



ECU Strategic Energy & Water Plan (2022-2023)

TABLE OF CONTENTS

Executive Summary	1
Summary of Referenced Data	5
Energy Performance Summary	6
Supply Strategies / Tactics	7
Past 12 Months.....	7
Next 12 Months.....	7
Demand Strategies / Tasks	8
Past 12 Months.....	8
Next 12 Months.....	9
Awareness and Training Strategies / Tactics	10
Past 12 Months.....	10
Next 12 Months.....	11
Water Management Strategies	12
Past 12 Months.....	12
Next 12 Months.....	12
Declaration	13
Signature Page.....	15
Energy and Water Consumption Data	Appendix A

EXECUTIVE SUMMARY

General

The preparation of the 2022 - 2023 ECU Strategic Energy and Water Plan involved consolidating responses by the departments in Campus Operations related to procedural changes or projects that contributed to the conservation of energy or water. This year's plan documents Campus Operations' successes related to energy and water conservation based on the availability of funding sources, be they operating, repair and renovation, or energy savings carry forward.

Analysis

Through the continued efforts of Campus Operations and the East Carolina University community, the institution has realized a 31% decrease in its energy consumption and a 53% reduction in water consumption in 2021-2022 from the FY 2003 baseline. When compared to the previous year, electrical consumption increased 2.5% per gross square foot while natural gas usage increased by 1.0%. A portion of these increases are due in part to ECU constructing the new Life Sciences and Biotechnology Building. The 139,771 square foot laboratory and research building has domestic hot water and heating provided by natural gas fired boilers. The air conditioning is provided by chilled beams with displacement air, conditioned by 100% outdoor air units. Chilled water is provided by a central chiller plant, and energy recovery is provided by water coils in the exhaust air stream.

“The institution has realized a 31% decrease in its energy consumption and a 53% reduction in water consumption since our FY 2003 baseline”

There was a leak in the natural gas line that feeds the main campus steam plant, requiring a switch to fuel oil for a period during October 2021, contributing to an increase in #2 fuel oil usage in FY 21/22. Although the energy content of fuel oil compares favorably with natural gas, it is significantly more expensive and has a greater negative impact on ECU's “carbon footprint”.

The energy consumption data included in this report is “raw” metered data (i.e., it does not take temperature variations into account). To better appreciate ECU’s effort to improve energy efficiency, the top chart on page 4, “ECU Annual Energy Consumption” includes a weather-normalized view of the total energy usage per square foot. The weather-normalized EUI (Energy Utilization Index) shows a decrease of 4.7% since our 2002-2003 baseline. Over this same period, we experienced an increase in the campus gross square footage of 64%.

“When compared to the previous year, electrical consumption increased 2.5% per gross square foot, while natural gas usage saw a 1.0% increase”

During FY 2022, ECU completed the optimization of Central Chiller Plants 1 and 2. Part of the optimization was to re-establish water side economizing in Central Chiller Plant 1. This optimization should reduce energy required to produce chilled water.

Energy Carry Forward (ECF) funds were utilized to continue the optimization of the Brewster Building. Constructed in 1970, this 118,456 gross square foot building is organized into four distinct wings. The project was phased over four years, started with the B-wing three years ago, followed by the C-wing, D-wing, and the A-wing this year. This optimization project will replace the obsolete pneumatic controls with new electronic controls that will enable us to setback during holidays, weekends, and periods of lower occupancy.

Excluding the COVID period anomaly, ECU continued to drive down water usage per gross square foot, reaching our highest level of reduction since our baseline year of 53.4% since the 2002-2003 baseline. Rain Bird Smart Irrigation Controllers were continued to be deployed with this last year being installed on our largest lawn area on Main Campus, which is referred to as The Mall. This will enable our grounds team to optimize the irrigation program as this system utilizes weather and evapotranspiration data to automate the irrigation schedules.

“ECU continued to drive down water usage per gross square foot, reaching our highest level of reduction since our baseline year of 53.4% since the 2002-2003 baseline.”

ECU continued replacing the failing steam infrastructure serving our College Hill housing neighborhood, completing the first phase earlier this past fiscal year with two more phases scheduled to begin construction this FY. These projects have replaced the old, deteriorating lines with new, pre-insulated ones that will improve condensate return to the plant and reduce our energy losses in transmission.

On October 29, 2018, Governor Roy Cooper issued Executive Order No. 80 establishing targets for Greenhouse Gas emission reductions throughout North Carolina. One of the order's specific actions directs a 40% reduction in energy consumption (per square foot) of state-owned buildings by the end of fiscal year 2025. The baseline continues to be our FY 2003 level. Most recently, in January of this year, Governor Roy Cooper issued Executive Order No. 246, affirming North Carolina's commitment to a clean energy economy and directing next steps in the state's plan to achieve net-zero greenhouse gas emissions and create economic opportunities across the state of North Carolina. This increased the statewide goal to a 50% reduction from the 2005 levels by 2030 and achieving net-zero by 2050.

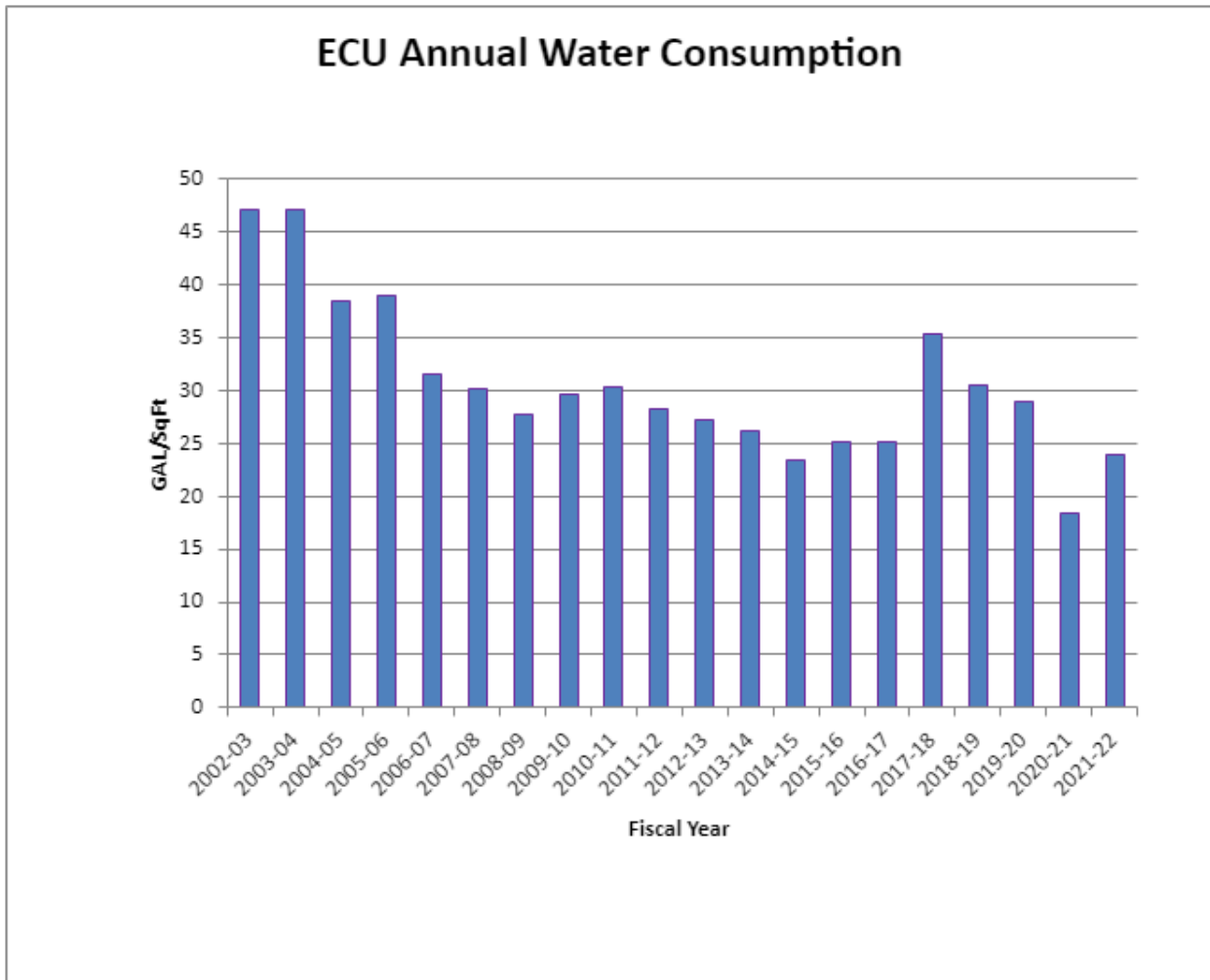
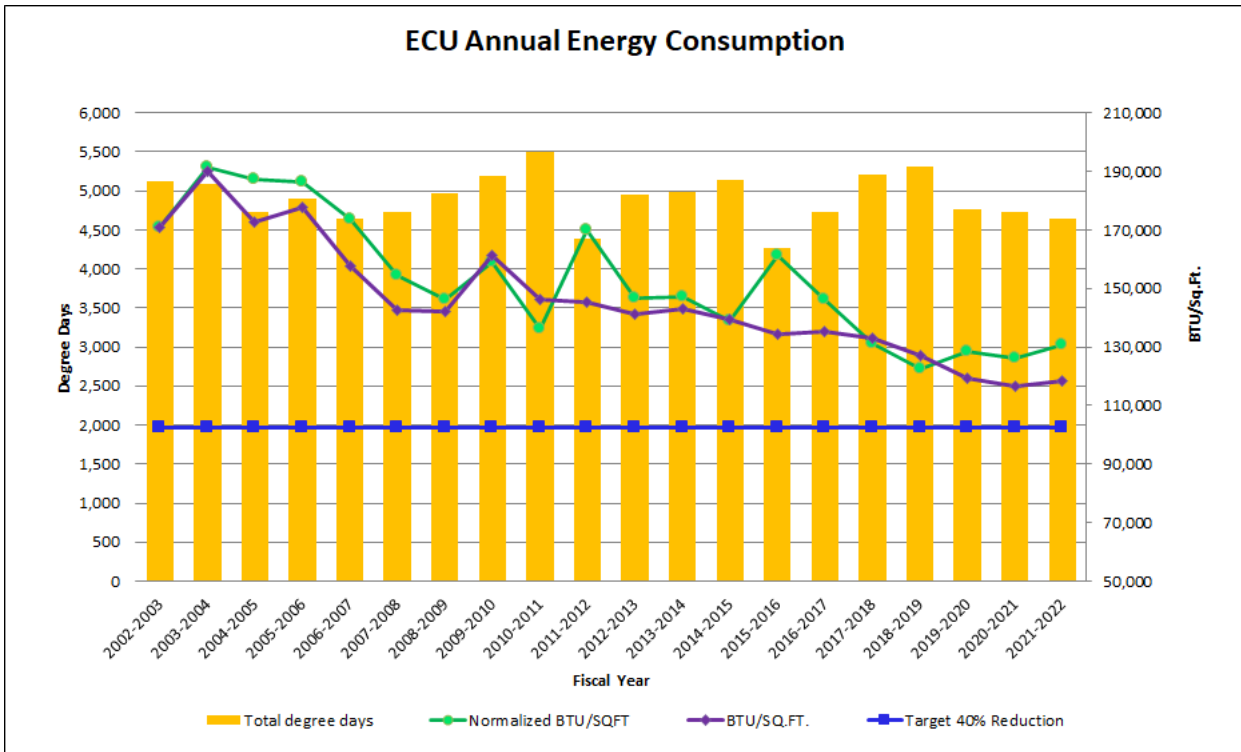
For ECU to achieve targeted energy consumption goals, substantial reductions must still be realized. These reductions will require both the continued replacement of less efficient equipment utilized on campus as well as making behavioral changes in how campus facilities are operated. Over the next twelve months, ECU will continue to pursue equipment upgrades, retrofits, and conversions, while also ensuring the campus is operated as efficiently as possible. These endeavors will be undertaken without compromising our primary missions of education and research. This will include such actions as continuing to establish and maintain building operating schedules and defining optimal building operating parameters for energy intensive locations, such as research labs. These efforts, combined with continued campus community education and involvement, will continue to allow ECU to move closer to targeted reductions.

Griffin Avin
Chief Sustainability Officer

Paul Carlson
Interim Energy Manager

Chad Carwein
University Sustainability Manager

Summary of referenced data



ENERGY PERFORMANCE SUMMARY

(Data is not weather-normalized)

Fiscal Year	Total Utility Costs	Cost / MMBTU	Cost / GSF	BTU / GSF	% Change from 2003
2002-2003	\$11,021,822	\$12.50	\$2.13	170,724	-
2003-2004	\$12,661,561	\$12.32	\$2.33	189,287	10.9%
2004-2005	\$14,277,138	\$14.29	\$2.47	172,569	1.1%
2005-2006	\$17,129,124	\$16.66	\$2.96	177,567	4.0%
2006-2007	\$17,297,153	\$16.30	\$2.56	157,404	-7.8%
2007-2008	\$17,569,897	\$17.14	\$2.44	142,573	-16.5%
2008-2009	\$18,924,248	\$19.16	\$2.72	142,207	-16.7%
2009-2010	\$19,658,784	\$17.71	\$2.86	161,238	-5.6%
2010-2011	\$18,392,943	\$17.84	\$2.61	146,059	-14.4%
2011-2012	\$18,151,180	\$17.58	\$2.56	145,433	-14.8%
2012-2013	\$17,942,582	\$17.15	\$2.42	141,416	-17.2%
2013-2014	\$17,883,685	\$17.13	\$2.43	141,752	-17.0%
2014-2015	\$18,628,334	\$17.97	\$2.51	139,480	-18.3%
2015-2016	\$16,361,605	\$15.93	\$2.14	134,410	-21.3%
2016-2017	\$15,864,576	\$15.35	\$2.08	135,262	-20.8%
2017-2018	\$15,364,652	\$14.88	\$1.98	133,158	-22.0%
2018-2019	\$16,022,036	\$15.18	\$1.93	127,096	-26.0%
2019-2020	\$15,604,175	\$15.50	\$1.85	119,270	-30.1%
2020-2021	\$14,372,208	\$14.96	\$1.72	116,452	-31.8%
2021-2022	\$17,037,778	\$16.66	\$1.97	118,377	-30.7%

SUPPLY

Strategies

- Continue to implement programs and initiatives to make University's energy management more effective.
- Strive to obtain reasonable cost of interruptible natural gas from local provider.

Tactics

PAST 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
Schneider Electric PME Technical Support	Subscription renewed	Subscription renewed	\$0	\$0	\$15,000	0	Griffin Avin	FY 2021 HB1292 Funds
Dude Solutions Technical Support	Subscription renewed	Subscription renewed	\$0	\$0	19,464	0	Griffin Avin	FY 2021 HB 1292 Funds
Completed interviews for Energy Manager	Position approved	Interviews Completed	\$0	\$0	N/A	1	Griffin Avin	Campus Operations Funds
Submitted justification document for Energy Analyst and Sustainability Outreach Specialist positions	Position approved	Under Review	\$0	\$0	N/A	2	Griffin Avin	Campus Operations Funds

NEXT 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
Schneider Electric PME Technical Support	Subscription renewed	Renewal in process	\$0	0	\$15,000	0	Griffin Avin	FY 2022 HB1292 Funds
Utility Manager utility data collection	Subscription renewed	Renewal in process	\$0	0	\$20,000	0	Griffin Avin	FY 2022 HB1292 Funds
Evaluate CHW Thermal Storage at HSC CUP for load management	Evaluation made	In process	TBD	TBD	0	0	Griffin Avin	Part of Medical Education Building Project
Complete Engineering Evaluation for installing rooftop solar arrays at HSC (Warren Life, ECHI, and CUP)	Rooftop Solar Design Report	TBD	TBD	TBD	TBD	0	Griffin Avin / Chad Carwein	FY 2022 HB1292 Funds
Hire Energy Manager	Start in Fall 2022	TBD	N/A	N/A	N/A	1	Griffin Avin	Campus Operations Funds
Create Energy Analyst Position	Post job in Fall 2022	TBD	N/A	N/A	N/A	1	Griffin Avin	Campus Operations Funds

DEMAND

Strategies

- Continue to implement programs and initiatives, install equipment, and renovate buildings to make University buildings more efficient.

Tactics

PAST 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
Steam trap replacements HSC	New traps installed	Complete	N/A	\$7,152	\$10,870	0	James Roberson	FY 2021 HB 1292 Funds
Steam Blanket Main Campus Boilers	Install Blankets	Complete	\$39,463	\$6,288	\$120,000	0	Mike Deyoc	FY 2021 HB 1292 Funds
Retro Commission CCP1 and CCP2	Improved Operational Efficiency	Completed	\$177,099	\$59,033	\$398,060	0	Ray Schmit	FY 2021 HB 1292 Funds
Install thermal window film SODM CSLC (3)	Film Installed	Completed	\$1,972	\$526	\$30,000	0	Donald Crawford	FY 2021 HB 1292 Funds
Upgrade Building Automation System - Carol Belk	Improved Operational Efficiency	Completed	\$25,000	\$3,003	\$166,825	0	Ray Schmit	FY 2021 HB 1292 Funds
Lighting performance Contract savings surplus	State M&V	Completed	NA	\$132,361	NA	0	Griffin Avin	UNC System Lighting Performance Contract

DEMAND (Continued)

Strategies

- Continue to implement programs and initiatives, install equipment, and renovate buildings to make University buildings more efficient.

Tactics

NEXT 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
VAV Controller Replacements - Rivers	Improved Operational efficiency	In Process	20,000	TBD	\$147,600	0	Dan Durham	FY 2022 HB 1292 Funds
VAV Controller Replacements - Flanagan	Improved Operational efficiency	In Process	\$25,000	TBD	\$228,200	0	Dan Durham	FY 2022 HB 1292 Funds
Upgrades Controls from pneumatic to DDC - Brewster	Controls upgrades	In Process	\$31,540	TBD	\$446,300	0	Ray Schmit	FY 2021 HB1292 Funds
VAV Controller Replacements - Old Café	Improved Operational efficiency	In Process	\$5,000	TBD	\$68,200	0	Dan Durham	FY 2022 HB 1292 Funds
Retro Commission CCP3	Improved Operational Efficiency	In Process	\$15,000	TBD	\$78,800	0	Ray Schmit	FY 2022 HB 1292 Funds
ASHRAE Level II Audits of 5-10 buildings with high EUI relative to benchmarks	Final Reports	TBD	TBD	TBD	TBD	0	Griffin Avin	FY 2023 HB 1292 Funds
Conduct Pilot Project to create an In-House Building Retro Commissioning Program	Final Report	TBD	NA	TBD	0	0	Griffin Avin	FY 2023 HB 1292 Funds
Upgrade Lighting to LED - Leo Jenkins	Upgraded Lighting	TBD	N/A	TBD	TBD	0	Griffin Avin	FY 2023 HB 1292 Funds
Occupancy sensors and wireless thermostats for in-house installation	Purchase Devices	TBD	N/A	TBD	TBD	0	Griffin Avin	FY 2023 HB 1292 Funds

AWARENESS & TRAINING

Strategies

- Continue to focus efforts on developing and expanding resources of the ECU Sustainability Committee. Expand efforts to recognize and document efforts to reduce energy consumption and realize savings.

Tactics

PAST 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
University - Participate in the Appalachian Energy Summit	Attend Energy Summit	Energy Summit attended by faculty and staff in July 2019	N/A	N/A	\$0	0	Chad Carwein / Griffin Avin	State Funds - HSC Sustainability
University - Participate in the Sustainability Alliance meeting	Attend Alliance Meeting	Participated in Alliance calls and annual meetings during the App Energy Summit	N/A	N/A	\$0	0	Chad Carwein / Griff Avin	State Funds - HSC Sustainability
Attend AASHE Conference	Attend conference in October 2021	Attended virtually	N/A	N/A	\$300	0	Chad Carwein	State Funds - HSC Sustainability
Hosted Campus Sustainability Day Fair	Hosted by ECU Sustainability Program and Student Clubs	Over 300 students, staff, faculty, and community members stopped by and learned about campus sustainability efforts	N/A	N/A	\$500	0	Chad Carwein	State Funds - HSC Sustainability
Hosted 6th Sustainability Film and Discussion Series	Monthly screenings in fall 2021 and spring 2022	~ 40 attendees at each event on average	N/A	N/A	\$800	0	Chad Carwein	State Funds - HSC Sustainability
Sustainability Manager gave guest lectures and group presentations	About 10-12 presentations per semester	Completed	N/A	N/A	\$0	0	Chad Carwein	N/A
Hosted Earth Day Festival	Hosted by ECU Sustainability Program, Campus Departments, and Student Clubs	Over 500 students, staff, faculty, and community members stopped by and learned about campus sustainability efforts	N/A	N/A	\$500	0	Chad Carwein	State Funds - HSC Sustainability
Update Construction Standards	Incorporate Energy and Water Efficiency Measures	Work in progress, long-term process	N/A	N/A	\$0	0	Griffin Avin	N/A
Continued implementation of the ECU Sustainability Plan	Continued implementation	In process	N/A	N/A	\$0	0	Chad Carwein	State Funds - HSC Sustainability
Complete Greenhouse Gas Emissions Inventory	Complete FY 2020-21 Report	Completed in Fall 2021	N/A	N/A	\$400	0	Chad Carwein	N/A
Submit second AASHE STARS Report for ECU	Earn STARS Silver	STARS Silver earned in February 2020	N/A	N/A	\$600	1 (intern)	Chad Carwein	State Funds - HSC Sustainability
Increase ECU presence on social media	Weekly activity on Facebook, Twitter & Instagram	Increased followers	N/A	N/A	\$0	0	Chad Carwein	N/A

AWARENESS & TRAINING

Strategies

- Continue to focus efforts on developing and expanding resources of the ECU Sustainability Committee. Expand efforts to recognize and document efforts to reduce energy consumption and realize savings.

Tactics

NEXT 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
University - Participate in the Appalachian Energy Summit	Attend Energy Summit in 2023	TBD	N/A	N/A	N/A	0	Griffin Avin	State Funds - HSC Sustainability
University - Participate in the Mid-Year Energy Summit	Attend mid-year meeting in 2023	TBD	N/A	N/A	N/A	0	Griffin Avin	State Funds - HSC Sustainability
Create Sustainability Outreach Specialist Position	Post job in Fall 2022	TBD	N/A	N/A	N/A	0	Griffin Avin	Campus Operations Funds
Attend Virtual AASHE Conference	Sustainability Manager and Chief Sustainability Officer will attend	TBD	N/A	N/A	\$700	0	Chad Carwein/Griffin Avin	State Funds - HSC Sustainability
Host 7 th Annual Sustainability Film and Discussion Series	Monthly screenings held virtually in fall 2020 and spring 2021	TBD	N/A	N/A	\$1,200	0	Chad Carwein	State Funds - HSC Sustainability
Sustainability Manager gives guest lectures and group presentations	About 10-12 presentations per semester	TBD	N/A	N/A	N/A	0	Chad Carwein	N/A
Continue implementation of first ECU Sustainability Plan	Continue Implementation	TBD	N/A	N/A	N/A	0	Chad Carwein	State Funds - HSC Sustainability
Continue Green Office Program	Sign up 1-2 additional offices per semester	TBD	N/A	N/A	N/A	1 (intern)	Chad Carwein	State Funds - HSC Sustainability
Complete Greenhouse Gas Emissions Inventory	Complete FY 2019-20 Report in Fall 2020	TBD	N/A	N/A	\$300	0	Chad Carwein	State Funds - HSC Sustainability
Establish a Building Air Barrier Standard for New Construction (blower door testing)	Posted to Construction Standards website	TBD	N/A	N/A	\$0	0	Griffin Avin	NA

Water Management

Strategies

- Continue to implement programs, initiatives, and equipment that conserve water resources.

Tactics

PAST 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
Upgrade existing irrigation zones to IQ "smart" system	Systems upgraded	Multiple systems upgraded	\$5,000	\$5,117	\$30,000	0	John Gill	FY 2021 HB1292 Funds

NEXT 12 Months' Activities	Measurement		Savings		Cost	Jobs	Assigned to	Funding Source
	Expected	Actual	Expected	Actual				
Complete feasibility study to assess ground water infiltration into Ross Hall basement and distribution tunnel to include reclaim and reuse of water	Complete Study	TBD	TBD	TBD	\$30,000	0	Griffin Avin	Campus Operations Funds

DECLARATION

I have read the 2022-2023 Strategic Energy & Water Plan for East Carolina University. The plan, as presented, supports the reductions required in Senate Bill 668.

William E. Bagnell
Associate Vice Chancellor for Campus Operations