



City of Portland Green Purchasing Case Study

Hybrid Utility Vehicles

Purchasing Green

Over the last several years, CityFleet has worked with Eaton Corporation to design different hybrid utility vehicles for use in various departments and bureaus around the city.

Hybrid Step Vans

CityFleet worked with Eaton Corporation to outfit four new Freightliner hybrid step vans with auxiliary generators that convert electricity generated by standard hybrid technology to power tools such as drills, augers, and post pullers used by City maintenance crews. Standard hybrid technology uses a motor to generate electricity to run the vehicle. The auxiliary generators specified by CityFleet provide additional functionality by converting this electricity to a current that can power tools and be stored for later use.

With the conventional step vans previously used by CityFleet, the engine needed to run continuously in order to power the tools. But with the new modified hybrid step vans, the motor kicks on and starts the engine when the batteries run low. The engine only needs to run 4-7 minutes to generate enough electricity to recharge the batteries, and then shuts off.

In the spring of 2011, the hybrid step vans were put into service. However, later that year budget cuts took effect and bureaus were required to reduce their fleets. Because the majority of work requiring the use of the hybrid step vans took place during winter months, the step vans were only being used six months out of the year. It was decided to turn the step vans over to another bureau where they could be used year round, allowing their full potential benefits to be realized.

Water Bureau Trucks

Acting as the chief designers, CityFleet once again worked with Eaton Corporation to build these vehicles from the ground up. What they came up with are two 33,000 GVW class 7 medium duty trucks, outfitted with a three passenger crew cab, a back-end utility box, and the same auxiliary power system as the step vans. Similar to the vans, these trucks power the Water Bureau's jackhammers, portable pumps, and 110v lights for night work. The trucks are equipped with [Espar heaters](#) and a storage compartment complete with an auxiliary radiator to dry the workers' gear during wet winter months. They even have a microwave, since it is not uncommon for these trucks and their crews to be out on the road working over a period of 24 hours.

These trucks are two-of-a-kind and cost \$200,000, about 25 percent more than a similar conventional vehicle. So far, the Water Bureau has seen a 2 percent fuel savings to-date as compared to their previous trucks. The hybrid trucks were put into use starting August 2011 and are still going strong today.



This hybrid aerial bucket truck is one example of the hybrid utility vehicles used by CityFleet.

At a glance –

Who –

- CityFleet

Product –

- Hybrid Utility Vehicles

Cost –

- \$50,000 more than conventional vehicle (on average)
- Estimated fuel savings range from 2%-47% depending on vehicle

Benefits –

- Considerable fuel savings
- Reduces idling, noise, & exhaust
- Improves air quality
- Reduces GHG emissions

“The hybrid vehicles are proving to be a great asset to our fleet that are good for our employees, the public, and the environment. They are a win, win, win.”

Don DePiero,
Vehicle Maintenance Superintendent,
CityFleet

Fueling Trucks

The fueling trucks, added to the fleet in July 2011, are essentially the same vehicle as the Water Bureau trucks, except that instead of a service truck body, these trucks carry fuel tanks. What is most remarkable about using this hybrid technology for the fuel trucks is the fuel savings. While all of the hybrid utility vehicles have seen noticeable improvements in fuel usage, the fuel trucks have demonstrated a 47 percent increase in fuel mileage.

The fuel trucks travel from various maintenance yards to fuel service vehicles overnight. A conventional fueling truck would need to remain idling during the entirety of the fueling time. The hybrid fueling trucks' engines, however, are able to be shut off and run on the auxiliary generator while refueling other vehicles. The only time the engine runs is while driving from one service yard to another.

Also like the Water Bureau trucks, these fueling trucks are two-of-a-kind designed by the City and built by Eaton Corporation. It's somewhat difficult to compare pricing on these hybrid fueling trucks. The two conventional trucks the hybrids replaced cost the City \$120,000 in 1998; the hybrid fueling trucks were \$215,000 apiece. A comparable standard truck today would have cost the City in the vicinity of \$150-\$160,000, so the hybrid replacement is approximately 28 percent more expensive than conventional fueling trucks. A conservative estimate of fuel savings is \$1,500 per vehicle, per year.

Aerial Bucket Trucks

The City has seven aerial bucket trucks: one at the Parks Bureau and six at the Maintenance Bureau for replacing and repairing lights. Though the hybrid aerial bucket trucks were one of the earliest hybrid vehicles produced by Eaton Corporation, they are the latest hybrid utility vehicle to be added to CityFleet, only being in service since February 2013.

The aerial bucket trucks utilize an electric hydraulic lift system to run the bucket, and have a backup hydraulic system that can power the bucket if necessary. Neither powering system requires the truck to idle while powering the bucket, which is how standard bucket trucks operate.

To date, the Bureau's utilizing these hybrid aerial trucks have seen a 3 percent improvement in fuel savings, which is expected to increase the longer the vehicles are in service.

The aerial bucket trucks varied in price, depending on the equipment each truck required. The Parks Bureau truck cost \$175,000 and the Maintenance Bureau trucks were \$215,000

Benefits

All of the hybrid utility vehicles used by the City have proven fuel savings, though the amount of savings is dependent on vehicle use. When looked at together, these hybrid technologies realize fuel savings approaching 50 percent.

In addition to fuel savings, air quality is significantly improved due to the elimination of idling engines while crews are working. Because the hybrid engines can be set to a "work mode" (kicking on only when 75 percent of the stored energy in the batteries powering equipment has been used, and then only running long enough to recharge the batteries), idling time is reduced to

4-7 minutes. Averaging the reduced emissions from all of the hybrid vehicles, CityFleet estimates that 151 metric tons of greenhouse gases (GHG) will be eliminated over the life of each vehicle, approximately 10-14 years.

Cost

Hybrid utility vehicles can average as much as 25 percent more than a comparable conventional utility vehicle. However, the expected fuel savings over the life of the vehicle can make up for the additional cost. Initially, the City used tax credits to purchase the four step vans, but the cost of the hybrid technology in the vehicles is now covered through vehicle replacement funds and no additional funds were sought to cover the costs.

Performance

CityFleet's hybrid utility vehicles have performed as, or better than, expected. The crews using the vehicles can't say enough about the improved work site operation conditions. There is little-to-no engine noise since the engine only runs to charge the batteries of the tools when needed, and there is a marked reduction in exhaust.

Lessons Learned

The only issue the maintenance crew has had is with the automatic shifting of the manual transmission. The trucks, though manual transmission vehicles, are shifted automatically by a computer, which optimizes fuel economy and performance of the vehicle's engine. The crew found this a bit off-putting at first, but Eaton Corporation made modifications that have since eliminated operator concern.

■ April 2016 (v2)

About CityFleet

CityFleet's seven repair facilities maintain Portland's 3,150 vehicles and equipment. This includes parking patrol vehicles, sedans, pick-ups, vans, police sedans, dump trucks, back hoes, and heavy construction equipment. They perform oil, lube, and filter changes; DEQ emission inspections; and engine, transmission, drive train, electrical, suspension, heating, cooling, and air conditioning diagnoses and repairs. CityFleet garages are also certified Eco-Biz Automotive Shops, a designation that recognizes their commitment to minimizing their environmental impacts. CityFleet was also named one of the Top Elite Fleets by Government Fleet Magazine from 2011-2016, after being named the number one fleet in 2010. In 2015 CityFleet became a GFMA Certified Management Operation and Clean Fleet Certified. As a result, CityFleet was the first government fleet in North America to obtain a Master Certification.

For more information: Don DePiero, Vehicle Maintenance Superintendent
CityFleet, 503-823-1804.
