

Petroleum Displacement Program Annual Report FY 2010-2011

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North Carolina FY 2010-2011 Petroleum Displacement Program Report



Prepared by the
North Carolina Solar Center's
Clean Transportation Program



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North Carolina FY 2010-2011
Petroleum Displacement Program Report

Executive Summary

A FY 04-05 special budget provision required a 20% reduction (adjusted to 17.5 based on provision criteria) in petroleum use by the state fleet. Implementation of the Petroleum Displacement Plan (PDP) requirement in FY 10-11 has resulted in a 16% reduction in petroleum use by state fleet vehicles as compared to the baseline of fuel use established in FY 04-05. This data is based on an adjusted total accounting for justified growth in the state fleet over this time period. Thirty seven reporting state agencies have displaced petroleum use in vehicles through the use of alternative fuels, advanced vehicle technology, conservation and efficiency measures.

Analyses of FY10-11 reports from state fleet representatives show that nearly 4.2 million gallons of petroleum were displaced through the following efforts. Of the 16% displaced:

- 4.85% displaced through E10 use
- 0.56% displaced through E85 use
- 4.75% displaced through biodiesel use
- 6.15% displaced through increased conservation and efficiency compared to the adjusted¹ baseline; estimated 4.64% from conservation (including 0.74% from electric vehicle use), and 1.4% from efficiency
- *0.2% of displacement was lost through decreased use of CNG (natural gas) and LPG (propane)*

This 16% reduction fell short of the stated 17.5 percent reduction goal established through the FY 04-05 fuel use baseline. In FY 08-09 many fleets were forced to drastically curtail vehicle purchases and use due to a State budget freeze. Though vehicle count continued to decline modestly as a residual effect of the economic downturn, mileage has increased in the past two reporting years (although still below baseline) as fleets have been forced to do more with fewer assets. The proportion of alternative fueled vehicles and fuel use continued to increase slightly, but not enough to counter the effects on petroleum use created by the increase in miles driven.

Eighteen state agencies met their individual PDP goals. The largest 10 fleets account for 96.7% of the total reported fuel use and account for 97.3% of the petroleum displacement. Given their size any changes in petroleum use can significantly impact the overall progress from year to year.

¹ Adjustments to baseline to account for justified growth have been made on previous reports for: Davidson County CC; East Carolina University; Elizabeth City State University; NC Dept. of Admin., Motor Fleet Management; NC Dept. of Correction; NC State University; UNC-Charlotte; Winston-Salem State University, and UNC- Wilmington.

Significant changes include:

- The FY10-11 state fleet vehicle count (27,668) continued to contract, though slightly less than in the previous year and still slightly higher than the 27,353 vehicle baseline.
- E10 (10% ethanol-90% gasoline fuel blend) has almost completely replaced gasoline as the most commonly used fuel by state fleet vehicles. 13.6 million gallons of E10 were used, an increase of more than 2 million gallons compared to the previous year and more than 21 times the baseline year use.
- B20 biodiesel (20% biodiesel, 80% diesel) has widened its lead against diesel as the second most common fuel used by state fleet vehicles; use is now over 4 times higher compared to the baseline year. More than 8.2 million gallons of B20 were used in FY10-11, an increase of 80,000 gallons over use in FY09-10 though much more modest compared to previous years' progress when NCDOT expanded availability to its over 100 fuel sites.
- Flex fuel vehicles capable of using E85 now comprise 26% of the state fleet. Improving availability of E85 has allowed more of these vehicles to use the high blend of ethanol compared to previous years (418,000 gallons in FY10-11 compared to 398,000 in FY09-10), but E85 use is still limited in comparison to other alternative fuels. During this reporting period DOT installed new E85 stations in Charlotte, Marion, Hillsborough, and Asheboro.
- Conservation (reduced mileage) and efficiency gains through mechanical, process and behavior changes saved over 1.39 million gallons of fuel over baseline reporting year yielding significant savings to the state via avoided fuel costs.
- On average the prices for E10 and E85 on the state contract were less expensive than gasoline in FY 10-11 and significantly less than they were relative to gasoline on the state contract in FY 09-10. In FY 10-11 E10 was 2.5 cents less than gasoline and E85 was 33 cents less.

In 2011, the NC General Assembly extended the PDP requirements through FY 2016, allowing for a more robust comparison and foundation for petroleum reduction planning. Recommendations for continued PDP success include: executive office involvement to raise awareness of the fiscal and environmental benefits of petroleum use reduction in the state fleet and facilitated efforts to support continued reduction; review of Department of Administration Motor Fleet Management vehicle leasing policies to promote conservation and use of alternative fuel and advance technology vehicles; and providing increased coordination and incentives for expanding E85 refueling and additional alternative fuel use.

Background

In August 2005, the North Carolina State Budget included Section 19.5 of Session Law 2005-276, which required a 20 percent displacement of petroleum consumption in the state fleet by January 1, 2010. Based on this provision, a FY04-05 baseline established a total petroleum use for the state at 26.1 million gallons (adjusted for justified mileage increases). This excludes off-road equipment, vehicles not in a covered fleet (agencies with fewer than 10 vehicles) and all county-titled vehicles, including school buses. Emergency/Educational vehicles are required to meet 10% petroleum reduction goal. These, combined with the rest of the obligated fleet held to a 20% reduction yield an overall 17.5% reduction (or 4.5 million gallons) goal. Given the baseline fuel use of 26.1 million gallons and a 17.5% reduction requirement, a collective goal of 21.5 million gallons of annual petroleum use was established to meet the petroleum displacement plan (PDP) requirement.

Sixty-nine agencies and community colleges have fewer than 10 on-road state-titled vehicles and are exempt from the PDP requirements, based on original analysis to establish the FY 04-05 reporting year baseline. Thirty seven agencies, universities and community colleges must submit a report by September 1 of each year that documents vehicle and fuel use (one community college clarified vehicle licensing in FY 10-11 and was subsequently moved into the 'exempt' pool of state fleets that are not required to report under the PDP). In addition participating agencies are requested to submit a plan that outlines strategies they will undertake to reach their displacement requirement. This information is assessed annually to evaluate progress on individual agency goals and aggregated to determine achievement of the State's overall goal. For FY 10-11 all 37 participating agencies reported data.

In 2009 the PDP provision was extended to July 1, 2011 by the General Assembly in [Section 14.14\(b\) of Session Law 2009-451](#), and through the "Current Operations and Capital Improvements Appropriations Act of 2011" [Section 19.5\(c\) of S.L. 2005-276](#) (page 222) was amended to extend the PDP again through September 1, 2016:

The genesis of this report is stated in the provision; "Agencies shall report by September 1, 2006, and annually thereafter through September 1, 2016, to the State Energy Office within the Department of Commerce on the efforts undertaken to achieve the reductions. The State Energy Office shall compile and forward a report to the Joint Legislative Commission on Governmental Operations by November 1, 2006, and annually thereafter through November 1, 2016, on the agencies' progress in meeting their plans."

State Petroleum Displacement Activities and Achievements

Implementation of the Petroleum Displacement Plan (PDP) requirement in FY 10-11 has resulted in a 16% reduction in petroleum use by state fleet vehicles compared to the FY04-05 baseline. Figure 1 below illustrates the annual percent displacement in relation to the stated 17.5% reduction goal.

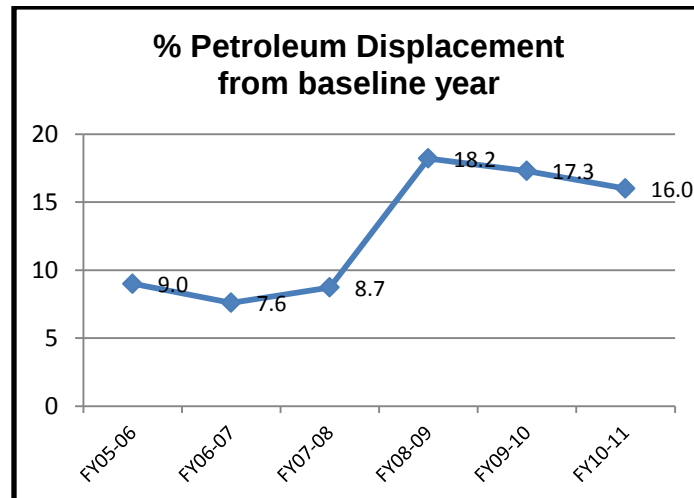


Figure 1. Petroleum displacement from baseline year. Displacement peaked in FY08-09 and declined the two years after, but remains nearly two times higher than the first reporting year.

The agencies shown below met or exceeded their goal for consuming less petroleum compared to the baseline year. Those in bold print met or exceeded their PDP goal for the first time in FY 10-11.

State agencies that have met or exceeded their PDP goal:

1. Caldwell Community College (continued to exceed goal)
2. Davidson County Community College (exceeded goal)
3. Fayetteville State University (continued to exceed goal)
4. Johnston Community College (continued to exceed goal)
5. NC A&T State University (continued to meet goal)
6. NC Department of Correction (continued to exceed goal)
7. NC Department of Environment and Natural Resources (continued to exceed goal)
8. NC Department of Health & Human Services (exceeded goal)
9. NC School of Science and Math (exceeded goal)
10. **UNC-School of Arts** (met goal)
11. NC State Ports Authority (continued to exceed goal)
12. Rowan-Cabarrus Community College (continued to exceed goal)
13. UNC-Asheville (continued to exceed goal)
14. UNC-Chapel Hill (continued to meet goal)

15. UNC-Charlotte (continued to meet goal)
16. UNC-Hospitals (continued to meet goal)
17. **UNC-Pembroke** (met goal)
18. **UNC-TV** (met goal)
19. **Wilson Community College** (exceeded goal)

Four agencies that had previously met or exceeded PDP goal have slipped: ²

1. North Carolina Arboretum at -15%, down from a previous -25%. Vehicle count and mileage increase from previous year, both above the baseline.
2. NC Central University at -14%, down from -59%. Vehicle count increased substantially above the previous year and baseline (104, up from 71), but miles decreased compared to the previous year (378,000, down from 382,000) and remained below the baseline year (515,000). The slippage in petroleum displacement is likely due to losses incurred from decrease in alternative fuel use, as well as a possible drop in fuel efficiency and/or accounting errors.
3. NC Department of Justice SBI at -3%, down from -29%. Vehicle count and miles both increased from previous year, above FY04-05 baseline.
4. NC Department of Transportation at -17%, down from -21%. Total vehicle count decreased from previous year but stayed above the baseline; the number of diesel vehicles decreased but diesel fuel use increased, suggesting the petroleum displacement slippage may be due to an increase in diesel miles and/or decrease in fuel efficiency (mileage is not reported by DOT, but plans are underway to begin reporting in 2012).

Vehicles

The FY 10-11 report accounts for 27,668 vehicles from 37 agencies as illustrated in Figure 2, which provides a breakdown by vehicle type. The proportion of gasoline vehicles has decreased steadily, while FFVs have increased. Electric vehicles remain a small portion of the state fleet making it difficult to tell from this graph, but the EV 'footprint' in the fleet has increased dramatically year over year from baseline year of 13 Neighborhood Electric Vehicles (NEVs), also referred to as Low Speed Electric Vehicles (LSVs), to 239 as documented in Table 1 below.

² All four agencies may be eligible to adjust their baseline based on justified growth. An opportunity to adjust individual baselines in relation to required growth in service and mission will be provided to all agencies before next report year. Moreover alternatives to using baselines established in FY 04-05 will be evaluated now that the PDP requirement has been extended through 2017.

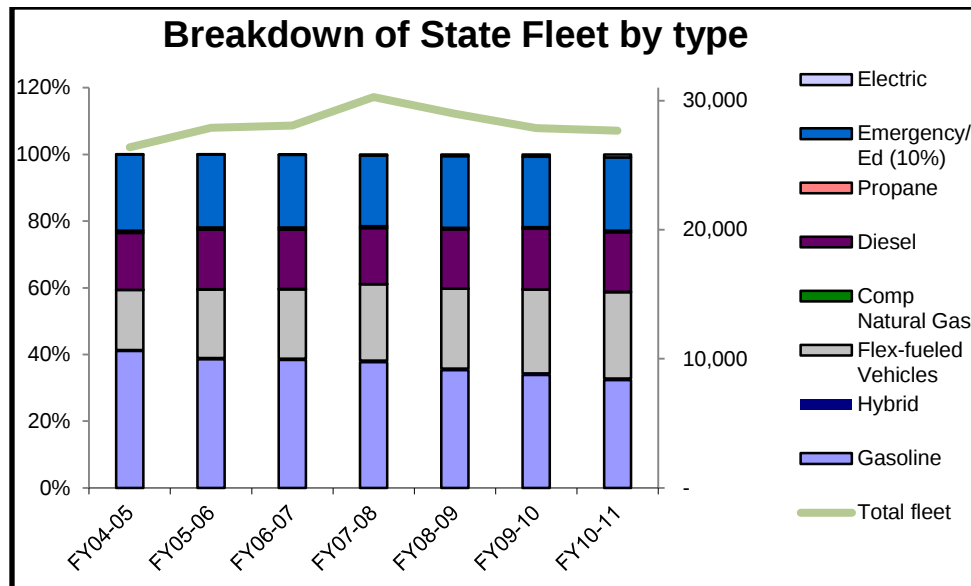


Figure 2. The proportions of the state fleet by vehicle type, each bar representing 100% of the vehicles for that reporting year. The green line is the total vehicle count for the state fleet.

State Vehicle Types and Percent Change between FY04-05, FY09-10 and FY10-11				
Vehicle Type	# Baseline, adjusted (FY04-05)	# FY09-10	# FY10-11	% change from baseline
Gasoline only	10816	9436	8952	-17.2%
E85 capable, flex-fuel (FFVs)	4752	7018	7186	51.2%
Diesel	4498	5066	4940	9.8%
Electric	13	199	239	1738%
Propane	192	150	130	-32.3%
Hybrid Electric	78	129	118	51.3%
Natural Gas (CNG)	14	5	4	-71.4%
*Emergency and Educational	6007	5871	6099	1.5%
TOTAL	26,370	27,874	27,668	1.2%

Table 1. *The “Emergency and Educational” category includes vehicles that have been modified specifically for that purpose, which are only required to meet a 10% petroleum displacement goal. There are an increasing number of FFVs being used in this category by the Department of Crime Control and Public Safety (roughly 5% of the total E/Ed fleet in FY10-11), which are not included in the FFV count above to avoid duplication of total vehicle counting.

The vehicle count continued to fall this year, possibly due to residual budget tightening and economic uncertainty, though the contraction was smaller than FY08-09 to FY09-10. As indicated above, the most significant positive changes in the state fleet composition between FY09-10 and FY10-11 were in electric vehicles and FFVs. From FY09-10 to FY10-11, EV presence increased 20%: NC Central University has added 15, UNC Chapel Hill went from 19 NEVs to 26, UNC Charlotte added 9, and UNC Greensboro added 5.

Many fleets indicated that high-efficiency and flex-fueled vehicles were given priority for new purchases. E85 fuel use increased by 73% compared to the baseline year, while FFV acquisitions increased 51% in that same timeframe (not including those added to the Emergency/Educational fleet tally). With FFVs now accounting for 26% of the state fleet, E85 use still only accounts for less than 2.0% of total fuel usage and contributes 0.56% towards the total petroleum reduction.

Fuel

Despite continued contraction of the fleet size, total fuel use increased for a third consecutive year. Total petroleum use in FY10-11 was 22 million gallons, representing a 16% petroleum displacement from the baseline year, below the PDP goal of 17.5% for the state fleet. Of that 16% percent, approximately 10% petroleum displacement can be attributed to the use of alternative fuels – ethanol blends of gasoline account for 5.4% and biodiesel blends account for 4.75% of petroleum displacement. Table 2 illustrates the petroleum displacement from E10, E85, and various Biodiesel blends. Though CNG and Propane use increased slightly in FY10-11, both remained lower than in the baseline year and therefore did not contribute to reaching the petroleum displacement goal.

Petroleum Displacement by Alternative Fuels, FY10-11 compared to baseline		
Alt Fuel	% petroleum displaced by:	Approx. gallons displaced above baseline use
E10	4.85%	1,269,271
Biodiesel (all blends)	4.75%	1,243,101
E85	0.56%	146,555
Propane and CNG	-0.20%	-52,341
<i>Other contributors</i>	6.04%	1,580,701
Total	16%	4,187,287

Table 3. Petroleum displacement from E10, E85, and various Biodiesel blends.

The Figure below illustrates the change in alternative fuels in comparison to petroleum fuels.

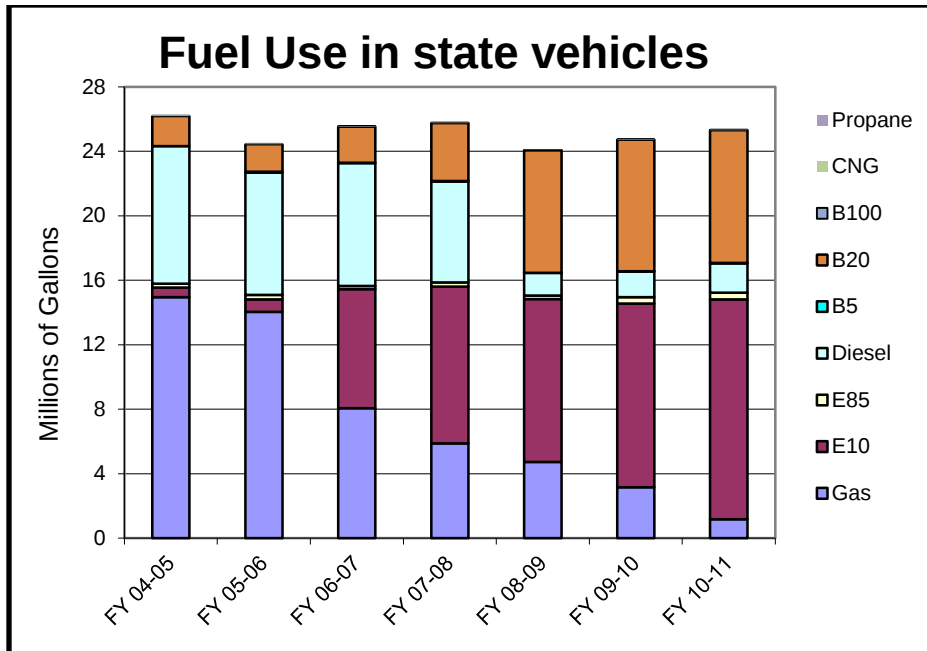


Figure 3. Total state fleet fuel used by type, FY 04-05 to FY 10-11. Does not include “gallons of gasoline equivalent” for electric vehicle use.

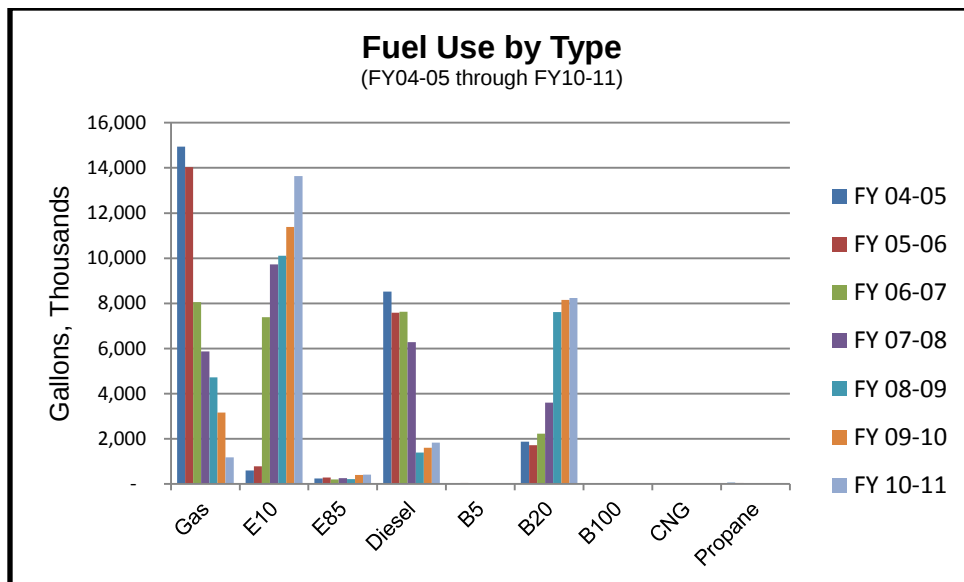


Figure 4. Comparison of fuel use over the 7-year reporting period by fuel type. B5, B100, CNG and Propane use is too small in comparison to other fuels to register on this graph.

Alternative fuel use increased over FY09-10 and remains higher than the baseline year as indicated in Figure 4. However, while Figure 4 illustrates a drop in gasoline use in FY 10-11 as compared to previous year an increase in diesel fuel is noted. Hence Figure 5 shows that while petroleum (gasoline + diesel) use in FY10-11 remained lower than the baseline year, it increased compared to FY09-10:

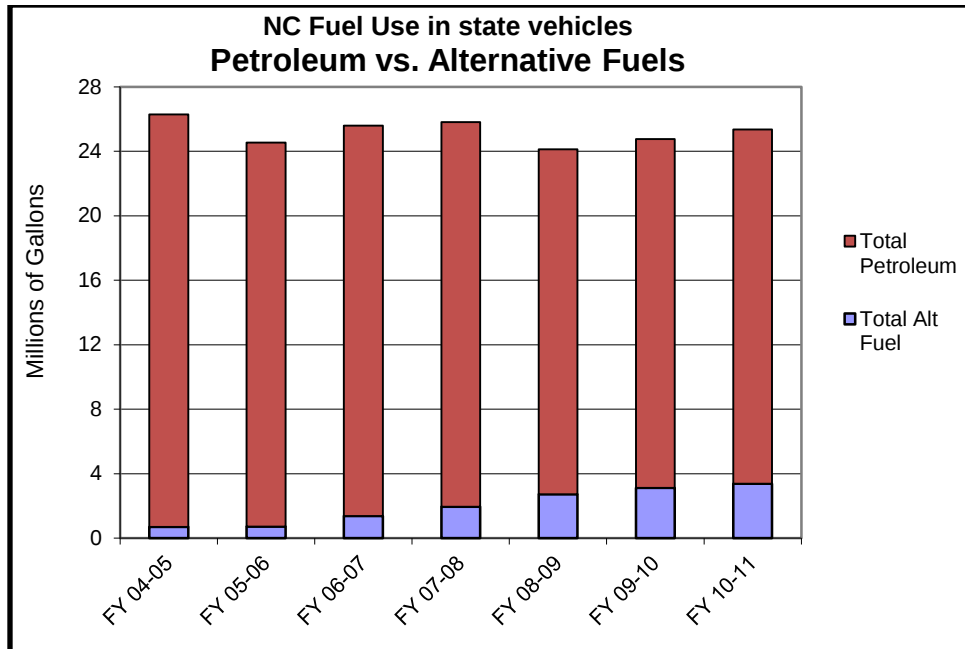


Figure 5. Total fuel use has increased the past two reporting years, and though alternative fuels increased in FY10-11, so did petroleum fuel use in that same period.

Ethanol use continues to increase steadily as fueling stations swap gasoline with E10. E10 is now being used at a rate of nearly 12-to-1 over conventional gasoline within the fleet. Moreover, DOT completed construction on four E85 stations in FY 2010-11 allowing more flex-fueled vehicles opportunities to fill up with the higher blend of ethanol as indicated in Figure 6 below.

E85 Fueling Sites in North Carolina

State motor fleet use of E85 enhances NC's economy, environment and energy security

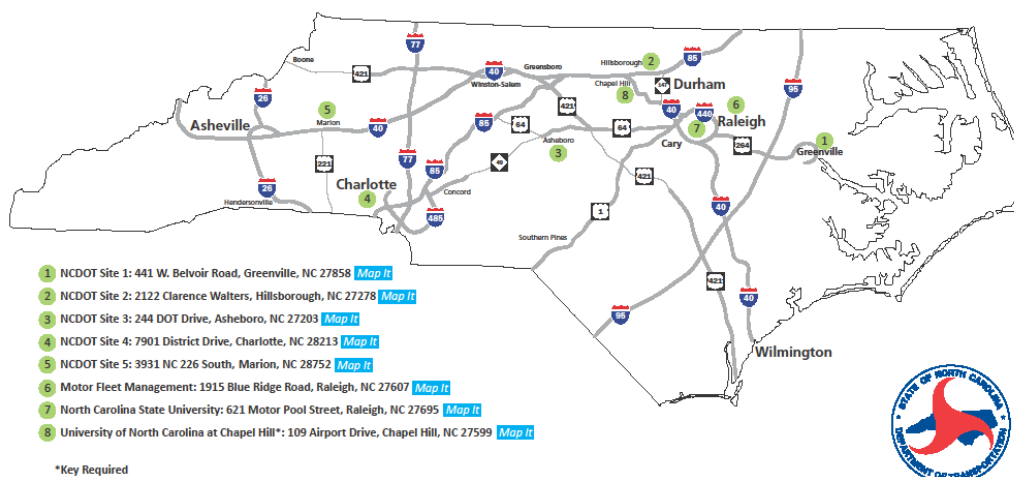


Figure 6: DOT created E85 station map

However, despite these installations E85 use has still not increased significantly as compared to the baseline year. More coordination with and support from other agencies that operate FFVs is required.

A total of 12 agencies reported E85³ use in FY 10-11: Department of Administration Motor Fleet Management (MFM); Department of Agriculture & Consumer Services, Department of Crime Control & Public Safety, East Carolina State University, Department of Environment and Natural Resources, Department of Transportation (DOT), NC State University, UNC Chapel Hill, UNC Charlotte, UNC Hospitals, UNC TV, and Winston-Salem State University. In FY 04-05 only MFM reported E85 usage. Most fuel at DOT, MFM or their own E85 fueling stations, but a few get their E85 at commercial/retail locations and record fuel use either by receipts tracking or estimation based on mileage logs.

Figure 6 below illustrates E85 use by organization. With the greatest number of E85-capable FFVs, DOA Motor Fleet Management has consistently been the largest user of E85, followed by UNC Chapel Hill, both of which have increased their use in both of the last two reporting years. Use by Department of Environment and Natural Resources, which expanded dramatically in FY09-10, declined sharply in FY10-11.

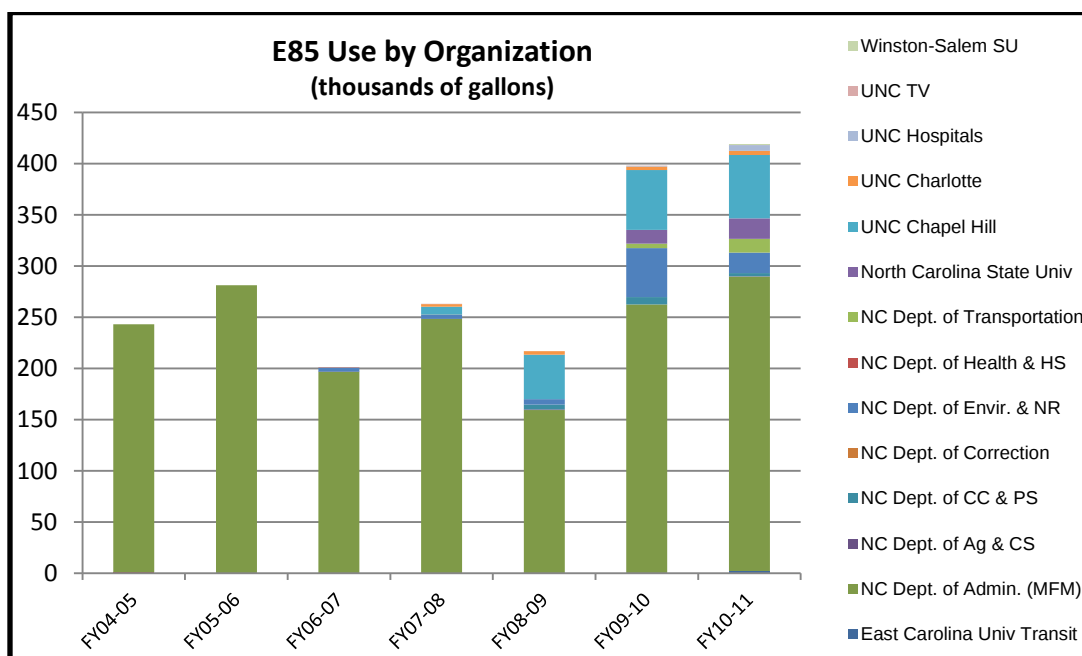


Figure 7. E85 use by Organization.

³ Accurately tracking E85 use remains complicated by the fact that many state vehicles stop at commercial service stations that dispense E85 (at least 14 across the state). Fuel dispensed at these stations is not currently reported accurately through the state fuel card system by fuel type. It is very likely that E85 use by the state fleet is actually higher than reported, but there is no way at present to determine how much higher.

Among fleets using E85 that have the largest FFV numbers – MFM, DOT, Correction, Crime Control and Public Safety, and UNC Chapel Hill – only UNC Chapel Hill has maintained a notable and steady E85gal/FFV ratio. Despite reaching a new high for E85gal/FFV in FY10-11, the ratios are still far lower than they could be if E85 were made more broadly available. The persistently low E85 use numbers makes it difficult to justify the expense of new E85 refueling equipment, and difficult to avoid wasted fuel from lack of tank turnover (E85 cannot sit for more than 90 days in the tank without risking going bad). Although there are over 7,000 state vehicles capable of using E85, they are not necessarily all deployed near a source of E85. This hampers expansion of E85 use. With other state agencies increasing E85 use and the proportion of FFVs in their fleets, the viability of new E85 stations is increasingly more secure. Inter-agency coordination of state fleet E85 use must become a priority to ensure success for existing and planned E85 fueling sites.

- *If E85 use in existing FFVs fleet-wide was slightly more than doubled without increasing total fuel use (i.e. replace 500,000 gallons of E10 with E85, less if replacing gasoline) this would result in meeting the PDP goal of 17.5% petroleum displacement immediately. Using Motor Fleet Management as a more straightforward example, 64% of the MFM vehicles are capable of running on E85 but less than 6% of their fuel use is E85. If MFM went from 6% to 16% E85 use, the 17.5% petroleum displacement goal would be met (as would the MFM organizational-level goal of 19% petroleum displacement). Alternatively, the PDP goal could be reached with far less dramatic shifts in E85 use that are spread out across the entire fleet.*

Biodiesel blends, most typically B20, continue to displace diesel fuel and are used nearly 5-to-1 over conventional diesel fuel. UNC Chapel Hill installed a new B20 tank and dispenser, allowing for near-complete conversion of their diesel fleet to B20 by the end of 2010. Several fleets set progressive goals in FY09-010 for converting their entire diesel stock to a biodiesel mix during the following year, but may have delayed or scaled back those plans due to supply issues and economic concerns levying counter-pressure against making any major changes to fleet composition or operation.

The use of CNG increased very slightly to 320 GGE (gallons of gasoline equivalent) from the previous year's 270 GGE, but remained lower than the baseline year's 3,340 GGE. LPG also increased very slightly from the previous year but remained well below the use in FY04-05.

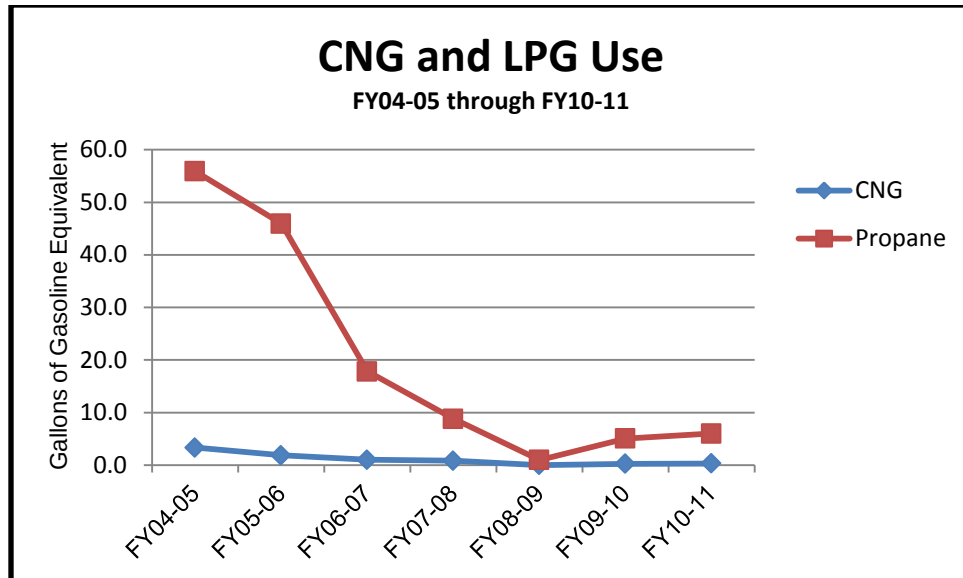


Figure 8. Compressed Natural Gas and Liquefied Propane Gas use throughout PDP reporting period.

CNG has not been broadly used in the state fleet since tracking began in FY0-05, but the decline in LPG has been significant, especially given the broad application for LPG fuel and how easy and relatively inexpensive it is to convert to LPG use. Both fuels were initially only used by Departments of Transportation and Administration (Motor Fleet Management). Other CNG and Propane users over the years since FY04-05 include: Department of Corrections, Department of Agriculture and Consumer Science, Department of Health and Human Services, UNC-Asheville, and Durham Technical Community College. Only HHS and DOT reported having propane-fueled vehicles in FY10-11.

Conservation and Efficiency Achievements

To better understand the role conservation (reduced mileage) and efficiency are playing in State PDP accomplishments, questions related to mechanical, process, or behavior changes were added to the FY09-10 report survey and continued in FY10-11. Agencies were asked to explain changes in fuel use that cannot be attributed to lower miles or increased alternative fuel use. Eighteen specific questions were asked to focus on what efficiency methods may have been effective in reducing petroleum consumption. By process of elimination, it is estimated that conservation and efficiency combined account for the largest proportion of petroleum displaced, followed by increased replacement of gasoline and diesel with E10 and biodiesel.

Conservation - Mileage and Fuel Savings

State agency mileage increased 3.1% compared to the previous year (almost 211 million, up from 204 million), though still down from the adjusted baseline by

2.2% (215 million). This represents a drop in conservation that contributed significantly to the backslide from 17.3% petroleum displacement in FY09-10 to 16% in FY10-11.

Comparing FY10-11 miles to the baseline year reveals a -2.3% change. However, mileage change does not translate directly to changes in petroleum use due to the wide spectrum of vehicle types in use across all reporting organizations. A correlation analysis of miles to petroleum use was performed, revealing a 96.1% correlation between the two data sets. Subtracting 96.1% from 100 yields a 3.9% reduction in petroleum used as a result of conservation compared to the baseline year. Thus the 2.3% reduction in state vehicle miles traveled accounts for 3.9% attributed to conservation of the 16% petroleum displacement.

Efficiency – Miles per gallon equivalent

Efficiency gains can be achieved through myriad methods, including driver training (emphasizing driving the speed limit, avoiding rapid starts and stops, tire pressure checks, etc.), removing excess weight from the vehicle, vehicle reassignments, route optimization, purchase of more fuel efficient vehicles, idle reduction technology, and fuel tracking procedures or software that enable implementation of a comprehensive fuel efficiency program. The U.S. Department of Energy⁴ states that the fuel economy benefits for these various efforts can range from 2-33%. Efficiency-focused driving habits are relayed to fleets through driver training programs as well as decals and driver placards placed in vehicles.

It is important to keep in mind tracking efficiency accomplishments means trying to characterize fuel use avoidance. Efficiency may be more properly defined as the efforts to make a given amount of fuel go further, e.g. driving further on the same amount of fuel. The most widely applied measure of efficiency for vehicles is miles per gallon (mpg). Although easily understood as applied on a “by vehicle” basis, it becomes more complicated when applied on an aggregated “by fleet” basis. Most fleets are comprised of a wide variety of vehicle types, ages, and use patterns, and the NC DOT – always one of the largest fuel users in the state – does not report mileage at all (though they are working on a solution to this data omission for FY11-12). Using the over-simplified ‘miles per gallon’ measure⁵, efficiency improved slightly between FY09-10 (15.5 mpg) and FY10-11 (15.83mpg), which improved petroleum reduction (though not enough to counteract the increase in miles driven between those two years). FY10-11 fuel efficiency using this measure was also higher than in the baseline year (15.36 mpg).

⁴ U.S. Department of Energy. Driving More Efficiently.

<http://www.fueleconomy.gov/feg/driveHabits.shtml>

⁵ Excluding fuel used by organizations not reporting miles driven (e.g. DOT), as well as miles driven by electric vehicles.

As referenced above, the fleet-wide mpg measure is not wholly adequate for directly approximating fuel efficiency gains from year to year. By process of elimination, efficiency improvements are estimated to account for 1.4% of the petroleum reduction (366,387 gallons) seen between FY10-11 and the baseline.

The table below lists the top ten largest state fleets, their change in mileage and petroleum use as compared to FY 04-05 baseline as well as new efficiency action put in place this reporting year. Overall there were fewer new strategies employed by the top 10 fleets to conserve fuel and increase efficiency as compared to previous years.

Organization	Conserving Action- Miles Change Compared to Baseline	New Efficiency Actions put in place in FY 2011
DOT	Miles: N/A Petro use: -17%	None reported
DOA, Motor Fleet Mgmt. (MFM)	Miles: -2.8% Petro use: -15.2%	None reported
Crime Control & Public Safety (CC&PS)	Miles: +9.5% Petro use: -1.8%	None reported
DENR	Miles: -20.8% Petro use: -35.3%	- Increased use of webinars and teleconferencing - Intra-departmental vehicle tracking system implemented
DHHS	Miles: -34.4% Petro use: -42.5%	None reported
Correction	Miles: -13.4% Petro Use: -22.9%	Continued practice of making all new vehicle purchases alternative fuel capable
UNC-CH	Miles: +0.45% Petro use : -20%	Improved inspection scheduling
Ag and CS	Miles: +11.7% Petro use: -3.2%	- Increased FFVs - Tire pressure checks - Efficiency education with reminders via email
East Carolina University Fleet	Miles: -15.8% Petro use: -16%	Replaced less fuel efficiency vehicles with new FFVs
ECU- Transit	Miles: +50.2% Petro use: +4.5%	Reduced service hours and mileage
NC State University	Miles: -11.1% Petro use: -11.4%	None reported

Table 4. Ten largest state fleet conservation (as compared to FY 04-05) and new FY 10-11 efficiency actions

General Trends in FY10-11 PDP

- Vehicle count fell by nearly 200 between FY09-10 and FY10-11, a notable though smaller drop compared to the previous years.

- Despite a decline in vehicle count, miles driven increased by nearly 6.4 million, most likely a result of economic constraints combined with static or expanded organizational responsibilities (doing more with less).
- E10 is widely used statewide at rates that are most likely higher than what is reported above. The retail fuel market has continued to provide E10 at regular, unmarked unleaded dispensers throughout the year as market price and availability fluctuated. According to the NC Petroleum and Convenience Marketers, in 2011 95-98% of gasoline in NC was actually E10. The NC Department of Agriculture and Consumer Services sampled retail locations throughout 2010 and 2011 and found that towards the end of the fiscal year nearly 98% of gasoline batches sampled contained ethanol, up from 76% in 2009.
- E85 infrastructure for state vehicles, though it continues to expand, remains inadequate to meet the fuel needs of FFVs in state fleets, resulting in widespread gasoline use in vehicles that could be using high-blend ethanol.
- B20 use has continued increasing, and the use of Neighborhood Electric Vehicles (NEVs) on campuses is growing.
- Success in meeting the PDP goals continues to be more related to commitment and grasp of the serious nature of this undertaking than to fleet size.
- Cooperation by agencies to understand the PDP, submit reports on time, ask for suggestions to help them meet goal has improved. Most participants seem committed to make this work.

Efforts are underway to improve data accuracy, particularly with regards to minimizing incorrect or double-counting of Motor Fleet Management vehicles/fuel/miles, caused by organizations that have a mix of owned and leased vehicles and tracking systems that make it difficult to parse this information out.

FY 10-11 PDP Accomplishments of the 10 Largest Fleets

The 10 largest fleets account for 96.67% of the fuel use, 92.2% of the vehicles, and 96.1% of the reported miles, and therefore have tremendous influence over petroleum displacement. The 10 largest fleets also account for 97% of the total petroleum displaced through PDP efforts. Therefore it is critical to better understand the methods employed by these fleets to reduce their petroleum use through alternative fuels, conservation and efficiency. The following two figures illustrate the amount of total fuel use by the 10 largest fleets as compared to all others, and the amount of petroleum displaced as compared to all others.

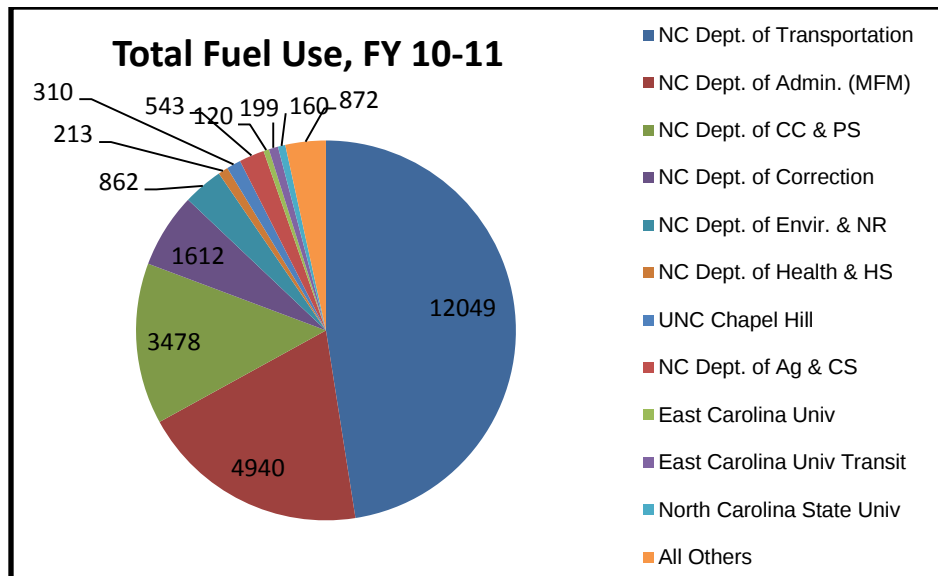


Figure 9. Fuel use (1,000s of gallons) used in FY 10-11, 10 largest fleets compared to “All Others”.

The Department of Transportation alone accounts for 47.5% of the total state fleet fuel use (see above), and 29.8% of the vehicles.

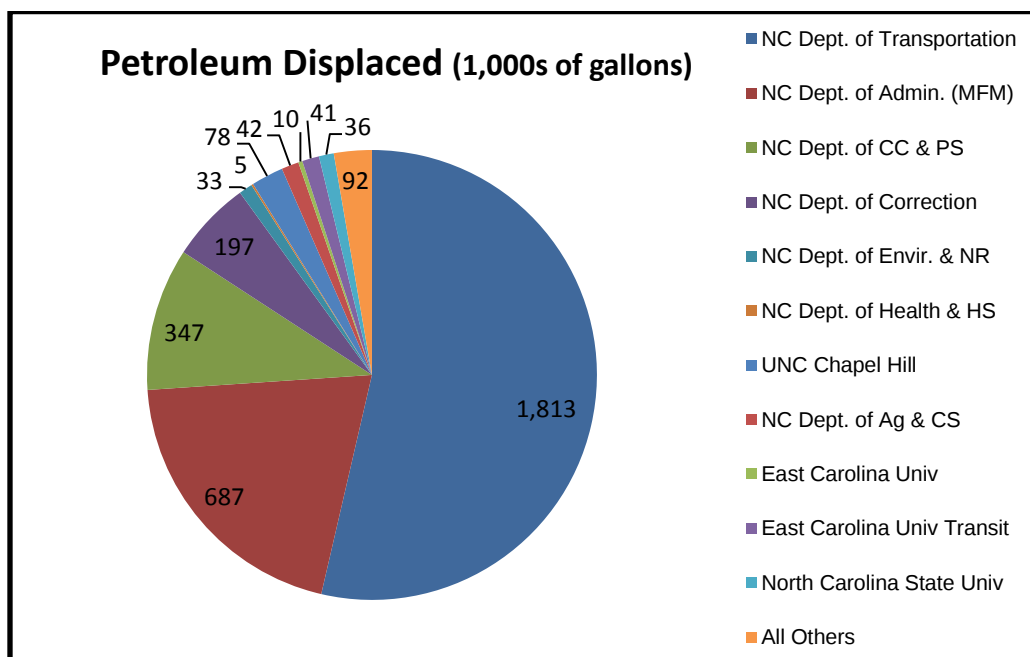


Figure 10. Number of Gallons (in thousands) Displaced by 10 Largest State Fleets compared to ‘All Others’.

Across the board, reduced state spending has delayed implementation of some PDP strategies, most specifically replacement of older vehicles with newer, more efficient models. MFM had planned to have 218 hybrid electric vehicles by 2009 – currently they have only 110 and that number is on a steady decline.

Note the following accomplishments of the state's 10 largest fleets in order of largest to smallest.

1. NC Department of Administration – Motor Fleet Management (MFM)

PDP goal: -18.7%

FY10-11: -16% (agency best)

Vehicle count: 8,440 (decreasing)

Notes for FY10-11: MFM has accomplished a drop in petroleum use primarily through an expanded use of E10 (534,000 gallons of E10 in FY 04-05 to 4.4 million gallons in FY 10-11). Also contributing was a 2.8% decrease in mileage and 9% reduction in fleet size. State budget restrictions have continued to preclude the planned purchase of many vehicles of all types. An increase of E85 use is noted from 262,460 gallons in FY09-10 to 287,348 gallons in FY10-11.

2. NC Department of Transportation (DOT)

PDP goal: -20%

FY10-11: -12% (down from previous year's progress)

Agency best: -27%, FY08-09

Vehicle count: 8,244 (decreasing)

Notes for FY 10-11: The fleet size has decreased for a third year in a row but is still 1 percent larger than the baseline. DOT received funding assistance to install new E85 fueling stations in Hillsborough, Marion and Asheville. Refer to appendix for map created by DOT for distribution to state agencies regarding state operated E85 fuel sites. DOT is in the process of altering their vehicle accounting system and may be able to provide mileage reporting as part of the next PDP report. B20 use grew over 165,000 gallons from the previous report to a total of 7.2 million gallons.

3. NC Crime Control and Public Safety – State Highway Patrol (SHP)

PDP Goal: -10%

FY10-11: -2% (down from previous year's progress)

Agency best: -7% FY06-07, 08-09

Vehicle count: 2478 (a new high)

Notes for FY10-11: Displacement of gasoline by E10 has continued to increase since becoming widely available at SHP fueling sites in 2009, with about 3.4 million gallons of E10 used in FY10-11 compared to just 27 thousand gallons of gasoline. E85 fuel is still not widely available – FY10-11 use actually decreased to slightly more than 3,000 gallons, less than half of what was used the year prior and a new low since the introduction of E85 use by NC SHP in FY07-08. No additional information was provided to explain this change. In FY09-10 there were plans to consolidate 301 FFVs near a MFM E85 fueling station in Wake County, but no additional information about this plan was reported in FY10-11. The newest highway patrol cruisers (Dodge Chargers) utilize cylinder

deactivation at highway speed to achieve better mpg – department fleet mpg did improve from 12.9 in FY09-10 to nearly 14 mpg in FY10-11. In FY09-10 the department reported experimenting with after-market fuel-saving technologies, but did not provide results of those testing projects in FY10-11.

4. NC Department of Environment and Natural Resources

PDP Goal: -13.2%

FY10-11: -35% (agency best)

Vehicle count: 1612 (decreasing)

Notes for FY10-11: The department has exceeded its PDP goal, most significantly through total fuel conservation; even though its fleet has expanded 15% since FY 04-05, the department's mileage has been reduced by 20.8%. Annual mileage may vary significantly as a reaction to fires, storms, catastrophe damage that may occur in an unpredictable fashion. DENR had a sharp drop in E85 use from the previous year, down to 20,000 gallons, and was one of the few departments to scale back on E10 use. No additional information was provided to explain this change.

5. NC Department of Correction (DOC) (adjusted):

PDP Goal: -11.6%

FY10-11: -23% (down slightly from previous year's progress)

Agency best: -26% FY09-10

Vehicle count: 1284 (decreasing)

Notes for FY10-11: The DOC has again surpassed its petroleum displacement goal. Complete replacement of gasoline with E10 and consistent use of B20 contributed significantly, while further reductions were made by choosing economical vehicles to replace less efficient older models. DOC continues to increase its fleet of FFVs, but did not report any E85 use in FY10-11 (this could be due to a possible fuel tracking error, as E85 fuel use has been reported in each of the 3 subsequent months following the end of FY10-11). They have expressed willingness to experiment with low speed electric vehicles for prison patrol duties, but no further progress on this has been reported.

6. NC Department of Health and Human Services

PDP Goal: -19.9%

FY10-11: -42% (agency best)

Vehicle count: 795 (decreasing)

Notes for FY10-11: The mileage reduction of 34% is likely attributed to restrictions imposed by the state budget crisis. E10 use appeared again after falling off in FY09-10, as did a small amount of propane fuel use for their 7 LPG vehicles.

7. UNC Chapel Hill

PDP Goal: -20%

FY10-11: -20%

Agency best: -23.18% FY09-10

Vehicle count: 704 (increasing)

Notes for FY10-11: Despite a 13% percent increase in fleet size and a 0.5% increase in mileage this “top 10” fleet met goal for the second year in a row, through consistent, diligent application of several alt-fuel use strategies – E10, B20 and E85 use, as well as 26 electric vehicles (up from 19 last year). Alternative fuel vehicles (diesel, FFVs and electric) now account for 30.1% of UNC’s overall fleet (up from 26% in FY09-10), with plans to continue in this direction. On top of previous efforts that remain on-going, UNC Chapel Hill also implemented improved inspection scheduling that contributed to decline in miles driven between FY10-11 and the previous year. E10 credit card purchases are being reported for the first time in this PDP report, which gives an extra boost in appearance of ethanol use.

8. NC Department of Agriculture and Consumer Services (NCDA & CS)

PDP Goal: -20%

FY10-11: -3.2%

Agency best: -7.24% FY07-08

Vehicle count: 653 (no change from last year)

Notes for FY10-11: Another mileage increase and related fuel use increase in FY10-11 puts the NCDA & CS even farther away from its goal than in FY09-10. The department applies a number of tactics, including using increasing amounts of E10, varying amounts of a range of biodiesel blends, and a small amount of E85, as well as efficiency practices like tire pressure check and efficient-driving training with follow-up email reminders. The NCDA & CS has again increased its number of FFVs over last year to 73, but E85 availability continues to be a problem with no department-operated fueling sites.

9. East Carolina University (ECU)

PDP Goal: -20%

FY10-11: -16% (+5% for ECU Transit, new ‘best’ for Transit)

Agency best: -22% FY07-08

Vehicle count: 386 (increasing)

Notes for FY10-11: For a second year in a row the university has grown the fleet but reduced mileage in comparison to the baseline year, by +5% and -15.8% respectively. ECU continues to universally utilize E10 in its gasoline fleet. The ECU Transit Operation decreased in size from FY09-10 but remains 4% higher than its first year of tracking. Mileage for the Transit fleet also declined, although sitting at 50% higher than the baseline year, compared to 54% higher in FY09-10. Only E10 was used as an alternative fuel for the ECU fleet, while B20, E85, and E10 were used in the Transit fleet. Transit services contracted in FY10-11, creating the mileage reduction noted above.

10. NC State University (NCSU)

PDP Goal: -20%

FY10-11: -11%

Agency best: 15.7% FY09-10

Vehicle count: 387 (increasing)

Notes for FY10-11: Petroleum displacement was down compared to FY09-10, likely due to the 45% growth in the fleet. Increased use of E10, E85 and B20 helped keep petroleum use from increasing proportionately to the fleet expansion. E85 use in particular increased, from, 13 thousand gallons in FY09-10 to 41 thousand in FY10-11, thanks to installation of an E85 fueling station in 2009. NCSU has 64 FFVs, up from 46 in FY09-10.

Several of the top 10 fleets have requested and been granted baseline adjustments based on justifiable fleet or mileage increases since the start of this program in FY04-05: Motor Fleet Management, East Carolina University (including Transit), Department of Corrections, and North Carolina State University.

Fuel Pricing, Trends, and Cost Savings

Gasoline pricing for FY 2010-2011 fluctuated upward on the state purchasing contract declining a little from the peak in May but still settling more than \$1.00/gal higher than the beginning of the fiscal year.

The state contract average prices over the past fiscal year for B20 blends have averaged \$.25 more per gallon while E10 averaged \$0.025 less than regular unleaded gasoline and E85 averaged \$0.33 less per gallon as indicated by transportation load pricing averages listed in Table 4 below. Average tank wagon propane fuel prices were well below all gasoline, ethanol and diesel blends in FY10-11. This is significant because tank wagons are smaller size loads and are always more expensive per gallon than the same fuel purchased via transport load size. Currently propane is not sold via transport load on the state contract because there is little demand and few state fleet propane vehicles.

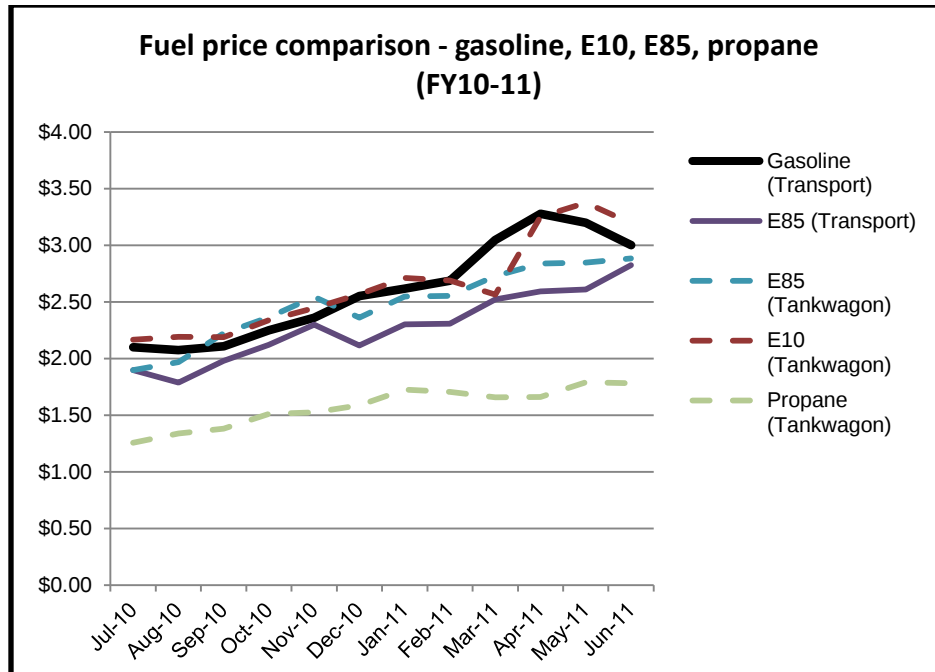


Figure 11. Fuel prices continued to trend upward throughout FY10-11, some dipping slightly towards the end of the fiscal year. Transport load gasoline prices were generally on par or higher than alternatives such as transport E85 and tank wagon propane, and on par with tank wagon E10 prices.

While there have been times when the disparity between the price of conventional fuel and its bio-blend alternatives has been wide, overall the average incremental price remains small and in some cases provide a significant savings to the state.

State Contract Fuel Price Average, FY04-05 through FY10-11								
DATE	B20 Price	ULSD Price (transport)	B20 - ULSD Difference	E85 Price	E10 Price	Gasoline Price	E10 - Gas Difference	E85 - Gas Difference
FY 04-05	\$1.7690	\$1.6165	\$0.1525	\$1.5300	\$1.6185	\$1.5379	\$0.0752	-\$0.0212
FY 05-06	\$2.0726	\$1.9909	\$0.0818	\$1.9041	\$2.0036	\$1.9329	\$0.0707	-\$0.0287
FY 06-07	\$2.0821	\$2.0344	\$0.0477	\$2.1713	\$2.0563	\$1.9753	\$0.0809	\$0.1960
FY 07-08	\$2.8876	\$2.8785	\$0.0091	\$2.2323	\$2.5624	\$2.5560	\$0.0064	-\$0.3237
FY 08-09	\$2.5307	\$2.1716	\$0.3591	\$1.9260	\$2.0218	\$1.9916	\$0.0302	-\$0.0655
FY 09-10	\$2.3181	\$2.0980	\$0.2201	\$2.1206	\$2.2679	\$2.0915	\$0.1764	\$0.0291
FY 10-11	\$3.10365	\$2.7840	\$0.2525	2,2800\$	2.6314\$	2.6059\$	-\$0.0254	-\$0.3259

Table 5. FY04-05 through FY08-09 and FY10-11 data are for Wake County only, and FY09-10 are state averages. Some FY 10-11 averages are based on incomplete data as indicated by shaded cells.

In FY10-11, E85 was on average less expensive than gasoline and E10 supporting a recommendation that the state consider eliminating regular

unleaded gasoline from the state contract as well as expanding efforts to get state FFVs to utilize E85 whenever possible.

Likewise, the Figure above represents another opportunity for cost savings through a shift towards propane as a fuel source. There would be even greater per-gallon savings if transport loads of propane were available on the state contract.

Summary Results

In FY10-11 the 37 participating state fleets displaced petroleum through three primary methods: an increasing proportion of alternative fuels, increased fuel efficiency, and improved fuel conservation. Collectively, these petroleum displacement efforts account for a savings of nearly 4.2 million gallons of petroleum; a 16% displacement compared to FY04-05.

Specific factors supporting petroleum displacement compared to FY09-10 were:

- + Fewer vehicles in the fleet
- + Slightly higher proportion of alternative fuels to petroleum, and
- + Slightly improved fuel efficiency (though the largest fuel user, DOT, could not be included in calculations due to lack of mileage reporting)

Factors working against petroleum displacement in FY10-11 compared to the previous year were:

- Increased mileage
- Increased total use of fuel
- Increased use of petroleum, in particular petro-diesel
- Less dramatic increase in E85 use compared to other ‘lesser’ biofuel blends (no new collaboration to enable FFVs in departments without a fueling station to use existing E85 stations)
- Near-stagnation in biodiesel use
- Possible decrease in fuel efficiency in largest fuel user
- Decrease in hybrid electric vehicles

Due to the combination of these factors, petroleum displacement in FY10-11 remained above the baseline year but fell compared to FY09-10.

Recommendations

The following measures will help put downward pressure on petroleum use in North Carolina, reducing transportation-related emissions and in some cases supporting economic development.

Require low bio-fuel blends in state fuel contracts. E10 is being used at a rate of nearly 12 to 1 over conventional gasoline within the fleet (up from a 3.6:1 ratio in FY09-10). With federal tax credits available to fuel blenders the bulk of NC's gasoline is voluntarily blended with ethanol at the 10% level. Purchasing and Contracts may want to consider eliminating transportation loads of gasoline on the state contract and only offer E10. This may yield a cost savings to the state as vendors realize there is only one gasoline contract with the state and quantities are not split between gasoline and E10. The same could be considered for diesel fuel. A 2-5% biodiesel blend requirement in all diesel fuel should be considered since up to 5% biodiesel (B5) can be sold as diesel with no labeling requirements. Moreover, just 2% biodiesel (B2) enhances the lubricity of ultra-low sulfur diesel (ULSD), removing the necessity of lubricity additives currently required for ULSD.

Require E10 and B20 use in all gasoline and diesel vehicles for agencies that operate their own fueling sites, and instituting departmental policies to encourage agencies that do not operate their own sites to fuel at DOT sites (which all have E10 and B20). This will help individual agencies expand PDP success. E10, B20 and E85 all are on the state purchasing contract.

Expand use of E85 refueling to provide for the state's E85-capable flex-fuel vehicles (FFVs) while earning Energy Policy Act credits that are being sold and deposited in the Alternative Fuel Revolving Fund (AFRF). The number of FFVs within the reported fleet has grown 51% percent since FY 04-05. FFVs now make up 26 percent of the fleet, and while use of E85 has increased from 242,000 gallons in the baseline year to 418,000 for this report year, there is significant opportunity to expand use without costly or complex changes to fleet operations. Expanding state use will increase the number of credit available to trade through the [Energy Policy Act Credit Banking and Trading Program](#). As of Sept 2011, the AFRF had total of \$589,968 (after dispersing \$223,228 to NC DOT in Dec 2009) through credits sales that have been earned through E85 use.

Require departments to adopt a centralized/standardized system for tracking and reporting fuel use, vehicle count, and mileage. While some departments already have systems in place that make it relatively easy for them to track and report these data points, others do not. This makes it difficult for these fleet managers to access the data they have, ensure that their information is accurate from year to year, track their own progress towards reaching their fleet PDP goal, and analyze and adopt the most appropriate petroleum-displacing fuels, practices and technologies for their needs.

Update MFM rules to encourage conservation and expanded use of AFV and hybrid electric vehicles. The built-in connection between miles traveled and justification for a vehicle as written in the DOA MFM rules should be uncoupled to reduce wasteful driving. The rationale that 'miles traveled' is the

only relevant measure for justifying need for a vehicle is outdated, and charging for a minimum number of miles driven monthly encourages unnecessary driving to continue to 'qualify' for a vehicle.

Make exceptions in the MFM rules to replace less efficient vehicles with newer, more efficient ones. Some agencies that have reduced unnecessary trips now find themselves with older, inefficient vehicles that do not qualify (by the established guidelines) for replacement because they have low mileage. Those affected by this policy are schools and agencies with early- to mid-1990s-model vehicles. There are economic models available that suggest a cost-savings through replacement of older, even low-mileage vehicles with newer more efficient ones that are cheaper to operate and maintain.

Revise MFM rules to allow for agencies to purchase passenger vehicles if they are hybrid electric or alternative fuel vehicles. Currently MFM rules prohibit agencies from purchasing passenger vehicles. This rule has the effect of hindering efforts to increase the proportion of hybrids and alternative fuel vehicles.

Expand support for and revise the PDP. Funding for a full-time PDP position or specific appropriation for PDP report coordination will facilitate better PDP tracking and implementation among state agencies. This will enable a Fleet Best Practices program that can facilitate sharing of what works and what doesn't among departments; development of a standardized method of accounting among agencies; interdepartmental coordination geared towards increased E85 use; cost-benefit analyses of various alternative fuel and advanced vehicle technology options (including electric, natural gas and propane vehicles); facilitation of E85 and B20 coding at retail service stations to enhance PDP data accuracy; and revision of the PDP to enhance tracking of conservation efforts, encourage innovations, and include currently exempt state vehicles such as school buses.

Cabinet and Executive Office support will reinforce the importance of the PDP. Establishing a state agency task force and incentive program to recognize exemplary efforts to expand use of alternative fuel, promote conservation and implement other advanced transportation technologies that reduce petroleum use and harmful emissions will support and encourage staff level efforts. The [NC Alternative Fuel Consortium](#), previously hosted by the State Energy Office could be revived and expanded to serve this purpose.