Alternative Fuel Tool Kit

Case Study on Ethanol (E85):

University of North Carolina at Chapel Hill

Introduction

The University of North Carolina at Chapel Hill (UNC) is a public university with a student body and faculty totaling approximately 35,000. The campus covers 729 acres. Fleet Services controls the vehicles required to support university operations. The fleet totals 709 light duty service vehicles and commercial trucks. By fuel type, the current fleet composition is:

- 456 gasoline
- 168 flex fuel vehicles (FFV's)
- 28 diesel
- 30 biodiesel (B20)
- 27 neighborhood electric vehicles (NEV's)

Motivation to Change

In 2005, the State of North Carolina mandated all state agencies to reduce petroleum consumption by 20% in order to grow the use of alternative fuels and foster programs and policies that encourage conservation and fuel efficiency. UNC decided to pursue alternative fuels and advanced technology vehicles to achieve this goal. Officials looked at a number of options. The rolling topography of the Chapel Hill campus was a consideration in making their decision. The support vehicles run loaded, and needed to maintain similar performance and range to the vehicles in use. Therefore, electric vehicles did not fit most applications. Note that the university did decide to purchase 27 NEV's and they are used on campus where the application is a good fit. In addition, budget constrains limited expenditures in maintaining a fleet to meet the university's needs.

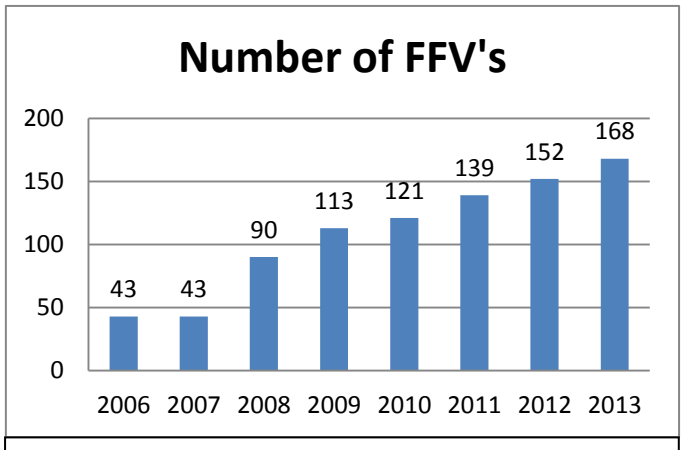

Figure1. UNC Fleet Services Number of FFV's

Hybrid electric vehicles (HEV's), propane and natural gas would require additional expenditure over their conventional counterparts. Therefore, officials decided on E85 as the main component in meeting the petroleum displacement objective. Flex Fuel Vehicles (FFV's), which can run on conventional gasoline or a gasoline and ethanol mixture up to E85, do not cost more than a similar conventional fuel vehicle. They developed a plan to purchase FFV's as part of the fleet life cycle replacement plan to replace vehicles where there was an appropriate FFV alternative. The university's replacement cycle is ten years, replacing approximately 60 vehicles per year. However, over the last few years, additional budget cutting has reduced the rate to approximately 20 vehicles per year. (The ten year replacement cycle is being stretched.) Over the course of eight years, the university purchased and put into service 168 FFV's. Figure 1 shows the growth of FFV's in the UNC fleet.

Two years ago, the university adopted the same approach with diesel vehicles. Vehicles that can run on biodiesel are run on B20. UNC currently has 30 vehicles running on B20.

Implementation

Purchasing the FFV's required no change to normal business operations for UNC – there were no differences with regard to purchasing, operation or service. Access to the fuel was the only challenge. In 2009, the university installed an 8,000 gallon E85 tank and pump at the campus fueling facility. The addition of on-site E85 fueling made it easy and convenient to use the fuel in fleet vehicles. The results are evident in the significant increase of E85 usage since 2008. See figure 2.

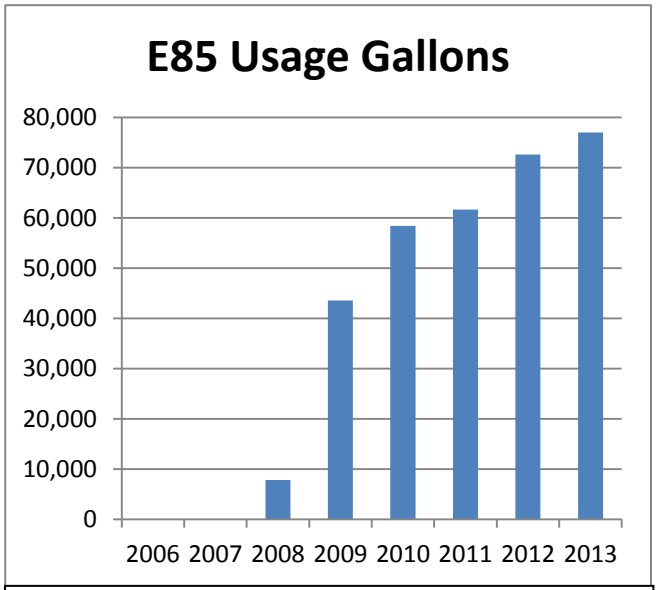

Figure 2. UNC Fleet Services E85 Usage in Gallons by Year

The difference between E85 and regular unleaded gasoline fuel prices fluctuates, sometimes breaking even and at other times providing modest cost savings. (Note that regular gasoline, also called 87 octane, sold at the pump is most likely E10, containing up to 10% ethanol. More than 95% of regular unleaded gasoline sold in the US is E10.) Each year, university purchasing enters into contracts with four to five E85 suppliers, allowing them to shop for the best price on every fuel order. Using this method, they can purchase from the state contract or from one of the separately negotiated contracts, whichever offers the lowest price. During July 2013, UNC paid $2.85/gallon for E10 and $1.95/gallon for E85. For reference, the average price for E85 on the state purchasing contract was $2.82 in July 2013 (http://www.doa.state.nc.us/PandC/dynfuels/fuelcost.asp). Thus, the strategy of having a competitive bid situation for each fuel load can be an effective method to save on fuel costs.

Impact

UNC has been able to meet the 20% petroleum reduction target, achieving 21% for FY2011-2012 and 23% for FY2012-2013. For FY2012-2013, UNC's fleet used 77,009 gallons of E85 and 206,479 gallons of E10. Their total petroleum usage was 309,414 gallons of which 88,580 gallons were biofuels. Since the start of the program, 321,022 gallons of E85 have been used. Laura Corin with UNC Facilities Services Business Operations says: "The transition to E85 was seamless and easy. E85 is a simple and cost effective method to achieve petroleum displacement." In addition, using E85 instead of gasoline yields reduced criteria pollutant emissions. As determined by the Argonne National Lab fleet emissions calculator, AFLEET, using E85 in FFV's instead of gasoline results in 40% less carbon monoxide, 30% less oxides of nitrogen, and 10% less volatile organic compounds.