuel type. A 31.8% response rate was achieved for the survey and the mileage collected from the 31.8% of employees was extrapolated to estimate commute emissions for all 1,200 employees.

For vehicle transportation, it is necessary to apply average miles per gallon and emissions factors for CH_4 and N_2O to each vehicle type. The factors used are shown in Table 9.

[14] Google EIE Methodology

Table 9. MPG and Emissions Factors by Vehicle Type

Activity/Source	Vehicle type	MPG	CH_4 g/mile	N_2O g/mile
Gasoline	Passenger car	24.37713	0.0183	0.0083
Gasoline	Light truck	17.86788	0.0193	0.0148
Gasoline	Heavy truck	5.371652	0.0785	0.0633
Gasoline	Motorcycle	24.37713	0.0183	0.0083
Diesel	Passenger car	24.37713	0.0005	0.001
Diesel	Light truck	17.86788	0.001	0.0015
Diesel	Heavy truck	6.392468	0.0051	0.0048

Wastewater/ Water

Table 10. Wastewater/Water Data Sources

Communitywide		
Effluent Discharge	• Gainesville Regional Utilities • University of Florida • City of Newberry • Alachua City	• (UF) While the WWTP serves a subset of city population at various times, this record uses an average service population of 50,000 • (Alachua City) Due to the lack of data the calculation uses the entire Alachua City population (this may create an insignificant amount of double counting) • (Alachua City) It was assumed the treatment process utilizes nitrification/denitrification as all other treatment systems captured utilize these processes
Wastewater Treatment Process	• Gainesville Regional Utilities • University of Florida • City of Newberry • Alachua City	• (UF) While the WWTP serves a subset of city population at various times, this calculation uses an average service population of 50,000 • (Alachua City) Due to the lack of data the calculation uses the entire Alachua City population (this may create an insignificant amount of double counting) • (Alachua City) It was assumed the treatment process utilizes nitrification/denitrification as all other treatment systems captured utilize these processes
Septic Systems	Florida Department of Health	• The calculation treats all 32,166 systems as residential due to the lack of data • The calculation uses a population-based estimate using average persons per household

Water/Wastewater Energy Use	• Gainesville Regional Utilities • City of Newberry	• (GRU) Energy use is included in GRU-provided commercial/industrial data • (Newberry) Energy use is included in commercial data • (UF) All potable water provided by GRU • (UF) Energy use is included in Duke data
Local Government Operations		
Water/Wastewater Energy Use	Alachua County	• Some data represented more than 365 days, data was scaled down using an average daily energy usage • Because water treatment occurs at various locations, data was aggregated and uses EPA eGRID emissions factors • To calculate associated electricity usage, calculations used an electricity intensity per gallon from GRU
Wastewater Treatment Process & Effluent Discharge	Alachua County	• Some data represented more than 365 days, data was scaled down using an average daily energy usage • To calculate an associated N Load, calculations used an N load per gallon average from GRU

Solid Waste

Table 11. Solid Waste Data Sources

Activity/Source	Data Source	Data Gaps/Assumptions/Notes
Communitywide		
Waste Generation	Alachua County Solid Waste and Resource Recovery	N/A
Landfill Gas Flaring	Alachua County Solid Waste and Resource Recovery	• The activity reflects Alachua County's portion of New River Landfill's LFG Flared • The total landfill gas flared was multiplied by the ratio of Alachua County waste generation over total waste in place
Compost	Gainesville Solid Waste Department	N/A

Local Government Operations		
Waste Generation	EPA	• Due to the lack of data, the employee waste generation calculation is a low-quality estimate • Estimate is based on the EPA's Per capita MSW generation average

Agriculture, Forestry, and Other Land Use

Table 12. Agriculture and Forestry Data Sources

Activity/Source	Data Source	Data Gaps/Assumptions/Notes
Communitywide		
Emissions and Removals from Forests and Trees outside of Forests	LEARN Tool	Emissions and removals were included in the inventory but do not count towards total emissions (included for informational purposes)
Livestock	• United States Department of Agriculture • Intergovernmental Panel on Climate Change	• Livestock emissions were included in the inventory but do not count towards total emissions • Due to the lack of county-specific data, emissions were estimated using county head counts and agriculture emissions factors

Process and Fugitive Emissions

Table 13. Process & Fugitive Emissions Data Sources

Activity	Data Source	Data Gaps/Assumptions
Communitywide		
Fugitive Emissions From Natural Gas Distribution	• Gainesville Regional Utilities • University of Florida	N/A
Industrial Process Emissions: Argos Cement LLC-	EPA FLIGHT	N/A
Local Government Operations		
Cement Production		

Fugitive Emissions From Natural Gas Distribution	Alachua County	N/A

Inventory Calculations

The 2019 inventories were calculated following the US Community Protocol, the Local Government Operations Protocol and ICLEI's ClearPath software. As discussed in Inventory Methodology, the IPCC 5th Assessment was used for global warming potential (GWP) values to convert methane and nitrous oxide to CO_2equivalent units. ClearPath's inventory calculators allow for input of the sector activity (i.e. kWh or VMT) and emission factor to calculate the final CO_2e emissions.