# » IN DEPTH U.S. Bus Fleets Report PAGE 22

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216

RTA



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r a

PARATRANSIT PARTNERSHIPS Using Alternative Methods PAGE 30

RAIL SYSTEMS Get Powered Up PAGE 34

**TRANSIT AS A** 

New Orleans | RTA

Community input has been a driving force in how the Regional Transit Authority improves and enhances its many transit modes to serve its riders.

PAGE 12

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# **Contents** APRIL/MAY 2019







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## 12 Transit as a **Community Affair**

#### **NEW ORLEANS RTA**

Community input has been a driving force in how the Regional Transit Authority improves and enhances its many transit modes to serve its riders and the city of New Orleans.

#### **FEATURES**

#### 22 **U.S. Bus Fleets Report**

A look at the trends impacting the bus market and the state of U.S. fleets.

#### 30

#### **Forming Paratransit Partnerships Through Alternative Methods**

Agencies have greater availability when it comes to implementing and expanding their paratransit services. DART formed a partnership to offer more options and greater ease of travel when requesting a ride.

#### 34 **Rail Systems Get Powered Up**

Providers of rail traction power solutions are developing systems that are environmentally friendly and boost energy efficiency.

#### 43 **Operating a Self Driving City**

Self-driving vehicles are becoming a more prominent aspect of the transit world, agencies are working to further meld them into their current service offerings.



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#### DEPARTMENTS



#### 10 **People & Places**

The lastest industry and people news and updates

6 Ad Index

#### 8 Editor's Notebook Showing, as well as telling

47 **Best Practices** Deployment of Hydrogen Fuel

48

#### Cell Buses

Products In Focus: Buses and Components

#### **ONLINE EXCLUSIVES**

#### Why Replace Fare Gates, When You Can Retrofit?

An adaptable new solution adds major convenience for riders, extends the life of existing infrastructure and enables innovation. MassTransitmag.com/21073366

#### **Autonomous Vehicle Technology:** Preparing for the Next Wave of

#### **Innovation in Public Transit**

Increased automation for buses promises to improve safety, operations and efficiency, while also addressing congestion in cities. MassTransitmag.com/21073560

#### Advertiser's Index

| AECOM                         |  |
|-------------------------------|--|
| Alexander Dennis Ltd 11       |  |
| Alpina Manufacturing          |  |
| Alstom2                       |  |
| AngelTrax27                   |  |
| Axis Communications           |  |
| BAE Systems Controls 51       |  |
| Bitimec Int'l                 |  |
| BYD America3                  |  |
| City View Bus Sales & Service |  |
|                               |  |
| Complete Coach Works 45       |  |
| Ecolane                       |  |
|                               |  |

#### **Houston Metro, TransLink Hope** to Tap Community Innovation for Mobility Solutions

48

50

Classifieds

Social Hubs

Transit post highlights

from around the web

Follow us on Twitter

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The two transit providers look to solve transportation challenges through solutions found within their respective startup communities. MassTransitmag.com/21073930

#### **MARTA's Asset Management Program Gains International** Certification

MARTA becomes first North American transit agency to achieve ISO 55000 certification.

MassTransitmag.com/21072639

| Protran Technology          | 37  |
|-----------------------------|---|
| Q'Straint                   | 19  |
| Radio Engineering Industrie | s5  |
| Rosco Inc                   | 33  |
| Safety Vision               | 42  |
| Slec, Inc                   | 40  |
| STV                         | 36  |
| Thermo King                 | 38  |
| Tolar Mfg                   | 18  |
| Vericom LLC                 | 46  |
| Western Cullen Hayes        |   |
| Winsted Corporation         | 32  |
|                             |   |
|                             | Protran Technology<br>Q'Straint<br>Radio Engineering Industrie<br>Rosco Inc.<br>Safety Vision<br>Safety Vision<br>Safety Vision<br>Safety Vision<br>Safety Vision<br>STV<br>Thermo King.<br>Vericom LLC.<br>Western Cullen Hayes<br>Winsted Corporation |

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# Showing in addition to telling

Knowledge has a better chance of sticking around if it's earned through experience.

had the pleasure of visiting New Flyer's Vehicle Innovation Center (VIC) in Alabama recently and it was a truly informative event. Attendees were given an all-encompassing experience that included non-salesy lectures, hands-on demonstrations and a stint in an electric bus simulator, among other elements. As you know, I come from the rail world and while buses are becoming more familiar territory for me, they still feel a bit foreign. Visiting the VIC, riding in an electric bus, seeing how battery cells are eventually linked into battery strings -all of it was eye opening and my efforts to self-educate during the past few months paled in comparison to a single day of experiencing.

This kind of learning experience is called kinesthetic learning or tactile learning. If you've ever asked someone to show you how to do something instead of telling you, then you have used kinesthetic learning and it's a pretty darn effective. The lessons I've only needed to learn once, were borne on experience, not lectures.

Those who attended APTA's Marketing & Communication's Workshop held in New Orleans this past February were treated to a keynote address by Scott Crabtree, who helps company's boost happiness among their team members. Before you roll your eyes, know that he uses science to back up his techniques. He not only had the crowd stand up, but had them actively participate in his keynote. Why? We learn better when we engage more of our senses.

Do you allow your transit operators into the cab or driver's seat of your vehicles following a good lecture? Of course not, most training for skilled labor positions is not lecture heavy, but task heavy. Why can't this same principle be applied to procurements? Where it would

> be situationally appropriate, of course. But this can be a helpful step as it pertains to the purchase of a new bus or the leap of committing to an entire new fleet.

Providing a hands-on approach isn't limited to electric buses. Stark Area Regional Transit Authority (SARTA) announced an innovative Borrow-A-Bus Program in October 2018 that will allow any fellow transit provider the opportunity to get their own hands-on experience with a hydrogen fuel cell (HFC) bus. SARTA CEO and Executive Director Kirt Conrad provides an outline of the authority's HFC fleet adoption process in this issue's "Best Practices" section. He also includes a story that illustrates how he "quenched" elected officials' curiosity about HFC buses. I don't want to spoil the ending, but give his "Best Practices" column a read. It's another example where showing was a more effective tool than telling.

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# PEOPLE & PLACES



**PROVINCIAL OFFICIALS** and transit representatives gathered at an event committing funds to the Stage 2 LRT project.

#### Ottawa's Stage 2 LRT receives billiondollar provincial backing

The provincial government of Ontario, Canada has committed up to C\$1.208 billion (US\$900 million) in funding to Ottawa's Stage 2 Light Rail Transit (LRT) project. On March 6, the Ottawa City Council approved the Stage 2 LRT project, which is an ambitious plan to expand the O-Train network in order to bring 77 percent of the city's population within five kilometers (3.1 miles) of rail.

The network will see 44 kilometers (27.3 miles) of rail and 24 new stations added to the south, east and west. The expansions will be completed in phases with the Trillium Line south extension scheduled for completion in 2022, and the Confederation Line east and west extensions are scheduled for completion in 2024 and 2025. MassTransitmag.com/21073213

L.A. Metro celebrates completion

of the Southwestern Yard The Los Angeles County Metropolitan

Transportation Authority (L.A. Metro) celebrated the completion of Southwestern Yard with a ribbon cutting ceremony.

The \$172-million facility, which will serve the future Crenshaw/LAX Line and Metro Green Line, was designed and constructed to attain LEED Silver Certification. The "green" features include pollution reducing construction processes, easy access to public transportation for workers, treatment of stormwater runoff and the use of low-emitting paints, sealants, coatings and materials. There is also energy-saving lighting and air conditioning. Hensel Phelps Herzog (HPH) designed and built Southwestern Yard with design work beginning in June 2015, construction in May 2016 and work completed in January 2019 with the project on time and on budget.

L.A. Metro explained that its Southwestern Yard, the Airport Metro Connector/96th Street Station, the Automated People Mover and the Aviation/Century Station will become the gateway to LAX for travelers and will provide better and equitable access to employment centers in this area.

MassTransitmag.com/21074765

#### THE LASTEST INDUSTRY NEWS

#### Apple Pay coming to select US transit agencies later this year

▶ Your phone or your watch may be all you need to pay a transit fare in New York City, Chicago and Portland later this year with news that Apple is bringing its Apple Pay feature to the select transit systems in the United States.

Apple Pay is used by several global transit systems including several locations in China, Russia, all of Japan's transit that accept Suica and Transport for London.

The Chicago Transit Authority (CTA) will be one of the first U.S. transit agencies to debut the Apple Pay function through its Ventra Card, which can be used on CTA buses or trains and the area's Pace suburban bus service.

Chicago Mayor Rahm Emanuel and CTA President Dorval Carter released a statement, "Chicago is proud to work with Apple to elevate the experience of CTA riders. New Ventra Cards on iPhone will build on the strength of the existing Ventra system to make commuting in Chicago even easier and more convenient and help modernize America's second largest mass transit system for the 21st century. When one of the world's most inventive cities teams up with one of the world's most innovative companies, great things happen.

An iPhone-compatible Hop card is also planned for TriMet's service area, as is an iPhone-friendly fare for New York City Transit.

MassTransitmag.com/21073395

#### CTA, city of Chicago open new Belmont Transit Center

► The Chicago Transit Authority (CTA) has completed the \$17-million Belmont Blue Gateway project, which is part of its \$492-million Your New Blue program to modernize and improve the O'Hare branch of the Blue Line.

It is the largest project that has been completed to date as part of the program and the modernization of the station represents the first major renovation to the facility since it opened nearly 50 years ago. The Belmont Transit Center serves nearly 1.8 million entries to the Blue Line and provides connections to heavily traveled bus routes.

One of the most eye-catching elements of the project is the new architectural steel canopy. CTA notes that the canopy creates a community gateway for the station and local neighborhood, while also visually enhancing the street-level entrance to the subway station.

MassTransitmag.com/21074134

#### People in the News



#### **Port Authority Trans Hudson**

**The Port Authority** of New York and **New Jersey named Clarelle DeGraffe** 

as the director of rail transit and general manager of PATH. De-Graffe's appointment took effect March 25 and she will be responsible for carrying out PATH's critical mission of moving nearly 300,000 people daily safely and effectively. MassTransitmag.

com/21073062



#### Transdev **Transdev promoted Justin T. Augustine**

III to a new corporate position, senior vice president of infrastructure and supply chain. He will help agencies secure state and federal funding and help to manage capital projects from concept through implementation. He will also focus on talent acquision and development. MassTransitmag.

com/21073442

#### **Darryll Simpson**

Transdev

**The Regional Transit Authority (RTA) Board of Commis**sioners unanimously approved the appointment of Darryll Simpson to serve as general manager of Transdev in New Orleans, in service to the RTA, effective March 18, 2019, He most recently served as general manager of the streetcar system in Milwaukee.

MassTransitmag. 0 com/21073442



#### Markus Coleman

#### **City of Phoenix** The city of Phoenix, Ariz., named Markus Coleman as Light

Rail Administrator. Coleman has worked in the Public Transit, Planning and Development departments and the City Manager's office. He has a total of 23 years of experience with the city of Phoenix and has spent his career working on development projects and transportation. MasstTransitmag.

com/21071273



Joe Calabrese

#### **Focused Technology** Solutions

**Focused Technology** Solutions, a division of The Marmon/ **Berkshire Hathawav Company, named Joe** Calabrese as senior advisor. Calabrese's most recent position was as CEO and general manager of the Greater Cleveland Regional Transit Authority, overseeing operation of a multimodal transit system. MassTransitmag. com/21073566

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by Mischa Wanek-Libman, executive editor

216

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It's Easy

# Affair

**RANSIT HAS BEEN AN INTEGRAL PART** of New Orleans' 300-year history. It has been a catalyst to the city's growth and development and, later, in post-Katrina years, to its resurgence.

"Transportation has always been an important thread woven into the tapestry of the city's spirit and culture," said Flozell Daniels, Jr., the Regional Transit Authority's (RTA) Board of Commissioners chairman.

That thread began in 1835 when the New Orleans and Carrollton Railroad established the first city rail lines, which were operated with a mix of steam locomotives and horsecars. Six streetcar companies operated 28 lines by the late 1800s with the first electric-powered streetcars making their appearance in February 1893 on the Carrollton line. Follow-

Photos from Regional Transit Authority

ing an extension out to Carrollton Avenue, the original line was renamed St. Charles and now holds the title as the oldest continuously operating street railway system in the world.

The St. Charles Streetcar line was placed on Louisiana Landmark's National Register of Historic Places in 1973 and became a National Historic Landmark in 2014; designations that keep the line operating to this day.

While the city's streetcars are its most famous mode of transportation among tourists, 95 percent of the RTA's bus routes connect to the streetcar network and local riders make up 78 percent of streetcar ridership. However, New Orleans can still draw a crowd. RTA, which has been operating the city's streetcars, buses and paratransit service since 1983 and the ferry service since 2014, recognizes

#### New Orleans RTA Fleet By the Numbers 132 buses

66 streetcars

57 paratransit vehicles

> 6 ferry boats

#### **NEW ORLEANS RTA**

tourism is a major factor in New Orleans, where the population can swell by several hundred thousand during key times of year.

"To be honest, we feel we have the equivalent of a Ph.D. in managing events of all sizes," said Jared Munster, the RTA's interim executive director. "We are constantly tweaking and improving our operational plans, security plans and passenger/public information strategies to ensure that people (whether locals or tourists) are well aware of route, time and frequency changes, plus any special service routes we institute for a particular event."

New Orleans is among the top 50 metropolitan areas with the most transit travel ranked by ridership per capita, according to the American Public Transportation Association's 2018 Public Transportation Fact Book. New Orleans ranks higher than cities with two to three times its population, beating St. Louis, Mo., Phoenix-Mesa, Ariz., Houston, Texas, the Dallas-Fort Worth metropolitan area and the Tampa, Fla., metropolitan area.

"At a time when most transit agencies are losing passengers, the RTA's bus and streetcar ridership has risen in the past decade to what is now, about 18 million passengers each year," said Munster.

A feat made sweeter with the memory of 2005's Hurricane Katrina. The storm's flood waters and debris ravaged New Orleans leaving offices and facilities in shambles and most buses and many streetcars destroyed or damaged.

"The Regional Transit Authority's transit system embodies resilience and restoration," said Daniels. "With the perseverance of RTA's skilled maintenance crews and other employees, the commitment of city government and the Federal Transit Administration and the RTA Board, the effective action of Transdev (the RTA's private sector operator) and many more stakeholders, the RTA's system was re-built from the ground up in about seven years."

While the recovery has been impressive, the question remains, "Would New Orleans' public transit have been different had the storm spared the city?"

Daniels says it's hard to find an apples-to-apples comparison for several reasons: Population in the city remains 10-15 percent below pre-Katrina levels, settlement patterns have changed and policy impacting RTA has changed. One example he provides involves the city's public school students, who used the RTA network pre-Katrina and provided tens of thousands of additional riders every day on the RTA system, but that work is now contracted to different transportation providers for each school.

"While a comparison is difficult, the RTA is proud of how far we've come. Katrina destroyed or flooded nearly 80 percent of the RTA's fleet and nearly all our maintenance, operating and administrative facilities. Yet, in the past 10 years, we have nearly doubled service levels (including an 87 percent growth in bus service), while dropping system-wide operating costs by 40 percent. Our operating efficiency

#### FERRIES ARE the most recent mode

to enter under RTA management. RTA assumed control of the ferry system in 2014.

> **"The** Regional Transit Authority's transit system embodies resilience and restoration."

- FLOZELL DANIELS, JR., Regional Transit Authority's Board of Commissioners Chairman is now better than it was before Hurricane Katrina and those efficiencies have allowed us to continue to expand service for our riders," said Daniels.

RTA provides 76 percent of pre-Katrina service and has seen ridership grow 62 percent since the storm. RTA has also restored or expanded administrative, operating and maintenance facilities, as well as expanded its streetcar infrastructure with three major extensions since 2011.

RTA's current challenge is an aging bus fleet. Munster says RTA will be adding eight new buses this year, with 17 more planned for 2020, in addition to 50 new transit shelters.

"There is much more work to do. That's why we worked closely with the community to develop our 20-year Strategic Mobility Plan (SMP), which sets a clear direction for the RTA and the transit services that we want as a region," explained Munster. "We are currently performing a Comprehensive Operational Analysis in partnership with our Regional Planning Commission to ensure that we maximize the number of people who can get to job centers via our routes and our system. Ensuring that we stay committed to our core principles of equity and



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#### NEW ORLEANS RTA

fair-minded access is a foundational aspect of our approach."

#### Modal and regional synthesis

New Orleans has a population that is just shy of 400,000, based on the U.S. Census Bureau QuickFacts New Orleans city, Louisiana, but it has four interconnected modes of transit, a fact that Laura Bryan - an RTA Board Commissioner and the director of the New Orleans Mayor's Office of Transportation - calls unusual, but notes that the RTA is looking to grow its service in creative ways to get passengers where they need to go, regardless of mode.

"New Orleanians have lots of options to get around, and we work hard so that our four transit modes work together for our residents. There's more to do, but we certainly aim for a seamless multimodal system," she said.

Bryan explains that the various modes do come with their own level of complexity, such as the specialized knowledge required for streetcar and ferry operations and maintenance.

"Most of our streetcars are nearly 100 years old and we make nearly all the parts for our streetcars in-house – from mechanical equipment to the wooden seats at our carpentry shop. This is a requirement of being on the register of National Historic Landmarks. Hiring for those skills is difficult, so we invest a lot in training," said Bryan. "However, one result is that the RTA has unique knowledge. We use that to advise streetcar operations around the country."

In 2018, the RTA responded to riders' request for regional transit and, with the support of the Orleans and Jefferson Parish governments and business leaders and the collaboration of Jefferson Transit (JeT), opened transit hubs, expanded service and launched pilot programs. These efforts, as Daniels points out, strengthened the "regional" in Regional Transit Authority. "When people move around the region, they don't care about political boundaries – they care about getting where they need to go. Our region's economy is integrated, so our transit network must be as well," he explained.

These regional transportation efforts, which were included in the RTA's Strategic Mobility Plan, include:

- The opening of the Cemeteries Transit Center in January 2018. The transit center serves as a connection hub for six bus lines and the Canal-Cemeteries Streetcar and the improvements implemented make it easy for riders to connect between the RTA and JeT systems.
- The September 2018 implementation of the Regional Ride Pilot Program, which gives bus riders all-day access to both RTA and JeT bus lines for \$6, without having to buy separate passes.
- Mid-September 2018 service expansions including the expansion of the #39 Tulane bus line to reach Ochsner's Main Campus in Jefferson Parish and extended 24-hour service on the #16 South Claiborne bus to match the 24-hour service provided on the #39 Tulane line. Alfonzo explains that the extension complements the Regional Ride program.

• RTA and JeT combined their call centers in November 2018 to

provide commuters with stronger customer service assistance.

"Each of these milestones was achieved to enhance the rider experience, help provide better access to jobs throughout the region and to allow locals and visitors alike to more easily explore Orleans and Jefferson Parishes," said Daniels.

#### SMP roadmap

One element that is providing RTA and the surrounding region with a roadmap of future efforts regarding transportation growth and enhancement is the Strategic Mobility Plan (SMP). The plan contains 129 action items for short, mid and long-term goals and was approved by the RTA Board in late 2017.

"[We believe] the RTA's Strategic Mobility Plan is an unusually forward-thinking plan. We had a great engagement process throughout the city and the region, and the resulting vision and goals speak not only to the type of system we want this year and next year, but truly over the next 20 years. That strategic vision, along with the 129 action items, have been well integrated into our day-to-day decision-making," said RTA Commissioner and Chairman of the RTA's Operations Committee Fred Neal, Jr.

The SMP's first goal is to earn trust, a goal that the agency continually strives to achieve. NEW ORLEANS iconic electricpowered streetcars first began operation in 1893.

#### Streetcar Facts

Electric-powered streetcars first appeared in New Orleans in **1893** 

St. Charles Streetcar line is the oldest continuously operating street railway system in the world

78%

of streetcar riders are locals



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#### **NEW ORLEANS RTA**

"We're making good progress, but we realize this is an ongoing process. Even having the SMP as a benchmark for our actions is very helpful in building trust. With that document as our guidepost, it's easy to evaluate how the RTA is doing, and whether our big decisions match the strategy and objectives we agreed on as a community," explained Neal.

In addition to the regional mobility accomplishments mentioned in the previous section, the SMP supports additional projects RTA has made progress on.

The Regional Planning Commission (RPC) recently initiated a Comprehensive Operational Analysis (COA), known as New Links which is being led by the RPC in partnership with RTA and JeT with support from the city of New Orleans and is a year-long project designed to study regional public transit connectivity between Orleans, Jefferson and St. Bernard parishes. Neal explains that the goal is to develop recommendations for a network redesign that will ultimately improve the frequency, reliability and integration of public transit across all three parishes.

"New Links is a key step to implementing the RTA's 2017 Strategic Mobility Plan," said Munster. "The SMP calls for completing a new COA with recommendations for a network redesign by 2020. The New Links process will be modeled on successful network redesigns in cities such as Houston and Columbus, Ohio, which were able to significantly grow their transit ridership. We are hopeful that this redesign will

#### "When

people move around the region, they don't care about political boundaries they care about getting where they need to go."

- FLOZELL DANIELS, JR., Regional Transit Authority's Board of Commissioners Chairman help us serve more people and eventually increase frequency on the routes that will help carry the highest number of people to jobs."

The SMP outreach process also identified the Canal Streetcar line as one corridor where riders believed improvements would be beneficial.

"[This is] the most important transit line for residents in our system. Residents take more than 3 million trips on it every year, more than any other line, yet it's one of the slowest segments in the RTA system. It connects to our downtown job centers, as well as to every streetcar line, the Canal Street ferry and nearly every bus line. Improving performance is essential for getting our riders better access to jobs, healthcare and simply freedom of movement," said Munster.



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#### NEW ORLEANS RTA

RTA conducted an internal analysis of options to speed up the Canal Streetcar line. The initial analysis focused on the area between Carrollton Avenue and Harrah's Casino at the foot of Canal Street, as well as on three elements: speeding up trip times, enhancing safety and improving reliability.

"Right now, we're in the listening stage. We will spend the next 2 months or so hearing from riders and the larger community about some of those options [and gather] their input and concerns. We're finalizing a robust outreach plan to make sure we get that input from residents, before a final decision is made," said Neal.

#### A look to the future

Technology has and will continue to play a key role for RTA. As Munster notes, the SMP contains specific guidance developed through community feedback on where technology can be brought into the RTA.

This past year, RTA implemented a Computer Aided Dispatch/Auto Vehicle Locator (CAD-AVL) system and launched a new mobile app, GoMobile 2.0.

"These new technologies have given riders access to information to help them plan and navigate the system better than ever before," said Munster. "It's a game changer. Real-time vehicle locations and alerts when services are disrupted make a huge difference for the riding public. When that is integrated with an easy mobile ticketing solution and trip planning, it's even better.

The RTA's GoMobile 2.0 app incorporates real-time tracking for bus and streetcars, trip planning and mobile ticketing for all ticket types. A ticket may be purchased using a credit or debit card and then scanned once onboard a vehicle.

"Our passengers have responded well to the integrated app, and some folks from oth-



**RTA'S TOP** techfocused priority in 2019 is improving mobile and online options for its paratransit passengers.

> **"New** Orleanians have lots of options to get around and we work hard so that our four transit modes work together for our residents."

-LAURA BRYAN, An RTA Board Commissioner and Director of the New Orleans Mayor's Office of Transportation er transit authorities have even approached us about it – asking how we pulled all that together into a single, passenger-friendly platform," said Munster.

RTA has also added an online performance dashboard to the NORTA.com website at the beginning of 2019 and plans to launch an online chat feature for the Rideline call center, add a dashboard to track the progress of the Strategic Mobility Plan, incorporate new technology to provide information in the new ferry terminal building and explore the option to track the ferries on the mobile application all before the end of the year.

Munster notes that the RTA hopes to make major advances on its top technology priority in 2019: improving mobile and online options for its paratransit passengers.

"The RTA works hard to stay abreast of new technologies by working closely with tech partners, attending conferences and gathering new ideas from staff members," said Munster. "Our approach is to keep close tabs on emerging technologies and what other agencies are considering and implementing. When we see good ideas that match the SMP, we look at incorporating them."

Munster explains that the RTA aims to evaluate technology through the lens of what would make transportation more convenient for passengers.

"Our driving focus is to improve every step of the passenger experience - to remove any friction or pain points and make it even easier and more seamless for people to use transit. The RTA strives to make sure technology investments do not come at the expense of service supply. We understand providing efficient, reliable service is a priority," said Munster. "The RTA is continuously balancing the addition of technology improvements with the basics of providing on-time, lean, safe service with capacity for everyone."

As RTA prepares for its future through its SMP and through new technology, it also recently underwent a change in top management with the appointment of Darryll Simpson as general manager for Transdev, in service to the RTA. Board Chairman Daniels explains Simpson was named to the position for several reasons: he is an operations expert, he knows how to provide great service and he is committed to helping the RTA achieve its vision for mobility.

Simpson has held successively senior roles in the transit, paratransit and rail industry during his 30-year career. Transdev credits Simpson with bringing the Atlanta Streetcar to full compliance with Georgia Department of Transportation and Federal Transit Administration regulations. He most recently served as general manager for Milwaukee's streetcar service.

"Darryll is a unique talent in that he has deep, hands-on experience with the multiple modes operated by the RTA. He is dedicated to achieving excellence through continuous improvement. He'll work to connect with passengers and advocacy groups and build trust. He will be a great addition to our team as the RTA prepares for its next chapter in improving public transit in New Orleans," said Mike Setzer, Transdev president of the Transit Division.

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SPECIAL REPORT

# U.S. BUS FLEETS REPORT

A look at the trends impacting the bus market and the state of U.S. fleets.

Compiled by Mischa Wanek-Libman, executive editor

#### CCORDING TO THE AMERICAN PUBLIC TRANSPORTA-

tion Association's 2018 Public Transportation Fact Book, U.S. public transportation systems operated 148,879 railcars, buses and vans in a typical peak period during 2016 out of a total of 179,021 vehicles available for service. Demand response service and bus fleets make up the most vehicles available and approximately 51 percent of transit trips taken are via roadway modes (bus, BRT, trolleybus, commuter bus and demand response).

Ridership on public transportation was down slightly in 2016 with bus ridership declining by 2.8 percent. While ridership slipped, service has improved, vehicles and stations continue to incorporate more advanced technology and both rail and non-rail public transit modes continue to be one of the safety surface transportation options.

*Mass Transit* has used statistics from a variety resources to provide a snapshot of trends affecting bus fleets and operations.

#### **Capital Expenses**



#### **Terminology NTD Mode Types**

- **RB:** Bus Rapid Transit
- **CB:** Commuter Bus
- DR: Demand Response
- DT: Demand Response Taxi
- **TB:** Trolleybus
- **VP:** Vanpool
- PB: Publico

**VOMs:** Vehicles Operate in Maximum Service

The number of revenue vehicles operated across the agency to meet the annual maximum service requirement.

#### Active Vehicles in the United States

**86.93%** of the active vehicles are rubber-tired road vehicles; up slightly from 2016's figures



#### Vehicles Operated at Maximum Service

#### VOMs OVERALL GROWTH







**SPECIAL REPORT** 

# Fuel Options Alternative fuels gain ground

#### **REDUCING EMISSIONS CONTINUES TO BE AN INITIATIVE**

shared by many public transit providers across the county and is not exclusive to the bus market. Diesel once fueled 70 percent of the rubber-tired transit, it now hovers around the 50 percent mark, according to data from the National Transit Database. While much of this shift has been voluntary, some has been policy driven, such as the recent ruling by the California Air Resources Board (CARB) to require the transition to transition to an all zero-emission bus fleet in the state by 2040. A large part of the reduced emissions conversation has focused on battery-powered buses. APTA's 2018 Public Transportation Fact Book says electric hybrid buses now hold 16 percent of market share, while natural gas-powered buses have 29.9 percent. Additionally, hydrogen-fuel cell options have been the subject of research efforts such as those announced by the Canadian Urban Transit Research and Innovation Consortium (CUTRIC), which began a fouryear effort to develop new hydrogen fuel cell technology for transit and automobile applications. Π

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15 MPGe

#### Percentage of Total Miles by Fuel Types



#### E-BUS CHARGE MANAGEMENT BEGINS WITH PLANNING

#### FOR AGENCIES ENTERING THE ELECTRIFICATION PROCESS, THE JOURNEY

can be question-filled, especially because it requires an operational paradigm. That's because the introduction of electric vehicles affects every aspect of a public transit agency's operation - planning, fleet monitoring, charging and range management, personnel requirements and depot infrastructure to name a few.

The challenging scenarios e-buses present require altered or redesigned planning processes. For instance, determining which routes the vehicles will operate on and what the topology of the routes are is critical because battery energy will drain faster if the route is hilly - versus primarily flat roads.

Understanding the type and range of the battery is also important because it will determine whether the vehicle will be able to complete the distance of the block before needing to be recharged. Passenger loads and environment must also be taken into consideration. More riders will cause the vehicle to consume more energy, as well as extreme temperatures because the vehicle will require the use of air conditioning or heating.

Read the complete article on how to plan and prepare for the electric revolution at MassTransitmag.com/21073372.



Average MPG/MPGe\*

\*kWh to MPGe calculated by taking kWh multiplied by

33 705

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**SPECIAL REPORT** 

## Bus Amenities A BOOST IN BENEFITS

#### PASSENGER COMFORT IS INCREASINGLY BECOMING AN

area of focus for service providers. Stations are incorporating convenience and safety elements, while there has been a bump in the number of vehicles with technology advancements incorporated onboard.

APTA's 2018 Infrastructure Database reports that more than 97 percent of bus stations are ADA Accessible, while nearly half (48.9 percent) have security cameras and 12.8 percent have emergency call buttons. Just shy of 40 percent of bus stations have vehicle arrival time displays and slightly more than 31 percent have information/ad displays. Additionally, 20 percent of bus stations have a secured bike facility, 42.9 percent have bike racks and 2.9 percent have a bikeshare station.

In 2017, APTA began tracking autonomous features in transit vehicles. APTA's 2018 Vehicle Database shows that most segments are making progress incorporating electronic fareboxes into vehicles, while buses are leading the adoption of automatic passenger counters, while BRT seems to be the segment with the most advanced technology with healthy statistics in the adoption of automatic passenger counters, collision warning/mitigation, lane keeping assist and pedestrian/bicyclist detection.

#### **Advanced Technology**

Emorgoney Broking

|            | Emergency braking              |  |
|------------|--------------------------------|--|
|            | Pedestrian/Bicyclist Detection |  |
|            | Blind Spot Detection           |  |
|            | Lane Keeping Assist            |  |
|            | Collision Warning/Mitigation   |  |
|            | Adaptive Cruise Control        |  |
|            | Electronic Farebox             |  |
|            | Non-electronic Farebox         |  |
|            | Automatic Passenger Counter    |  |
|            |                                |  |
| TROLLEYBUS |                                |  |

#### IROLLEYBUS

**39.1% 7.3** have electric fareboxes.

7.3% have automatic passenger counters

VANPOOL **0,20/0** have automatic passenger counters

SOURCE: APTA 2018 Vehicle Database

#### ents in-

0%

0.6%

0%

0%

2.7%

25%

COMMUTER BUS

#### **DEMAND RESPONSE**



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**SPECIAL REPORT** 

#### Service & Reliability AIMING FOR MORE SPEED

**Average Speed MPH for 2017** 

ACCORDING TO NATIONAL TRANSIT Database statistics from 2017, bus, BRT, demand response, commuter bus, trolleybus and vanpool services provided more than 254.3 million vehicle revenue hours and 3.51 billion vehicle revenue miles. Vanpool and commuter bus are the fastest service, but there have been efforts launched in major metropolitan areas, such as Philadelphia and New York City, aimed at improving the speed and reliability of bus service.

Southeastern Pennsylvania Transportation Authority (SEPTA), in a joint effort with SEPTA Police, the city of Philadelphia and the Philadelphia Police Department, recently completed the Market and Chestnut Bus Lane Enhanced Enforcement Pro-

AECOM

gram. The four-month program was designed to cut down on congestion caused by illegal traffic behaviors. Chestnut Street saw a 6.4 percent improvement in transit travel times during the midday period, while Market Street saw a four percent improvement. Travel times for the public driving on both Market and Chestnut Streets decreased slightly during the program, while increasing on average in the city.

New York City is also steeping up bus lane enforcement with the city setting up seven new New York City Police Department tow teams to operate in all five boroughs. Additionally, New York City Transit has plans to purchase an automated mobile camera system to install on buses to capture real-time bus lane violations.



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#### **Revenue Hours and Revenue Miles for 2017**





# **MULTI-LAYER PROTECTION**



# Forming Paratransit Partnerships Through Alternative Methods

Agencies have greater availability when it comes to implementing and expanding their paratransit services. DART formed a partnership to offer more options and greater ease of travel when requesting a ride.

By Maile Rudebusch, assistant editor

**ARATRANSIT IS AN ESSEN**tial cog within any agency's operation, as transit modes continue to expand, so do paratransit passengers options. Dallas Area Rapid Transit (DART) recently announced a

new model of implementation to its paratransit offerings.

Tammy Haenftling, assistant vice president, Paratransit Management Services, DART, explained that DART works with MV Transportation and will con**FOR RIDERS,** DART is still offering paratransit services at the same cost that it previously did.

tinue to do so with the new pilot.

"They will do scheduling and dispatch, but they won't operate any service. We're going to broker our services through MV Transportation. We will continue on with them, but they will be a broker only, they will do reservations, scheduling and dispatch, but they won't operate any service. What we asked was the prime contractor bring sub-contractors on to the platform and we are operating though this contract paratransit, microtransit and a program we call microtransit assistance program," Haenftling said.

She added that ride booking will be essentially through the same software with additional benefits for riders. "We want to provide a more spontaneous flexible service for all of our riders, not just our ADA paras. What we've been able to do during our current Lyft program, we want to provide the same flexibility and availability."

#### Alternating how passengers travel

Donnie Thompson, assistant vice president, DART said that the agency determined that there was a demand for an expanded range of services.

"ADA paratransit riders have traditionally not been able to be as spontaneous in their travel as our traditional riders," said Thompson. "We wanted to afford them the same opportunities, so, we felt like, if we offered the service, it could be something that they'd like to have and so, it was really trying to meet the customer's needs."

Thompson said that DART changed its paratransit models.

"We started paying our providers by the trip as opposed to the revenue hour. In doing so, we were paying for services only as we needed them and only as they actually needed them as opposed to vehicles operated," he said.

"When a request for a trip comes in, we have lots of different options to fulfill that request," said Jeff Womack, chief marketing officer, MV Transportation, Inc. "We have the ability to use a TNC partner, like Lyft. We can dispatch a TNC, we have some taxi partners that we use and we will have a number of different dedicated providers, as well, with the traditional both ambulatory and unambulatory care – so the dedicated vehicles with wheelchair lifts for example."

For riders, while service options have been increased, DART is still offering paratransit services at the same cost that it previously did. With the expanded service, the technology that riders use to utilize paratransit services is also expanding.

"Every rider will have a customer profile in this software, which will be Routematch. We will have all of their trip information from how they contact their provider. They will all schedule their trips through calling or through the Go-Pass app or though the web. What we intend is for ADA paratransit riders trips [to] be scheduled on efficiency," said Haenftling.

"DART is really going to be revolutionizing the way that mobility management services are provided. In their case, they're going to be combining or integrating several different forms of transportation together into, what we like to call, a family of services," explained Rob Bryans, regional vice president, Routmatch. "We're providing a technology platform which allows them to glue together various transportation services that they have. Being able to have their riders leverage all of the different resources that are available to deliver the services in a spontaneous way."

#### More options for ease of travel

The new program gives DART more flexibility.

"It frees up a lot of the dedicated fleet and all of the resources that go to support that. It also gives them a lot more options to support their ridership. You have more options to personalize and tailor. Traditionally, in many cities, you may have a cut away vehicle taking one, maybe two, passengers to their drop off. You have a big cut away vehicle with passengers going from one mile to 20 miles, and that may or may not be a non-ambulatory passenger," said Womack. "In the future, you'll have the possibility to put an ambulatory passenger

> **"When** a request for a trip comes in, we have lots of different options to fulfill that request.

-JEFF WOMACK, chief marketing officer, MV Transportation, Inc.

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SPECIAL ADVERTISING SECTION

#### **Ecolane Mobile App v3.0**

The Ecolane rider-facing mobile app is designed so agencies can increase ridership through on-demand transit. With a sleek UX design, it empowers riders to manage their own trips without the need to speak to a reservationist. Users can book and move trips, including those that are same-day, with a smart phone. The mobile app also reminds users of upcoming trips, which diminishes cancellations and no-shows. and it enables them to pay with a registered credit card.



in a rideshare vehicle, you might be able to put them in a taxi and so you have a smaller vehicle that is more tailored to the needs of the particular passenger. The end goal would be to move from a 24-hour notice to an even same day reservation, which is the ultimate goal."

MV Transportation needed to ensure that there was a software platform in place that would benefit the operation, which is what they found in Routematch.

"What we're doing is, we're having to go in and make sure that we had the right partnerships. Ultimately, we had to understand what service level that DART wanted to operate with and then we needed to establish the right partnerships. We needed to make sure that we had those service level agreements understood and accepted," said Womack.

#### The addition of rideshare programs

DART also provides riders with the option to ride with Lyft. Lyft has a number of paratransit partnerships across the country - offering riders an on-demand choice.

#### PARATRANSIT PARTNERSHIPS





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"The 'rider-choice' programs provide an alternative on-demand transportation option to paratransit program participants. Via survey and testimonials gathered by our agency partners, these new On-Demand programs with Lyft have dramatically improved access to healthcare, employment and social events for paratransit riders," said Lauren Alexander, policy communications manager, Lyft.

Lyft's decision to branch into paratransit stems from the company's goal to increase accessibility. Lyft has a number of additional partnerships that work to promote greater independence for riders. Lyft partners with the National Down Syndrome Society, the National Federation of the Blind and the National Association of the Deaf. Lyft has also released Lyft Amp, which is now available throughout the country, it helps the company continue its commitment to the deaf and hard of hearing community. Lyft Amp allows for drivers to have pre-ride texting sercvice that alerts the passenger and allows for in-car communication as well as notifies drivers of new requests.

"Lyft is committed to working with our agency partners to reduce transportation access barriers and decouple the right to mobility from auto ownership. Through these rider-choice programs, participants have noted that the expanded transportation access provided to them by Lyft has completely transformed their quality of life, helping them stay active and independent," said Alexander. "The positive results and immense impact of these programs on people's lives have encouraged us to expand our partnership work with other agencies in this space."

When Lyft joined the partnership with DART and MV, the company provided information, including educational information and an overview, for those that would be using their services. Riders are also given an alternative method of requesting a ride if necessary.

"Riders are able to request rides that are subsidized by the agency. To specifically address the needs of people who don't have access to smartphones and

those who may not feel comfortable using one, Lyft developed its Concierge platform that allows agencies and organizations to request rides on behalf of others. Rides can be requested in real time or scheduled up to a week in advance on both the App and Concierge," said Alexander.

#### **Continuing the program**

The service continues to expand. Womack explained that as the program rolled out there were adjustments that needed to be made.

"The challenges are what you expect, changing the model, it's just the disruption of bringing in new partners and making sure that you're vetting them out and that you're allied on the services levels and the expectations and that you have the right training and quality of service that you have ensured into the model. From a technology standpoint, we're bringing in a whole new model, so it has to serve the needs of the users. It also has to seamlessly work with MV in the role of dispatching and customer service," said Womack. "Lastly, and most importantly, you have change management with your passengers. It's a demographic of users who the transportation is very important to them, it's emotional and life-impacting activity, so any time there is a change or disruption, even ideally perceived as being for their benefit, as well as the provider, it's really difficult. You have to communicate, you have to work with the passenger advocacy groups to make sure that they are part of the process and that they're helping making sure that everyone and every process is reviewed and that it is communicated clearly."

Womack added that MV supports a number of paratransit customers and there are a number of agencies that are interested in the program with DART. " [Agencies] have a lot of the same issues, the expansion of constrained budgets and the expansion of their service area and their ridership is increasing as the ridership ages. All of that, coupled with the technology evolving, all of that is an exciting combination. I think that DART is on the leading edge with this model. We believe it will be a really good case point for this model," said Womack.

"What we're looking to do is provide them with better customer service overall. Shorter ride times, more courteous drivers, we are going to have a rating system sort of like Uber and Lyft do. So, all of our riders will have the ability to rate their drivers and rate their trips," said Haenftling.



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# Rail Systems Get Powered Up

Providers of rail traction power solutions are developing systems that are environmentally friendly and boost energy efficiency.

By Mischa Wanek-Libman, executive editor

#### **IGHT-RAIL AND STREETCAR**

systems are growing in the U.S. Since 2016, there have been approximately 18 systems that have come online or been expanded. This rail resurgence is also propelling a growing interest in the best

way to power these lines. *Mass Transit* reached out to several companies that provide rail traction power systems to see where they see trends developing and how their solutions are helping transit providers become more efficient with their energy consumption.



Energy per day captured by an in-field WESS substation **AN AERIAL** view of a Burnsdesigned substation.



A SUBSTATION designed by Burns Engineering.

#### **Energy storage**

ABB reports transit agencies are increasingly interested in energy storage as a significant way to become more energy efficient. The company offers a wayside energy storage system (WESS) to help them accomplish the task. The battery energy storage system, or a combination of batteries and supercapacitors, is located as part of the traction power substation and captures energy from braking trains that would otherwise be lost and delivers it back to trains as they accelerate.

ABB also notes the operational and economic benefits provided by WESS including the reduction in energy consumption from the grid and associated cost, lower maintenance costs as compared to convention traction power substations, the ability to address voltage sags from the grid at a reduced cost between 40 and 70 percent and provides emergency backup power in the event of a grid blackout. ABB offers the reminder that this last benefit would have been valuable during the 2003 Northeast Blackout when WESS could have brought trains to the next station instead of stranding thousands of transit riders.

In addition, ABB says WESS gives transit operators the ability to sell ancillary services back to the power grid in markets where it is allowed and has the potential to allow transit operators to participate in demand response programs.

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#### **POWER SUPPLY**

ABB points to two real world examples of WESS in operation. Southeastern Pennsylvania Transportation Authority (SEPTA) began its first WESS project in 2012 and, following two subsequent phases, decided to roll out the technology across its entire system.

In a white paper on the project, a SEPTA WESS substation capturing 1.2MWh of energy per day, can deliver electricity at a cost of around \$0.06/kWh over a 15year period or \$0.09/kWh over 30 years, the higher figure accounting for additional maintenance costs. For comparison, SEPTA's grid delivered power is \$.095/kWh.

New York Metropolitan Transportation Authority (MTA) will launch a pilot project in 2019 with ABB and Viridity that will be funded by New York State Energy Research and Development Authority. The pilot aims to use the stored energy to do peak shaving during periods when rates are highest.

#### Environmental considerations

Alstom notes the emergence of environmentally-friendly innovations that also address the energy efficiency of rail systems. The company says that the transportation sector in most countries is the second largest producer of environment damaging emissions, which is why environmental considerations among rail stakeholders have been on the rise.

"Such innovations are also transferring part of the electrification infrastructure to the trains themselves, through onboard energy systems, such as batteries or supercapacitors, which also have the benefit of making the trains more autonomous. In parallel, we are seeing requests for solutions that help optimize the life-cycle costs of the transport systems, such as the re-injection of electricity into the rail networks, thus, both reducing CO2 emissions and costs," explained Alstom.

Alstom notes that the development of its Coradia iLint electric train powered by a hydrogen fuel cell is the result of investing to improve the environmentally-friendly aspects of its product and solutions. The train has been running passenger operation since September 2018 and recently toured six states in Germany to demonstrate its capabilities. The company says the Coradia iLint is 100 percent emission free, less noisy and offers comparable acceleration and braking performance to a conventional Coradia

#### "Such

innovations are also transferring part of the electrification infrastructure to the trains themselves. through onboard energy systems, such as batteries or supercapacitors, which also have the benefit of making the trains more autonomous."

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DMU. Additionally, Alstom says the train consumes less energy during operations with its flexible energy storage and intelligent energy management systems.

Alstom's Hesop was developed to address energy production and recovery. Hesop is a reversible substation, which allows for the recovery of more than 99 percent of available energy during braking for reinjection into the electric network.

"Hesop not only provides high quality energy, it also provides dynamic voltage regulation to optimize power use in traction mode and allows for better in-tunnel air quality as braking dust is reduced. In additional to its energy recovering capability, on existing networks Hesop also allows operators to increase traffic density up to 40 percent with the same number of substations," explained the company.

Hesop is in use in Paris, London, Milan, Sydney, Panama and Riyadh. Alstom explains that the Arriyadh Development Authority (ADA) of Riyadh chose Hesop to remove the need for on-board braking resistors and to optimize the power supply architecture of the system. Under the terms of the contract with ADA, Alstom supplied 35 bi-group substations or 70 Hesop substations over the 72.7 km (45.17 miles) of lines servicing 32 stations.

Catenary-less solutions, such as ground-level dynamic feeding (APS), ground-level static charging (SRS) with ecopacks and batteries, are manufactured by Alstom to provide the same power but better aesthetics.

"These off-wire systems provide the same performance as wire systems for a better integration into

#### HESOP

Allows for the recovery of more than

**99%** of available

energy during braking for reinjection into the electric network. the urban environment, a factor that is particularly expressed by and important to light rail and streetcar operators who wish to minimize the visual impact caused by overhead lines and poles, as these types of rail systems tend to traverse historical areas and city centers," said Alstom.

Alstom's off-wire systems have been deployed in Bordeaux, Nice and Reims in France; Dubai, UAE; Sydney, Australia and Lusail, Qatar.

#### Understanding system and client needs

Burns Engineering offers a range of specialized engineering solutions to help maintain, improve and expand transit systems including AC and DC traction power systems. Burns explains that tight capital dollars are producing work calling for the rehabilitation



#### **POWER SUPPLY**

of equipment within a smaller subset of an overall system. The company notes that it is replacing overhead catenary systems a few miles at a time and traction power substations one or two at a time and is also designing larger system extensions in phases.

"The biggest challenge, as is so often the case in large-scale infrastructure rehabilitation, is funding. Given the size and complexity of even the smallest transit operators, the cost to improve the entire system in one sweeping effort is typically cost-prohibitive," said Daren Petroski, PE, vice president and Railroad & Transit Group leader at Burns. "The challenge is to provide the best technology, while maintaining the appropriate flexibility for seamless integration into the older sections of their system, as well as into future upgrades."

In order to provide its clients with the needed technology and flexibility, Petroski says that Burns helps its clients understand the best use of their capital improvement funds.

"We frequently perform State of Good Repair inspections for agencies across the country as a way to document and track system conditions and to determine the remaining useful life of critical system components," said Petroski. "It is much easier to design systematic replacements than to perform emergency repairs that disrupt passenger service. We have a duty to our clients to make the best use of their available funds, so it is important to help categorize and prioritize the work. Even if inspections reveal that the components still have many years of life remaining, this is an important tool for the owner to use to help set their budgets in the coming fiscal years. Second, we are committed to providing the best solutions to our clients. Our staff stay well-trained on the latest technology developments, and serve on IEEE, AREMA and APTA committees, which allow us to keep the pulse of the industry, as well as the preferences of many of the individual agencies."

Next, Burns works with its clients to understand and visualize the needs of the client's system in order to develop a right-size approach.

"New technology allows us to paint a clearer picture to the owner as to what their system may look like in order to best serve the needs of their passengers," said Jonathan Schimpf, PE, project manager at Burns.

Schimpf notes that modeling the system is the first step of any



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BELOW, THE interior of the Siemens Mobility container substation.



new traction power system and references the adage "only that which is measured can be managed."

"Only through the use of timestepped dynamic load flow simulations can one accurately size the traction power system," said Schimpf. "Without these simulations, the client runs the risk of either suffering from decreased resiliency in their power system or wasting money overbuilding their system. Along these lines, we help our clients understand the probability and impact of the various failure modes of the critical traction power equipment. While it may have once been acceptable to disregard regenerative braking altogether, this approach marginalizes a significant and reliable power source. It is fantastic to see regenerative braking become commonplace and for on-board or

wayside energy storage systems become more prevalent. However, unless these new technologies are properly accounted for, their full impact may not be realized."

#### **Flexible solutions**

Siemens Mobility says that it is seeing light rail solutions growing in popularity due to rising city populations and traffic congestion. The company points to Sound Transit's recent LRT expansion in Tacoma as an example where the project helped drive traction power solutions.

"We're glad to see a renewed interest in electrification – especially in markets needing to achieve sustainability targets and increase energy savings through transit," said Andreas Thon, vice president of Turnkey Projects and Rail Electrification, North America.



For more information, visit www.MassTransitmag.com/10065485

Thon explains that this increase in interest is pushing many transit operators in the U.S. to update and expand their existing electrified networks.

"Unfortunately, some older long-distance rail infrastructure in America remains unelectrified, and there are important challenges associated with integrating or migrating those to any type of electrification solutions. However, it does not impede electrification from being a good option for the future of efficient rail operations," said Thon.

He notes that the biggest trend the company is seeing is a real willingness to take advantage of the full benefits of new digitalized technologies because of how it informs and optimizes overall op-



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erations and maintenance.

"Through real-time transparency of information, operators can now bring down the energy supply in all areas, even identifying the optimal point in time for trains to accelerate based on the energy demand of the complete network. This information also helps to avoid power peaks and improves overall cost and energy efficien-

cy," explained Thon. "Of course, with new digitalization capabilities comes a keen interest in better understanding and addressing safety issues and cyber security for rail power."

For Thon and Siemens Mobility, providing more flexible, modular solutions work best due to the unique needs of each customer.

"For example, we provide a plugand-play compact prefabricated DC traction power substation with all necessary equipment integrated. This solution takes up a smaller space in its container and is easy to move so it can be placed at different locations with less installation effort," said Thon. "These can then be supplemented with IoT connectivity, predictive maintenance and digital monitoring. For example, for monitoring or predictive maintenance, the full transparency on the performance of traction power networks enables peak loads to be predicted and avoided. This enables train timetables to be optimized by energy demand and consumption, which ultimately reduces energy consumption."

He notes that Siemens Mobility's Sitras Sidytrac RT solution will be able to save customers up to 15 percent in energy consumption.

"For maintenance, the analysis of data from the network further speeds up action to needed areas. For instance, operators can now more precisely locate defective sections in the third rail and quickly send maintenance crews, minimizing downtime," said Thon. "This modular availability is also being used more for protection devices. Our Sitras MDC protection and control unit is available in modules, so customers can use only what is really needed and simplify servicing."

Siemens Mobility also addresses cybersecurity by offering a comprehensive concept for IT security that

#### **POWER SUPPLY**

ranges from risk analysis to continuous monitoring and IT security training.

Thon points to the increasing adoption of Building Information Modeling for the planning, design and construction of new projects, which result in a "digital twin" of the system.

"This 'digital twin' is a computer-generated model that provides object-oriented, parametric and digital 3D depiction of the planned system. Here, it is possible to play out extensive simulations that ensure system conflicts are avoided, risks of delays are reduced and project implementation can be expedited. At Siemens Mobility, we use Sicat Master together with Bentley Open Rail to apply standardized and automated work processes for planning catenary systems. This significantly reduces project engineering time, as well as results in improved design quality," said Thon.

#### Modeling as a confidence booster

Editor's note: The following section was submitted by Ethan Kim, P.E., with Paul Chedrawi, P.E., Edward Manning, and Richard Rauceo, P.E., LTK Engineering Services, Inc.

Based on third quarter 2018 ridership data published by the American Public Transportation Association, transit ridership on heavy rail, light rail, and commuter rail has been steadily declining since 2010. Ridership changes typically result from increases in transportation alternatives, fuel costs, or the state of the economy. However, some transit authorities are seeing ridership reductions from aging infrastructure, overcrowding, and capacity constraints. Agencies often respond to these challenges by extending the length of trains or running them more frequently. Both solutions can severely stress the existing traction power system, which is best examined via simulation and modeling before changes to the operation are made. These models provide key information for understanding the capabilities and limitations of traction power infrastructure and allow transit agencies to financially prioritize system improvements.

**Solutions:** LTK uses its TrainOps<sup>®</sup> simulator software to perform traction power load flow modeling. It takes a holistic approach to the dynamic modeling of train operations by simulating the vehicles, signal system, traction power system and track in a single model. As a result, the model can determine the change in an individual train's power draw based on

all the other systems' changes. Dynamic modeling will uncover sometimes-hidden operational capacities, system limitations, or specific weak links in the traction power chain. This provides critical information transit systems and railroad operators can use to make important infrastructure upgrades. The process is unlike other constant power or constant current modeling



#### POWER SUPPLY

methods in which vehicle performance is not adjusted in real time. In those models, train voltage and performance are calculated in a separate module that does not feed back into the electric network, resulting in inaccurate train loadings and locations.

Technology applications: The applications for dynamic modeling include assessing traction power and operational system limitations; prioritizing traction power improvements to coordinate with the commissioning schedule of new vehicles or increase in service and capacity; evaluating the feasibility of new operational schedules; evaluating wayside and onboard energy storage systems; and identifying construction sequences to minimize disruption to service. The results from the studies provide the framework for the design



of the traction power system.

For models that require further correlation to actual performance, onboard collection of data provides direct vehicle power analyses. Information such as train voltage, current, and GPS location are collected using data acquisition hardware, transducers, and GPS sensors, allowing engineers to pinpoint locations where power system anomalies

occur and to correlate the model with actual daily operations. The combination of load flow modeling and data acquisition can reveal system performance characteristics with greater precision, allowing transit systems and railroad operators to make better-informed decisions and apply resources where they will have the greatest positive effect on the operation.

LTK ENGINEERING'S TrainOps simulations software model graphic interface.



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# Operating a **Self-Driving City**

Self-driving vehicles are becoming a more prominent aspect of the transit world, agencies are working to further meld them into their current service offerings.

#### By Maile Rudebusch, assistant editor

#### N JULY 2018, THE DENTON

County Transportation Authority (DCTA) and Drive.ai rolled out a pilot program of self-driving vehicles in Frisco, Texas. The pilot program was the first of its kind for the state, having the vehicles operate in a public setting.

Kristina Holcomb,DCTA deputy CEO, explained, "The reason why [Drive.ai] selected Frisco was because they had newer road infrastructure and traffic devices to make for a good AV deployment. They were also impressed with the collaboration of Frisco Transportation Management Association (TMA). The TMA really offered a fully-comprehensive pilot program because the TMA represents different areas, which include a large office park, an entertainment district, as well as a new high-density residential development. From Drive.ai's perspective, their location needed to have good infrastructure and they wanted to be able to have a fully comprehensible pilot program that provides a good case study more than one market."

"Drive.ai's partnership with DCTA and the Frisco TMA was the result of collaborative en-



DCTA Deputy CEO **THE PROGRAM** offers a firstmile last-mile option for riders in the area.

gagement in late spring of 2018. As Drive.ai was looking for a location for its first deployment, the state of Texas, and specifically the Dallas/Fort Worth area emerged as an ideal location, thanks to 1. a clear regulatory framework in the state, 2. an ability to address real transportation challenges within the local community and 3. the eagerness of partners like DCTA to work together transparently while educating stakeholders," said Bijit Halder, Drive.ai CEO.

#### An autonomous plan

"The Frisco pilot program was initially scheduled to run from July 2018 through the end of January 2019, serving the Hall Park area of Frisco's North Platinum Corridor and connecting employees at the office park with retail, entertainment and dining options in the area. The pilot was ultimately extended through the end of March 2019, due to its popularity and regular usage by riders," said Halder.

#### **SELF-DRIVING CITY**

The area that the pilot serviced was a high traffic area for both office workers and retail business.

"Hall Office Park has nine buildings that are all located within a certain geographic area. Any of the tenants within those buildings could use the service to get over to the Star entertainment district. It could be a half mile to a mile depending on which office park they are coming from. The Star is actually in pretty close proximity to Hall Office Park, but just a little too far to walk, so this was a great pilot program for us to deploy to connect those complementary developments," said Holcomb. "Hall Office Park offered up to 10,000 employees for their entire park and the Star has numerous restaurants, like for lunch time and for people to go for meetings, those two just complemented each other to go back and forth. Once we introduced the residential area, clearly those residents that wanted to have access to entertainment – or if they worked at the Hall Office Park – that was another complementary element."

Holcomb explained that the TMA, which is comprised of the city of Frisco, DCTA, Frisco Station, Blue Star, the Star Development and Hall Group, is a collaborative group.

"That collaboration is really focused on enhancing connectivity and mobility for employers and employees that are in that Frisco North Platinum Corridor. By the TMA partnering with Drive.ai, it allowed for the launch of the self-driving pilot program in Frisco," said Holcomb.

Since the launch of the pilot, Drive.ai provided around 5,000

#### All Arlington Routes.



trips to both tenants in the Hall Office Park and visitors to the area.

"It really has been an incredible partnership to be a part of, because the driverless car partnership program was not only a milestone for all parties involved in this partnership, but also for the state of Texas. This marks the first time that members of the public had access to an on-demand, self-driving serDRIVE.AI PARTNERED with DCTA and the Frisco TMA to offer an expanded transit route option.



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Drive.ai By the Numbers

5,000 trips provided

9 months length of pilot program vice on public roads. They always say that the state of Texas is AI friendly, which is another reason that Drive.ai selected Frisco, the state allows for pilot programs like this, where a lot of states are not AV friendly. This program has just been a joint partnership with Drive.ai and the TMA and it's been an incredible partnership for us," said Holcomb.

#### Introducing a new technology

Introducing autonomous vehicles can sometimes seem like a daunting task, but with the partnership both DCTA and Drive.ai informed the public as to what it would mean for their transportation options.

"Prior to the launch, we had many community forums and open house events to talk about these self-driving programs that were going to be coming on-board to answer any concerns. The response was very positive. Many community members came out to those events and they were excited about the technology that was being deployed within their city. They were excited about what that could mean in the future. They were disappointed to hear that this program was focused for those tenants at Hall Office Park. They wanted to know when it was going to come to their neighborhood. I think that was really exciting to see, because when you deploy a new technology, you do sometimes have a perception of what the public perception might be, so it was pleasantly surprising to see how the public responded,' said Holcomb.

The technology that Drive.ai

launched was focused on benefiting the community.

"Drive.ai is a self-driving vehicle company transforming the relationship between people and transportation with a people-centric safety approach to self-driving. Using deep learning, a sophisticated branch of artificial intelligence, Drive.ai integrates the raw data from sensor hardware – such as radar, lidar and full-surround cameras – with proprietary AI software to develop self-driving systems from the ground-up," said Halder.

In the initial conception of the program, the community asked about the safety of the vehicles and relying on the autonomy to stop the vehicle in the event of an obstacle.

"The day we had demo rides there was an incident where



#### **SELF-DRIVING CITY**

someone ran out in front of the vehicle and the vehicle stopped. The two people who were in the vehicle got out and said 'if I was driving, or if I was distracted, I don't know if I would have missed that pedestrian'," said Holcomb.

"Drive.ai uses detailed mapping, annotation and simulations to further train and develop the cars' self-driving 'brain,' improving the cars' ability to distinguish other vehicles and pedestrians, as well as driving environments and scenarios, to safely and effectively navigate through the world," Halder explained. "Drive.ai's vehicles are also equipped with external communication panels, which indicate the vehicles' intended actions to others on the road, based on situational context. For example, when the car stops at an intersection, it will flash a 'Wait-



**THE PILOT** was been extended due to popularity.

# Survey Says

**98%** of riders felt safe during the ride

ing for you' message to a pedestrian who wants to cross the street."

# Benefiting the transportation infrastructure

The self-driving pilot program saw great success in the area.

"Drive.ai's self-driving shuttle program in Frisco helped address a pressing transportation issue in the DFW area by offering a lastmile solution. The pilot program enabled riders to travel distances that are too far to walk, but too close to drive, and connected them with dining, entertainment and retail destinations," explained Halder. "Especially in thehot Texas summer, Drive.ai was able to provide a practical, easyto-use transportation option for members of the community."

The pilot was extended for an additional two month extension to the original plan.

"The AV program [ended] Friday March 29, right now the Frisco TMA is deciding what to do next. We've been able to review some lessons learned, what worked and what didn't work to evaluate the service and determine what worked for that area. Although the pilot has come to a close they'll still focus on mobility applications for the users there," said Holcomb.



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# Deployment of Hydrogen Fuel Cell Buses

Clearly defining a goal, building a team and illustrating the innovation are a few of the suggestions laid out for agencies exploring deployment of HFC buses.



**By Kirt Conrad** CEO and Executive Director, Stark Area Regional Transit Authority

**CANTON, OHIO** • I've received many inquiries from transit professionals and reporters about SARTA's drive to deploy one of the largest fleets of Hydrogen Fuel Cell (HFC) buses. I'm routinely asked, "How did you do it? How did a small urban transit agency in Ohio become a leader in the HFC forum?"

There is no simple answer; however, here's how we did it:

- Clearly defined goal and options for achieving it. Our goal was to assemble a zero-emissions fleet that transitioned from diesel, to diesel/electric, to Compressed Natural Gas (CNG) vehicles. We soon realized, that CNG was not fulfilling our goal. As we learned about other alternative fuels, it became apparent that the addition of HFCs to our fleet would do just that.
- Secured the funding. Like many transit agencies, we didn't have excess funds available to develop an HFC program. That meant we had to search for and secure funding. At the time, there were several competitive grants available, we just needed to apply.
- Kept the public informed. Since we are a funded by tax payer money, it was important to keep our community informed on what we were doing, why we were doing it, and how it was being funded. As a result, we received tremendous support from the public, media and our community leaders.
- Built a team. To plan and launch the program we envisioned, we required assistance. Fortunately, we had many partners that included CalStart, Center for Transportation & the Environment, Ballard, BAE, El Dorado, Toyota, Cleveland State University, the Ohio State University, the Ohio Fuel Cell Coalition, DOT, FTA, ODOT, the U.S. Department of Energy and other firms.

• Illustrated the innovation. Honestly, buses, as a whole, are not innovative; however, HFC's have changed that. We demonstrated this by taking our HFC bus to the statehouse in Columbus and invited state legislators to take a ride. During this time, I demonstrated the HFC's "zero emission" moniker by drinking the water that had been emitted from the tailpipe. It didn't taste like Evian; however, it was a great way to illustrate the definition of "zero emission."

Our bus became a rolling classroom to bring our "Fueling Our Future" energy education program to area middle schools. The curriculum introduced seventh graders to alternative fuels, the environmental impact of clean technologies, and career opportunities in renewable energy. This program has been funded by grants from the FTA.

Recently, we developed the "Borrow a Bus" program. Since its introduction, we have received interest from transit systems across the U.S. and Canada. This spring, SARTA's HFC bus will make appearances on Capitol Hill and to several transit agencies across the US. For information on this program, visit our website www.sartaonline.com/sartas-borrow-a-bus-program.

So, when I'm asked, "How did you do it?" My response is we had a goal and worked to achieve it. We did not set out to become a leader in the HFC forum, we simply did it because we could and we are grateful to be a driving force in the zero emissions industry.



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# Discussion



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#### Ben Winslow @BenWinslow

Waiting for the 500 to the Capitol and a woman approaches to say she recognizes me from TV: "YOU take public transit?!?!" Yes, ma'am, I do. She told me I should make all those other TV anchors do the same. **#utpol** 





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