Village of Tequesta Greenhouse Gas (GHG) Inventory

Overview & Results

Environmental Advisory Committee

November 9, 2022

About ICLEI

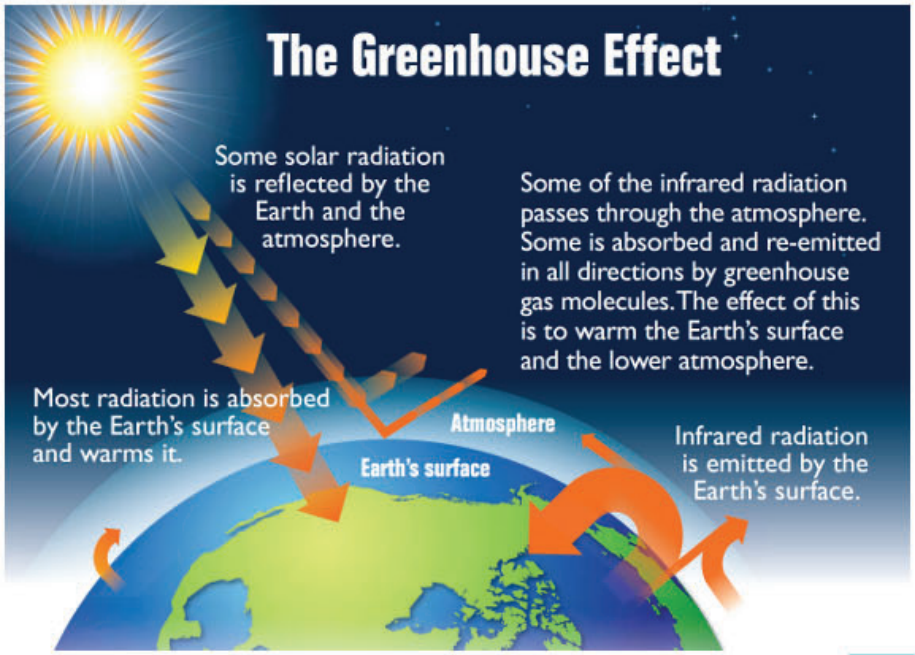
ICLEI – Local Governments for Sustainability is a global network working with more than 2,500 local and regional governments committed to sustainable urban development. Active in 125+ countries, we influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development. Our Members and team of experts work together through peer exchange, partnerships and capacity building to create systemic change for sustainability.

Agenda

1. Greenhouse Gas, and Inventory 101
2. Inventory and Forecasting Importance
3. Inventory Results
4. Forecast Results
5. Key Takeaways & Principles

What is a greenhouse gas (GHG)?

- Greenhouse gases act like the glass in a greenhouse, trapping the sun's heat near the earth's surface. The gas lets sunlight pass through the atmosphere but prevents the heat that the sunlight brings from leaving the atmosphere
- The main gases responsible for the greenhouse effect are carbon dioxide, methane, and nitrous oxide
- GHG emissions from human activities are largely responsible for our changing climate



Primary types of GHGs

GHG	Global Warming Potential (GWP)
Carbon Dioxide (CO2)	**1**
Methane (CH4)	**28**
Nitrous Oxide (N2O)	**265**
Hydrofluorocarbons (HFCs)	116-12,400 (varies based on type)
Perfluorocarbons (PFCs)	6,630-11,100 (varies based on type)
Sulfur Hexafluoride (SF6)	23,500

GHG Emissions are typically reported as Carbon Dioxide-Equivalent (CO2e)

How are GHG emissions calculated?

Energy Consumption x **Emission Factor** x **Global Warming Potential** = **GHG Emissions**

GHG Emissions are measured in terms of carbon dioxide equivalent (CO2e)

Emission Factor = A value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant

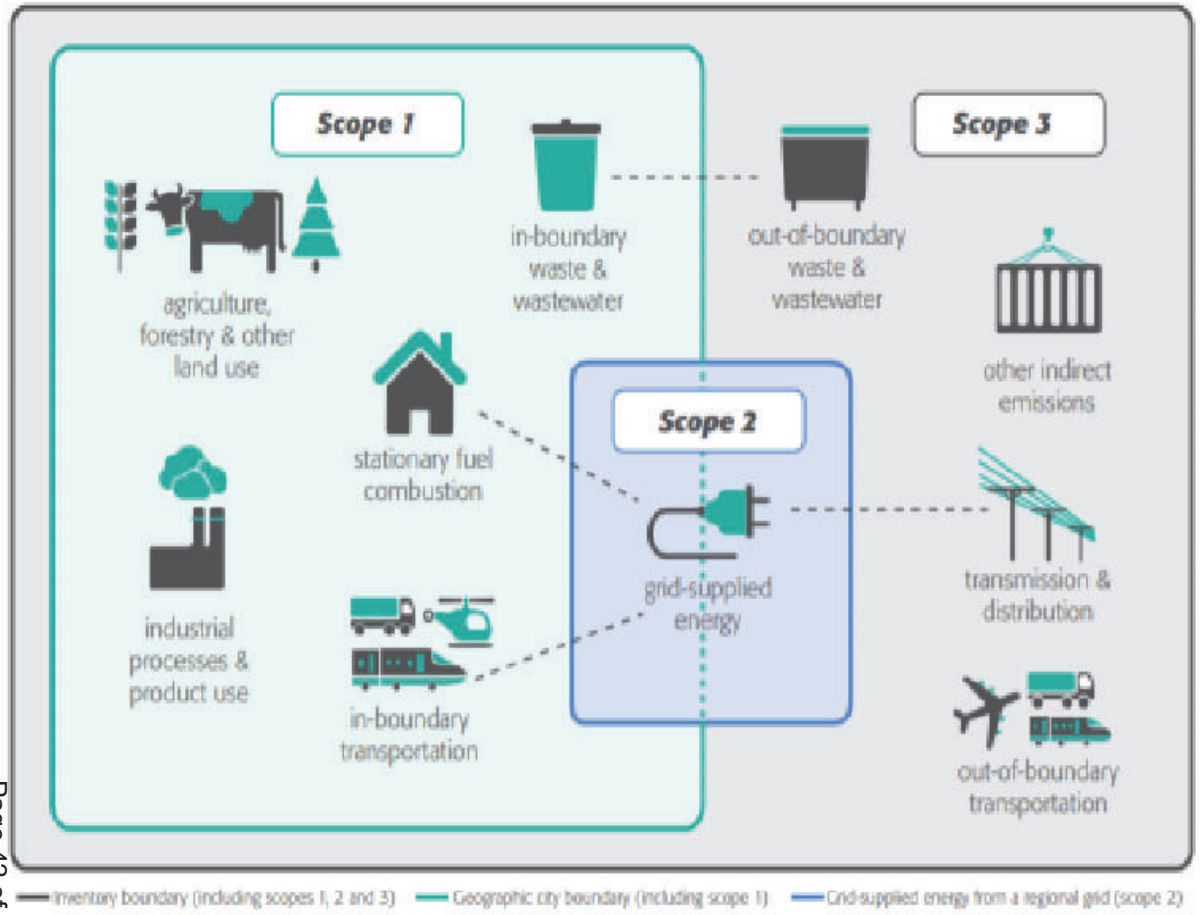
Global Warming Potential = A measure that examines a GHG's ability to trap heat in the atmosphere in comparison to CO2 over a specific time period

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kilowatt hours)	CO_2 emitted/kWh	CO_2 emitted
Natural Gas Consumption (therms)	CO_2 emitted/therm	CO_2 emitted
Gasoline/Diesel Consumption (gallons)	CO_2 emitted /gallon	CO_2 emitted
Solid Waste Generated (tons)	CH_4 emitted/ton of waste	CH_4 emitted

Carbon Dioxide Equivalent

- A carbon dioxide equivalent or CO2 equivalent is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP) by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential
- CO2 equivalents are commonly expressed as million metric tonnes of carbon dioxide equivalents (abbreviated as MMTCDE)
- The CO2 for a gas is derived by multiplying the tonnes of the gas by the associated GWP: MMTCDE = (million metric tonnes of a gas) * (GWP of a gas)
- E.g., the GWP for methane is 25 and for nitrous oxide 298. This means that emissions of 1 million metric tonnes of methane and nitrous oxide, respectively, is equivalent to emissions of 25 and 298 million metric tonnes of carbon dioxide

GHG Inventory Scopes - for consistent reporting



Scope 1: Direct emissions that occur from sources controlled or owned by an organization

Scope 2: Indirect emissions from the generation of purchased energy

Scope 3: All other indirect emissions generated throughout an organization's value chain (e.g., exported waste, purchased goods and services, business travel and employee commute)

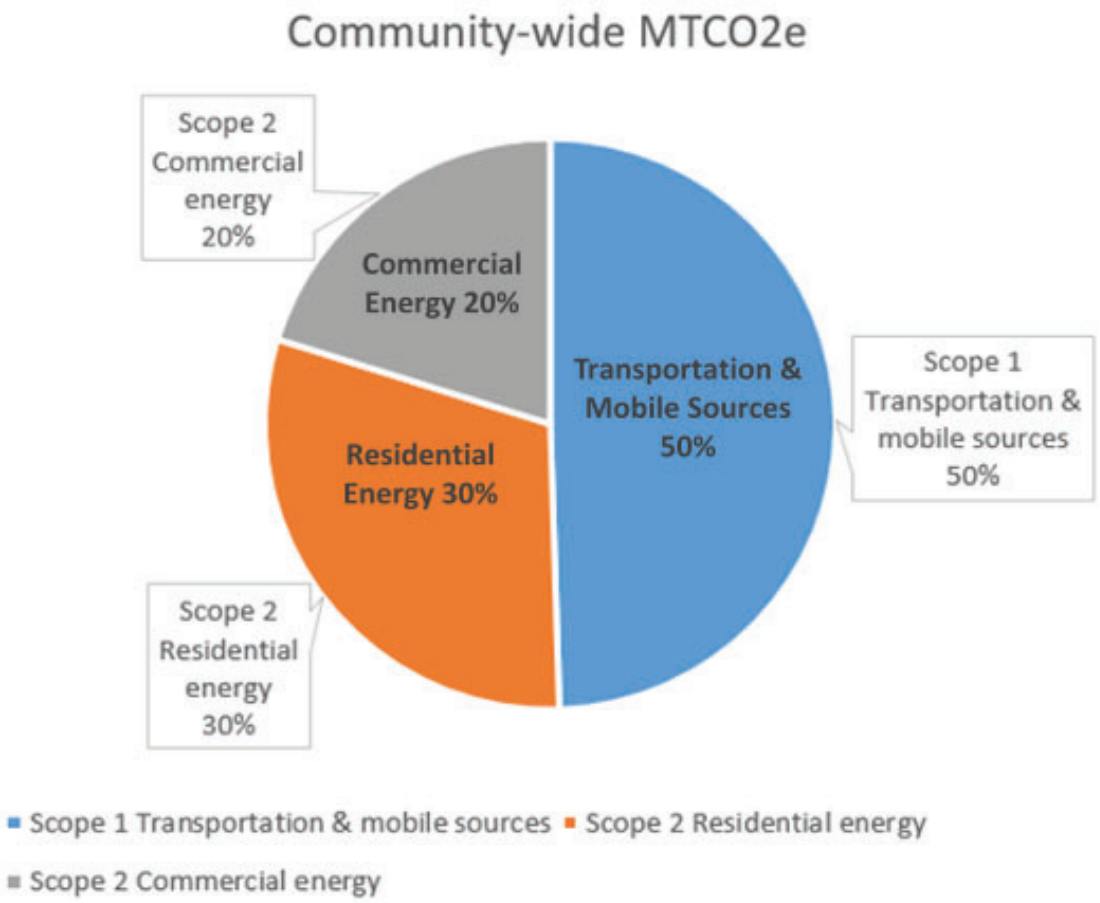
What does a Community-wide GHG Inventory measure?

- Stationary energy use (e.g. buildings)
  - Electricity
  - Natural Gas
  - Other fuels (propane, kerosene, etc)
- Mobile fuel use (gas and diesel)
  - Vehicles
  - Off-road equipment
- Solid waste decomposition/combustion
- Wastewater treatment (such as digester gas combustion or nitrogen discharge)

Community-wide Inventory Results

Sector	Fuel or Source	2019 Usage	Usage Unit	2019 Emissions
Residential Energy	Electricity (Florida Power & Light)	47,693,993	kWh	14,457
			Residential Energy Total	**14, 457**
Commercial Energy	Electricity	30,623,571	kWh	9,283
			Commercial Energy Total	**9,283**
Industrial Energy	Electricity	14,085	kWh	4
			Industrial Energy Total	**4**
Transportation & Mobile Sources	Gasoline	40,786,452	VMT	18,836
	Diesel	4,224,170	VMT	6,220
			Transportation Total	**23,056**
Solid Waste	Waste Generated	15	Tons	8
			Solid Waste Total	**8**
Water & Wastewater	Wastewater Energy	12	Tons	6
			Water & Wastewater Total	**6**
			Total 2019 Community-wide Emissions	**46,814**

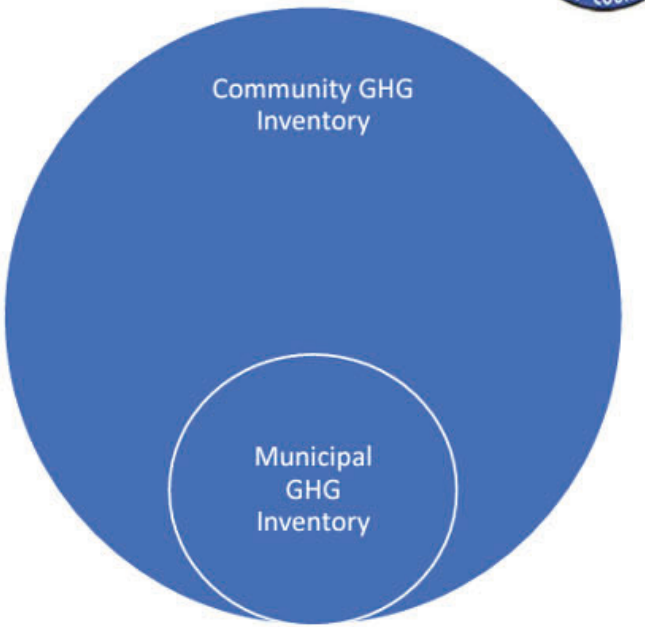
Community-wide Inventory (2019)



46,814 MTCO2e

What does a Local Government Inventory measure?

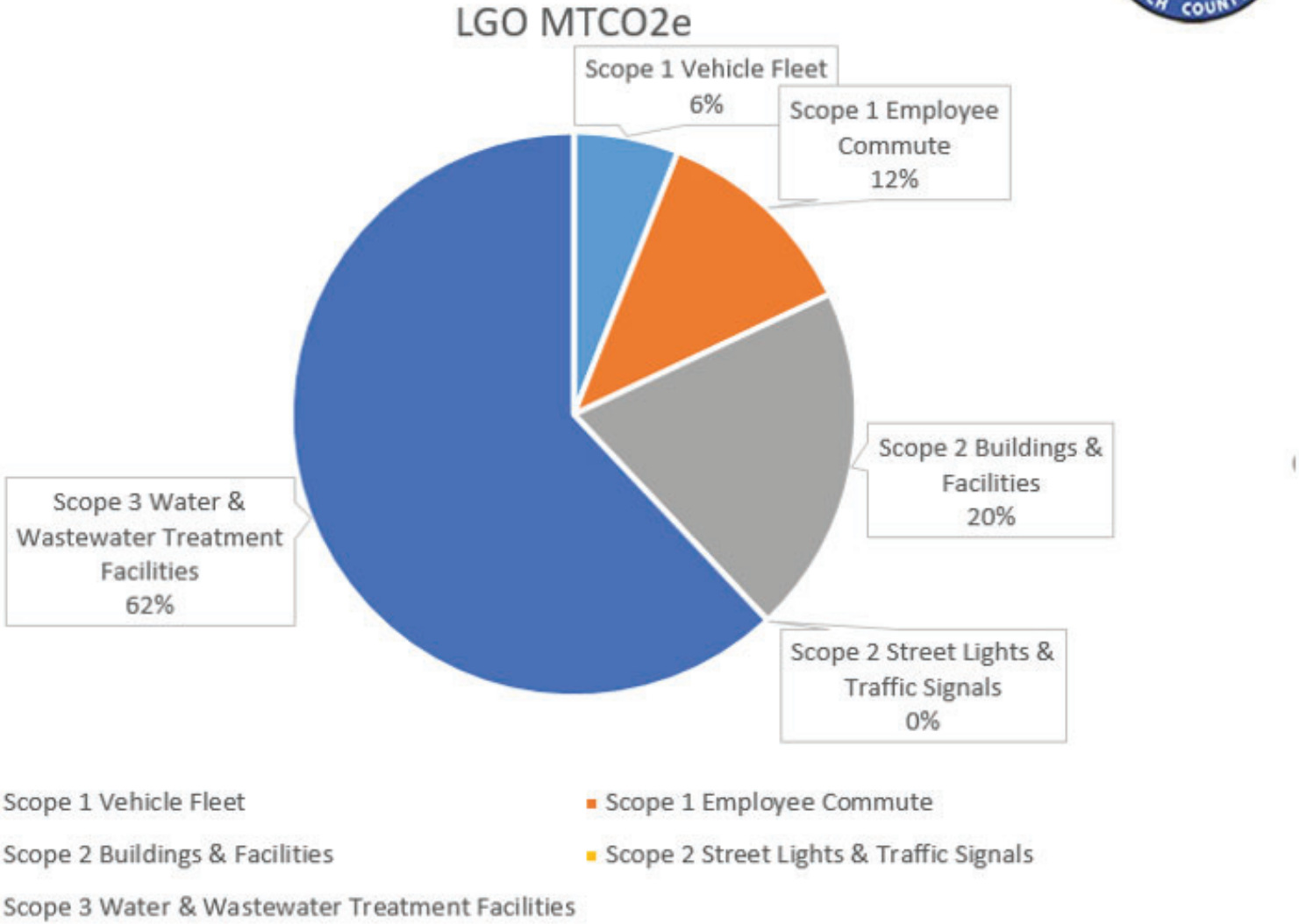
- Stationary energy use (e.g. buildings)
  - Electricity
  - Natural Gas
  - Other fuels (propane, kerosene, etc)
- Mobile fuel use (gas and diesel)
  - Vehicles
  - Off-road equipment
- Solid waste decomposition/combustion
- Wastewater treatment (such as digester gas combustion or nitrogen discharge)



Local Government Inventory Results

Sector	Fuel or Source	2019 Usage	Usage Unit	2019 Emissions
Buildings & Facilities	Electricity (Florida Power & Light)	1,408,370	kWh	427
			Buildings & Facilities Total	**427**
Street Lights & Traffic	Electricity	3,072	kWh	
			Street Lights & Traffic Total	**0**
Vehicle Fleet	Gasoline	12,211	GAL	107
	Diesel	2,940	GAL	30
			Vehicle Fleet Total	**137**
Employee Commute	Gasoline	664,058	VMT	241
	Biodiesel/Ethanol	6,877	VMT	3
			Employee Commute Total	**244**
Solid Waste	Waste Generation	0.27	Tons	0 (less than 1)
			Solid Waste Total	**0**
Water & Wastewater Treatment Facilities	Digester Gas Flared	6,088	People	1,301
			Water & Wastewater Total	**1,301**
			Total 2019 Community-wide Emissions	**2,110**

Government Operations Inventory (2019)



2,110 MTCO2e

Why is a GHG Inventory Important?

- Foundational element to create science-based emissions reduction targets
  - Measurable, actionable, and time-bound GHG reduction strategies
  - Aligned with:
    - Earth's limits (1.5°C)
    - The Global need of 50% reduction by 2030 / net zero by 2050
    - Societal Sustainability Goals
  - A 2030 target that reflects maximum effort toward or beyond a fair share of 50% CO2 reductions by 2030

What can we do to reduce Community-wide emissions?

- **Promoting electric vehicles** (EVs) to replace gasoline passenger vehicles through the provision of public spaces charging and through fleet policies to increase EVs in City fleet and familiarize staff with EVs
- **Reducing per-capita VMT** through land use planning and encouraging use of transit, bicycling, and walking.
- **Investing in infrastructure** to improve safety and comfort for people on bikes and people walking such as separated bike lanes and sidewalks with canopy trees.
- **Incentivizing energy efficiency** for residential and commercial buildings through building codes and incentives which mandate or incentivize green building credentials (e.g. LEED or similar) in new construction and major renovations as well as incentives for energy efficiency retrofits (such as weatherization and conversion to more efficient HVAC systems)
- **Increasing the use of renewable energy** by reducing soft costs to residential installation, encouraging commercial installation, adding on site renewables to City facilities, and engaging with Florida Power and Light to increase renewable energy in their fuel mix.

What can we do to reduce Local Government Operations emissions?

- **Reducing fleet emissions** through right-sizing, encouraging virtual meetings, purchasing electric/hybrid vehicles, and efficient route design
- **Reducing employee commute VMT** by creating programs that encourage employees to use alternative transportation (e.g. carpool match program, transit subsidy, installing EV charging stations, etc.)
- **Increasing energy efficiency** by retrofitting municipal buildings, installing LEDs and auto shutoff lights, and educating City staff on how to conserve energy and water
- **Increasing the use of renewable energy** by installing on-site energy production (solar photovoltaics)

Key Takeaways

- Human activity is producing excessive quantities of greenhouse gases and driving climate change
- When combining electrification with energy efficiency and renewable energy, the Village could see enhanced greenhouse gas mitigation
- Given that mobile combustion (on-road transportation) is one of the largest individual source of emissions, there may be opportunities to leverage electric vehicle (EV) programs and promote multi-use pedestrian infrastructure to support gaoline-alternative transportation.
- Given that electricity usage is another leading source of emissions, there are continued opportunities for economic, climate, and social benefits through energy efficiency and renewable procurement.
- There is also great opportunity to bolster county-wide support for local recycling and composting programs to remove greenhouse gas emitting waste types (e.g., papers, food waste, yard waste) from waste streams.

High Impact Analysis Summary Report

SBTs and Emissions Goals	Baseline Year	2030 Per Capita	2030 Absolute	Baseline Scope 1 & 2 (MT CO2e)	2030 Scope 1 & 2 (MT CO2e)
	2019	62.8%	58.2%	46,802	19,583

Growth Rates	Commercial	Residential	Industrial	On-Road Transportation	Grid Decarbonization
	Population Growth	Population Growth	Population Growth	Population Growth	CES
	12.54%	12.54%	12.54%	12.54%	-80.00%

	Baseline & Forecasted Emissions			Modeled Emissions (After HIAs)	
	Baseline Emissions (MT CO2e)	% of total (Adjusted)	2030 Forecasted Emissions (MT CO2e)	2030 Modeled Emissions (MT CO2e)	Percent Change
Fuels Commercial	-	0%	0	0	0.0%
Electric Commercial	9,283	**20%**	2,090	1,965	-6.0%
Fuels Residential	14,457	**31%**	16,271	8,319	-48.9%
Electric Residential	14,457	**31%**	3,254	3,497	7.5%
Fuels Industrial	-	0%	0	0	0.0%
Electric Industrial	-	0%	0	0	0.0%
On-Road Transportation	23,056	**49%**	21,383	11,173	-47.8%
Sum of Primary Sectors	61,253	131%	42,997	24,953	-42.0%
Inventory Total	**46,810**	-	-	-	-

Key Principles for Next Steps

1. Adopt a **2030 Science Based Target** Reduction Goal
2. Future planning and prioritization efforts should incorporate **changing trends**
3. Consider Programs that focus on **mitigating high emitting sectors** (on-road transportation, combustion, renewable energy)
4. Seek ways to **collaborate with adjacent communities, state agencies and local utilities**
5. Inventories provide the foundation for **informed decisions and transparency**

Thank You!

Tom Herrod
ICLEI USA
Senior Program Officer
Tom.herrod@iclei.org

Hannah Miller
ICLEI USA
Program Officer
Hannah.miller@iclei.org

Lynne Britt
Village of Tequesta
Building Support Administrator
Lbritt@tequesta.org