

# **LAKETRAN**

## **Climate Action Plan**



**VERSION DATE – April 5, 2022**

# 1. Contents

1. Contents .....	2
2. Introduction .....	3
3. Agency Overview .....	4
4. Emissions Inventory.....	9
5. Past and Current Initiatives .....	16
6. Emission Reduction Goals and Targets.....	18
7. Strategies and Actions .....	19
8. Implementation and Monitoring .....	20
9. Appendix A: References.....	22
10. Tables .....	23
11. Figures.....	24

## 2. Introduction

The Federal Transit Administration launched the Sustainable Transit for a Healthy Planet Challenge to encourage transit agencies to reduce greenhouse gas emissions to support the Biden Administration's goal to achieve a 50% reduction in economy wide emissions by 2030.

Laketrans has a long history of commitment to alternative fueled vehicles. Our agency was among the first in the State of Ohio in the 1990s to implement compressed natural gas heavy duty buses. In 2016, Laketrans began the process of converting our fleet of paratransit vehicles from diesel to propane. And most recently, in 2021, Laketrans put into service the first majority battery electric fleet of heavy duty buses in the state. The purpose of this plan is to outline Laketrans's commitment to a clean energy and sustainable future in order to reduce greenhouse gas and carbon emissions to improve air quality in the Cleveland region as well as provide a path towards future environmentally sustainable achievements.

The scope of this plan encompasses Laketrans's work between 2010 and the future projections for Laketrans's fleet in 2025 with the goal to achieve 50% or greater reduction in carbon dioxide emissions in the year 2025. The baseline emissions data was set for the year 2010. Sources of data to establish the baseline year are the National Transit Database (NTD) and Laketrans's internal asset register. Using the established Transit Asset Management (TAM) Plan, Laketrans is able to predict, with accuracy, the composition of the fleet in 2025. Using the Environmental Protection Agency's (EPA) Diesel Emissions Quantifier (DEQ), the emissions of Laketrans's fleet of heavy-duty vehicles at baseline in 2010 were calculated and compared with the emissions of the predicted fleet of vehicles in 2025.

The DEQ calculates emissions data in short tons for the following greenhouse gases: nitrogen oxides (NOx), fine particulate matter (PM2.5), hydrocarbons (HC), carbon monoxide (CO), and carbon dioxide (CO2). However, the DEQ is most effective for heavy duty vehicles. Emissions of the smaller classes of vehicles that Laketrans uses for Dial-a-Ride cannot be calculated accurately using the DEQ. An alternative calculation for CO2 emissions was performed for Dial-a-Ride vehicles based upon the volume of fuel consumed by this particular fleet of vehicles in 2010 and the projected fuel consumption for 2025.

Additionally, environmentally sustainable upgrades to Laketrans's facilities were qualitatively compiled. Because baseline utility costs and usage were not available from 2010 for analysis, it is not possible to quantitatively determine emissions reductions.

This plan will be used as a guide for short term and long range planning for the agency.

### 3. Agency Overview

Laketrans is headquartered in Lake County, Ohio which is located 30 miles east of Cleveland. Lake County has a population of approximately 230,000 and is primarily suburban development on its western half and rural on its eastern half. Laketrans was founded with the commitment to provide quality public transportation services to all Lake County residents with a special emphasis on meeting the transportation needs of senior citizens and people with disabilities. Laketrans provides over 700,000 rides annually.

By providing public transportation, Laketrans invests in its community, connects residents with jobs, reduces congestion, and contributes to lowering carbon and greenhouse gas emissions by decreasing the number of personal vehicles on the road. Over half of Laketrans riders take the bus to get to work. To meet the diverse needs of its community, Laketrans operates three distinct services: In-County Fixed Route; Commuter Express; and Demand Response. Through these three services, Laketrans serves a tri-county area. Additionally, Laketrans partners with neighboring transit operators such as Greater Cleveland Regional Transit Authority for reciprocal fare agreements in order to increase access to transportation throughout the Greater Cleveland Metropolitan Area.

Laketrans's Commuter Express service provides residents with transportation direct to downtown Cleveland. Commuter Express also functions as a reverse commute option for Cleveland residents to reach the manufacturing corridor in Lake County. Promoting the reverse commute option is a cost-effective way to offer new service because the buses are typically empty on the return trip.

In-County Fixed Route is the local transit service within Lake County that operates nine routes Monday through Saturday. Of the three services Laketrans offers, the Local routes serve the most residents. In 2020, Laketrans introduced two new fixed routes to provide transportation to underserved communities in Mentor and Mentor-on-the-Lake as well as provide hourly service to the manufacturing corridor on Tyler Boulevard. In 2021, Laketrans was the first agency in the state to put into service heavy duty, battery-electric buses that are charged on-route using overhead opportunity chargers.

The demand response service, known as Dial-a-Ride, provides door-to-door assisted transportation via a shared-ride paratransit service. Transportation is provided throughout Lake County and to select world-renowned medical facilities in the greater Cleveland area. Laketrans experienced an 18% increase in ridership on Dial-a-Ride between 2014 and 2019. The need for Dial-a-Ride service is expected to grow as the population ages. The "Silver Tsunami" is expected to impact Laketrans significantly as baby boomers progress through retirement age.

**Table 1 Laketran Fleet Makeup in 2010**

<u>Style of Vehicle</u>	<u>Service</u>	<u>Vehicle Classification</u>	<u>Qty</u>	<u>Model Year(s)</u>	<u>Fuel</u>
Cutaway	Dial-a-Ride	Medium-Duty Medium Size	79	2002-2010	Diesel
Heavy Duty Bus	Fixed Route	30ft Heavy Duty	4	2010	Diesel
Heavy Duty Bus	Fixed Route	35ft Heavy Duty	16	2009	Diesel
Heavy Duty Bus	Commuter Express	40ft Motor Coach	20	2016-2018	Diesel

**Table 2 Projected Fleet Makeup in 2025**

<u>Style of Vehicle</u>	<u>Service</u>	<u>Vehicle Classification</u>	<u>Qty</u>	<u>Model Year(s)</u>	<u>Fuel</u>
Cutaway	Dial-a-Ride	Medium-Duty Medium Size	75	2017-2025	60 Propane 15 Gasoline
Unmodified Van	Dial-a-Ride	Light Duty	18	2019-2021	Gasoline
Heavy Duty Bus	Fixed Route	35ft Heavy Duty	17	2021	10 Electric 7 Diesel
Heavy Duty Bus	Commuter Express	40ft Motor Coach	20	2016-2018	Diesel

**Table 3 Laketran Facilities and Associated Amenities**

Facility Name	Location	Operations	Offices	Bus Garage	Maintenance Shop	Bus Charger	EV Chargers	Passenger Waiting Area	Bus Shelter
Eastlake Transit Center	Eastlake							X	
Frank J. Polivka Transit Center	Willoughby					2	4*	X	
Great Lakes Mall Transfer Center	Mentor								X
Headquarters	Painesville	X	X	X	X	2	4*	X	X*
Julie A. Cunningham Transfer Center	Painesville					1			X
Madison Park-n-Ride	Madison								X
Mentor Park-n-Ride	Mentor								X
Wickliffe Park-n-Ride	Wickliffe					2	4	X	

\* - pending construction

Laketran Headquarters houses the entirety of our operations including maintenance shop, dispatch, customer service call center, administrative offices and bus garage. Laketran operates two transit centers , constructed in 2021, the Frank J. Polivka Transit Center (FJP) at Lakeland Community College and the Wickliffe Park-n-Ride. These facilities are state of the art with electric vehicle and bus charging, real-time arrival signage, climate controlled indoor passenger waiting environments.

Laketran also operates two additional Park-n-Ride lots in cities of Mentor and Madison.

Laketran’s six on-route, fast charging infrastructure are located at FJP, Wickliffe Park-n-Ride, Julie A. Cunningham Transfer Center in downtown Painesville, and Laketran Headquarters.

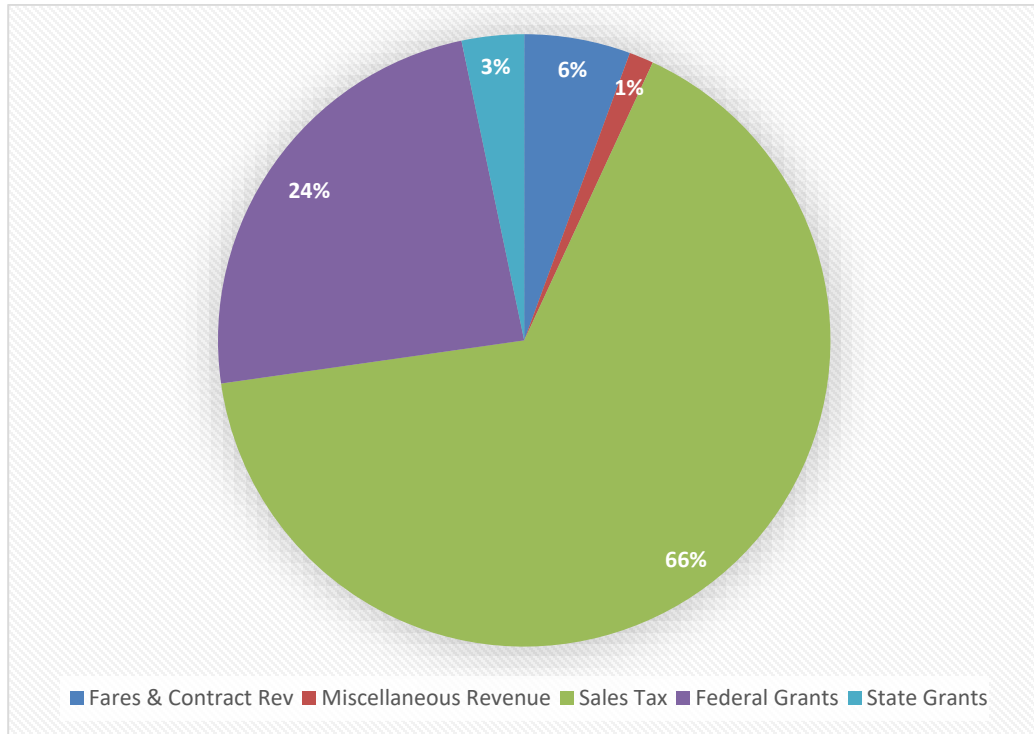
**Table 4 Vehicle Replacement Schedule per Laketrans' Transit Asset Management Plan**

	Asset Class	Qty	Acquisition Year	Mileage	Useful Life	Age	Earliest Replacement Year	Useful Life Remaining	Estimated Cost
2015 Chevrolet Express 4500 1500-1515*	Cutaway	16	2015	198,997	7	7	2022	0	\$2,384,000
2016 Chevrolet Express 4500 1600-1611*	Cutaway	12	2016	210,340	7	6	2023	1	\$1,788,000
2017 Ford Transits 1770-1771	Van	2	2017	80,797	4	5	2021	-1	\$160,000
2017 Propane Ford Turtle Top 1701-1706, 1721	Cutaway	7	2017	98,070	4	5	2021	-1	\$1,120,000
2019 Ford Transits 1970-1979	Van	10	2019	4,381	4	3	2023	1	\$800,000
2020 Ford Transit 2070-2075	Van	6	2020	14,671	4	2	2024	2	\$510,000
2019 Propane Turtle Top 1901-1934	Cutaway	34	2019	71,923	7	3	2026	4	\$5,440,000
2019 FR Capable Turtle Top 1950-1953	Cutaway	4	2019	36,728	7	3	2026	4	\$700,000
2017 New England Wheels for Campus Loop	Cutaway	2	2019	26,527	7	3	2026	4	\$350,000
2020 Turtle Top VT3	Cutaway	8	2020	14,127	7	2	2027	5	\$1,120,000
2020 FR Capable Turtle Top (4)	Cutaway	4	2020	14,351	7	2	2027	5	\$660,000
2021 Turtle Top VT3 2130-2137	Cutaway	12	2021	14,202	7	1	2028	6	\$1,680,000
2021 FR Capable 2140-2143	Cutaway	4	2021	14,351	7	1	2028	6	\$700,000
Commuter Express 1631-1644	Heavy Duty	14	2016	156,098	12	6	2028	6	\$11,900,000
Commuter Express 1831-1836	Heavy Duty	6	2018	92,888	12	4	2030	8	\$5,100,000
Fixed Route Buses 2150-2166	Heavy Duty	17	2021	16,894	12	1	2033	11	\$13,600,000

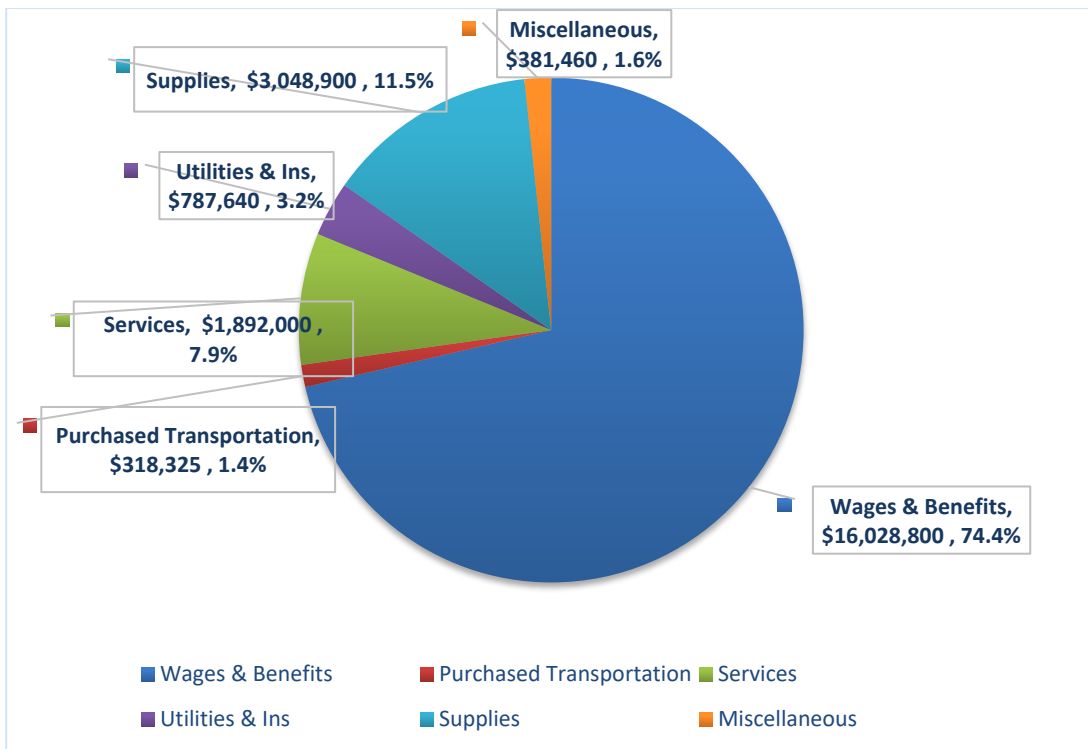
(\*) – 18 propane powered replacement buses were ordered on October 28, 2021

The 2022 operating budget is \$22,457,125.

**Figure 1 2022 Budget Laketrans Revenue Sources**



**Figure 2 2022 Budget Laketrans Expenses**





## 4. Emissions Inventory

Laketrans operates in Lake County, Ohio and throughout the Cleveland Urbanized Area (UZA). The Cleveland UZA is a non-attainment area for air quality – 8 hour ozone – meaning that our region’s air quality is among the worst in the nation. Reducing greenhouse gas emissions and improving energy efficiency to improve air quality is a key goal for CUZA.

Laketrans’s emissions have been categorized by transit operations as fleet and facilities.

### 4.1 Fleet Emissions

Laketrans operates a fleet of revenue vehicles that operate in three diverse services: Commuter Express, In-County Fixed Route, and county-wide Dial-a-Ride paratransit. Different classes of vehicles are used in each service due to the different operating structure and use case. As such, in order to understand Laketrans’s total fleet emissions at baseline in 2010 and projected fleet emissions for 2025, the GHG emissions for each service was calculated independently.

Laketrans’s rolling stock is majority funded through Federal dollars. As such, the minimum useful life of the equipment and the replacement schedule is dictated by Federal regulations as defined by FTA’s Award Management Circular 5010.1e IV-25.

- Large, heavy-duty transit buses including over-the-road buses (approximately 35' – 40' or larger including articulated buses): At least 12 years of service or an accumulation of at least 500,000 miles.
  - Fixed Route 35ft buses and Commuter Express 40ft coaches
- Medium-size, medium-duty transit buses: At least seven years or an accumulation of at least 200,000 miles.
  - Dial-a-Ride cutaway vehicles
- Light Duty Vehicles: Other light-duty vehicles used as equipment and to transport passengers (revenue service), such as regular and specialized vans, sedans, and light-duty buses including all bus models exempt from testing in the current 49 CFR part 665: At least four years or an accumulation of at least 100,000 miles.
  - Dial-a-Ride transit vans

#### 4.1.1 Commuter Express

In 2010, Laketrans operated Commuter Express with a fleet of 20 diesel powered 40ft coaches: 14 model year 1998 vehicles and 6 model year 2004 vehicles. Baseline emissions are described in Table 5.

In 2016, the 1998 buses were replaced with new lower emissions diesel powered coaches. In 2018, the 2004 vehicles were replaced with new lower emissions diesel powered coaches.

Using the EPA’s DEQ, the baseline emissions for the fleet as it existed in 2010 were calculated. Because the fleet of Commuter Express buses are not scheduled for replacement until 2028-2030, emissions data for the current fleet of 2016/2018 model year vehicles can be calculated. The fleet is

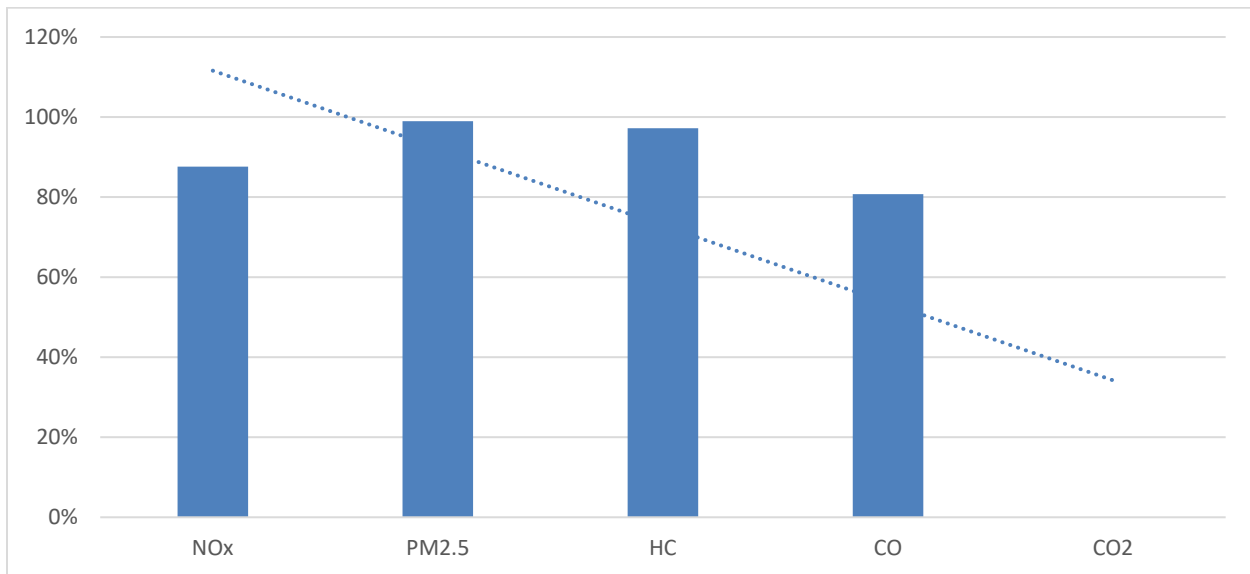
also not expected to change by 2025.

Between 2010 and 2025, Laketran will be able to reduce GHG emissions by 73% on average. However, as Table 5 demonstrates there is no change in Carbon Dioxide emissions because vehicles in 2010 and 2025 are both diesel fueled.

**Table 5 Commuter Express Vehicle Emissions Calculations Between 2010 and 2025.**

<b>Emissions in Pounds (lbs.)</b>	<b>NOx</b>	<b>PM2.5</b>	<b>HC</b>	<b>CO</b>	<b>CO2</b>
Baseline 1998 CE Buses (Qty 14)	34,324	562	2,232	13,360	1,931,200
Baseline 2004 CE Diesel (Qty 6)	6,466	218	576	2,376	827,600
2016 Diesel CE Buses (Qty 14)	4,422	6	72	2,834	1,931,200
2018 Diesel CE Buses (Qty 6)	638	2	6	200	827,600
<b>Total 2010 Emissions</b>	<b>40,790</b>	<b>780</b>	<b>2,808</b>	<b>15,736</b>	<b>2,758,800</b>
<b>Total 2025 Emissions</b>	<b>5,060</b>	<b>8</b>	<b>78</b>	<b>3,034</b>	<b>2,758,800</b>
<b>% Emissions Reduction between 2010 and 2025</b>	<b>88%</b>	<b>99%</b>	<b>97%</b>	<b>81%</b>	<b>0%</b>

**Figure 3 Commuter Express Fleet Emissions Reduction in Criteria Pollutants between 2010 and 2025**



#### 4.1.2 In-County Fixed Route

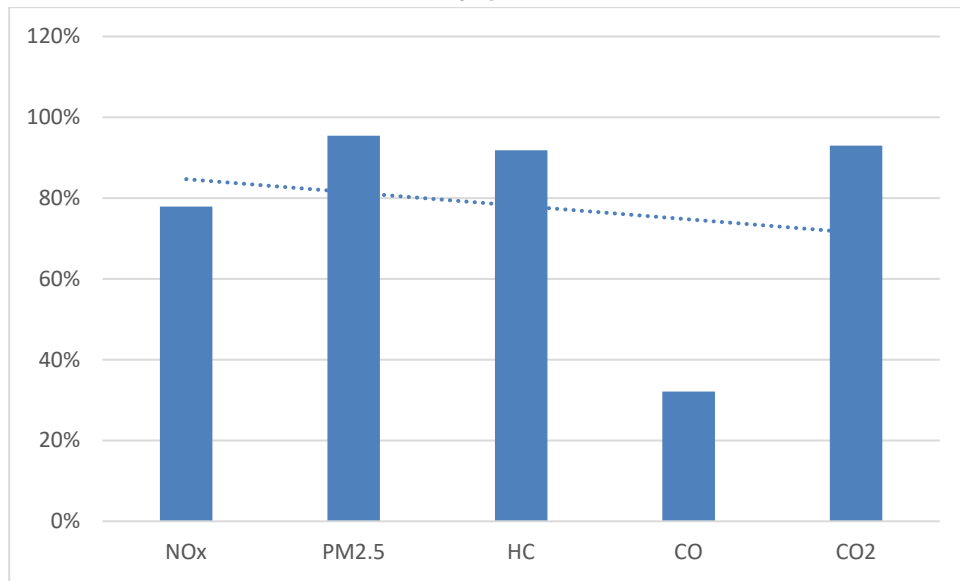
In 2010, Laketrans operated 16 fixed route buses powered by diesel engines. In 2021, the entire fixed route fleet was replaced with 35ft heavy duty buses – 10 zero emissions battery electric buses and seven lower emissions diesel powered buses. Battery electric buses entered revenue service in late third quarter 2021 as not only the first battery electric buses in the State of Ohio, but as also the first majority electric fleet.

Using the EPA’s DEQ, the baseline emissions for the fleet as it existed in 2010 were calculated and then the calculations were performed on the new fleet as it exists in 2021. Because this fleet of buses is so new, there is no expected change in the composition of the fleet. Therefore, Laketrans can predict the GHG emissions for the Fixed Route fleet in 2025. Between 2010 and 2025, Laketrans will reduce greenhouse gas emissions in our fleet of fixed route buses by 78% on average.

**Table 6 Laketrans In-County Fixed Route Vehicle Emissions Calculations Between 2010 and 2025.**

Emissions in Pounds (lbs.)	NOx	PM2.5	HC	CO	CO2
Baseline for Emissions (16) Diesel vehicles model year 2009	8,628	44	416	1,850	13,794,800
Baseline Emissions for (10) Battery Electric Vehicles model year 2021	-	-	-	-	-
Baseline Emissions for (7) Diesel Vehicles model year 2021	1,906	2.00	34	1,256	965,600
Total Emissions 2010 Vehicles	8,628	44	416	1,850	13,794,800
Total Emissions 2025 Vehicles	1,906	2	34	1,256	965,600
<b>% Emissions Reduction between 2010 and 2025</b>	<b>78%</b>	<b>95%</b>	<b>92%</b>	<b>32%</b>	<b>93%</b>

**Figure 4 Fixed Route Fleet Emissions Reduction in Criteria Pollutants between 2010 and 2025**



### 4.1.3 Dial-a-Ride

Laketrans' Dial-a-Ride fleet is comprised of cutaway style medium duty buses and light duty vans. Historically, Dial-a-Ride vehicles have been powered with diesel engines. A portion of the Dial-a-Ride fleet is replaced every year.

In 2017, Laketrans began to replace diesel powered vehicles with propane powered vehicles. Propane is also known as liquified petroleum gas or LPG. The final remaining diesel buses will be replaced before 2025.

The DEQ is limited in its analysis of propane powered vehicles. According to the July 15, 2021 DEQ Release Notes, "CNG, LNG, and LPG/propane baseline fuel types now quantify NOx, PM2.5, HC and CO emissions using alternative fuel factors from the Department of Energy Argonne National Laboratory's GREET model when available. For LPG/propane vehicles, alternative fuel factors are available ONLY for school buses. The DEQ uses ULSD factors when alternative fuel factors are not available."

Beginning in 2019, Laketrans began to incorporate light duty unmodified vans into the fleet. These vans are gasoline powered. The DEQ is limited in its analysis of light duty vehicles as only vehicle classes four through eight are incorporated into the calculator. Vans are typically categorized in vehicle classes one, two, or three.

"In the preamble to the joint EPA/Department of Transportation rulemaking on May 7, 2010 that established the initial National Program fuel economy standards for model years 2012-2016, the agencies stated that they had agreed to use a common conversion factor of 8,887 grams of CO<sub>2</sub> emissions per gallon of gasoline consumed (Federal Register 2010). For reference, to obtain the number of grams of CO<sub>2</sub> emitted per gallon of gasoline combusted, the heat content of the fuel per gallon can be multiplied by the kg CO<sub>2</sub> per heat content of the fuel. This value assumes that all the carbon in the gasoline is converted to CO<sub>2</sub> (IPCC 2006). (Reference - <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>)

As such, in order to calculate emissions for gasoline powered light transit vehicles, the gallons of fuel consumed were multiplied by the British thermal unit (Btu) per gallon and the pounds of CO<sub>2</sub> emitted per million Btu of fuel. The conversion factors are listed in Tables 7 – 11.

Laketrans' fleet replacement and transit asset management plans provide the knowledge that the order to replace the remaining diesel powered cutaways will be placed later this year with an expected delivery date in 2024. Therefore, it is possible to predict the fleet composition for 2025 and make reasonable assumptions for fuel consumption. Section 4.1.4 describes the methodology used to calculate estimated fuel consumption for 2025.

**Table 7 Pounds of CO<sub>2</sub> emitted per million Btu of energy for various fuels**

Diesel fuel	163.45
Propane	138.63

**Table 8 Btu of energy per gallon of fuel**

Diesel fuel	1 gallon = 137,381 Btu
Propane	1 gallon = 91,452 Btu

**Table 9 Pounds of CO2 emitted in 2010 for Laketran's Dial-Ride Fleet**

	<b>Diesel</b>
Gallons	189,984
btu*gallon	26,100,191,904
lbs. CO2 / million Btu	4,266,076

**Table 10 2025 Predictions for Pounds CO2 emitted for Laketran's Propane Fleet**

	<b>Propane</b>
Gallons	340,961
btu*gallon	31,181,577,720
lbs. CO2 / million Btu	4,322,702

**Table 11 2025 Predictions for Pounds CO2 emitted for Laketran's Gasoline Fleet**

	<b>Gasoline</b>
Gallons	122,301
8887g/gal	1,086,891,446
lbs. CO2	2,396,187

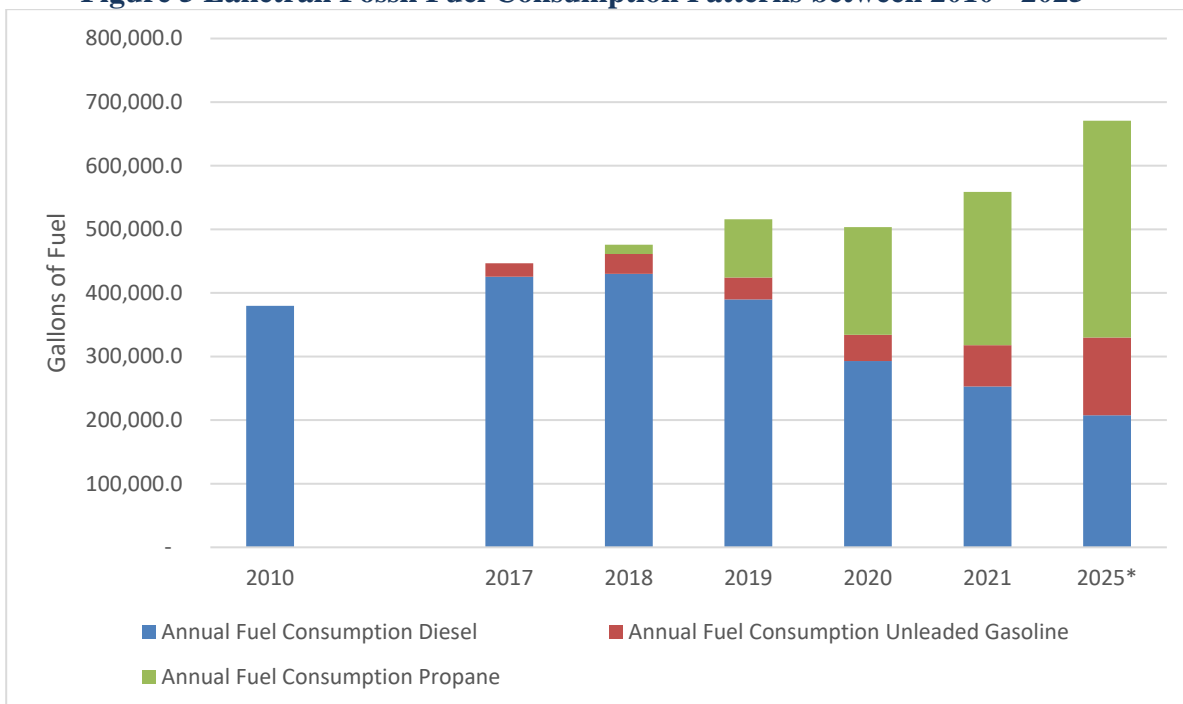
#### 4.1.4 Fossil Fuel Consumption

Implementation of 10 battery-electric buses is expected to reduce Laketran's fossil fuel consumption by roughly 75,000 gallons or 10.7 terajoules (TJ) of energy annually.

The transition away from diesel powered paratransit vehicles will be completed by the end of 2024 when the final 2015 and 2016 model year diesel powered Dial-a-Ride vehicles are replaced with propane buses. Laketran's Dial-a-Ride fleet will be comprised of a majority propane vehicles and gas powered smaller buses and vans. In 2010, all fuel consumed by Laketran was in the form of diesel. Laketran's diesel fuel usage will continue to decline as the final diesel powered Dial-a-Ride vehicles are replaced. Decreasing overall consumption of diesel fuel will yield improve air quality in Lake County as diesel fuel has the highest GHG emissions.

Figure 5 demonstrates Laketran's fuel consumption as it transitions away from diesel and to other fuels throughout the years. Actual numbers are available for 2010 – 2021 and the numbers for 2025 are predicted based upon average fuel increases between 2017-2021. Propane consumption has increased and diesel fuel usage and decreased significantly. Total gallons of fuel consumed has increased as Laketran has increased service. Additionally, it must be noted that a gallon of propane contains 27% less energy than a gallon of gasoline (expressed as btus). Therefore, the fuel economy (expressed as miles per gallon) for propane is less than for gasoline and diesel. However, propane is considered a clean fuel according to the Clean Air Act due to its low-carbon composition. So despite using more fuel per mile, propane emits fewer greenhouse gases.

**Figure 5 Laketran Fossil Fuel Consumption Patterns between 2010 - 2025**



#### 4.1.5 Total Fleet Emissions

In the year 2025, Laketran is projected to meet the Biden Administration’s goal for 50% or greater reduction in greenhouse gas emissions. Due in large part to Laketran’s implementation of zero emissions heavy duty fixed route buses, Laketran is several years ahead in meeting President Biden’s goal for improving air pollution.

The total vehicle emissions from Laketran’s fleet is described in Table 12.

**Table 12 Laketran Total Fleet Emissions for 2010 and Predicted Emissions for 2025**

	Pounds of CO2 Emissions
Total Emissions by Baseline 2010 Vehicles	20,819,676
Predicted Emissions by 2025 Vehicles	10,443,290
<b>Total Reduction in Emissions</b>	<b>50%</b>

Unfortunately due to limitations of the EPA’s DEQ instrument, it was not possible to calculate the emissions of NOx, CO, PM2.5 and HCs for the medium-duty and light-duty vehicles. Resources for calculations for the other GHG emissions factors were not able to be located for the Dial-a-Ride buses, therefore, the total fleet emissions could only be calculated for CO2. This is a limitation of Laketran’s plan.

Laketran will achieve 52% reduction in carbon dioxide emissions in 2025 despite increasing service from 2010 levels. Between 2018 and 2020, Laketran introduced three new fixed routes that operate Monday – Saturday – a 37% increase in revenue hours.

## **4.2 Facilities Emissions**

Laketran Headquarters houses the entirety of our operations including bus garage, dispatch offices, customer service call center, maintenance shop, and administrative offices. Headquarters is now 30 years old having been built in 1992. Laketran has made many building modifications to improve energy efficiency over the past 30 years. Laketran consumes less energy using light timers and motion sensors in the vehicle storage areas and installed skylights to reduce the need for artificial light and improve safety. Offices and the maintenance shop are heated using a waste oil furnace and a waste oil boiler. Used oil (or waste oil) from Laketran vehicles is stored in underground tanks and then burned in the waste oil furnace/boiler to heat the building. Laketran saves roughly 54,000kWh of energy by recycling used oil to heat the facility.

Laketran constructed two indoor transit centers in 2021. Each facility houses the en-route, opportunity chargers for our electric bus fleet. There are also four public access charging stations for electric vehicles (EV) installed at the Wickliffe Park-n-Rode with plan to install four to eight additional EV chargers at other Laketran properties. One facility is designed with a bioswale that collects polluted stormwater runoff, soaks it into the ground, and filters out the pollution. Bioswales are similar to rain gardens but are designed to capture much more runoff coming from larger areas of impervious surfaces like streets and parking lots. Bioswales also have complicated design features such as layers of engineered soil and gravel, perforated pipe underdrains, and overflow structures to help handle runoff from bigger storms.

A major limitation to Laketran's facilities emissions reporting is that data from the baseline period is not available. Kilowatt hours of electricity used, gallons of water, and heating costs from 2010 are not available with which to calculate baseline emissions. Additionally, the footprint of Laketran's facilities has grown significantly since 2010 with the construction of the Julie A. Cunningham Transfer Center in Downtown Painesville in 2014 (three semi-permanent heated bus shelters), the Frank J. Polivka Transit Center in 2019 (a 1,600 square foot climate controlled building), and the transit center at the Wickliffe Park-n-Ride in 2020 (a 1,015 square foot climate controlled building). It would be prohibitively difficult to make quantitative claims as to the reduction of facilities related emissions when the facilities themselves have increased so dramatically. Thus, Laketran can only make qualitative claims regarding sustainability and total emissions reductions for our facilities.

## 5. Past and Current Initiatives

Laketrans has undertaken initiatives to reduce our agency's emissions for many years. The largest source for greenhouse gas emissions is Laketrans' fleet of vehicles which operate 16 hours a day six days a week. However, since 2017, the fleet has been gradually overhauled with alternatively fueled vehicles that will reduce emissions. 2017 was the first year propane buses were put into revenue service. 2021 marks the year that Laketrans implemented a majority zero emissions fleet of battery electric fixed route buses. It is anticipated by the year 2025, the conversion of the Dial-a-Ride fleet to propane and gasoline will be completed with the replacement of the last diesel powered cutaways.

Each year, Laketrans recycles over five tons of recyclables and saves the equivalent of 54,000 kWh of energy by recycling used (waste) oil to heat our building. Used oil filters are crushed, and metal is separated and recycled. Coolant is also recycled. Laketrans recycles over 50 cubic yards of metal annually. Water used in our bus washer is recycled and reused to wash buses. Laketrans provides recycle bins throughout our headquarters for paper, cardboard, plastic and aluminum cans through a single stream recycling program.

Our agency uses oil additives to increase oil life four fold. Laketrans uses re-refined oil in propane and unleaded gasoline powered vehicles and once the re-refined oil has reached its second useful life in our buses, it is reused once again (a third useful life) to heat our building. Laketrans recycles about 3,000 or more gallons of motor oil annually to heat our entire Headquarters building with a waste oil heating system. This is considered recycling according to the EPA and highly recommended because it reduces need to transport more oil to more places and reduces risks of spills in transportation of oil. There is "cradle to grave" liability when oil leaves the garage, therefore, recycling the oil on-site also reduces risks to the agency.

In 2013, light fixtures in the bus garage were upgrade to energy efficient LEDs. According to the U.S. Department of Energy "Energy Saver," LED lighting uses 75% less energy than traditional incandescent lighting. As lighting is replaced through maintenance activities, new LED light fixtures are installed. All recent construction projects have installed LED lighting.

The Northeast Ohio Areawide Coordinating Agency (NOACA) is the Metropolitan Planning Organization (MPO) for the five county region of which Lake County is included. NOACA will advocate for public policies that provide greater transportation choice, reduce mobile emissions, benefit public health, create economic opportunity, and enhance quality of life in Northeast Ohio.

NOACA's long range plan *eNEO 2050* devotes a whole chapter to the environmental impacts of transportation.

"One of the five goals specified in NOACA's vision statement is "enhance quality of life." Embedded within the achievement of that goal are the attributes of the natural environment and human health. Furthermore, there are numerous objectives under this and other goals in NOACA's Regional Strategic Plan that specifically address them:

- foster collaboration on issues of transportation, air and water quality that will lead to greater regional cohesion and cooperation on other issues of regional concern



- reduce energy use and improve air quality
- reduce greenhouse gas emissions
- engage in regional efforts to control stormwater, protect and improve water quality, and control development in floodplains
- enhance the public's access to and enjoyment of the region's parks, cultural assets and recreational activities
- preserve agricultural lands, open space and important habitat areas, woodlands, and wetlands
- promote healthy and active living"

Laketrans sustainable climate action plan is in line with the regional air quality goals outlined by NOACA.

## 6. Emission Reduction Goals and Targets

Laketrans goals are:

- 1) To achieve a 50% reduction in carbon dioxide gas emissions from 2010 levels by 2025
- 2) To implement a 100% zero emissions heavy duty bus fleet by 2040.

## 7. Strategies and Actions

**Goal #1: To achieve a 50% reduction in greenhouse gas emissions from 2010 levels by 2030.**

Strategy	Actions	Metric to track progress	Timeframe	Responsible Office(s)
Reduce Vehicle Carbon Dioxide Emissions by 50% compared to 2010 level	Develop Sustainable Climate Action Plan	Yes/No	June 2025	Compliance

Laketrans implemented the first majority electric fleet of fixed route buses in 2021. Fleet replacement and TAM plans predict total replacement of all diesel buses in Dial-a-Ride with either propane or gasoline powered vehicles by 2024. Therefore, Laketrans is on target to reach its goal of 50% reduction in carbon emissions in the year 2025 when compared with the baseline year of 2010.

**Goal #2: To implement 100% zero emissions fixed route bus fleet by 2040.**

Strategy	Actions	Metric to track progress	Timeframe	Responsible Office(s)
To implement 100% zero emissions heavy duty bus fleet by 2040	Replace diesel powered fixed route buses with 100% zero emissions battery electric buses	# of buses funded for replacement	June 2040	Compliance, Operations, Maintenance
	Replace first fleet of battery electric buses with new zero emissions buses	# of buses funded for replacement	June 2040	Compliance, Operations, Maintenance

Federal interest remains in Laketrans' new model year 2021 diesel powered fixed route buses until the useful life of the vehicles is reached. Laketrans' Fixed Route Buses were delivered in 2021 and have a useful life of 12 years / 500,000 miles. Therefore, diesel powered fixed route buses cannot be replaced until 2033 at the earliest. Laketrans will pursue capital grants to replace these vehicles including applying to discretionary grant programs.

## 8. Implementation and Monitoring

### Funding

Between 2010 and 2022, the Producer Price Index (PPI) for heavy duty truck and bus chassis manufacturing rose by 22% (Figure 6). Laketrans can reasonably approximate that the future costs of buses needed to implement at 100% zero emissions fleet in 2033-2040 will total \$15.33 million. Laketrans will begin to pursue capital grants for vehicle replacements in 2033 as the current fixed route buses approach the end of their useful life.

**Figure 6 - Producer Price Index for Heavy Duty Truck Manufacturing between 2010 and 2022**



2022 will mark the first full year of service with our 10 battery electric buses. Laketrans will achieve over 50% reduction in vehicle emissions in 2025. Moving from implementation to long term operation, Laketrans will shift into monitoring our fleet of BEBs. The charger manufacturer, ABB, has a dashboard so that each overhead (OH) charger can be monitored. In the first six months of operation, between August 1, 2021 and February 1, 2022, Laketrans's chargers dispersed 307,768 kWh of electricity over 8,995 individual charging sessions. Future goals include pursuing charge management strategies that will help make electrical consumption more cost efficient and sustainable.

**Table 13 - Laketran Charging Session Statistics between August 1, 2021 and February 1, 2022.**

	Energy Delivered (kWh)	Duration	Battery State Of Charge At Session Start (kWh)	Battery State Of Charge At Session Stop (kWh)
Average per Session	34.22	0:09:16	62.0	75.8
Median of all Sessions	34.27	0:07:40	64.0	80.0
TOTAL	307,768.1	1390 hours		
		58 days		

**Emerging Challenges**

- **BEB Battery Useful Life**  
 There is not an industry standard for battery life. Standard battery useful life will be important to transit asset management, operations, and capital planning. Laketran will continue to monitor our BEB performance and the BEB industry to understand useful life benchmarks for bus batteries.
  
- **Recycling BEB batteries**  
 A sustainability question is what will happen to bus batteries after they can no longer perform.
  1. Can old batteries be used to store energy from a solar array?
  2. Can old batteries be repurposed to store energy for charge management?
 Laketran will continue to watch as the BEB industry evolves as initial adopters replace original technology and as more transit agencies adopt zero emissions technology.

## 9. Appendix A: References

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## 10. Tables

Table 1 Laketran Fleet Makeup in 2010 .....	5
Table 2 Projected Fleet Makeup in 2025 .....	5
Table 3 Laketran Facilities and Associated Amenities .....	6
Table 4 Vehicle Replacement Schedule per Laketran’s Transit Asset Management Plan .....	7
Table 5 Commuter Express Vehicle Emissions Calculations Between 2010 and 2025. ....	10
Table 6 Laketran In-County Fixed Route Vehicle Emissions Calculations Between 2010 and 2025.....	11
Table 7 Pounds of CO2 emitted per million Btu of energy for various fuels .....	12
Table 8 Btu of energy per gallon of fuel.....	13
Table 9 Pounds of CO2 emitted in 2010 for Laketran’s Dial-Ride Fleet .....	13
Table 10 2025 Predictions for Pounds CO2 emitted for Laketran’s Propane Fleet.....	13
Table 11 2025 Predictions for Pounds CO2 emitted for Laketran’s Gasoline Fleet .....	13
Table 12 Laketran Total Fleet Emissions for 2010 and Predicted Emissions for 2025.....	14
Table 13 - Laketran Charging Session Statistics between August 1, 2021 and February 1, 2022. ....	21

**11. Figures**

Figure 1 2022 Budget Laketran Revenue Sources..... 8

Figure 2 2022 Budget Laketran Expenses ..... 8

Figure 3 Commuter Express Fleet Emissions Reduction in Criteria Pollutants between 2010 and 2025..... 10

Figure 4 Fixed Route Fleet Emissions Reduction in Criteria Pollutants between 2010 and 2025 11

Figure 5 Laketran Fossil Fuel Consumption Patterns between 2010 - 2025 ..... 14

Figure 6 - Producer Price Index for Heavy Duty Truck Manufacturing between 2010 and 2022 20