

CASE STUDY



Location: Chapel Hill, NC

Company: University of
North Carolina

Study: E85

Governments and consumers have increasingly become aware of petroleum use in the U.S. and the movement to reduce overall petroleum consumption. Seven years ago, the state of North Carolina mandated that all state-related agencies would reduce petroleum consumption by 20%. As a state institution, the University of North Carolina (UNC) decided it would use alternative fuels and advanced technology vehicles to reduce its petroleum consumption. The university consists of 17 institutions throughout the state. This case study focuses on the main campus at Chapel Hill. After looking at various alternative fuels it was determined that the easiest and best option for the Chapel Hill campus fleet was to convert to flexible fuel vehicles (FFVs). New E85-capable vehicles replaced conventional gasoline vehicles. These vehicles are capable of running on any blend up to E85. The ethanol is produced domestically from renewable resources, therefore reducing conventional petroleum consumption.

Decision Points

Varieties of biofuels exist and are available throughout North Carolina. Officials weighed a number of variables as they determined what technology to implement in order to meet the 20% reduction mandate. Laura Corin, of the Facilities Services Business Operations at UNC, addressed some of the aspects of the final decision to utilize E85 at the Chapel Hill campus. Corin said that, "It was great leadership on the part of the state government to implement a 20% reduction in petroleum by all state agencies." The Chapel Hill campus is considered hilly and the vehicles performance needed to be comparable to conventional vehicles. The easiest and most cost effective option for fleet vehicles was to utilize E85 and FFVs. It also should be noted that the Chapel Hill fleet purchased 26 electric vehicles for campus use. This number is small when compared to the number of FFVs. However, Chapel Hill's sister campus in Charlotte, North Carolina, is much flatter. At that campus, EVs have been the prime candidate for petroleum reduction. However, those vehicles are limited to campus-only use due to limited range and top speed of 35 miles per hour. For the larger and hillier terrain, FFVs offer unlimited range and conventional speeds for the Chapel Hill fleet.



As an example, FFV badges are shown above. Left: GM, Right: Ford. Photos courtesy of NAFTC.

Ethanol Case Study



UNC FFV car and truck. Photo courtesy of UNC.

Fleet Facts

The fleet at the Chapel Hill campus is a large fleet at 886 total vehicles. Of that fleet, 271 vehicles are FFVs. This is slightly more than 30% of their entire fleet. Of the FFVs, 151 are owned by the university. These include vehicles such as cargo vans and pickup trucks. The other 120 FFVs include mostly passenger cars that are leased by the university. The university creates a yearly sustainability report that includes data on all of its owned vehicles. This report is submitted to the state legislature to ensure at least 20% of

QUICK FACTS

Alternative Fuel Practice:
E85 and E10

Number of Fleet Vehicles:
886

Flexible Fuel Vehicles: 271
E85 Price: \$2.40 per gallon

Yearly E85 Use: More than
61,000 gallons

the University's total fuel consumption is from nonpetroleum fuels. University-owned vehicles traveled more than 3,142,000 miles in the 2010-2011 fiscal year. The owned FFVs traveled more than 654,000 of those accumulated miles. These FFVs consumed 61,632 gallons of E85 fuel. All gasoline-fueled vehicles on campus use E10, which is common, at most pumps in the U.S. FFVs use E85 when fueled on campus and E85 when available outside of campus operation. The FFVs include some campus police vehicles, but it was determined that these would only be fueled with E10 to ensure safety and readiness of these vehicles. The fleet is composed of FFVs from all major U.S. brands including Chrysler, GM, and Ford.

Infrastructure

Depending on U.S. location there may already be an E85 infrastructure available. However, to enable campus fleet fueling with E85, UNC installed an 8,000 gallon E85 tank and pump at its campus fuel station. The station is open to other state vehicles, but Corin said that more than 90% of the E85 is used for fueling University fleet vehicles. The station has been dispensing E85 for about four years. Nearly 400 gallons of E85 is sold daily at the station. Vehicle operators receive a university fuel card to use at these pumps. It is university policy that campus vehicles fueling at other locations use E85 when available. At this point, FFVs are only added to the fleet as older conventional vehicles are decommissioned. When this happens, new vehicles are required to be FFV since the university has invested in the E85 on-campus infrastructure. Corin said that due to the winter climate in NC, the winter ethanol blend is E70. This blend is 70% ethanol and 30% conventional gasoline. This is a common practice to ensure fuel stability and performance during the winter months.



E85 pump at the UNC fuel station. Photo courtesy of UNC.

Costs

The cost of E85 is cheaper for the university, but Corin said cost was not a major incentive in the switch to E85. The main focus she said was on the reduction of petroleum consumption. E85 has less energy per gallon of fuel when compared to conventional gasoline (E10). Due to the increased E85 consumption of these vehicles, the conversion had previously been an economic 'wash'. As the price of gasoline continues to skyrocket, however, Corin said the switch is actually beginning to save the university money. Since UNC is a state agency its fuel prices are different than those at public pumps. Its fuel suppliers are charging \$3.40 per gallon of gasoline (E10). However, the price of E85 is lower at just \$2.40 per gallon. In order to compare based on equivalent energy per gallon of fuel, the price of E85 can be divided by about 0.7. This yields a price of about \$3.42 per gasoline gallon equivalent (GGE).

Satisfaction

The fleet of FFVs has been operational for four years at the UNC Chapel Hill campus. "We are very happy with conversions to E85 and will continue to use and purchase E85 vehicles in the future," Corin said. "We will also look into EVs as they continue to evolve." There have been no major problems or maintenance issues with the UNC E85 fleet. There was one incident reported where an FFV was calibrated to run on E10 instead of E85. Since the fuels have a different energy content this was a problem. However, reprogramming of the vehicle computer and fuel system was an easy and simple fix.

Summary

The state of North Carolina passed legislation in 2005 to reduce state agency petroleum consumption by 20%. The University of North Carolina at Chapel Hill decided to convert more than 30% of its fleet to flexible fuel vehicles and use an on-campus E85 fueling station to reduce its petroleum consumption. The university has surpassed the target of 20%. Not only does the University operate E85 vehicles around campus, is also uses B20 biodiesel in some campus buses and has purchased electric vehicles for on-campus use. The university also hosts a sustainability office that encourages many of the aspects of operating as a green university. These examples emphasize how large fleets can reduce petroleum consumption by using U.S. produced renewable resources and that E85 as a petroleum reduction technology really works.



Photo courtesy of UNC.



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UNC has its own sustainability program. To find out more about UNC's petroleum reduction and sustainability check out their website, www.carolinagreen.unc.edu.