State of New Hampshire

Energy Management Annual Report for State-Owned Buildings and Fleets Fiscal Year 2009

December 2009

Prepared by the State Energy Manager at the Department of Administrative Services with assistance from the Office of Energy and Planning and the Interagency Energy Efficiency Committee.

Highlights

- The state electricity contract with ConEdison for FY10 guarantees that 25% of electricity will come from renewable sources, in line with the Governor's 25 x '25 Initiative to meet at least 25% of New Hampshire's total energy needs by utilizing renewable energy sources, by 2025.
- Eleven out of 15 state agencies report a decrease in energy use per square foot of occupied space; nine have shown an outright decrease in total energy use.
- Overall, the energy use in state owned buildings has decreased by 4% since 2005 when measured as energy use *per square foot*. Gross consumption is up 4% due to new buildings and expansions.
- The Health and Human Services building on Hazen Drive in Concord shows the largest increase in energy use since FY05 of any single state owned building. The increase is attributable to the addition of the lab in 2006 that runs 24 hours a day, and increased energy demand by the Department of Information Technology at the same site.

New Hampshire's Agencies Make Progress in Reducing Energy Use

In 2005, Governor Lynch issued Executive Order 2005-4, which adopted the EPA's Energy Star Challenge and set a goal of reducing energy use in state buildings by 10%. As this report shows, many state agencies have already met that initial challenge, while others struggle to make changes that result in overall energy savings. As can be seen from Table 1 below, Energy Use Intensity or EUI, which measures energy use on a square foot basis, has *declined* by 4% since fiscal year 2005, the baseline year. When measured without considering square footage, the state's gross energy use for state owned buildings has increased by 4%. Table 3 on page 5 shows details for the 15 state agencies whose energy use is tracked. Of these, 11 have shown decreases in EUI since the baseline year, while nine are reporting decreases in total energy use regardless of the square footage of their portfolio.

In terms of the type of energy consumed, New Hampshire is investigating more sustainable means of purchasing or generating heat and electricity in order to meet the state's Renewable Portfolio Standard, and other renewable energy goals. New Hampshire's recent 11-month electricity contract with ConEdison, which guarantees 25% of the energy will be generated from wind energy, helps promote these goals directly.

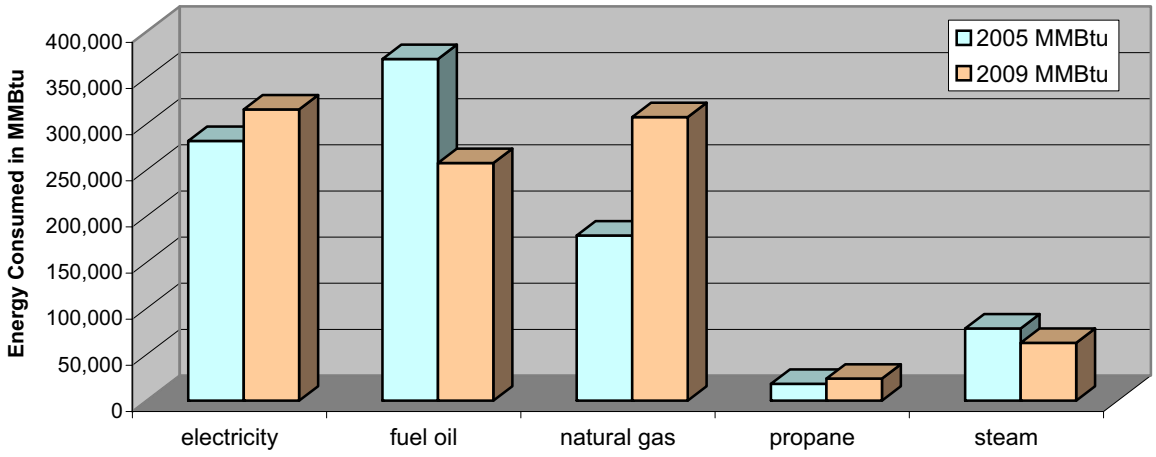
Snapshot of the State's Energy Use and Cost

Table 1 shows that total square footage under state ownership has grown by 9%, from 7.7 million square feet in FY05 to 8.4 million square feet today. Significantly, while the State has increased its space by 9%, energy use has increased by only 4%, leading EUI to decline by 4% overall. A more detailed analysis in Table 2 (next page) shows that overall expenditures on energy actually came down slightly in FY09 compared to FY08 given a significant drop in fuel prices in early FY09. However, total costs remain up by 50% over the baseline year. Clearly, how

Table 1: Summary of Change FY2005 to FY2009

	Total Sq. Ft.	kBtus used	Total Cost	EUI (kBTU per sq ft)	CUI (cost per sq ft)
FY2005	7,724,723	927,311,660	$14,953,724	120	$1.94
FY2009	8,436,411	967,177,238	$22,484,723	115	$2.67
% Change	9%	4%	50%	-4%	38%

Figure 1: 2005 & 2009 State Energy Consumption by Type



the state uses energy has significant cost-savings potential. Increased use of electricity by the state since FY05 (see Figure 1), as well as sharply increasing electricity costs (see *cost per MMBtu*[1] in Table 2), are largely responsible for the increased expenditures on energy overall. Electricity spending alone increased by $1.5 million in FY09 versus FY08, not including facilities that the state leases. This cost increase was offset by a drop in the cost of fuel oil, which was $1.8 million lower in FY09 than in FY08.

About the Data

Over the past year, concerted efforts have been made to improve data accuracy in the state's energy database, which has led to the inclusion of buildings in this year's report that were omitted from last year's report. In addition, the Community College System of NH (CCSNH) is included this year upon request by administrators; however, continued work is needed to ensure the accuracy of both square footages and energy use data for CCSNH. Great effort has been undertaken this year with other agencies to improve data quality. The State Energy Manager and staff from the Office of Energy and Planning (OEP) have met in person with data managers from almost all property-owning agencies at least once over the past several months. Continued efforts are being made to review potential problem areas, provide training on new reporting features built into the state's energy database, and support agencies as they manage their energy data and actual use.

Table 2: Energy Cost and Use

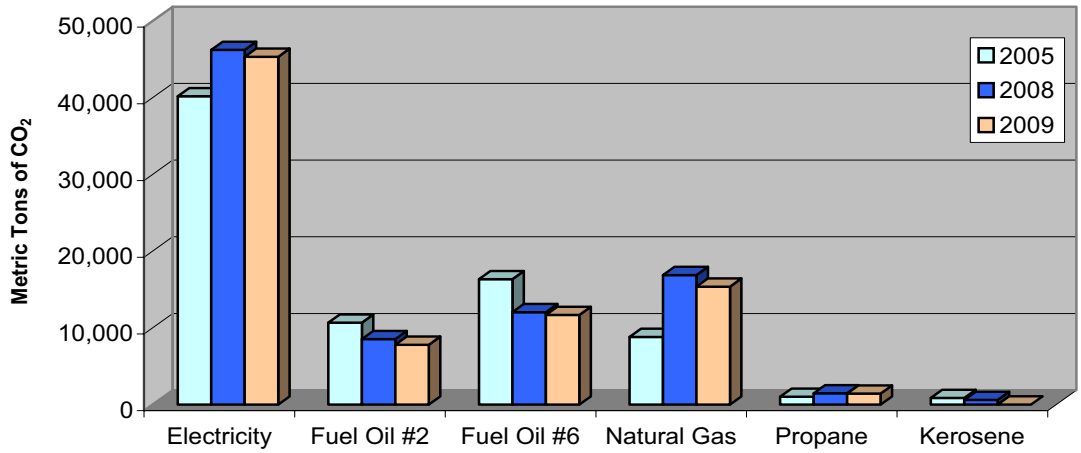
	electricity	fuel oil	natural gas	propane	steam	totals
FY05 cost per MMBtu	$29.85	$8.02	$10.80	$11.44	$18.32	$16.12
FY09 cost per MMBtu	$43.38	$10.74	$12.31	$14.03	$30.45	$23.25
% change cost per MMBtu	**45%**	**34%**	**14%**	**23%**	**66%**	**44%**
FY05 consumption MMBtu	281,552	370,276	179,041	18,318	78,317	927,505
FY09 consumption MMBtu	315,610	257,535	307,407	23,902	62,723	967,177
% change in consumption	**12%**	**-30%**	**72%**	**30%**	**-20%**	**4%**
FY05 total spending	$8,404,911	$2,969,970	$1,934,482	$209,466	$1,434,986	$14,953,815
FY08 total spending	$12,145,347	$4,612,920	$3,856,924	$505,994	$1,749,130	$22,870,315
FY09 total spending	$13,691,071	$2,765,237	$3,783,439	$335,307	$1,909,668	$22,484,722
% Change FY09 vs FY05	**63%**	**-7%**	**96%**	**60%**	**33%**	**50%**
% Change FY09 vs FY08	**13%**	**-40%**	**-2%**	**-34%**	**9%**	**-2%**

[1] One MMBtu is equal to 1,000 kBtus, which is more easily represented on charts and graphs.

Greenhouse Gas Emissions

With federal debate on climate change focusing increasingly on the impact of energy use and greenhouse gas emissions, and with the adoption of the NH Climate Action Plan, it is important that the state begin to track and address how emissions are changing over time. Carbon dioxide emissions (the primary greenhouse gas by volume) from state facilities from all fuel types[2] were approximately 86,000 metric tons in FY05. This is the equivalent of what approximately 3,600 families would contribute in a year. In FY08, emissions had increased to 96,000 metric tons, a 10% rise. However, emissions from state owned buildings were lower in FY09 than FY08, dropping to 91,000 tons. This is still a 5% increase over the baseline year, but it demonstrates that significant improvements can be made even in a single year, and that emissions can be reduced even as overall square footage increases. The relative contribution to total carbon dioxide emissions by the different fuels is illustrated in Figure 2, with electricity accounting for more than half of the total. The state's fleets are another major source of greenhouse gas emissions, and are estimated to have contributed another 36,000 metric tons of carbon dioxide to the atmosphere in FY09, nearly half of the total contributed by state buildings.

Figure 2: CO_2 Emissions from State Buildings, by Energy Type



Statewide Fleet

Table 4 on page 6 shows improvements in the overall fuel efficiency of the state's passenger vehicles and light duty trucks. When compared to FY06, fuel efficiency in FY09 has increased by 2% for the state's passenger vehicles and by 8% for light duty trucks[3]. Figure 3 (page 4) shows the relative amount of fuel used by the various agencies for passenger cars and for all other vehicles. The State Police passenger vehicle fleet uses more fuel than all other agencies, while the Department of Transportation (DOT) is the state's largest consumer of fuel overall. The vast majority of DOT's fuel consumption is of diesel used in its heavy duty machinery and equipment.

New legislation requires agencies to utilize their vehicles so that on average each agency's passenger auto fleet meets or exceeds a minimum number of miles, as set by the Department of Administrative Services (DAS). Using a fleet *average* rather than focusing on each *individual* vehicle will encourage utilization of the most fuel-efficient vehicles, and ultimately reduce costs. In addition, new vehicle purchasing requirements require agencies to purchase cars and light duty trucks that meet higher EPA fuel economy targets, which should also reduce fuel use and cost.

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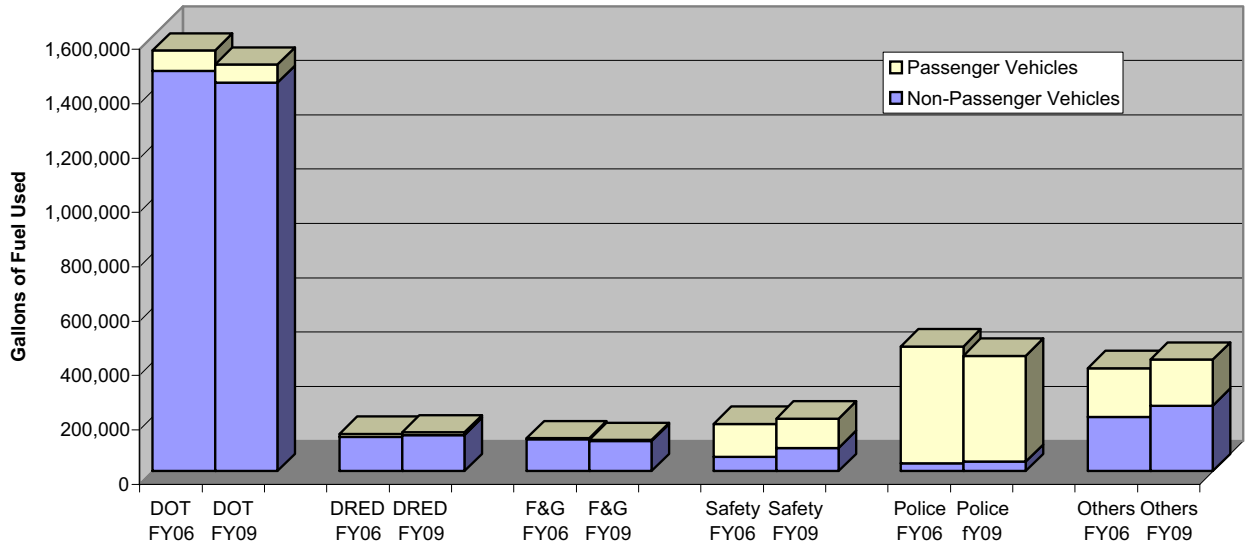
[2] Conversion factors for various energy types are based on the tool used by the Public Utilities Commission in its administration of the Greenhouse Gas Emissions Reduction Fund. Emissions resulting from steam-generated heat are not included here due to difficulties in determining what percentage of fossil fuels versus woodchips were used to generate the steam.

[3] Due to significant data quality issues in FY05, this report has used FY06 as the baseline year for fleet data for the past two years. Given significant improvements to the categorization and definition of vehicles in FY09, as well as changes to the way EPA calculates fuel economy, it is likely that FY09 will become the new baseline year in the FY10 Annual Energy Report.

Figure 3: Fuel Use by Agency Fleets FY06 and FY09



Moving Forward

The FY10-11 biennium will see the largest investment in energy improvements in state buildings since the Governor's 2005 Executive Order. More than $10 million in funding from the American Recovery and Reinvestment Act (ARRA) has been received by OEP through its State Energy Program. An agreement with the Department of Administrative Services' Bureau of Public Works and Construction calls for a wide range of work, including replacement of aging and inefficient heating systems, improvements to building envelopes such as the installation of new insulation and windows, improvements to the state's steam system, and upgrades to various electronic building controls. An additional $3 million in state capital funds will allow for replacement and upgrade of electrical equipment and lighting as well as other energy efficiency measures. A number of renewable energy projects will also be undertaken, including a new wood chip boiler at the Glencliff Home. This and other improvements at Glencliff will bring the off-grid facility into the 21st century: saving money, creating jobs, and dramatically reducing the use of fossil fuels. Relative to fleets, ARRA funding will allow the state to increase its investment in alternative fuels and vehicles.

In both the public and private sectors, energy reduction achievements are often the result of an energy champion, who organizes a team, tracks energy use, searches for ways to reduce energy use, and has the ability to influence budgeting, planning, and personnel decisions. New Hampshire is fortunate to have a few such champions, whose agencies are showing significant energy reductions. In March 2009, the State recognized several of these leaders at its annual Energy Efficiency in State Government meeting for creative ideas, such as substituting ozone for hot water in institutional laundry facilities, implementing a waste-oil recovery program to help heat a Department of Safety maintenance facility, and implementing geothermal systems at state facilities.

Moving beyond individual efforts, it is important to recognize that energy and cost savings are most impressive where agencies take a strategic and comprehensive enterprise-wide approach to energy reduction and renewable energy, yet current constraints on state resources make such planning particularly challenging. With the help of ARRA funds, additional funding for energy efficiency in the state capital budget, and dedicated staff throughout state government, the next two years should result in significant progress in improving energy conservation and efficiency in state buildings and fleets.

Table 3: Energy Use, Intensity, and Costs from FY05 and FY09

Department	FY05 Square Footage	FY09 Square Footage	kBtus FY05[1]	kBtus FY09	% Change in Total kBtus	EUI FY05 (energy per square foot)	EUI FY09 (energy per square foot)[2]	% Change in EUI	Energy Cost FY05	Energy Cost FY09	% Change in Cost	CUI FY05 (cost per square foot)	CUI FY09 (cost per square foot)	% Change in CUI
Corrections	959,275	929,475	221,827,306	220,158,791	-1%	231	237	2%	$2,542,059	$3,653,182	44%	$2.65	$3.93	48%
DHHS[3]	722,351	797,080	127,339,663	121,072,998	-5%	176	152	-14%	$1,575,426	$2,266,783	44%	$2.18	$2.84	30%
Juvenile Justice[4]	129,310	201,419	35,778,783	45,835,463	28%	277	228	-18%	$312,930	$858,860	174%	$2.42	$4.26	76%
NH Hospital	331,832	334,452	64,444,948	49,604,905	-23%	194	148	-24%	$1,049,641	$1,041,072	-1%	$3.16	$3.11	-2%
Behavioral Health	4,305	4,305	476,306	496,229	4%	111	115	4%	$9,876	$12,831	30%	$2.29	$2.98	30%
Glencliff Home	256,904	256,904	26,639,626	25,136,401	-6%	104	98	-6%	$202,979	$354,021	74%	$0.79	$1.38	74%
Veterans Home	172,600	183,600	21,070,445	22,339,113	6%	122	122	0%	$400,689	$523,277	31%	$2.32	$2.85	23%
Transportation	658,219	690,852	85,153,849	77,638,739	-9%	129	112	-13%	$1,422,077	$1,602,375	13%	$2.16	$2.32	7%
Discovery Center[5]	10,890	22,223	1,392,947	2,455,469	76%	128	110	-14%	$28,125	$71,009	152%	$2.58	$3.20	24%
CCSNH	862,054	957,554	75,663,300	100,580,832	33%	88	105	20%	$1,202,168	$2,520,257	110%	$1.39	$2.63	89%
Admin Services	2,619,844	2,965,099	271,469,471	303,636,912	12%	104	102	-1%	$5,668,663	$9,044,333	60%	$2.16	$3.05	41%
Employment Security	150,448	150,448	16,647,383	15,253,564	-8%	111	101	-8%	$368,240	$462,726	26%	$2.45	$3.08	26%
Liquor Commission	181,559	184,773	15,784,371	17,542,218	11%	87	95	9%	$315,126	$465,019	48%	$1.74	$2.52	45%
Police Standards	57,100	57,100	4,548,100	4,454,859	-2%	80	78	-2%	$54,578	$61,160	12%	$0.96	$1.07	12%
Environmental Services[6]	15,419	15,193	1,277,019	976,447	-24%	83	64	-22%	$31,702	$32,137	1%	$2.06	$2.12	3%
Department of Safety	236,611	236,279	17,130,322	14,651,493	-14%	72	62	-14%	$339,439	$381,076	12%	$1.43	$1.61	12%
Adjutant General	772,580	893,803	47,508,099	53,311,231	12%	61	60	-3%	$670,946	$1,032,687	54%	$0.87	$1.16	33%
DRED[7]	274,056	321,215	20,439,062	13,076,345	-36%	75	41	-45%	$333,488	$367,105	10%	$1.22	$1.14	-6%
Agriculture[8]	31,717	31,717	60,323	28,227	-53%	2	1	-53%	$999	$1,597	60%	$0.03	$0.05	60%
Fish & Game[9]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**7,724,723**	**8,436,411**	**927,311,660**	**967,177,238**	**4%**	**120**	**115**	**-4%**	**$14,953,724**	**$22,484,723**	**50%**	**$1.94**	**$2.67**	**38%**

1 - In some cases, 2005 data does not match that in the last report. Agencies are continuously correcting errors and filling in missing data to improve the accuracy of the reporting.
2 - The list is sorted in terms of Energy Use Intensity (energy use per square foot) during the four quarters ending 6/30/09 from most intense to least intense.
3 - The four DHHS facilities have been combined to show the agency-wide statistics. However, the individual facility data was left in the report for informational purposes.
4 - Juvenile Justice has seen a dramatic drop in its reported energy use due to the correction of natural gas deliveries that were accidentally entered twice in the database.
5 - The McAuliffe-Shepard Discovery Center has recently completed an addition to its facility that has been prorated for this report to accurately reflect its energy use.
6 - DES recently recorded energy data from 2005 that had been missing from the database; pumping stations and wastewater treatment facilities are not included in this report.
7 - DRED data shows a dramatic decrease in energy use due to periodic large fuel deliveries to the buildings on top of Mt. Washington; a delivery took place in FY05 but not in FY09.
8 - The Department of Agriculture's energy use and cost vary widely from year to year due to infrequent use of a single building located at the fairgrounds in Massachusetts.
9 - Fish and Game has not reported any data since the inception of this program, however efforts are now being made for the agency's inclusion in the 2010 annual report.

New Hampshire Summary Data
FY2006 and FY2009

Table 4: Fleet Summary Data for FY06 and FY09

Passenger Autos

	Number Vehicles		Fuel Used (in gallons)		Miles Traveled		MPG		Fuel Costs		Fuel Cost/mile		CO_2 (metric tons)	
	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009
DOT	125	120	74,426	66,999	1,867,456	1,888,904	25.09	28.19	$153,121	$159,466	$0.08	$0.08	655	589
DRED	21	22	11,993	9,248	308,551	251,014	25.73	27.14	$24,859	$22,619	$0.08	$0.09	106	81
Fish & Game	9	8	3,101	3,810	76,509	98,561	24.67	25.87	$6,440	$8,573	$0.08	$0.09	27	34
Safety[1]	144	155	121,666	108,398	2,219,106	2,021,746	18.24	18.65	$148,928	$237,595	$0.07	$0.12	1,070	954
State Police	362	339	430,453	389,282	6,635,977	5,840,581	15.42	15.00	$652,561	$867,588	$0.10	$0.15	3,787	3,425
Other	338	321	178,890	169,456	4,271,226	4,203,415	23.88	24.81	$388,337	$392,185	$0.09	$0.09	1,574	1,491
State Total	**999**	**965**	**820,529**	**747,193**	**15,378,825**	**14,304,221**	**18.74**	**19.14**	**$1,374,246**	**$1,688,025**	**$0.09**	**$0.12**	**7,219**	**6,574**

[1] The Department of Safety's data for FY06 included some passenger vehicles with incomplete data for gallons of fuel used. In these cases, values were substituted based on those vehicles' *actual* mileage and the *average* miles per gallon of vehicles of the same make and model for which complete data had been entered.

Light Duty Vehicles/Trucks

Includes pick-up trucks, vans, minivans, and SUVs. For FY09, the definition of vehicles for this category changed to exclude vehicles whose gross vehicle weight rating exceeds 8,500 pounds. As a result, vehicle counts, fuel used, miles traveled, and costs show a decrease compared to previous years.

	Number Vehicles		Fuel Used (in gallons)		Miles Traveled		MPG		Fuel Costs		Fuel Cost/mile		CO_2 (metric tons)	
	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009	2006	2009
DOT	232	122	274,189	113,741	3,841,616	1,849,714	14.01	16.26	$559,209	$273,495	$0.15	$0.15	2,412	1,001
DRED	138	80	92,027	52,776	1,294,115	827,977	14.06	15.69	$188,207	$131,743	$0.15	$0.16	810	464
Fish & Game	111	83	106,258	92,759	1,607,509	1,371,476	15.13	14.79	$212,500	$208,708	$0.13	$0.15	935	816
Safety	93	74	69,610	68,334	1,109,055	1,053,903	15.93	15.42	$103,211	$151,993	$0.09	$0.14	612	601
State Police	46	43	25,919	31,498	421,139	507,688	16.25	16.12	$38,716	$66,015	$0.09	$0.13	228	277
Other	252	177	166,065	141,738	2,454,222	2,259,297	14.78	15.94	$374,867	$330,895	$0.15	$0.15	1,461	1,247
State Total	**872**	**579**	**734,068**	**500,846**	**10,727,656**	**7,870,055**	**14.61**	**15.71**	**$1,476,710**	**$1,162,849**	**$0.14**	**$0.15**	**6,458**	**4,407**

All Vehicles[2]

Includes passenger cars, light duty vehicles, medium, heavy, and extra heavy trucks, mobile equipment, trailers, snow machines, motorcycles.

	Number Vehicles		Fuel Used (in gallons)		Miles Traveled		Fuel Costs	
	2006	2009	2006	2009	2006	2009	2006	2009
DOT	1,930	1,699	1,547,954	1,496,601	9,511,047	9,311,769	$3,188,906	$3,915,477
DRED	358	349	137,605	142,463	1,694,437	1,546,041	$280,193	$344,697
Fish & Game	159	298	121,166	114,508	1,782,356	1,664,022	$244,344	$258,020
Safety	610	616	173,398	193,602	3,357,600	3,252,276	$264,282	$429,630
State Police	447	433	458,644	424,168	7,127,122	6,429,363	$693,718	$942,835
Other	683	660	379,244	410,123	6,987,963	7,452,182	$785,436	$962,738
State Total	**4,187**	**4,055**	**2,818,011**	**2,781,466**	**30,460,525**	**29,655,653**	**$5,456,879**	**$6,853,396**

[2] Miles per gallon, cost per mile, and green house gas emissions have not been calculated due to the inconsistent mix of vehicles included in this category.