

TRANSIT TALK

VOL. 41

Edmonton Launches Battery Bus Service

Eleven years after the City of Edmonton scrapped its 140 km electric trolleybus system in a backward move that will live in infamy, electric buses of sorts have returned to its streets. The new vehicles are battery buses, built by American manufacturer Proterra.

Although only about half as energy efficient overall as trolleybuses, the vehicles are just as quiet and just as fume-free in the streets, where the noxious fumes from diesel buses have the greatest potential for harm. 21 of the new battery-electric buses debuted in August, with the remainder of an order of 40 vehicles to follow.

Built in South Carolina, the buses run off long-range batteries, which are charged overnight using electricity from the grid at overhead charging stations in the garage. Edmonton is one of only a few cities in North America to employ this particular type of charging technology. The buses can travel up to 350 km on a single charge.

The vehicles are considered a “long range battery bus”. Transit Branch Manager Eddie Robar explained: “We chose a long-range charge bus because that gives us effectively the same capability we have with our diesel buses today — we can do the same things with our electric bus. We get a full service day from that bus. We’re able to apply it to any route or any location in the city. We’re not restricted by where we need to charge the bus at what time of day. It goes back to the garage, it charges overnight and it’s back out for a full day of service the next day.”

The 40-foot Proterra Catalyst E2 MAX vehicle boasts 660 kWh of onboard energy and Proterra’s DuoPower drivetrain. The E2 MAX bus has six battery packs on board – the most energy storage on any 40-foot battery bus. This vehicle broke the world record for the longest distance traveled by a battery bus on a single charge. (continued on Page 2)

Toronto Announces Canada’s Largest Battery Electric Bus Fleet

On September 8th, as more battery electric buses entered service, the TTC announced that it now operates the largest fleet of battery buses in Canada. Approximately 35 battery buses were in service in Toronto by early September, with the remainder of an order of 60 expected by the end of September or early October.

In November 2017, the TTC Board approved procurement of 30 battery-electric vehicles; then in June 2018, the Board approved the purchase of 30 more. The battery buses have been sourced from three different manufacturers: BYD Canada Co. Ltd., New Flyer Industries Inc. and Proterra Inc.

The TTC’s Arrow Road Garage was the first location to be outfitted with charging infrastructure for the New Flyer vehicles. Mount Dennis Garage followed with vehicles made by Proterra that use the same charging technology. The BYD vehicles are based out of the TTC’s Eglinton Bus Division, and they use a different type of charging infrastructure. While the other eBuses use Direct Current for charging, BYD vehicles use Alternating Current.

The differences between all three models will be evaluated as the TTC progresses with its head-to-head comparison that will determine future procurements of battery-electric buses.

Internal combustion vehicles generate about one-third of all emissions in Toronto today. The electrification of vehicles is a key component of Toronto’s TransformTO climate action strategy, which targets an 80-per-cent reduction in local greenhouse gas emissions by 2050. The full electrification of the bus fleet, which is targeted for 2040, demonstrates the City’s commitment to lead by example. It is not known at this time whether a return to electric trolleybuses on selected, heavy-use routes might eventually form part of the strategy. (continued on Page 2)



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Edited by Retired Employees of the Edmonton Transit Service

Edmonton (continued)

Featuring two electric motors, the DuoPower drivetrain delivers an impressive 510 horsepower—twice that of a standard diesel bus engine with five times better fuel efficiency. The DuoPower drivetrain can propel a bus up a 25 percent grade, making it an ideal option for routes with steep hills, like those using Bellamy, McDougall or Connors Hill.

Edmonton Mayor Don Iveson, a long time supporter of electric transit and indeed of the former trolleybus system, got to test drive one of the buses in a parking lot on July 23rd. “It’s going to be extraordinary for our operators and for the public to be on a really quiet, comfortable, highly efficient bus”, he said. Iveson also touted the long-term savings possible with electric buses. “They do cost more to buy (about \$1.2 million each compared to about \$550,000 for a diesel bus), but they’re about 30 per cent more efficient to operate. And at a time where we’re all sort of scratching our heads to make sure that all civic expenditures — particularly transit — are as efficient as possible and as focused as possible, these super-efficient buses will help us control the cost of delivering service long into the future.” Iveson hopes that more battery-electric buses will be included in the ETS fleet in the years ahead. Iveson told reporters that he has been taking calls from mayors across North America asking about the investment and the technology behind it.

Iveson said the buses help the city meet its climate goals as well, even though they run using power from the grid. “Overall there will be a lower footprint in our community directly on the street, and a lower overall ecological footprint cumulatively with these buses.”

ETS Manager Robar told reporters that 40% less greenhouse

gases would be emitted for each diesel bus that is replaced by a battery-electric and that the buses would be about 30% cheaper to maintain.

Ryan Birch, Acting Director of Transit Operations, indicated that the buses are equipped with regenerative braking. “As we drive the bus, when we let go of the throttle pedal, it lets power go back and be regenerated into the battery system.”

“These are really ideal as transit vehicles to use electrification because of the regenerative braking in particular, which you can actually feel when you take your foot off the gas. You can feel the bus recharging itself as it slows down.”

Like transit systems everywhere, Iveson said that Edmonton is also suffering from decreased transit ridership during the pandemic. He said ridership was about half of what it would normally be when interviewed in August. And there are also increased costs associated with cleaning transit vehicles and facilities. He is hopeful the federal government will come through with grant money to help pay for the new battery buses after the UCP provincial government cancelled the funding earmarked for the new fleet.

The battery electric buses are housed at the city’s new Kathleen Andrews Garage near Fort Road.

A video highlighting the introduction of battery buses to Edmonton can be viewed at:

https://www.youtube.com/watch?v=anM-xPtwlx4&feature=emb_title&fbclid=IwAR3pFCqM-NAS8xM9jID3sTzEVi-6G2ves0SZPF9W7jM12hubzSvetqIneg

[Information Sources: Global News, April 16 and July 23, 2020; City of Edmonton/ETS News Release, July 23, 2020; Proterra July 24, 2020]

Toronto (continued)

Several officials spoke in response to the September 8th announcement. Toronto Mayor John Tory said: “I’m proud to help launch these new electric buses and to celebrate the fact that Toronto is now officially operating the largest fleet of battery-electric buses in Canada. This fleet of 60 buses was only made possible thanks to an investment by the City of Toronto and the Government of Canada of \$140 million. Our eBus fleet is one of the many projects that our city government has jointly funded with the federal government through the federal Public Transit Infrastructure Fund. I want to thank the Government of Canada for providing this funding that helps keep Toronto residents moving by investing in modernizing, expanding and upgrading our transit and transportation infrastructure. This is the right and responsible thing to do for our transit system, our city, and our environment.”

“Public transit allows Canadians to get around in cheaper, cleaner and faster ways,” said The Honourable Catherine McKenna, Minister of Infrastructure and Communities. “Our government’s investment in the TTC’s electric bus pilot program is a sign of our commitment to made-in-Canada clean technology and an important step toward our target of 5,000 electric buses in Canada’s fleets over the next five years.” [Source: TTC, September 8, 2020]

Calgary Council Approves Green Line

In June of 2020, Calgary City Council approved an updated alignment and construction strategy for the first stage of that city’s Green Line LRT from 16th Avenue North to Shepard. General Manager of the Green Line, Michael Thompson, told reporters that the approval is a “pivotal step in achieving the vision of the Green Line promised to Calgarians, as the Green Line will improve mobility for all Calgarians by connecting communities, employment hubs and key destinations across the city.”

In addition to approving the alignment, Council approved a new construction staging strategy. The Green Line Stage 1 will be constructed in three segments:

- Segment 1: Elbow River to Shepard
- Segment 2A: 2 Avenue SW station to Elbow River
- Segment 2B: 16 Avenue N to north of 2 Avenue SW station

Segment 1 of the Green Line is shovel ready. A Request for Proposal was issued, with design details to be finalized and construction set to begin in 2021. [Sources: City News, June 16, 2020; 660 News, June 18, 2020]

Toronto Transit Commission Board Approves new Procurement Plan

A C\$550-million investment in new vehicles and transit system upgrades, made possible by Toronto's City Building Fund, was approved by the Toronto Transit Commission (TTC) Board in late October. "This plan will see hundreds of new energy-efficient and zero-emission buses . . . to replace our aging fleet, advance the city's climate change goals, and improve the customer experience while promoting economic prosperity and the social vibrancy of the city," explained Rick Leary, TTC's CEO.

As part of the Fleet Procurement Strategy, the TTC Board gave the go-ahead to purchase 300 new hybrid buses for 2022 and 300 new battery-electric buses to roll out starting in 2023, pending the results of the battery bus tests currently underway. There will also be 70 new Wheel-Trans paratransport buses and 13 new electric streetcars, to be rolled out in 2022 and 2023, respectively.

With more government support, 47 more streetcars in addition to the 13, would be purchased.

The plan also funds the start of work needed to purchase 80 new subway trains for Lines 1 and 2 to accommodate expansion, and an upgraded signaling system on Line 2. [Source: TTC News Release, October 23, 2020]

Mesa, Arizona Mulls Streetcar

Mesa officials are studying the possibility of implementing a streetcar route in the western part of the city. Details such as the exact route and cost are yet to be finalized. It is envisioned that the streetcar would serve the Asian District, Mesa Community College, two Banner hospitals and the Fiesta District before connecting to downtown along Country Club Drive.

But the likely 7-8-mile route is just starting to reach a level of consensus. Planning and paying for it would first depend on voter approval of an extension of Proposition 400, the special tax that helps pay for road and other transportation projects in Maricopa County. The extension would not appear on the ballot until 2022 or 2024.

Because a new source of revenue must be secured, the potential Mesa streetcar could be as long as 10 years into the future according to Mesa Mayor John Giles. The plan would connect a Mesa streetcar loop into the Tempe streetcar system, which is now under construction.

"The character of West Mesa is going to change," Giles said. "It's going to be a newer, more urban, more dense part of the city." Hundreds of new apartment units are on the drawing board in that part of the city, adding to hundreds more already under construction downtown. The streetcar would offer residents a way to commute without having to use cars.

Giles said "2030 is probably very optimistic" as a potential timeline for a Mesa's streetcar system to get underway. [Source: East Valley Tribune, Nov. 20, 2020]

Toronto to test Automated Driverless Shuttle

The City of Toronto, Toronto Transit Commission (TTC), and Metrolinx are working together on a trial public transit service to connect residents travelling to and from Rouge Hill GO station using a driverless shuttle. The shuttle will run through residential streets not currently served by conventional transit.

On October 14, 2020, the City of Toronto announced an agreement with Local Motors to provide an "Olli 2.0" automated driverless shuttle vehicle for testing in the Spring of 2021. It is a small state-of-the-art electric shuttle that is mostly self-driving, but will have an on-board human attendant present at all times.

The aim of the trial is to demonstrate the future opportunity for a safe, green, accessible and convenient transit technology to support local travel needs. This type of "first and last mile" service would be offered as an alternative choice for residents to get to the nearest transit station, which could help to reduce traffic congestion and parking lot demand. [Source: City of Toronto News Release, Oct. 14, 2020]



New Trolleybus Fleet in Operation in Milan, Italy

On May 4th, the city of Milan, Italy held a ceremony marking the debut of a brand new electric trolleybus fleet. The delivery of an order of Solaris Trollino trolleybuses, built in Poland, commenced in June 2019, with the last vehicle being delivered early this year.

The Solaris Trollino vehicles are 18 metre articulated, 100% low-floor vehicles that can accommodate 135 people if wheelchair seating is not used, or 130 with wheelchair seating in use. The trolleybuses feature 4 doors. The internal and external lighting is LED-based, with dedicated lighting near the doors.

The large windows guarantee excellent natural lighting. USB ports are located near the seats for quick charging of mobile devices. Full climate control is available both in the driver's cab and in the passenger environment.

The new trolleybuses are equipped with lithium-titanate battery packs and IMC (In Motion Charging) technology which allows operation at normal speed for up to 10 km without an overhead line, in addition to a significant reduction in energy consumption. The maximum speed of the vehicle is electronically regulated at 50 km /h.

Milan is also operating 30 battery-electric buses and has been considering acquiring more of them to complement the trolleybus fleet. A contract for up to 250 battery-electric buses to replace aging diesel buses is pending. [Source: Sustainable Bus, May 7, 2020]

Latvia gets Trolleys with Fuel Cell Range Extender

An innovative concept is carrying passengers on Route 4 in Riga, Latvia's capital city. The public transport operator announced earlier this year that ten trolleybuses equipped with a fuel cell range extender had been successfully placed in service.

The vehicles were supplied by European coach builder Solaris of Poland. The contract was signed in late 2016, and some delays were experienced in completing the project. The deal also includes an option for a further ten vehicles which can be exercised if the operator so chooses.

Each trolleybus is fitted with a fuel cell set as well as a battery set which allow the vehicle to operate without a traction energy supply for up to 100 km, according to the manufacturer. This makes it possible to use the trolleybuses in regular service in areas without overhead wires, but also allows them to operate with maximum energy efficiency in areas that are under wire. A Medcom traction motor provides the power to drive the vehicle.

The fuel cell trolleybuses are part of the international project H2Nodes. The European Union co-funded 50% of the total project costs, which are estimated at EUR 16.1 million. [Source: Sustainable Bus, March 28th, 2020]

European Trolleybus Investments on the Rise

Trolleybus projects and investments are on the rise in several European countries, notably Switzerland, France, Austria, Italy, Poland and the Czech Republic. Significant renewal plans are underway in all of these countries; Berlin, Germany is considering new investments in trolleybus technology. In general, the interest in electric bus transport—both in grid connected and battery type vehicles—is growing worldwide as an energy transition in urban public transport takes place. Here are some recent highlights from Europe:

👉 Modena and Parma, Italy to get Polish made Trolleys

18 Polish-made Solaris Trollino 12 metre trolleybuses are in store for Modena and Parma. 2020 is set to be an important year for operators SETA Modena and TEP Parma, as both are providing carrier services in the Emilia-Romagna region on which they plan to use the new vehicles.

The vehicles will feature a central traction motor and traction batteries with a capacity of 45 kWh as well as a cooling system, all of which will allow the vehicles to cover a considerable distance without the need to be attached to overhead wires.

👉 Trolleybus-based plans in Genoa

Genoa, Italy also has trolleybus plans. In May, the city put forward a revised proposal for a rapid transit system comprised of four lines to be served by trolleybuses. In the spring of last year, a pilot project was carried out using a 24 metre Van Hool Exquicity trolleybus with a capacity of 180 passengers. And earlier this year, an Iveco Crealis trolleybus was tested in Genoa. The current plan is valued at EUR 478 million and envisions the purchase of up to 145 new trolleybuses. (continued on Page 5)

👉 Lyon, France issues Tender for Trolleybuses

In January, Lyon's public transport owner SYTRAL issued a tender for 20 new trolleybuses (with a minimum order of 18 and no maximum). The new generation of trolleybuses are to feature In Motion Charging (IMC), which is expected to be standard on tenders beyond 2020. Six new lines in Lyon are to be fitted with trolleybuses featuring IMC.

👉 New Trolleybuses in Zurich, Switzerland

In Switzerland, Zurich's public transport network looks forward to a future with new technologies and new trolleybus lines. Following the delivery of three 24-metre maxi trolleybuses in 2019, the operator VBZ Zurich continues to renew its rolling stock. Hess is once again the chosen industry player. In March 2020, deliveries began of 9 new trolleybuses, series 200-208, of the Lightram 19 type, 18.7 m long, equipped with four doors, IMC technology and a battery pack.

👉 Czech Republic: New Trolleybus Line and new Trolleybuses in Four Cities

As of the beginning of July this year, Prague transit users got to take advantage of a new trolleybus service operating on Route 58 connecting Palmovka (Metro B) and Letňany (Metro C). The line has a length of 5 km and is currently served by a single trolleybus.

Fleet renewals are underway in several cities in the Czech Republic. New electric trolleybuses have been delivered to Teplice, with more still on order. Opava has ordered new vehicles, Ostrava has published a call for tenders, and Mariánské Lázně has an order close to delivery. The Czech manufacturer Skoda Electric is involved in supplying these orders. A total of 30 new trolleybuses will be supplied in these orders. [Source: Sustainable Bus, April 16, 2020]

Retired Dayton Trolleybus joins Illinois Railway Museum Collection

The latest addition to the Illinois Railway Museum's historic collection, ETI trolleybus 9809 from Dayton, Ohio, arrived at the museum on May 1, 2020. The type 14TrE2 trolleybus was built in 1998 by Electric Transit Inc, a joint venture between US defense contractor AAI and longtime Czech Republic streetcar and bus manufacturer Skoda. It was the last 14TrE2 trolleybus in regular service in Dayton and was retired in December 2019.

Dayton 9809 is the second-youngest piece of equipment preserved at IRM. It is also the first trolleybus acquired by the museum to have been built with batteries sufficient to operate off-wire. Number 9809 represents a third generation of former Dayton trolleybuses housed at the museum, joining a 1947 Pullman-Standard and two 1977 Flyer Industries models. The newly-acquired trolleybus is complete and operational.

The Illinois Railway Museum is home to the largest and most comprehensive collection of historic trolleybuses in North America. With this new addition, the museum now has 24 historic trolleybuses as well as 12 historic motor buses. It is the museum's intention to operate Dayton 9809 for visitors on IRM's demonstration trolleybus line.

A retired San Francisco MUNI ETI Skoda two-axle 14TrSF trolleybus, MUNI fleet number 5538, was recently added to MUNI's historic fleet. MUNI was the only other transit authority to operate ETI Skoda trolleybuses in North America.

A fleet of new trolleybuses now operates in Dayton. All of the new trolleybuses had been placed into service by December 1, 2020. [Sources: IRM News Release, May 2, 2020; Jeff Marinoff, May 4, 2020; Dayton Trolleybus Group, December 2, 2020]

Moscow, Russia inaugurates Special Historic Trolleybus Route

In recognition of the tremendous role that trolleybuses have played over the years in the city of Moscow, a special trolleybus route was inaugurated there on September 4th. Route T (for "trolleybus") operates on a 10-minute service seven days a week on a 3.5 km loop from Komsomolskaya Square to Novoryazanskaya Street. No special tickets are required to ride the route. Retired Moscow trolleybuses are used to operate the route, with two vehicles normally required to hold down the service. Some of the vehicles display the words "Museum Route" in large lettering on the sides of the vehicle. The establishment of a transit museum using a nearby disused streetcar depot had long been planned, however it appears that this will no longer come to fruition, as the parcel of land on which it stands has reportedly been sold to developers. [Source: RU-Main, September 4, 2020]

MORE Battery Bus News . . .



Philly's Proterra Battery Buses Out of Service

Philadelphia's battery-powered buses were mysteriously put on ice earlier this year — largely unbeknownst to SEPTA riders during a pandemic that's caused record-low ridership. The battery buses represent an investment of some \$24 million.

SEPTA spokesperson Andrew Busch acknowledged that the transportation agency's entire fleet of 25 battery buses--the third-largest fleet in the U.S.--has been "fully sidelined" since February. "We made the decision to take them out of service," he said in response to an inquiry about the missing buses. "We're not able to get into the specific issues...but we're hopeful we can come up with resolutions that will allow us to get them all back into service." Busch said there had been no service interruptions, as diesel buses had been substituted. (continued on Page 6)

Philadelphia Battery Buses (continued from Page 5)

The spokesperson said SEPTA believed the issues would be covered by a manufacturer's warranty. Although Busch declined to reveal the issue that caused the agency to remove the buses from service, multiple sources blamed a defect in the buses' plastic chassis that caused cracks to appear, making the buses unsafe.

While SEPTA has continued to attract grant funding to expand battery bus use, battery buses already experienced other issues prior to 2020. Seasonal temperature fluctuations affected battery performance, especially when heating and cooling systems were in use, reducing the range the buses could travel in summer and winter. As a result, the Southern District Bus Depot required significant infrastructure upgrades, including a new electrical substation and the installation of charging stations to handle the power demands of the 25 vehicles.

The battery-electric buses were deployed in summer 2019 to two pilot routes that both bisect South Philadelphia: Route 79, along Snyder Ave, and Route 29, which runs on Tasker and Morris streets. The high-profile program was intended to presage a larger pivot toward zero-emission vehicles, although advocacy groups questioned the agency's wisdom in putting battery buses on routes equipped with infrastructure for electric trolleybus service, albeit not in use at the time. Emissions reductions only occur with battery buses if they are used to replace internal combustion vehicles.

Justin Rocznik from the Philly Transit Riders Union criticized SEPTA for gambling on new technology rather than restoring or expanding environmentally friendly trolleybus infrastructure. "Agencies always want to replace fixed infrastructure with a new gimmick. We end up planning on hypothetical future improvements to battery bus technology instead of using the infrastructure we know works."

Rocznik pointed to a statement in a recent battery bus study indicating that any savings with battery vehicles were "speculative because SEPTA does not have the service record with these vehicles that it does with diesel-electric hybrid buses and trackless trolleys." And Rocznik said the current issue with the pilot fleet could be indicative of deeper problems with the still-budding technology underpinning battery buses — and that could end up costing both SEPTA and its riders.

Despite this uncertainty and the recent frame cracking problem, Busch said the agency remains "fully committed" to a plan to move forward with expanding battery bus technology. SEPTA won a \$4.5 million Federal Transportation Administration grant that it plans to use to build out infrastructure to power the Midvale Depot in order to bring battery bus lines to North Philadelphia.

There are over 1,500 internal combustion powered buses in operation in Philadelphia. [Source: WhyY (PBS), September 17, 2020]

New Federal Funding for Battery Buses for Vancouver

As part of a \$10-billion infrastructure investment to stimulate the economy and create jobs, the Canadian Federal government announced a \$1.5 billion fund for zero-emission buses in early October. While funds have not been allocated to specific projects yet, Vancouver, with its intent to transition to battery buses as a replacement for its internal combustion fleet, is hoping to be on the receiving end. 57 aging diesel buses are slated to be replaced by battery models in 2023.

Just prior to the onset of COVID-19, TransLink announced its Low Carbon Fleet Strategy would entail seeking funding for up to 635 battery buses. The acquisition cost is about \$1 million for a 40-ft battery bus, and similar for each charging station. While these capital costs are higher, there are reduced operating costs of up to \$124 million this decade based on acquiring 635 vehicles. The increased electrification of the bus fleet is TransLink's primary strategy for reducing emissions by 45% in 2030, and 80% by 2050.

In February 2020, TransLink's Board of Directors approved a \$104 million investment, funded by the federal gas tax transfer, towards a battery-electric bus program, including the design and construction of the new Marpole Transit Centre depot. This compliments the nearby Vancouver Transit Centre, which is home to the large zero-emission electric trolleybus fleet. The new facility will house up to 300 battery buses and will be built on an industrial site west of the Canada Line bridge. It is slated to be operational by Fall 2024. (The existing electric trolleybus fleet will be replaced with new trolleybuses in 2027-2028, when the fleet reaches the end of their lifespan.)

For near-term investments, TransLink closed its procurement process in March 2020 for up to 15 battery buses. The vehicles are expected next year and will allow Route 100 22nd Street Station/Marpole Loop to be converted into TransLink's first fully battery bus operated route. Four battery buses went into service on Route 100 last year.

A TransLink report from earlier this year noted some operating challenges with battery technology. Batteries have a lower life duration after each charge in cold weather, and maintenance crews will have to monitor projected overnight temperatures during the winter months and implement cold weather procedures if temperatures fall below 3°C. Such procedures may include ensuring all buses are connected to depot charging or have battery heating mode enabled when parked at the depot overnight. As well, charging is something that must happen according to schedule, even if a bus is running late. This means if the existing layover time in bus schedules is used for charging, one would have to ensure that the bus is not late and that the layover time is available. Irregular and unpredictable break and recovery times for bus drivers was a major issue in last year's bus union strike. [Source: Daily Hive/Vancouver Urbanized, October 2, 2020]

Seattle Orders Battery Buses

King County Executive Dow Constantine announced earlier this year that King County Metro will purchase 40 battery-electric buses from New Flyer, Inc., to be delivered in 2021, thanks to \$20 million in grant funding. There are also plans to order 80 more. The vehicles will achieve a major milestone in the county's efforts to improve air quality, reduce carbon and create a zero-emissions fleet.

The current order is for 40 60-foot-long articulated battery buses valued at \$1.3 million each for a total of approximately \$50 million. The remaining 80 battery-electric buses planned for purchase in 2021 include 20 more articulated buses and 60 40-foot-long buses, valued at approximately \$925,000 each. Total cost for the second order, to arrive in Fall 2022, is estimated to be around \$80 million. The 120 new coaches are all New Flyer's Xcelsior CHARGE model. (continued on Page 7)

Seattle (con't): Battery buses have operated in King County since 2016. The 11 existing battery-electric buses in Metro's fleet are all 40 feet long and can travel only 23 miles before requiring a 10-minute charge.

In 2017, Executive Constantine and METRO General Manager Rob Gannon called on the industry to invest more in battery-electric options, including the creation of coaches that could travel farther and handle the varying terrain requirements of the region. New Flyer, Inc. of America came forward, producing both a 40-foot and 60-foot battery-electric bus that met Metro's specifications and timeline needs. These long-range battery-electric buses can travel approximately 140 miles on a single charge.

The next milestone in Metro's journey to a zero-emission fleet is the addition of base capacity and charging infrastructure to support battery-electric bus fleet operations. A phased approach is planned, starting with the completion of a temporary interim bus base in fall 2020 next to the existing South Base, adding capacity for approximately 125 buses. This extra capacity will support Metro's existing diesel/hybrid fleet until the first order of new battery-electric buses arrives one year later. This interim base will house a charging system for 100 buses installed in phases starting in 2021, which will be capable of charging the 120 buses housed at that facility. Metro is investing \$41 million into this hybrid base construction, with electrification infrastructure estimated to cost \$50-\$60 million.

After this initial procurement of 120 buses, Metro is planning an additional procurement of 250 battery buses for delivery in 2025, by which time Metro plans to complete its South Annex Base on land currently occupied by Metro's Training Center and Construction Management Office. This base will house 250 battery buses and be built with the conversion from internal combustion engines to battery buses in mind.

Transportation is the region's largest source of greenhouse gas emissions, producing nearly half of all greenhouse gas emissions. Metro operates a fleet of 174 clean electric trolleybuses in Seattle and also takes an estimated 190,000 cars off the road each weekday across King County. Increased transit service with a cleaner fleet will further reduce county greenhouse gas emissions, keeping in line with the Strategic Climate Action Plan and the Executive's goal of a zero-emissions bus fleet by 2040. [Source: King County via Westside Seattle, Jan. 20, 2020]

Jackson, Wyoming gets first Battery Bus

On November 12th, START Bus and e-bus manufacturer Proterra unveiled the state of Wyoming's first battery-electric bus. This is the first of eight Proterra ZX5 transit buses coming to the agency and will be the first ZX5 buses deployed in the U.S. The buses started to enter service in November – a step towards transitioning 40% of the bus fleet to zero emission technology by 2040.

The 40-foot Proterra ZX5 MAX vehicles boast 660 kWh of onboard energy and Proterra's DuoPower™ drivetrain. They can deliver up to 329 miles of driving range using two 550 hp motors. [Source: START Bus News Release, November 16, 2020]

Orange County, California Testing Battery Buses

In November, the Orange County Transportation Authority (OCTA) received approval to buy 10 battery buses for testing. The 10 New Flyer battery buses are standard 40-foot vehicles with a capacity of up to 76 riders each. They have an estimated range of 200 miles between charges, which will allow them to run for a full day and be charged nightly at OCTA's Garden Grove bus base. The vehicles will be operating by the end of 2021.

Earlier in 2020, OCTA also began operating 10 hydrogen fuel-cell electric buses, and this new pilot will help determine which technology – or mix of technologies – will work best for Orange County moving forward. The hydrogen fuel-cell buses continue to be tested on routes throughout Orange County. [Source: OCTA, November 12, 2020]

LA Metro Deploys Battery Buses

The first battery buses have now been deployed for revenue service on the Los Angeles County Metropolitan Transportation Authority's (Metro) G Line (Orange) following the completion of testing and the installation of charging stations along the alignment. The vehicles being used are 60-foot articulated buses manufactured by New Flyer. The agency plans to deploy 40 electric buses into service by the end of 2020.

"Even as we confront the immediate challenge of COVID-19, we are making an investment in a healthier, more sustainable future with the delivery of the first battery buses on the G Line," said Los Angeles Mayor and L.A. Metro Board Chair Eric Garcetti. "Every electric vehicle we put on our streets today means lower emissions, and we remain fully committed to cleaner transportation options and a better quality of life for all Angelenos."

The battery buses cost \$1.15 million each in a total project valued at US \$80,003,282, including infrastructure improvements and charging equipment. The new buses will be capable of recharging at various points along the G Line (Orange) to support its 24/7 operation.

In 2017, the L.A. Metro Board adopted a motion endorsing a plan to transition the agency to a zero emission bus fleet by 2030 using battery buses, and actually hopes to achieve that goal in time for the Olympic Games in 2028. The plan is contingent upon two primary factors: continuous advancements in battery-electric bus technology – which includes an increase in range, reduction of charging times and extension of battery life cycles – as well as a drop in price as the technology develops.

Under a separate contract, L.A. Metro also ordered an additional 65 zero emission battery buses from manufacturer BYD. Five of those are 60-foot articulated models earmarked for the G Line (Orange), with the remainder to be used on the J Line (Silver). Metro plans to convert the J Line (Silver) to battery buses in 2021, and plans to have at least 155 battery buses in service on its network within two years. The purchases are being funded using grants from the Federal Transit Administration; the State Transit and Intercity Rail Capital Program; California Hybrid and Zero-Emissions Truck and Bus Voucher Incentive Program; Transformative Climate Communities; Low Carbon Transit Operations Program; Mobile Source Air Pollution Reduction Review Committee; and matching city funds. [Sources: LA Metro News Release, July 28, 2020; Metro Magazine, Feb. 21, 2020]

St. Louis, Missouri to Launch Battery Buses

In mid-October, St. Louis Metro Transit has received the first two of 14 battery-electric articulated buses manufactured by New Flyer of America, as it prepares for the launch of battery-electric buses in 2021. “The introduction of these battery-electric buses into the MetroBus fleet next year represents our commitment to providing economically and environmentally sustainable mobility options as well as an excellent transit experience for our riders,” said Jessica Mefford-Miller, St. Louis Metro Transit Executive Director. “We will be leaner and greener by introducing this battery-electric bus technology, not just with the buses but also through the charging infrastructure and operating facilities.”

The 60-foot battery-electric buses have 320 kilowatts of battery storage on each bus. That is enough power to support about 10, 2,000-square-foot houses for an entire day. They will operate exclusively on the #70 MetroBus route, the city’s busiest route that carries about 10 percent of all St. Louis Metro Transit’s customers daily.

Over the 15 year life of the buses, the agency hopes for a savings of about \$105,000 in diesel fuel costs and another \$125,000 in maintenance costs as a result of this purchase. [Source: Bi-State Development Agency of the Missouri-Illinois Metropolitan District (St. Louis Metro) Oct 16th, 2020]



A long time supporter of electric transit, Edmonton Mayor Don Iveson stands in front of new Proterra battery electric buses at the Kathleen Andrews Garage on July 23rd. Battery buses went into service on August 4th in Edmonton. (See story, page 1) [Photo: City of Edmonton]



A Return to Electric Bus Service in Edmonton: A new Proterra Catalyst E2 MAX battery-electric bus (right) stands next to a 1954 CCF Brill Model T-48A electric trolleybus. The Brill, part of the ETS historic collection, was the last trolleybus to be built at the CCF plant in Fort William, Ontario (now Thunder Bay). (See story, page 1) [Photo: City of Edmonton]



With 60 battery electric buses from three different manufacturers in service by the end of 2020, Toronto boasts the largest battery-electric bus fleet in Canada. The electric vehicles operate out of three different garages and will be compared in order to assist the TTC with the electrification of its bus fleet by 2040. (See story, page 1) [Photo: TTC]



Retired Dayton ETI trolleybus 9809 under wire at the Illinois Railway Museum. (See story on page 5.) [Photo: IRM]



Historic trolleybuses available for service on Moscow’s newly inaugurated Route T. (See story on page 5) [Photo: Moscow Department of Transportation]