



## **RTD a Leader in Alternative Fuels and Emissions Standards Testing**

RTD remains on the leading edge of the transit industry in our work with alternative fuels and pollution reducing technology. Presently, the RTD fleet is operating on ultra low sulfur diesel fuel which contains 95 percent less sulfur. Sulfur produces particulate emissions during the engine combustion process. The use of ultra low sulfur diesel fuel alone will result in noticeable Preventive Maintenance (PM) emissions reduction. To further take advantage of the ultra low sulfur diesel fuel, RTD is taking delivery of new buses, which are equipped with many advanced emission devices compatible with ultra low sulfur diesel fuel. These buses are equipped with an exhaust gas recirculation (EGR) valve to reduce oxides of nitrogen emissions, a particulate filter to capture the PM emissions, an oxidation catalyst to reduce CO, HC, and PM emissions, and a variable geometry turbocharger to improve the overall efficiency of the combustion process. The new buses will allow a total exhaust emissions reduction of more than 90 percent over the level emitted by the old buses. RTD has received and operated 341 new clean-diesel, particulate-trap equipped buses. These new buses replaced the oldest and most polluting buses in the fleet. In addition, when RTD's gasoline support vehicles need replacement, RTD is replacing them with low emitting vehicles (LEV) or cleaner vehicles.

Over 15 years ago, RTD began to experiment with various alternative fuels including methanol, propane and Compressed Natural Gas (CNG) in the daily operation of our standard passenger buses and support vehicles. In 2000, RTD introduced a fleet of 36 new mall buses that operate on CNG in a hybrid-electric configuration. To support RTD's CNG buses, RTD has a CNG fueling station at its District Shops facility. RTD has recently concluded a successful fleet study on biodiesel in partnership with the National Renewable Energy Lab (NREL). Five regular transit buses were operating from our Boulder facility on a mixture of 20 percent biodiesel made from agricultural products and 80 percent regular diesel.

RTD is one of the pioneers in the use of true hybrid-electric buses in transit service with our 16th Street Mall Shuttle hybrid buses fueled by Compressed Natural Gas (CNG). These mall shuttle buses take advantage of the latest advanced technology, series hybrid-electric propulsion systems. They use a combination of conventional internal combustion engines powered by CNG and electric motors. A small Ford 2.5 liter engine drives a generator which in turn charges a set of batteries. These batteries provide electrical power to propel two electric motors that drive the rear wheels. Each bus can carry up to 116 passengers under the horsepower produced by an engine that is as small as the engine in the popular Toyota Prius hybrid passenger car. The mall buses are quiet and have very low exhaust emission. This fleet of hybrid-electric buses is one of the most successful fleets of hybrid buses in the country. For our hard work with hybrid-electric buses we received the prestigious award from the Department of Energy's National Renewable Energy Laboratories for leadership in promoting renewable energy and energy efficiency. To further enhance the use of hybrid technology, RTD now operates in regular city transit service nine (9) hybrid buses equipped with the highly advanced parallel hybrid system designed and produced by General Motors. These buses are driven by both a small diesel engine typically found in a pickup truck and electric motors integrated in a transmission like component. The hybrid buses are showing about 30 percent improvement in fuel consumption as compared to the conventional diesel buses.

In other efforts to minimize vehicle emissions, RTD continues to phase out the use of old high emission buses. Since 2000, RTD has procured 937 new buses to replace the old buses. All of the new buses are powered by clean diesel engines which are equipped with the latest emission reduction devices and certified to meet the most stringent EPA emission regulations at the time of manufacture. These buses reduce exhaust emissions as much as 90 percent when compared to some of the old high emission buses which they replaced.

RTD's District Shops has housed one of the premier engine and fuel research labs in the nation, the Renewable Fuels and Lubricants (ReFUEL) Research Laboratory. The Lab is being operated by the Department of Energy's National Renewable Energy Laboratories. Many of RTD's alternative fueled test buses were thoroughly tested by the lab for exhaust emission reduction as compared to regular diesel buses.

RTD maintains high exhaust emissions standards of two times more stringent than the requirements by the state of Colorado. If a bus fails an emissions test, it is taken off the streets immediately to remedy the problem. To make sure RTD buses are the cleanest in the state, RTD maintains one of the largest diesel fleet self certification stations in the state.