AGENDA OF THE TRANSIT COMMISSION

WEDNESDAY, FEBRUARY 21, 2024, 8:15 AM
TRANSIT
901 University Ave

A. Roll Call.

1. Roger Kolb, Chair; Emily Ysebaert, Vice-Chair; Kevin Kuehn, Secretary; Alderman Randy Scannell, Michael Conley-Kuhagen, Terri Refsguard and Hector Rodriguez.

B. Approval of the Agenda.

1. Approval of the Wednesday, February 21, 2024 Transit Commission Agenda.

C. Approval of Minutes.

1. Approval of Transit Commission minutes from January 17, 2024.

D. Regular Business.

1. Presentation: Green Bay Metro Zero - Emissions Fleet Transition Plan

E. Informational.

1. Operational Reports
2. Director's Report
3. Next Transit Commission Meeting: March 20, 2024 at 8:15am.

F. Adjournment.

1) ACCESSIBILITY: Any person wishing to attend who requires special accommodation because of a disability, should contact the City Safety Manager at 920-448-3125 at least 48 hours before the scheduled meeting time so that arrangements can be made.
2) QUORUM: Please take notice that a majority or quorum of the Common Council will attend this Transit Commission meeting and will constitute a meeting of the Common Council for purposes of discussion and information gathering relative to this agenda.
3) REPRESENTATION: The party requesting the communication, or their representative, should be present at this meeting.

Report to the
Transit Commission
of the City of Green Bay

Green Bay METRO

MEETING DATE	PREPARED BY
February 21, 2024	

AGENDA ITEM # B.1

Approval of the February 21, 2024, Transit Commission Agenda.

BACKGROUND

RECOMMENDATION

Staff recommends the approval of the Transit Commission agenda for February 21, 2024.

FISCAL IMPACT

ATTACHMENTS

None

Report to the
Transit Commission
of the City of Green Bay

MEETING DATE	PREPARED BY
February 21, 2024	Patty Kiewiz, Transit Director

AGENDA ITEM # C.1

Approval of Transit Commission minutes from January 17, 2024.

BACKGROUND

Minutes from the meeting held on January 17, 2024.

RECOMMENDATION

Staff recommends approval of the minutes from the January 17, 2024, meeting.

FISCAL IMPACT

ATTACHMENTS

1. Transit Commission 1-17-24

MINUTES OF THE TRANSIT COMMISSION

WEDNESDAY, JANUARY 17, 2024, 8:15 AM
TRANSIT
901 University Ave

A. ROLL CALL.

1. Roger Kolb, Chair; Emily Ysebaert, Vice-Chair; Kevin Kuehn, Secretary; Alderman Randy Scannell, Michael Conley-Kuhagen, Terri Refsguard and Hector Rodriguez.

Present: Roger Kolb, Kevin Kuehn, Hector Rodriguez, Alderman Randy Scannell and Terri Refsguard

Excused: Emily Ysebert, Michael Conley Kuhagen

Chair Roger Kolb called the meeting to order at 8:15 a.m.

B. APPROVAL OF THE AGENDA.

1. Approval of the January 17, 2024 Transit Commission Agenda.

Moved by Alder Randy Scannell, seconded by Commissioner Kevin Kuehn, to approve the agenda for January 17, 2024. Motion carried.
Yes - Roger Kolb, Terri Refsguard, and Hector Rodriguez
No - None, Abstain- None

C. APPROVAL OF MINUTES.

1. Approval of Transit Commission minutes from December 6, 2023.

Moved by Commissioner Kevin Kuehn, seconded by Alder Randy Scannell, to approve the minutes from the December 6, 2023 meeting. Motion carried.
Yes - Roger Kolb, Terri Refsguard, and Hector Rodriguez
No - None, Abstain- None

D. REGULAR BUSINESS.

1. Discussion/Action: Green Bay Metro Financial Management & Procedures

Director Kiewiz stated this is an important document that provides guidance and expectations for

staff. She shared this update includes some general housekeeping updates in addition to comments made through the triennial review. Changes are represented by being highlighted.

Moved by Commissioner Kevin Kuehn, seconded by Alder Randy Scannell, to approve the Green Bay Metro Financial Management & Procedures as presented. Motion carried.
Yes - Roger Kolb, Terri Refsguard, and Hector Rodriguez
No - None, Abstain- None

2. Mobility Management Report - Biannual 2023

Director Kiewiz stated this is a report that Andrea Vlach, Mobility Coordinator, prepares twice a year. This report summarizes all the great work she does. P. Kiewiz reminded the Commission this is a position that is funded through the 5310 program. Metro partners with Brown County Planning to provide these services.

Lisa Conard from Brown County Planning commented that they are pleased with how the program has been functioning. P. Kiewiz commented that A. Vlach does a great job working with the public.

No action is necessary.

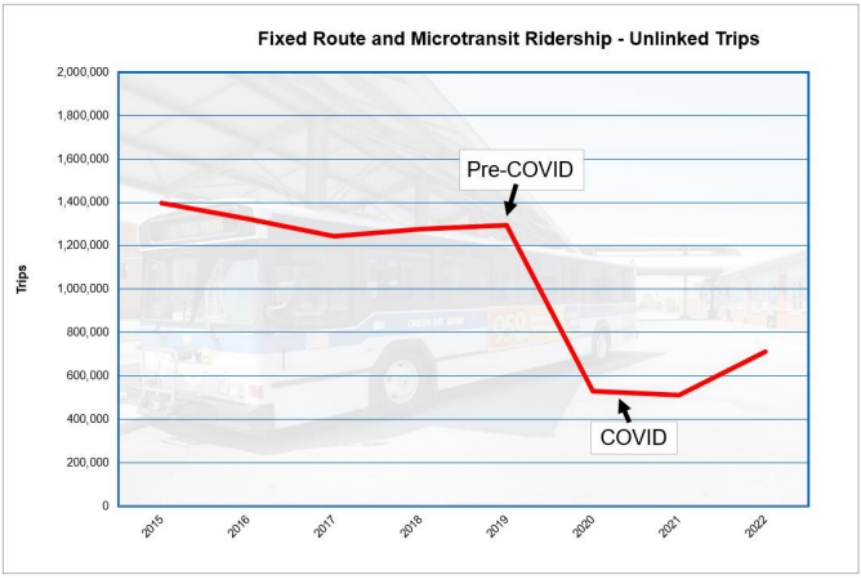
Received and placed on file.

3. Presentation: Green Bay Metro – Annual System Review and Analysis Report, December 2023, by the Brown County Planning Commission/Metropolitan Planning Organization (MPO) for the Green Bay Urbanized Area.

L. Conard provided a brief review of the annual report.

L. Conard referenced the graph on page 8, noting that unlinked passenger trips (boardings) decreased with the onset of the pandemic but has since been trending higher. L. Conard cautioned that it is important to note how transit services were delivered pre pandemic and how they are being delivered post pandemic.

For example, prior to the pandemic a person living in De Pere traveling to NWTC would board a fixed route bus in De Pere, travel to the transportation center and transfer to another bus before arriving at NWTC. On the way home, the opposite would occur resulting in four boardings for the day. Today, with the implementation of microtransit, that same person would board a microtransit vehicle and travel to NWTC. Again, on the way home, the person would board a microtransit vehicle and travel to De Pere. This would be recorded as two boardings for the day. Therefore, comparing trip totals from 2019 (no microtransit) and before to today (with microtransit) is not an apple-to-apple comparison. Discussion occurred.



L. Conard referred to the table on page 9, noting the data represents the number of passengers transported on a fixed route bus per hour of service. L. Conard noted that the Passengers per Hour measure is commonly used in the transit industry to measure service effectiveness.

L. Conard noted that the data shown in the table is very good, noting that annual system reviews prior to the implementation of microtransit would include former routes with rates below five passengers per hour. Those routes were replaced by microtransit services.

Summary
Fixed Route Bus Service
Passengers per Hour
Weekday

Route	February 2023	May 2023	August 2023	November 2023
#1 Pink	9.5	10.3	10.4	12.8
# 2 Orange	16.7	20.0	12.0	21.9
# 3 Silver	11.2	11.9	13.6	14.1
# 4 Blue	17.9	19.7	15.2	19.6
# 5 Yellow	11.3	10.6	11.7	12.6
# 6 Red	18.4	19.0	17.8	22.1
# 7 Lime	14.4	15.3	10.3	15.7
# 8 Green	15.0	14.0	15.5	13.8
# 9 Gold	15.8	16.8	16.7	17.0
#10 Plum	16.7	15.9	16.1	20.4
#11 Sky	12.6	10.3	9.4	12.5
Weighted Average:	**15.2**	**15.6**	**13.9**	**17.3**

L. Conard noted that the Green Bay Metropolitan Planning Organization (MPO) celebrated its 50th anniversary on January 9, 2024. Governor Patrick Lucey designated the Brown County Planning Commission as the Green Bay MPO on January 9, 1974.

Moved by Commissioner Kevin Kuehn, seconded by Alder Randy Scannell to approve and place on file. Motion carried.
Yes - Roger Kolb, Emily Ysebaert, Michael Conley-Kuhagen Terri Refsguard, and Hector Rodriguez
No - None, Abstain- None

4. Discussion Action: New Advertising Rates Effective February 1, 2024

Director Kiewiz reviewed the current Metro advertising program. This program is all managed in-house and generates approximately $120-150K per year. P. Kiewiz explained that advertising revenue helps reduce the local share in regard to federal and state grants. Rates have been constant for more than 10 years. The staff is proposing an increase. Commissioner Kuehn stated the King Kong size could go higher. P. Kiewiz stated she is looking into advertising opportunities for new infotainment systems that are now located on buses.

Moved by Commissioner Kevin Kuehn, seconded by Hector Rodriguez, to approve the advertising rates as presented. Motion carried.
Yes - Roger Kolb, Emily Ysebaert, Michael Conley-Kuhagen Terri Refsguard, and Alder Randy Scannell
No - None, Abstain- None

E. INFORMATIONAL.

1. Operational Reports

Director Kiewiz provided a brief overview of the Fixed Route, Paratransit, and GBM On Demand services. P. Kiewiz stated the staff are pleased overall with how services have been going. Schedule adherence is a main focus at this time. Director Kiewiz expects to have a plan to present to in March.

2. Financial Reports

Director Kiewiz provided an overview of the financial statements. Metro is expecting to finish the year under budget.

3. Director's Report

Director Kiewiz stated everything is going great. She stated the staff had been doing a great job considering we are still short six operators. P. Kiewiz said she is reviewing local call options for On-Demand to help with customer service. She will report back with her recommendation at a future meeting.

4. Next Transit Commission Meeting: February 21, 2024, at 8:15am.

F. ADJOURNMENT.

Report to the
Transit Commission
of the City of Green Bay

MEETING DATE	PREPARED BY
February 21, 2024	Patty Kiewiz, Transit Director

AGENDA ITEM # D.1

Presentation: Green Bay Metro Zero - Emissions Fleet Transition Plan

BACKGROUND

Green Bay Metro partnered with the City of Green Bay and the Water Utility on a clean energy plan. As part of this plan, a fleet transition plan was prepared for Green Bay Metro. Dan Streit, the consultant from Slipstream will present the fleet transition plan.

This plan will assist staff and the Transit Commission in the decision-making process on future equipment purchases, bus purchases and facility upgrades.

RECOMMENDATION

Staff recommends to receive and place on file.

FISCAL IMPACT

ATTACHMENTS

1. Green Bay Transit Fleet Transition Plan v2.3 - FINAL

Green Bay Metro Transit

ZERO-EMISSIONS FLEET TRANSITION PLAN

February 2024

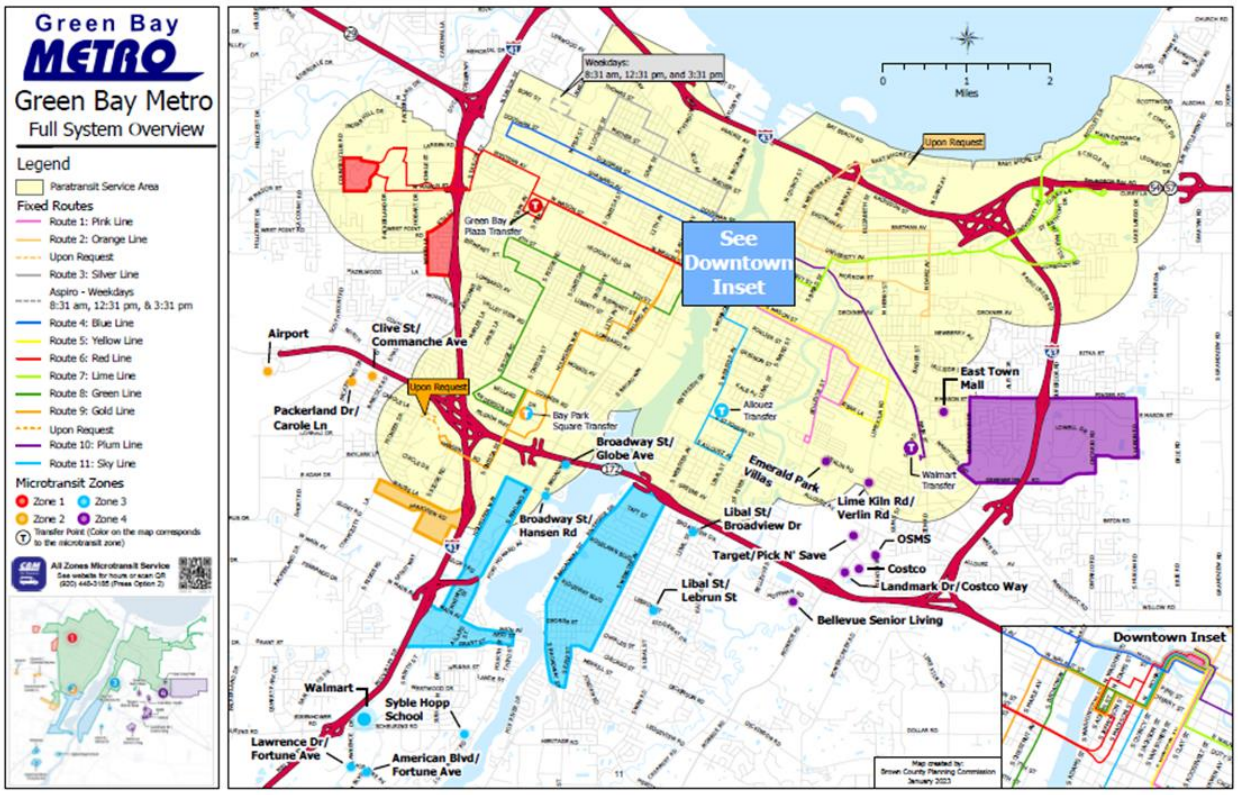
EXECUTIVE SUMMARY

The City of Green Bay, Green Bay Metro (GBM) Transit, and the Green Bay Water Utility partnered with Slipstream, a mission-based non-profit organization, to complete a community energy planning project. The planning project started in August 2022 and was funded through Wisconsin Office of Energy Innovation grant.

Over the last year, the partners collaborated on developing a communitywide plan, "Clean Energy Green Bay". This communitywide plan, along with the City's 2050 carbon neutrality goal aligns with the description of the Federal Transit Administration's (FTA's) description of a Climate Action Plan.

Green Bay Metro provides public transportation services to the cities of Green Bay and De Pere, and villages of Allouez, Ashwaubenon, and Bellevue (Figure 1). The public transportation system consists of three modes of transportation: fixed route, on demand, and paratransit. Service includes 11 full-service routes, 3 limited-service routes, 4 game day routes, and 4 on demand microtransit zones. Communities served by Green Bay Metro have a population of 181,233 with a service area of 61.50 square miles.

Figure 1. Green Bay Metro service territory.



Through the planning process, Green Bay Metro worked with Slipstream to review fuel, mileage, and ridership data to develop recommendations for how GBM can lower carbon emissions. The team evaluated low-carbon options for its existing fixed route fleet of 40-foot, 35-foot, and 29-foot clean diesel buses, its contractor fleet of gasoline shuttle buses and paratransit vans; and its non-revenue operations gasoline, diesel, and propane vehicles to zero-emissions alternatives.

The process included the following steps:

- Analysis of all fleet and facility energy use data to develop a baseline energy, cost and carbon profile.
- Compilation of a vehicle list along with gasoline and diesel purchases to identify low-carbon options.
- Analysis of onsite solar opportunities at the Transit building.

Creating a greenhouse gas profile is a vital first step in a planning process to identify savings opportunities and serve as a baseline to use when tracking future progress. Figure 2 illustrates the relative CO_2 emissions and cost impact for the Transit building, the fixed route vehicles, contractor vehicles, and non-revenue vehicles.

Figure 2. Annual CO_2 emissions and cost impacts of Transit buildings and fleet

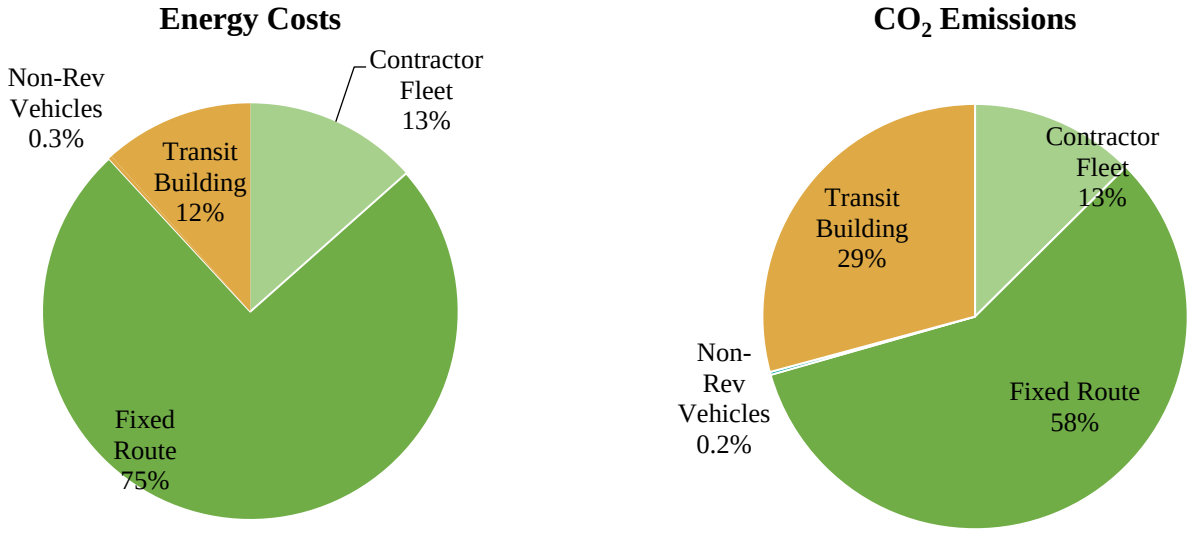


Table 1 shows the distribution of annual fuel use, cost, and metric tons (MT) CO_2 emissions for Green Bay Metro's three vehicle fleets.

Table 1. GBM fuel and emissions by fleet segment

Fleet segment	Annual fuel use (gallons)	Fuel costs	CO_2e emissions (MT)	% total emissions
Fixed route	142,415	$609,534	1,459	82.0%
Contractor fleet	37,131	$132,929	316	17.7%
Non-revenue vehicles	588	$2,418	6	0.3%
Total	**180,133**	**$744,882**	**1,781**	

The recommendations for the Green Bay Metro are as follow:

- **Continue to replace equipment with high-efficiency options at the end of life.** GBM recently upgraded its facility to LEDs and a new high-efficiency heating system. This limits the number of efficiency recommendations for the building currently. However, we recommend that GBM continue to use qualified professionals for audits and prioritize high-efficiency equipment at end of life.

- **Install a 300-kW solar installation at the Transit Building.** This replaces 66% of total electricity used at the building currently. As EV charging grows, there is ample roof space to add more panels as needed and as budget allows.
- **Begin to replace the current fleet with electric vehicles as feasible with grant funding and budget.** The current cost of electric vehicle Transit buses is cost-prohibitive for an immediate pilot. However, GBM can start with a transition of light-duty non-revenue vehicles and as grant funding is available, pilot battery electric buses. Table 2 includes considerations for a pilot of electric vehicles in the Transit fleet.

Table 2. Green Bay Metro Pilot Considerations

Fleet	EVs/ZEBs to add	Timeline	Avg. CO_2 Savings per Vehicle (metric tons)	Charging strategy	Funding source(s)
Fixed route	4 BEBs	Only when additional funding to cover substantial portion of incremental cost is available	12.94	2 DCFC ports at the Transit Center	FTA grant funding WPS Business EV Charging Pilot
Non-revenue	1 EV Small SUV 1 PHEV Small SUV	At replacement	EV Small SUV: 0.26 PHEV Small SUV: 0.11	1 Level 2 chargers	Commercial clean vehicle credit WPS Business EV Charging Pilot
Contractor	1 Passenger Van 1 Shuttle Bus	In discussion with Via	Passenger van: 7.77 Shuttle Bus: 19.87	Number of level 2 chargers equal to number of vans	Commercial clean vehicle credit Supplemental ADA funding WPS Business EV Charging Pilot

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GLOSSARY OF TERMS

BEB (Battery Electric Buses): Buses fueled by a battery that is charged with electricity.

CEJST (Climate and Economic Justice Screening Tool): Federal government tool to identify disadvantaged communities.

DCFC (Direct Current Fast Charging): Chargers that can charge vehicles to 80% battery charge quickly. Can charge up to 80% in usually under an hour.

DOT (Department of Transportation): Federal agency responsible for all modes of transportation.

Direct pay: A provision in the Inflation Reduction Act that makes non-taxable entities eligible for tax credits for clean energy items (including renewable energy and alternative vehicles)

EV (Electric vehicle): Vehicles; cars, trucks, and buses powered by a battery and electricity.

EUI (Energy use intensity): Total energy use of a building divided by the total square feet of the building. Normalizes energy use across buildings of different sizes.

ENERGYSTAR Portfolio Manager: Tool from the EPA to help track energy use over time. Free for use.

EVSE (Electric Vehicle Supply Equipment): Terminology for charging infrastructure needed to charge electric vehicles.

FTA (Federal Transit Administration): A federal agency that provides financial and technical assistance to local transit service providers.

FCEB (Fuel Cell Electric Bus): Bus that utilizes fuel cell technology. A fuel cell combines hydrogen and oxygen to generate electricity that powers the buses' motor.

ICE (Internal combustion engine): Conventional gasoline or diesel vehicles

Inflation Reduction Act (IRA): Federal law passed in 2022 that directs significant funding to clean energy and climate solutions. A portion of funding is directed at local governments through rebates or grant programs.

Solar PV: Photovoltaic (PV) solar energy; converts energy from the sun to electricity.

Renewable energy: Energy that is generated from a naturally replenishing resource that does not release carbon, such as solar energy, wind energy, or geothermal.

TOU (Time of use): Electricity rate that charges a different rate per unit of electricity used based on the time of the day.

WPS (Wisconsin Public Service): Energy utility for the City of Green Bay; delivers natural gas and electricity

ZEB (Zero emissions buses): Buses that do not emit any emissions from their tailpipe.

PROJECT BACKGROUND

The Green Bay Metro (GBM) Transit, the City of Green Bay, and the Green Bay Water Utility partnered with Slipstream, a mission-based non-profit organization, to complete a community energy planning project. One objective of the project was to prioritize near-term and medium-term actions that each partner entity could take to work towards the City's goal of achieving community-wide carbon neutrality by 2050. The planning project started in August 2022 and was completed in October 2023 and was funded through a grant from the Wisconsin Office of Energy Innovation.

The community energy plan, "Clean Energy Green Bay," in combination with the City's 2050 carbon neutrality goal aligns with the description of the Federal Transit Administration's (FTA's) description of a Climate Action Plan. To develop the plan, the partners aggregated multiple years of data on building energy consumption, vehicle fuel consumption, and vehicle annual mileage. Additionally, Slipstream assessed energy efficiency and renewable energy opportunities for municipal facilities.

Robust community engagement informed the development of recommendations for near-term and medium-term actions. Community engagement included surveys of Green Bay residents and businesses, collaboration with community-based organizations, hosting community forums, and online feedback forms.

Through the planning process, Green Bay Metro worked with Slipstream to review fuel, mileage, and ridership data to develop recommendations for how GBM can transition its existing fixed route fleet of 40-foot, 35-foot, and 29-foot clean diesel buses, its contractor fleet of gasoline shuttle buses and paratransit vans; and its non-revenue operations gasoline, diesel, and propane vehicles to zero-emissions alternatives. A third-party contractor owns and operates the shuttle buses and passenger vans used to provide microtransit and paratransit services (respectively) to the Green Bay community. The contractor fleet is considered part of GBM's operations and is therefore also considered in Greem Bay Metro's fleet transition plan.

METRO TRANSIT BASELINE

Creating a greenhouse gas profile is a vital first step in a planning process. The profile allows for identification of savings opportunities and serves as a baseline to use when tracking future progress. Figure 3 illustrates the relative CO_2 emissions and cost impact for the Transit building, the fixed route vehicles, contractor vehicles, and non-revenue vehicles.

Figure 3. Annual CO_2 emissions and cost impacts of Transit buildings and fleet

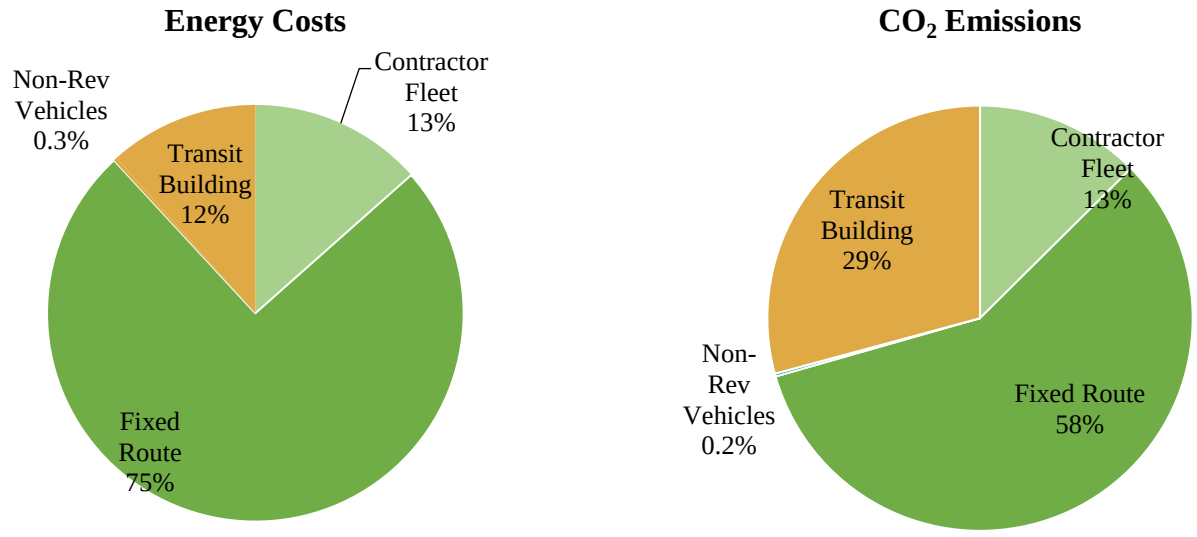


Table 3 shows the distribution of annual fuel use, cost, and CO_2 emissions for among GBM's three vehicle fleets.

Table 3. GBM fuel and emissions by fleet segment

Fleet segment	Annual fuel use (gallons)	Fuel costs	CO_2 emissions (metric tons)	% total emissions
Fixed route	142,415	$609,534	1,459	82.0%
Contractor fleet	37,131	$132,929	316	17.7%
Non-revenue vehicles	588	$2,418	6	0.3%
Total	**180,133**	**$744,882**	**1,781**	

As shown in Table 4, the fixed route fleet generates 82% of GBM's total emissions and is therefore GBM's highest priority for incorporating zero emissions vehicles.

Table 4 indicates CO_2 emissions per mile and rider for the three fleet types.

Table 4. CO_2 Emissions Intensity - per rider and mile

Fleet Type	Metric Tons Per Mile	Metric Tons Per Rider
Contractor Fleet	0.0007	Unknown
Fixed Route	0.0019	0.0021
Non-Rev Vehicles	0.0005	N/A

Table 5 summarizes the number of its existing fixed route buses that Transit plans to retire and replace through 2034.

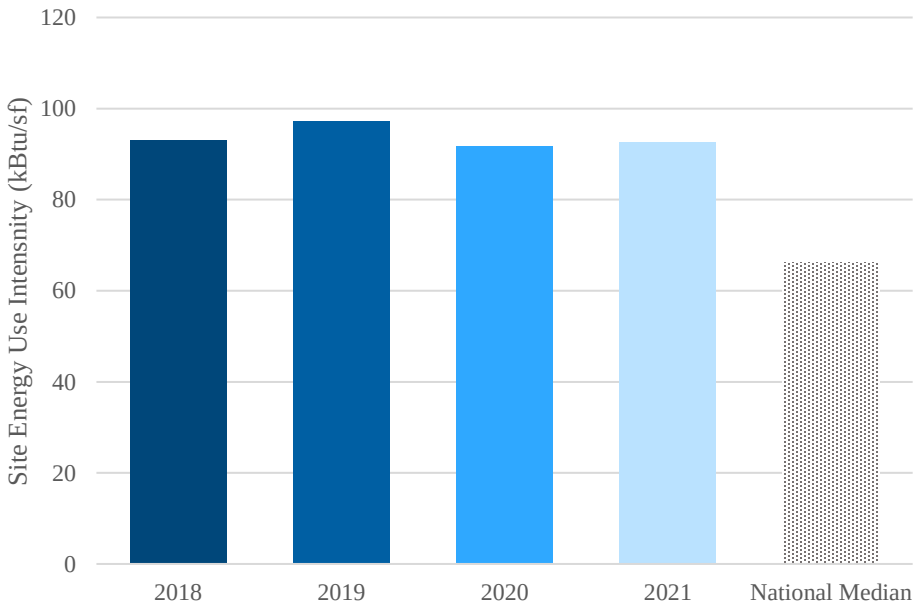
Table 5. Fixed Route bus replacement schedule

Year	Number of buses
2023-2024	10 (retire)
2024	6
2027	4
2030	4
2031	4
2032	4
2034	4

Figure 4 illustrates the energy use intensity of the Transit Center over time and compared to the median energy use intensity of similar buildings (age, building type, and characteristics) in the climate zone. Energy use intensity is calculated as total energy use divided by the square feet of the building. The EUI is slightly higher than the national median. However, the building had significant upgrades done in 2022, including a heating system replacement and LED lighting upgrades, that likely lowered the EUI.

The City of Green Bay has data through August 2022 in ENERGYSTAR Portfolio Manager for the Transit Center, and Transit should work with the City to continue to track EUI over time in that platform. ENERGYSTAR Portfolio Manager provides a way to benchmark EUI over time and in comparison to buildings with similar characteristics (age, type) in the region.

Figure 4. Transit building EUI compared over time and to the national median.



BUILDING RECOMMENDATIONS

In 2021 and 2022, Green Bay Metro renovated its Transit Center. During the renovation, GBM implemented best practice energy efficiency improvements, including LED lighting and efficient HVAC equipment. Because efficiency improvements were installed recently and no additional significant building renovations are expected to be funded within the next 5-10 years, this plan does not include specific energy efficiency recommendations for the Transit Center. Instead, when the recently installed improvements near the end of their service lives, GBM will obtain a professional energy assessment that will recommend energy and emissions reducing building improvements, based on technology that is available at that time.

The Transit Building was reviewed for solar with an assessment by NWTC students. Analysis at the building identifies available space, tilt, and orientation. South-facing arrays generally offer the most cost-effective opportunities for installing solar arrays, followed by east or west facing arrays. The degree tilt represents how angled the panels are on the roof. On average, matching the degrees of tilt for the panels to the degrees latitude of the solar array will produce the most electricity. If a building's roof is not tilted at this angle, panel mounting can apply a tilt; however, the tilt must be balanced against shading effects created between rows of panels.

The roof space available was combined with monthly energy data and utility bill rates to optimize the sizing of solar PV. The analysis assumes that the net metering limit is 20 kW dC. This is the current limit set by Wisconsin Public Service and any solar installation below this size receives the full utility retail rate (the same

as what is paid) for any overproduction of solar that is sent back to the grid.[1] Any solar size above 20 kW dC receives the buyback rate instead. The buyback rate is lower than the retail rate and changes yearly. Both rates are only applicable when the amount of solar produced at a certain time is higher than the building's consumption. The rest of the time the solar array is saving money as no energy must be purchased.

Other assumptions include:

- The lifetime of the system is 25 years. This is a conservative estimate with estimates ranging from 25 to 50 years.
- The upfront cost of the system is $2,000/kW for systems larger than 100 kW.
- Roof loading and electrical panel space needs to be verified by a trained design professional. Roof and/or electrical panel upgrades needed to support the installation of a roof-mounted PV system would increase the total project cost.
- Operations and maintenance costs are low per year. Inverters need to be replaced in year 15.

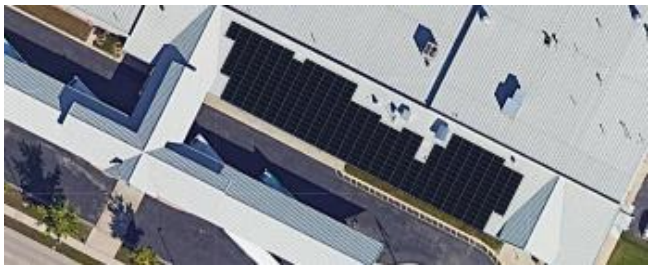
Table 6 includes a definition for each output shared for the buildings.

Table 6. Solar analysis output definitions

Output	Definition
System Size	Total solar photovoltaics size in kW dc.
Payback (years)	Calculated as total upfront cost (after incentives) divided by first year cost savings.
Percent Renewable Electricity	Total electricity produced divided by total energy consumption
Lifetime CO_2 Savings (metric tons)	Avoided grid electricity use multiplied by a grid hourly emissions factor
Lifetime Energy Savings	Total energy bill savings over the lifetime of the solar panels (25-years).
Total Upfront Cost	Total initial upfront cost ($2,000/kW multiplied by system size)
Focus on Energy Incentives	Focus on Energy Business rebates[2]
IRA Tax Credit	30% direct pay through the Inflation Reduction Act.
Net Cost	Total initial upfront cost minus rebates and tax incentives

[1] There are currently Wisconsin Public Service Commission cases that are considering the requirement for utilities to offer net metering in the future. The cases have not been decided and each utility would then need to submit their own request for new rates. If that occurs, the payback period and annual energy savings may change slightly but other results will be constant.

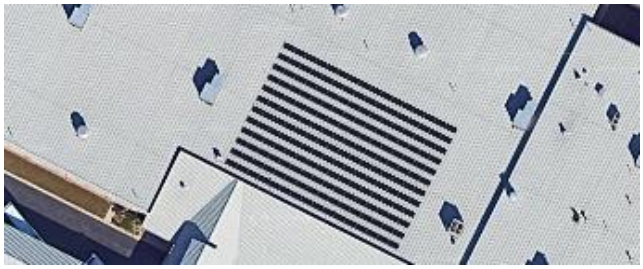
[2] Solar rebates are here: https://assets.focusonenergy.com/production/inline-files/2023/RR-Solar-PV-APL.pdf



Office Roof

Available space: Up to 86 kW

Orientation: Southwest facing at 23-degree tilt



Main Roof

Available space: Up to 960 kW

Orientation: Southwest facing at 10-degree tilt

Bus Canopy

Available roof space: Up to 85 kW

Orientation: Southwest facing at 23-degree tilt

Overall

Wholesale energy rate: $0.0472 in off-peak; $0.05575/kWh in summer on-peak; $0.05168 in winter off-peak

Annual energy use: ~297,000 kWh

Utility rates: Flat rate

Solar Cost: $2,000/kW

Table 7 presents one option for solar on the Transit Building. It minimizes the financial payback period and utilizes all available roof space. The Inflation Reduction Act Clean Energy Tax Credit is a 30% rebate on the upfront cost and is available for all non-tax paying entities through a provision in the bill called direct or elective pay. To access the funding, Transit must submit a tax return after the installation is placed in service.

Table 7. Transit Building recommended solar array.

Metric	System Information
System Size (kW-DC)	300
Payback (years)	9.9
Annual Energy Production (kWh)	572,800
Percent Renewable Electricity	66%
Lifetime CO_2 Savings (metric tons)	10,898
Total Energy Savings	$982,205
Total Upfront Cost	$600,000
Focus on Energy Incentives	($33,000)
IRA Tax Credit	($180,000)
Net Cost	$387,000

Section 1: Long-Term Fleet Management Plan

Technology Evaluation (BEB vs. FCEB)

Green Bay Metro worked with Slipstream to gather information on the performance and costs of both Battery Electric Buses (BEBs) and Fuel Cell Electric Buses (FCEBs) as potential technologies to engage to transition toward a fleet of zero emissions buses. As part of this investigation, the team collected information from other transit agencies - especially agencies serving cities in the upper Midwest - about their experiences incorporating zero emissions buses (ZEBs) into their fleets. Information on ZEB strategy, performance, and experience was collected from public transportation agencies that have deployed ZEBs in their fleets. Agencies included those serving Duluth (MN), the Twin Cities (MN), Rochester (MN), Madison (WI), Racine (WI), Chicago (IL), STARK (OH), and Alameda County (CA).

One objective in reviewing how other agencies integrated BEBs and FCEBs into their fleets was to determine how to manage challenges created by the maximum driving range per charge of most BEBs being less than the daily miles traveled by GBM's clean diesel buses. Based on findings from transit agencies serving Duluth and the Twin Cities, GBM anticipates that the gap between maximum driving ranges and daily mileage requirements for its fixed route buses will be aggravated by reduced driving range in the very cold weather and snowy conditions in which its buses must operate.

While FCEBs do not face the same driving range limitations as BEBs, the cost of constructing hydrogen fueling stations and the additional cost of the PV-powered electrolysis equipment needed to produce emissions-free hydrogen fuel creates a significant barrier to adding FCEBs to GBM's fleet. Higher fuel cost per mile for hydrogen, compared with diesel or electricity, and fewer examples of other transit agencies in the region that have successfully deployed FCEBs also create concerns for GBM when considering FCEBs. Based on cost, emissions, and market development considerations, Green Bay Metro is currently focusing its fleet transition plan on incorporating BEBs, while keeping other fleet options open as technology advances. While adding BEBs to transition to a zero-emissions fleet is currently the most feasible path for GBM, the U.S. Department of Energy's recent announcement of funding for seven regional Hydrogen Hubs may significantly accelerate development and adoption of FCEBs, which could enable GBM to deploy FCEBs in its transition plan. Transit will continue to evaluate the feasibility of FCEBs as the technology develops and more public transit agencies in the upper Midwest purchase the buses.

Via, Green Bay Metro's third-party contractor, provides paratransit and microtransit services for public transportation authorities throughout the country. In some regions, Via has initiated a transition from gasoline-powered vehicles to electric passenger vans and shuttle buses. GBM will engage with its third-party contractor to negotiate contractual terms supporting the plan for deploying electric vehicles in GBM's contractor fleet.

Table 8 shows estimated incremental purchase costs for alternative electric vehicles for each of the vehicle categories currently in-use by GBM and by its contractor. The EV incremental cost column applies the estimated amount of the Clean Vehicle Credit, if applicable, to each electric option shown. However, because applications for the Federal Transit Authority's Low- No-Emissions Bus Grant Program are competitive, receipt of funding from this source is not considered in the table.

Table 8. Estimated EV costs and savigns potential

Category	Current Vehicle	New ICE vehicle benchmark	Ex. EV Alternative	EV Incremental Cost	Cost Savings/Mile	Miles for Financial Payback
Transit Bus	Gillig Bus	5.2 mpg $457,000	Gillig BEB	$453,000	$0.672	674,000[4]
Shuttle Bus	Ford StarCraft	7.3 mpg $130,000	GreenPower Motor Co. AV Star	$20,000	$0.438	46,000
Passenger Van	Ford Van	22 mpg $40,600	Chrysler Pacifica PHEV	$0	$0.120	0
Small SUV	Ford Edge	29 mpg $32,400	Hyundai Kona	$2,500	$0.102	24,000
Mid-size SUV	Ford Explorer	21 mpg $36,800	Hyundai Ioniq 5	$8,500	$0.137	62,000

Table 9 describes the fuel cost savings and emissions reductions that Green Bay Metro would achieve by transitioning its buses, shuttle buses, SUVs, and passenger vans to BEB and EV alternatives. The emissions reductions estimates are based on current emissions rates for grid-purchased electricity in Green Bay. The emissions savings will increase to 100 percent as GBM installs the proposed rooftop PV array and as the City of Green Bay engages with WPS to transition the utility toward 100 percent renewable electricity.

Table 9. Green Bay Metro fuel and emissions savings opportunity

Vehicle Type	Fuel Cost Savings	CO_2 emissions (MT)	Percent Savings (%)
Transit Bus	$234,600	484.6	32%
Shuttle Bus	$57,550*	127.2	61%
Paratransit Van	$23,035*	38.7	39%
Small SUV	$275	0.5	47%
Mid-size SUV	$495	1.0	56%
Total	**$315,955**	**652.0**	**36%**

*Receipt of fuel cost savings for shuttle buses and paratransit vans by Metro Transit would be dependent on contractual terms with its third-party contractor.

BEB Transition Strategies

Other transit agencies applied one, or more, of four strategies to address limited driving ranges between charges for BEBs:

1. Limited Use: Use BEBs for peak routes and short mileage routes only.
2. On route charging: Construct on-route charging stations to extend driving range between full terminal charges.
3. BEB: Diesel Ratio: Add a greater number of BEBs to the fleet than the number of diesel buses that the BEBs will replace.
4. Supplemental space heating: Mitigate reduced driving range in the winter by adding diesel supplemental space heating to preserve battery charge for powering the drivetrain.

[4] The stated incremental cost assumes that no replacement of the battery in the new BEB will be required during GBM's period of ownership for the bus. Estimates of battery useful life periods range from eight years to at least 15 years; however, there is limited real-word data on actual battery lifespans. If battery replacement is required, the number of miles of use needed to achieve financial payback of the EV incremental cost will increase.

Transit assessed how it may use each strategy when adding BEBs to its fleet.

Limited Use

All buses in GBM's fixed route fleet operate at full-service levels and are not retained in limited service. None of the clean diesel buses in GBM's fleet are reserved only for use during peak period or on special routes. Instead, all clean diesel buses are in constant service on weekdays from 5:15 am to 6:45 pm and from 7:45 am – 1:45 pm on Saturdays. The combination of the lack of breaks between routes, lengths of all routes, and range limits of BEBs (which are further reduced in cold weather) prevents GBM from simply adding a BEB to its fleet, installing a terminal charging station and retiring a clean diesel bus.

On Route Charging

On-route charging uses very high voltage charging equipment to partially recharge BEB batteries during 10-20-minute breaks at transfer stations or between route service. Partially or fully recharging buses mid-route can increase the number of miles that the BEB can travel between full charges at the terminal. Green Bay Metro's routes and schedules currently do not allow for service gaps at locations where on-route charging equipment could be installed. The current routes are also short enough that they would not currently require in-route charging.

BEB: Diesel Ratio

GBM would be unable to allocate its BEBs to serve only limited use functions and extending driving range by using on-route charging is not viable at this time. Therefore, to maintain existing service levels, GBM will need to increase the number of buses in its fleet when it purchases BEBs and use more buses to serve the same routes. Increasing the number of buses will allow BEBs to stop at the Transit Center mid-shift to fully recharge before returning to serve additional routes during the remainder of the day. GBM will stagger route schedules to make time for each BEB to recharge during its shift.

Supplemental Space Heating

Heating air to maintain comfortable interior bus temperatures in the winter adds a significant electrical demand on a BEB's battery. The draw on the battery from space heating combines with negative effects of cold temperatures on battery performance to significantly reduce the range of BEBs in cold conditions. Transit agencies serving Duluth and the Twin Cities mitigated BEB cold weather range reductions by installing supplemental diesel-powered space heating equipment in the BEBs. While the diesel fuel combusted for space heating generates emissions, total emissions from supplemental space heating represent a small percentage (less than 5%) of the emissions generated by operating diesel transit buses year-round. GBM will consider the potential of using supplemental space heating to extend wintertime BEB ranges.

Fleet Transition

Pre-Pilot

While current list prices for BEBs are prohibitively expensive in comparison to clean diesel buses, several categories of light-duty EVs offer beneficial returns on investment. Without significant reductions in list prices, GBM will not be able to purchase BEBs in the absence of grant funding from DOT, or other sources.

As a starting point that is not dependent upon grant funding, starting in 2024, Green Bay Metro will explore the use of EVs in its light duty non-revenue fleet.

GBM's non-revenue gasoline and diesel vehicles rarely travel more miles per day than the stated mileage ranges for equivalent EVs. Additionally, the incremental cost of electric light duty vehicles vs. conventional vehicles would limit the additional cost required for shifting Metro Transit's non-revenue fleet to zero-emissions vehicles. Therefore, GBM plans to include two light duty vehicles in the pre-pilot as it retires and replaces the two Ford Edge SUV support vehicles and may expand its non-revenue EV fleet in the pilot to also replace the administrative support Ford Explorer.

Based on its ongoing evaluation of the number of non-revenue vehicles it requires to support its fixed route fleet, GBM will purchase one electric small SUV and one PHEV small SUV as it retires existing gasoline-powered vehicles in that category. As the non-revenue vehicles are retired, GBM will also perform an analysis on the number of non-revenue vehicles and if a smaller number of vehicles can perform the same functions. Fewer vehicles with more miles each can improve the cost-effectiveness of transitioning to EVs. It will install one Level 2 charging ports at the Transit Center to support the vehicles and will train drivers and maintenance staff on use and maintenance requirements of the vehicles. Although a relatively small impact, this transition signals Transit's commitment to EVs and helps meet the City's goal of carbon neutrality by 2050.

Pilot overview

BEB: Diesel > 1.0. Green Bay Metro identified lack of funding resources to increase the number of buses in its fleet as a major obstacle to adding a greater number of BEBs to its fleet than the number of clean diesel buses that those BEBs would replace. If a supplemental funding source is identified to increase the total number of buses in GBM's fleet, GMB will explore an 18-24 month pilot of BEBs. Four BEBs would be added to the fleet upon retirement of two of GBM's existing clean diesel buses. During the pilot period, GBM will operate the BEBs on multiple routes and will monitor BEB performance to identify the routes that best align with the BEB's capabilities.

Green Bay Metro's agreement with the third-party contractor that owns and manages the paratransit and microtransit vans and shuttle buses allows GBM to influence the types of vehicles that the contractor purchases to serve Green Bay. In the pilot, GBM will partner with its contractor to replace one or more of its paratransit vans with a PHEV minivan or full-size electric van, adapted per the requirements for paratransit vehicles. Experience adding BEV and/or PHEV paratransit vehicles to its fleet can help prepare the contractor to replace its shuttle bus fleet with electric equivalents in the future.

Currently, Green Bay Metro's with its third-party contractor stipulates that GBM is responsible for vehicle fuel costs. If the contractor installs EVSE at its facility and charges the vans and shuttle buses at that location, the contractor will assume the cost of fueling these vehicles on its electric bill. As GBM periodically renews and renegotiates its contract with the third-party, it will evaluate options for crediting the contractor for the cost of electricity used for charging.

Table 10 summarizes the structure of the pilot across the three fleets.

Table 10. Metro Transit Electric Vehicle Pilot Summary

Fleet	EVs/ZEBs to add	Vehicles to retire	Charging strategy	Funding source(s)
Fixed route	4 BEBs	The first two clean diesel transit buses are scheduled for retirement following receipt of funding for the pilot.	**2 DCFC ports at the Transit Center**	FTA grant funding WPS Business EV Charging Pilot
Non-revenue	1 EV Small SUVs 1 PHEV Small size SUV	2018 Ford Edge #182 2018 Ford Edge #183	1 Level 2 chargers	Commercial clean vehicle credit WPS Business EV Charging Pilot
Contractor	1 Passenger Van 1 Shuttle Bus	2019 Ford Starcraft #GB101 2019 Ford Passenger Van #GB109	Number of level 2 chargers equal to number of vans	Commercial clean vehicle credit Supplemental ADA funding WPS Business EV Charging Pilot

A robust vehicle maintenance plan is essential to GBM effectively achieving its primary purpose of providing reliable and high-quality public transportation service to the Green Bay region. While studies have found that BEBs require less maintenance than clean diesel buses,[5] electric buses use different technology and vehicle systems than diesel buses. Therefore, in the pilot, Metro Transit will engage with the OEM[6] of the selected BEBs to obtain training for Metro Transit's technicians on maintaining the new BEBs and to develop a network of contacts and resources from the OEM to supplement its in-house maintenance capacity.

Data Collection and Pilot Evaluation

Throughout the 18-month pilot period, as well as during the non-revenue fleet pre-pilot, GBM will track data on the performance of the BEBs, as well as on the clean diesel buses in its fleet, which will serve as a comparison

[5] AC Transit, Zero Emission Transit Bus Technology Analysis. https://www.actransit.org/sites/default/files/2022-06/0105-22%20Report-ZETBTA%20v3_FNL.pdf; FTA Research, Zero-Emissions Bus Evaluation Results: King County Metro Battery Electric Buses, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/115086/zero-emission-bus-evaluation-results-king-county-metro-battery-electric-buses-fta-report-no-0118.pdf

[6] The Duluth Transit Authority's experience adding BEBs to its fleet demonstrated the value of a strong relationship between the transit agency and the OEM in troubleshooting operational challenges and maximizing availability rates for BEBs.

when evaluating the pilot. For each vehicle, Transit will collect data on fuel use and costs, as well as on maintenance hours and maintenance direct costs. Based on fuel consumption and miles driven, Transit will calculate and track the CO_2 emissions for each vehicle. To better understand the driving range of each vehicle, staff will track the vehicle's level of charge at the start of the shift; the level of charge prior to each charging session, the vehicle charge at the end of the shift; and the miles driven. When tracking beginning and ending charge, Transit will document high and low temperatures for the day, as well as snowfall, so that it can analyze how weather affects vehicle range and charging needs. Additionally, GBM will track the availability of each bus (percentage of shifts for which the bus is scheduled to serve that it is ready to complete) and bus reliability (miles between on-route service calls). When Transit installs the charging stations, it will configure the electrical metering so that it will be able to track the electricity used to charge the buses separately from the electricity that powers the remainder of its facility.

Transit will conduct interim evaluations of the performance data of the BEBs, as well as any feedback on the buses received from drivers, maintenance staff, and riders. Evaluations will review the performance of the BEBs, as well as the experiences of stakeholders. If the evaluations reveal performance problems for the BEBs, this information can be used to inform adjustments to the pilot to resolve any availability, reliability, or cost issues that arise. During the reviews, Transit will also obtain progress reports from its third-party contractor, which will conduct parallel data collection for its vehicles and from its drivers and maintenance staff.

Following the 18-month pilot, Transit will comprehensively evaluate the performance of the pilot based on each of the data points described above. It will also evaluate feedback on stakeholder experiences. The review will include both GBM's fixed route fleet and, in partnership with Via, its contractor fleet. Based on range, level of charge, availability, and reliability data that it collects during the pilot, Transit will identify additional routes and service schedules that best fit BEB performance parameters and will determine how many BEBs it would require in order to serve those routes and schedules.

While Transit will initially rely on DCFC ports in its service garage for all BEB charging, as it expands beyond the pilot, it will assess the additional charging systems that will be required to support the growing fleet of BEBs. Options may include additional terminal chargers, installation of DCFC at new terminal-based locations, and on-route charging options.

Green Bay Metro currently operates 36 buses and plans to replace vehicles after an ownership period of 12-14 years.[7] In alignment with planned vehicle replacement cycles and the City's goal of achieving a zero-emissions fixed route fleet by 2050, GBM will forecast the numbers and types of charging stations that it will need to add each year, or in parallel with each round of new BEB purchases, to support the additional BEBs in its fleet. In addition to planning for new purchases, GBM plans to evaluate the size of its fleet to continuously determine the optimal number of buses. GBM has already started these efforts and has plans to reduce fleet to 30 vehicles and eventually reach 26 buses.

It will develop a plan to add charging infrastructure that may include additional DCFC ports at its primary terminal; DCFC ports at future additional terminals; and/or on-route charging equipment. It will solicit bids to estimate the costs of additional charging infrastructure and will seek funding sources that will enable it to install the needed EVSE. It will also seek to minimize the long-term costs of adding EVSE by upgrading electrical service to each future charging location based on estimated future service level needs, rather than near term required level of service.

[7] As stated earlier, Transit anticipates that the current gap between the daily miles driven of its current buses and the estimated cold-weather driving ranges of BEBs, it will need to increase the size of its fleet as it replaces diesel buses with BEBs. Additionally, Transit recognizes that the useful lifetimes and ownership periods of BEBs may differ from the equivalent parameters for diesel buses.

Section 2: Availability of Current and Future Resources to support BEB Transition

Sufficient funding is critical in ensuring Green Bay Metro can successfully implement the transition to BEBs and EVs. The cost impact will be significant with GBM needing to purchase more than one BEB to replace each clean diesel bus that it retires. Green Bay Metro currently pays approximately $500,000 to purchase a new clean diesel transit bus. Grant funding from FTA usually funds 80 percent of the purchase cost of a clean diesel bus. GBM relies on rider fares and financial support from the City of Green Bay and contributing municipal partners that it serves to fund the remainder of the purchase cost. It also pays over $600,000 for diesel fuel and approximately $775,000 per year for parts and labor to maintain the buses. Due to the uncertain nature of transit funding, Green Bay Metro will need to constantly monitor funding opportunities.

Current BEB list prices range from $700,000 to $1 million. Transit anticipates benefiting from lower fuel and maintenance costs to operate BEBs; however, the long-term operational cost savings would require between 270,000 and 590,000 driving miles to achieve parity in the total cost of ownership of BEBs in comparison to clean diesel buses. Fixed route buses drive an average of approximately 29,000 miles per year, so Transit would need to drive the BEBs between 9.25 years and 20 years to achieve overall cost parity between the BEB and the clean diesel bus. There is a lack of historical data on the effective lifespans of BEB batteries and it is therefore unknown whether GBM should anticipate incurring additional costs for battery replacement during the ownership period. Battery replacement would further extend the period of ownership required to achieve financial payback for higher purchase costs for BEBs. The upper (and more likely) end of the range of estimated BEB purchase costs leads to a payback period for BEBs that significantly exceeds Transit's 12–14-year period of ownership, and also exceeds the expected equipment lifetimes of the BEBs. Additionally, Transit does not have the financial resources to fund the higher initial costs of BEBs in order to benefit from the lower ongoing maintenance costs.

In addition to the higher incremental purchase costs for BEBs, Transit will need to install high-capacity DCFC stations in order to support the new buses. No existing operational or capital budget item can be re-assigned to pay for the cost of these installations, which will include both the equipment and labor costs for the stations themselves and significant upgrades to the level of electrical service to GBM's garage.

Increasing rider fares to fund the transition to BEBs is likely to reduce ridership, thus indirectly increasing overall emissions by discouraging use of public transportation by Green Bay residents. With limited available funding from the City of Green Bay, Transit will require external funding support to pay for the higher purchase costs of BEBs.

Through elective pay provisions of the Inflation Reduction Act, Green Bay Metro can access the Federal Commercial Clean Vehicle tax credit, which can offset up to $40,000 per vehicle of the cost of BEBs. Unfortunately, this amount of funding only decreases the number of years to financial payback by 1.5 years and therefore does not sufficiently reduce the initial purchase price to enable Transit to afford the higher purchase prices of BEBs.

In the absence of other sources of funding, until BEB purchase prices decrease significantly and BEB driving ranges improve to enable 1:1 replacement of diesel buses with BEBs, Transit will require funding through the FTA's Low- No-Emissions competitive grant program to enable it to start and sustain its transition from clean diesel buses to BEBs. Grant funding will be used for four primary purposes:

1. Offset the higher initial purchase costs of BEBs over clean diesel buses.
2. Increase the total number of buses in Transit's fleet so that the BEB range limitations do not compromise Transit's capacity to maintain existing levels of service to the Green Bay community.

3. Fund the installation of DC fast charging stations and required electrical service upgrades.
4. Train drivers and vehicle maintenance staff to operate and repair BEBs, including adding maintenance staff trained to work with high voltage charging and battery systems.

BEB Purchase Costs

Transit will use data collected for BEBs and clean diesel buses during the pilot to calculate the average cost per mile, including fuel and maintenance expenses, to operate BEBs and to operate clean diesel buses. Applying the operational cost differential between the two types of buses to annual updates to market prices for high-performing BEBs and clean diesel buses, Transit will calculate the amount of grant funding needed per bus to enable the BEBs to achieve total cost of ownership parity with equivalent diesel buses. It will also assess its financial capacity to use TCO savings forecasts to fund a higher purchase price of BEBs and will use these findings to assign a corresponding discount rate to the long-term cost savings that BEBs will provide. Findings from the discounted savings calculation will be used to identify the amount of grant funding needed per bus.

Fleet Expansion

To optimize the emissions reductions benefits from BEBs, Transit will prioritize deploying BEBs on routes that serve disadvantaged census tracts as identified by CEJST. Transit will determine the number of miles driven per day by the buses that serve these routes and will compare the daily mileage with stated driving ranges between charges for Transit's preferred model of BEB. Based on the experiences of other cold-weather public transportation agencies who have added BEBs to their fleets, Transit will apply a winter range loss factor to the stated vehicle range. It will use the reduced winter driving range estimate to evaluate the level of service that the BEB could provide between charges. The difference between the daily mileage for existing clean diesel buses on the prioritized routes and the cold-weather BEB driving range between charges will be used to calculate the number of BEBs that Transit will need to add to its fleet to replace the clean diesel buses that will be retired.

In 2022, average daily mileage for all GBM transit buses was less than 150 miles. The stated driving range between charges for many available BEBs is more than 150 miles. To avoid fully depleting charge mid-route, GBM would deploy BEBs on its routes so that a minimum of 20 percent of charge remains when the buses return to the Transit Center for recharging. Additionally, transit agencies and research have reported varying rates of range loss in very cold weather. While data reported by the Duluth Transit Authority applies to older models of BEBs and it later mitigated range loss by installing diesel space heathers on the buses, Duluth's experience of 40 percent range reduction in very cold weather may offer a relevant worst-case scenario to consider for planning purposes. Applying both a 40 percent cold weather range penalty and a 20 percent range cushion to stated BEB driving ranges results in estimated cold weather useable ranges between 73 and 96 miles for a sampling of currently available BEBs. A BEB's potential inability to complete a route due to insufficient charge would cause an unacceptable service interruption and risk stranding customers in very cold conditions. Therefore, GBM could plan to apply a conservative 2.25 BEB: 1 diesel bus ratio and to deploy the BEBs on its shorter routes, as it starts to incorporate BEBs into its fleet. As it prepares to shift additional buses to BEBs, it can evaluate cold-weather range performance of the BEBs and re-assess the range of new BEBs based on improvements in battery technology to determine the number of BEBs needed to replace its next phase of retired diesel buses.

Table 11 estimates the total vehicle cost for GBM to fully transition its buses from clean diesel to BEB. This table is intended only as a preliminary assessment of potential scope and vehicle cost of a shift to a 100% BEB fleet. It applies high-level cost estimates based on 2023 prices and funding opportunities. As the BEB market develops in future years, costs of both BEB and clean diesel buses may change considerably.

Table 11 Cost estimate for full BEB transition.

	100% Clean Diesel Fleet (BAU case)	100% BEB Fleet
Vehicles needed	26	58
Cost/vehicle	$500,000	$800,000 (Est. cost range: $700,000 - $1,000,000)
Est. grant/vehicle	($400,000)	($680,000)[8]
Net cost/vehicle	$100,000	$120,000
Total net cost	**$2,600,000**	**$6,960,000**

EVSE Installation

Transit will solicit bids from local EVSE installation contractors for the DCFC equipment and installation labor that will be required. It will also engage WPS, its electric utility, to request an estimate for the cost of the in-front of the meter electrical service upgrades that will be needed to support Transit's projected future electrical demand for a 100 percent BEB fleet. Transit will seek grant funding for the full installed cost of the EVSE needed to support the buses.

Training

Transit staff complete most tasks needed to repair and maintain the clean diesel buses. While BEBs require less maintenance than clean diesel buses, maintenance staff will require significant amounts of additional training to prepare them to support the BEBs. The TVMs of the BEBs are expected to provide the most required training for maintenance staff.

Metro Transit understands that it will not be able to use FTA's Low- No-Emissions Program to fund costs incurred for transitioning its contractor fleet to electric vehicles. Instead, Metro Transit will work with Via to ensure that it accesses Commercial Clean Vehicle tax credits, as well as potential sources of ADA-related funding to pay for Via to add EVs, and the necessary EVSE, to its service offerings in Green Bay.

Section 3: Relevant Policy and Legislation.

Local

In 2021, the City of Green Bay Common Council established a goal that municipal operations and the entire Green Bay community would achieve 100 percent clean energy and carbon neutrality by 2050. Through its affiliation with the City of Green Bay, and as an important factor in the Green Bay community, Transit is committed to meeting the 2050 goal for 100 percent clean energy and carbon neutrality. Energy and emissions use in buildings and transportation are both within the scope of the goal, so Green Bay Metro must transition its fixed-route, third-party contractor, and non-revenue fleets from using clean diesel and gasoline to using emissions-free energy sources. Electricity purchased from WPS is not currently emissions-free; however,

[8] FTA requires a minimum 15% cost share by Low- No-Emissions Bus grant recipients. Grants may also provide funding for related project costs, such as charging infrastructure and training.

Transit will rely upon an on-site renewable installation and the City's engagement with WPS in support of supplying renewable electricity to the Green Bay community. Green Bay Metro's Transit Development Plan, developed in collaboration with Brown County Metropolitan Planning Organization (MPO), is a five-year plan that addresses various aspects of the transportation system, including service type, amount of service, fare structure, and operating and capital needs.

State

The electricity rate options and prices offered by WPS, the electricity utility that serves Green Bay, will directly influence Transit's fuel costs for running BEBs. If electricity prices increase more quickly than diesel prices, the trend would reduce the cost-effectiveness of Transit's shift to BEBs.

WPS currently offers a pilot program through which it provides credits to business customers that may offset a portion of the costs of electric service upgrades and site electrical improvements required to support added electrical demand generated by EV charging systems. The utility's decision on whether to expand the pilot into a full program offering will affect financial support available to Transit to pay for the charging systems. As part of this pilot, WPS may offer customers an option to apply a different meter and rate for the electricity used for vehicle charging than the meter and rate that serve the remainder of the facility. If WPS terminates the pilot without creating a broader program offering, Transit may be required to include electricity used for charging with the electricity that it uses for the remainder of its facility, leading to higher overall demand charges and energy costs.

Federal

The Inflation Reduction Act authorized significant increases in funding for electric vehicles (including BEBs and other large vehicles) and for EVSE. Funding deployment includes tax credits, formula grants to states, and competitive grant programs. Together, these funding strategies are expected to further stimulate domestic production of EVs, expansion of national electric vehicle charging infrastructure, and advancement of EV technology. Growth in the market and advancement of the underlying technology may support an existing trend toward cost-equivalence between EVs and ICE vehicles. Improvements in EV technology may also lead to advancements in key performance metrics, including vehicle range and fuel economy (kWh/100 miles) related to Transit's adoption of BEBs. Federal funding through the FTA's Low-No Emissions is vital for advancing Transit's transition to BEBs.

Section 4: Existing and Future Facilities

Green Bay Metro currently operates all buses and routes from the Transit Center, which houses administrative offices, passenger center, and the fleet garage and is located at 901 University Avenue. The garage is used for all vehicle maintenance and is also where buses are stored when not in use. In addition to Transit Center, which also functions as a transfer point, Transit's routes are configured around three other transfer points. The transfer points have basic electrical service, but do not support bus maintenance or storage. Metro Transit does not plan to construct additional terminals or bus depots in the foreseeable future.

Based on current facilities, Transit will focus its BEB EVSE plan around a set of terminal DCFC ports, located in the Transit Center garage. Depending on space limitations in the Transit Center garage and the rate of increase in BEB range in the future, Transit may consider installing on-route charging systems at one, or more, transfer points and revising its route schedules to allow buses to periodically stop at the transfer points for 15-20 minutes of on-route charging.

Section 5. Utility Partnership

The Transit Center receives electrical service from WPS under the Small Commercial and Industrial CG-5 rate. CG-5 is a flat rate that does not offer time-of-use (TOU) variable pricing to customers. Green Bay Metro's electricity demand consumption is expected to increase as it adds EVSE to the Transit Center facility and starts regularly charging a growing number of EVs and BEBs in its garage. As it adds vehicle charging, WPS may request or require that the Transit Center switch to the CG-20 rate, which is a TOU and demand-based rate. Under the CG-20 rate, GBM could achieve significant energy cost savings by charging buses during off-peak periods and staggering bus charging sessions so as to limit its overall electrical demand. In addition to these steps, the proposed rooftop solar array described above would help GBM further limit its energy charges under both rates.

WPS offers a pilot Business EV Charging Pilot program for facilities at specified rates, including both the CG-5 and CG-20 rates. The Business EV Charging program offers a pathway through which businesses can engage the utility to obtain electric service upgrades needed to support added EVSE. The program also offers bill credits to customers to offset a portion of the cost of the needed service upgrades and facility electrical improvements.

WPS may permit Transit to establish service for the EVSE ports under a separate meter and rate than the rate that serves the Transit Center building. This option may provide preferential pricing for Transit for the electricity that it will use to charge the BEBs.

Green Bay Metro has had limited past engagement with WPS, but it intends to involve WPS as it develops plans to add an initial set of DCFC ports that will support the initial set of BEBs and also to add more ports in the future.

Section 6. Impact on Workforce

With the introduction of BEBs and EVs to Green Bay Metro's fleet, operational training for bus operators, mechanics and other support employees will need to be addressed. The transition to BEB affects not only the maintenance and operations departments, but also the transit facility, procurement, scheduling, and dispatch. Many positions will be impacted, and a lack of preparation and training could negatively impact Green Bay Metro, ranging from failure to provide bus service to safety repercussions.

Green Bay Metro will develop a training program that will help assess skills of current workers and provide guidance on new skill requirements with the help of transit vehicle manufacturers (TVM), recommendations from other transit agencies and the zero-emissions bus maintenance training practices developed by APTA standards program. Our current workforce will be trained in new equipment and infrastructure to ensure non-displacement of the existing workforce. The additional training for future propulsion systems will provide GBM with another tool to help recruit new staff to join our team.

- Training will be required for maintenance staff regarding safety, operations, and maintenance of the following systems: traction motors, high voltage electricity, power generation/charging, energy storage systems, additional control systems, and data communication networks.
- Training will be required for bus operators in BEB technology including high voltage safety and regenerative braking techniques.
- Training will be required for service technicians on charging/fueling, bus cleaning, and safety protocols.
- Training will be required for dispatchers in situational awareness and safety protocols to assist during an emergency. Dispatch staff along with operations supervisors are often the first line of the defense when a bus operator needs assistance.

Some potential training resources to assist with program development:

- Vehicle and charge TVM training curriculum purchased as part of a new BEB procurement.
- Vehicle subsystem/subcomponent TVM training curriculum.
- Partnership with local first responding agencies.
- Collaboration with other transit agencies with operational zero emissions fleets with in-house training programs.
- Transit Mutual Insurance (TMI)
- National Transit Institute (NTI) training.
- American Public Transportation Association (APTA)
- Wisconsin Public Transportation Association (WIPTA)
- Partnerships with third-party contractors of paratransit and on demand services sharing innovative training and planning options.

Green Bay Metro staff will receive the proper training, coaching, and refresher training to ensure our agency continues to operate safely and efficiently. GBM is committed to providing safe and dependable transportation to jobs, schools, medical services, and other destinations.

Report to the
Transit Commission
of the City of Green Bay

Green Bay METRO

MEETING DATE	PREPARED BY
February 21, 2024	

AGENDA ITEM # E.1

Operational Reports

BACKGROUND

Operational reports included. Staff will present the reports.

RECOMMENDATION

No action is necessary.

FISCAL IMPACT

ATTACHMENTS

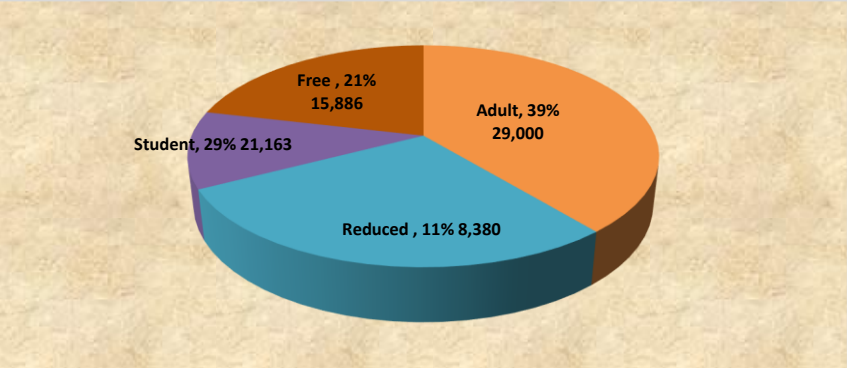
1. 12-Dec Ridership
2. 2023 Ridership Totals

Fixed Route Ridership

	ADULT	STUDENT	*REDUCED	*FREE	MONTHLY FIXED ROUTE	YTD FIXED ROUTE
December 2022	23,748	15,979	7,742	14,239	61,708	681,502
December 2023	24,436	20,559	8,033	15,862	68,890	758,383
Difference	688	4,580	291	1,623	7,182	76,881
	3%	29%	4%	11%	12%	11.3%

Microtransit On Demand Ridership

	ADULT	STUDENT	*REDUCED	*FREE	MONTHLY ON DEMAND	YTD ON DEMAND
December 2022	2,339	139	170	2	2,650	28,888
December 2023	4,564	604	347	24	5,539	60,110
	2,225	465	177	22	2,889	31,222
	95%	335%	104%	1100%	109%	108.1%



YTD PASSENGERS
818,493

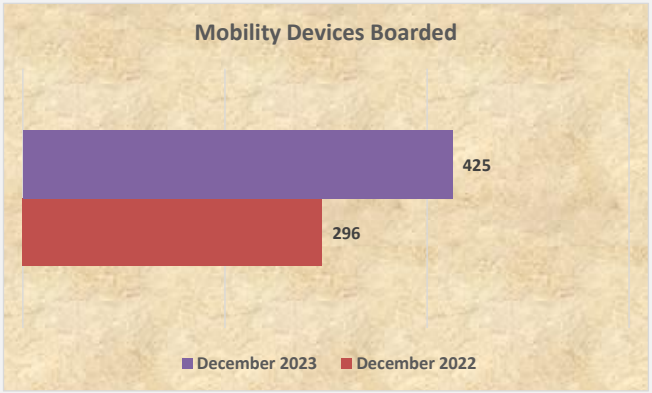
**Reduced fare program is for individuals who are age 65 and older, Medicare recipients, and individuals with qualifying disabilities.*

**Free is comprised of game day, children 4 & under, promos, etc.*

Paratransit Ridership

	BASE TRIPS	*AGENCY TRIPS	TOTAL TRIPS	YTD
December 2022	511	742	1,253	16,398
December 2023	490	646	1,136	15,188
Difference	(21)	(96)	(117)	1,210
	-4.1%	-12.9%	-9.3%	7.4%

**Agency Fare includes base fare plus additional cost for expenses that is permitted by 49 CRF 37.131 to social service agencies and other organizations for agency trips (i.e., trips guaranteed to the organization).*



2022 Total	4,676
2023 Total	4,336

2022 Total	10,098
2023 Total	8,437

49 CRF 37.131 - Service Criteria for Complementary paratransit (c) (4) The entity may charge a fare higher than otherwise permitted by this paraprah to a social service agency or other organization for agency trips (i.e., trips guaranteed to the organization).

Fixed Route Ridership

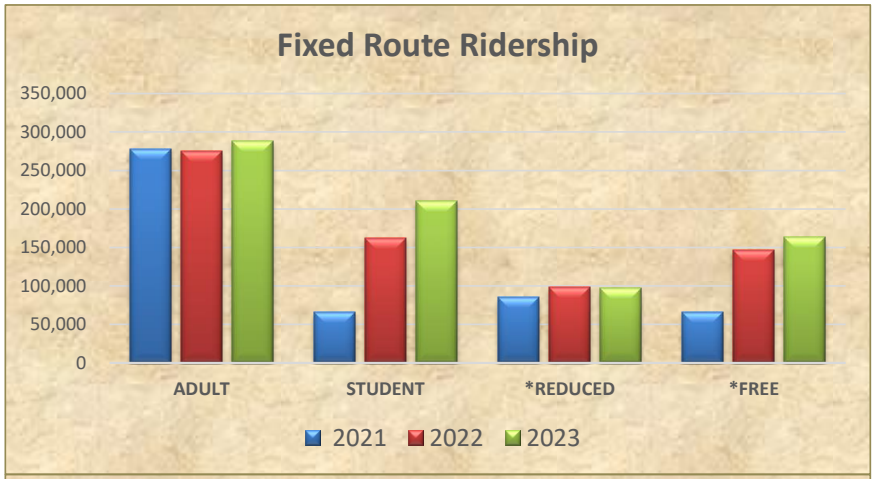
	ADULT	STUDENT	*REDUCED	*FREE	FIXED ROUTE
2021	278,130	66,257	84,813	66,172	495,371
2022	274,769	161,768	98,083	146,882	681,502
2023	287,612	210,672	96,660	163,439	758,383
Difference	12,843	48,904	(1,423)	16,557	76,881
	4%	23%	-1%	10%	10%

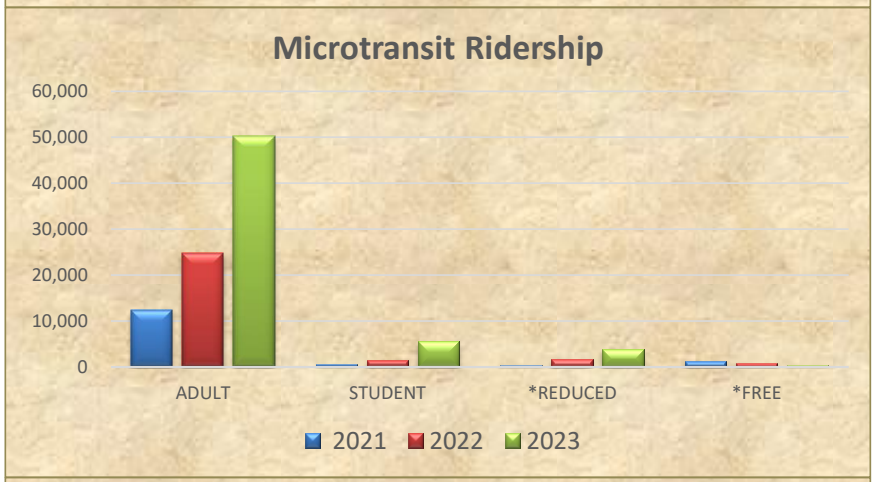
Microtransit On Demand Ridership

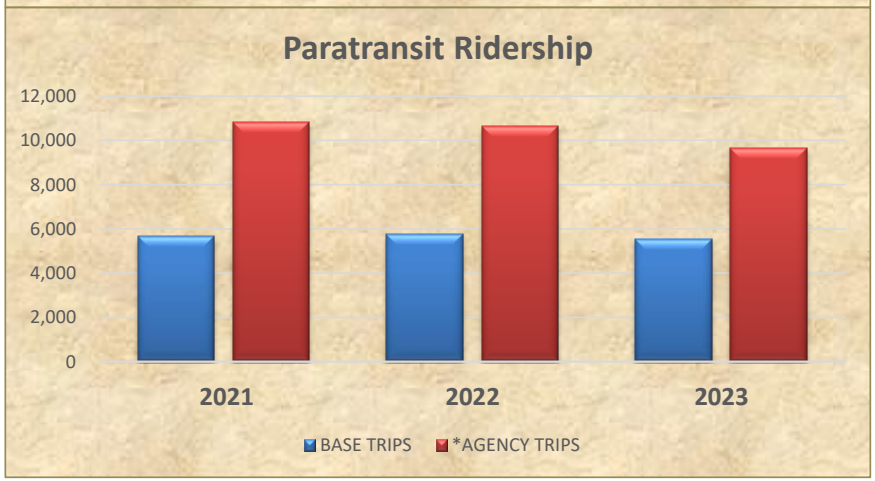
	ADULT	STUDENT	*REDUCED	*FREE	MICRO
2021	12,300	547	507	1,287	14,641
2022	24,816	1,421	1,764	887	28,888
2023	50,178	5,616	3,908	408	60,110
Difference	25,362	4,195	2,144	(479)	31,222
	51%	75%	55%	-117%	52%

PARATRANSIT RIDERSHIP

	BASE TRIPS	*AGENCY TRIPS	PARA
2021	5,652	10,844	16,496
2022	5,760	10,638	16,398
2023	5,533	9,655	15,188
Difference	(227)	(983)	(1,210)
	-3.9%	-9.2%	-7.4%







Report to the
Transit Commission
of the City of Green Bay

MEETING DATE	PREPARED BY
February 21, 2024	

AGENDA ITEM # E.2

Director's Report

BACKGROUND

Director Kiewiz will provide the Transit Commission with a system update.

RECOMMENDATION

No action is necessary.

FISCAL IMPACT

ATTACHMENTS

None