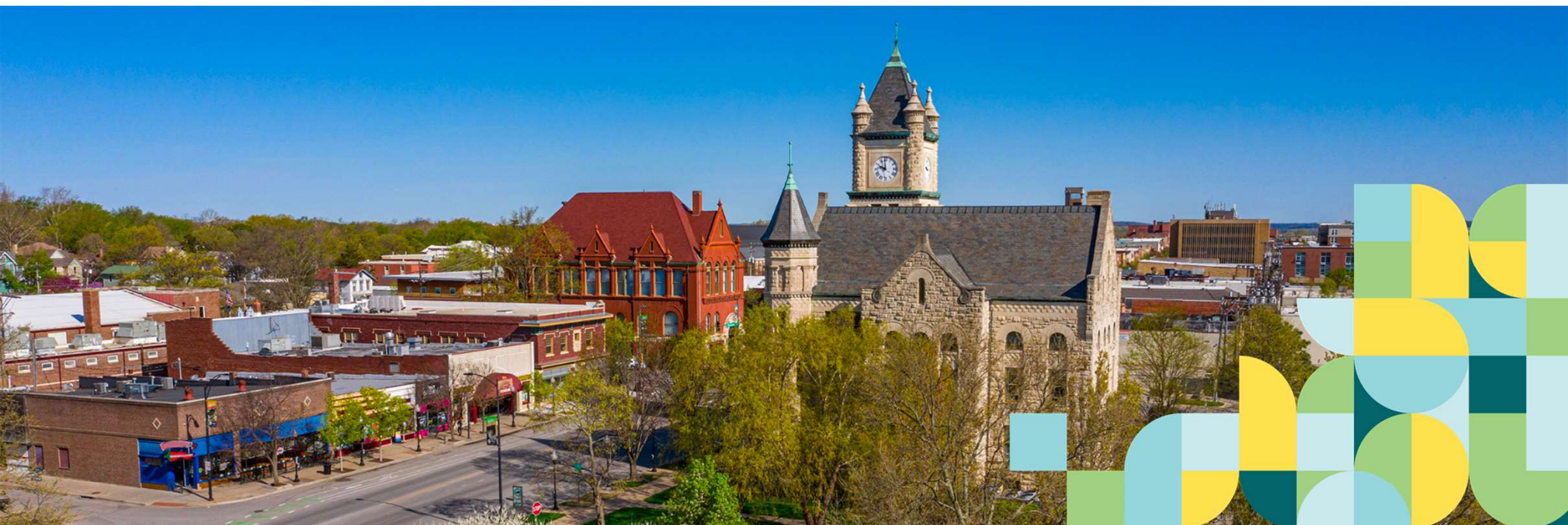


# Douglas County's 2021 Community-Wide GHG Inventory

## Overview & Results





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Local Governments  
for Sustainability

USA



## Who We Are

ICLEI is the first and largest global network of local governments devoted to solving the world's most intractable sustainability challenges. Our standards, tools, and programs credibly, transparently, and robustly reduce greenhouse gas emissions, improve lives and livelihoods and protect natural resources in the communities we serve.

[icleiusa.org](http://icleiusa.org)

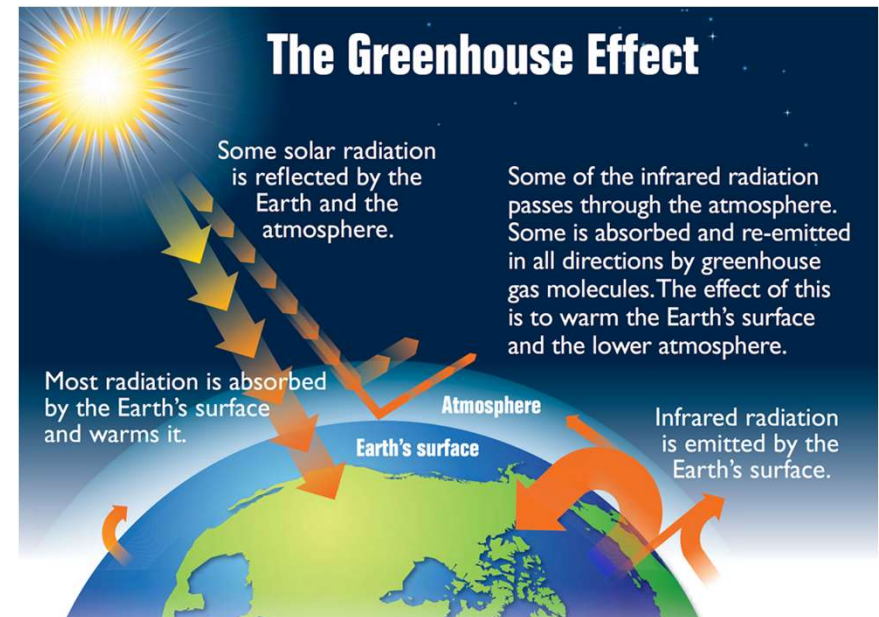
# Agenda

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



# What is a greenhouse gas?

- “GHG” for short
- Gases that act like the glass in a greenhouse, trapping the sun’s heat near the earth’s surface
- GHG emissions from human activities are largely responsible for our changing climate



# Primary types of GHGs

| GHG                                    | Global Warming Potential (GWP)      |
|----------------------------------------|-------------------------------------|
| <b>Carbon Dioxide (CO<sub>2</sub>)</b> | <b>1</b>                            |
| <b>Methane (CH<sub>4</sub>)</b>        | <b>28</b>                           |
| <b>Nitrous Oxide (N<sub>2</sub>O)</b>  | <b>265</b>                          |
| Hydrofluorocarbons (HFCs)              | 116-12,400 (varies based on type)   |
| Perfluorocarbons (PFCs)                | 6,630-11,100 (varies based on type) |
| Sulfur Hexafluoride (SF <sub>6</sub> ) | 23,500                              |

**GHG Emissions are typically reported as Carbon Dioxide-Equivalent (CO<sub>2</sub>e)**

# What is a Community-wide GHG Inventory?

Although community-wide GHG inventories do not necessarily include all of these activities, these are a majority of the emissions-generating activities that might be included:

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

# How are GHG emissions calculated?

- Activity Data x Emissions Factor = Emissions Estimate

| Activity Data                            | Emissions Factor                     | Emissions               |
|------------------------------------------|--------------------------------------|-------------------------|
| Electricity Consumption (kilowatt hours) | CO <sub>2</sub> emitted/kWh          | CO <sub>2</sub> emitted |
| Natural Gas Consumption (therms)         | CO <sub>2</sub> emitted/therm        | CO <sub>2</sub> emitted |
| Gasoline/Diesel Consumption (gallons)    | CO <sub>2</sub> emitted /gallon      | CO <sub>2</sub> emitted |
| Solid Waste Generated (tons)             | CH <sub>4</sub> emitted/ton of waste | CH <sub>4</sub> emitted |

# Why is a GHG Inventory Important?



- This is an element of your Climate Action Plan
- Your GHG inventory is a baseline that will allow your community to:
  - Forecast business-as-usual emissions
  - Create emissions reduction targets
  - Model potential reduction scenarios
  - Monitor emissions reduction progress
  - Make informed decisions on mitigation
  - Demonstrate accountability and leadership
  - Motivate community action
  - Recognize GHG emissions performance relative to similar communities

# Why is a GHG Inventory Important? (Cont)



- Create emissions reduction targets- **Science Based Targets**
  - Measurable, actionable, and time-bound climate targets
  - Aligned with:
    - Earth's limits (1.5°C)
    - The Global need of 50% reduction by 2030 and net zero by 2050
    - Societal sustainability goals

# Douglas County GHG Inventory Results



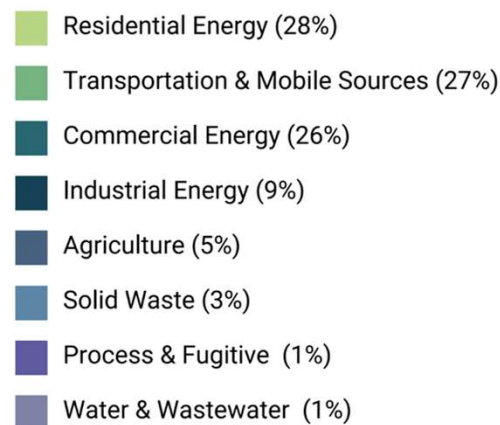
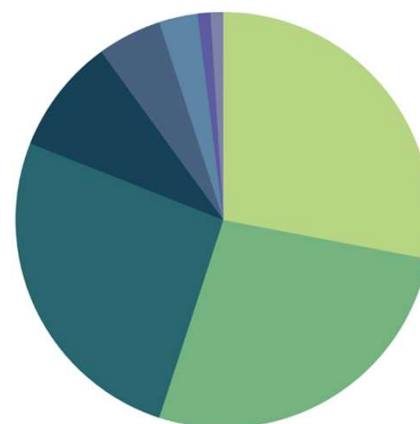
# Inventory Results

## EMISSIONS AT A GLANCE

**1** Residential  
Energy  
28%

**2** Transportation &  
Mobile Sources  
27%

**3** Commercial  
Energy  
26%



**Figure 1: Community-Wide Emissions by Sector**

# Inventory Results: Total Gross Emissions



| Sector                          | Fuel or Source         | 2021 Usage  | Usage Unit | 2021 Emissions |
|---------------------------------|------------------------|-------------|------------|----------------|
| Residential Energy              | Electricity            | 501,967,770 | kWh        | 254,593        |
|                                 | Propane                | 262,288     | MMBtu      | 16,277         |
|                                 | Natural Gas            | 22,945,073  | Therms     | 122,037        |
| Total                           |                        |             |            | 392,907        |
| Commercial Energy               | Electricity            | 546,905,708 | kWh        | 259,509        |
|                                 | Natural Gas            | 18,436,795  | Therms     | 98,059         |
| Total                           |                        |             |            | 357,568        |
| Industrial Energy               | Electricity            | 255,145,356 | kWh        | 131,020        |
|                                 | Natural Gas            | 193,309     | Therms     | 1,026          |
| Total                           |                        |             |            | 132,046        |
| Transportation & Mobile Sources | Diesel                 | 71,515,579  | VMT        | 102,860        |
|                                 | Gasoline               | 670,347,276 | VMT        | 267,086        |
|                                 | Public Transit         |             |            | 1,971          |
| Total                           |                        |             |            | 371,917        |
| Solid Waste                     | Waste Sent to Landfill | 74,188      | Tons       | 48,458         |
|                                 | Yard Waste for Compost | 14,759      | Tons       | 1,028          |
|                                 | Methane Flaring        |             |            | 131            |
| Total                           |                        |             |            | 49,617         |

|                       |                                   |           |       |           |
|-----------------------|-----------------------------------|-----------|-------|-----------|
| Water & Wastewater    | Septic Systems                    |           |       | 1,527     |
|                       | Combustion of Digester Gas        |           |       | 6         |
|                       | Flaring of Digester Gas           |           |       | 34        |
|                       | N2O                               |           |       | 862       |
| Total                 |                                   |           |       | 2,430     |
| Process and Fugitive  | Natural Gas Distribution          | 4,157,500 | MMBtu | 7,213     |
|                       | Fugitive Emissions from Oil Wells |           |       | 237       |
|                       | Industrial Process Emissions      |           |       | 12,326    |
|                       | Total                             |           |       | 19,776    |
| Agriculture           | Enteric Fermentation              |           |       | 30,632    |
|                       | Manure Management                 |           |       | 2,436     |
|                       | Crop Residues                     |           |       | 40,545    |
| Total                 |                                   |           |       | 73,613    |
| Total Gross Emissions |                                   |           |       | 1,399,873 |

# Inventory Results: Net Emissions after Sequestration

| Sector                                    | Fuel or Source           | 2021 Usage | Useage Unit | 2021 Emissions   |
|-------------------------------------------|--------------------------|------------|-------------|------------------|
| <b>Total Gross Emissions</b>              |                          |            |             | <b>1,399,873</b> |
| Forests & Trees                           | Forests & Trees          |            |             | -121,888         |
|                                           | Trees Outside of Forests |            |             | -29,374          |
| <b>Total</b>                              |                          |            |             | <b>-151,262</b>  |
| <b>Total Emissions with Sequestration</b> |                          |            |             | <b>1,248,611</b> |

# Inventory Results: Summary by Sector



| Sector                                     | 2021 Emissions   | Percentage of Total Emissions |
|--------------------------------------------|------------------|-------------------------------|
| Residential Energy                         | 392,907          | 28%                           |
| Transportation & Mobile Sources            | 371,917          | 27%                           |
| Commercial Energy                          | 357,568          | 26%                           |
| Industrial Energy                          | 132,046          | 9%                            |
| Agriculture                                | 73,613           | 5%                            |
| Solid Waste                                | 49,617           | 3%                            |
| Process and Fugitive                       | 19,776           | 1%                            |
| Water & Wastewater                         | 2,430            | 1%                            |
| <b>Total Gross Emissions:</b>              | <b>1,399,873</b> |                               |
| Forests & Trees                            | -151,262         |                               |
| <b>Total Emissions with Sequestration:</b> | <b>1,248,611</b> |                               |

# Why is a GHG Forecast Important?



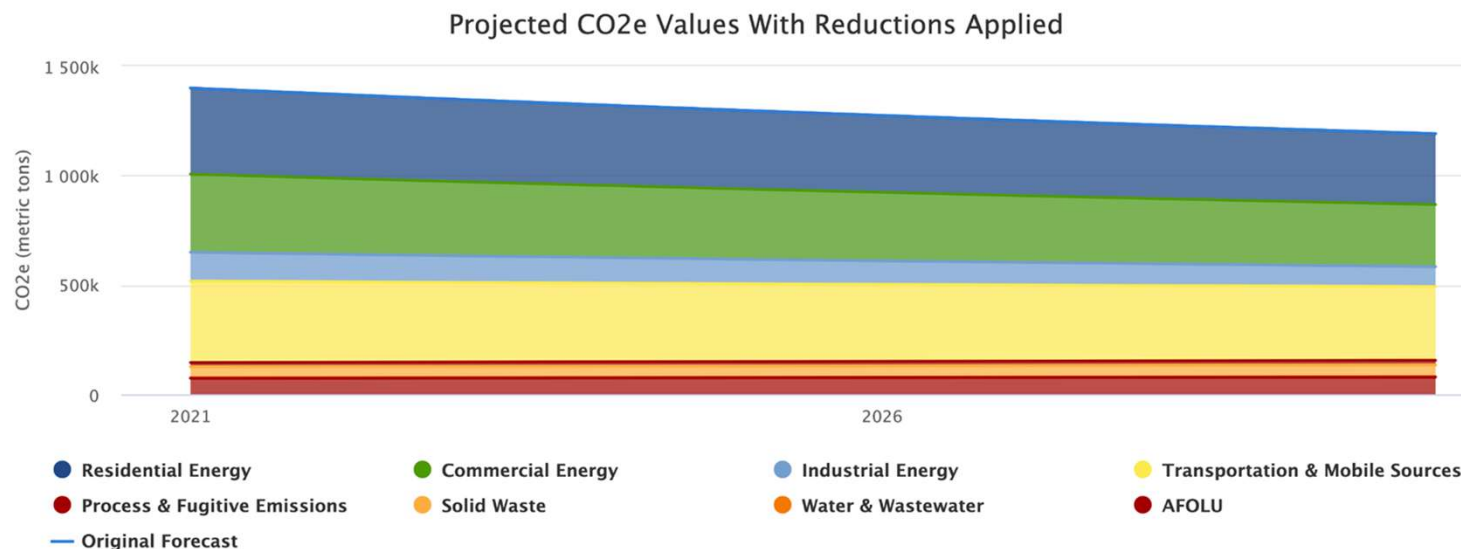
- Another foundational element of your Climate Action Plan
  - Projects future emissions based on a Business-as-Usual Scenario
    - BAU= “on the books” expected emissions reductions/growth before reduction strategies put in place
- Projected population growth
- Everygy decarbonisation goal 70% below 2005 by 2030 (adjusted for other utilities without goals)
- Federal vehicle efficiency (CAFE) standards
- GHG reduction strategies (e.g., energy efficiency) are then applied to forecasted emissions

# Business-As-Usual (BAU) Forecast



The BAU forecast (pictured below) is a projection of emissions through the year 2030. The projected emissions result from estimated population growth, changes in automotive fuel efficiency standards, and changes to the carbon intensity of grid electricity.

Douglas County's 2021 emissions were 1,399,873 Metric Tons Carbon Dioxide equivalent (MT CO<sub>2</sub>e). Based on population growth, increasing on-road vehicle fuel efficiency, and utility decarbonization plans, Douglas County's 2030 emissions will be 1,191,395 MT CO<sub>2</sub>e. **This is a 14.9% decrease.**



# Science-Based Target and High Impact Action Analysis



| SBTs and Emissions Goals | Baseline Year | 2030 Per Capita | 2030 Absolute | Baseline Scope 1 & 2 (MT CO2e) | 2030 Scope 1 & 2 (MT CO2e) |
|--------------------------|---------------|-----------------|---------------|--------------------------------|----------------------------|
|                          | 2021          | 62.9%           | 60.4%         | 1,351,415                      | 534,723                    |

| HIA Overview                         |                               |                         |                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                               |
|--------------------------------------|-------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                                 | Name                          | Net Reduction (MT CO2e) | Description                                                                                                                                                                                                 | Explanation/Source                                                                                                                                                                                                                                                            |
| Grid Decarbonization                 | Custom                        | 495,514                 | The change in carbon intensity (kg CO2/MWH) from the baseline year to 2030. The 2030 carbon intensity was acquired from Custom input % reduction. This equates to a 72% reduction in Grid Carbon Intensity. | Reduction from grid decarbonization occurs within the 2030 forecast, before other High-Impact Actions are modeled.                                                                                                                                                            |
| High Level VMT Reduction             | Moderate (5% VMT Reduction)   | 16,826                  | 5% Reduction in total VMT                                                                                                                                                                                   | Generic moderate baseline                                                                                                                                                                                                                                                     |
| On-Road Electric Vehicles Adoption   | Moderate (4.5% Annual Growth) | 61,542                  | 22.5% of VMT is EV by 2030. This action influences an increase in Residential & Commercial buildings electricity emissions.                                                                                 | Middleground of BAU and aggressive approaches, <a href="https://evadoption.com/ev-sales/ev-sales-forecasts/">https://evadoption.com/ev-sales/ev-sales-forecasts/</a>                                                                                                          |
| Commercial Building Efficiency       | 10% EB Renovated              | 13,953                  | 10% of all SF (existing) per year is reduced by 20% (energy)                                                                                                                                                | <a href="https://www.eia.gov/consumption/commercial/data/2012/c&amp;e/pdf/e2.pdf">https://www.eia.gov/consumption/commercial/data/2012/c&amp;e/pdf/e2.pdf</a>                                                                                                                 |
| Residential Building Efficiency      | 10% EB Renovated              | 13,689                  | 10% of all SF (existing) per year is reduced by 20% (energy)                                                                                                                                                | <a href="https://www.eia.gov/consumption/commercial/data/2012/c&amp;e/pdf/e2.pdf">https://www.eia.gov/consumption/commercial/data/2012/c&amp;e/pdf/e2.pdf</a>                                                                                                                 |
| Commercial Building Electrification  | 10% EB Electrified            | 81,538                  | 10% of existing SF per year is electrified. This action influences an increase in Commercial buildings electricity emissions.                                                                               | Because heating systems are replaced at a minimum of 10 years, this scenario represents an all electric replacement of heating systems. <a href="https://www.energystar.gov/campaign/heating_cooling/replace">https://www.energystar.gov/campaign/heating_cooling/replace</a> |
| Residential Building Electrification | 10% EB Electrified            | 115,011                 | 10% of existing SF per year is electrified. This action influences an increase in Residential buildings electricity emissions.                                                                              | Because heating systems are replaced at a minimum of 10 years, this scenario represents an all electric replacement of heating systems. <a href="https://www.energystar.gov/campaign/heating_cooling/replace">https://www.energystar.gov/campaign/heating_cooling/replace</a> |

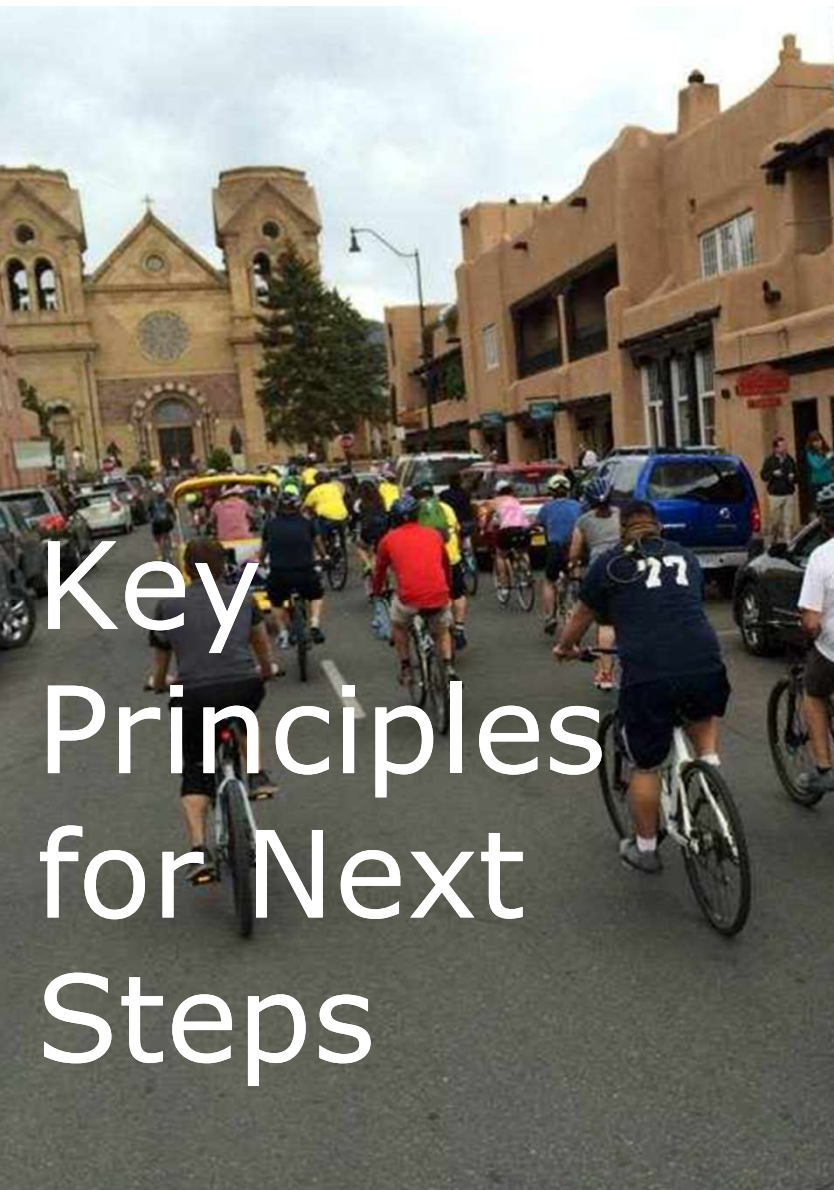
| Notice:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The HIA summary is a high-level analysis that represents an example pathway to achieving your Science Based Targets (based on your 2021 baseline year). This analysis uses national data and assumptions to form our preset scenarios. In short, the HIA summary should be used as an illustrative high-level, general pathway to support decision-making but should not be used as the sole influence on decision-making directly. However, the analysis remains as a demonstration of the need for swift and ambitious action. |

## Key Takeaways

- Residential Energy and Transportation & Mobiles Sources are the largest emitting sectors within Douglas County, contributing 28% and 27% of total emissions, respectively.
- Commercial Energy is the third largest emitting sector at 26%.
- The remaining sectors contribute to 19% of emissions (Industrial energy use, Agriculture, Solid Waste, Process & Fugitive, and Water & Wastewater).

### Next Steps:

- Reducing VMT, shifting to EVs, and mode-switching will be crucial to the climate action planning success within Douglas County.
- Collaborating with Evergy, Free State, and the Cities of Eudora and Baldwin to introduce more renewable energy resources to the community and support commercial/residential builds for solar energy can help reduce emissions from residential and commercial energy use.
- Continue look for ways to reduce natural gas usage, ICLEI recommends focusing on residential and commercial building retrofits and electrification through heat pumps.



# Key Principles for Next Steps

1. Programs should take a **holistic approach**, including health, resilience, and equity
2. Emissions reductions are urgent; a **2030 SBT** is recommended
3. Planning should incorporate rapidly **changing trends**
4. Local government can't do it alone. **Collaboration with state and utilities** is essential
5. Inventories provide the foundation for **informed decisions and transparency**

# GHG Inventory Scopes

- **Scope 1:** Direct emissions
- **Scope 2:** Indirect emissions from electricity consumption
- **Scope 3:** All other indirect emissions (exported waste, out-of-boundary transportation, etc.)

## Information-only / optional items:

- biofuels, ozone depleting substances, carbon offsets, RECs

