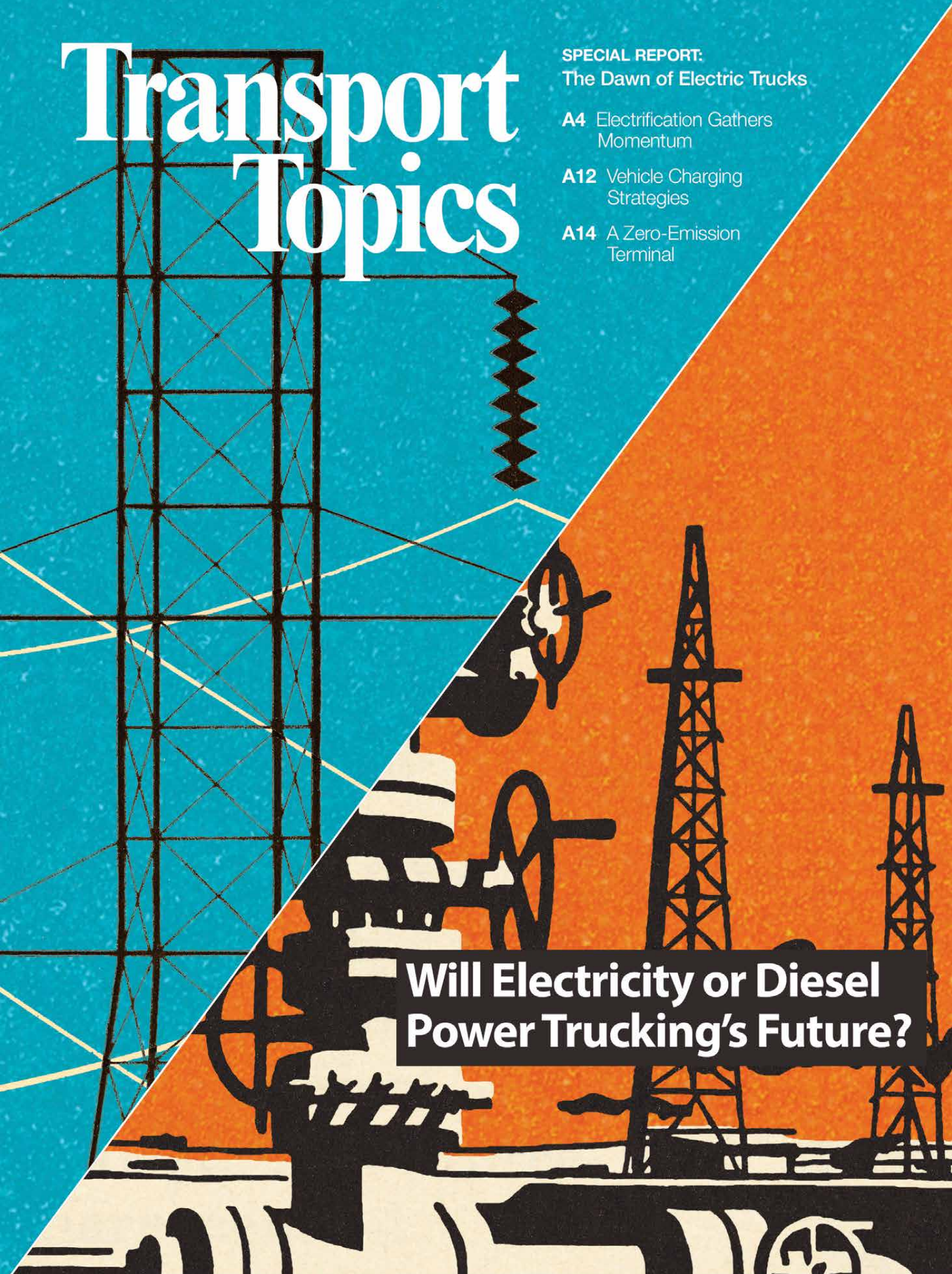
Transport Topics

SPECIAL REPORT:
The Dawn of Electric Trucks



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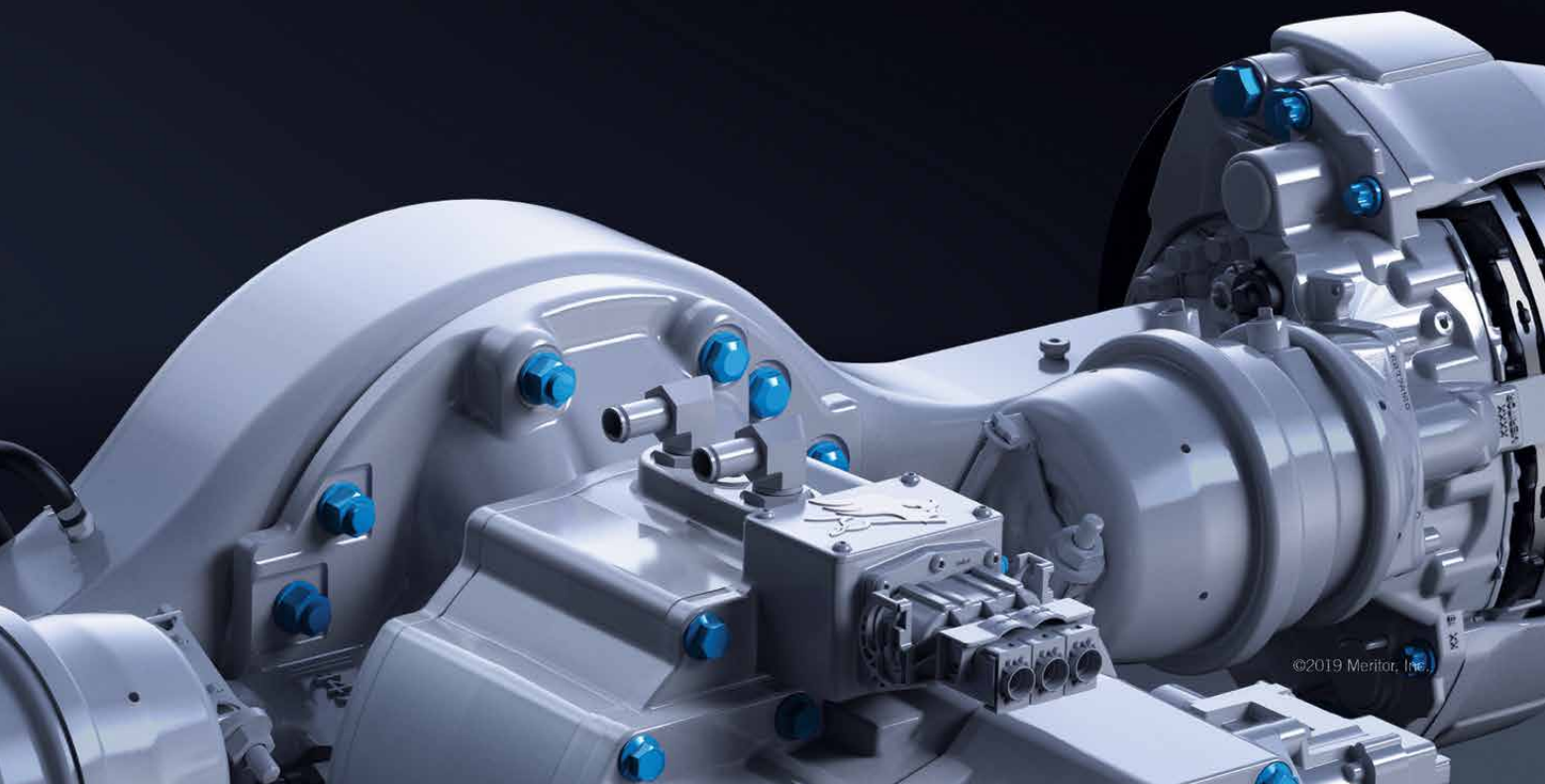

Electric-Powered Trucks Gain More Momentum

Electric-powered trucks are only just beginning to enter freight operations, but these limited early deployments herald the dawn of a new segment of commercial trucking.

In the 12 months since Transport Topics produced its first special report on the advance of electric trucks in December 2018, the industry has seen more electric prototype models unveiled and more investments in electrification announced by manufacturers and suppliers.

This follow-up report recaps these latest developments and provides an updated look at where this emerging market stands today.

While electric trucks are not yet broadly available, truck manufacturers have been working in concert with their fleet customers to pave the way for full commercial product launches in the next few years.

Early deployments concentrated primarily in Southern California and supported by government grant money have put the first wave of electric trucks on the road, moving real freight in drayage and shorthaul applications.

The industry's continued progress toward electrification also was clear at the 2019 North American Commercial Vehicle Show in Atlanta. Truck makers showcased battery-electric vehicles alongside their diesel models, and a growing number of manufacturers and suppliers also highlighted their investments in hydrogen fuel cells.

Electric trucks still face myriad challenges, especially higher costs, limited vehicle range and payload and the need for charging infrastructure. But as the years go by, these zero-emission vehicles are poised to play an increasingly important role in our industry.

Whether you are interested in adding electric vehicles to your fleet or simply want to learn more about them, we hope this special report helps you broaden your understanding of this young but promising new breed of commercial vehicle.

— Seth Clevenger

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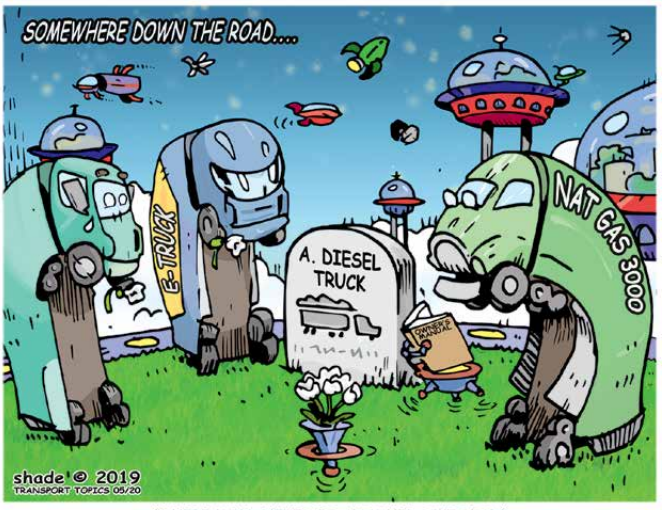


"THERE WILL NEVER BE ANOTHER LIKE HIM."

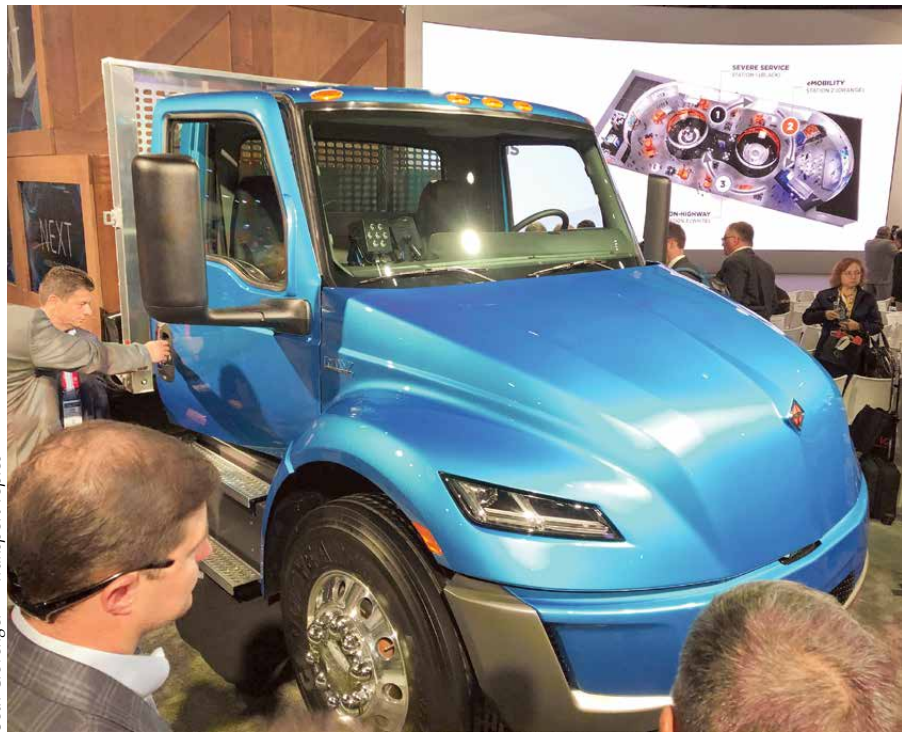
John Sommers II for Transport Topics

John Sommers II for Transport Topics

Daimler Trucks North America

The Dawn of Electric Trucks

Batteries and Hydrogen Fuel Cells Poised to Power a New Segment Of Commercial Transportation



Seth Clevenger — Transport Topics

NACV attendees check out Navistar's battery-electric eHV Series medium-duty truck.

By Seth Clevenger
Managing Editor, Features

The introduction of electric-powered commercial trucks continued to gain momentum in 2019 with more investment, more prototypes unveiled and more deployments in real-world freight operations.

This emerging segment of the commercial vehicle market is still in its infancy, but the world's largest truck makers and their suppliers have made it clear that they see electrification as a pillar of the industry's future.

What's less clear, however, is how quickly that future will arrive.

Diesel undoubtedly will remain trucking's primary fuel for years to come, and the internal combustion engine still has a long road ahead of it, but manufacturers believe that electric trucks are poised to become an increasingly important piece of the freight transportation industry.

"I'm convinced in the next 10-15 years, one-third of our trucks and buses will have an alternative drivetrain, and most of those will be fully electric. And by the way, this is a very conservative ballpark figure," Traton Group CEO Andreas Renschler said at an Oct. 28 press event at the 2019 North American Commercial Vehicle Show in Atlanta.

Traton Group, a Volkswagen subsidiary, sells commercial vehicles worldwide under the MAN, Scania and Volkswagen brands and has a strategic alliance with U.S.-based truck maker Navistar.

Electric trucks hold great potential for

reducing diesel expenses and helping the transportation industry meet existing and future emissions regulations in markets around the world.

At this stage, however, these trucks come with higher costs than diesel models, along with vehicle range limitations and added weight that can cut into payload capacity.

Nonetheless, financially viable business cases for electric trucks are starting to appear in applications with high vehicle utilization and repetitive freight flows, and in areas with strong clean-air regulations and government incentives, said Volvo Group CEO Martin Lundstedt.

"In certain regions and countries, I think we will see a ramp-up," Lundstedt said at the Heavy Duty Manufacturers Association's luncheon and briefing Oct. 29 at NACV.

But the shift toward electric trucks will require more than the vehicles themselves. It also will require charging infrastructure, adequate power grid capacity and upstream electricity generation that is sustainable, he said, adding that it wouldn't make sense from an environmental standpoint to replace diesel with electricity from coal-fired power plants.

"That's the reason why it's so important to take it from a system perspective," Lundstedt said.

Volvo Group is the parent of Volvo Trucks and Mack Trucks.

Although electric trucks are not yet widely available in North America, truck manufacturers and a select number of their fleet customers have begun putting prototype vehicles to work moving freight.

The majority of these electric trucks have been deployed in port drayage operations in Southern California with the aid of grant money available in the state.

Meanwhile, industry suppliers such as Dana and Meritor have been investing in electrification to support original equipment manufacturers.

Battery-electric vehicles remain the most prevalent development pathway toward zero-emission trucking, but a growing number of developers also are espousing hydrogen fuel cells as a complementary technology.

That was particularly evident at NACV, where several exhibitors showcased hydrogen-electric trucks.

Hyundai Motor Co. revealed its fuel cell-powered HDC-6 Neptune concept tractor on the show floor, while engine maker Cummins and supplier Bosch also discussed their investments in the technology.

Kenworth Truck Co., which has partnered with Toyota to develop hydrogen-electric trucks, also showcased a fuel cell prototype.

Bosch exhibited a hydrogen-electric truck from Nikola Motor Co. to illustrate its collaboration with the startup truck manufacturer. Nikola helped spark the trucking industry's conversation about electric trucks — and the use of hydrogen fuel cells to extend their range — when it revealed its first hydrogen-electric Class 8 model in late 2016.

All of the established truck manufacturers in North America have since introduced their first electric truck models, and have outlined plans to begin series production within the next couple of years.

Continued on next page

Seth Clevenger — Transport Topics

Electric-vehicle charging systems on display at NACV 2019 in Atlanta.

Continued from previous page

The nascent electric truck segment also has attracted several newcomers to the industry.

Electric car maker Tesla jumped into the race when co-founder and CEO Elon Musk unveiled its battery-electric Tesla Semi in late 2017.

OEMs Work to Address Implementation Challenge

As truck makers prepare for the commercial launch of electric-powered models over the next couple of years, they are focused on easing the learning curve associated with implementing these vehicles.

Electric trucks feature different operating characteristics and a radically different vehicle architecture compared with today's familiar diesel trucks.

Navistar, for one, has established an electric-vehicle business that will not only build electric vehicles, but also provide consulting and support to fleet customers as they look to deploy them in their operations.

The mission of this business unit, named NEXT eMobility Solutions, is "to make the move to electric as easy as possible," Persio Lisboa, Navistar's chief operating officer, said at NACV.

> "Early adopters are finding there is no one-size-fits-all option."
>
> — *Persio Lisboa, Navistar*

Fleets need more than a truck — they need clarity on issues such as vehicle charging infrastructure, training for drivers and technicians, and the availability of grant money, he said. "Over and over, we hear it is not just about the hardware. Their concern is about everything else required to move to electric."

NEXT will develop customized implementation plans for each fleet customer's unique operations, along with charging strategies and performance monitoring, the company said.

"There is a large potential market for electric trucks. The economics of these vehicles is getting better every day. But the market is still finding its footing," Lisboa said. "Early adopters are finding there is no one-size-fits-all option."

Navistar also unveiled a battery-electric model based on its medium-duty International MV Series truck at NACV. The company said it plans to begin production of medium-duty electric trucks under the International brand in early 2021.

Early Use Cases for Electric Trucks

In the near term, electric trucks will be best suited to shorthaul and regional operations in which the vehicle returns to a terminal for recharging.

At NACV, Peterbilt Motors Co. showcased three electric trucks configured for refuse, regional and urban delivery applications.

Continued on page A10

John Sommers II for Transport Topics

Hyundai showcases its hydrogen fuel cell-powered HDC-6 Neptune concept tractor at NACV 2019.

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Continued from page A6

"We have designed our electric vehicles to perform as well as a diesel powertrain truck," said Scott Newhouse, Peterbilt's chief engineer. "We believe these three applications — refuse, regional haul and city delivery — will provide the most immediate and near-term return on investment for our customers."

Today, the company is focused on gaining test miles in real-world applications. Peterbilt announced at the show that it has 16 electric trucks in operation, with 21 more going into service in the first half of 2020.

The truck maker said it will begin taking orders for its three electric truck models in the second quarter of 2020, with low volume production scheduled to start by the end of 2020.

In early October, PepsiCo's Frito-Lay division took delivery of the first electric Peterbilt 220EV model, designed for local pickup and delivery.

"Frito-Lay is continuously exploring current and emerging technologies for our freight equipment as we work toward reducing PepsiCo's absolute greenhouse gas emissions by 20% by 2030," said Michael O'Connell, the company's vice president of supply chain.

PepsiCo ranks No. 1 on the Transport Topics Top 100 list of the largest private carriers in North America.

Meanwhile, Napa, Calif.-based logistics company Biagi Bros. placed the electric Model 579EV in service in October.

"Biagi Bros. has a history of green fleet operations, and we're extremely proud to have partnered with Peterbilt to add the 579EV to our diverse fleet of special trucks, tractors and trailers we use to serve our customers," said Gregg Stumbaugh, director of equipment at Biagi Bros.

Peterbilt's electric trucks feature electric-vehicle systems from TransPower and Meritor's Blue Horizon brand.

Hauling Freight With Electric Trucks

Electric trucks are not just appearing at trade shows, but increasingly are moving freight in real-world trucking operations.

Manufacturers have begun handing over electric prototypes to fleet customers to help prove the viability of the technology and pave the way for a broader rollout.

John Sommers II for Transport Topics

Engine supplier Cummins exhibits a hydrogen fuel cell truck at NACV 2019.

These early deployments have been concentrated primarily in Southern California, which has become an early incubation zone for this technology in North America.

Volvo Trucks is demonstrating the capabilities of battery-electric trucks through a collaborative project dubbed Volvo LIGHTS, or low-impact green heavy transport solutions.

Through this initiative, the truck maker plans to introduce 23 of its VNR Electric regional haul models to haul freight from the ports of Long Beach and Los Angeles to four nearby logistics facilities.

Volvo is partnering with two trucking fleets — NFI and Dependable Highway Express — to put the demonstration trucks to work.

The project addresses not only the trucks themselves, but also charging infrastructure and other factors necessary to support electrification.

Volvo LIGHTS is supported by a $45 million investment by Volvo and a $45 million grant funded by the California Air Resources Board.

Daimler Trucks North America also has partnered with fleet customers to put battery-electric trucks on the road.

The truck maker has been handing over its initial Class 8 Freightliner eCascadia and medium-duty eM2 models to NFI and Penske Truck Leasing for testing in their freight operations.

This first wave of test trucks, dubbed the Freightliner Electric Innovation Fleet, is intended to help DTNA and the fleets expand their knowledge on how to implement the technology more broadly.

DTNA said it plans to expand the Innovation Fleet to 20 eCascadias and 10 eM2s to help prepare for series production of those models in 2021.

Certain vocational applications such as garbage collection also present ideal opportunities for electrification.

Mack Trucks is preparing to deploy a battery-electric refuse truck with the City of New York Department of Sanitation.

The Road Ahead For Alternative Fuels

While electric-powered trucks are just beginning to enter the market, compressed natural gas remains the most widely available alternative to diesel today.

DTNA CEO Roger Nielsen recently said the CNG truck market is neither deteriorating nor skyrocketing.

"We continue to believe that CNG is a viable alternative for many customers here in North America," he said in an interview with Transport Topics at NACV.

John Sommers II for Transport Topics

Suppliers such as Dana have developed e-axles and other systems for electric trucks.

At the same time, manufacturers will continue to further refine diesel engines ahead of the federal Phase 2 greenhouse gas regulations, which will introduce increasingly stringent emissions and fuel-economy standards through 2027.

"Definitely, we are not done developing diesel engine technology," Nielsen said.

But looking further ahead, manufacturers are positioning electric trucks as the industry's future, or at least an important part of it.

Andreas Juretzka, director for product development at DTNA's e-mobility group, said the electric truck market may ramp up slowly when the vehicles first become available, but he predicted that this new truck category eventually will take off.

He acknowledged that electric trucks currently rely heavily on government grants and incentives to offset higher vehicle costs, caused primarily by the high cost of batteries. Battery prices are coming down, but must continue to drop to reduce the price disparity with diesel.

However, in the decades to come, Juretzka said it's not difficult to envision a day when renewable energy has become widely available. He predicted that future generations will marvel that people once extracted fossil fuels from the ground just to be mobile.

"I took this assignment because I really believe in it," he said. "I believe that electric is for the future."

The current push toward electric vehicles is also in some ways a return to the distant past.

In the early 1900s, electric cars held a sizable portion of the still young automobile market, but were leapfrogged by mass-produced cars powered by gasoline engines.

Now, more than a century later, electric vehicles are again becoming competitive with combustion engines and have a chance to overtake them, due in large part to the advance of battery technology, Juretzka said.

"There was always this rivalry," he said. "It seems that there's a real chance for electric now where it never had a chance before, because of energy storage."

Peterbilt has introduced battery-electric commercial trucks designed for regional haul, refuse and city delivery applications.

Peterbilt Motors Co.

Strategies Begin to Emerge For Charging Electric Fleets

By Roger Gilroy
Staff Reporter

Charging infrastructure has been identified as one of the largest unknowns and sources of anxiety for fleets considering deployment of battery-electric trucks in their fleets, according to the North American Council for Freight Efficiency.

Nonetheless, near-term gains are possible with medium-duty and drayage applications, NACFE Executive Director Mike Roeth said during a media conference call to review "Amping Up: Charging Infrastructure For Electric Trucks," its latest guidance report on future technology.

"We do discuss larger trucks throughout the report, but in a more limited way because we just don't know enough yet. But we do plan to update this report as more progress is made in those areas," Roeth said.

Some key initial steps can help fleets succeed in charging the zero-emission vehicles, especially when charging multiple vehicles or those with large batteries on-site, NACFE concluded.

One is using smart-charging software that can minimize infrastructure capital, installation costs and operating expenses — and help a fleet get the best rate possible from its utility and ensure the trucks are ready to go when needed, said Jessie Lund, the author of the NACFE report, and an associate at the Rocky Mountain Institute, which supports the findings.

"Electric charging for the foreseeable future is going to be private, or what we are calling depot or return-to-base charging," Lund said. "While there are some tentative plans out there for public fast-charging networks across main corridors throughout the country that would be capable of quickly charging commercial vehicle batteries, we don't see that as a reality for the immediate future."

John Sommers II for Transport Topics

A view of the Fuso eCanter battery-electric model in the Daimler Trucks North America exhibit at NACV 2019.

John Sommers II for Transport Topics

Electric vehicle charging equipment on display at the 2019 North American Commercial Vehicle Show in Atlanta.

Another key initial step is that fleets are going to have to work closely with utilities, and start the process as soon as possible and allow plenty of lead time, she said.

"We are already seeing some utilities work with fleets to offer make-ready options and programs that can help ensure facilities have the needed electrical distribution infrastructure," Lund said, including adequate transformers and conduit, and, potentially, new separate meters for electric vehicle charging.

Many of these programs have become available in California, she said, and she expects this trend to continue as more utilities target programs for commercial fleets.

Utilities want the business from commercial vehicles in order to sell more electricity or help meet state and local sustainability goals, Lund said.

"So fleets shouldn't be shy in working with them and telling them what they need," she added.

The full report includes a list of charging infrastructure suppliers and utilities with electric charging programs. It also includes insights from fleets, electric truck makers, manufacturers of charging infrastructure, energy groups and standards-setting organizations.

The report is available for purchase in the resources section at nacfe.org.

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Fleet Adds Electric Yard Trucks For Zero-Emission Terminal

By Mindy Long
Special to Transport Topics

ONTARIO, Calif. — Dependable Supply Chain Services has deployed two electric powered yard trucks from Orange EV at its facility here, bringing the company closer to its goal of creating a sustainable, zero-emission terminal.

The vehicles replace two diesel yard trucks at the facility, which is used by the company's less-than-truckload division, Dependable Highway Express.

Joe Finney, chief operating officer for Dependable Supply Chain Services, unveiled the equipment and the charging cabinets they use on Oct. 15. In addition to the new tractors, Dependable Highway Express is investing in electric forklifts, solar panels and over-the-road electric tractors.

Volvo has announced that it would partner with Dependable Highway Express to introduce all-electric Class 8 tractors in California as part of a partnership that includes Volvo Group, California's South Coast Air Quality Management District and other companies involved in transportation and electrical charging infrastructure.

Finney said Dependable Supply Chain Services has explored several alternatives to diesel, including compressed natural gas and hydrogen.

"The only thing that makes viable sense is electric," he said, adding that drivers simply plug in when they get out of the truck. "We can keep business running as we would."

Over the course of 15 years, the two new yard trucks can eliminate 50 tons of nitrous oxide, 46 tons of carbon monoxide and 5,000 tons of carbon dioxide when compared to their diesel counterparts, Finney said.

Mike Saxton, chief commercial officer for Orange EV, which is based in Kansas City, Mo., said the electric terminal trucks have no engine, no transmission, no radiator, no liquid cooling, no motor oil, no fuel tanks, no exhaust system and no emission after-treatment control systems.

"The headaches the fleets have to manage around are gone," he said, adding that operationally the trucks are cooler, quieter and smoother than diesel equivalents while also providing regenerative braking advantages.

The electric trucks should reduce maintenance costs, said Ron Massman, co-founder of Dependable Supply Chain Services, which is based in Los Angeles and ranks No. 92 on the Transport Topics Top 100 list of the largest for-hire carriers in North America.

Saxton explained that maintenance savings vary based on usage, but some fleets report seeing up to a 75% reduction in maintenance and repair expenses.

Dave Marler, regional director of operations for Dependable Highway Express, said he has not had to stock any additional parts to maintain the vehicles and added that the pre-trip inspection process will be simpler with electric trucks.

Anheuser-Busch to Deploy 21 BYD

Anheuser-Busch

The electric trucks from BYD will operate at four Anheuser-Busch distribution facilities in Southern California.

By Roger Gilroy
Staff Reporter

Beer giant Anheuser-Busch plans to deploy 21 battery-electric trucks in its California fleet as part of a state project to showcase economically and environmentally sustainable warehousing and distribution technology.

The Class 8 trucks will be supplied by electric vehicle manufacturer BYD Motors Inc.

"At Anheuser-Busch, we are committed to leading our industry toward a more sustainable future by reducing our carbon emissions across our value chain by 25% by 2025," Angie Slaughter, vice president of sustainability procurement

"The only fluid they have to check is hydraulic fluid," he said, adding that there isn't a great deal of training that is required to get drivers or mechanics up to speed on the new tractors.

Dependable Highway Express purchased one standard-duty yard truck, which has an 80-kilowatt-hour battery pack, as well as an extended-duty yard truck that features a 160-kilowatt-hour battery pack. "Now we can experience both firsthand and get data and knowledge to help determine what we will need at our other terminals," said Troy Musgrave, director of process improvement for Dependable Supply Chain Services.

Two 22-kilowatt charging cabinets provide power to the trucks, and Saxton said the terminal did not require electrical upgrades for the cabinets.

Dependable Highway Express will encourage drivers to use opportunity charging, such as plugging in when taking a break or eating lunch, Musgrave said. The trucks will also receive a full charge over the weekend when they will be plugged in from Friday evening to late Sunday, he said.

Terminal managers can collect data from the trucks through telematics to view operational and charging data to manage any anomalies.

"You can go to the users not following the processes," Musgrave said.

DHE expects the electric yard trucks from Orange EV to curb emissions and maintenance costs.

Mindy Long for Transport Topics

Dependable Highway Express received incentives for the trucks from the California Air Resources Board's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project. HVIP funds enable Orange EV to provide discounts of up to $165,000 per T-Series electric terminal truck, Saxton said.

Sydney Vergis, assistant division chief at CARB, said the program is funded through the California Climate Investment program, which is designed to help improve the environment and public health while reducing greenhouse gas emissions. Vergis told Transport Topics that since 2009, 1,400 vehicles have received incentives through HVIP.

CARB is in the process of transitioning terminal trucks into its Clean Off-Road Equipment Voucher Incentive Project, Vergis said. In addition to providing funding for trucks, the vouchers could include funding for charging stations.

Saxton said Orange EV sold its first electric truck in 2015.

"Every truck we've built since 2015 is still on the road under original ownership with the original battery pack," he said. "It took a lot to get us to this day."

Electric Trucks

for Anheuser-Busch, said in the Oct. 2 announcement.

"The transport industry is one that is prime for innovative solutions and we are excited to continue driving progress toward a zero-emission fleet through this partnership," she said.

Anheuser-Busch, which operates a fleet of nearly 700 tractors, ranks No. 69 on the Transport Topics Top 100 list of the largest private carriers in North America.

The project, dubbed "Zero Emission Beverage Handling and Distribution at Scale," will showcase BYD's second-generation 8TT electric trucks at four Anheuser-Busch distribution facilities across Southern California: Sylmar, Riverside, Pomona and Carson.

Engie Services U.S., a division of Engine Inc., will design and install charging infrastructure at all four facilities. Engie also will install a solar array at the Carson site to generate zero-emission power to offset the use of conventional energy in the charging process.

The project includes equipment testing, a one-year demonstration period, data collection and associated reporting.

Organizers anticipated that the trucks would begin operating in late 2019, with full project completion in early 2021.

The project is part of California Climate Investments, a statewide program that uses cap-and-trade dollars to fund efforts to reduce greenhouse gas emissions, strengthen the economy and improve public health and the environment, particularly in disadvantaged communities.

The project is expected to eliminate emissions of 910 metric tons of carbon dioxide per year, the equivalent of taking almost 200 passenger vehicles off of the road.

To facilitate the project, the California Air Resources Board awarded funds to the Center for Transportation and the Environment, a nonprofit that will be responsible for project oversight, development, management and reporting during this deployment.

CTE will also provide technical support, risk analysis and mitigation strategies, permitting, equipment and station deployment, training, and assistance with commissioning.

"This project represents a huge step forward in integrating clean energy and clean transportation to realize the full environmental benefits of battery-electric vehicles," said Joel Donham, an engineering consultant at CTE.

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