

Making the Case for Electric Waste Transfer Vehicles

Electric terminal trucks haul the same loads as diesels, are cheaper and cleaner to operate, and can be purchased at steep discounts. Now is the time to switch.

■ By Mike Saxton

Electric vehicles have become very attractive in the face of rising fuel prices and ever-tightening emissions standards, but to be a viable option, they must meet operational and financial demands. Field data shows that pure-electric terminal trucks (aka, hostlers, spotters, yard trucks) can do the same job as their diesel counterparts and are cheaper to operate due to savings on fuel, maintenance and more. Given that electrics are also eligible for purchase incentives that discount the price up to \$150,000+ per truck, they are worth a hard look.

Benefits of Electric

The debate over switching from diesel to electric seems an open-and-shut case given the environmental and human-factors benefits alone:

- An electric terminal truck has zero emissions, far exceeding the most stringent compliance requirements, which in turn qualifies it for large purchase incentives.

- The electric power train generates much less vibration, heat and noise, creating driver-friendly work conditions and a truck that is smoother, cooler and quieter.
- The significant emissions and noise reductions provide immediate benefits to health and well-being for both workers and the surrounding community.

Electric terminal trucks also deliver improved vehicle performance with smooth acceleration and deceleration, torque-on-demand and regenerative braking. There is no idling, so no wasted fuel and, with no emissions, they can be safely used indoors.

The benefits listed above are clear and compelling, but for electrics to win out, they must satisfactorily answer two questions: 1) Can they do the job? and 2) Do they make good economic sense?



Orange EV's T-Series Pure Electric Terminal Truck. Photo courtesy of Orange EV.



A Case Study

Groot Industries, a subsidiary of Waste Connections Inc., leads the waste industry as the first to commercially deploy a 100 percent electric terminal truck, operating since January of 2016 at one of their Chicago-area transfer stations. Manufactured by

Orange EV, the heavy-duty class 8 truck capably hauls up to 81,000 pounds (gross combined vehicle weight) up to 25 miles per hour. Though harsh Chicago winters create a challenging operating environment, a full year of operational data shows that, on average, the truck operated 8.9 hours per day in single-shift operations, and used 2.7 percent of the battery charge per hour.

“Running out of juice” is an often-voiced concern with electrics, but the Groot truck ended each operating period with significant battery charge remaining. Though the truck averaged 8.9 key-on hours per day, there were a handful of 17 to 22 hour days. At the truck’s heaviest use (dictated by hours, load and operating conditions), only 55 percent of the battery was used. This performance suggests that in many waste management applications, trucks with a smaller battery pack would do the job nicely while saving money at purchase. Facilities using electric terminal trucks “top off” vehicles throughout the day, plugging in to charge during breaks, lunch, shift changes and other downtime.

Orange EV data from deployed fleets confirms that electric terminal trucks can operate 24+ hours on a single charge, and the Groot performance data demonstrates that its truck does the work with room to spare. Seventy-five percent of fleets using Orange EV terminal trucks have reordered additional vehicles in less than six months.



Groot's Orange EV T-Series electric terminal truck, operating since January of 2016 at a Chicago waste transfer station.

Photo courtesy of Waste Connections.

Terminal Trucks in Waste Management

Although technology is advancing rapidly, most classes of alternative fuel vehicles still have a sweet spot: that operational scenario where the technology gets the job done while also benefiting the business’ bottom line. For heavy-duty electrics, the terminal truck is one such sweet spot.

Terminal trucks by definition are generally off-road vehicles that operate at lower speeds within the confines of container-handling facilities in the business of waste management, manufacturing, retail distribution, railroad inter-modal transfer, LTL freight and more. In such scenarios, battery charging (i.e. fuel) is always well within reach. Terminal trucks can be registered as on-road (DOT-compliant) if working at larger facilities connected by city roads.

Waste management operations like transfer stations, recycling sites and other container-handling facilities are a natural fit for electric terminal trucks. In a typical transfer operation, waste collection vehicles dump loads for consolidation into larger trailers or intermodal

containers. Terminal trucks move these trailers/containers around the site, readying loads for pickup by the semi-tractors for transport to a landfill or other disposal site.

Lower Total Cost of Ownership

When breaking down the economics of electrics, it is critical to analyze both ongoing operational expenses as well as upfront capital outlay to get an accurate picture of the total cost of ownership.

It is estimated that electric terminal trucks save up to 90 percent net on fuel and about \$1.50 per Tier 3 (and older) diesel engine hour when accounting for preventative maintenance and repairs avoided due to eliminating the engine, transmission and other diesel systems.¹ This translates to savings of \$10,000 to \$30,000 annually for trucks operating under moderate conditions. In one waste transfer facility, the electric terminal truck provides a calculated annual savings of more than \$12,000 in fuel and Tier 3-related maintenance alone.²

Diesel operating expenses hinge on total engine hours and load, so heavier-use vehicles generate even greater savings when replaced by electrics, estimated at up to \$30,000 to \$60,000 annually. Eliminating diesel also eliminates the need for new Tier 4 emissions control systems and associated operational problems and expenses. Tier 4 emission control systems are designed for the higher speeds and higher corresponding engine exhaust temperatures found in long haul operations. Operating a Tier 4 diesel in the low speed, start-stop nature of yard operations can lead to unplanned regen (which takes trucks out of operation for a period of high idle) and higher repair and maintenance (e.g., melted filters, broken glow bulbs, etc.).

Due to significant operational savings, the total cost of ownership for an electric terminal truck is often significantly less than that of its diesel counterpart. Still, electric vehicles typically come with a higher price tag than diesels, and companies can find it challenging to fit increased capital expenditures into tight budgets with competing demands. Financing programs can help smooth the cash flow and use existing capital and expense budgets. Funds from government incentive programs can also play a key role.

Emissions Reductions Drive Incentives

Most government agencies have a stated mission to improve air quality, and heavy-duty terminal trucks are prime targets for incentive programs given the dramatic per-vehicle emissions reductions. Figures vary by site and usage, but it is estimated that, compared to Tier 3 diesel engines operated 6,000 hours at 2.5 gallons per hour, annual per truck emissions eliminated can be up to:

- 166 tons CO₂
- 1.7 tons NO_x
- 1.6 tons CO
- 81.5 kg PM

In lighter-use operations like waste transfer facilities, annual emissions reductions can also be quite significant with some sites at an estimated 77 tons CO₂, 0.8 tons NO_x, 0.7 tons CO and 37.9 kg PM.

Due to guaranteed emissions reductions, state and federal entities are offering incentives for fleet owners to upgrade to electric, particularly in non-attainment areas with poor air quality where container-handling facilities—and terminal trucks—are often located.

Save with Vouchers and Grants

Numerous incentives are available at city, state

and federal levels, offering significant savings to fleet owners. While both voucher and grant programs are rich resources, vouchers have many advantages. For example, the states of New York and California as well as the greater Chicago area have voucher programs that enable point-of-sale discounts. These “first-come, first-served” programs are:



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- Administratively simple, having few restrictions or commitments;
- Risk-free, since secured vouchers may be released at no penalty;
- A guaranteed purchase-price discount, with funding amounts pre-approved by vehicle type—e.g. up to \$150,000 per electric terminal truck in New York and Chicago.

Fleets request vouchers through an approved vehicle manufacturer or dealer; requests can be approved within days. Vouchers are ultimately redeemed by the manufacturer/dealer, so they (not fleet owners) receive voucher funds at project completion. Fleet savings are secured upfront, resulting in reduced capital outlay, greater certainty and ease of planning.

In contrast, competitive grant programs reimburse fleet owners the agreed dollar amount once vehicles have been delivered and the manufacturer/dealer have been paid in full. Though funding approval can take longer, potential savings can be enticing. The state of California offers multiple grant programs with one covering up to 85 percent of the entire project cost. To take advantage, fleet owners apply directly to the appropriate air quality management district.

At a national level, DERA Clean Diesel Grants pay for up to 60 percent of the total truck solution including truck, charging and electrical infrastructure. City and state programs can be easier to work with and more certain, but where not available, DERA offers a great alternative. As of this writing, the DERA application period is expected to open early March with submission deadline by about

the end of April. DERA applications are submitted on a fleet owner's behalf by a third-party entity with an air quality mission; fleet owners simply provide required data.

A Rare Strategic Opportunity

Fleets are using the programs mentioned previously to deploy their first trucks while planning to re-fresh the rest of their fleet at a fraction of the cost. Volkswagen (VW) settlement funds, a highly anticipated new development on the grant front, offer a rare opportunity to upgrade an entire fleet from diesel to electric. One portion of the \$14.7 billion settlement requires Volkswagen to establish a \$2.7 billion Environmental Mitigation Trust to fund state-by-state programs that will offset excess emissions from VW vehicles that had been equipped with defeat devices. Lead agencies in each state will develop incentive programs specifically designed to help fleets accelerate deployment of clean vehicles. These programs will heavily favor zero-emission, heavy-duty electric vehicles like terminal trucks.

According to settlement documents, up to 75 percent of project costs for non-government owned fleets may be covered, including vehicle, charging and electrical infrastructure. Government-owned fleets may have up to 100 percent of project costs covered. Each state's lead agency is expected to have published its plan and begin accepting applications by late 2017 or early 2018. Fleets are advised to track their state's progress, begin planning now and submit applications as soon as program details are announced. The VW funds offer a rare opportunity to upgrade old diesel fleets with new electric trucks; companies taking advantage could gain a strong competitive edge operationally and financially.

The Perfect Storm

Electric terminal trucks are a good fit for waste management operations, doing the job while saving money on fuel, maintenance and other diesel-related costs. Incentive programs sweeten the pot, reducing the purchase price and payback period to levels similar to (or even below) that of a new Tier 4 diesel truck. Though significant incentive money is available now, even more is on the way. Going electric is a win-win for fleet owners, and now is the perfect time to switch. | **WA**

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Notes

1. According to Orange EV.
2. Data from Groot Industries.

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