



Lane Transit District



Lane Transit District

FY22 Operations GHG Inventory

Fiscal Year 2022
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ParametriX



Acknowledgements

Lane Transit District staff

Matt Imlach, Director of Development

Jeramy Card, Development Planner

Consulting team

Claudia Denton, Project Manager

Suzy Godber, Analyst and Author



Good Company (a division of Parametrix), a sustainability consulting group based in Eugene, Oregon, conducted this greenhouse gas inventory. Claudia Denton and Suzy Godber provided data-gathering assistance to Lane Transit District staff and conducted all data analysis using Good Company's Carbon Calculator, G3C. They are the primary authors of this report.

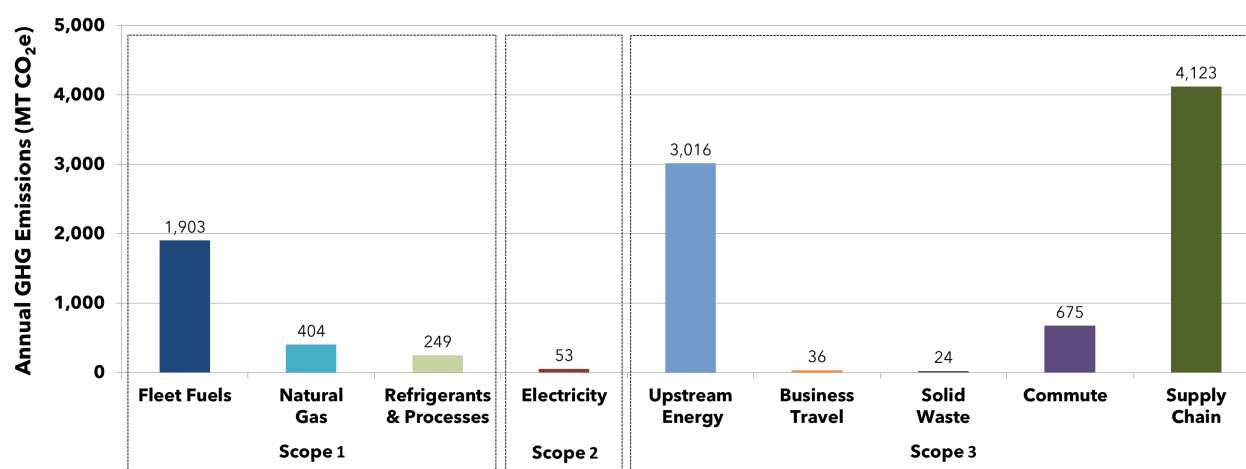
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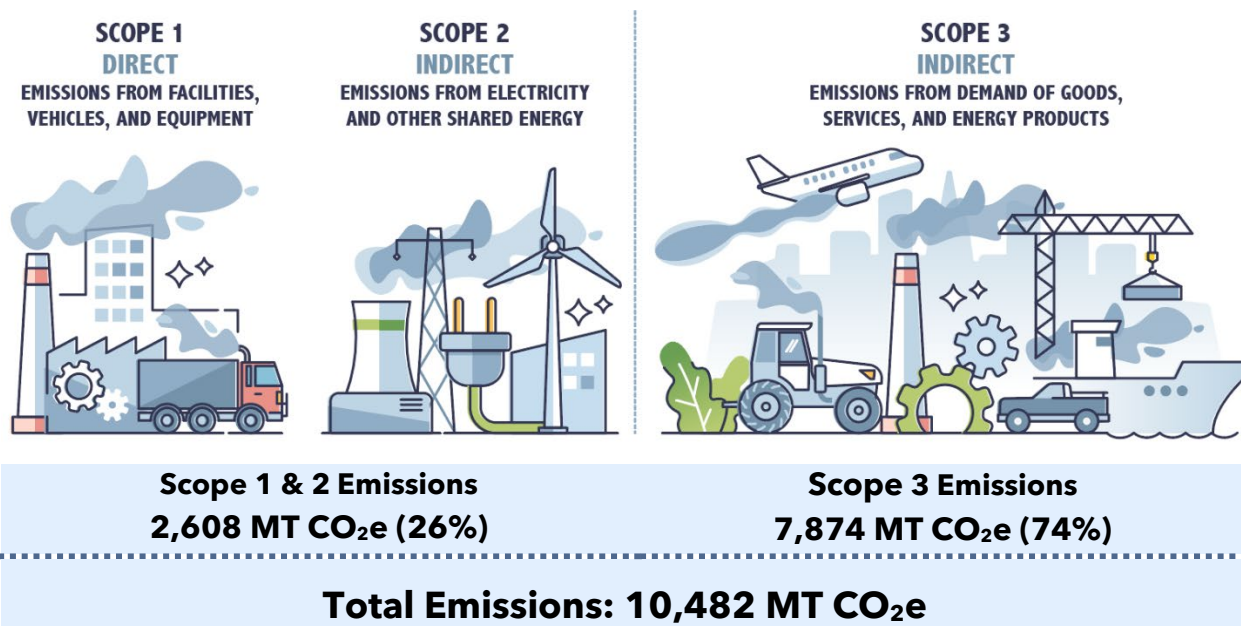
Executive Summary

This greenhouse gas (GHG) inventory quantifies the GHG emissions associated with Lane Transit District's (LTD's) internal operations for Fiscal Year 2022 (FY22: July 1, 2021–June 30, 2022). In FY22, LTD operations generated GHG emissions from owned facilities and vehicles (Scope 1), electricity (Scope 2), and demand for goods and services such as supply chain purchasing and upstream energy fuel production (Scope 3). Below illustrates the total GHG emissions by LTD, reported in metric tons of carbon dioxide equivalent (MT CO₂e). All emissions are shown in **Figure 1** sorted by emissions source.

Figure 1: LTD FY22 Operational Emissions by Source and Scope



Because most greenhouse gases are more potent in warming the atmosphere than carbon dioxide, all gases are calculated and combined into a carbon dioxide equivalent, typically measured in metric tons, to calculate and compare emissions easily.



GHG Emitting Activities

This inventory includes all available emissions sources for LTD operations and facilities following standard GHG protocols.¹ The sources of LTD's Scope 1 and 2 GHG emissions include gasoline and diesel combustion by service vehicles and equipment, natural gas combustion, fugitive refrigerants, and electricity use. Sources of Scope 3 GHG emissions include upstream energy from production of fuel, business travel, solid waste, employee commute, and supply chain emissions from manufactured goods, services, and capital improvement project purchases.

The **largest** sources of GHG emissions in FY22 were:

Supply Chain (39%)



Upstream Energy (29%)



Fleet Fuel Use (18%)



Smaller sources of emissions included employee commute, natural gas, refrigerants, electricity, business travel, and solid waste, making up less than 15% of total emissions combined.

Intensity Metrics

Transit agencies are known to change service over time, such as expanding to new bus routes, removing underutilized routes, or adding additional service to popular routes. As services change, emissions will change; but in the case of transit agencies, more service activities, which may add up to more emissions, mean a greater benefit to the community. For this reason, intensity metrics are important to include and consider because they are a normalized metric that can be used to compare emissions per quantity of specific activities. This is helpful for comparing emissions over time. **Table 1** summarizes LTD's GHG emissions intensity by vehicle revenue miles (VRM), unlinked passenger trips, and service population. LTD has more control over scope 1 and 2 emissions, which is why they are shown compared to total emissions.

Table 1: Intensity Metrics for LTD, FY22

	MT CO ₂ e per 1,000 people in service population	MT CO ₂ e per 1,000 VRM	MT CO ₂ e per 1,000 UPT
Scope 1 & 2 Emissions	8.6	.5	.5
Total Emissions	33	1.9	2

MT CO₂e = metric tons carbon dioxide equivalent; UPT = unlinked passenger trips; VRM = vehicle revenue miles

¹ Including the Greenhouse Gas Protocol (GHGP) Corporate Standard, GHGP's Scope 2 Guidance, and GHGP's Corporate Value Chain (Scope 3 Standard)

Introduction

Agency Summary

LTD has been providing service to the Eugene-Springfield community since 1970 with the vision of creating a more connected, sustainable, and equitable community. LTD lives its mission to connect the community by linking diverse set of commuters, students, and families with 30 fixed bus routes and three EmX Bus Rapid Transit lines. In FY22, LTD provided service to 247,421 residents and an employment base of approximately 170,000, through the work of 313 staff and an adopted budget of over \$150 million. LTD's service to the community is comprised of five different services:

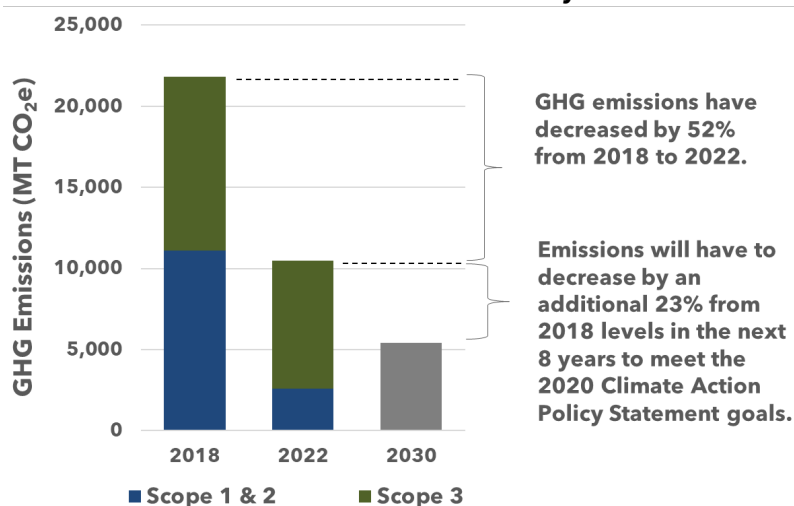
- **Fixed Route Bus** – Fixed Route Bus is LTD's standard fixed route bus service.
- **Emerald Express (EmX)** – EmX connects West Eugene to the Gateway area in Springfield using bus rapid transit service.
- **Vanpool** – Vanpool is an incentive program to encourage carpooling to work. A vanpool is a group of five to 15 individuals who regularly travel to work together. Each passenger pays a monthly fare to ride in the van.
- **Rural Connections** – Rural Connections extends beyond Eugene/Springfield, LTD provided fixed route service to the communities of Cottage Grove, Veneta, Creswell, Coburg, Lowell, and Junction City.
- **RideSource** – RideSource is LTD's paratransit service, which provides more than 250,000 trips annually for people with disabilities and Medicaid recipients.

LTD Progress Toward Climate Action Goals

This FY22 inventory provides an update to assess progress toward meeting the goals set by the 2020 Climate Action Policy Statement. The 2020 Climate Action Policy Statement commits LTD to the following sustainability goals: 100% fleet turnover and phase out of fossil fuels by 2035 and 75% GHG emissions reduction by 2030 compared to the 2018 baseline.

Operations emissions between 2018 and 2022 GHG inventories are shown in **Figure 2**. LTD's emissions have decreased by 52% due to strategic choices such as purchasing renewable R99 diesel fuel and electrification of fleet vehicles as well as circumstances surrounding the COVID-19 pandemic's impact on ridership and service. LTD will continue make strategic decisions to meet sustainability goals.

Figure 2: LTD Summary of Emissions Versus 2020 Climate Action Policy Goals



Detailed Findings

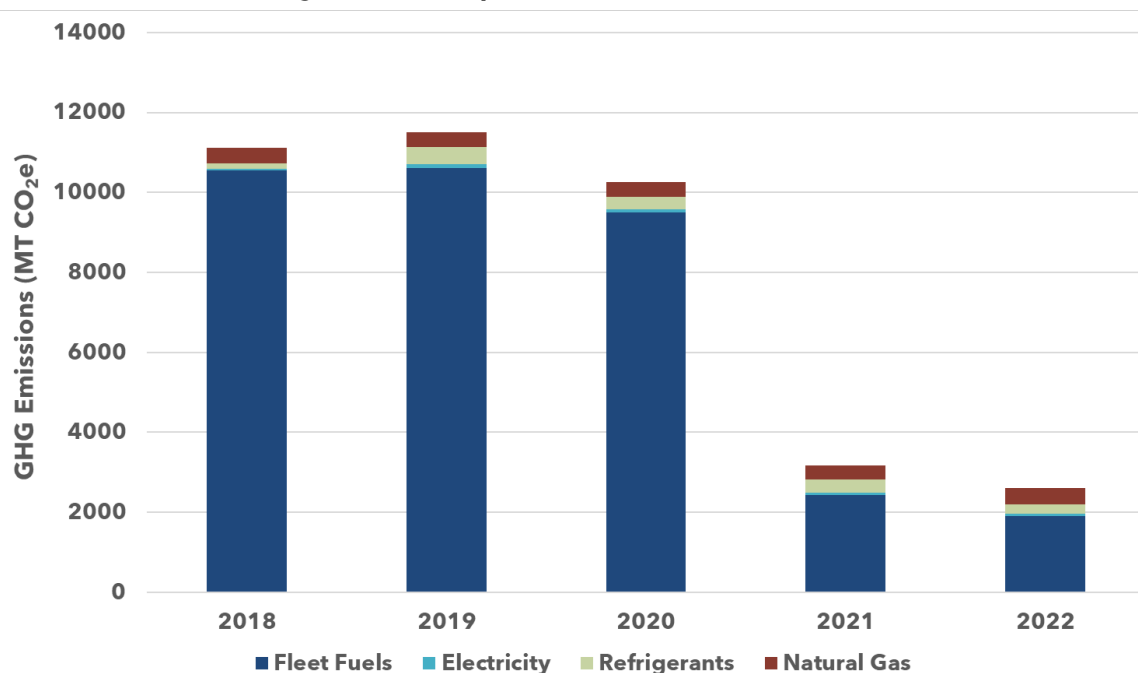
Scope 1 & 2 Emissions Over Time

As shown in **Figure 3** below, fleet fuel emissions dropped from hovering around 10,500 MT CO₂e to just under 2,000 MT CO₂e. Scope 1 and 2 emissions have reduced drastically over the past 5 years due to the following:

- LTD's decision to switch to renewable diesel (R99) to reduce emissions.
- LTD's purchasing of electric vehicles to reduce emissions.
- Reduced revenue miles/reduction in service due to the COVID-19 global pandemic.

Scope 1 and 2 GHG emissions have reduced by **82%** since 2018.

Figure 3: LTD Scope 1 and 2 Emissions Past 5 Years



Fleet Fuels

In FY22, LTD's fleet consumed the following volumes of fuel/energy:

E10 gasoline



125,736 gallons

B5 diesel blend



111,862 gallons

Renewable Diesel



549,661 gallons

Electricity

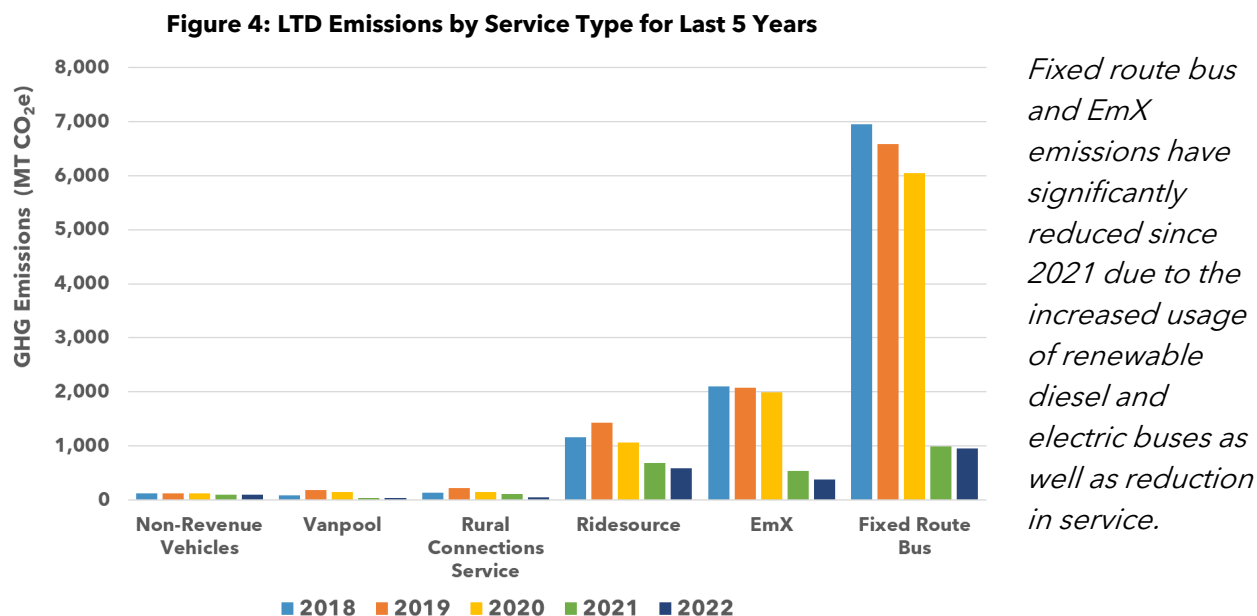


632,543 kWh

Scope 1 fleet fuel emissions total **1,903 MT CO₂e**, accounting for **76%** of scope 1 & 2 emissions.

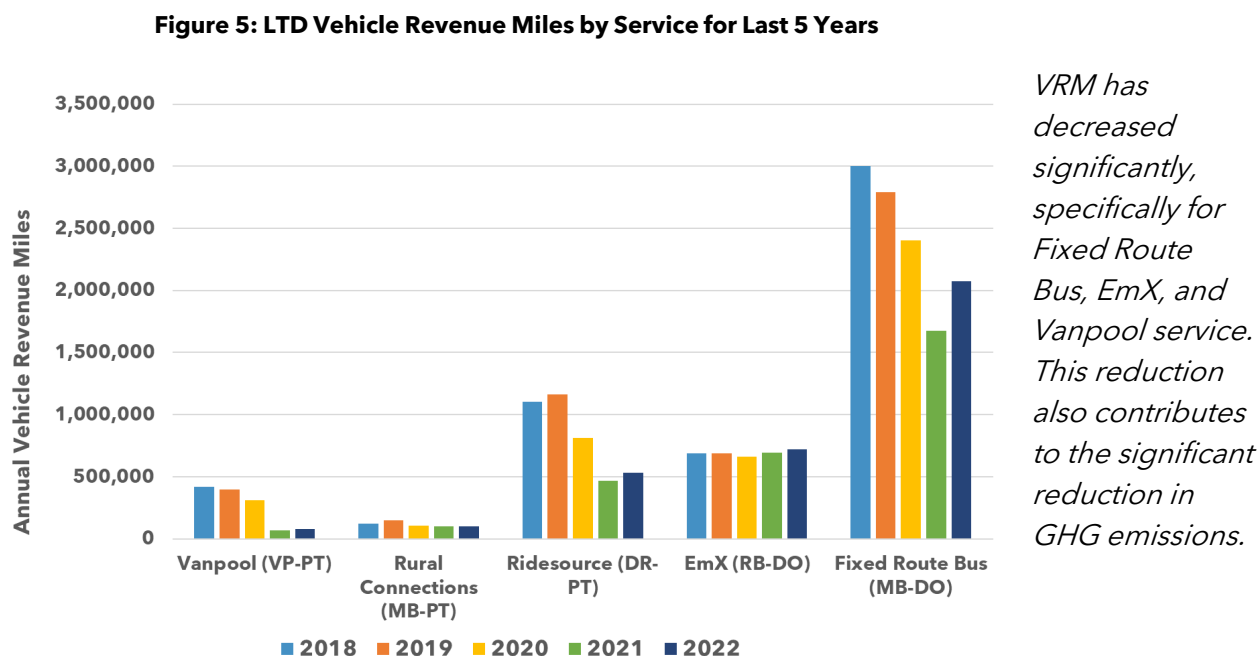
Fleet Emissions by Service Type

Figure 4 below displays emissions by transit service type for the last five years.



Fleet fuel emissions have decreased by **82%** since 2018, while total VRM for all fleets has decreased by 34%.

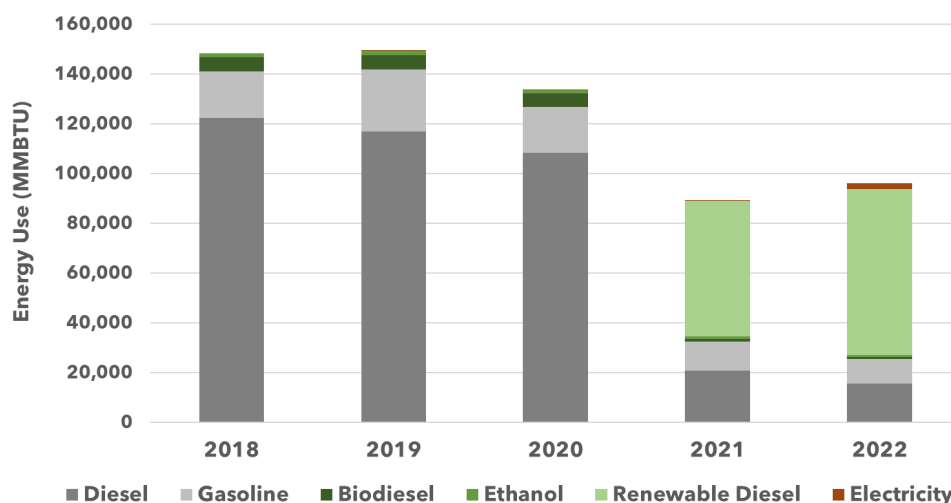
Figure 5 below displays VRM by service type for the last five years.



Fleet Energy Usage by Fuel Type

Figure 6 below displays energy use by fuel type for the last 5 years.

Figure 6: LTD Energy Use by Fuel Type for Last 5 Years

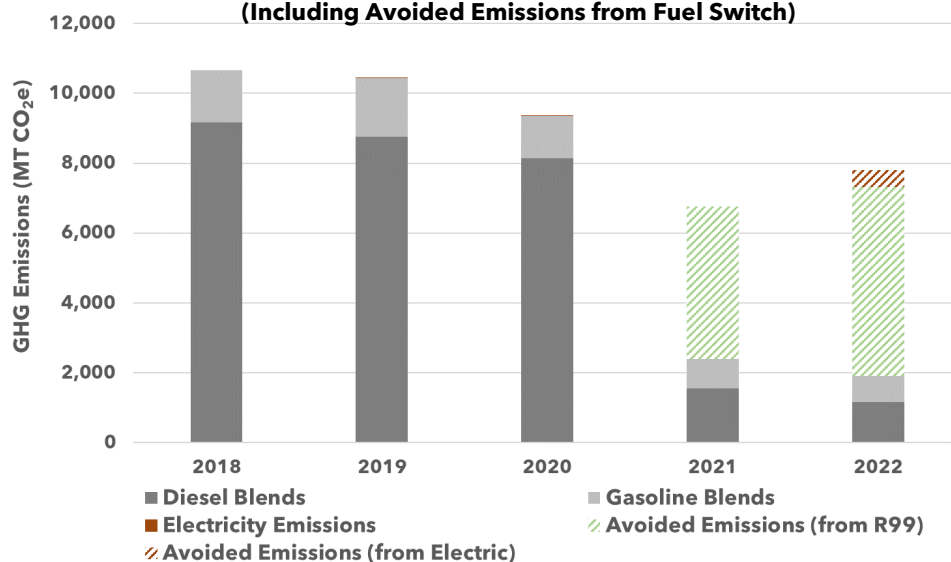


LTD has strategically switched to vehicle fuels that have less emissions for the same quantity of energy. Energy use reduction is also due to the reduction in service displayed in Figure 5.

Electric vehicles accounted for 6% of total revenue miles but only 0.5% of total emissions. Electric vehicles overall use significantly less energy per mile and contribute minimal GHG emissions.

Figure 7 below displays emissions by fuel type for the last five years, including the avoided emissions due to the switch from standard B5 diesel to R99 renewable diesel and fleet transitions to electric bus. LTD's goal is to eliminate fossil fuels from fleets by 2035, and **LTD has accomplished an 82% reduction in fossil fuel use since 2018.** Note that electricity emissions are included but too small to be visible for 2019-2022 (only 6 MT CO_{2e} in FY22).

**Figure 7: LTD Fleet Emissions by Fuel Type for Past 5 Years
(Including Avoided Emissions from Fuel Switch)**



LTD avoided a total of 4,367 MT CO_{2e} in 2021 and 5,907 MT CO_{2e} in 2022 by switching to R99 and incorporating electric vehicles in the fleet.

Upstream Energy & Lifecycle Emissions

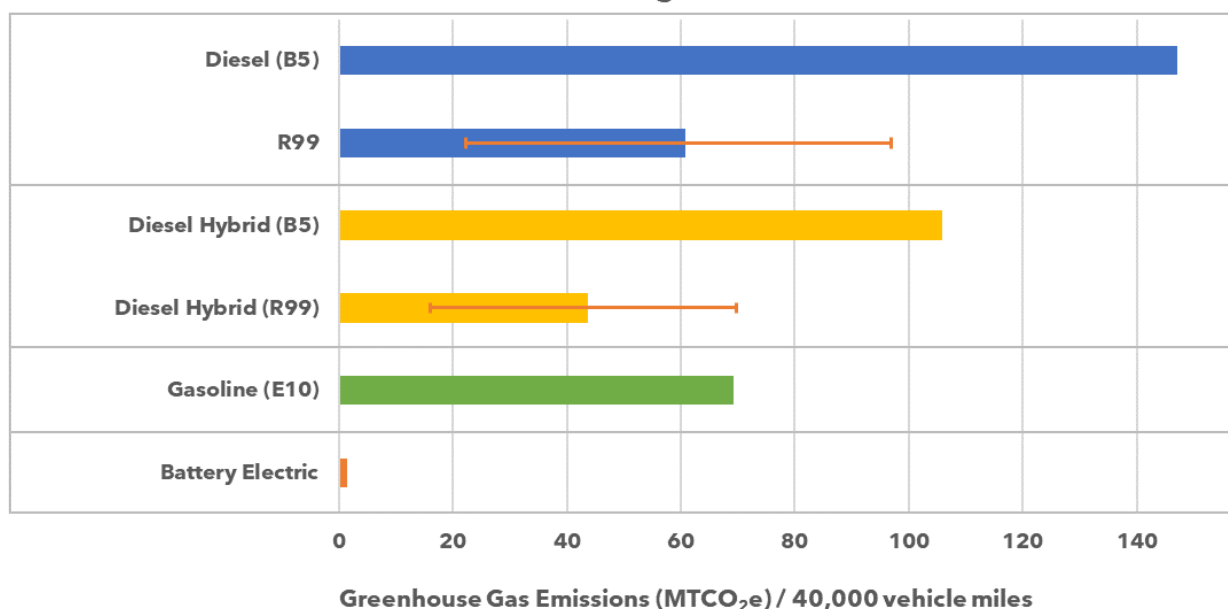
Upstream energy and lifecycle emissions are associated with extracting, refining, processing, transporting, and/or distributing vehicle fuels and building energy. Depending on the fuel, upstream emissions account for approximately 10% to 35% of total fuel emissions. These emissions are in addition to LTD's Scope 1 "tailpipe" emissions from fleet and equipment, Scope 1 natural gas use, and Scope 2 electricity use.

- LTD's upstream energy emissions are largely from **fleet fuel** source emissions.
- If LTD were to continue reducing fleet fuel use and switching fuels, upstream energy emissions would correspondingly change (depending on specific fuel types and feedstocks).

Figure 8 below outlines comparison of lifecycle (Scopes 1, 2, and 3) GHG emissions by fuel type. Electricity has by far the smallest emissions (based on electricity from EWEB and SUB), followed by R99 (based on R99 fuels available for purchase in Oregon).

When comparing GHG emissions, electric vehicles demonstrate superior energy efficiency, achieving significantly greater distance coverage per unit of emitted GHGs. The efficiency of battery electric is nearly 100 times that of standard B5 diesel and nearly 50 times that of standard E10 gasoline.

Figure 8: Well-to-Wheel Lifecycle GHG Emissions by Fuel Type for 40,000 Miles of Travel
(with error bars for range for carbon scores)
Carbon Scores Vary Depending on Feedstocks and Sources



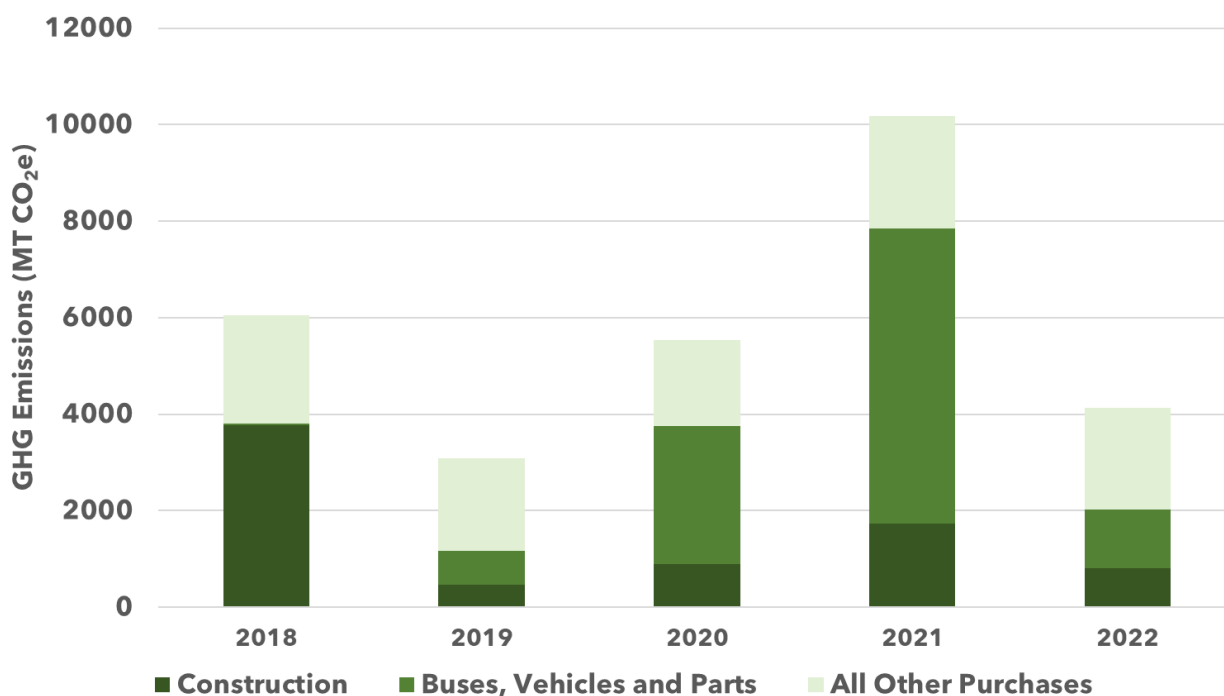
Supply Chain Emissions

Supply chain emissions account for emissions from purchased goods and services and are outlined in **Figure 9** below.

- Supply Chain emissions were the **largest** source of emissions for FY22 despite being low compared to previous years.
- Fluctuations are highly dependent on major construction projects and investments, such as electric bus purchases and associated infrastructure and upgrades.
- All other spending emissions have stayed relatively consistent over the last five years.

Emissions from major projects and bus upgrades contribute to expanded and improved transit service to the community. This will reduce community emissions from single-occupancy vehicles and result in higher efficiency of LTD vehicles. Emissions from other supply chain purchased goods and services accounted for 39% of total emissions.

Figure 9: LTD Supply Chain Emissions by Purchase Category for Last 5 Years



Category descriptions:

- **Construction** emissions include all expenditures associated with capital improvement projects and construction for upgrading and maintaining facilities.
- **Buses, vehicles, and parts** include bus and vehicle purchases to enhance or replace the existing fleet as well as vehicle parts and supplies, such as tires and fluids.
- **All other purchases** include all other expenditures on capital improvement projects (electronics and associated manufactured goods and services) and manufactured goods and services (clothing, electronics, food and beverage, furnishings and supplies, and other noncapital improvement goods and services purchases).

Transit Benefit Analysis

Emissions from transit operations are arguably displaced by both the ridership and land use benefits they bring to the community. Community emissions benefit was estimated using the Transit Cooperative Research Program's (TCRP) Land Use Benefit Calculator, which was designed for transit agencies and metropolitan organizations to estimate land use and ridership contributions to reduction in GHG emissions for current transit operations.

Land Use Benefit

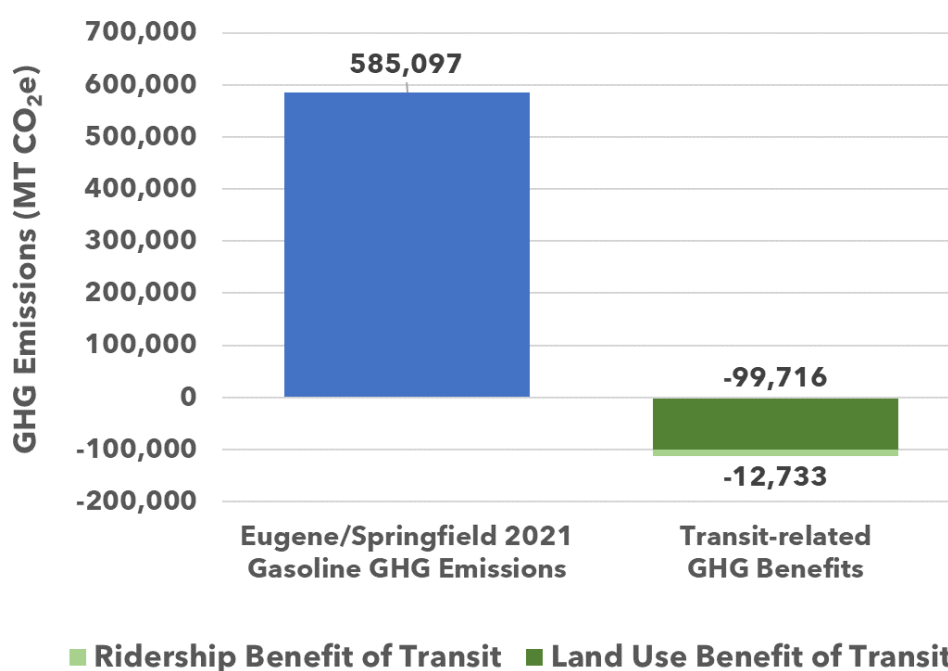
Investments in public transportation contribute to land use benefits in the form of compact development. This kind of development reduces distances needed for the community to travel and requires less land needed for development. Shorter distances contribute to less fuel use and increase alternative modes of transportation, including active transportation modes (walking and biking). Compact housing also requires less building energy for smaller/multi-family units, which is not included in this benefit estimate.

The current transit system's influence on land use is estimated to have provided the following benefit in FY22:

- Reduced community vehicle miles traveled (VMT) by **14%**.
- Reduced **gasoline** usage by **11 million gallons**.
- Mitigated **99,699 MT CO₂e** annually.

Figure 10 displays the estimate of Eugene/Springfield 2021 community GHG emissions versus the land use and ridership benefits of transit.

Figure 10: LTD Community Emissions Versus Land Use and Ridership Benefit

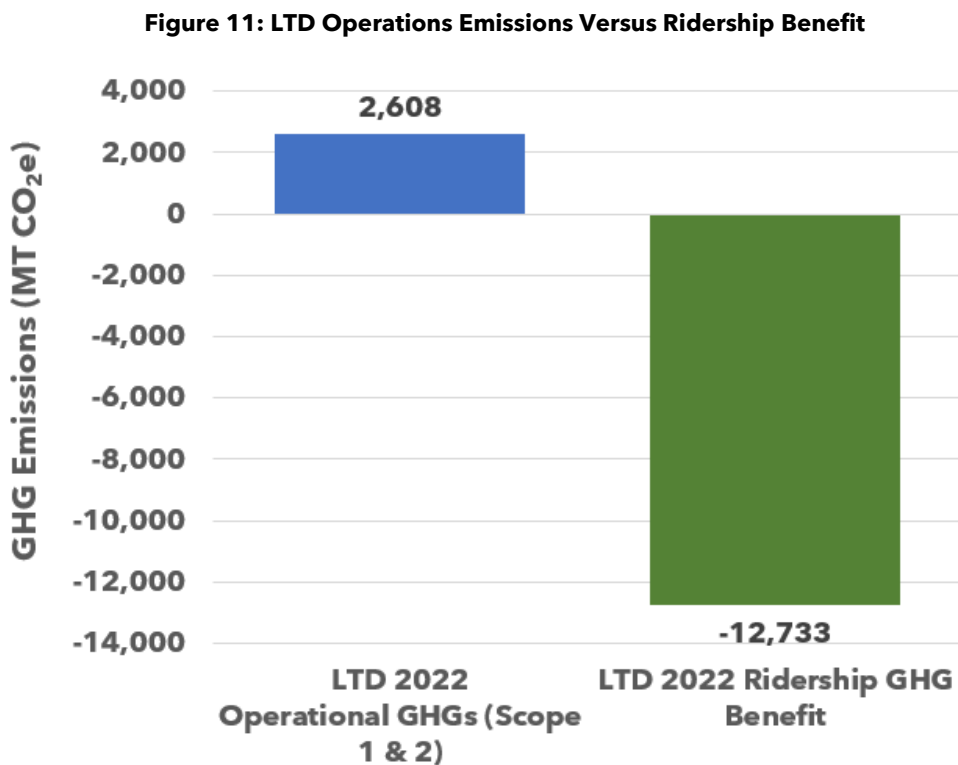


Ridership Benefit

Using the TCRP calculator, LTD's transit service was estimated to provide the following regional ridership benefits to the region in FY22:

- **1.8%** reduction in community **VMT**.
- **1.5 million gallons** reduction of **gasoline** usage in the community.
- Mitigated **12,733 MT CO₂e**.

Results are displayed in **Figure 11** compared to LTD's FY22 total operational emissions (scope 1 and 2).

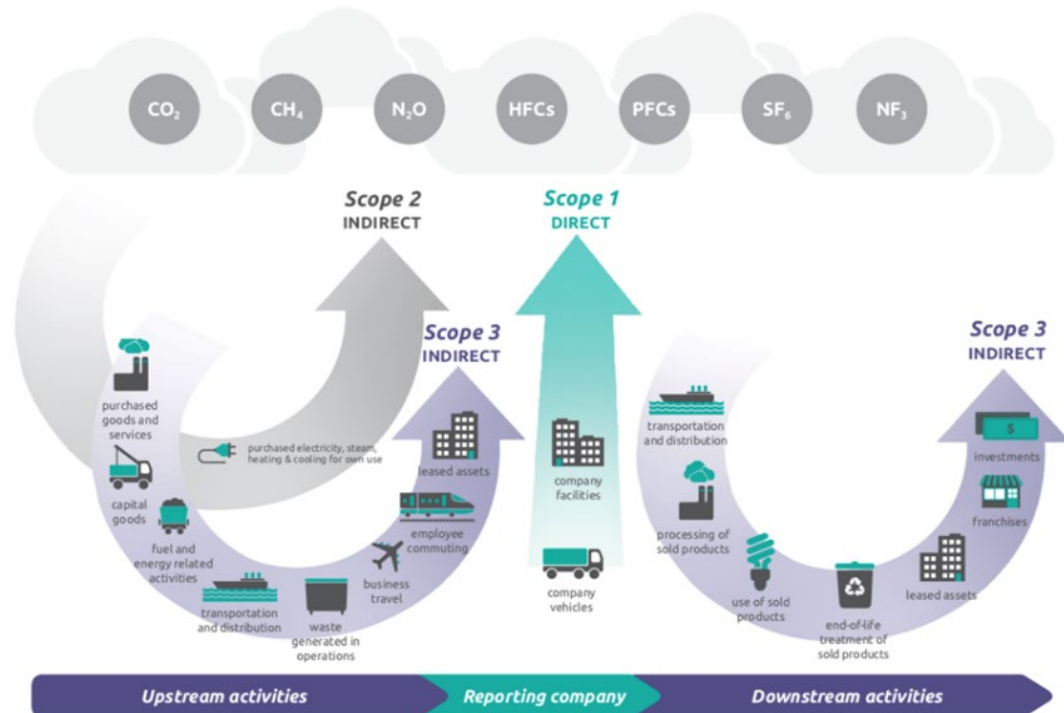


Appendix A: Methodology

LTD included all available emission sources and facilities following standard GHG inventory protocols including the Greenhouse Gas Protocol (GHGP) Corporate Standard, GHGP's Scope 2 Guidance, and GHGP's Corporate Value Chain (Scope 3 Standard). This inventory captures all direct and indirect emissions associated with operations for which data was available.

Direct emissions are from sources owned or controlled by an organization. Organizations are in direct control of selecting vehicle and equipment types and the related efficiency and fuel types used by the equipment. Indirect emissions occur because of the organization's actions, but sources of indirect emissions are controlled by a separate entity. Organizations can influence these emissions through their purchasing power and other incentives. To distinguish direct from indirect emissions sources, three scopes are defined for GHG accounting and reporting.² **Figure 12** illustrates the three emissions scopes.

Figure 12: Greenhouse Gases Accounting and Reporting Scopes^{3,4}



² WRI/WBSCD Greenhouse Gas Protocol, Corporate Accounting & Reporting Standard (Revised Edition), Chapter 4.

³ WRI/WBSCD Greenhouse Gas Protocol, Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

⁴ Explanation of Greenhouse Gas chemical formulas: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF₃), and sulfur hexafluoride (SF₆).

- Scope 1: All direct GHGs from equipment and facilities operated by an organization; emissions include those from fossil fuel combustion and process emissions.
- Scope 2: Indirect GHG emissions from electricity (and other shared energy) purchased for operational needs.⁵
- Scope 3: All other indirect emissions sources that result from an organization's activities but occur from sources owned or controlled by another company or entity, including business travel, embodied emissions in material goods purchased and services contracted by an organization, upstream emissions from energy production (vehicle fuels, electricity, natural gas), and emissions associated with employee commute behavior.

Inventory boundaries

Data Collection

Good Company worked with LTD staff to collect the data required to calculate emissions. LTD staff graciously provided time, data and expertise. Data collected is described in the table below.

SCOPE	EMISSIONS SOURCE	EMISSIONS SOURCE DESCRIPTION
Scope 1 (Direct Emissions)	Fleet Fuels	LTD provided total gallons of fuel purchased in FY22. Combustion fuel data provided was split by fuel type and by each service provided by LTD (Fixed-Route Bus, EmX, RideSource (ADA Paratransit), Rural Connections, Vanpool, and non-revenue). In FY22, LTD's vehicle fleet used diesel (95% diesel, 5% biodiesel), gasoline (90% gasoline, 10% ethanol), and renewable diesel fuel blends (as well as electricity—see Scope 2). MPG by service type was averaged by fuel use total divided by total miles driven. <i>High confidence data.</i>
	Building Natural Gas	LTD uses natural gas in building operations. LTD provided total therms of natural gas usage through utility provider, NW Natural. No renewable energy offset purchases were made in FY22. <i>High confidence data.</i>

⁵ In 2015, the World Resource Institute and World Business Council for Sustainable Development released the Scope 2 Guidance (2015), an amendment to the GHG Protocol Corporate Standard. The Climate Registry also follows this updated guidance, which requires dual reporting.

- Location-based method (or regional grid) multiplies an organization's electricity use by the average emissions intensity of a specific regional electricity grid that is published by the Environmental Protection Agency. For LTD's service area, the regional grid is the Northwest Power Pool.
- The market-based method (or utility-specific) represents emissions from the electricity procurement contracts that an organization has purposefully chosen. For many, market-based contracts are predominately represented by average retail emissions factors for local electric utility(s).

For LTD's service area, local utilities include Eugene Water and Electric Board and Springfield Utility Board. The Scope 2 Guidance recommends using the market-based method for goal setting.

SCOPE	EMISSIONS SOURCE	EMISSIONS SOURCE DESCRIPTION
	Refrigerants	Refrigerants are used in LTD's vehicle fleet, and a thorough record of fleet maintenance is maintained. LTD reported total refrigerant loss by type, weight, and end use. R-134a and R-407c were the only identified refrigerants used in LTD's vehicle fleet, and usage by pounds was documented for all maintenance during FY22. <i>High confidence data.</i>
Scope 2	Electricity	LTD included total kWh of electricity use for FY22 from the utility providers that service facilities, Eugene Water and Electric Board and Springfield Utility Board. Data was split for building and vehicle use. No RECs or renewable energy credit purchases were made in FY22. <i>High confidence data.</i> Following Greenhouse Gas Protocol's Scope 2 Guidance, emissions from electricity were calculated using both market-based and location-based methodologies for all electric utility providers.
Scope 3 (Indirect Emissions)	Solid Waste	This category includes landfilled solid waste from LTD's operations. Solid waste volumes were estimated using container volumes in gallons and pick-up frequency reported on service vendor invoices. <i>Medium confidence data.</i>
	Employee Commute	Employee commute data was calculated by counting total in-person employees (284) assumed to commute 5 days a week on an average of 11.9 miles distance. Partially remote employees (24) are assumed home 60% and in office for 40% of their time, traveling 10.9 miles. The fully remote staff (5) are assumed to not commute at all. We assume commuters are using single-occupancy vehicles 98% of the time and other non-fossil fuel modes 2% of the time, based on previous surveys. <i>Low confidence data.</i>
	Upstream Energy	Upstream emissions were calculated based on total fleet fuels, natural gas, and electricity purchased for FY22 combined with data from Oregon Department of Environmental Quality. <i>High confidence data.</i>
	Supply Chain & Business Travel	LTD staff collected and provided financial data, including dollars spent on the following categories: manufactured goods and services (clothing, electronics, food and beverage, furnishings, other manufactured goods, services, vehicles and parts) and capital improvement projects (construction, electronics, heavy duty truck manufacturing, other manufactured goods, services, and vehicles and parts). <i>Medium confidence data.</i>

kWh = kilowatt hours; LTD = Lane Transit District; MPG = miles per gallon; RECs = recognized environmental conditions