

UNIVERSITY of NORTH CAROLINA
P E M B R O K E

**STRATEGIC
ENERGY & WATER
PLAN**

2017 / 2018

UNIVERSITY *of* NORTH CAROLINA
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EXECUTIVE SUMMARY

UNC Pembroke is working to build upon our current successes of being a good steward of natural resources. The objective of the Strategic Energy and Water Plan is to foster economically and environmentally responsible usage of valuable resources in accordance with state legislation, while providing a positive and comfortable learning environment for students, faculty, staff and visitors.

Key Elements of the plan include:

- Educate and engage students, faculty and staff about the benefits of energy and water conservation as well as the goals of this plan.
- Continue accurate measurements and analysis of electricity, fossil-based fuels and water usage. Conduct periodic reviews of utility billing invoicing, rates and consumption with utility suppliers. Monitor consumption, study trends and investigate any anomalies.
- Provide energy management system, building controls and other technical training to staff.
- Control where applicable, building temperature and lighting settings—striving to shut off lighting and let building temperatures drift when spaces are unoccupied.
- Update campus design and construction standard guidelines and operations practices to reflect all current mandates, commitments and goals.
- Install energy saving equipment, materials and measures through available funding sources, capital improvement projects, repair and renovation projects and related opportunities.
- Continue to benchmark progress, share and compare lessons learned and best practices with peer institutions.
- Review costs and benefits associated with available utility supplier programs, rebate strategies, alternative power purchase agreements.

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NORTH CAROLINA LEGISLATIVE BASIS FOR PLAN

GENERAL ASSEMBLY OF NORTH CAROLINA SESSION 2007 / SENATE BILL 668—RATIFIED BILL

AN ACT TO PROMOTE THE CONSERVATION OF ENERGY AND WATER

SECTION 3.1. (a) G.S. 143-64.12. Authority and duties of State agencies. The Department; State agencies and State institutions of higher learning.

(a) “The Department of Administration through the State Energy Office shall develop a comprehensive program to manage energy, water, and other utility use for State agencies and State institutions of higher learning and shall update this program annually. Each State agency and State institution of higher learning shall develop and implement a management plan that is consistent with the State's comprehensive program under this subsection to manage energy, water, and other utility use. The energy consumption per gross square foot for all State buildings in total shall be reduced by twenty percent (20%) by 2010 and thirty percent (30%) by 2015 based on energy consumption for the 2002-2003 fiscal year. Each State agency and State institution of higher learning shall update its management plan annually and include strategies for supporting the energy consumption reduction requirements under this subsection. Each community college shall submit to the State Energy Office an annual written report of utility consumption and costs.”

The UNC-system universities adopted a voluntary goal of reducing their energy unit intensity 40 percent (40%) from the 2002-2003 fiscal year baseline by the year 2025, known as the UNC Energy Leadership Challenge. This extended energy reduction goal was recommended by the Division of Environmental Assistance and Customer Service – Utility Savings Initiative, Department of Environmental Quality to the Joint Legislative Energy Policy Commission. Since 2012, UNC Pembroke, all other UNC-system universities, many community colleges and private universities have been convening annually during the Appalachian Energy Summit to monitor progress, share best practices and lessons learned relating to this endeavor.

Note: UNC Pembroke has met and exceeded the above general statute by reducing energy consumption per gross square foot by 39 percent (39%) in FY2015 as compared to the 2002 – 2003 baseline. As of FY2017, UNC Pembroke has a reduction of 43 percent (43%), which represents an energy cost avoidance of \$7.8 million dollars since 2002. This represents the elimination of a substantial operational cost to the State’s taxpayers.

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BASELINE ENERGY COST AND KEY PERFORMANCE INDICATORS

a. Financial Evaluation

Detailed cost and percentage of total expenditures

Fiscal Year	Electricity	Natural Gas	Water / Sewer	LP Gas	Heat Oil #2	Total Utility Expenditures	Consumption BTU / Ratio :
02/03	\$1,031,658	\$487,910	\$657,512	-	\$25,179	\$2,202,259	115,427,334,610
03/04	\$1,036,199	\$441,680	\$739,701	-	\$22,890	\$2,240,470	110,599,887,476
04/05	\$1,068,894	\$399,653	\$821,890	-	\$28,500	\$2,318,937	108,632,852,564
05/06	\$1,071,394	\$443,081	\$897,456	-	\$9,622	\$2,421,553	113,122,320,944
06/07	\$1,481,650	\$375,742	\$983,536	-	\$20,115	\$2,861,043	114,495,523,300
07/08	\$1,756,487	\$532,958	\$1,124,397	-	\$43,072	\$3,456,914	131,302,377,880
08/09	\$1,783,521	\$485,908	\$954,511	-	\$29,311	\$3,253,251	135,506,884,220
09/10	\$1,843,824	\$343,171	\$1,031,474	-	\$35,584	\$3,254,053	129,838,596,400
10/11	\$1,836,240	\$334,134	\$1,012,310	-	\$34,030	\$3,216,714	132,046,538,137
11/12	\$1,744,547	\$284,852	\$944,904	-	\$12,217	\$2,986,520	126,574,203,570
12/13	\$1,627,136	\$285,569	\$910,777	-	\$9,925	\$2,833,407	119,326,071,600
13/14	\$1,618,507	\$309,944	\$847,432	-	\$7,789	\$2,783,672	115,845,626,170
14/15	\$1,578,102	\$206,252	\$833,050	-	\$10,275	\$2,627,679	107,514,433,190
15/16	\$1,577,367	\$177,822	\$820,197	-	\$2,998	\$2,578,384	106,187,889,200
16/17	\$1,518,906	\$219,918	\$853,716	-	\$1,000	\$2,594,364	100,908,539,600

b. Utility Cost per sq. /ft.

Fiscal Year	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Electrical	\$1.17	\$1.181	\$1.21	\$1.12	\$1.41	\$1.58	\$1.60	\$1.65	\$1.65	\$1.39	\$1.21	\$1.20	\$1.17	\$1.17	\$1.13
Nat. Gas	\$0.55	\$0.50	\$0.45	\$0.46	\$0.36	\$0.48	\$0.44	\$0.31	\$0.30	\$0.23	\$0.21	\$0.23	\$0.15	\$0.13	\$0.16
Water/Sewage	\$0.75	\$0.84	\$0.93	\$0.94	\$0.94	\$1.01	\$0.86	\$0.93	\$0.91	\$0.75	\$0.68	\$0.63	\$0.62	\$0.61	\$0.63
Total Utility	\$2.54	\$2.58	\$2.68	\$2.52	\$2.71	\$3.06	\$2.89	\$2.89	\$2.85	\$2.37	\$2.10	\$2.06	\$1.95	\$1.92	\$1.93

c. Utility Cost per Student.

02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
\$466	\$446	\$412	\$416	\$482	\$548	\$522	\$488	\$464	\$478	\$452	\$444	\$420	\$400	\$414

d. Enrollment

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
4,722	5,027	5,632	5,827	5,937	6,303	6,235	6,664	6,940	6,251	6,269	6,222	6,269	6,441	6,268

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FISCAL YEARS ENERGY EVALUATIONS PER ANNUAL REPORT

ENERGY EVALUATION						
Fiscal Year	Energy \$ Avoided	Energy \$/Gsf	\$/Mmbtu	\$/Mmbtu %Change	Btu/Sf	Btu/Sf % Change
02/03		\$1.76	\$13.38		131,194	
03/04	\$65,505	\$1.71	\$13.57	1%	125,707	-4%
04/05	\$93,633	\$1.70	\$13.78	3%	123,471	-6%
05/06	\$170,519	\$1.59	\$13.47	1%	117,993	-10%
06/07	\$378,379	\$1.79	\$16.40	23%	109,189	-17%
07/08	\$266,327	\$2.09	\$17.76	33%	117,749	-10%
08/09	\$183,001	\$2.06	\$16.96	27%	121,520	-7%
09/10	\$281,692	\$1.99	\$17.12	28%	116,437	-11%
10/11	\$237,857	\$1.98	\$16.69	25%	118,417	-10%
11/12	\$618,574	\$1.62	\$16.13	21%	100,687	-23%
12/13	\$919,851	\$1.43	\$16.11	20%	88,738	-32%
13/14	\$1,012,366	\$1.44	\$16.71	25%	86,150	-34%
14/15	\$1,150,098	\$1.33	\$16.69	25%	79,955	-39%
15/16	\$1,162,784	\$1.31	\$16.56	24%	78,968	-40%
16/17	\$1,302,480	\$1.29	\$17.25	29%	75,042	-43%

b. Fiscal Years Water and Sewer Evaluations per Annual Report

WATER/SEWER EVALUATION					
Fiscal Year	Water \$ Avoided	\$/Kgal	\$/Kgal %Change	Gal/Sf	Gal/Sf %Change
02/03		\$21.21		35.24	
03/04	-\$82,184	\$21.21	0%	39.64	12%
04/05	-\$164,370	\$21.21	0%	44.05	25%
05/06	-\$180,955	\$21.21	0%	44.14	25%
06/07	-\$199,872	\$21.21	0%	44.22	26%
07/08	-\$231,956	\$22.71	7%	44.40	26%
08/09	-\$18,032	\$23.83	12%	35.92	2%
09/10	\$3,621	\$26.34	24%	35.11	0%
10/11	\$17,146	\$26.20	24%	34.65	-2%
11/12	\$305,186	\$28.22	33%	26.63	-24%
12/13	\$402,599	\$27.72	31%	24.44	-31%
13/14	\$494,013	\$28.31	33%	22.26	-37%
14/15	\$508,395	\$28.31	33%	21.88	-38%
15/16	\$521,248	\$28.31	33%	21.54	-39%
16/17	\$487,727	\$28.31	33%	22.43	-36%

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SUPPLY SIDE: ACTION PLAN

Because utility consumption is impacted and consumed in some manner by each and every one interacting with the campus facilities we will continue to expand and implement the following actions:

- a) Educate and engage students, faculty and staff about the benefits of energy and water conservation as well as the goals of this plan. Engage campus populations through on-boarding, orientations, staff meetings, website, social media, email and other available forms of communication. Host energy and water reduction competitions.
- b) Continue accurate measurements and analysis of electricity, fossil-based fuels and water usage. Conduct periodic reviews of utility billing invoicing, rates and consumption with utility suppliers. Monitor consumption, study trends and investigate any anomalies.
- c) Review costs and benefits associated with available utility supplier programs, rebate strategies, alternative power purchase agreements.
- d) Update campus design and construction standard guidelines and operations practices to reflect all current energy and water conservation mandates, commitments and goals.
- e) Continue to increase capacity of on-site renewable energy sources as feasible and resources permit. This includes solar photovoltaic (PV) panels associated with the plug-in electric vehicle charging program, solar PV associated with the new School of Business Building (which is planned to be energy net positive or at least net zero), solar thermal water heating where appropriate and other applications and technologies as become available. Continue to integrate these technologies with academic programs.
- f) Continue to benchmark progress, share and compare lessons learned and best practices with peer institutions.

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DEMAND SIDE: ACTION PLAN

- a) Control where applicable, building temperature and lighting settings—striving to shut off lighting when spaces are unoccupied and the following heating and cooling standards:

	When Occupied	When Unoccupied
Summer	73-75 degrees Fahrenheit	80 degrees Fahrenheit max.
Winter	70-72 degrees Fahrenheit	63 degrees Fahrenheit min.

- b) Install energy saving equipment, materials, systems and measures through available funding sources, capital improvement projects, repair and renovation projects, House Bill 1292 funds and related opportunities. This includes upgrade, retrofit, replacement, etc. of building systems and equipment with equipment that is more energy efficient. This includes water efficiency as well. Ensure life-cycle cost analysis and return on investment numbers are favorable. Coordinate this with other deficiencies, such as identification on the Facilities Condition Assessment Program (FCAP) list or Six-Year Repair and Renovation list or a subproject appropriately incorporated with a capital improvement project, etc.
- c) Continue working with all campus departments and units, especially the Department of Information Technology (DoIT) to integrate energy-saving, paper saving and other resource conservation measures and technologies throughout campus.
- d) Provide energy management system, building controls and other technical training to staff. Work to further develop and improve this expertise as well as the ability to better maintain and operate all systems associated with the campus's newer high-performing buildings.

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SIGNATURE PAGE

Strategic Energy and Water Plan

I have read and support this Strategic Energy and Water Plan for my Organization.

David Hatch, Interim Associate Vice Chancellor for Facilities Management

Signed:  Date: 9/20/17

W. Stewart Thomas, Vice Chancellor for Finance & Administration

Signed:  Date: 9/20/17

Robin G. Cummings, Chancellor

Signed:  Date: 9/21/17

This strategic energy and water mandate serves as a memorandum of agreement to support strategic energy and water plans for the State of North Carolina's Utility Savings Initiative.

_____ Date: _____

Manager, Utility Savings Initiative, NC DEQ

