

Idaho National Laboratory Fuel Usage Reduction Efforts

Idaho National Laboratory (INL) has implemented several new transportation programs and practices over the past year that resulted in significant petroleum-based fuel use reductions and operational savings. Overall, INL has decreased total transportation fuel use by 14% and decreased fossil-based transportation fuel use by 21% compared to Fiscal Year (FY) 2008.

INL is faced with several unique transportation challenges. The laboratory's fleet includes 90 buses that provide service between local communities and the remote INL site for approximately 1,800 employees, with commutes ranging from 23 to 90 miles one way over two lane highways. In addition, INL manages a fleet of more than 400 light vehicles (cars and trucks) for use by laboratory operations. Reducing the use of petroleum-based fuels in this large fleet was complicated by the fact that alternative fuels are not readily available in southeastern Idaho because the infrastructure for such fuels has not yet been built. Instead, the infrastructure in place in FY 2008 was aging, in many cases outdated, and designed for petroleum- or fossil-based fuels.

As a result of these challenges, INL used an average 1.08M gallons of transportation fuel annually between FY 2005 and 2008. Figure 1 shows the laboratory's annual transportation fuel usage since 2005.

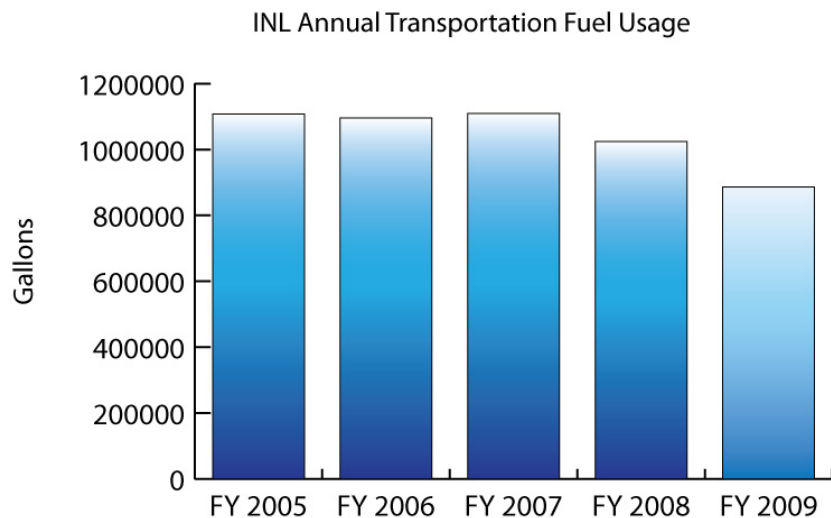


Figure 1. INL reduced total transportation fuel use by 14% in Fiscal Year 2009.

INL's efforts to reduce fuel use were driven by several factors. First, the laboratory was supporting the goals and requirements of E.O. 13423. In addition, tight budgets made innovative solutions a necessity. The laboratory's fleet management team responded to the challenge by implementing four strategies:

- Using an increased percentage of alternative fuels
- Altering and right-sizing the fleet composition
- Implementing a more efficient bus route system
- Using innovative technology to track and reduce fuel usage.

Changing the Fuel Composition

In FY 2008 INL used more than 278,000 gallons of gasoline. As recently as FY-2005 the laboratory was using more than 370,000 gallons of gasoline in its light fleet. To decrease the use of petroleum-based fuels, INL evaluated the transportation programs fuel composition, quantity, and usage. A full-time fuel coordinator was appointed to lead efforts in this area and ensure that the fuel composition was managed as efficiently as possible. These actions led to a plan to replace as much unleaded gasoline and regular diesel fuel as possible with an ethanol-mixed gasoline and biodiesel, respectively.

Since no public sources of E-85 are available in the area, several fueling tanks across the laboratory were converted to E-85 (blended fuel that is 85 percent ethanol and 15 percent gasoline) and all bulk purchases of regular unleaded gasoline were switched to E-10 gasoline. The results were immediate and dramatic. E-85 usage across the site more than doubled and gasoline usage was reduced by more than 50,000 gallons compared to FY 2008 and by nearly 100,000 gallons compared to Fiscal Year 2006 (see Figure 2).

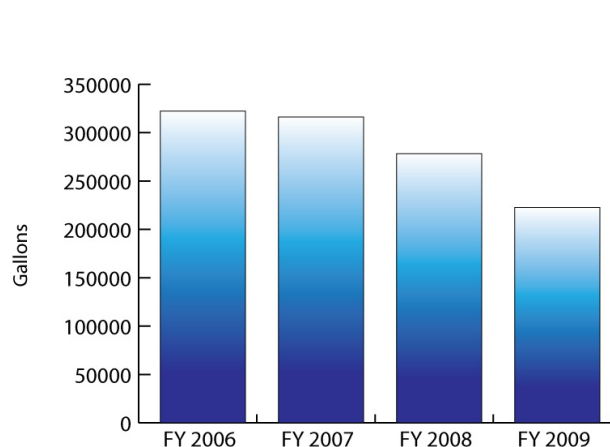


Figure 2. INL's focus on alternative fuels led to a dramatic reduction in gasoline use.

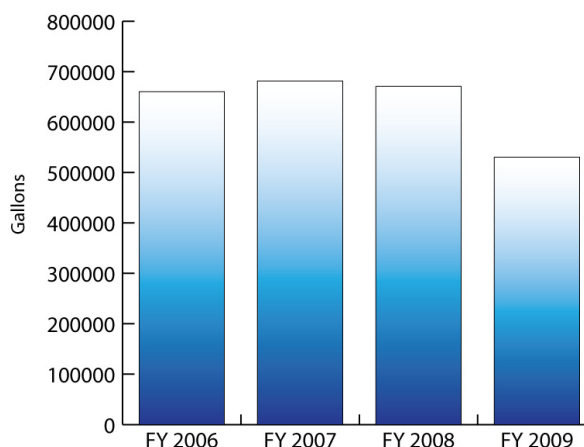


Figure 3. INL's annual usage of standard diesel was reduced more than 140,000 gallons.

In addition to switching out the fuel type used in its light fleet, the INL began focusing on the fuel used in its bus fleet. Biodiesel replaced standard diesel as the fuel of choice for diesel engines. As a result, biodiesel usage more than quadrupled compared to FY 2008 and standard diesel usage was reduced by more than 140,000 gallons (see Figure 3).

Altering and Right-sizing the Fleet

To help reduce fuel consumption while promoting the use of alternative fuels, INL undertook the task of altering its vehicle composition since many vehicles were aged, got poor fuel mileage, and incapable of using alternative fuel. This effort dovetailed with efforts to increase use of flex fuels such as E-85. To truly realize the benefits of alternative fuels INL restructured its fleet to include more flex fuel vehicles (FFV) and several gasoline/electric hybrids.

In August of 2008, INL reached an agreement with the U.S. General Services Administration (GSA) to renew a portion of its light fleet each year. This agreement allowed INL to begin replacing older vehicles that were only capable of running on gasoline with newer FFVs that could run on E-85. By the end of FY 2009, INL replaced almost 60% of its light duty vehicles with FFVs. Six new hybrid-electric sedans are now used for courtesy taxi service between INL buildings and site locations, and pool car rentals where gasoline-powered vehicles were previously used.

INL's bus fleet was also upgraded. Beginning in 2006, INL began a focused effort to renew its bus fleet, where the average age of a bus was 25 years old. Many older buses only got 5 mpg. Since that time, 27 buses have been replaced with newer and larger buses capable of carrying more passengers with better fuel mileage. The average age of the INL bus fleet has now been reduced to 18 years old. Renewal efforts continue during FY 2010—two new full-size buses and three mini-motor coaches will be leased. The full size buses provide a 20% increased fuel economy over older buses while carrying 11 more passengers per bus. The mini motor coaches are expected to improve in fuel mileage by 200% and will be better suited to cover smaller passenger loads where full-sized coaches are currently being used. Four of these coaches will be new diesel-electric hybrids that will be used to pilot fuel performance on the highway versus stop-and-go, in-town traffic. The overall increased fuel mileage coupled with the increased passenger capacity has helped lower the total fuel use of the laboratory.

Increasing Bus Route Efficiency

Coupled with efforts to reduce fuel usage, the INL team realized that continuing to provide bus service to and from the site remained crucial as the safest mode of transportation for over 1,800 employees. An evaluation of the legacy model revealed that fuel use in the bus services could be reduced by implementing express routes, eliminating underutilized routes, pursuing a reduced engine idling campaign, establishing target passenger loading metrics, and implementing a metro park-and-ride system. These efforts reduce fuel usage without reducing employee safety.

In years past, INL buses drove an intricate series of routes through local communities such as Idaho Falls and Blackfoot. These routes passed through neighborhoods and canvassed the city, picking up many employees at stops within walking distance of their homes. While convenient, these routes were costly in terms of fuel usage and vehicle mileage.

INL streamlined the bus routes by reducing the number of stops, eliminating neighborhood stops, and providing express routes. Central parking areas were established to pick up a greater numbers of employees at each stop, reducing fuel usage and increasing efficiency by eliminating the constant starting and stopping of buses on routes with

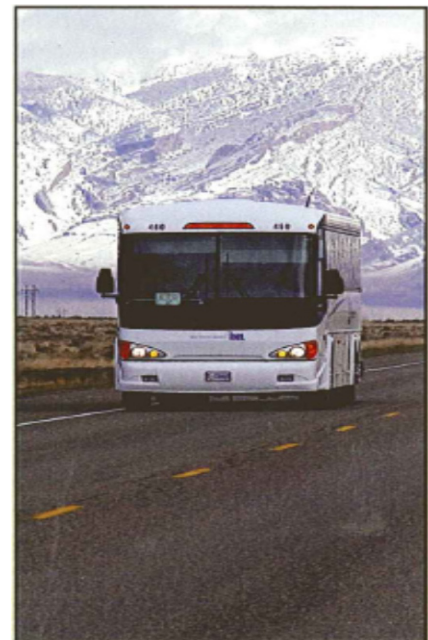


Figure 4. INL streamlined its bus services to reduce fuel usage and improve efficiency.

many stops. Five underused routes were canceled completely and passengers were re-routed to express routes.

On average these changes resulted in an annual \$500,000 savings in operating costs and approximately 200,000 less miles driven per year, which equated to an annual fuel reduction of 38,000 gallons. Additional streamlining efforts continue. Competitive solicitations to establish larger, permanent, park-and-ride locations that will result in even greater reductions of fuel use were completed at the end of FY 2009, with new leases and additional bus model streamlining expected to be completed in early FY 2010.

Using Innovative Technology to Track and Reduce Fuel Usage

With a new set of vehicles and increased amount of alternative fuels being used in those vehicles, INL determined that it was imperative to use and track fuel as accurately as possible. To do so, the laboratory installed two innovative technologies: radio-frequency identification (RFID) fuel rings and GPS tracking technologies.

The pilot RFID fuel ring uses an RFID chip that communicates with an enabled gas pump. The chip sends a message to the pump that identifies the vehicle and its required fuel type. The technology helps ensure alternative fuels such as biodiesel and E-85 are used over their petroleum-based equivalent by locking out unauthorized fuel types. Early indications show the pilot has been successful and will be considered for lab-wide use during FY 2010.

GPS tracking technology has now been installed in over 60% of the INL's light duty vehicles and is scheduled to be installed in the bus fleet in FY 2010. This technology captures accurate mileage and engine use data, providing INL with a clear picture of how much fuel is being used per mile and how well a vehicle's engine is performing.

While bus fleet renewal and new technology application continues, more practical changes have also occurred. Older 2-stroke engines and transmissions have been replaced with new EGR-equipped 4-stroke engines to help improve fuel mileage on the older buses. INL continues to look at other means to reduce fuel consumption such as implementing a pre-tax commuter benefit for van-poolers coming from areas where there is no bus service, and working with local transit providers and a DOE Clean Cities Coalition organization to create multi-modal or use options for transportation of INL employees.

Conclusion

The efforts described above combined to allow INL to meet and exceed its FY 2009 goals. When the year began INL transportation personnel set a goal of decreasing petroleum-based fuel use by 2% while increasing alternative fuel use by 10% from the previous year. These goals were both surpassed as INL reduced fossil-based fuels by 21%. In total, INL reduced its fuel use by 138,000 gallons compared to FY 2008 and by more than 220,000 gallons compared to FY 2007. These accomplishments were achieved while managing one of the largest fleets in the Department of Energy complex, and being faced with the lack of alternative fuel options in southeastern Idaho.