Going Green with OTS

Transportation by bus has a significant positive impact on many aspects of our community, including the environment. The environmental benefit of public transit is magnified by the use of hybrid buses, but it is also a benefit to riding all Oshkosh Transit buses. Individuals that choose to take the bus, instead of their personal vehicle, reduce fossil fuels consumed, lower carbon emissions, and decrease congestion in the City of Oshkosh. These daily benefits help to improve the air we breathe, decrease our dependence of fossil fuels, lessen traffic and reduce the need for more parking space.

Quick Facts:

- Each day, OTS buses provide approximately 3,000 rides.
- One full load of bus riders can take 30 or more cars off the road.
- Each year, OTS provides 2,800 trips where the rider uses the bus bike rack to carry his/her bike.
- Public transportation's overall effects save the United States 4.2 billion gallons of gasoline annually: more than 3 times the amount of gasoline imported from Kuwait.*
- Communities that invest in public transit reduce the nation's carbon emissions by 37 million metric tons annually: equivalent to if the combined areas of New York City; Washington, DC; Atlanta; Denver; and Los Angeles stopped using electricity.*

*Source: American Public Transit Association

Hybrid Bus Project Timeline

March, 2009—OTS awarded an American Recovery & Reinvestment Act grant to purchase four 40-foot hybrid buses
November, 2009—OTS awarded hybrid bus contract to New Flyer USA Inc.
Spring-Summer, 2010—Hybrid buses assembled in St. Cloud, MN
July-August, 2010—4 hybrid buses delivered to Oshkosh
September 21, 2010—Hybrid buses put into service for OTS riders

Assembly of the Oshkosh Transit System hybrid buses was completed in the **USA** (St. Cloud, MN). Over 75% of hybrid bus components were of US content.

Oshkosh Transit System hybrid buses were funded entirely by a $2.1 million Federal Transit Administration grant under the 2009 American Recovery and Reinvestment Act.

Oshkosh Transit System

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Hybrid Bus Information

Oshkosh Transit System

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Go Green with OTS!

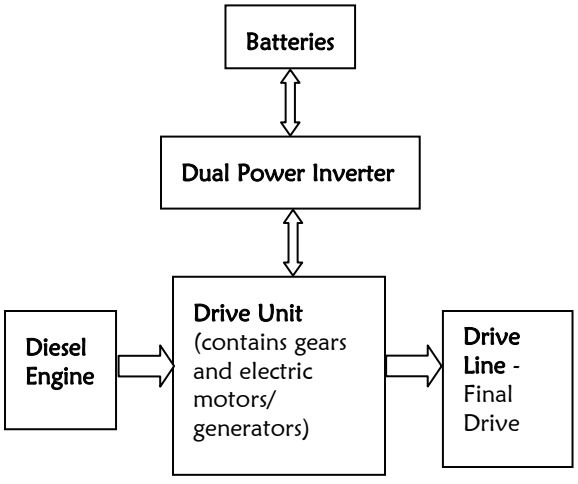
How does a hybrid bus operate?

A hybrid bus uses power from a diesel engine and electric motors. A computer determines the most efficient way to propel the bus. During operation, electric motors provide the initial propulsion force required to accelerate the vehicle from a standstill (0-12 mph). At speeds above 12 mph, the diesel engine primarily propels the vehicle.

OTS's hybrid buses blend electric and mechanical drive paths, which is called a parallel hybrid system. The diesel engine is connected to a drive unit (contains electronic motors/generators and gears). A simple model of a parallel system is illustrated in Figure 1 below.

Since bus service requires a lot of start and stop operation, the hybrid system relies on electric motors during initial acceleration and reduces power normally supplied by a diesel engine.

Figure 1: Parallel Hybrid System



How is electricity generated?

Hybrid buses generate electricity in two ways. First, the electric motors in the drive unit are also generators of electricity. During cruising speeds, the diesel engine propels the vehicle and turns the motors/generators in the drive unit, which produces electricity. Second, the motors/generators in the drive unit are driven by the weight of the vehicle, through the driveline, anytime the bus is slowing down. This process, known as "regenerative braking," also slows the vehicle by imposing drag on the driveline.

An energy storage system (mounted on the roof), consisting of a nickel-metal hydride battery pack, stores the generated electricity.

What are the benefits of hybrid buses?

Energy Savings

- Use 20% less diesel fuel than conventional diesel buses
- Over a 12-year expected life of the hybrids, OTS will save more than 86,000 gallons of diesel fuel

Greenhouse Gas Reductions

- Compared to conventional diesel buses, hybrids produce fewer emissions.
- Less nitrogen oxide, carbon monoxide, hydrocarbons, and particulate matter

Maintenance Savings

- A regenerative braking system increases the life of brakes.
- The diesel engine lasts longer with less wear & tear
- The drive unit requires less maintenance than a standard transmission

Reduced Noise

- With use of electric motors, hybrid operation is quieter than conventional diesel buses

Hybrid Vehicle Specifications

Vehicle Type	
Model	New Flyer DE40LF
Build Year	2010
Length, Width, Height	40.8 ft., 8.5 ft., 11.1 ft.
Vehicle Weight (approx.)	31,080 lbs.
Assembly Location	St. Cloud, MN

Engine and Fuel	
Engine	Cummins ISL07
Horsepower	280 HP—900ft-lb.
Fuel	Ultra low sulphur diesel
Useable Fuel Capacity	125 U.S. gallons

Hybrid Drive System	
Drive Unit	*Allison Ev 40 Drive *Max. output speed 3300 RPM *Max. Output torque during propulsion 3500 ft-lb. *Max. regenerative torque during braking 1400 ft-lb.
Energy Storage System (ESS)	Allison nickel-metal hydride battery pack (roof-mounted)
Dual Power Inverter Module	Allison hybrid inverter