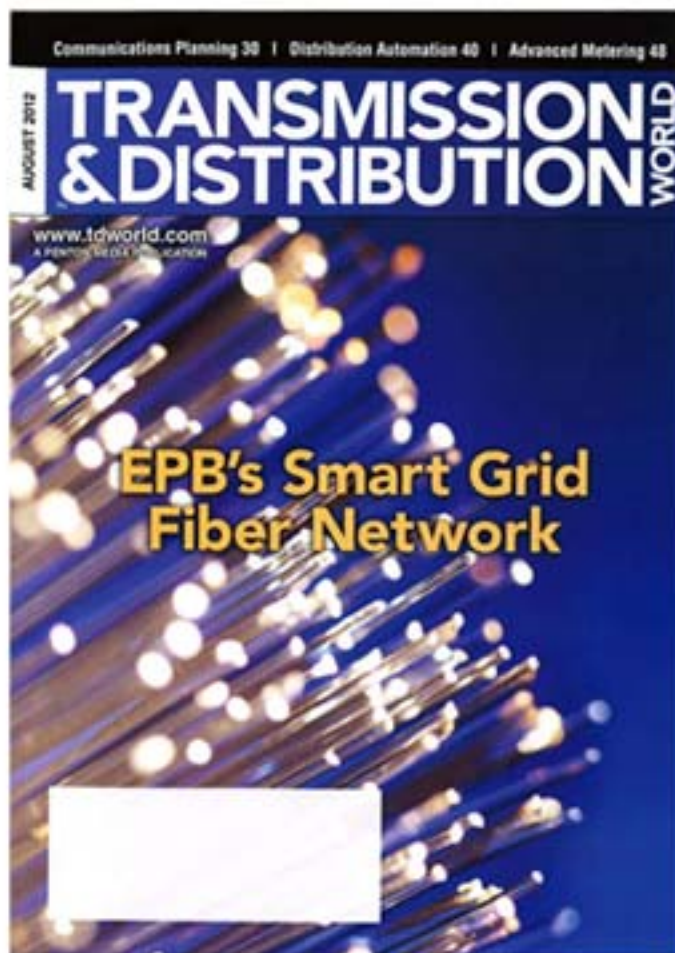


# Odyne in the News



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# The Greening of the Fleet

Marshfield Utilities invests in hybrid bucket trucks for its linemen.

By **Greg Geiger**, *Marshfield Utilities*

Utility companies face the challenge of operating a fleet efficiently. They not only must make the most of their equipment, but they also must improve their crews' work environment. For Marshfield Utilities, one of the solutions to this challenge is a plug-in hybrid electric bucket truck used for utility grid line construction and maintenance.

The utility considered the hybrid technology in part due to the Wisconsin Clean Transportation Program (WCTP). This program, which is administered jointly by the State of Wisconsin

Energy Office and Wisconsin Clean Cities/Southeast Area, is part of the U.S. Department of Energy's National Clean Cities initiative. It supports local decisions to reduce petroleum consumption in the transportation sector through the use of alternative fuels, advanced technology vehicles and fuel economy measures.

To support this initiative, Marshfield Utilities ordered its first Odyne Systems plug-in electric hybrid truck in 2009. Then two years later, the utility invested in a second truck with a more advanced Odyne plug-in hybrid system. Both units fea-



Crews cover energized equipment to allow for new 795 ACSR installation. Linemen use the jib and winch feature to remove an existing capacitor bank (inset).



This photo shows a close up of the plug-in power unit.

ture a Navistar chassis, Terex HRX55 aerial devices, fiberglass bodies and a material handling boom with a 2,000-lb lift capacity. The trucks are used to build three-phase feeder lines, reroute lines and maintain the utility grid. They are part of a small fleet, including two 1-ton dump trucks, two digger derricks and five bucket trucks, including the two hybrid-powered units.

Marshfield's second Odyne hybrid-powered bucket truck has been in use for line work since Jan. 12, 2012. The truck was purchased as a direct replacement for a truck that had been in use for a decade. The new truck is like other bucket trucks in the Marshfield fleet, except for the hybrid system.

### Powering Aerial Devices

The Odyne plug-in hybrid system uses an electric motor, in parallel with the existing drive train, to provide launch assist and regenerative braking. When the truck is in the hybrid driving mode, the hybrid system's 69-hp Remy electric motor works in parallel with the truck's engine to improve acceleration. During a braking event, energy is generated by this same motor to recharge the hybrid batteries. This combination of launch assist and regenerative braking saves fuel and reduces emissions.

Once at the job site, the truck engine is turned off and the vehicle is placed in the "ePTO" mode. This all-electric stationary operation mode results in a quieter job site and the option for extended work hours. The crew operates the Terex aerial device powered by the hybrid system's two 14.2-kWh Johnson Controls lithium ion batteries without constantly running the truck's engine. The truck's hybrid system is a more efficient way to power the truck's aerial device with the batteries' stored energy, rather than running a bucket truck's 225-hp engine to power a 20-hp hydraulic pump that runs the aerial device. In case of an issue with the hybrid system, the vehicle automatically switches back to conventional vehicle mode to maximize the vehicle uptime and utilization. Marshfield's hybrid truck is fitted with optional in-cab heating and cooling, providing comfort for its crew at the job site, without running the truck's engine.

### Reducing Fuel Costs

The hybrid truck provides several benefits to Marshfield Utilities. The hybrid system increases fuel efficiency while driving, and reduces emissions and noise when operating in hybrid mode at the job site. Recent data, collected from Marshfield's hybrid bucket truck, indicates engine operating hours are reduced by six hours a day compared to a conventional bucket truck.

The reduced engine hours lead to reduced fuel consumption. In fact, a truck uses 6 gal to 10 gal less per day depending on the load. Reduced engine run time means reduced wear and tear, and less-frequent maintenance and trips to the service shop. As a result, vehicle uptime increases, adding to further productivity gains. Consuming less fuel also leads to fewer trips to the pump, saving drive time and time away from the job site, which enhances crew productivity as well. The hybrid truck's electricity consumption for charging its batteries averages about 16 kWh a night per charge. At \$0.0825 per kWh, the average cost has been \$1.32 per charge.

Marshfield's crews found that even with daily use, the batteries last an entire workday without having the engine restart in the field to recharge the hybrid batteries. The hybrid system can be optimized to provide additional power while driving, consuming more of the battery. It will also see higher demands in the summer with use of the auxiliary air conditioner.

### Quieting the Job Site

In addition to saving fuel and decreasing its carbon footprint, the utility's biggest benefit has been an improved working environment for its crews. When operating the hybrid truck's aerial device in ePTO mode, without the engine running, the crews didn't breathe exhaust fumes or experience their adverse effects. Crew members reported fewer headaches and no longer feel as fatigued at the end of their shift.

Marshfield's crews also have a quiet work environment to communicate in. The operation of the hybrid truck in ePTO



This charging station is shown in operation.



mode is much quieter than a conventional diesel engine-powered truck. Communicating without yelling to one another makes the linemen more productive. The linemen on the ground are much safer when they're working with others up in the bucket of the hybrid truck.

Without the background noise, they can hear one another easier and are more aware of what's going on around them. Less noise and improved communication among crew members translates to lower stress, which also contributes to safer working conditions.

The hybrid truck's quieter work environment has benefited the utility's apprentice linemen training program as well. The utility currently employs three apprentices and six journeyman lineman, and clear communication is vital during instruction in proper procedures. During training, crews often use a second bucket truck to work on the same structure. As a result of the quiet operation of the hybrid bucket truck, Marshfield has been able to train apprentices without sending a second truck, saving that expense.

### Accepting the Hybrid Trucks

Although Marshfield Utilities uses only the trucks it needs on a daily basis, their hybrid truck is used every day. When integrating it to its fleet, the utility put one journeyman in charge of the hybrid truck and rotated its crew members until all had used it. Today, the linemen prefer the hybrid truck over conventional trucks. As a result, Marshfield expects to

add other hybrids as it replaces bucket trucks in the future.

Marshfield Utilities' customers have accepted the hybrid truck as well. They don't hear a truck running all day long when it's working in their area. After a recent power outage, the utility entered the service area, repaired downed lines and left the area without nearby residents realizing the hybrid truck was there.

The utility realized the greatest savings of its hybrid truck by operating the aerial device without the truck's engine running, reducing fuel and maintenance costs. Its greatest benefit, however, was reduced emissions, noise and most importantly increased crew comfort and safety. Thanks to a hybrid solution, the utility met its fleet utilization challenge, improved its crew environment and looks forward to the future. **TDW**

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#### Companies mentioned:

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