Idling Reduction for Work Trucks

Work trucks are everywhere—delivering packages to our doorsteps, removing refuse, and towing disabled vehicles. Unlike the 18-wheelers that travel over 500 miles per day, work trucks typically travel short distances from home base to work site and are tailored to perform a specific service. Utility trucks are common work trucks used for installing and repairing electric and telecommunication lines, powering equipment and tools, and supplying heating, ventilation, and air conditioning (HVAC) for workers in the cab or down a manhole.

In order for utility trucks to carry out these functions, power from the vehicle's transmission is diverted to provide power for onboard equipment—such as raising and lowering workers in the bucket on a bucket truck. This process is called *power take-off* (PTO) and often requires that the vehicle engine runs nonstop, though work may only be performed intermittently. The idling while the vehicle or equipment is not in use wastes fuel, causes engine wear, and generates noise and emissions.

Solutions

To eliminate unnecessary idling for PTO, auxiliary power sources can be used to more efficiently provide power to on-board equipment. Auxiliary power sources typically include batteries charged from the electrical grid overnight, recharged while the vehicle's engine is running, or through regeneration technology that captures energy lost during braking while the vehicle is in motion. Utility companies can purchase a new hybrid truck or retrofit an existing truck with an auxiliary battery system to power electric or hydraulic equipment and provide climate control for the crew compartment.

Hybrid utility truck allows for work on utility lines without engine idling. *Photo credit: Altec, Inc..*

Benefits

In addition to the reduced costs from fuel and maintenance, hybrid utility trucks have several benefits without direct financial payback. The reduction in idling significantly reduces the amount of noise and emissions produced and creates a safer work environment for the utility crew. The quieter operations also allow crews to work later into the evenings without disrupting the surrounding residents.

Since the main engine is used for fewer hours, a hybrid utility truck will have a longer service life than its conventional counterpart and it provides the ability to run small power tools from the battery. Work is underway to enable hybrid utility trucks to supply emergency power to utility customers during a power outage.

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Payback

Hybrid utility trucks have a higher upfront cost than traditional utility trucks, primarily due to the cost of the battery. Users can recover this upfront cost through reduced fuel and lower maintenance costs from less engine wear. Due to the high cost of the battery, it may take as long as 10 years to pay back the incremental cost on a large (Class 7) bucket truck. The payback period depends on several factors: incremental cost of the vehicle, fuel use during idling, and the number of hours idled. Hybrid trucks that are displacing a higher number of idling hours will have a shorter payback than vehicles that previously idled less.

For example, a Class 7 hybrid bucket truck that replaces a truck that idled 4 hours daily has a payback of nearly 13 years (Table 1 Base Case). When the number of idling hours is increased to 6 hours daily, the payback period drops to just 7 years (Table 1, row 2). Similarly, if the truck runs at high idle and consumes 1.5 gal/h rather than the more conservative Base Case estimate of 1 gal/h, the payback drops to 8 years. A Class 5 hybrid bucket truck that replaces a truck that idled 4 hours daily has a payback of 5.7 years (Table 2 Base Case). When the number of idling hours displaced increases to 6 hours daily, the payback period falls to 4.6 years. If the truck consumes 1 gal/h rather than 0.8 gal/h, the payback drops to 4.7 years.

Tax credits, grants, or other subsidies may be available to help defer the incremental cost. For a Class 7 hybrid bucket truck, a $10,000 grant could reduce the payback time by about 2 years (Table 1, row 3). For a Class 5 hybrid bucket truck, a $10,000 grant could reduce the payback time by more than 2 years (Table 2, row 3). Technical advances and economies of scale are expected to bring costs down further and make hybrid utility trucks even more attractive.

Table 1. New Class 7 Hybrid Bucket Truck Projected Payback

Parameter	Base Case Value (12.7-y payback)	Changed to	New Payback (y)
Idling Fuel Use (gal/h)	1.0	1.5	8.1
Idling Hours (h/d)	4	6	6.9
Vehicle Marginal Cost ($)	60,000	50,000	10.6

Table 2. New Class 5 Hybrid Bucket Truck Projected Payback

Parameter	Base Case Value (5.7-y payback)	Changed to	New Payback (y)
Idling Fuel Use (gal/h)	0.8	1.0	4.7
Idling Hours (h/d)	4	6	4.6
Vehicle Marginal Cost ($)	24,000	14,000	3.3

References: All About Trucks—Fleet Electrification, Joe Dalum, Odyne Plug-in 2013 (September 2013); Transportation Electrification: Utility Fleets Lead the Charge, http://www.eei.org/issuesandpolicy/electrictransportation/FleetVehicles/Documents/EEI_UtilityFleetsLeadingTheCharge.pdf (Edison Electric Institute, June 2014)