

# Workbook Introduction and Guide

## Legend for Data Entry and Inventory Year

### Legend for data entry

Do not edit	Do not edit; this cell is a formula.
May need to be updated	These cells may need to be updated depending on the inventory year.
Needs to be updated each inventory	These cells require manual entry each year.

## Lead Coordinator and Lead Consultant

### Lead Coordinator

<b>Jurisdiction</b>	Town of Erie
<b>Name</b>	Tyler Kesler
<b>Title</b>	Sustainability Manager
<b>Department</b>	Public Works
<b>Telephone</b>	303.926.2880
<b>Email</b>	<a href="mailto:tkesler@erieco.gov">tkesler@erieco.gov</a>

## Inventory Management Spreadsheet Contents

Source/Activity	Worksheet
Background	
All	<a href="#">Visual Summary</a>
All	<a href="#">Emission Summary</a>
Data Sources	<a href="#">Inventory Data Checklist</a>
Data Inputs: Supporting Data	
Conversion Factors and GWPs	<a href="#">Conversion Factors and GWPs</a>
Community Indicators	<a href="#">Community Indicators</a>
Data Inputs: Stationary Energy	
Energy Use	<a href="#">Stationary Energy Data</a>
Energy Use	<a href="#">Fugitive Emissions Data</a>
Data Inputs: Transportation	
On-Road Vehicles	<a href="#">On-Road Data</a>
Transit	<a href="#">Transit Data</a>
Aviation	<a href="#">Aviation Data</a>
Off-Road Vehicles	<a href="#">Off-Road Data</a>
Data Inputs: Waste	
Solid Waste Generation	<a href="#">Waste Recycling Data</a>
Wastewater Treatment Facilities	<a href="#">Wastewater Data</a>
Reporting: GPC Outputs	
Community Indicators	<a href="#">GPC Table 4.1</a>
GPC Table 4.3	<a href="#">GPC Table 4.2</a>
Activity data tabs	<a href="#">GPC Table 4.3</a>
Activity data tabs	<a href="#">GPC Table 4.4</a>















































ding on if new emissions factors are released by a protocol, etc. These cells are not  
due to data that is updated on an annual basis.

	<b>Lead Consultant</b>
	<b>Company</b>
	<b>Name</b>
	<b>Title</b>
	<b>Telephone</b>
	<b>Email</b>
	<b>Website</b>

Description	
	Provides summary information, including charts and graphs, for the inventory.
	Provides all summary information for the inventory, including emissions by scope, sector, and source.
	Identifies required data and provides a place to store contact information for relevant community organizations.
	Provides standard conversion factors used in calculations and Global Warming Potential factors.
	Includes general community characteristics used to complete GPC Table 4.1 and to calculate emissions.
	Input raw energy data for stationary fuels and electricity to calculate the total emissions.
	Input key metrics regarding fugitive emission activities, including the number of oil well completions.
	Input raw data, including data on VMT and electrical vehicles, to estimate mobile fuel consumption and emissions.
	Input raw transit data to estimate transit fuel consumption and emissions.
	Input raw aviation data used to estimate emissions from airline travel.
	Input raw off-road fuel use data to estimate emissions from off-road vehicle fuel use.
	Input raw community generated waste data sent to landfill or composting facility and recycled.
	Input raw data for wastewater treatment to calculate the total emissions from wastewater treatment.
	Data is linked from Community Indicators tab. Required for GPC compliance.
	Data is linked from GPC Table 4.3. Required for GPC compliance.
	Data is linked from activity data tabs into GPC Table 4.3. Required for GPC compliance.
	Data is linked from activity data tabs to calculate information-only emissions reductions.

















































	<b>Inventory Year</b>
	2021

Lotus Sustainability and Engineering
Rachel Meier
Senior Associate
612.558.6296
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or, and source.
community inventory sources and sectors.
s (GWP)
ulate GHG emission metrics.
s for each source.
s and natural gas consumption, to calculate total fugitive
onsumption and emissions.
ecycling data to calculate emissions for waste disposal.
ter treatment processes.
. Not required for GPC compliance.





































































































































































































## Emission Summary

### Emission Inventory Summary (BASIC+)

Scope
Scope 1
Scope 2
Scope 3
<b>Total BASIC+</b>
Information only

### Emission Inventory Summary (BASIC)

Scope
Scope 1
Scope 2
Scope 3
<b>Total BASIC</b>
Information only

*Note: BASIC emissions do not include emissions from trans-boundary aviation sources.*

### All Emissions by Sector (BASIC+)

Emission Source
Commercial and Industrial Buildings
Residential Buildings
Oil & Gas Wells
Transportation
Solid Waste
Wastewater Treatment
Industrial Processes and Product Use
Transmission and Distribution Losses
<b>Total</b>

### All Emissions by Sector (BASIC)

Emission Source
Commercial and Industrial Buildings
Residential Buildings
Oil & Gas Wells
Transportation
Solid Waste

Wastewater Treatment
Industrial Processes and Product Use
<b>Total</b>

All Emissions by Source (BASIC+)
Emission Source
Building Electricity
Natural Gas (including fugitive emissions)
Propane
Stationary Diesel
Oil & Gas Wells
On-Road Transportation including Electric Vehicles
Off-Road Transportation
Transit
In-Boundary Aviation
Trans-Boundary Aviation
Landfilled Waste
Composted Waste
Wastewater
Refrigerant Leaks
Transmission and Distribution Losses (including electric vehicles)
<b>Total</b>

All Emissions by Source (BASIC)
Emission Source
Building Electricity
Natural Gas (including fugitive emissions)
Propane
Stationary Diesel
On-Road Transportation including Electric Vehicles
Off-Road Transportation
In-Boundary Aviation
Transit
Landfilled Waste
Composted Waste
Wastewater
Refrigerant Leaks
<b>Total</b>

Detailed Emissions Breakdown by Sector
Stationary Energy
Energy

Fuel combustion within the city
Grid-supplied energy (electricity)
Transmission and Distribution Losses
<b>Fugitive Emissions</b>
Fugitive emissions from oil and natural gas systems within the city boundary
<b>Transportation</b>
<b>On-Road Vehicles</b>
Emissions from fuel combustion on-road transportation occurring in the city
Emissions from grid-supplied energy consumed in the city for on-road transportation
Emissions from transmission and distribution losses from grid-supplied energy consumed in the city for on-road transportation
<b>Total On-Road</b>
<b>Off-Road</b>
Emissions from fuel combustion off-road transportation occurring in the city
<b>Total Off-Road</b>
<b>Transit</b>
Transit activities within the city (buses)
<b>Total Transit</b>
<b>Aviation</b>
In-Boundary Aviation
Transboundary LTO Aviation
<b>Total Aviation</b>
<b>Total Transportation</b>
<b>Waste</b>
<b>Community Solid Waste</b>

Landfilled waste treated inside the City
Landfilled waste treated outside the City
Composted waste treated outside the City
<b>Total Solid Waste</b>
<b>Wastewater Treatment and Discharge</b>
Wastewater Generated and Treated in City
<b>Total Wastewater</b>
<b>Industrial Processes and Product Use</b>
<b>Refrigerants</b>
Refrigerant Leaks
<b>Total Waste and IPPU</b>
<b>Total BASIC emissions</b>
<b>Total partial BASIC+ emissions</b>

<b>Information Only Breakdown by Sector</b>
Recycling
Renewable energy
<b>TOTAL INFORMATION-ONLY AVOIDED EMISSIONS</b>
















































Emissions (mt CO2e)	Percentage of BASIC+ Total
228,150	65%
88,097	25%
37,170	11%
<b>353,418</b>	<b>100%</b>
(20,238)	N/A

--	--

Emissions (mt CO2e)	Percentage of BASIC Total
228,150	72%
88,097	28%
2,305	0.72%
<b>318,552</b>	<b>100%</b>
(20,238)	N/A

*n, transmission and distribution losses, or consumption-based*

--	--

Emissions (mt CO2e)	Percentage of Total
27,197	8%
112,367	32%
38,494	11%
55,122	16%
115,292	33%
130	0.04%
101	0.03%
4,716	1%
<b>353,418</b>	<b>100%</b>

--	--

Emissions (mt CO2e)	Percentage of Total
27,197	9%
112,367	35%
38,494	12%
24,972	8%
115,292	36%

130	0.04%
101	0.03%
<b>318,552</b>	<b>100%</b>

Emissions (mt CO2e)	Percentage of Total
86,565	24%
52,581	15%
116	0.03%
302	0.09%
38,494	11%
23,500	7%
7	0.002%
140	0.04%
1,325	0.4%
30,150	9%
115,187	33%
105	0.03%
130	0.04%
101	0.03%
4,716	1%
<b>353,418</b>	<b>100%</b>

Emissions (mt CO2e)	Percentage of Total
86,565	27%
91,075	29%
116	0.0%
302	0.1%
23,500	7%
7	0%
1,325	0%
140	0.0%
115,187	36%
105	0.03%
130	0.04%
101	0.03%
<b>318,552</b>	<b>100%</b>

Type	GHG Emissions (mt CO2e)	Scope

Commercial and Industrial	5,287	1
Commercial and Industrial	302	1
Commercial and Industrial	107	1
Residential	45,497	1
Residential	9	1
Commercial and Industrial	21,314	2
Residential	65,251	2
Commercial and Industrial	1,136	3
Residential	3,504	3
<b>Total Buildings</b>	<b>142,406</b>	
<b>Type</b>	<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>
Commercial and Industrial	187	1
Residential	1,611	1
Oil & Gas Wells	38,494	1
<b>Total Fugitive</b>	<b>40,292</b>	
<b>Total Stationary Energy</b>	<b>182,698</b>	
<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>
21,968	1	53,935,129
1,533	2	1,992,760
76	3	105,178
<b>23,576</b>		
<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>
7	1	680
<b>7</b>		
<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>
140	1	13,723
<b>140</b>		
<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>
1,325	1	141,187
30,150	3	3,063,527
<b>31,475</b>		
<b>55,198</b>		
<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>

112,987	1	1,742,151
2,200	3	
105	3	1,400
<b>115,292</b>		
<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>
130	1	30,000
<b>130</b>		
<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>
101	1	78
<b>115,522</b>		
<b>318,552</b>		
<b>353,418</b>		

<b>GHG Emissions (mt CO2e)</b>	<b>Scope</b>	<b>Value</b>
(13,506)	N/A	4,453
(6,731)	N/A	14,210,848
<b>(20,238)</b>		

















































Value	Unit

1,013,206	therms
29,383	gallons diesel
18,961	gallons propane
7,718,075	therms
1,560	gallons propane
36,030,346	kWh
108,428,740	kWh
5,812,270	kWh
1,958,577	kWh

<b>Value</b>	<b>Unit</b>
1,013,206	therms
8,723,183	therms
14,967	Barrels of Oil Produced

<b>Unit</b>
VMT
kWh
kWh
<b>Unit</b>
gallons
<b>Unit</b>
gallons diesel
<b>Unit</b>
gallons of jet fuel and aviation gasoline
gallons of jet fuel and aviation gasoline
<b>Unit</b>

tons waste
tons waste
tons compost
Unit
population served
Unit
(kg) of R-134A

Unit
tons recycled waste (life-cycle emissions)
kWh







































































































































































































































































# Visual Summary of Data

## All Emissions by Scope

Scope	Emissions (mt CO2e)	Percentage of Total
Scope 1 BASIC	228,150	72%
Scope 1 BASIC+	228,150	65%
Scope 2 BASIC	88,097	28%
Scope 2 BASIC+	88,097	25%
Scope 3 BASIC	2,305	0.72%
Scope 3 BASIC+	37,170	11%
<b>Total Emissions BASIC</b>	<b>318,552</b>	<b>100%</b>
<b>Total Emissions BASIC+</b>	<b>353,418</b>	<b>100%</b>

## All Emissions by Sector (BASIC+)

Sector	Emissions (mt CO2e)	Percentage of Total
Commercial and Industrial Buildings	28,332	8%
Residential Buildings	115,871	33%
Oil & Gas Wells	38,494	11%
Transportation	55,198	16%
Solid Waste	115,292	33%
Wastewater Treatment	130	0.04%
Industrial Processes and Product Use	101	0.03%
<b>Total Emissions</b>	<b>353,418</b>	<b>100%</b>

\*Note Transmission & Distribution losses are added into the building and transportation emissions totals

## All Emissions by Sector (BASIC)

Sector	Emissions (mt CO2e)	Percentage of Total
Commercial and Industrial Buildings	27,197	9%
Residential Buildings	112,367	35%
Oil & Gas Wells	38,494	12%
Transportation	24,972	8%
Solid Waste	115,292	36%
Wastewater Treatment	130	0.04%
Industrial Processes and Product Use	101	0.03%
<b>Total Emissions</b>	<b>318,552</b>	<b>100%</b>

### All Emissions by Source (BASIC+)

Emission Source	Emissions (mt CO2e)	Percentage of Total
Building Electricity	86,565	24%
Natural Gas (including fugitive emissions)	52,581	15%
Propane	116	0.03%
Stationary Diesel	302	0.09%
Oil & Gas Wells	38,494	10.89%
On-Road Transportation including Electric Vehicles	23,500	7%
Off-Road Transportation	7	0.002%
Transit	140	0.04%
In-Boundary Aviation	1,325	0.4%
Trans-Boundary Aviation	30,150	9%
Landfilled Waste	115,187	33%
Composted Waste	105	0.03%
Wastewater	130	0.04%
Refrigerant Leaks	101	0.03%
Transmission and Distribution Losses	4,716	1%
<b>Total</b>	<b>353,418</b>	<b>100%</b>

### All Emissions by Source (BASIC)

Emission Source	Emissions (mt CO2e)	Percentage of Total
Building Electricity	86,565	27%
Natural Gas (including fugitive emissions)	91,075	29%
Propane	116	0.04%
Stationary Diesel	302	0.1%
On-Road Transportation including Electric Vehicles	23,500	7%
Transit	140	0.04%
Landfilled Waste	115,187	36%
Composted Waste	105	0.03%
Wastewater	130	0.04%
Refrigerant Leaks	101	0.03%
<b>Total</b>	<b>318,552</b>	<b>100%</b>

### Emissions by Source and Sector (BASIC+)

Emissions Sources	Emissions (mtCO2e)
-------------------	--------------------

<b>Residential Fuel Use</b>	<b>115,871</b>	
Residential Electricity		68,755
Residential Natural Gas		45,497
Residential Propane		9
Fugitive Emissions		1,611
<b>Commercial Fuel Use</b>	<b>66,826</b>	
Commercial Electricity		22,449
Commercial Natural Gas		5,287
Commercial Propane		107
Commercial Diesel		302
Fugitive Emissions		38,681
<b>Transportation</b>	<b>55,198</b>	
On-Road Gasoline		21,968
On-Road Diesel		140
On-Road Electricity		1,608
Off-Road Fuel Use		7
In-boundary Aviation		1,325
Transboundary Aviation		30,150
<b>Waste</b>	<b>115,421</b>	
Landfilled		115,187
Compost		105
Wastewater		130
<b>Industrial Processes and Product Use</b>	<b>101</b>	
Refrigerant Leaks		101
<b>Total</b>	<b>353,418</b>	

\*Note Transmission & Distribution losses are added into the electricity emissions totals.

Emissions by Source and Sector (BASIC)		
Emissions Sources	Emissions (mtCO <sub>2</sub> e)	
<b>Residential Fuel Use</b>	<b>112,367</b>	

Residential Electricity		65,251
Residential Natural Gas		45,497
Residential Propane		9
Fugitive Emissions		1,611
<b>Commercial Fuel Use</b>	<b>65,691</b>	
Commercial Electricity		21,314
Commercial Natural Gas		5,287
Commercial Propane		107
Commercial Diesel		302
Fugitive Emissions		38,681
<b>Transportation</b>	<b>24,972</b>	
On-Road Gasoline		21,968
On-Road Diesel		140
On-Road Electricity		1,533
In boundary aviation		1,325
Off-Road		7
<b>Waste</b>	<b>115,421</b>	
Landfilled		115,187
Compost		105
Wastewater		130
<b>Industrial Processes and Product Use</b>	<b>101</b>	
Refrigerant Leaks		101
<b>Total</b>	<b>318,552</b>	

## Stationary Energy Emissions Detail

Emission Source	Emissions (mt CO2e)	Percentage of Total
-----------------	---------------------	---------------------



Residential Electricity	65,251	36%
Residential Natural Gas	45,497	25%
Residential Propane	9	0.005%
Commercial Electricity	21,314	12%
Commercial Natural Gas	5,287	3%
Commercial Propane	107	0.1%
Commercial Diesel	302	0.2%
Fugitive Emissions	1,798	1%
Oil & Gas Wells	38,494	21%
Stationary Energy T&D Losses	4,640	3%
<b>Total</b>	<b>182,698</b>	<b>100%</b>

Transportation Emissions Detail		
Emission Source	Emissions (mt CO2e)	Percentage of Total
On-road Gasoline	18,457	33%
On-road Diesel	3,511	6%
Transit Diesel	140	0.3%
Electric Vehicles	1,533	2.8%
Transportation T&D Losses	76	0.14%
Off-Road Diesel	7	0.01%
In-Boundary Aviation	1,325	2%
Transboundary Aviation	30,150	55%
<b>Total</b>	<b>55,198</b>	<b>100%</b>

Waste Emissions Detail		
Emission Source	Emissions (mt CO2e)	Percentage of Total
Solid Waste	115,292	99.9%
Wastewater	130	0.1%
<b>Total</b>	<b>115,421</b>	<b>100%</b>



































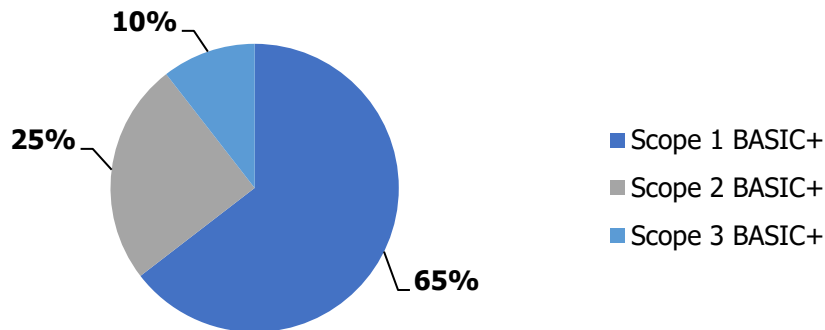




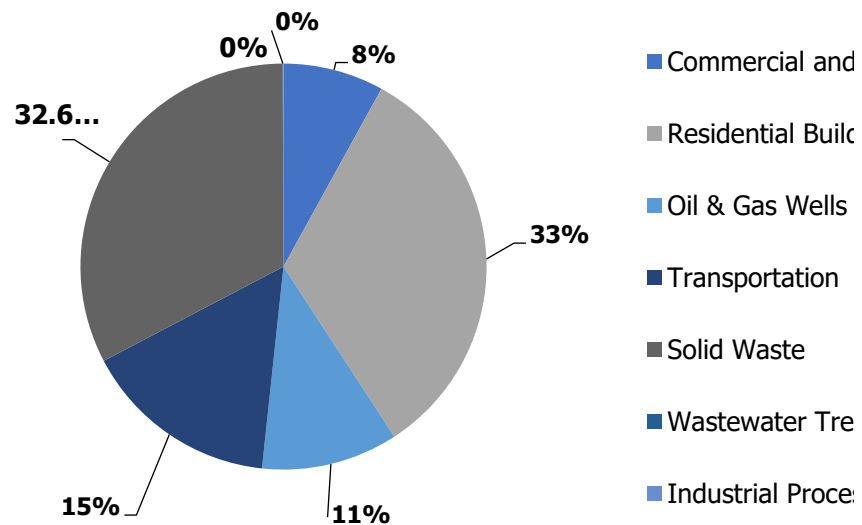




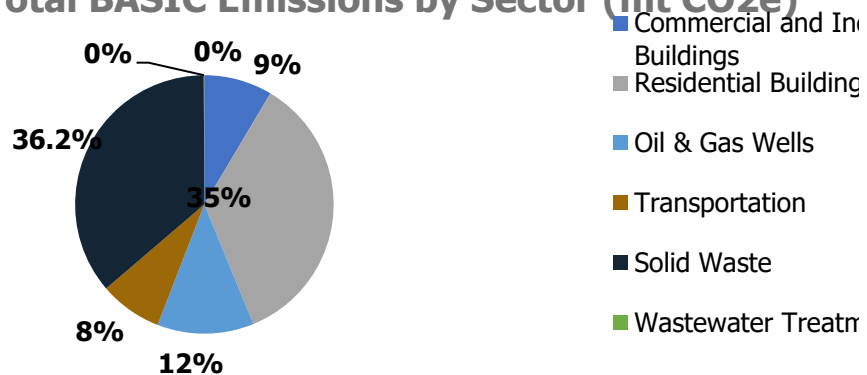
**Total BASIC+ Emissions by Scope (mt CO2e)**



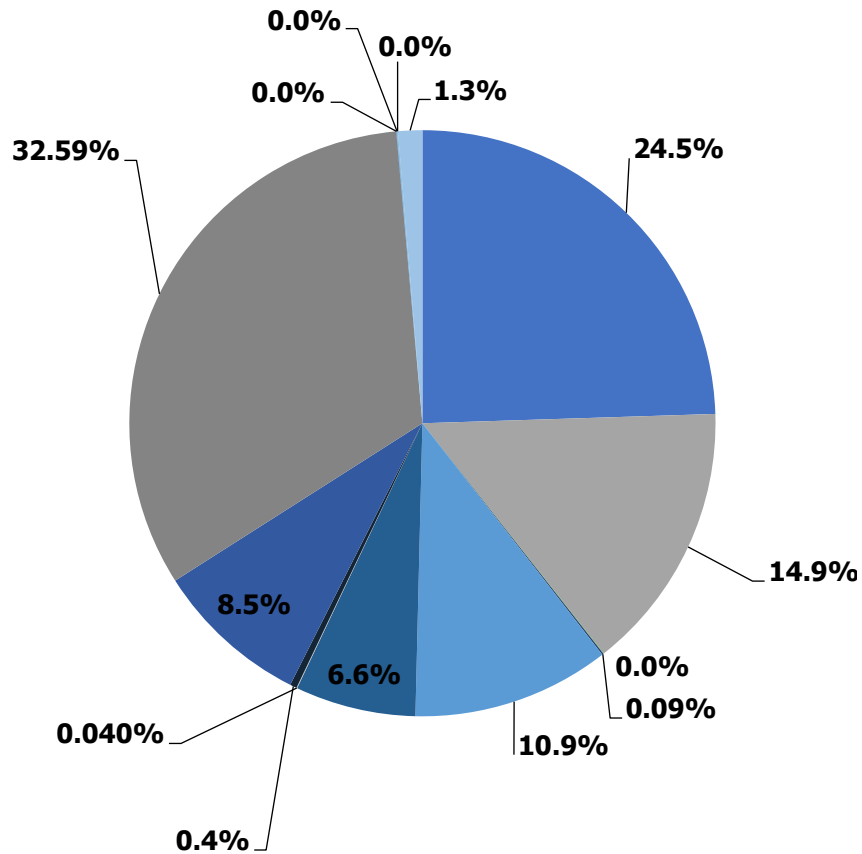
**Total BASIC+ Emissions by Sector (mt CO2e)**



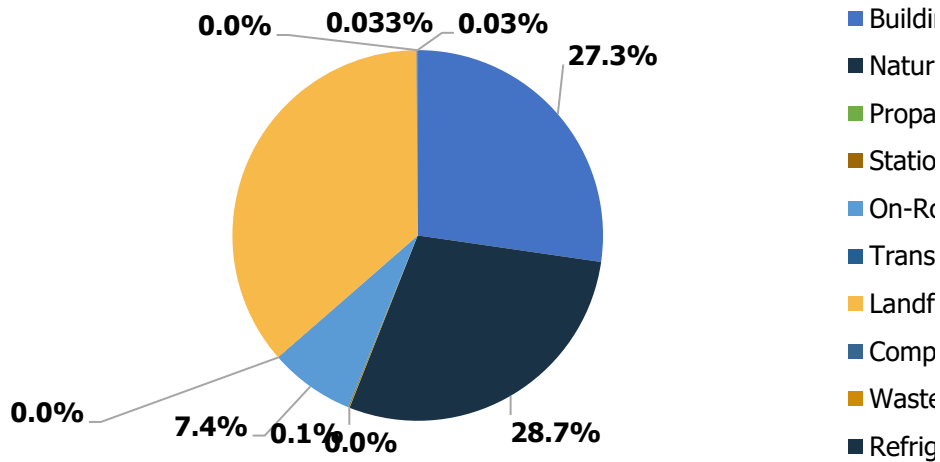
**Total BASIC Emissions by Sector (mt CO2e)**



## Total BASIC+ Emissions by Source



## Total BASIC Emissions by Source

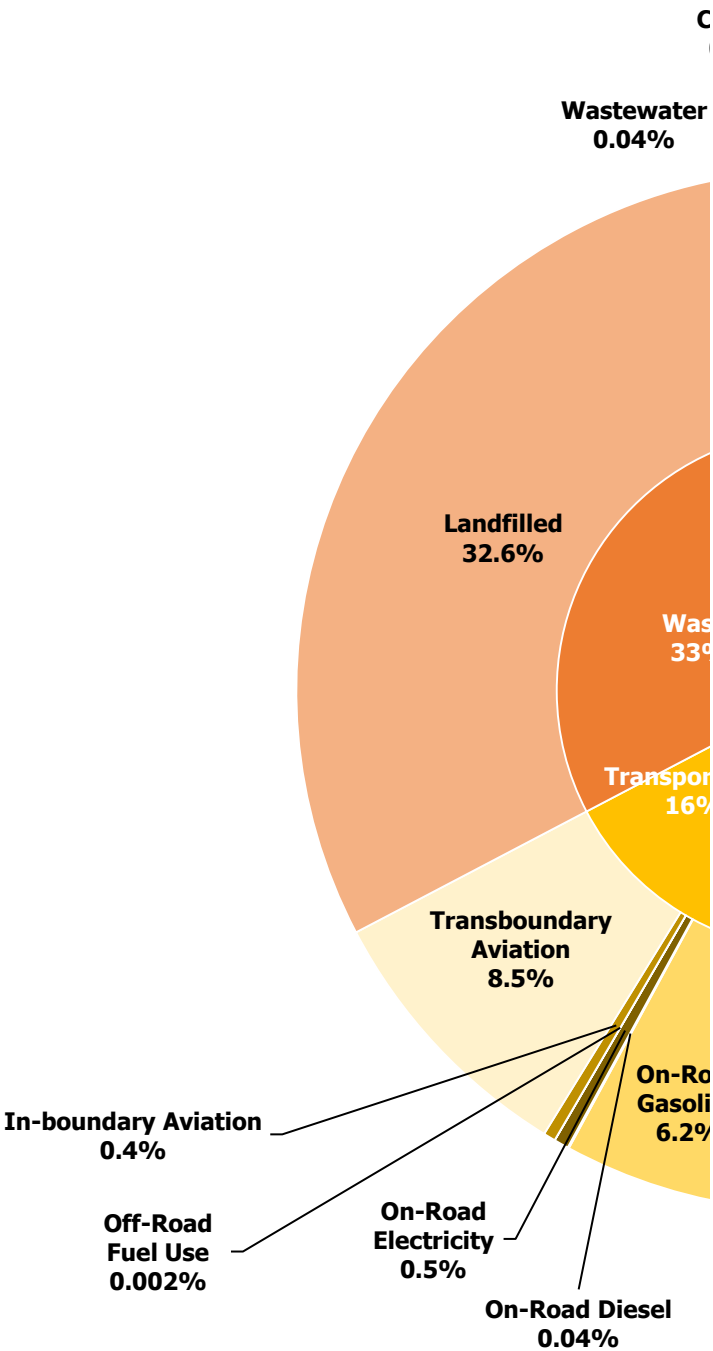


Percent

Total BASIC+ Emissions

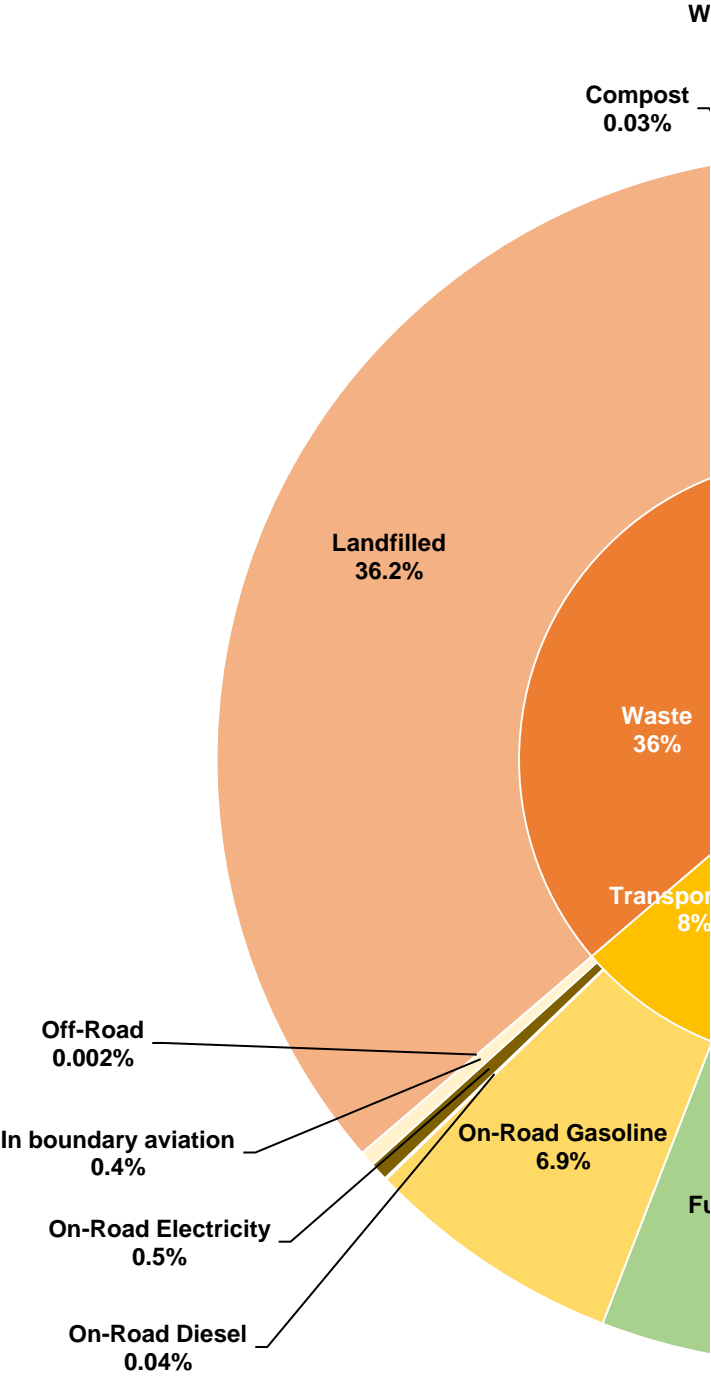
33%
19%
13%
0.002%
0.5%
19%
6%
1%
0.03%
0.09%
11%
16%
6%
0.04%
0.5%
0.002%
0.4%
9%
33%
33%
0.03%
0.04%
0.03%
0.03%

Total BASIC EMISSIONS



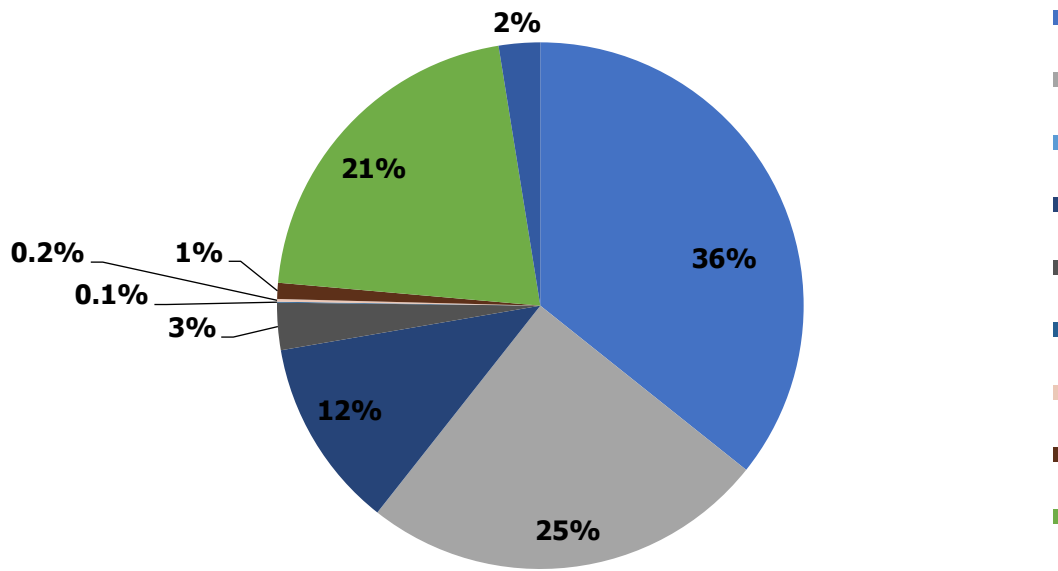
Percent	Total BASIC Emissions
35%	

20%
14%
0.003%
1%
<b>21%</b>
7%
2%
0.03%
0.1%
12%
<b>8%</b>
7%
0.04%
0.5%
0.4%
0.002%
<b>36%</b>
36%
0.03%
0.04%
<b>0.03%</b>
0.03%

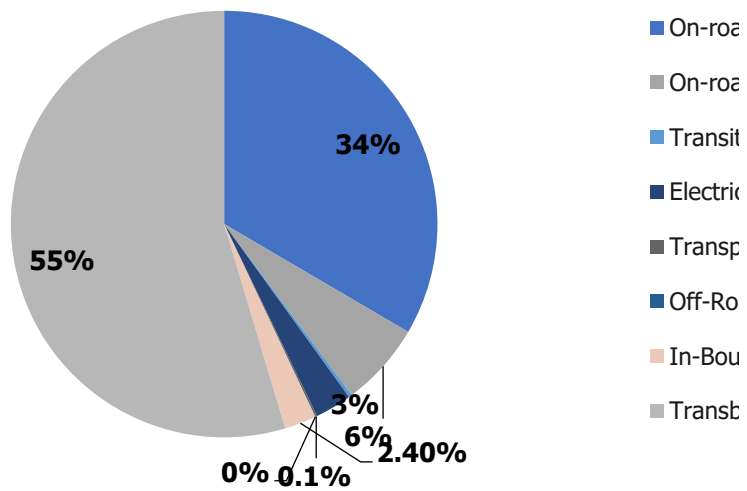


Stationary Emissions Details (mt CO<sub>2</sub>e)



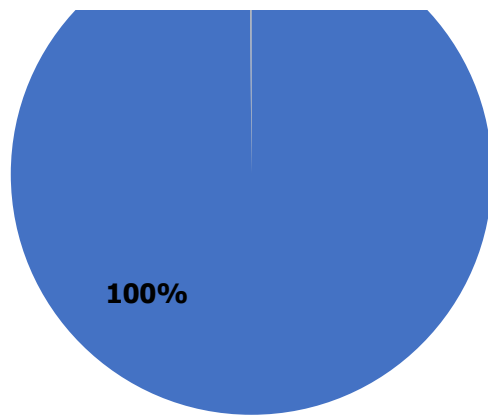


## Transportation Emissions Details (mt CO<sub>2</sub>e)



## Waste Emissions Details (mt CO<sub>2</sub>e)





































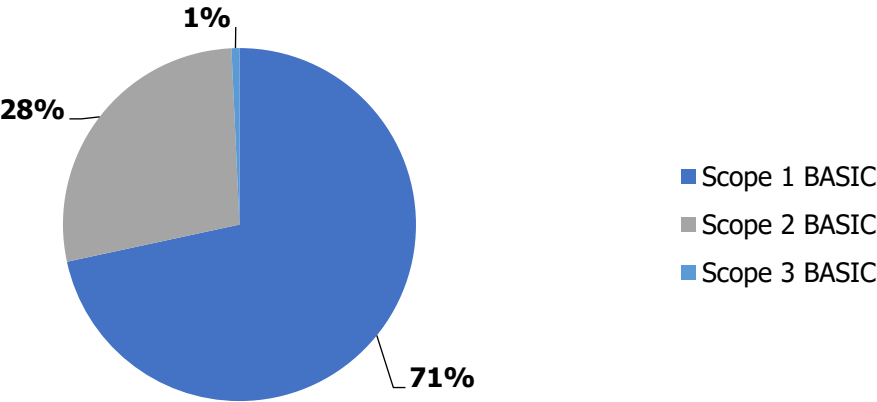




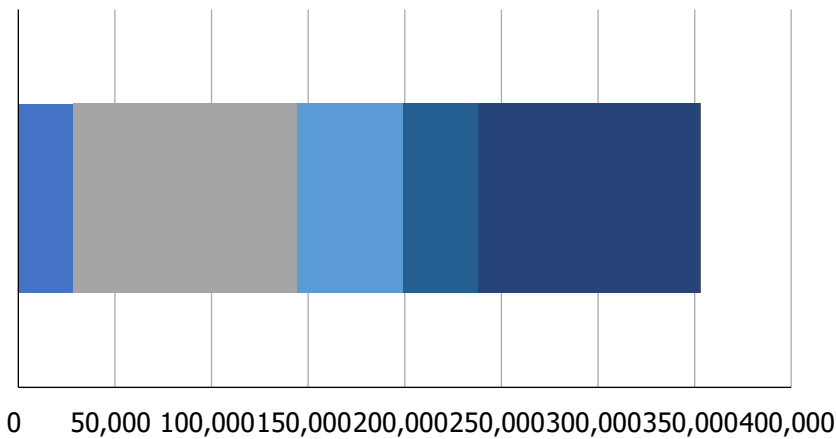




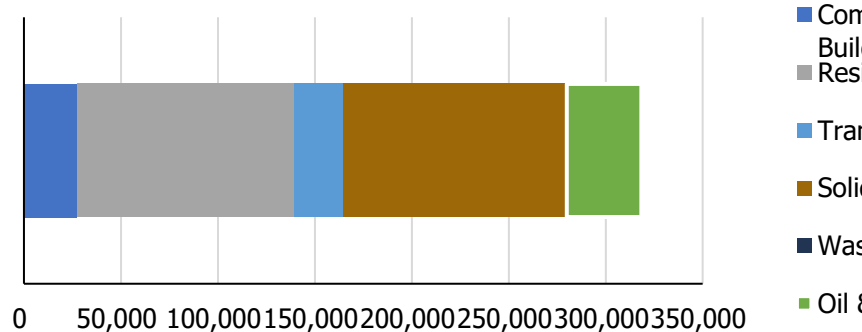
Total BASIC Emissions by Scope (mt CO2e)



Total BASIC+ Emissions by Sector (mt CO2e)



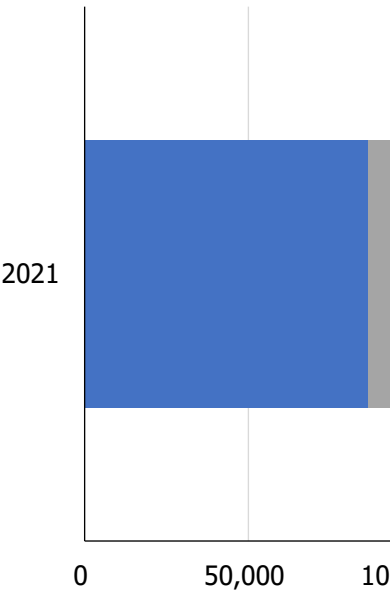
Total BASIC Emissions by Sector (mt CO2e)





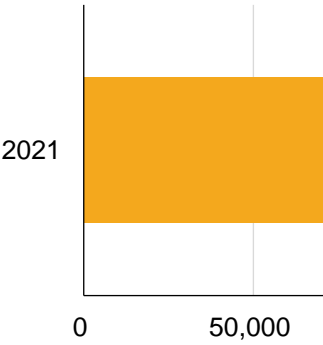
Source (mt CO2e)

- Building Electricity
- Natural Gas (including fugitive emissions)
- Propane
- Stationary Diesel
- Oil & Gas Wells
- On-Road Transportation including Electric Vehicles
- Off-Road Transportation
- Transit
- In-Boundary Aviation
- Trans-Boundary Aviation
- Landfilled Waste
- Composted Waste
- Wastewater
- Refrigerant Leaks
- Transmission and Distribution Losses



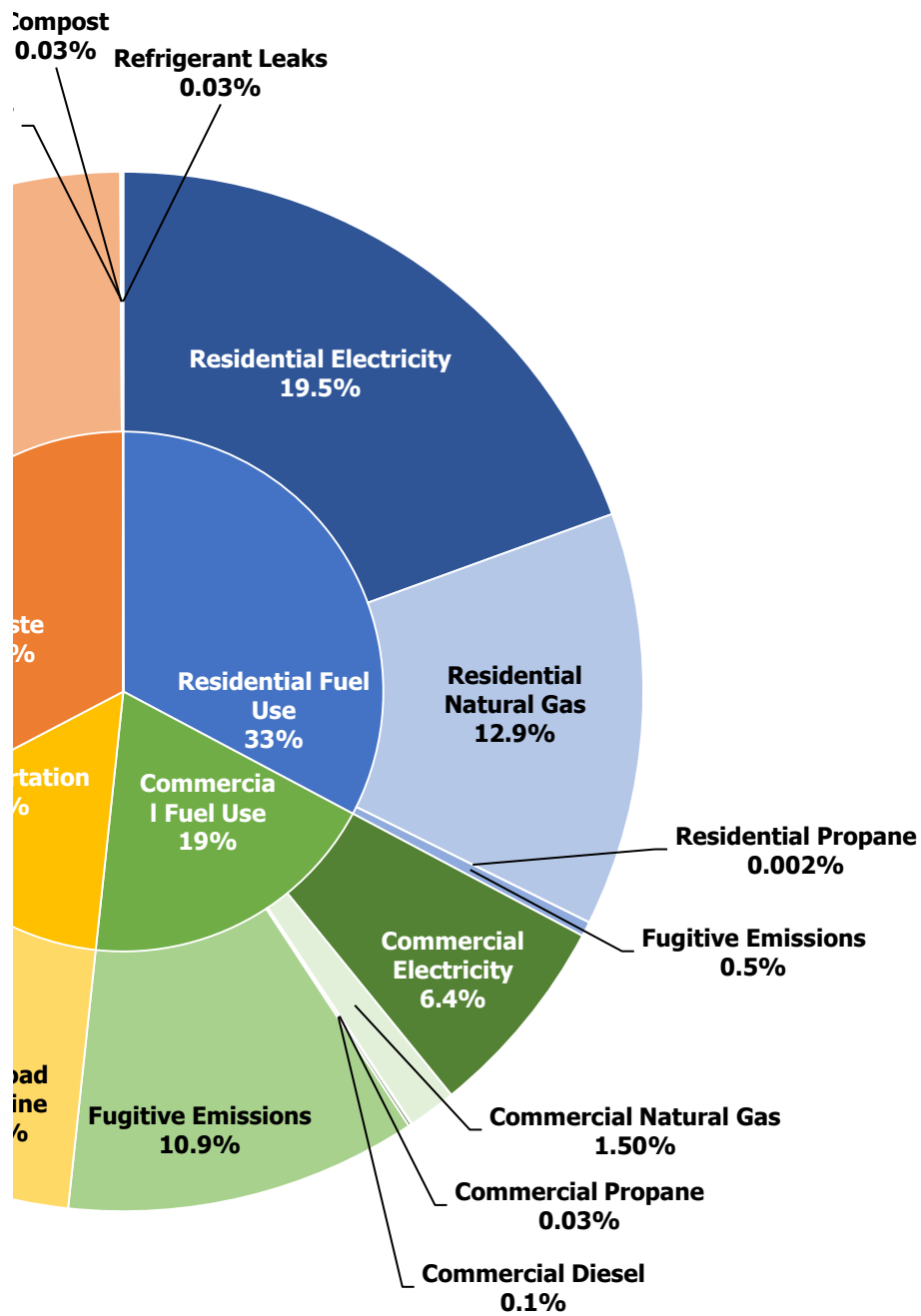
(mt CO2e)

- Building Electricity
- Natural Gas (including fugitive emissions)
- Propane
- Stationary Diesel
- On-Road Transportation including Electric Vehicles
- Transit
- Landfilled Waste
- Composted Waste
- Wastewater
- Refrigerant Leaks

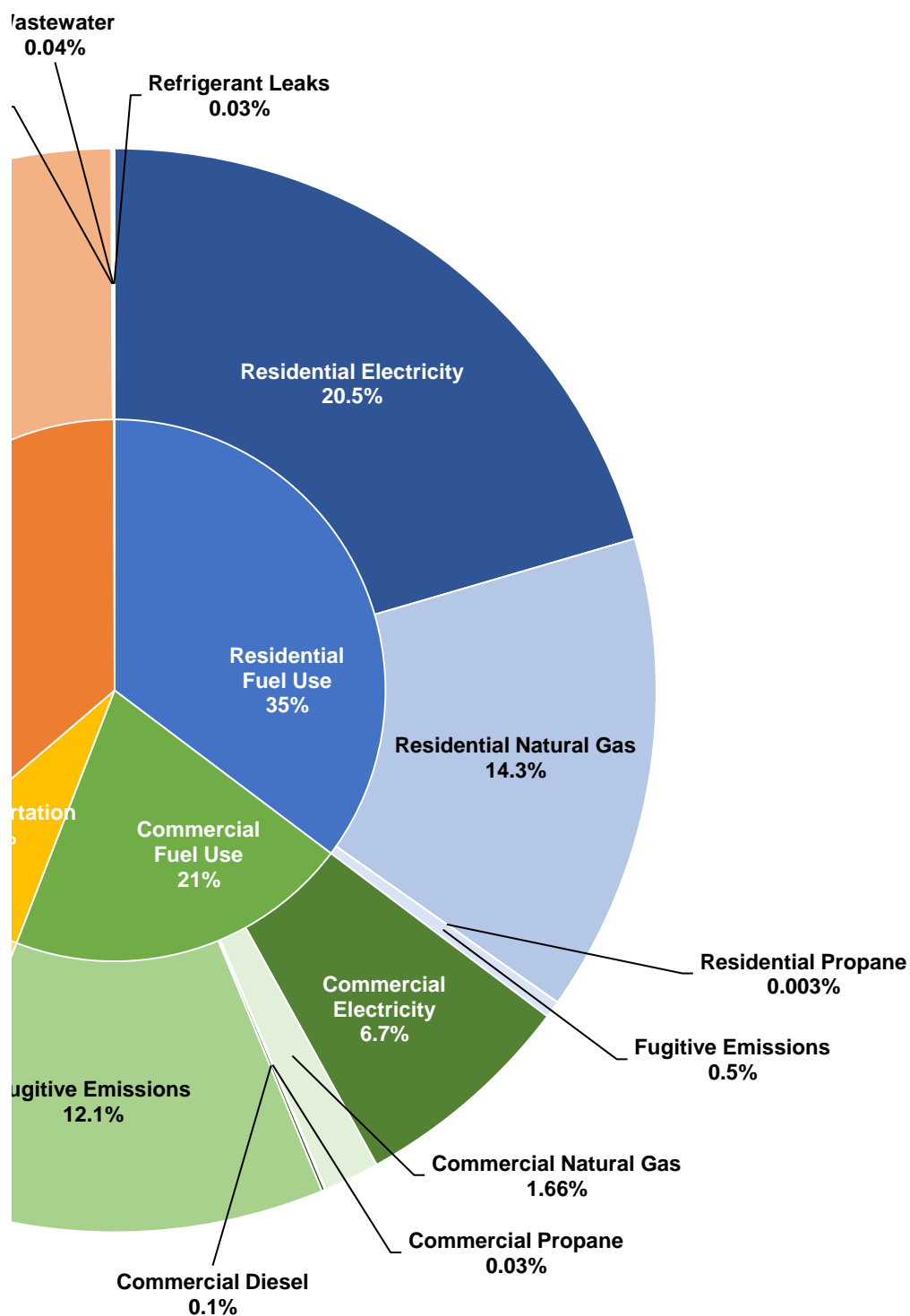


by Source and Sector (mt CO2e)

## Emissions by Source and Sector (mt CO2e)



## Emissions by Source and Sector (mt CO2e)



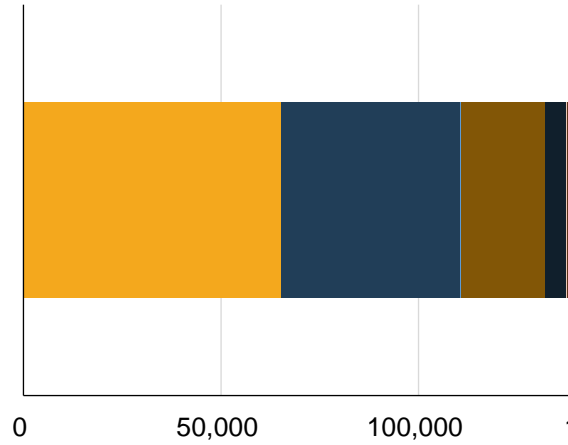
(CO2e)

Stationary Emissions Details



- Residential Electricity
- Residential Natural Gas
- Residential Propane
- Commercial Electricity
- Commercial Natural Gas
- Commercial Propane
- Commercial Diesel
- Fugitive Emissions
- Oil & Gas Wells
- Stationary Energy T&D Losses

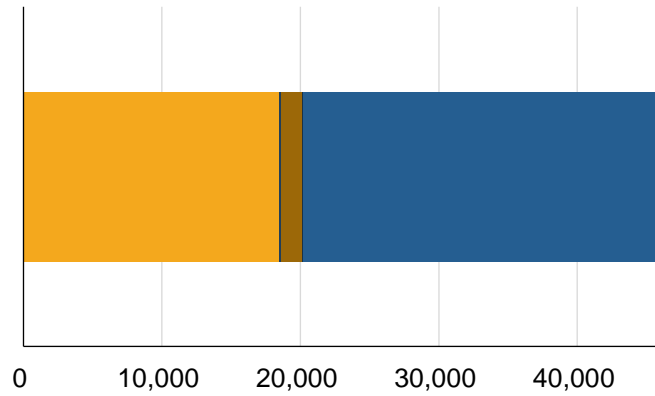
2021



CO2e)

- Road Gasoline
- Road Diesel
- Air Diesel
- Commercial Vehicles
- Transportation T&D Losses
- Road Diesel
- Boundary Aviation
- Boundary Aviation

2021



e)

■ Solid Waste

■ Wastewater































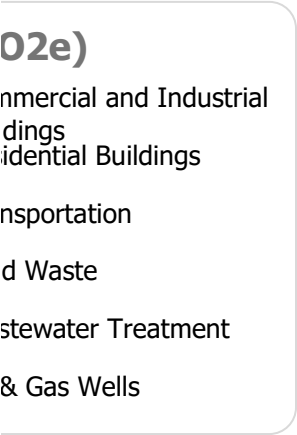
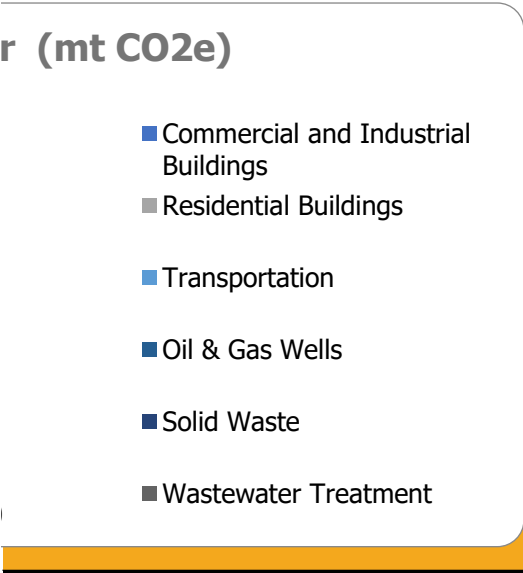






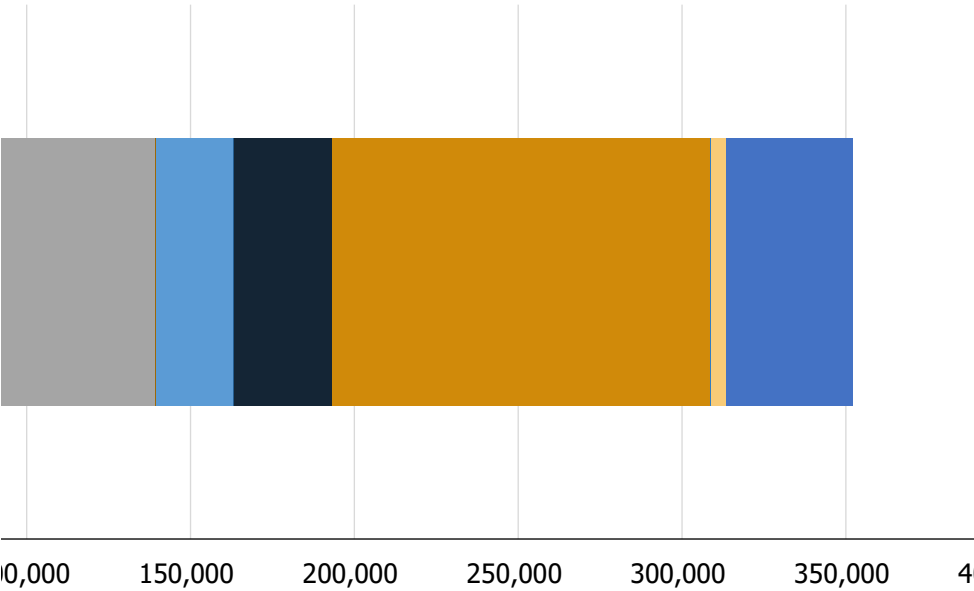




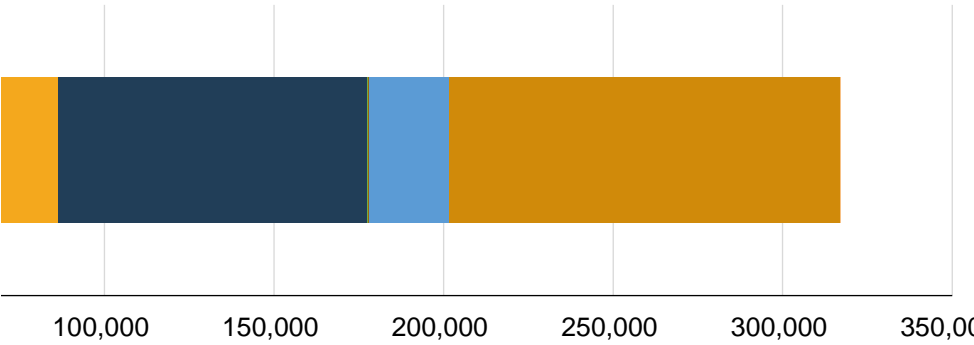




**Total BASIC+ Emissions by Source (n**



**Total BASIC Emissions by Source (mt)**

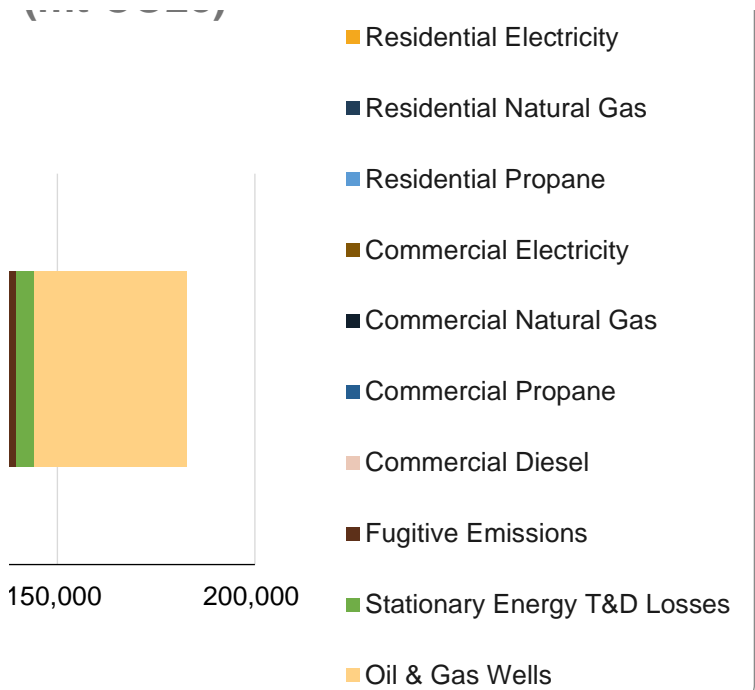




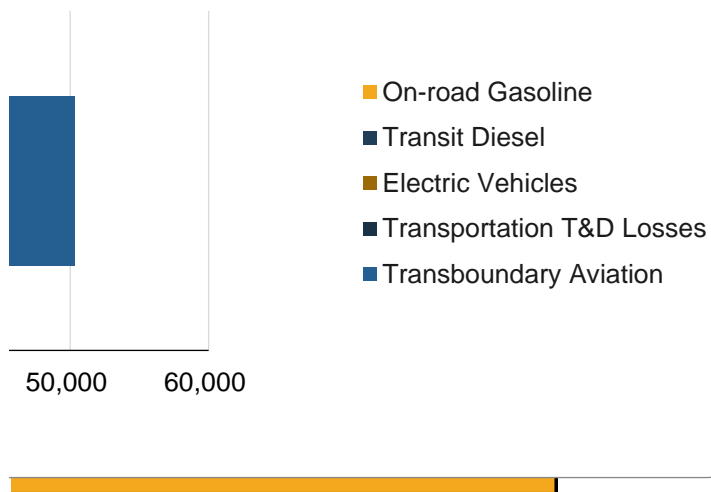


(mt CO2e)





## ons Details (mt CO2e)







































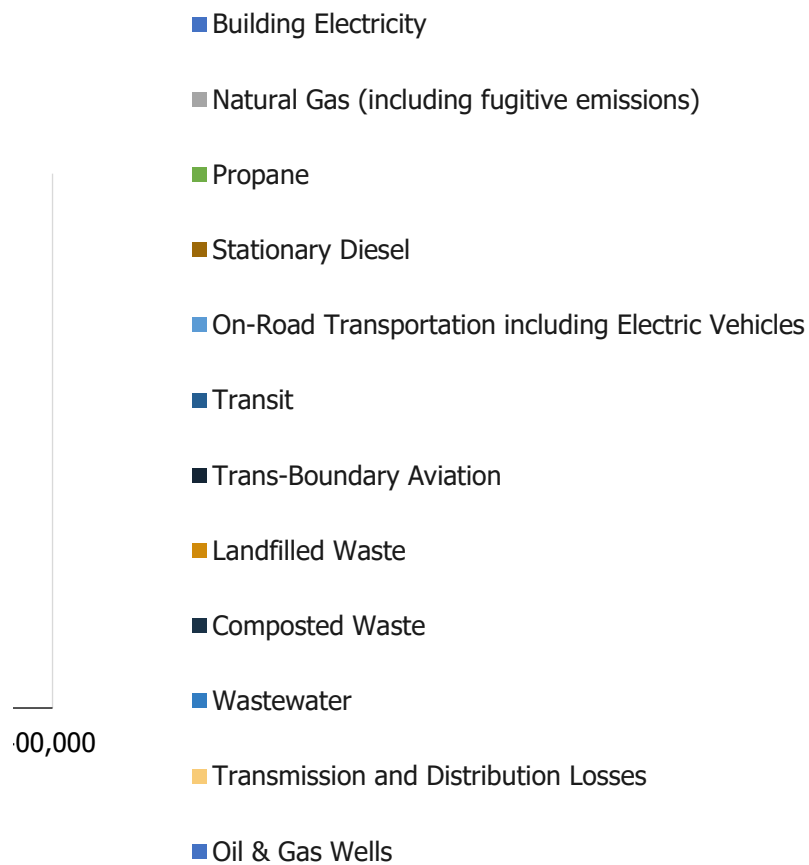




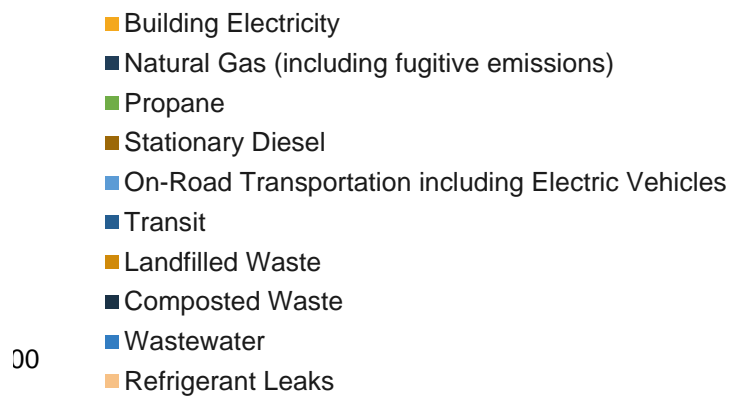




## nt CO2e)



## CO2e)































































































































































# Inventory Data Checklist for BASIC Inventory

## Data Contacts

### Stationary Energy

Emissions Source	Required Data	Data units
Utility provided electricity	<ol style="list-style-type: none"> <li>1. Residential electricity consumption</li> <li>2. Commercial and institutional electricity consumption</li> <li>3. Manufacturing industries and construction electricity consumption</li> <li>4. Electricity emission factors</li> </ol>	kWh, MWh, tons CO2/MWh
Utility provided natural gas	<ol style="list-style-type: none"> <li>1. Residential natural gas consumption</li> <li>2. Commercial and institutional natural gas consumption</li> <li>3. Manufacturing industries and construction natural gas consumption</li> </ol>	therms, ccf, MMBtu
Direct access/transport natural gas/stationary diesel	<ol style="list-style-type: none"> <li>1. Residential consumption</li> <li>2. Commercial and institutional consumption</li> <li>3. Manufacturing industries and construction consumption</li> </ol>	therms, ccf, MMBtu, gal
Energy Industries	<ol style="list-style-type: none"> <li>1. Energy production used in power plant auxiliary operations within the city</li> <li>2. Electricity consumed by energy industries</li> </ol>	various fuel units AND kWh, MWh
Agriculture, Forestry, Fishing	1. Agriculture, forestry, fishing electricity consumption	kWh, MWh
Agriculture, Forestry, Fishing	1. Agriculture, forestry, fishing fuel consumption	therms, ccf, MMBtu
Non-specified energy sources	1. Electricity consumed within the city boundary	kWh, MWh

Non-specified energy sources	1. Fuel combustion within the city boundary	therms, ccf, MMBtu
Fugitive emissions from coal	1. Commercial and institutional coal consumption 2. Manufacturing industries and construction coal consumption	tons
Fugitive emissions oil and gas	1. Residential natural gas and oil consumption 2. Commercial and institutional natural gas and oil consumption 3. Manufacturing industries and construction natural gas and oil consumption	therms, ccf, MMBtu AND gallons
<b>Transportation</b>		
<b>Emissions Source</b>	<b>Required Data</b>	<b>Data units</b>
On-road vehicles	1. Origin destination VMT or In-boundary annual VMT	annual VMT
Transit	1. Origin destination VMT 2. Trans-boundary VMT	annual VMT
On-road vehicles	1. Electricity consumed in the city for on-road transportation	kWh, MWh
Railways	1. Electricity consumed for railway transportation in the city	kWh, MWh
Railways	1. Fuel combustion for railway transportation in the city	various fuel units
Waterborne navigation	1. Electricity consumed for waterborne navigation in the city	kWh, MWh

Waterborne navigation	1. Fuel combustion for waterborne navigation in the city	various fuel units
Aviation	1. Electricity consumed for aviation occurring in the city	kWh, MWh
Aviation	1. Fuel combustion for aviation occurring in the city (including Boulder Municipal Airport and Denver International Airport)	gal of aviation gasoline, gals of jet fuel
Off-road transportation	1. Electricity consumed for off-road transportation in the city	kWh, MWh
Off-road transportation	1. Fuel combustion for off-road transportation in the city	various fuel units

## Waste

Emissions Source	Required Data	Data units
Community solid waste generated	1. Residential waste generation 2. Commercial and institutional waste generation 3. Industrial waste generation 4. Location(s) of landfills 5. Types of treatment: traditional landfill, open dump, biological treatment, OR incineration, open burning,	tons of waste, in-boundary and out-of-boundary landfill location(s), types of treatment per waste disposal location
Wastewater generation	1. Residential wastewater generation 2. Commercial and institutional wastewater generation 3. Industrial wastewater generation 4. Location(s) of wastewater treatment	gallons/person/day, in-boundary and out-of-boundary wastewater treatment designation(s)

Wastewater treatment	1. Measured methane and nitrous oxide emissions from waste water treatment facilities under local government's significant influence 2. Aerobic or anaerobic treatment system 3. Nitrification or denitrification system	kg BOD5, tons of nitrogen, aerobic or anaerobic, nitrification or denitrification
<b>Community Indicators</b>		
<b>Indicators</b>	<b>Required Data</b>	<b>Data units</b>
Population	1. Community population	# residents
Physical size	1. City land area	square miles
Community descriptors	1. GDP 2. Composition of economy 3. Climate	\$, text describing composition of economy and climate
<b>Information-Only</b>		
<b>OPTIONAL: Information only</b>	<b>Required Data</b>	<b>Data units</b>
Recycling	1. Amount of waste recycled 2. Type of waste recycled 3. Distribution of types of waste 4. Location(s) where recycling takes place by amount	tons, % wastes, description
WindSource	1. Subscribed energy	kWh
Rooftop solar - Solar* Rewards	1. Energy production	kWh
Rooftop solar - non-Solar* Rewards (NO KWH PROVIDED)	1. Energy production	kWh
Community solar	1. Subscribed energy	kWh















































Is Data Available (Y/N)	GPC Notation Keys	Notation Keys Comments
Y	IE for industrial	Electricity data for manufacturing, industries and construction is lumped together with Commercial data as "Business" in Xcel Energy's Community Energy Report. Municipal street lights are lumped together with Commercial Electricity in Xcel Energy's Community Energy Report.
Y	IE for industrial	Natural gas data for manufacturing, industries and construction is lumped together with Commercial data as "Business" in Xcel Energy's Community Energy Report.
Y	IE for transport natural gas	Transport natural gas is lumped together with Commercial natural gas data as "Business" in Xcel Energy's Community Energy Report.
N	NO	
Y	IE	Included with Xcel Energy's 2021 Annual Community Report for "Business".
Y	IE	Included with Xcel Energy's 2021 Annual Community Report for "Business".
N	NO	There are no known sources.

N	NO	There are no known sources.
N	NO	There is no coal consumption or coal systems in the city.
Y	N/A	N/A

Is Data Available (Y/N)	GPC Notation Keys	Notation Keys Comments
Y	N/A	N/A
Y	N/A	N/A
Y	N/A	N/A
N	NO	Railways do not use electricity.
Y	N/A	Burlington Northern Santa Fe Railroad operates a railroad that travels 6.5 miles through the City of Boulder.
N	NO	There is no waterborne navigation is present.

N	NO	There is no waterborne navigation is present.
Y	IE	Included with Xcel Energy's 2016 Annual Community Report for "Business" for City and County of Denver.
Y	N/A	N/A
N	NO	There are no known significant sources.
N	NO	There are no known significant sources.

Is Data Available (Y/N)	GPC Notation Keys	Notation Keys Comments
Y	N/A	N/A
Y	N/A	N/A

Y	N/A	N/A
Is Data Available (Y/N)	GPC Notation Keys	Notation Keys Comments
Y	N/A	N/A
Y	N/A	N/A
Y	N/A	N/A
Is Data Available (Y/N)	GPC Notation Keys	Notation Keys Comments
Y	N/A	N/A
Y	N/A	N/A
Y	N/A	N/A
Y	N/A	N/A
Y	N/A	N/A















































Data Source
<p>2021 Annual Community Report by Xcel Energy for the Town of Erie <a href="https://www.xcelenergy.com/community_energy_reports">https://www.xcelenergy.com/community_energy_reports</a></p> <p>United Power</p>
<p>2021 Annual Community Report by Xcel Energy for the Town of Erie <a href="https://www.xcelenergy.com/community_energy_reports">https://www.xcelenergy.com/community_energy_reports</a></p> <p>Black Hills Energy</p>
<p>(1) Transport natural gas is provided in the 2021 Annual Community Report by Xcel Energy for the Town of Erie <a href="https://www.xcelenergy.com/working_with_us/municipalities/community_energy_reports">https://www.xcelenergy.com/working_with_us/municipalities/community_energy_reports</a>.</p> <p>(2) Stationary diesel consumption is provided in CDPHE's CACTIS.</p>
N/A
<p>2021 Annual Community Report by Xcel Energy for the Town of Erie <a href="https://www.xcelenergy.com/community_energy_reports">https://www.xcelenergy.com/community_energy_reports</a></p>
<p>2021 Annual Community Report by Xcel Energy for the Town of Erie <a href="https://www.xcelenergy.com/community_energy_reports">https://www.xcelenergy.com/community_energy_reports</a></p> <p>United Power</p>
N/A

N/A

N/A

2021 Annual Community Report by Xcel Energy for the Town of  
Erie [https://www.xcelenergy.com/community\\_energy\\_reports](https://www.xcelenergy.com/community_energy_reports)

Black Hills Energy

COGCC Website

### Data Source

Google EIE Data  
CDPHE  
CO DOR

Regional Transportation District

Atlas EV Dashboard

N/A

(1) DRCOG (2) CDOT

N/A

N/A
<p>2021 Annual Community Report by Xcel Energy for the Town of Erie <a href="https://www.xcelenergy.com/community_energy_reports">https://www.xcelenergy.com/community_energy_reports</a></p> <p>United Power</p>
(1) Erie Airport Manager (2) City and County of Denver
N/A
Erie Municipal Airport
<b>Data Source</b>
Town of Erie
Town of Erie

Town of Erie

### Data Source

US Census

US Census

US Census

### Data Source

Town of Erie

2021 Annual Community Report by Xcel Energy for the Town of Erie [https://www.xcelenergy.com/community\\_energy\\_reports](https://www.xcelenergy.com/community_energy_reports)

United Power

2022 Annual Community Report by Xcel Energy for the Town of Erie [https://www.xcelenergy.com/community\\_energy\\_reports](https://www.xcelenergy.com/community_energy_reports)

United Power

2023 Annual Community Report by Xcel Energy for the Town of Erie [https://www.xcelenergy.com/community\\_energy\\_reports](https://www.xcelenergy.com/community_energy_reports)

United Power

2024 Annual Community Report by Xcel Energy for the Town of Erie [https://www.xcelenergy.com/community\\_energy\\_reports](https://www.xcelenergy.com/community_energy_reports)

United Power















































Contact Information	Status
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com  Bill Meier bmeier@unitedpower.com	On file.
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com  Katie Fleming katie.fleming@blackhillscorp.com	On file.
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com  Katie Fleming katie.fleming@blackhillscorp.com  Adam Wozniak Inventory Unit Supervisor CDPHE adam.wozniak@state.co.us 303.692.3160	On file.
N/A	N/A
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com	On file.
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com  Bill Meier bmeier@unitedpower.com	On file.
N/A	N/A

N/A	N/A
N/A	N/A
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com  Katie Fleming katie.fleming@blackhillscorp.com	On file.
Contact Information	Status
Tom Herrod - ICLEI (Google EIE Data) tom.herrod@iclei.org  Dale Wells - CDPHE dale.wells@state.co.us  Kevin Kihn- CO DOR kevin.kihn@state.co.us	On file
Zach Van Gemert Senior Operations Analyst RTD 303.299.2830 Zachariah.VanGemert@rtd-denver.com	On file
<a href="https://atlaspolicy.com/evaluateco/">https://atlaspolicy.com/evaluateco/</a>	On file
N/A	N/A
Matthew Harrell Geographic Information Specialist Illinois EPA – Air Quality Planning 217.557.2437 matthew.harrell@illinois.gov	De minimis
N/A	N/A

N/A	N/A
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com  Bill Meier bmeier@unitedpower.com	On file.
Scott Morrissey Sustainability Manager Denver International Airport 303.342.2636  Todd Fessenden tfessenden@erieco.gov  Jason Hurd jason@vectorair.net	On file.
N/A	N/A
Todd Fessenden tfessenden@erieco.gov  Jason Hurd jason@vectorair.net	On file.
Contact Information	Status
Todd Fessenden tfessenden@erieco.gov  Tyler Kesler tkesler@erieco.gov	On file.
Jon Coyle jcoyle@erieco.gov  Bruce Chameroy bchameroy@erieco.gov	On file.

Jon Coyle jcoyle@erieco.gov	On file.
Bruce Chameroy bchameroy@erieco.gov	
Contact Information	Status
See Community Indicators tab for specific sources	On file.
Contact Information	Status
Todd Fessenden tfessenden@erieco.gov	On file.
Tyler Kesler tkesler@erieco.gov	
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com	In progress
Bill Meier bmeier@unitedpower.com	In progress
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com	
Bill Meier bmeier@unitedpower.com	In progress
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com	
Bill Meier bmeier@unitedpower.com	In progress
Tyler Carroll Community Energy Report Manager tyler.a.carroll@xcelenergy.com	
Bill Meier bmeier@unitedpower.com	







































































































































































































































































# Community Indicators

## Data Sources and Assumptions

(1) Percentage of occupied housing units and the number of people employed data on file. Data is from July 2021. Number of occupied housing units was ca

(2) The land area, population, and total number of housing units data is from t

(3) GDP is estimated using data from the U.S. Bureau of Economic Analysis for percentage of the population of Erie living in Boulder County (42%) was multipl population of Erie living in Weld County (58%) was multiplied by the total popu population, and combined for the total GDP for Erie. PDFs are on file. Data are <https://www.usinflationcalculator.com/>.

(4) Climate type is defined using the Koppen Climate Classification, which desi summary.php3?s=96427&cityname=Denver,+Colorado,+United+States+of+A

(5) Composition of the economy is defined on DATAUSA (<https://datausa.io/pr>

(6) Number of municipal buildings data were calculated from Building Detail Re

7) Commercial businesses and instututional units square footage data were pr

(8) Number of industries and Number of commerical businesses & institutions and Weld Counties, then scaled to Erie population and combined.

(9) HDD and CDD data is available for zip code 80026 (assumed to be repre

(10) Data on 2021 sales taxes collected are drawn from Town of Erie's Annual on file. Total retail sales are calculated from total sales taxes and the sales tax

## Community Indicators and Corresponding Values

### Community Indicator

Land area (mi<sup>2</sup>)

Resident population

Number of housing units

Number of commercial businesses and institutions

GDP

Composition of economy

Climate

Number of occupied housing units / households

Number of municipal buildings

Number of industries

Commercial businesses and institutional units area (sq. ft.)

Number of people employed in the city
Heating degree days
Cooling degree days
Sales taxes
Retail sales












































*the Town of Erie 2021 Community Profile: <https://www.erieco.gov/ArchiveCenter/ViewFile/Item/100>*

*r 2020 (most recent): <https://www.bea.gov/sites/default/files/2021-12/lagdp>.  
plied by the total population of Erie. This number is assumed to be the number  
ulation of Erie. This number is assumed to be the number of people living in  
calculations on file. GDP values are reported in 2020 dollars and are updated*

ignates a classification of BSk: <https://www.weatherbase.com/weather/weat/america>.

*profile/geo/erie-co#economy) under the section titled 'Economy.' Screenshot of reports provided by the Town of Erie. PDF and spreadsheet on file.*

provided by Stavan Vanscoy. Spreadsheet on file.

*are from the US Census County Business Patterns chart for 2020: [https://da](https://data.census.gov/tables//2020/states/tx/cb20-01)*

ntative of the Town) from [www.weatherdatadepot.com](http://www.weatherdatadepot.com) using 65 degrees Fa

*Comprehensive Financial Report, table titled 'Principal Sales Taxpayers' on page 118 and the effective tax rate (on page 119 of the same report).*

	Value
	20.55
	30,038
	10,125
	889
	\$2,527,420,745.61
Professional, Scientific, & Technical Services; Health Care & Social Assistance; Manufacturing; Educational Services; and Retail Trade	
Semi-arid, with low humidity	
	8,647
	79
	1
	1,860,686



22,078
5,753
816
\$17,397,657
\$497,075,914































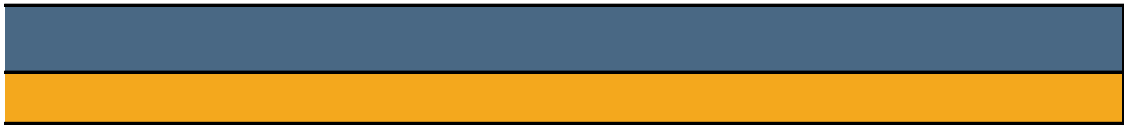












*us.gov/quickfacts/fact/table/erietowncolorado,US/PST045221. Screenshots of housing percentage.*

*enter/ViewFile/Item/3121. PDF of data on file.*

*1221.pdf. These data are at the county level. To estimate Erie's GDP, the number of people living in Erie and Boulder County. The percentage of the Erie and Weld County. GDP was then scaled for each county based on and to 2021 dollars using the inflation estimator at*

*her-*

*on file.*

*ta.census.gov/cedsci/table. Screenshots on file. Data were taken from Boulder*

*ahrenheit as the balance point temperature.*

*page 120: <https://www.erieco.gov/ArchiveCenter/ViewFile/Item/3134>. PDF is*















































































































































































































































































# Conversion Factors and Global Warming Potentials

## Constants

Unit	Value
2,204.62	lbs.
2,000.00	lbs.
1,000.00	kWh
1,000.00	kg
1,000,000	g
0.1000	MMBtu of natural gas
0.1385	MMBtu of distillate fuel

## Global Warming Potentials

Common Name	Formula
Carbon dioxide	CO <sub>2</sub>
Methane	CH <sub>4</sub>
Nitrous oxide	N <sub>2</sub> O
Refrigerants	R-134A











































Unit
1
1
1
1
1
1
1
GWP
1
29.8
273
1300













































<b>Value</b>
metric ton
US ton
MWh
metric ton
metric ton
therm
gal diesel
<b>Source</b>
IPCC AR6: <a href="https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf">https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf</a>





































































































































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# Stationary Energy Data

## Emissions Summary

Scope 1
Scope 2
Scope 3
<b>Total (Scope 1 and Scope 2)</b>
Information-Only Avoided Emissions

## Data Sources and Assumptions

- (1) Data on electricity and natural gas consumption was provided in Xcel Energy's Commu
- (2) The Town of Erie also receives electricity from United Power. This data was provided in
- (3) Additional natural gas for the Town of Erie is supplied by Black Hills Energy. Spreadhse
- (4) Electricity consumed by electric vehicles was removed from the stationary totals; it was commercial electricity total, as they are accounted for in the on-road tab.
- (5) Data on the use of stationary diesel was provided by Adam Wozniak with the Colorado within the community. Because sources are only required to report their use every five yea
- (6) Data on propane use was provided by Matt Hanson with FerrellGas. AmeriGas was unr
- (7) Note that the natural gas CO2 emissions factor provided in Xcel's CER is different from
- (8) The 2021 Xcel CER provided renewable energy content for Erie.
- (9) Transmission and Distribution losses were calculated by using 2020 Colorado specific E.
- (10) United Power was unable to provide renewable energy data.

## Emission Factors

### Electricity

#### Utility

Xcel Energy

United Power

Various

Various

### Natural Gas

#### Utility

Xcel Energy

Xcel Energy

Xcel Energy



<b>Diesel</b>
<b>Utility</b>
Various
Various
Various
<b>Propane</b>
<b>Greenhouse Gas</b>
CO <sub>2</sub>
CH <sub>4</sub>
N <sub>2</sub> O

<b>Data Calculations</b>
<b>Utility Data</b>
<b>Electricity</b>
Commercial and Industrial
Residential
Street Lighting - Metered
Street Lighting - Non-Metered/Xcel-Owned
Irrigation Sales
Oil Wells
<b>Total Electricity</b>
<b>Natural Gas</b>
Commercial and Industrial
Residential
<b>Total Natural Gas</b>
<b>Propane</b>
Commercial and Industrial
Residential

<b>Total Propane</b>
<b>Stationary Diesel</b>
Commercial and Industrial
<b>Total Diesel</b>
<b>Transmission and Distribution Losses</b>
Transmission and Distribution Losses
<b>Total</b>
Commercial and Industrial
Residential
<b>Total Losses</b>
<b>Information-Only Renewable Energy</b>
<b>Xcel Windsource/RECs Retained by the Customer</b>
Commercial and Industrial
Residential
<b>Total RECs (Windsource)</b>
<b>Xcel Renewable*Connect/RECs Retained by the Customer</b>
Commercial and Industrial
Residential
<b>Total Renewable*Connect</b>
<b>On-site Solar (Solar Rewards)/RECs owned by Utility</b>
Commercial and Industrial
Residential
<b>Total Solar Rewards</b>
<b>On-site Solar (non-solar Rewards)/RECs Retained by Customer</b>
Commercial and Industrial
Residential
<b>Total On-Site Solar</b>
<b>Community Solar/RECs owned by Utility</b>

Commercial and Industrial
Residential
<b>Total Solar Gardens</b>
<b>Total Information-Only Renewable Energy Avoided Emissions from Customer Owned RECs</b>
<b>Total Information-Only Renewable Energy Avoided Emissions from Utility Owned RECs</b>
<b>Total Information-Only Renewable Energy Avoided Emissions</b>













































51,201	
86,565	
4,640	
<b>142,406</b>	
(6,731)	

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nity Energy Report (CER) for 2021 for the Town of Erie. Xcel provide  
 n United Power's 2021 Franchise Report for the Town of Erie. PDF is  
 et is on file. Black Hills Energy reports residential and commercial/ir  
 s assumed that electricity consumed by electric vehicles was metered

Department of Public Health and the Environment. Spreadsheet is c  
 rs, this value may not represent the exact usage of stationary diese

esponsive to data requests after multiple attempts. PDF on file.

ICLEI's values used in ClearPath. The value used for calculations be

IA data (<https://www.eia.gov/electricity/state/colorado/>) and taking

Greenhouse Gas	Value	Units
CO <sub>2</sub>	0.470	mt CO <sub>2</sub> /MWh
CO <sub>2</sub>	0.712	mt CO <sub>2</sub> /MWh
CH <sub>4</sub>	0.0000531	mt CH <sub>4</sub> /MWh
N <sub>2</sub> O	0.0000077	mt N <sub>2</sub> O/MWh

Greenhouse Gas	Value	Units
CO <sub>2</sub>	0.0052	mt CO <sub>2</sub> /th
CH <sub>4</sub>	0.0000005	mt CH <sub>4</sub> /th
N <sub>2</sub> O	0.00000001	mt N <sub>2</sub> O/th



Greenhouse Gas	Value	Units
CO <sub>2</sub>	0.010243	mt CO <sub>2</sub> /gal
CH <sub>4</sub>	0.00000040	mt CH <sub>4</sub> /gal
N <sub>2</sub> O	0.000000100	mt N <sub>2</sub> O/gal

Value	Units	ICEL's U.S. Commit Emissions (Com Activities and Sour Note: CO2 emissior
0.00559	mt CO <sub>2</sub> /gal	
0.0000010	mt CH <sub>4</sub> /gal	
0.0000001	mt N <sub>2</sub> O/gal	

Electricity Provided by United Power (kWh)	Electricity Provided by Xcel Energy (kWh)	Total Electricity Minus EVs(kWh)
15,534,170	20,327,389	35,562,645
59,057,670	51,064,916	108,428,740
N/A	6,928	6,928
N/A	460,773	460,773
154,193	N/A	154,193
624,858	N/A	624,858
<b>75,370,891</b>	<b>71,860,006</b>	<b>145,238,137</b>
Natural Gas Provided by Black Hills Energy (th)	Natural Gas Provided by Xcel Energy (th)	Emissions (mt CO <sub>2</sub> )
N/A	1,013,206	5,269
1,005,108	7,718,075	45,361
<b>1,005,108</b>	<b>8,731,281</b>	<b>50,629</b>
Ferrell Gas (gal)	AmeriGas (gal)	Total Consumption (Gal)
18,961	N/A	18,961
1,560	N/A	1,560

<b>20,521</b>	<b>0</b>	<b>20,521</b>
<b>Total Consumption (gal)</b>	<b>Emissions (mt CO2)</b>	<b>Emissions (mt CH4)</b>
29,383	301	0.01
<b>29,383</b>	<b>301</b>	<b>0.01</b>
5.28%		
<b>Total Electricity (kWh)</b>	<b>Total Electricity Minus EVs (kWh)</b>	<b>Emissions (mt CO2)</b>
1,958,577	1,942,800	1,128
5,812,270	5,722,869	3,483
<b>7,770,847</b>	<b>7,665,669</b>	<b>4,612</b>

<b>Electricity Provided by Xcel Energy (kWh)</b>	<b>Emissions (mt CO2)</b>	<b>Emissions (mt CH4)</b>
113,702	53	0.006
1,487,271	699	0.08
<b>1,600,973</b>	<b>752</b>	<b>0.08</b>
<b>Electricity Provided by Xcel Energy (kWh)</b>	<b>Emissions (mt CO2)</b>	<b>Emissions (mt CH4)</b>
0	0	0
67,897	32	0.004
<b>67,897</b>	<b>32</b>	<b>0.004</b>
<b>Electricity Provided by Xcel Energy (kWh)</b>	<b>Emissions (mt CO2)</b>	<b>Emissions (mt CH4)</b>
2,416,578	1,136	0.1
6,056,040	2,846	0.3
<b>8,472,618</b>	<b>3,982</b>	<b>0.4</b>
<b>Electricity Provided by Xcel Energy (kW)</b>	<b>Calculated Electricity Provided by Xcel Energy (kWh)</b>	<b>Emissions (mt CO2)</b>
19	0	0
3,913	4,012,347	1,886
<b>3,933</b>	<b>4,012,347</b>	<b>1,886</b>
<b>Electricity Provided by Xcel Energy (kWh)</b>	<b>Emissions (mt CO2)</b>	<b>Emissions (mt CH4)</b>

0	0	0
57,013	27	0.003
<b>57,013</b>	<b>27</b>	<b>0.003</b>
<b>5,681,217</b>	<b>2,670</b>	<b>0.3</b>
<b>8,529,631</b>	<b>4,009</b>	<b>0.5</b>
<b>14,210,848</b>	<b>6,679</b>	<b>1</b>















































as CERs on an annual basis. Spreadsheet is on file. Xcel Energy combines commercial and industrial natural gas usage as one value. In this inventory, this value is reported under 'residential' at an adjacent building. Commercial electricity includes electricity consumed by electric vehicles. Information on file. Stationary diesel use data reported by CDPHE represents the last 12 months of reporting in the inventory year, but is assumed to be a very close approximation of total use in the inventory year. Information on file. Stationary diesel use data reported by CDPHE represents the last 12 months of reporting in the inventory year, but is assumed to be a very close approximation of total use in the inventory year. Information on file. Stationary diesel use data reported by CDPHE represents the last 12 months of reporting in the inventory year, but is assumed to be a very close approximation of total use in the inventory year. Information on file.

Industrial natural gas usage as one value. In this inventory, this value is reported under 'residential' at an adjacent building. Commercial electricity includes electricity consumed by electric vehicles. Information on file. Stationary diesel use data reported by CDPHE represents the last 12 months of reporting in the inventory year, but is assumed to be a very close approximation of total use in the inventory year. Information on file.

Information on file. Stationary diesel use data reported by CDPHE represents the last 12 months of reporting in the inventory year, but is assumed to be a very close approximation of total use in the inventory year. Information on file.

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Information on file. Stationary diesel use data reported by CDPHE represents the last 12 months of reporting in the inventory year, but is assumed to be a very close approximation of total use in the inventory year. Information on file.



Source
Provided in Xcel Energy's 2021 Community Energy Report for Erie <a href="https://www.xcelenergy.com/community_energy_reports">https://www.xcelenergy.com/community_energy_reports</a>
Tri-State's Carbon Rate 2021: 1,570 lb/MWh. PDF on file. Pounds converted to metric tons using unit conversions.
EPA's eGrid: eGRID 2021 summary tables, table 1, sub region RMPA. <a href="https://www.epa.gov/sites/default/files/2021-02/documents/egrid2021_summary_tables.pdf">https://www.epa.gov/sites/default/files/2021-02/documents/egrid2021_summary_tables.pdf</a> .

Source
ICLEI's U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) – Appendix C: Built Environment Emission Activities and Sources, Version 1.1, July 2013: <a href="http://icleiusa.org/ghg-protocols/">http://icleiusa.org/ghg-protocols/</a> .



Source
ICLEI'S U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) – Appendix C: Built Environment Emission Activities and Sources, Version 1.1, July 2013: <a href="http://icleiusa.org/ghg-protocols/">http://icleiusa.org/ghg-protocols/</a> . Assumes distillate fuel oil number 2 and that diesel is primarily

Source
Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) – Appendix C: Built Environment Emission Activities and Sources, Version 1.1, July 2013: <a href="http://icleiusa.org/ghg-protocols/">http://icleiusa.org/ghg-protocols/</a> . Conversion factors was provided directly from Tom Herrod via email. On file

Emissions (mt CO2)	Emissions (mt CH4)
20,403	2
64,851	6
3	0.0004
217	0.02
110	0.01
445	0.03
<b>86,029</b>	<b>8</b>
Emissions (mt CH4)	Emissions (mt N2O)
0.5	0.01
3.9	0.08
<b>4</b>	<b>0.09</b>
Emissions (mt CO2)	Emissions (mt CH4)
106	0.019
9	0.002

<b>115</b>	<b>0.021</b>
<b>Emissions (mt N2O)</b>	<b>Emissions (mt CO2e)</b>
0.003	302
<b>0.003</b>	<b>302</b>

<b>Emissions (mt CH4)</b>	<b>Emissions (N2O)</b>
0.10	0.01
0.30	0.04
<b>0.41</b>	<b>0.06</b>

<b>Emissions (mt N2O)</b>	<b>Emissions (mt CO2e)</b>
0.001	54
0.01	705
<b>0.01</b>	<b>758</b>
<b>Emissions (mt N2O)</b>	<b>Emissions (mt CO2e)</b>
0	0
0.001	32
<b>0.001</b>	<b>32</b>
<b>Emissions (mt N2O)</b>	<b>Emissions (mt CO2e)</b>
0.02	1,145
0.05	2,869
<b>0.07</b>	<b>4,013</b>
<b>Emissions (mt CH4)</b>	<b>Emissions (mt N2O)</b>
0	0
0.2	0.03
<b>0.2</b>	<b>0.03</b>
<b>Emissions (mt N2O)</b>	<b>Emissions (mt CO2e)</b>

0	0
0.0004	27
<b>0.0004</b>	<b>27</b>
<b>0.04</b>	<b>2,691</b>
<b>0.1</b>	<b>4,040</b>
<b>0.1</b>	<b>6,731</b>















































*dustrial classes if minimum aggregation*

*tential.'*

*hicles; this value was subtracted from the*

*ted stationary diesel use from sources  
inventory year.*





Emissions (mt N2O)	Emissions (mt CO2e)
0.3	20,535
0.8	65,251
0.0001	3
0.004	218
0.001	110
0.005	447
<b>1</b>	<b>86,565</b>
Emissions (mt CO2e)	
5,287	
45,497	
<b>50,783</b>	
Emissions (mt N2O)	Emissions (mt CO2e)
0.002	107
0.0002	9

<b>0.002</b>	<b>116</b>
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<b>Emissions (mt CO2e)</b>
1,136
3,504
<b>4,640</b>

<b>Emissions (mt CO2e)</b>
0
1,901
<b>1,901</b>

















































































































































































































# Fugitive Emissions

## Emissions Summary

Scope 1	40,292	
Scope 2	N/A	
Scope 3	N/A	
<b>Total</b>	<b>40,292</b>	

## Data Sources and Assumptions

- (1) Data on active oil and gas wells in Erie is from the Colorado Oil and Gas Information System (COGIS) specifically for Erie. Data for barrels of oil produced also comes from COGIS. Data is found in the "Well\_Production\_Boulder\_Weld\_Totals2021" spreadsheet was used to match active wells with barrels produced.
- (2) Per data from COGIS, there are no natural gas gathering or transmission pipelines, gas processing facilities, or LNG storage facilities in the area.
- (3) Based off information in a report by CO Energy Office, the leakage rate for natural gas assumes a 0.0001% leakage rate system, which is calculated from the amount consumed and the leakage rate. Spreadsheet on file.
- (4) Assume that the density of natural gas is 0.8 kg per cubic meter and that natural gas is 93.4% methane.

## Emission Factors

### Fugitive and Process Emissions: Production Emissions from Natural Gas Wells

Greenhouse Gas	Value	Units
CH <sub>4</sub>	10.62	mt CH <sub>4</sub> /active well

### Fugitive and Process Emissions: Transmission Emissions from Natural Gas Wells

Greenhouse Gas	Value	Units
CH <sub>4</sub>	0.40	mt CH <sub>4</sub> /miles of gathering
CH <sub>4</sub>	1,250	mt CH <sub>4</sub> /number of gas processing
CH <sub>4</sub>	1,185	mt CH <sub>4</sub> /number of LNG storage
CH <sub>4</sub>	0.62	mt CH <sub>4</sub> /miles of transmission
CH <sub>4</sub>	983.7	mt CH <sub>4</sub> /number of gas transmission
CH <sub>4</sub>	964.2	mt CH <sub>4</sub> /number of gas storage

### Fugitive and Process Emissions: Venting/Flaring Emissions from Natural Gas Wells

Greenhouse Gas	Value	Units
CH <sub>4</sub>	54.71	mt CH <sub>4</sub> /million BTU of natural gas

### Fugitive and Process Emissions: Oil Wells

Greenhouse Gas	Value	Units
CH <sub>4</sub>	439.43	kg CH <sub>4</sub> /1000 barrel
CH <sub>4</sub>	6.26	kg CH <sub>4</sub> /1000 barrels
CH <sub>4</sub>	3.85	kg CH <sub>4</sub> /1000 barrels



## Data Calculations

### Leakage Rate for Natural Gas Distribution

Source	Total Therms	Leakage Rate
Commercial and Industrial	1,013,206	0.30%
Residential	8,723,183	0.30%
<b>Total</b>	<b>9,736,389</b>	

### Oil and Gas Wells

Source	Value
Oil produced (barrels)	14,967
Natural gas wells (number of wells)	121
Number of miles of natural gas gathering pipeline	0
Number of miles of natural gas transmission pipeline	0
Number of gas processing plants	0
Number of LNG storage compressor stations	0
Number of gas transmission compressor stations	0
Number of gas storage compressor stations	0
Million BTU of natural gas vented and flared	0

### Natural Gas Production, Transmission, and Venting/Flaring

Source	Emissions (mt CH4)	Emissions (mt CO2e)
Natural gas production	1,285	38,294
Natural gas transmission	0	0
Natural gas venting & flaring	0	0
<b>Total</b>	<b>1,285</b>	<b>38,294</b>

### Emissions from Oil Wells

Source	Emissions (mt CH4)	Emissions (mt CO2e)
Oil production	7	196
Oil refining	0	3
Oil transportation	0	2
<b>Total</b>	<b>7</b>	<b>201</b>
















































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COGIS) available at <https://cogcc.state.co.us/data.html#/cogis>. Data are pulled from Boulder and "FacilitySearch\_1042022\_ErieOil&GasFacilities" spreadsheet. This spreadsheet lists active wells. T

arrels of oil produced. Both spreadsheets on file.  
 ssing plants, or compressor stations in Erie. Natural gas is not vented or flared in Erie. Reports fro  
 es a 0.3% leakage in the distribution system. Fugitive emissions are based off an assumption of ti  
 and report here - <https://energyoffice.colorado.gov/climate-energy/ghg-pollution-reduction-roadr>  
 6 methane and 1% carbon dioxide.

Source
EPA's State Inventory Tool Emissions from Natural Gas and Oil Systems for <a href="https://www.epa.gov/statelocalenergy/download-state-inventory-and-proje">https://www.epa.gov/statelocalenergy/download-state-inventory-and-proje</a>

S	Source
ering pipeline	EPA's State Inventory Tool Emissions from Natural Gas and Oil <a href="https://www.epa.gov/statelocalenergy/download-state-invent">https://www.epa.gov/statelocalenergy/download-state-invent</a>
rocessing plants	
je compressor stations	
nission pipeline	
sion compressor stations	
e compressor stations	

ells	Source
gas vented and flared	EPA's State Inventory Tool Emissions from Natural Gas and Oil <a href="https://www.epa.gov/statelocalenergy/download-state-invent">https://www.epa.gov/statelocalenergy/download-state-invent</a>

	Source
ls produced	EPA's State Inventory Tool Emissions from Natural Gas and Oil <a href="https://www.epa.gov/statelocalenergy/download-state-invent">https://www.epa.gov/statelocalenergy/download-state-invent</a>
els refined	
: transported	

Emissions (mt CO2)	Emissions (mt CH4)	Emissions (mt N2O)
0.1	6	0
1	54	0
<b>1</b>	<b>60</b>	<b>0</b>

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*' Weld counties and filtered  
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*m COGIS on file.  
he amount supplied to the  
map.*




Colorado:  
ection-tool



Systems for Colorado:  
ory-and-projection-tool



Systems for Colorado:  
ory-and-projection-tool



Systems for Colorado:  
ory-and-projection-tool

Emissions (mt CO2e)
187
1,611
1,798

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# On-Road Data

## Emissions Summary

Scope 1	21,968
Scope 2	1,533
Scope 3	76
<b>Total</b>	<b>23,576</b>

## Data Sources and Assumptions

- (1) VMT data was provided by Dale Wells with the Colorado Department of Public Health and Environm
- (2) 2021 VMT from Google EIE was provided at the Boulder County level. CDPHE VMT data is for 2020.
- (3) Assumptions: a) 10% ethanol in gasoline; b) 0% biodiesel in diesel.
- (4) Vehicle efficiencies are from the EPA state inventory tool (on file).
- (5) Electric vehicle data were found on Atlas Public Policy's EValuateCO dashboard: <https://atlaspolicy.c>
- (6) Vehicle registrations by County was provided by Kevin Kihn with the Colorado Department of Reven
- (7) Based on a report by the Idaho National Laboratory titled Plugged In: How Americans Charge Their
- (8) Electric vehicle fuel efficiency from the U.S. DOE: [http://www.afdc.energy.gov/fuels/electricity\\_char](http://www.afdc.energy.gov/fuels/electricity_char)
- (9) Per email from Mike Salisbury, City and County of Denver, VMT for EVs is estimated around 7,000 n
- (10) Transmission and Distribution losses were calculated by using Colorado specific EIA data (<https://v>

## Emission Factors

### Electricity

Utility	Greenhouse Gas	Value	Units
Xcel Energy	CO <sub>2</sub>	0.470	mt CO <sub>2</sub> /MWh
United Power	CO <sub>2</sub>	0.712	mt CO <sub>2</sub> /MWh
Various	CH <sub>4</sub>	0.0001230	mt CH <sub>4</sub> /MWh
Various	N <sub>2</sub> O	0.0000180	mt N <sub>2</sub> O/MWh

### Gasoline

Greenhouse Gas	Vehicle Type	Value	Units
CO <sub>2</sub>	All	0.00878	mt CO <sub>2</sub> /gal
CH <sub>4</sub>	Passenger Vehicle	0.01730	g CH <sub>4</sub> /mile
CH <sub>4</sub>	Light Truck	0.01630	g CH <sub>4</sub> /mile
CH <sub>4</sub>	Heavy Vehicle	0.03330	g CH <sub>4</sub> /mile
CH <sub>4</sub>	Motorcycle	0.06720	g CH <sub>4</sub> /mile
N <sub>2</sub> O	Passenger Vehicle	0.00360	g N <sub>2</sub> O/mile
N <sub>2</sub> O	Light Truck	0.00660	g N <sub>2</sub> O/mile
N <sub>2</sub> O	Heavy Vehicle	0.01340	g N <sub>2</sub> O/mile
N <sub>2</sub> O	Motorcycle	0.00690	g N <sub>2</sub> O/mile

### Diesel

Greenhouse Gas	Vehicle Type	Value	Units
CO <sub>2</sub>	All	0.010210	mt CO <sub>2</sub> /gal
CH <sub>4</sub>	Passenger Vehicle	0.000500	g CH <sub>4</sub> /mile
CH <sub>4</sub>	Light Truck	0.001000	g CH <sub>4</sub> /mile
CH <sub>4</sub>	Heavy Truck	0.005100	g CH <sub>4</sub> /mile
CH <sub>4</sub>	Heavy Vehicle (Bus)	0.005100	g CH <sub>4</sub> /mile

N <sub>2</sub> O	Passenger Vehicle	0.001000	g N <sub>2</sub> O/mile
N <sub>2</sub> O	Light Truck	0.001500	g N <sub>2</sub> O/mile
N <sub>2</sub> O	Heavy Truck	0.004800	g N <sub>2</sub> O/mile
N <sub>2</sub> O	Heavy Vehicle (Bus)	0.004800	g N <sub>2</sub> O/mile

### Ethanol

Greenhouse Gas	Vehicle Type	Value	Units
CO <sub>2</sub>	All	0.006	mt CO <sub>2</sub> /gal
CH <sub>4</sub>	Light Duty	0.055	g CH <sub>4</sub> /mile
CH <sub>4</sub>	Heavy Duty/Buses	0.197	g CH <sub>4</sub> /mile
N <sub>2</sub> O	Light Duty	0.067	g N <sub>2</sub> O/mile
N <sub>2</sub> O	Heavy Duty/Buses	0.175	g N <sub>2</sub> O/mile

### Data Calculations

#### Gasoline, Diesel, and Ethanol Vehicles

Source	Emissions from Gasoline (mt CO <sub>2</sub> )	Emissions from Gasoline (mt CH <sub>4</sub> )	Emissions from Gasoline (mt N <sub>2</sub> O)
On-road vehicles	18,275	0.78	0.22

#### Fuel Additives

Percent of ethanol in gasoline	10%
Percent of biodiesel in diesel	0%

Source	Gas cars	Gas light trucks	Gas Single Unit trucks
Community VMT	22,147,849	20,673,527	213,046
Gallons of fuel	918,998	1,117,488	30,134

Year	Total Annual VMT	Total Annual VMT with EV VMT Removed	VMT by Gasoline
2021	53,935,129	53,935,129	43,773,219

Fuel Spread by Vehicle Type	% Diesel	% Gasoline	Total
Motorcycle	0.00%	100.00%	100%
Passenger Car	7.75%	92.25%	100%
Light Duty	7.75%	92.25%	100%
Bus	100.00%	0.00%	100%
Single Unit Truck	50.00%	50.00%	100%
Combination Unit Truck	100.00%	0.00%	100%

Vehicle Type	MPG
Gas cars	24.10

Gas light trucks	18.50
Diesel cars	32.40
Diesel light trucks	22.10
Diesel combo trucks	6.59
Gas single unit truck	7.07
Diesel single unit trucks	6.59
Diesel bus (paratransit)	7.69
Gas motorcycle	50.00

CDPHE Vehicle Miles Traveled			
	Motorcycle (HPMS ID - 10)	Passenger Car (HPMS ID - 20)	Light Truck (HPMS ID - 30)
Daily VMT	2,249	73,084	68,219
Annual VMT	820,886	26,675,480	24,899,767
<b>% VMT</b>	<b>1.5%</b>	<b>49.5%</b>	<b>46.2%</b>

Registered Vehicles	Gas	Other Vehicle Types	Diesel
Boulder County Number of Vehicles	229,361	24	8,174
Town of Erie Number of Vehicles	9,288	1	331
Weld County Number of Vehicles	277,169	156	34,190
Town of Erie Number of Vehicles	14,950	8	1,844
<b>TOTAL</b>	<b>24,238</b>	<b>9</b>	<b>2,175</b>
Percent Boulder County Vehicles Allocated to Erie	4.05%	Percent Weld County Vehicles Allocated to Erie	5.39%
Estimated electric consumption of battery electric vehicle (kWh/mile)	0.34		% Charging at Home
Estimated electric consumption of plug-in hybrid electric vehicle (kWh/mile)	0.70		% Charging at Commercial Stations

Source	Emissions (mt CO2)	Emissions (mt CH4)	Emissions (mt N2O)
Boulder County Erie Electric Vehicles	0	0.00	0.00
Weld County Erie Electric Vehicles	1,419	0.25	0.036
<b>Total</b>	<b>1,419</b>	<b>0.2</b>	<b>0.04</b>

Source	Estimated Number of Electric Vehicles	Average VMT per Vehicle	Total Electricity Consumption from Battery Electric Vehicles (kWh)
Boulder County Erie Electric Vehicles	0	7,000	0
Weld County Erie Electric Vehicles	512	7,000	1,218,560















































ent and through Google EIE data provided by Tom Herrod with ICLEI. Dale also provided daily travel br  
Erie's proportion of Boulder County's 2020 VMT data was applied to the 2021 Google EIE VMT data and

om/evaluateco/. Screenshots on file. Data was filtered for Erie's zip code (80516).  
ue. The electric vehicle data provided by Kevin Kihn groups plug-in hybrid electric vehicles (PHEVs) and :  
Electric Vehicles (<https://avt.inl.gov/sites/default/files/pdf/arra/PluggedInSummaryReport.pdf>), 85% of l  
ging\_home.html. Hybrid electric vehicle fuel efficiency from: <http://www.mdpi.com/1996-1073/4/3/435/>  
niles per year. Email on file.  
[www.eia.gov/electricity/state/colorado/](http://www.eia.gov/electricity/state/colorado/)) and taking estimated losses divided by total supply for Colorado e

Source
Provided in Xcel Energy's 2021 Community Energy Report for Erie. <a href="https://www.xcelenergy.com/community_energy_reports">https://www.xcelenergy.com/community_energy_reports</a>
Tri-State's Carbon Rate 2021: 1,570 lb/MWh. PDF on file. Pounds converted to metric tons using unit co
EPA's eGrid: eGRID 2018 summary tables, table 1, sub region RMPA. <a href="https://www.epa.gov/sites/production/files/2019/03/documents/egrid2018_summary_tables.pdf">https://www.epa.gov/sites/production/files/2019/03/documents/egrid2018_summary_tables.pdf</a> .

Source
Updated using EPA estimates as recommended by ICLEI ( <a href="https://www.epa.gov/sites/production/files/2019/03/documents/emission-factors_mar_2018_0.pdf">https://www.epa.gov/sites/production/files/2019/03/documents/emission-factors_mar_2018_0.pdf</a> ). Based on vehicles that are 2008 to present or 2009 to Past years utilized ICLEI Appendix D numbers.

Source
Updated using EPA estimates as recommended by ICLEI ( <a href="https://www.epa.gov/sites/production/files/2019/03/documents/emission-factors_mar_2018_0.pdf">https://www.epa.gov/sites/production/files/2019/03/documents/emission-factors_mar_2018_0.pdf</a> ). Based on vehicles that are 1996 to present. Past year

ICLEI Appendix D numbers.

Source
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Updated using EPA estimates as recommended by ICLEI ([https://www.epa.gov/sites/production/files/2003/documents/emission-factors\\_mar\\_2018\\_0.pdf](https://www.epa.gov/sites/production/files/2003/documents/emission-factors_mar_2018_0.pdf)). Past years utilized ICLEI Appendix D numbers.

Emissions from Gasoline (mt CO2e)	Emissions from Diesel (mt CO2)	Emissions from Diesel (mt CH4)	Emissions from Diesel (mt N2O)	Emissions from Diesel (mt CO2e)
18,359	3,507	0.01	0.01	3,511

Gas motorcycle	Diesel cars	Diesel light trucks	Diesel Single Unit trucks	Diesel Combination Trucks
738,797	2,066,760	1,929,181	236,718	827,517
14,776	63,789	87,293	35,921	125,572

VMT by Diesel	VMT by Ethanol	Gasoline Consumed (gal)	Diesel Consumed (gal)	Ethanol Consumed (gal)
5,298,219	4,863,691	2,081,396	343,529	231,266

aveled			
Bus (HPMS ID - 40)	Single Unit Truck (HPMS ID - 50)	Combinati on Unit Truck (HPMS ID - 60)	Total
652	1,297	2,267	<b>147,767</b>
238,044	473,435	827,517	<b>53,935,129</b>
<b>0.4%</b>	<b>0.9%</b>	<b>1.5%</b>	<b>100%</b>

Ethanol / Gas	Plug-in Hybrid	Standard Hybrid	Electric	Butane / Gas
2,323		12,030	5,881	82
94	0	487	0	3
5,771		4,774	1,207	64
311		258	512	3
<b>405</b>	<b>158</b>	<b>745</b>	<b>512</b>	<b>7</b>

85%		Transmission & Distribution Losses	5.28%
15%			

Emissions (mt CO2e)
0
1,533
<b>1,533</b>

Total
Residential - Xcel
Residential - UP
Commercial - Xcel
Commercial - UP
<b>Total</b>

Total Electricity Consumption from Plug-In Hybrid Electric Vehicles (kWh)	Total Residential Electricity Consumption (kWh)	Total Commercial Electricity Consumption (kWh)
0	0	0
774,200	1,693,846	298,914











































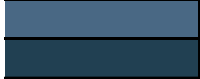




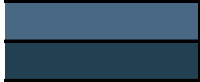
broken out by vehicle type. Email on file. HPMS vehicle type definitions are doubled as Erie is split nearly 50/50 between Boulder County and Weld

standard hybrids into the same category (called Electric/Gas). To identify EV charging is assumed to occur at residences, while 15% of charging is pdf.

electricity. Information on file.



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tion/files/2020-



18-  
o present.



18-  
rs utilized

18-

Emissions from Ethanol (mt CO2)	Emissions from Ethanol (mt CH4)	Emissions from Ethanol (mt N2O)	Emissions from Ethanol (mt CO2e)	Emissions from Ethanol (mt CO2(b))	Total Emissions (Biogenic mt CO <sub>2</sub> )
0	0.27	0.33	98	1,330	1,330

Diesel Buses	Ethanol passenger cars	Ethanol light trucks	Ethanol Single Unit trucks	Ethanol Motorcycle
238,044	2,460,872	2,297,059	23,672	82,089
30,955	102,111	124,165	3,348	1,642

Bio Diesel	Electric / Diesel	Propane	Natural Gas	Propane / Gas	Ethanol
32	5	79	74	8	4
1	0	3	3	0	0
27	3	8	142	10	5
1	0	0	8	1	0
<b>3</b>	<b>0</b>	<b>4</b>	<b>11</b>	<b>1</b>	<b>0</b>



Electricity (kWh)	Emissions (mt CO2)	Emissions (mt CH4)	Emissions (N2O)	Emissions (mt CO2e)
0	0	0.000	0.000	0
89,401	64	0.011	0.0016	64
0	0	0.000	0.0000	0
15,777	11	0.0019	0.00028	11
<b>105,178</b>	<b>75</b>	<b>0.01</b>	<b>0.002</b>	<b>76</b>

















































Total Emissions (Fossil Fuel mt CO <sub>2</sub> )	Total Emissions (mt CH <sub>4</sub> )	Total Emissions (mt N <sub>2</sub> O)	Total Emissions (mt CO <sub>2</sub> e)
21,782	1.06	0.56	21,968

Total
258,077
10,213
323,526
17,897
28,110













































































































































































































































































































































































# Aviation Data

## Emissions Summary

Scope 1	1,325
Scope 2	N/A
Scope 3	30,150
<b>Total with Total Fuel</b>	<b>31,475</b>

## Data Sources and Assumptions

- (1) DEN fuel use data was provided in an email from Scott Morrissey, Senior Vice Presic
- (2) The proportion of aviation activity attributed to Erie in the past Boulder County inve
- (3) There is current debate related to CH4 emissions from jet fuel as it has been recent
- (4) Erie Municipal Airport local/itinerant breakdown found at: <http://www.airnav.com/ai>
- (5) Erie Municipal Airport data for fuel usage and jet fuel-aviation gas split received from

## Emission Factors

Jet Fuel	
Greenhouse Gas	Value
CO <sub>2</sub>	0.0098
CH <sub>4</sub>	0
N <sub>2</sub> O	0.0000003
Aviation Gasoline	
Greenhouse Gas	Value
CO <sub>2</sub>	0.0083
CH <sub>4</sub>	0.0000007
N <sub>2</sub> O	0.0000001

## Data Calculations

Aviation Emissions	
Source	Emissions (mt CO <sub>2</sub> )
Erie Municipal Airport (In-Boundary)	1,305
Denver International Airport (Transboundary)	29,899

% of DEN Emissions Attributable to Erie	0.77%
Total fuel used at Erie Municipal Airport	141,187
Total Jet Fuel Used at DEN	397,856,725
Total Aviation Gas Used at DEN	3,911
Transboundary Aviation	Local/Itinerant
Erie Municipal Airport	Itinerant
Erie Municipal Airport	Itinerant
Denver International Airport	Itinerant
Denver International Airport	Itinerant

	<b>Aviation</b>
















































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dent of Sustainability for DEN. Email is on file.

entory (0.77%) was multiplied by the DEN fuel use data to estimate gallons of fuel cons

ly suggested that there are no net methane emissions from jet fuel use.

irport/KEIK. PDF also on file.

m Jason Hurd. Email on file.

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Units	Source
-------	--------

mt CO2/gal	The Climate Registry 22021 Default Emission Factors, Table 2.1 for C for CH <sub>4</sub> and N <sub>2</sub> O.: <a href="https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf">https://www.theclimateregistry.org/wp-</a> <a href="https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf">content/uploads/2021/05/2021-Default-Emission-Factor-Document.pc</a>
mt CH4/gal	
mt N2O/gal	

Units	Source
-------	--------

mt CO2/gal	The Climate Registry 2021 Default Emission Factors, Table 2.1 for CC for CH <sub>4</sub> and N <sub>2</sub> O.: <a href="https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf">https://www.theclimateregistry.org/wp-</a> <a href="https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf">content/uploads/2021/05/2021-Default-Emission-Factor-Document.pc</a>
mt CH4/gal	
mt N2O/gal	

--

Emissions (mt CH4)	Emissions (mt N2O)	Emissions (mt CO2e)
0.3	0.03	1,325
0.0002	0.9	30,150

Scope	Jet Fuel-Aviation Gasoline Split	Usage (gallons)	Fuel Type
1	65%	91,772	Jet fuel
1	35%	49,415	Aviation gasoline
3	100%	3,063,497	Jet fuel
3	0%	30	Aviation gasoline

<b>Gasoline Total</b>	<b>3,204,714</b>	<b>49,446</b>
<b>Jet Fuel Total</b>		<b>3,155,268</b>














































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sumed that can

CO <sub>2</sub> and Table 2.7
df.
CO <sub>2</sub> and Table 2.7
df.





































































































































































































Off-Road Data	
Emissions Summary	
Scope 1	7
Scope 2	0
Scope 3	0
<b>Total</b>	<b>7</b>

Data Sources and Assumptions
<i>(1) Data provided by Jason Hurd with the Erie Municipal Airport. Email on file.</i>
<i>(2) Propane use is reported in pounds used. One gallon of propane weighs 4.2 ,</i>
<i>(3) CNG use is reported in gallons of gasoline equivalent (GGE). There are 0.87.</i>
<i>(4) Additional off-road fuel usage may be consumed within the Town boundaries</i>

Emission Factors	
Fuel	Greenhouse Gas
Gasoline	CO <sub>2</sub>
Diesel	CO <sub>2</sub>
CNG	CO <sub>2</sub>
Propane	CO <sub>2</sub>

Data Calculations	
Fuel Used (Erie Airport-Owned Vehicles)	Emissions (mt CO2)
Gasoline	0
Diesel	7
CNG	0
Propane	0
<b>Total</b>	<b>7</b>

Off-Road Vehicle and Equipment Data	
Fuel Type	Fuel Used (Erie Airport-Owned Vehicles)
Gasoline (gal)	0
Diesel (gal)	680
CNG (GGE)	0
Propane (lbs)	0














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pounds.  
 '7 GGE in one hundred cubic feet of CNG (per the U.S. DOE Alternative Fuels Data C  
 es; however, its contribution is assumed to be negligible and data is difficult to retrie

Vehicle Type	Value	Units
All	0.00878	mt CO <sub>2</sub> /gal
All	0.01021	mt CO <sub>2</sub> /gal
Heavy Duty Vehicle	0.000054440	mt CO <sub>2</sub> /standard cubic foot
All	0.00572	mt CO <sub>2</sub> /gal
Emissions (mt CH4)	Emissions (mt N2O)	Emissions (mt CO2e)
0	0	0
0	0	7
0	0	0
0	0	0
0	0	0
0	0	7

Total Fuel Used
0
680
0
0















enter, <https://epact.energy.gov/fuel-conversion-factors>).  
e.

Source	
ICLIS U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) – Appendix D: Transportation and Other Mobile Emission Activities and Sources, Version 1.1, July 2013: <a href="http://icleiusa.org/ghg-protocols/">http://icleiusa.org/ghg-protocols/</a> .	
(1) CH <sub>4</sub> and CO <sub>2</sub> emission factor from: ICLIS U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) – Appendix D: Transportation and Other Mobile Emission Activities and Sources, Version 1.1, July 2013: <a href="http://icleiusa.org/ghg-protocols/">http://icleiusa.org/ghg-protocols/</a> .	
2021 Climate Registry Default Emissions Factors: <a href="https://www.theclimateregistry.org/content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf">https://www.theclimateregistry.org/content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf</a> .	



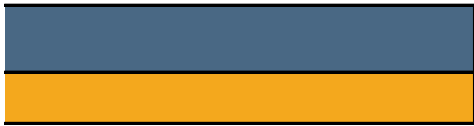












House Gas Emissions (Community
ities and Sources, Version 1.1, July
Accounting and Reporting of
ortation and Other Mobile Emission
protocols/ (2) CNG, CH <sub>4</sub> and N <sub>2</sub> O
efregistry.org/wp
CO <sub>2</sub> Emissions from combustion of





















































## Transit Data

### Emissions Summary

Scope 1	140
Scope 2	N/A
Scope 3	N/A
<b>Total</b>	<b>140</b>

### Data Sources and Assumptions

(1) Data for RTD Activity was provided by Roger Fang with RTD. Bus timetable completed each day. This was multiplied by 365 to get annual totals. These

(2) RTD diesel fuel use data for the Denver region were supplied by Justin

### Emission Factors

Diesel	
Greenhouse Gas	Vehicle Type
CO <sub>2</sub>	All
CH <sub>4</sub>	Light Duty (bus)
N <sub>2</sub> O	Light Duty (bus)

### Data Calculations

Transit Buses	
Source	Emissions (mt CO <sub>2</sub> )
Transit Buses	140
<b>Total Transit Emissions</b>	<b>140</b>

RTD Activity	
Value	Units
3,347,120	gal (diesel)
26,761,454	miles traveled - diesel




















































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ables were provided for all of 2021. Emails and spreadsheet on file. The length of the data were separated out by municipality and filtered for the Town of Erie.

Mueller with RTD. Emails on file. These data were also scaled to the Town of Erie.

Value	Units
0.01021	mt CO <sub>2</sub> /gal
0.00100	g CH <sub>4</sub> /mile
0.00150	g N20/mile

Emissions (mt CH4)	Emissions (mt N2O)
0.0001	0.0002
<b>0.0001</b>	<b>0.0002</b>

Percentage Attributable to Town of Erie	Erie Consumption
0.4%	13,723
0.4%	109,722


















































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gth of each route was multiplied by the frequency each route was

of Erie.

Notes
See On-Road data tab for emission factors. Note that per ICLEI recommendation, we utilized light duty vehicles for buses, not heavy duty.

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Emissions (mt CO2e)
140
140

Units
gal (diesel)
miles traveled - diesel















































































































































































































# Waste and Recycling Data

## Emissions Summary

Scope 1

Scope 2

Scope 3

### Total (Scope 1 and 3)

Information-Only Avoided Emissions

## Data Sources and Assumptions

- 1) Waste and recycling data were provided by Cody Lillstrom with Boulder County's ReTRAC.
- 2) Residential and ICI waste are taken to the Front Range Landfill in Erie. Compost goes to A.
- 3) According to data from the EPA's Landfill Methane Outreach Program (LMOP) (<https://www.epa.gov/lmop/>).
- 4) MSW characterization and Materials Recovery characterizations were taken from the 2021.
- 5) The Front Range Landfill falls within Erie town boundaries. Tons of waste collected at the l

## Emission Factors

### Landfilled Waste

#### Waste Component

MSW

Newspaper

Office paper

Corrugated containers

Magazines/third-class mail

Food scraps

Grass

Leaves

Branches

Dimensional lumber

Oxidization factor

Collection efficiency rate for landfills with gas collection systems

### Composted Waste

#### Value

0.00047

0.00022

### Recycled Materials

#### Waste Component

Paper and paperboard (mixed paper)

Newspaper

Office paper

Magazines/third-class mail

Glass

Metals (mixed)

Plastics (mixed)
Mixed recyclables

## Data Calculations

## Emissions Summary

Front Range Landfill
Tons of Waste Landfilled Inside City Limits
Tons of Waste Landfilled Outside City Limits
Tons of Waste Composted Outside City Limits
Tons of Recycling Recycled Outside City Limits
Tons of Yard Waste & Wood Recycled Outside City Limits
<b>Totals</b>

## Front Range Landfill

Waste Group	
1	100%
2	100%
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%
10	100%
11	100%
12	100%
13	100%
14	100%
15	100%
16	100%
17	100%
18	100%
19	100%
20	100%
21	100%
22	100%
23	100%
24	100%
25	100%
26	100%
27	100%
28	100%
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82	100%
83	100%
84	100%
85	100%
86	100%
87	100%
88	100%
89	100%
90	100%
91	100%
92	100%
93	100%
94	100%
95	100%
96	100%
97	100%
98	100%
99	100%
100	100%

Tons of Waste Landfilled Inside City Limits	
2000	1,000
2001	1,000
2002	1,000
2003	1,000
2004	1,000
2005	1,000
2006	1,000
2007	1,000
2008	1,000
2009	1,000
2010	1,000
2011	1,000
2012	1,000
2013	1,000
2014	1,000
2015	1,000
2016	1,000
2017	1,000
2018	1,000
2019	1,000
2020	1,000
2021	1,000
2022	1,000
2023	1,000
2024	1,000
2025	1,000
2026	1,000
2027	1,000
2028	1,000
2029	1,000
2030	1,000

## Residential and Multifamily Waste

## Waste Group

Tons of Waste Landfilled Inside City Limits
Tons of Waste Landfilled Outside City Limits
Tons of Waste Composted Outside City Limits
Tons of Recycling Recycled Outside City Limits
Tons of Yard Waste & Wood Recycled Outside City Limits
Tons of Reuse Inside City Limits

Total
-------

## ICI Waste

## Waste Group

Tons of Waste Landfilled Inside City Limits
Tons of Waste Landfilled Outside City Limits
Tons of Waste Composted Outside City Limits
Tons of Recycling Recycled Outside City Limits
Tons of Yard Waste & Wood Recycled Outside City Limits
Tons of Reuse Inside City Limits

Total
-------

## MSW Characterization

**Newspaper**

0.6%
------

## Materials Recovery Characterization

**Glass Containers**

17.6%













































112,987	
N/A	
2,305	
<b>115,292</b>	
(13,506)	

program. Spreadsheet on file.

1 organics which has several locations, none of which are within Erie. Recycling is taken to Boulder County ([www.epa.gov/lmop/project-and-landfill-data-state](http://www.epa.gov/lmop/project-and-landfill-data-state)), the Front Range Landfill has a gas collection system. Cf Countywide Waste Composition Study for Boulder County.

landfill and metric tons of methane produced were collected from the EPA's FLIGHT tool. PDF on file. To

Value	Description	
0.06	mt CH <sub>4</sub> /ton waste	ICLEI's U.S. Community Protocol for
0.043	mt CH <sub>4</sub> /ton waste	
0.203	mt CH <sub>4</sub> /ton waste	
0.12	mt CH <sub>4</sub> /ton waste	
0.049	mt CH <sub>4</sub> /ton waste	
0.078	mt CH <sub>4</sub> /ton waste	
0.038	mt CH <sub>4</sub> /ton waste	
0.03	mt CH <sub>4</sub> /ton waste	
0.062	mt CH <sub>4</sub> /ton waste	
0.062	mt CH <sub>4</sub> /ton waste	
10%		
75%		

Description	
mt CH <sub>4</sub> /ton waste	Documentation for Greenhouse Gas Emissions and Energy Factors L 03/documents/warm_v14_management_practices.pdf. Assumes gre
mt N <sub>2</sub> O/ton waste	

From using recycled inputs instead of virgin inputs (mtCO <sub>2</sub> e/short ton)	Landfill with gas collection but no energy recovery (mtCO <sub>2</sub> e/short ton)	Total avoided emission factor (mtCO <sub>2</sub> e/ton recycled)
3.52	0.57	4.09
2.78	0.24	3.02
2.85	1.00	3.85
3.07	0.27	3.34
0.28	0.04	0.32
3.97	0.04	4.01

0.98	0.04	1.02
2.80	0.47	3.27

Waste Generated	Units	Scope
1,733,953	Tons	1
8,198	Tons	1
4,865	Tons	3
426	Tons	3
4,453	Tons	N/A
975	Tons	3
<b>1,748,416</b>	<b>Tons</b>	

Units	Tonnage
Tons	1,747,016

Units	Tonnage
Tons	12,996
Tons	3,129
Tons	42
Tons	3,378
Tons	41
Tons	27
<b>Tons</b>	<b>19,613</b>

Units	Tonnage
Tons	67
Tons	1,736
Tons	384
Tons	1,076
Tons	933
Tons	8
<b>Tons</b>	<b>4,203</b>

Paper and Paperboard		
Office Paper	Magazines and Mixed Paper/Junk Mail	Cardboard/Kraft and Chip/Paperboard
1.3%	4.1%	6.3%

Aluminum	Steel/Tin	#1 PET Bottles, #2 HDPE Bottles, Rigid Containers #1-#7, and Bulky Rigids
1.1%	3.7%	5.1%












































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nty.  
collection efficiency rate is assumed to be 75% based on EPA estimates.

ons disposed of by Erie residences and businesses were subtracted from the tonnag

<b>Source</b>

Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) – A  
Sources, Version 1.1, July 2013: <http://icleiusa.org/ghg-protocols/>.

<b>Source</b>

Used in the Waste Reduction Model (WARM): <https://www.epa.gov/sites/production>  
een waste. Values are adjusted to CH<sub>4</sub> and N<sub>2</sub>O emission factors.

<b>Source</b>

ICLEI’s U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas  
and Composting Emissions Protocol, Version 1.0, July 2013: <http://icleiusa.org/ghg>  
for avoided emissions from a facility with landfill gas capture but no energy produc



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Emissions (mt CH4)	Emissions (mt N2O)	Emissions (mt CO2e)
3,667	0	109,280
124.4	0	3,707
73.8	0	2,200
0.2	0.1	32
		(13,579)
0.5	0.2	73
<b>3,866</b>	<b>0.3</b>	<b>115,292</b>

Other Paper (low-grade), To-Go Cups, and Aseptic Containers	Glass	Metals
9.8%	3.3%	4.7%

Paper and Paperboard		
Newspaper	Office Paper	Magazines and Mixed Paper/Junk Mail
4.6%	1.4%	9.1%

































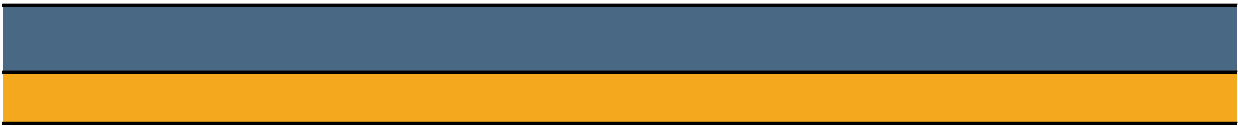




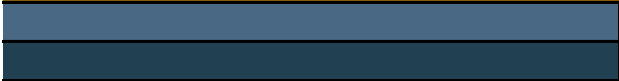
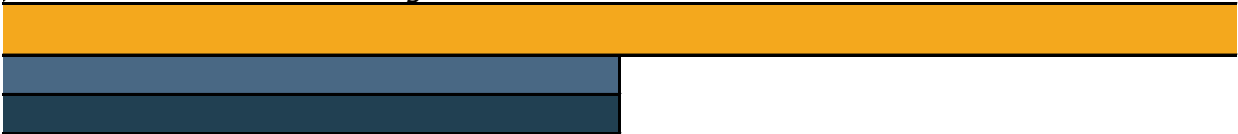








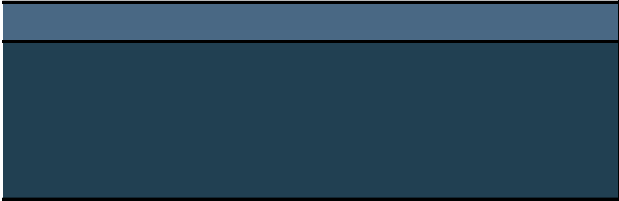
*ge total to avoid double counting.*



ppendix E: Solid Waste Emission Activities and



n/files/2016-



Emissions (Community Protocol) – Recycling  
g-protocols/. Emission factors represent those  
ction.



Plastics	Organics		
	Food	Yard Waste	Clean Wood
14.0%	15.8%	2.6%	3.9%

Cardboard/Kraft and Chip/Paperboard	Aseptic Containers	Styrofoam, To-Go Cups, and Contaminants
42.2%	0.7%	15.2%



































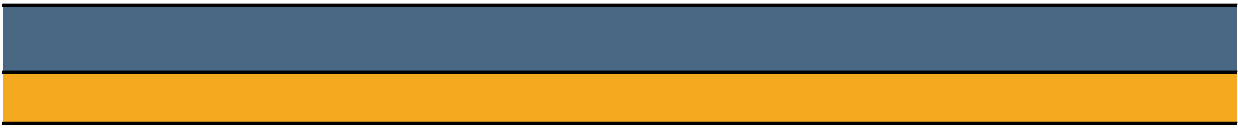














	Miscellaneous Other Waste		
Other	Textiles	C&D Debris	Composites
2.4%	3.6%	10.6%	0.0%





































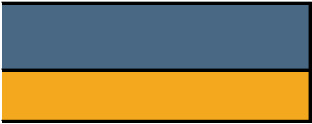


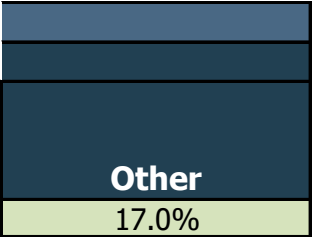














































































































































































































# Wastewater Data

## Emissions Summary

Scope 1
Scope 2
Scope 3
<b>Total</b>

## Data Sources and Assumptions

1) Wastewater treatment plant data were supplied by Jon Coyle with Town of Erie Public Works. Emissions from landfills and manure storage facilities are not applicable. The plant therefore does not use anaerobic processes, but does use nitrification and denitrification.

## Emission Factors

<b>Municipal Wastewater Treatment</b>
<b>Source</b>
Process N <sub>2</sub> O emissions for WWTPs with nitrification and denitrification
Fugitive N <sub>2</sub> O Emissions from Effluent Discharge
Combustion gas
Combustion gas
Days Year
Density of methane
Conversion
Methane Destruction Efficiency
Molecular weight ratio of N <sub>2</sub> O to N <sub>2</sub>
Industrial Commercial Discharge Multiplier

## Data Calculations

<b>GHG Emissions By Process</b>
<b>Process N<sub>2</sub>O Emissions for WWTPs with Nitrification and Denitrification</b>
Emissions as mt N <sub>2</sub> O
<b>Total Process N<sub>2</sub>O from Nitrification and Denitrification Emissions (mt CO<sub>2</sub>e)</b>
<b>Fugitive N<sub>2</sub>O Emissions from Effluent Discharge</b>
Emissions as mt N <sub>2</sub> O
<b>Total Process N<sub>2</sub>O from Nitrification and Denitrification Emissions (mt CO<sub>2</sub>e)</b>
<b>Combustion Gas Emissions</b>
Emissions as mt CH <sub>4</sub>
Emissions as mt N <sub>2</sub> O
<b>Total Combustion Gas Emissions (mt CO<sub>2</sub>e)</b>
<b>Flared Gas Emissions</b>
Emissions as mt CH <sub>4</sub>
<b>Total Flared Gas Emissions (mt CO<sub>2</sub>e)</b>
<b>Total</b>

## Input Data

### Municipal Wastewater Treatment

Plant uses nitrification/denitrification
Plant uses anaerobic processes
Erie's population served by the plant
Average total nitrogen discharged by plant (kg N/day)
Digester gas produced (scfd)
Digester gas flared (scfd)
Methane content of digester gas













































130
N/A
N/A
<b>130</b>

ils on file. The plant does not use digesters, so the values for digester gas produced, digeste  
nitrification/denitrification.

Greenhouse Gas	Value	Units
N <sub>2</sub> O	7	g N <sub>2</sub> O/person/year
N <sub>2</sub> O	0.005	kg N <sub>2</sub> O-N/kg sewage-N
CH <sub>4</sub>	0.003	kg CH <sub>4</sub> /MMBtu
N <sub>2</sub> O	0.001	kg N <sub>2</sub> O/MMBtu
N/A	365.25	Days
N/A	662	Grams per cubic meter
N/A	0.03	m <sup>3</sup> /ft <sup>3</sup>
N/A	99%	
N/A	1.57	44/28
N/A	1.25	

0.26
<b>72</b>
0.21
<b>58</b>
0
0
<b>0</b>
0
<b>0</b>
<b>130</b>

<b>Input Data</b>



Yes
No
30,000
73.94
0
0
0%















































*r gas flared, and methane content of*

Source	
ICLEI’s U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) – Appendix F: Wastewater and Water Emission Activities and Sources, Version 1.1, July 2013: <a href="http://icleiusa.org/ghg-protocols/">http://icleiusa.org/ghg-protocols/</a> .	
Standard assumption	





































































































































































































## Industrial Processes and Products Use Data

### Emissions Summary

Scope 1	101
Scope 2	N/A
Scope 3	N/A
<b>Total</b>	<b>101</b>

### Data Sources and Assumptions

- 1) All refrigerant information is based upon the quantity of commercial square footage used.
- 2) Lotus used a conservative estimate that 25% commercial space is air conditioned using R-134A.
- 3) Assumptions include: a) 300 sq. ft. per ton of cooling capacity based on the commercial building design standards; b) 1 kg refrigerant per ton based on the Environmental Impact of HVAC Refrigerants; and c) 5% refrigerant loss per year from the Core Module Guidance from the EPA.

### Emission Factors

#### Refrigerant Emissions from Commercial AC leakage

Variable	Value
Square feet per ton of cooling (sf/ton)	300
Amount of refrigerant (kg) per ton of cooling	1
Estimated refrigerant loss	5%
Estimated % of square footage air conditioned	25%

### Data Calculations

#### Refrigerant Use

	Value
Commercial Square Footage	1,860,686
% Commercial Square Footage Air Conditioned	465,172
Tons of Cooling	1,551
Charge of coolant per ton (kg)	1,551
Refrigerant Loss (kg) of R-134A	78
<b>Total metric tons of CO2e</b>	<b>101</b>

























































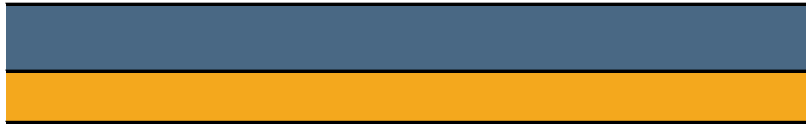












*within the City. Square footage provided by Stavan Vanscoy.  
ing 134a refrigerants.*

*ial average from the ASHRAE Pocket Guide for Air  
on a conservative estimate from the Treatment of LEED of  
m the Climate Leaders Greenhouse Gas Inventory Protocol*

Notes
Source (IPCC): <a href="https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html">https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html</a>
Lotus estimate





































































































































## GPC Table 4.1

*Notes: (1) Adapted from Global Protocol*

### GPC Table 4.1 - Inventory of Greenhouse Gas Emissions

#### Inventory Boundary

Name of City
State
Country
Inventory year
Inventory date
Geographic boundary
Land area (km <sup>2</sup> )
Resident population
GDP (\$)
Composition of economy
Climate
Other information



















































Protocol for Community-Scale Greenhouse Gas Emission Inventories, WRI, C40 Cities, and ICLEI.

City Information

City Information	
	Town of Erie
	Colorado
	USA
	2021
	October 2021
	City Boundary
	20.6
	30,038
\$	2,527,420,746
Professional, Scientific, & Technical Services; Health Care & Social Assistance; Manufacturing; Educational Services; and Retail Trade	
Semi-arid, with low humidity	
None	

















































|

|





































































































































































































## GPC Table 4.2

Notes: (1) Adapted from Global Protocol for Community-Scale Greenhouse Gas Emission Ir

### GPC Table 4.2 - GHG Emissions Summary

Sector		Scope 1 (mt CO <sub>2</sub> e)
Stationary Energy	Energy use	51,201
	Fugitive Emissions	40,292
Transportation	All emissions	23,439
Waste	Treated in the City	2,329
	Treated outside the City	
Industrial Processes and Production	Refrigerants	101
Total		117,363





















































inventories, WRI, C40 Cities, and ICLEI.



Scope 1 (BASIC+) (mt CO2e)	Scope 2 (mt CO2e)	Scope 3 (BASIC) (mt CO2e)	Scope 3 (BASIC+) (mt CO2e)
	86,565		4,640
	1,533		30,226
		113,092	
0	88,097	113,092	34,866





















































BASIC Emissions (mt CO2e)	BASIC+ (mt CO2e)
137,766	142,406
40,292	40,292
24,972	55,198
2,329	2,329
113,092	113,092
101	101
<b>318,552</b>	<b>353,418</b>













































































































































































































## GPC Table 4.3

Notes: (1) Adapted from Global Pro

### GPC Table 4.3 - GHG E

GPC Reference Number	Scope
<b>I</b>	
I.1	
I.1.1	1
I.1.2	2
I.1.3	3
I.2	
I.2.1	1
I.2.2	2
I.2.3	3
I.3	
I.3.1	1
I.3.2	2
I.3.3	3
I.4	
I.4.1	1
I.4.2	2
I.4.3	3
I.4.4	1
I.5	
I.5.1	1
I.5.2	2
I.5.3	3
I.6	
I.6.1	1
I.6.2	2
I.6.3	3
I.7	
I.7.1	1
I.8	
I.8.1	1
<b>II</b>	
II.1	
II.1.1	1
II.1.2	2

II.1.3	3
II.2	
II.2.1	1
	2
II.2.3	3
II.3	
II.3.1	1
II.3.2	2
II.3.3	3
II.4	
II.4.1	1
II.4.2	2
II.4.3	3
II.5	
II.5.1	1
II.5.2	2
II.5.3	3
III	
III.1	
III.1.1	1
III.1.2	3
III.1.3	1
III.2	
III.2.1	1
III.2.2	3
III.2.3	1
III.3	
III.3.1	1
III.3.2	3
III.3.3	1
III.4	
III.4.1	1
III.4.2	3
III.4.3	1
IV	
IV.1	1
IV.2	1
V	
V.1	1
V.2	1
V.3	1
VI	
TOTAL	
TOTAL	















































## Emissions Report

### GHG Emissions Source (By Sector and Subsector)

#### STATIONARY ENERGY

##### Residential buildings

Emissions from fuel combustion within the city boundary

Emissions from grid-supplied energy consumed within the city boundary

Transmission and distribution losses from grid-supplied energy

##### Commercial and institutional buildings and facilities

Emissions from fuel combustion within the city boundary

Emissions from grid-supplied energy consumed within the city boundary

Transmission and distribution losses from grid-supplied energy

##### Manufacturing industries and construction

Emissions from fuel combustion within the city boundary

Emissions from grid-supplied energy consumed within the city boundary

Transmission and distribution losses from grid-supplied energy

##### Energy industries

Emissions from energy production used in power plant auxiliary operations within the city

Emissions from grid-supplied energy consumed by energy industries

Emissions from transmission and distribution losses from grid-supplied energy used in power plant auxiliary operations

Emissions from energy generation supplied to the grid

##### Agriculture, forestry and fishing activities

Emissions from fuel combustion within the city boundary

Emissions from grid-supplied energy consumed within the city boundary

Transmission and distribution losses from grid-supplied energy

##### Non-specified sources

Emissions from fuel combustion within the city boundary

Emissions from grid-supplied energy consumed within the city boundary

Transmission and distribution losses from grid-supplied energy

##### Fugitive emissions from mining, processing, storage, and transportation of coal

Fugitive emissions from mining, processing, storage, and transportation of coal within the city boundary

##### Fugitive Emissions from oil and natural gas systems

Fugitive emissions from oil and natural gas systems within the city boundary

#### TRANSPORTATION

##### On-road transportation

Emissions from fuel combustion on-road transportation occurring in the city

Emissions from grid-supplied energy consumed in the city for on-road transportation

Emissions from transboundary journeys occurring outside the city, and T and D losses from grid-supplied energy use

## **Railways**

Emissions from fuel combustion for railway transportation occurring in the city

Emissions from grid-supplied energy consumed in the city for railways

Emissions from transboundary journeys occurring outside the city, and T and D losses from grid-supplied energy use

## **Waterborne navigation**

Emissions from fuel combustion for waterborne navigation occurring in the city

Emissions from grid-supplied energy consumed in the city for waterborne navigation

Emissions from transboundary journeys occurring outside the city, and T and D losses from grid-supplied energy use

## **Aviation**

Emissions from fuel combustion for aviation occurring in the city

Emissions from grid-supplied energy consumed in the city for aviation

Emissions from transboundary journeys occurring outside the city, and T and D losses from grid-supplied energy use

## **Off-road transportation**

Emissions from fuel combustion for off-road transportation occurring in the city

Emissions from grid-supplied energy consumed in the city for off-road transportation

Emissions from transboundary journeys occurring outside the city, and T and D losses from grid-supplied energy use

## **WASTE**

### **Solid waste disposal**

Emissions from solid waste generated in the city and disposed in landfills or open dumps within the city

Emissions from solid waste generated in the city but disposed in landfills or open dumps outside the city

Emissions from waste generated outside the city and disposed in landfills or open dumps within the city

### **Biological treatment of waste**

Emissions from solid waste generated in the city that is treated biologically in the city

Emissions from solid waste generated in the city but treated biologically outside of the city

Emissions from waste generated outside the city boundary but treated in the city

### **Incineration and open burning**

Emissions from waste generated and treated within the city

Emissions from waste generated within but treated outside of the city

Emissions from waste generated outside the city boundary but treated within the city

### **Wastewater treatment and discharge**

Emissions from wastewater generated and treated within the city

Emissions from wastewater generated within but treated outside of the city

Emissions from wastewater generated outside the city boundary but treated within the city

## **INDUSTRIAL PROCESSES and PRODUCT USES (IPPU)**

Emissions from industrial processes occurring in the city boundary

Emissions from product use occurring within the city boundary

## **AGRICULTURE, FORESTRY and OTHER LAND USE (AFOLU)**

Emissions from livestock

Emissions from land

Emissions from aggregate sources and non-CO2 emission sources on land

## **OTHER SCOPE 3**

### **BASIC**

### **BASIC+**















































	GPC Notation Keys Legend			GP	
	IE	Included elsewhere			
	NE	Not estimated			
	NO	Not occurring		Add'l	
	C	Confidential		Add'l s	
Notation Keys	CO2	CH4	N2O	HFC	PFC
	45,369	4	0		
	64,851	6	1		
	3,483	0	0		
	5,676	1	0		
	20,623	2	0		
	1,128	0	0		
IE					
IE					
IE					
IE					
ons					
NO					
NO					
NO					
NO					
NO					
	0.6	1,352.1			
	21,922	1	1		
	1,419	0	0		

	74.9	0.0	0.0		
NO					
NO					
NO					
NO					
NO	1,305.4	0.3	0.03		
NO					
	29,899	0.0002	0.9		
NO	6.9	0.0	0.0		
NO					
NO					
NO		74			
		3,792			
NO					
		0	0		
		0.7	0.3		
NO					
NO					
NO					
NO					
		0.0	0.5		
NO					
NO					
NO					
NO					
NO					
0.0					
161,1745,2323					
195,7595,2324					













































PC Color Legend
BASIC
subsectors for BASIC+
subsectors for Territorial

SF6	NF3	Total CO2e	CO2(b)	Activity Data Quality
		45,505		High
		65,251		High
		3,504		High
		5,696		High
		21,314		High
		1,135.6		High
		40,291.9		Medium
		22,108	1,330	Medium
		1,533		Medium





































































































This includes only emissions from T&D losses as a result of EV charging

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

Used data for landing and takeoff (LTO).

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

There are no landfills within the community.

There is no waste treatment within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community

No known sources exist within the community

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.

No known sources exist within the community.





















































































































































































































































## GPC Table 4.4

*Notes: (1) Adapted from Global Protocol for Community-Scale Greenhouse Gas E*

Scope 3 emissions based on market-based method

### Recycling

Recycling

**Total Avoided Emissions from Recycling**

### Renewable Energy

Renewable Energy with Customer-Owned RECs

Renewable Energy with Utility-Owned RECs

**Total Avoided Emissions from Renewable Energy**

**Total Community Avoided Emissions**





















































mission Inventories, WRI, C40 Cities, and ICLEI.

Value	Units	Emissions (mt CO2e)
4,453	U.S. short tons	(13,579)
		(13,579)
Value	Units	Emissions (mt CO2e)
5,681,217	kWh	(2,691)
8,529,631	kWh	(4,040)
		(6,731)
		(20,310)































































































































































































































































