North Carolina FY 2006-2007 Petroleum Displacement Program Summary

November 27, 2007

This report summarizes the state's progress in meeting Session Law 2005-276 to achieve a 20% displacement of petroleum consumption in the state fleet by January 1, 2010. The total petroleum use for the state is 26.2 million gallons (adjusted for justified mileage increases), which excludes off-road equipment, vehicles not in a fleet, and all county titled-vehicles including school buses. The petroleum displacement goal for the state is 4.65 million gallons, an 18% reduction accounting for the 6,115 emergency/educational vehicles that only have to meet a 10% displacement

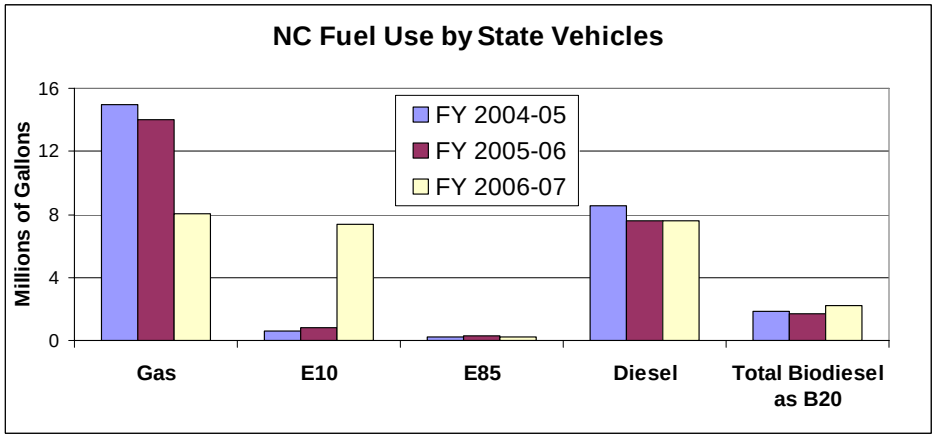
Overview of the State Fleet and Petroleum Displacement Goal;

- 69 agencies and community colleges have less than 10 on-road state-titled vehicles and are exempt from the Petroleum Displacement Provision (PDP).
- 39 agencies, universities and community colleges must report vehicle and fuel use by September 1st each year documenting achievement towards their PDP goal and provide a plan that outlines strategies they will undertake to reach their entire displacement requirement.
- The state fleet currently consists of 28,058 vehicles with more than half operating on gasoline only, and the others are about split between flex-fueled vehicles (FFVs) that can use E85 or gasoline and diesel vehicles. A very small fraction use propane, compressed natural gas, and electricity.

	FY 04-05	FY 2006-07	
Vehicle Types	#	#	% change
Gasoline	10,816	10,760	-1%
Hybrid	78	123	58%
Flex-fueled Vehicles	4,752	5,841	23%
Comp Natural Gas	14	11	-21%
Diesel	4,498	4,976	11%
Propane	192	187	-3%
Emergency/Ed (10%)	6,007	6,115	2%
Electric	13	45	246%
Total	**26,370**	**28,058**	**6%**

State Displacement Achievements;

- Total petroleum use in FY 2006-07 was 24.2 million gallons (-2 million / 7.5%), much of which was due to expanded use of low blends of biofuels (E10 and B20) while agencies also reduced miles driven, conserved fuel, and used more efficient vehicles.
  - 2.6% was displaced through E10 use
  - 1.8% was displaced through biodiesel use
  - 1.7% was displaced through conservation and efficient vehicles
  - 1.6% was displaced through a reduction in miles driven
  - -0.1% was added through a decrease in CNG and propane use
  - -0.1% was added through a decrease in E85 use



- The reduction in miles driven, conservation, and use of more efficient vehicles this last year saved the state $1,725,000 through a decrease of 862,500 gallons of fuel.
- Agencies have expanded the fleet of alternative fueled and advanced technology vehicles with new vehicle purchases of electric vehicles, hybrid-electric vehicles, flex-fueled vehicles, and diesel vehicles that can use biodiesel.
- 7 state agencies, universities, or community colleges have already met or exceeded their 2010 petroleum displacement goal and 9 others have met or exceeded this year's goal and are on target to reach their displacement requirement.

State Displacement Plan Strategies to reduce petroleum use by 18%;

- Reducing miles driven by some agencies could contribute a 1-2% displacement in petroleum. This is achieved through the use of technology that reduces the need to travel for every meeting, the combining of trips and tasks, and the elimination of unnecessary vehicle use. Those agencies that justify an increase in mileage to fulfill their mission will be given a petroleum allotment equal to the % increase in mileage based on their FY2004-05 fleet average mpg.
- Conservation of petroleum and more efficient vehicles could contribute a 2-3% displacement. An elimination of unnecessary idling, proper vehicle maintenance (good tire pressure), and better driver habits (not speeding or accelerating hard) might account for half of this petroleum reduction. The rest will be through the use of hybrid-electric vehicles and using more efficient conventional vehicles that replace older vehicles or used in situations that don't require a larger sized vehicle.
- Biodiesel used in diesel vehicles could contribute a 7-8% displacement in petroleum. The majority of this use is with a B20 blend that will be used and distributed at all Department of Transportation (DOT) sites equating to about 10 million gallons used per year.
- E10 used in any gasoline vehicle could contribute a 4-6% displacement. DOT has already switched to this ethanol blend at all of their fueling sites and use of E10 has jumped from 600,000 gallons in FY2004-05 to 7.4 million gallons in FY2006-07. This displacement will be achieved if the majority of the state vehicles utilize this E10 fuel.
- E85 used in flex-fueled vehicles (FFVs) could contribute a 1-5% displacement. Over 20% of the vehicles in the state fleet are FFVs but availability of E85 limits the use of this alternative fuel. Encouragement to fuel at existing and planned stations could drastically increase the use of this fuel that is made from 85% ethanol.
- Propane, natural gas, and synthetic or recycled motor oils many contribute to an individual organization's petroleum displacement requirement, but will not significantly affect the overall percentage change in petroleum use for the state.

Projected petroleum savings from the implementation of various PDP strategies (actual % may vary)

PDP Strategy	Reduction in miles	Conservation & Efficiency	Biodiesel (B20)	E10	E85	**Total**
Thousand of petroleum gallons displaced	250	640	1,950	1,300	510	**4,650**
% reduction	1%	2.5%	7.5%	5%	2%	**18%**

Hybrid Vehicles

A comparison between a hybrid and conventional vehicle is simpler with the Escape because there is a comparable model, but is a little more complicated with the Prius. For the comparison below, the Prius was compared with the Chevy Malibu, which is a comparable vehicle and engine size, as well as the Chevy Impala, which is the closest comparable vehicle that is alternative fueled. The hybrid-electric

vehicles have a significant increase in initial cost, however they have both petroleum and cost savings each year they are used. At 12,600 miles per year, these vehicles will typically be in the fleet for 9 years. This comparison shows that a Prius used primarily for city driving will save $7,542 in fuel costs over 9 years which is less than the initial cost difference. This cost is based on fuel costs remaining at $2 per gallon over the next 9 years which is very unlikely, and could make a hybrid in any driving situation a cost-savings venture for state agencies.

	Escape Hybrid	Standard Escape	Difference
Initial Cost	$25,309	$18,682	$6,627
Combined MPG	30	20	10
Petroleum use per yr	420	630	-210
Fuel Cost per year	$840	$1,260	-$420
City MPG	31	18	13
Petroleum use per yr	406	700	-294
Fuel Cost per year	$813	$1,400	-$587

	Prius Hybrid	Standard Malibu	FFV Impala	Average Difference
Initial Cost	$21,928	$14,349	$15,355	$7,076
Combined MPG	46	23	21	24
Petroleum use per yr	274	548	600	-300
Fuel Cost per year	$548	$1,096	$1,200	-$600
City MPG	48	19	18	30
Petroleum use per yr	263	663	700	-419
Fuel Cost per year	$525	$1,326	$1,400	-$838

E85 Ethanol

The Department of Transportation, UNC Chapel Hill, and UNC Charlotte have all announced plans to build E85 fueling stations and have started the process to site them, get permits, and obtain bids for the installation. Looking at their vehicles (this past year DOT added 300 FFVs to their fleet) and where it would be practical to install an additional tank, DOT will be putting E85 at their fueling sites in Greenville, Winston-Salem, Asheboro, Charlotte, and Marion. The following five possible locations have a high concentration of FFVs and would be potential sites for future E85 stations;

- **Raleigh –** a station located near NC State would be used by the 110 MFM FFVs leased by NCSU, 20 Department of Health and Human Services (HHS) leased FFVs from MFM at Morehead School and Dorthea Dix Campuses, and numerous other state agency leased vehicles in Raleigh that pass through that area to drive to the western part of the state.
- **Greensboro –** a station conveniently located between NC A&T and UNC Greensboro, or on one of their campuses, would be used by A&T's 43 FFVs leased from MFM and the 29 FFVs at UNC Greensboro, half of which they own and the other half are leased from MFM. The Department of Correction and HHS have an additional 35 leased FFVs from MFM based in this area for a total of 107 E85 vehicles.
- **Asheville –** the DOT refueling location is conveniently located off of I-40, and could by used by 133 leased FFVs from MFM which are assigned to Department of Correction (39), HHS (30), UNC Asheville (19), DOT (17), DENR (9), Department of Juvenile Justice (7), Department of Ag (6), and Commerce (6).
- **Wilmington –** the previous DOT site here was unsuccessful with distributing enough E85 fuel, but a more centrally located station at UNC Wilmington or HHS's site might be more convenient to the 106 FFVs assigned to Correction (31), HHS (25), DENR (20), UNCW (18), and Ports Authority (12).
- **Fayetteville –** the DOT site here would be a logical choice to service the 106 leased FFVs from MFM that are assigned to DOT (24), Correction (23), HSS (18), DENR (15), and Fayetteville State University (12).

In addition to these planned and proposed E85 stations, the state's PDP plan would benefit from the commercial fueling of FFVs at retail locations. Monitoring of public refueling by MFM drivers has identified numerous missed opportunities for drivers to choose E85 when refueling, The state could have used an additional 40,000 gallons of E85 in the last fiscal year had these drivers chosen to fuel at these stations. With the prospect of many additional commercial E85 stations coming online over the next few years, it will be valuable for the state to maximize the use of these stations to help meet the PDP.

Alternative motor oils

Engine lubricating oil does not wear out, but it becomes dirty as it cleans and protects a car engine. Producers can re-refine oil to remove contaminants introduced during its use and replace the additive packages that confer its specific properties, such as viscosity. Current technologies allow used oil to be re-refined into a high quality base-stock. Several oil companies now market products that have been certified by the American Petroleum Institute (API). API approved re-refined oil is subject to the same stringent refining and performance standards as virgin oil. Re-refined motor oils are offered by the same contract vendor that distributes the virgin oils and the price is similar. On the current state contract, re-refined motor oils are 7% cheaper per case and 22% cheaper by drum than virgin motor oils while the cost for synthetic motor oil is more than double.

State Options and Actions for PDP success to support individual organization's plans;

- Implement organizational and state-level initiatives to encourage conservation and efficiency. Policies should focus on the reduction of miles for official functions, including ridesharing and electronic conferencing. Drivers must be educated and encouraged to maximize the fuel efficiency of every vehicle through the elimination of unnecessary idling, driving less aggressively, driving at lower speeds, accomplishing multiple tasks in one trip, and ensuring proper maintenance of the vehicle by regularly checking tire pressure and reporting noticeable decreases in performance.
- Increase the number of hybrid-electric vehicles in the fleet and replace older vehicles with more fuel-efficient ones. Hybrid vehicles have a higher incremental cost, but will lower fuel costs every year and potentially save the state money over the course of its lifetime. Likewise, many older less-efficient vehicles remain in the state fleet because they have not reached 110,000 miles, but could reduce fuel costs and petroleum if that can be replaced by newer, more-efficient models.
- Issue a proclamation and/or statement to encourage state drivers to refuel whenever possible at E85 locations when they are using a flex-fueled vehicle. Combined with the current Department of Administration's Motor Fleet Management (MFM) site, commercial stations, and planned E85 stations by DOT and two universities, the state should be able to increase the use of E85 per year for significant petroleum savings at no cost. Drivers of other vehicles and FFVs-when E85 is not available- should use DOT sites for E10 and B20. The use of these biofuels will be the most significant contribution to the state's reduction in petroleum use.
- Review the fuel allowances provided to state organizations for their annual budgets to ensure that it properly reflects the current prices and does not cause agencies to cut back on other initiatives (such as the PDP) in order to meet the budget shortfall for this item. A lower rate could be given to those not using biofuel blends to encourage the use of these to meet the states displacement goal.
- Recommend a revision of MFM lease rates that would better encourage conservation and appropriate vehicle utilization. Instead of a monthly mileage minimum, a fixed monthly "base rate" with an additional per mileage charge could be used provided MFM is able to retain enough funds to cover their costs.
- Examine the state's purchasing and contract bid procedure to make sure they are in line with the PDP. Contracts for vehicle purchases should factor in fuel consumption to promote the use of more efficient vehicles, and alternative fuel vehicle options must be available for a longer period.

Reporting data from individual agencies for FY 2006-2007 sorted with the largest fuel users to the smallest. Note: fuel categories exclude E85, B5, B100, CNG, Propane, and motor oils.

Fiscal Year 2006 - 2007	Vehicles		Total Miles		Total Fuel use in thousands of Gallons						PDP Provision 19.5		
Organization	Total	% Chg	# in thsnds	% Chg	Gas	E10	Diesl	B20	Total Fuel	% Chg	Petro thsnds	% Chg	% Goal
NC Dept. of Transportation	**8915**	10%	**N/A**	N/A	647	3121	6290	1867	**11944**	-6%	**11241**	-9%	-20%
NC Dept. of Admin. (MFM)	**8764**	3%	**116775**	9%	3232	1839	1	6	**5281**	9%	**4928**	-2%	-19%
NC Dept. of CC & PS	**2280**	-1%	**41404**	-6%	2491	507	10	6	**3025**	-5%	**2973**	-7%	-10%
NC Dept. of Correction	**1682**	2%	**18908**	5%	201	772	671	135	**1789**	-1%	**1684**	-8%	-11%
NC Dept. of Envir. & NR	**1622**	16%	**12424**	-6%	452	482	72	110	**1124**	-12%	**1050**	-18%	-13%
NC Dept. of Ag & CS	**615**	16%	**4461**	-2%	225	78	149	27	**502**	-3%	**488**	-6%	-20%
NC Dept. of Health & HS	**910**	5%	**3617**	5%	253	17	76	0	**349**	-3%	**347**	-4%	-20%
East Carolina Univ	**388**	11%	**2000**	17%	8	101	179	10	**301**	25%	**288**	3%	-20%
UNC Chapel Hill	**658**	5%	**3127**	0%	39	229	6	8	**284**	2%	**259**	-7%	-20%
North Carolina State Univ	**345**	36%	**1406**	5%	0	128	0	22	**151**	13%	**133**	0%	-20%
Appalachian SU	**204**	3%	**860**	-3%	31	42	21	1	**96**	-13%	**91**	-17%	-20%
NC Dept. of Justice (SBI)	**95**	0%	**1259**	20%	87	0	3	0	**90**	11%	**90**	11%	-13%
Western Carolina Univ	**137**	15%	**292**	N/A	58	0	10	0	**69**	-4%	**69**	-4%	-19%
UNC Wilmington	**159**	26%	**533**	15%	48	0	1	0	**49**	15%	**49**	0%	-20%
UNC Greensboro	**158**	2%	**698**	-5%	0	38	0	16	**54**	11%	**47**	-3%	-20%
NC A&T	**144**	45%	**401**	7%	6	35	1	10	**52**	-8%	**46**	-16%	-20%
UNC TV	**46**	-23%	**635**	-13%	35	0	9	0	**44**	-9%	**44**	-9%	-20%
Wilson Technical CC	**74**	19%	**64**	-7%	8	0	32	0	**44**	2%	**43**	6%	-10%
UNC Hospitals	**55**	0%	**518**	1%	25	0	17	0	**42**	0%	**42**	0%	-16%
UNC Charlotte	**124**	19%	**345**	1%	38	0	0	0	**39**	-4%	**39**	-4%	-20%
NC Dept. of J Justice & DP	**93**	3%	**411**	-5%	35	0	4	0	**39**	21%	**39**	21%	-20%
NC Central University	**84**	18%	**489**	-5%	31	0	2	0	**33**	-8%	**33**	-8%	-20%
NC State Ports Authority	**81**	9%	**253**	-22%	30	0	0	0	**30**	-34%	**30**	-34%	-20%
Caldwell CC & TI	**24**	9%	**162**	-28%	0	0	22	3	**26**	-28%	**26**	-30%	-10%
NC School of the Arts	**55**	6%	**171**	-3%	14	0	3	0	**18**	-3%	**18**	-3%	-20%
Cape Fear CC	**24**	0%	**166**	-1%	0	0	12	3	**16**	-9%	**16**	-12%	-10%
Johnston CC	**23**	0%	**99**	-19%	0	0	15	0	**15**	-29%	**15**	-29%	-10%
Fayetteville SU	**54**	0%	**207**	0%	10	0	2	1	**12**	-2%	**12**	-4%	-20%
Elizabeth City SU	**43**	8%	**120**	20%	9	0	3	0	**12**	14%	**12**	-5%	-20%
UNC Asheville	**34**	10%	**73**	-10%	9	0	1	1	**12**	-17%	**11**	-23%	-20%
Winston-Salem SU	**42**	27%	**83**	13%	9	0	0	1	**11**	11%	**10**	-3%	-20%
Davidson County CC	**16**	0%	**131**	0%	1	1	9	0	**10**	0%	**10**	-1%	-20%
UNC Pembroke	**27**	13%	**104**	16%	9	0	0	0	**9**	-5%	**9**	-5%	-20%
NC Sch of Sci and Math	**17**	0%	**74**	0%	4	0	2	0	**6**	0%	**6**	0%	-11%
NC Cultural Resources	**25**	0%	**59**	0%	3	1	0	0	**4**	0%	**4**	-3%	-20%
NC Arboretum	**14**	-7%	**23**	8%	3	0	0	1	**4**	-6%	**4**	-10%	-20%
Durham Technical CC	**16**	-20%	**53**	-17%	3	0	0	0	**3**	-10%	**3**	-10%	-20%
Rowan-Cabarrus CC	**11**	-21%	**11**	-22%	1	0	0	0	**1**	-23%	**1**	-23%	-10%
Alamance CC													
Totals	**28058**	**6%**	**212410**	**-1.6%**	**8056**	**7391**	**7626**	**2227**	**25592**	**-3.3%**	**24212**	**-7.5%**	**18%**

Individual state organization achievements towards the PDP in 2006-2007.

% of Goal	State Organization	Petro Use	PDP Actions (Petroleum Reduction)
298%	Caldwell CC & TI	-30%	Reduced miles (26%), E10 (1%), B20 (3%)
288%	Johnston CC	-29%	Reduced miles (19%), reduced Idling (9%), synthetic oils (1%)
229%	Rowan-Cabarrus CC	-23%	Reduced fleet size and miles (23%)
172%	NC State Ports Authority	-34%	Reduced miles (22%), syn. oils (1%), Idling (5%), efficiency (6%)
141%	NC Dept. of Envir. & NR	-18%	Miles (6%), E10 (4%), E85 (1%), B20 (2%), efficiency (5%)
115%	UNC Asheville	-23%	Less miles (10%), B20 (1%), B50 (4%), oils (2%), efficiency (6%)
113%	Cape Fear CC	-12%	Reduced miles (1%), B20 (4%), vehicle efficiency (7%)
87%	Appalachian SU	-17%	Reduced miles (3%), E10 (5%), B20 (1%), vehicle efficiency (8%)
82%	NC A&T	-16%	E10 (7%), B20 (4%), synthetic oils (1%), vehicle efficiency (4%)
72%	NC Dept. of Correction	-8%	E10 (4%), B20 (2%), vehicle efficiency (2%)
67%	NC Dept. of CC & PS	-7%	Reduced miles (5.5%), E10 (1.5%)
49%	NC Arboretum	-10%	B20 (5%), vehicle efficiency (6%)
49%	Durham Technical CC	-10%	Reduced fleet size and miles (10%)
45%	NC Dept. of Transportation	-9%	E10 (3%), B20 (3%), vehicle efficiency (3%)
44%	UNC TV	-9%	Reduced fleet size and miles (9%)
42%	NC Central University	-8%	Reduced miles (5%), electric vehicles (2%), efficiency (1%)
40%	**This is the target goal by year 2 of 5 for implementing PDP strategies**		
36%	UNC Chapel Hill	-7%	E10 (5%), B20 (1%), synthetic oils (1%)
29%	NC Dept. of Ag & CS	-6%	Reduced miles (2%), E10 (2%), Biodiesel (1%), efficiency (1%)
26%	UNC Pembroke	-5%	Reduced Idling (2%), electric vehicles (2%), efficiency (1%)
25%	Elizabeth City SU	-5%	Conservation (2%), more efficient vehicles (3%)
22%	Western Carolina Univ	-4%	Electric Vehicles (2%), idling (1%), efficient vehicles (1%)
21%	UNC Charlotte	-4%	Electric vehicles (3%), smaller vehicles (1%)
20%	NC Dept. of Health & HS	-4%	E10 (1%), vehicle efficiency (3%)
18%	Fayetteville SU	-4%	B20 (1.5%), Synthetic oils (0.5%), more efficient vehicles (2%)
16%	NC School of the Arts	-3%	Reduced miles (3%)
16%	Winston-Salem SU	-3%	B20 (2%), Electric Vehicles (1%)
15%	UNC Greensboro	-3%	E10 (2%), B20 (1%)
15%	NC Cultural Resources	-3%	E10 (3%)
10%	NC Dept. of Admin. (MFM)	-2%	E10 (2%)
3%	Davidson County CC	-1%	E10 (1%)
3%	UNC Hospitals	0%	7% reduction in fuel for non-emergency gasoline vehicles
0%	NC Sch of Sci and Math	0%	Started producing their own biodiesel to use in buses
0%	UNC Wilmington	0%	
-1%	North Carolina State Univ	0%	Uses all E10 and B20, had mileage increase but no justification
-13%	East Carolina Univ	3%	Switched over to E10, started using B20 in transit busses
-58%	Wilson Technical CC	6%	Switched to B5, purchased Simulator Software, 2 more EVs
-87%	NC Dept. of Justice (SBI)	11%	Showed a mileage increase, but too late to provide a justification
-105%	NC Dept. of J Justice & DP	21%	
N/A	Allamance CC	N/A	

Highlighting indicates those agancies that have requested adjustments due to vehicle mileage increases