

TransiTalk

IN THIS ISSUE:

VOL. 32

- ☛ Edmonton NAIT Line LRT Opening Postponed a Third Time
- ☛ St. Albert Trail LRT alignment approved by St. Albert City Council
- ☛ New Prototype Gillig/Vossloh-Kiepe Trolleybuses Arrive in Dayton, Ohio
- ☛ Seattle's New Ride: New Trolleybus Prototypes Arrive for Testing
- ☛ Seattle proposes first Trolleybus BRT Line in North America
- ☛ Spokane Trolleybus Line enters Engineering Study Phase
- ☛ Battery Bus News from Winnipeg, Chicago and Mount Vernon, Washington
- ☛ Streetcar News from Seattle, Sacramento, Los Angeles, Tampa and Milwaukee

plus our Editorial and more . . .



Upper left: Dayton RTA 1401, the first prototype Gillig/Vossloh-Kiepe trolley to arrive in Dayton, has been suited up and is out on a test run. Lower left: Inside the RTA's shop, service personnel are able to explore the new trolleys 1401 and 1402. Above: Rear view of 1401, equipped with a Kiepe automatic retriever system for lowering and raising poles. [Photos courtesy R.T. Morrow, www.daytontrolleys.net]



News Bulletin of the Edmonton Trolley Coalition
Sustainable Transit for Liveable Communities

www.trolleycoalition.org

Edited by Robert R. Clark, Retired Supervisor of ETS Planning

Edmonton's NAIT LRT Line Opening Delayed a Third Time

Edmonton Mayor Don Iveson has expressed frustration and disappointment after being told the opening of the city's Metro LRT line has been further delayed. He called the performance of the signal supplier, Thales Canada, unacceptable, and also expressed concerns with the way city staff have handled the project.

Originally set to start running in April 2014, the 3.3 km line from Churchill Station to the Northern Alberta Institute of Technology (NAIT) has been plagued with signal system problems ever since testing began. The opening was postponed to June, then to December, and now Transportation General Manager Dorian Wandzura says it won't begin operating until at least February.

The city is scheduled to take over control of the signal system by Dec. 31 from the supplier. At least four weeks of training will then follow to familiarize City staff with the system, which will control intersections and train movement, including on the existing Capital Line where two routes run on the same track. The software-based system will allow trains to travel 2 1/2 minutes apart.

Wandzura estimated the delay will cost the city several million dollars in lost revenue. Although the contract provides for penalties in the event of delays, the current focus is on completing the work before penalties are examined, he said. The rest of the construction on the line was finished on time and at about \$90 million under the original \$665 million budget.

Hasib Baig, president of the NAIT Students' Association, said students were promised September LRT service when they approved a mandatory transit U-Pass last year. Although they've had express rush-hour bus service from downtown this fall, he wants students given a rebate on their \$155 U-Pass fee for this semester. "We have lost confidence in the Edmonton Transit System's ability to meet their deadlines because of the three delays."

Mario Peloquin, a vice-president of Thales Canada, said he's sure they'll hand over the system by Dec. 31, a year later than planned. He blamed the problems on Edmonton's 35-year-old equipment. [Source: Edmonton Journal, Oct 8, 2014]

St Albert Council Approves LRT to be routed via The Trail

At the December 1st St. Albert City Council Meeting, Council accepted the recent LRT Functional Alignment Study recommending that St. Albert's future LRT line be built in the median of St. Albert Trail from the northern boundary with Sturgeon County south to 153 Avenue in Edmonton.

It has been assumed that the line would connect into a Northwest LRT line in Edmonton via a bridge over the CN yards. The practicality of this assumption has been questioned, though, as apart from the expense of bridge construction, the structure would create a dividing wall through the communities involved. Blatchford, a "model city" of 30,000 being planned for the former airport lands, would clearly require the capacity of its own line.

The preference expressed at public meetings held in St. Albert has been to continue LRT along the Trail south of 153 Avenue and meet up with Edmonton's Metro line at Kingsway or to make a connection through Railtown. A future LRT extension to the International Airport was suggested in submissions, and this would be of great benefit to all stakeholders. [Source: R. Clark]

New Trolleybus Prototypes arrive in Dayton, Ohio

The first new trolleybus—a prototype Gillig/Vossloh Kiepe dual mode vehicle—arrived in Dayton on September 29th and was assigned fleet number 1401. It is the first new trolleybus in Dayton since 1999. Not long after, it was joined by a second prototype numbered 1402. The arrival of the first two prototypes marks a great step forward for trolleybus operations in Dayton.

The new prototypes offer a very smooth ride indeed—smooth as silk. The vehicle is designed to operate as a regular trolleybus under wire, but can also be taken away from the wire using an auxiliary onboard diesel generator unit, with diesel engine supplied by Cummins. When engaged, the auxiliary diesel unit produces electricity which is fed into the electric traction motors to propel the vehicle. Thus, the ride quality is the same whether the vehicle operates on grid power or diesel power – no jerking or shifting can be discerned.

The Greater Dayton Regional Transit Authority's plan is to conduct performance testing with both vehicles for at least a two month period before evaluating them in regular service. Instrumentation is installed, and the technical and maintenance teams are ensuring that everything performs to standard. Operator training has begun, and it is anticipated that the vehicles will enter service on Route 7 sometime in January 2015. The 7 is a very long route, and so it will allow the opportunity to do extensive testing both on and off wire, while always having wire available. If problems are encountered while in diesel mode, the poles can always be raised to allow the vehicle to carry on.

Two prototypes with battery auxiliary propulsion are also on order and expected to arrive soon. They will also allow operation both on and off wire, but the off-wire operation will be powered by traction batteries instead of a diesel generator. After evaluation, the GDRTA will decide which configuration best suits their operations and place an order for that type of vehicle to renew the Dayton trolleybus fleet.

[Sources: R.T. Morrow at www.daytontrolleys.net; Trolleybus Magazine, November-December 2014]

Seattle's New Ride: Electric Trolleybus Prototypes Arrive

Seattle's renowned electric trolleybus system--a fixture in the heart of the city--is about to get a big upgrade.

King County Metro Transit is currently testing a 40-foot prototype that will replace the current electric trolley fleet. Metro plans to buy 141 new trolleys--86 will be 40-footers, 55 will be larger 60-foot articulated vehicles.

"We came to a point when our old fleets are just not able to perform as reliably as they used to," said Katie Chalmers of Metro's Service Development unit. "The environmental benefits of trolleys are tremendous. They're very quiet. They're very clean. We also saw that, in the big picture, they're a cost-effective way for us to provide service to many riders."

One of the big differences with the new trolleys is that the vehicles have a lithium-ion battery pack that will allow drivers to operate them off wire. "That gives us up to three miles of off wire use with this vehicle," explains Bill Thon, project manager for the trolley fleet replacement program. "So if there are accidents, construction, or any type of obstruction that closes a street, we have the ability to bring the poles down and go around that issue and then get back on the wires and go about our daily routine."

The new trolleys are lighter than the old generation, and Thon estimates there could be as much 25 to 30 percent energy savings.

There are also noticeable differences for riders, such as a change in the floor plan that allows easier entry and exit. But the biggest difference is that the new vehicles have air conditioning! "On really hot days, to be in a vehicle without air conditioning--especially at max load which we see a lot of on our trolleys--that's a very uncomfortable environment," Thon said.

"The trolleys are more expensive than regular buses, but they have a really long service life," Thon said, adding that electric trolleys don't need transmission and engine replacement like diesel vehicles do. Seattle's hilly terrain is particularly hard on the transmissions and engines of heavily loaded diesel vehicles.

Seattle operates the second-largest electric trolleybus fleet in the United States, with 77 miles of two-way overhead wire above city streets. The purchase represents about 10 percent of the entire bus fleet. [Source: King 5, Nov. 20, 2014]

Seattle proposes first Trolleybus BRT line in US

Seattle's public transit system may be en route to becoming a regional leader by combining the efficiency and prestige of trolleybuses with Bus Rapid Transit in the nation's first trolleybus BRT line. The Madison BRT line will cost \$87 million and will offer emission-free speedy service. Electric trolleys are the mode currently most appropriate to the passenger volumes and hilly terrain in the area. The line will travel along Madison from Colman Dock to 23 Avenue.

To explain the project and gather public feedback, the Seattle Department of Transportation held a community workshop about the Madison BRT corridor on November 20th. Using "interactive design stations", SDOT was able to present community-developed design ideas that focus on key intersections and potential station locations within each area. Engineers, planners, and urban designers were on hand to permit an interactive exchange and capture community feedback. While SDOT has good ideas about transit right-of-way, signal priority and high-quality stops, it's important for them to hear from the public that would use the service.

A 2007 BRT study found that well-designed BRT systems can offer a quick-build rail alternative with ¼ of rail's price tag. BRT systems can also offer the option to upgrade to LRT in future on an established right of way when passenger volumes and conditions warrant. And BRT can also be green. SDOT brags that the electric trolleybuses it plans to use for Madison BRT will be carbon neutral.

While drivers may need to give up road space to transit in order to build BRT, this is a step in reclaiming streets for moving people. Public transit actually tends to reduce traffic congestion rather than increase it because more people can travel in fewer vehicles. Expanding roadways for cars has been proven to aggravate traffic congestion in the long run by attracting more drivers. [Sources: Capitol Hill Seattle Blog, November 20, 2014; sdotblog.seattle.gov.; Seattle Transit Blog, Nov 25, 2014]



KC Metro 4301, Seattle's new prototype high tech electric trolleybus. [Photo: KC Metro]

Spokane Officials launch Engineering Study for Trolleybus Line, ask Voters for Funds

Spokane's mass transit officials are poised to ask voters for a sales tax increase to run a trolleybus line from Browne's Addition through the heart of downtown to the campuses of Gonzaga University and Spokane Community College. The ambitious \$72 million proposal mostly would be paid for with federal funds. Only about \$12 million would come from local tax dollars.

Called the Central City Line, the effort is part of Spokane Transit Authority's plans to improve public transportation in the region's neighborhoods with 21st century technology. During the week of November 17th, the STA board voted to engage in preliminary engineering work for the trolleybus line.

STA's 10-year vision, called the Moving Forward Plan, requires voter approval of a 0.3 percent sales tax increase. The STA board will decide December 18 whether to put the issue on the ballot.

Backers say a more modern transit system will make Spokane attractive to new investment and new residents, especially younger adults who are increasingly giving up car ownership in favor of transit. "It's a good investment," said County Commissioner Al French, a member of the STA board. Board members were told on November 20th that an economic impact study, funded by STA, showed the Central City Line could increase property values by \$175 million in 20 years.

"Transportation is essential for development," said Terry Moore, of ECONorthwest, a regional economic consulting firm. "If it increases efficiency, it is going to increase development." Mark Aden, of DCI Engineers, told the board that the line could be the project "to get us out of the rut we've been in for a long time." [Source: Spokesman Review, Nov. 21, 2014]

Sustainable Electrically Driven Bus Axle acknowledged with Award

The German company ZF manufactures a low-floor electric portal axle for city buses that affords operators complete flexibility. Its liquid-cooled electric motors, integrated directly into the axle, can be fed from different power sources: In addition to plug-in battery operation with or without a range extender, energy can also be supplied by overhead cables with the appropriate infrastructure.

Besides emission-free driving, the "AVE 130", as the axle has been named, offers additional advantages in urban stop-and-go traffic: Its high-torque electric motors set fully loaded buses in motion quickly. When braking, they switch to generator mode and gain back valuable braking energy. As well, the axle gives new freedom to bus designers: Since the driving energy is supplied to the electric motors (which are near the wheels) via power cables instead of mechanical linkages, vehicle manufacturers can arrange components completely differently than in conventional buses.

As part of the International Sustainability Prize 2015, an independent jury of experts assessed bus innovations which combine economic success with social responsibility and environmental friendliness. In the "Components" category, ZF's AVE 130 electric portal axle ultimately took the top step on the winner's podium. It swayed the jury with its efficiency, flexible usage options, and unrestricted everyday practicality.

The prize was presented during a ceremony held in Munich on Nov. 20.

"We are absolutely delighted about winning the 'International 'Busplaner' Sustainability Prize 2015'" said Andreas Moser, head of the axle and transmission systems for buses unit at ZF Friedrichshafen AG. "The AVE 130 provides urban public transport with the potential to improve sustainability in many regards."

[Source: ZF Technologies Friedrichshafen AG – (Zahnradfabrik): http://www.zf.com/corporate/en/products/innovations/hybrid_technology/electric_drive_cv/electric_drive_cv.html]

Italy Continues Trolleybus Renewal and Expansion

✓ Construction of the third and final route of the new trolleybus system in Lecce, Italy was completed earlier this year, and service began in June.

✓ The Italian city of Cagliari recently placed an order for 14 new Van Hool trolleybuses with off-wire capability provided by a diesel generator. When delivered in 2015, they will bring that city's trolley fleet to 30 vehicles.

✓ Construction of overhead wiring for a trolleybus system in the south of Rome--not linked with the current trolleybus service on Route 90--is currently underway. A completion date has not yet been announced. [Source: Trolleybus Magazine, No. 317, 318]



Are we doing Light Rail right?

ETC Editorial by Bob Clark



If Edmonton is going to make a large investment in LRT, then there are a few basic things that need to be kept in mind.

LRT is not rocket science, it is the logical development of the electric streetcar and belongs within the bounds of public right of way. Stops need to be frequent and based on where people live. If we must have large structures, we should be exploiting the air rights above them to recoup construction costs. We must exploit all the possibilities inherent in the mode, including custom freight service.

LRT should have priority at road crossings, but not by means of barriers which are a holdover from main line parallel tracks on the Northeast Line. Traffic-wise there is no difference between an LRT and a B-train. Our cities will not really be liveable until we regain the streets for moving people rather than vehicles. And our cities must be able to spend infrastructure money as they see best, not at the whim of Ottawa politicians.

Electric Streetcar News

Streetcar Festival draws crowds in Tampa, Florida

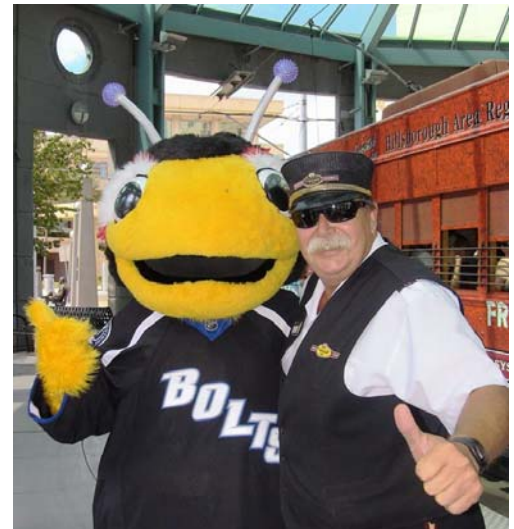
With about 100,000 passengers a year, most of them tourists, the old-fashioned streetcars that rumble down the streets of Tampa's Ybor City are definitely one of the area's major attractions. But in these days when traffic routinely backs up for miles on Tampa's highways, this once rejected form of transportation appears headed for a new heyday, says Peter Mikos, assistant manager of streetcar operations for the Hillsborough Area Regional Transit Authority (HART).

"There is this upswing in the cities in America that are starting to go to streetcar or light rail, and Tampa is no different. Tampa will have a light rail system one day. It's not a question of if; it's a question of when," Mikos said to a tour group in Ybor City.

Mikos, a 26-year HART veteran, gave a group of residents and tourists a walk through the history of Tampa's streetcars during a streetcar festival on October 18th, where users paid only 25 cents per ride.

He suggested it was not merely a love for the automobile that drove streetcars out of cities around the United States, but rather the cut-throat tactics of automakers in buying up electric transit lines and putting them out of business in the name of progress. Mikos believes the future will include options like light rail and even a lengthened streetcar line that could drop off visitors at the Tampa Museum of Art and the Straz Center downtown. "We would certainly like to make the streetcar a mode for downtown circulation, for moving people more efficiently," Mikos said.

The streetcar festival is an annual event in Tampa, taking place every October. [Sources: Tampa Tribune, Oct. 20, 2014; photos courtesy of Hillsborough Area Regional Transit]



Upper: Thunderbug poses with a TECO line motorman. Lower: The "Applebutter Express" gives an onboard concert. [Photos: HART]

Officials push for funds for Sacramento Downtown Streetcar

Downtown Sacramento has a \$477 million arena megaproject underway. But can the City also launch a \$150 million streetcar line connecting Sacramento and West Sacramento?

The streetcar project has been in the works for nearly a decade, but it faces a potential make-or-break moment next spring when advocates will ask downtown residents and property owners to vote on a \$30 million tax on properties within three blocks of the proposed line.

Proponents of the line have been told by officials that the federal government likely will pay for half of the project's cost if local officials can come up with the other half.

The city of West Sacramento has passed a local tax measure that could supply \$25 million. The city of Sacramento can contribute \$7 million. The county is being asked for \$3 million, and the state \$10 million. That leaves \$30 million that officials say needs to come from the private sector, i.e. the proposed property tax.

The streetcar project is being promoted as a sustainable transportation mode that will promote revitalization and attract development.

[Source: Sacramento Bee, Oct. 28, 2014]

Costs Drop for Los Angeles Streetcar Line

Building a streetcar line in downtown Los Angeles may cost about \$55 million less than officials had previously said -- an estimate that has buoyed the spirits of the project's boosters. But the now \$270 million streetcar line still faces a significant funding gap.

A tax district approved two years ago by downtown voters could raise as much as \$85 million. If the Federal Transit Administration gives the project the full \$75-million grant it seeks, that would still leave a funding gap of more than \$100 million. To make up the difference, the city plans to arrange a public-private partnership.

The downtown trolley has been publicly discussed for nearly a decade, ever since L.A.'s Community Redevelopment Agency began pushing for a partial rebirth of the streetcar network that once criss-crossed Southern California. Streetcar supporters hoped tracks in the ground could accelerate what was to be downtown's nascent renaissance.

An environmental assessment awaits completion. It is hoped that the \$75-million grant will be awarded in the summer of 2016, allowing the project to be completed and service to start by the end of 2019.

[Source: Los Angeles Times, Sept 4, 2014]

Milwaukee Mayor won't back down on Streetcars

In early November, Milwaukee Mayor Tom Barrett announced a plan to move forward a downtown streetcar project, with construction beginning in 2015 in preparation for an opening date in 2018. The total cost of the line is \$123.9 million. To cover these costs, Barrett will ask Council to create two tax financing districts to provide an estimated \$49.3 million in public funding. He'll also attempt to get a \$10 million outlay in new federal funds. This new cash comes on top of \$64.6 million already allocated -- \$54.9 million in federal aid and \$9.7 million from an existing tax district.

But Barrett's plans have been slowed by the Public Service Commission and derided by talk radio. Critics have sought to stop the project before the first tracks are laid. In April, the Public Service Commission ruled the city must pay for utility relocation, estimated at \$22.7 million. The City has filed a lawsuit to reverse that decision.

Barrett said the project will connect new business development, tie together amenities and allow people to move seamlessly downtown. He said the streetcar is part of a "comprehensive, 21st century transportation policy," that includes cars, parking, buses and bicycles. Since 2004, more than \$2.6 billion in public and private investment has taken place in downtown Milwaukee, with more than \$2 billion of additional development either under construction or in the planning stages. Since 2005, Milwaukee's close-in neighborhoods have seen an expansion of 6,300 housing units.

Barrett says he won't back down. "The others say do nothing, do nothing," Barrett said. "I reject that. We are not talking about a Streetcar Named Desire here." Barrett cited examples from Denver, Seattle, Minneapolis and Portland, where new streetcar lines have attracted young, educated people and allowed communities to move forward. "My message is, we've got a lot of momentum going in downtown Milwaukee," Barrett said. "Let's keep the momentum going."

[Source: Milwaukee Journal Sentinel, Nov. 25, 2014]

First Hill Streetcar Line Delayed in Seattle

The rails are set on Broadway, and the electric wires have been strung overhead. A green bike lane was completed last year, followed by the concrete boarding platforms. The only things still missing from the First Hill Streetcar line are the streetcars.

Passenger service on the \$134 million project has been delayed until "as early as the first quarter of 2015," according to a September memo to Seattle City Council. The cars were originally set to arrive by October 6th and cost about \$3.7 million each.

It seems that Inekon, the Czech-based car builder, underestimated how long it would take to design and build the cars, said Ethan Melone, streetcar program manager for the Seattle Department of Transportation. The Capitol Hill community may have to wait up to a year and a half beyond the original opening date of late 2013 to see streetcar service. All the while revenue is being lost and will never be recovered.

Melone says the Czech streetcars have performed with virtually no breakdowns for seven years on the city's existing South Lake Union line. "We still believe they are going to be really good vehicles," he said Tuesday, suggesting the wait may be worthwhile in some respects. Some cars are expected by late October. Inekon will be required to pay penalties to the city of \$25,000 the first day plus \$1,000 for each additional day of delay, Melone said.

Several factors contributed to the delay, including a backlog of orders at the plant, supply issues with the brakes, floor coverings that failed a fire resistance test, and a need for extensive testing of a new design for the internal wiring and controls.

American-made streetcars are available from Siemens in Sacramento, but Inekon won the Seattle bid competition because it could produce a narrower car that was more suited to Seattle's narrow streets, Melone said.

Michael Wells, Executive Director of the Capitol Hill Chamber of Commerce, urged patience. "You have to be a little patient, because that's how a city grows," he said. [Source: Seattle Times, September 24, 2014]

Battery Bus News

Battery Buses to Enter Service in Winnipeg

Winnipeg Transit launched a battery bus service on November 27th using up to four locally made battery operated transit buses. The buses will be in daily operation on a 40 kilometer, two-hour route between James Richardson International Airport and East Kildonan. The route was chosen as its length, speeds and loads are typical of many central business district routes in Canada and USA. A high power charging station has been installed at the airport to top up the battery charge when the buses arrive at the terminus. The aim is to test a battery-electric bus in real life situations that include a wide range of weather and traffic conditions.

At the airport terminus, the bus will raise a pantograph to connect to the charging station. A ten minute charge will be sufficient to replenish the energy consumed in the past two hours of operation. The vehicle's battery capacity actually allows the bus to operate for five full hours without recharge as a safety margin. By charging on route, the vehicle could theoretically provide service for more than 20 hours a day.

The buses will reduce fuel and maintenance costs, and result in a greenhouse gas reduction of about 160 tonnes, says Winnipeg Transit.

The project is a collaborative effort between a local bus manufacturer, the Province of Manitoba, Manitoba Hydro, Mitsubishi Heavy Industries, Red River College and Winnipeg Transit, with additional financial support from the Government of Canada and Winnipeg's Vehicle Technology Centre.

Speaking at the inauguration of service, Kevin Chief, Minister responsible for the City of Winnipeg, said that the project will highlight a commitment to clean, green energy that will grow the economy. [Sources: Winnipeg Sun, Nov. 27, 2014; CNW Newswire, Nov. 27, 2014]

Mount Vernon, Washington puts BYD Battery Bus to the Test

Skagit Transit is in the midst of test-driving a battery powered bus that sounds like a muffled U.S.S. Enterprise entering and leaving warp while changing speed, but is free from familiar diesel rumblings while stopped.. The 40-foot bus is on loan from manufacturer BYD Motors Inc.

"I'm used to it vibrating back here. But now I can hear!" exclaimed rider Oscar Morales during a stop on Riverside Drive along Route 208. "Normally it's quite a bit noisier in the back. But on this bus you can hear everything. It's unbelievable."

Skagit Transit Director Dale O'Brien said the county is one of several public transportation agencies in the U.S. and Canada that have put the battery bus through its paces this year.

The bus has performed admirably so far, Operations Manager Troy Fair said Thursday, achieving up to 12 hours of driving time on a single three- to five-hour charge of the iron phosphate batteries. "It moved well in traffic, kept up to speed. . . . It was well received by the drivers as well as the public," Fair said. Due to a cap on top speed, the bus may not be the solution for all of Skagit Transit's routes. But for urban and residential environments, it could be a good fit.

The typical range on intercity routes is 155 miles, but the bus drove 250 miles with 17 percent battery power to spare on a trip from Richland to Seattle, said Joel Reikes, fleet sales manager for BYD. Although initial investment for the California-built battery bus is higher than for its diesel counterparts, long-term maintenance costs and operating costs are expected to be lower than diesels, said Reikes. Reikes said a 33-foot BYD sells for around \$625,000, while comparable diesels cost \$476,000. The expected service life for each is 12 years.

"We're seriously thinking that in the future, when we look at transit coaches, electricity is a solution to diesel and its pollution," O'Brien said.

The BYD battery buses have been on test in Edmonton, Alberta this year. A version equipped for winter operation will be tested during the colder weather. A report based on tests conducted to date urged Edmonton City Council to purchase 250 of the vehicles, claiming cost savings would be achieved vs. diesel buses. No further details are known at this time. [Sources: Skagit Valley Herald, Nov 4, 2014; 630 CHED News, Nov. 27, 2014]

Chicago tests Battery Buses in Regular Service

Two CTA buses powered by batteries entered service in October in a \$2.5 million experiment that transit officials expect will be good for the environment, public health and the agency's bottom line. Although other U.S. transit systems have tested battery buses, the CTA is the first major U.S. transit agency to use the vehicles in regular service as part of their regular fleet, said George Cavelle, CTA vice president of vehicle and facility maintenance.

The two prototype buses, which will be operated on six routes that serve downtown, are painted green and labeled "electric bus" over the window line. The telltale signs of diesel buses -- plumes of dark smoke and a roaring engine -- are replaced by a soft whine when the electric buses accelerate. "It's just a smoother ride. A cleaner ride too," bus instructor Don Winston, a 30-year CTA veteran, said before taking reporters on a road test, hours before the two buses, which are outfitted with lithium-ion battery packs on the roof, entered service.

The 40-foot buses, which are priced at about \$1 million each, are made by New Flyer Industries USA with a propulsion system by Siemens. Regular diesel-powered buses cost \$400,000 to \$500,000 each, and diesel-electric hybrid buses cost about \$700,000, according to the CTA. CTA officials estimated the electric buses will reduce energy costs by more than \$25,000 a year per bus, or roughly \$300,000 over the average 12-year bus life span.

The CTA will test the electric buses in service over the next year or so before deciding whether to buy more of the vehicles, Cavelle said. "We already know these buses will be easier to maintain, in terms of not having to change oil like you do with an engine and not having to repair hydraulic lines that run through a conventional bus," he said. The big unknown is how far and how long the buses will be able to travel on Chicago's congested streets and in the city's challenging weather before needing to be recharged.

CTA officials said the buses are expected to run 80 to 120 miles per charge. CTA buses operate an average of 100 miles per day, officials said.

The electric buses are not emission-free; they have a diesel heater for the interior. But operating vehicles that are almost pollution-free would improve air quality if used fleet-wide and lead to a reduction in respiratory diseases, which alone is valued at about \$55,000 annually per bus, officials estimated. [Source: Chicago Tribune, Oct. 30, 2014]