

BUILDING OPPORTUNITIES

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Emma Lineberry, Christine Labuski, Catie Grayson, Erin Nuckols,
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VT 2020 CLIMATE ACTION COMMITMENT UPDATE
PROCESS – SPRING 2020



Buildings Opportunities Subcommittee

John Randolph, Chair CAC Working Group

Erin Hopkins, Assistant Professor, Apparel, Housing, and Resource Management

Anamaria Bukvic, Assistant Professor, Geography

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Christine Labuski, Associate Professor, Sociology

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Kim Briele, Facilities (Engineering Assessment)

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Mike Vellines, Facilities (Construction Standards)

Erin Nuckols, Graduate Student, Environmental Design & Planning

Emma Lineberry, Undergraduate Student, Architecture

Catie Grayson, Undergraduate Student, Environmental Planning & Policy

Yasmine Sikder, Undergraduate Student, Industrial Systems Engineering

Buildings Opportunities Subcommittee

Subcommittee Work Plan

- Review progress and potential in buildings
- Review implementation of existing CAC
- Develop updated CAC goals for new and existing buildings
- Identify pathways to achieve these goals



*Henderson Hall and Theater 101
Virginia Tech's first LEED Gold certified building (2010)*

Preliminary Findings: Buildings

- **All buildings** include campus academic (E&G) buildings (5.36 million ft²), auxiliary buildings (dining and residence halls, athletics, 4.35 million ft²), and off-campus buildings leased for VT operations (CAC geographic footprint includes 47 leased properties, 1.45 million ft²)
- From 2006 to 2019 the campus gross square footage (gsf) grew by 22% while electricity use grew by only 9% due to energy improvements, so **electricity intensity (kWh/gsf) dropped by 14%**.
- The **5-Year Energy Management Plan 2015-20** significantly reduced energy use & costs and GHG from academic (E&G) buildings with an investment of about \$3 million/year with a 5-year payback.

Preliminary Findings: Buildings

- **Governor's E.O 43** requires total electricity consumption reduction of 10% from 2006 by 2022.
- New buildings meet **LEED Silver green buildings standards and ASHRAE 90.1 building code**. Both LEED and ASHRAE standards are upgraded every 3 years
- **Building energy and GHG emissions can be reduced** not only by energy efficiency improvements, but also by smart operations, such as demand response, digital controls, thermostat settings, occupant behavior, and innovative space scheduling especially in summer
- VT building innovation offers **opportunities for research and instruction** by faculty and students



2010



2011



2011



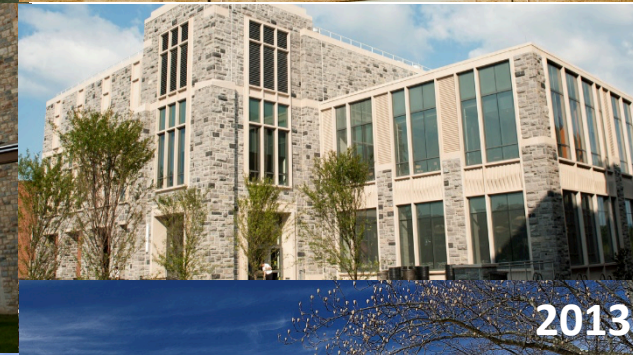
2012



2013



2013



2013



2013



2014



2015



2015



2015



2016



2017



2017

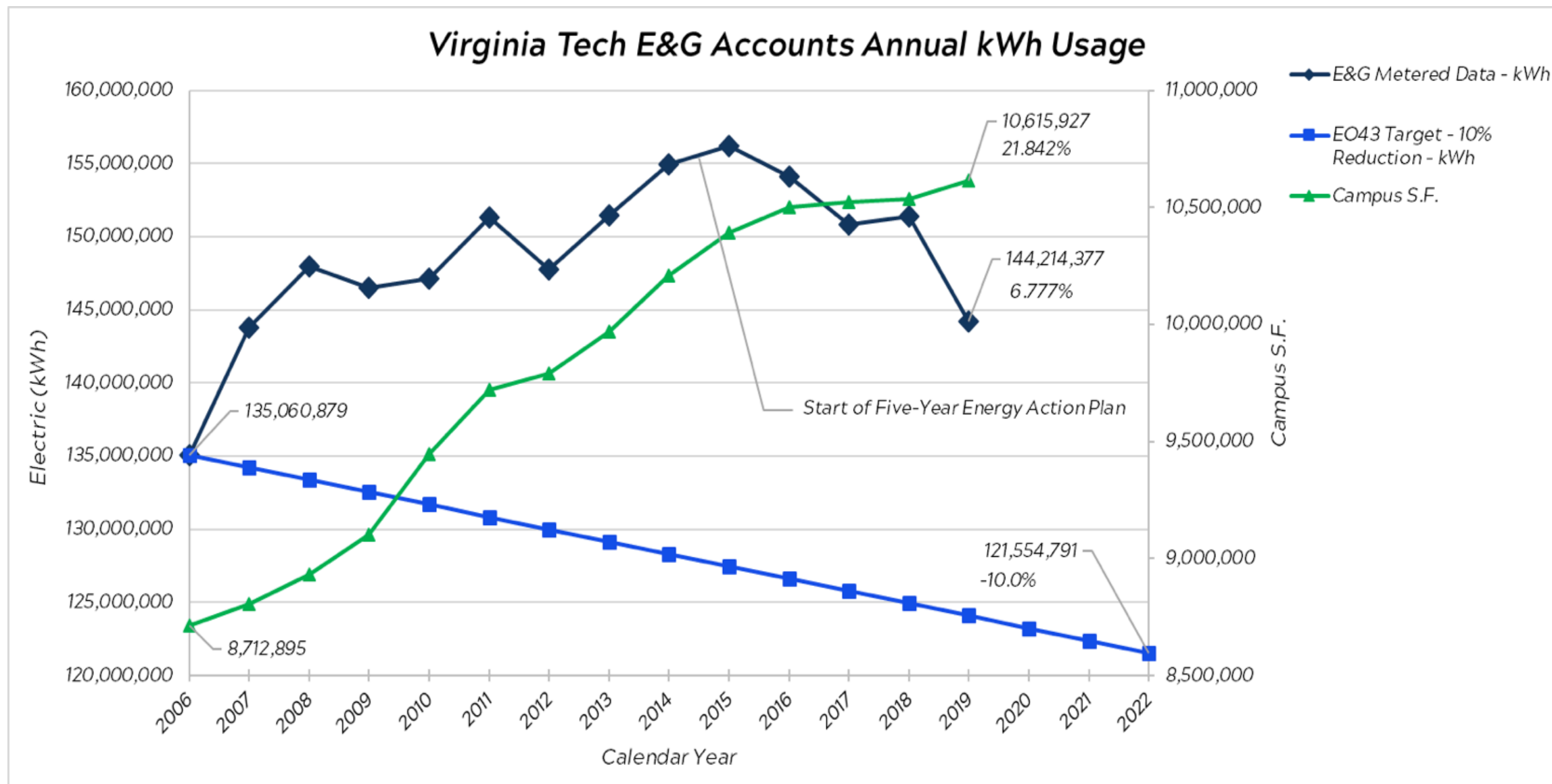


2018

Year 2 of 2015-20 5-Year Energy Management Plan

Energy Conservation Measure/Program	Estimated Cost, \$	Estimated Savings, \$	As-built Cost, \$	As-built Savings, \$	Payback, Yr
Implement various energy retrofit projects identified in Phase I	2,855,000	674,796	2,515,793	630,081	4.0
Install new steam meters in the buildings	550,000	75,000	540,019	70,034	7.7
Integrate more buildings to ICONICS	90,000	50,000	72,120	35,080	2.1
Retro-commissioning program	50,000	25,000	43,981	40,102	1.1
Part-time students	15,000	-	15,000	-	-
TOTAL	3,560,000	824,796	3,186,913	775,297	4.1

2006-2019 Campus Growth, E&G Electricity Impact of 5-year Energy Management Plan, E.O. 43 2022 mandate

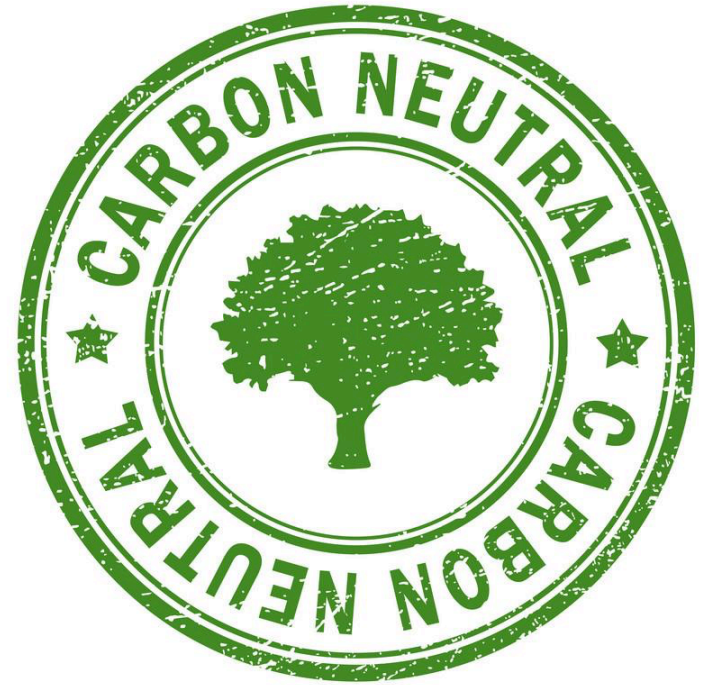


Overall CAC Goal: Carbon Neutral Campus by 2030



Preliminary Goals: Buildings

- **By the end of 2022** reduce total electricity consumption (kWh) by 10% and electricity intensity (kWh/gross square foot) by 20% below 2006 levels.
- **In 2021-30**, employ latest LEED Silver + ASHRAE 90.1 energy standards for new buildings
- **In 2021-30**, deploy 10-year energy management retrofit to reduce total energy use in all buildings by 10% and energy use intensity by 20% below 2020.
- **By 2030** all new buildings will be energy-carbon neutral with on-site solar production (kWh) equivalent to steam plant heat (natural gas Btu)



Preliminary Goals and Pathways: Buildings

PRELIMINARY GOALS:

- By the end of 2022 reduce total electricity consumption (kWh) by 10% and electricity intensity (kWh/gross square foot (gsf)) by 20% below 2006 levels.
- In 2021-30, employ latest LEED Silver + ASHRAE 90.1 energy standards for new buildings
- In 2021-30, deploy 10-year energy management retrofit to reduce total energy use in all buildings by 10% and energy use intensity (EUI=Btu +kWh/gsf) by 20% below 2020.
- By 2030, all new buildings will be energy-carbon neutral

Preliminary Goals and Pathways: Buildings

POTENTIAL PATHWAYS TO GOAL:

- Continue to upgrade new building efficiency guidelines conforming to latest LEED Silver and ASHRAE 90.1 standards and considering latest ASHRAE 189.1 guidelines.
- By 2022, reduce total EUI in newly initiated buildings by 20% compared to 2020 existing buildings.
- By 2026, build a signature zero-net-energy (ZNE) campus building as a showcase & learning model.
- By 2028, newly initiated building efficiency improvements will reduce total energy use intensity (EUI) in new buildings by 40% compared to 2020 existing buildings
- 100% renewable electricity by 2030 will reduce current GHG emissions by 50%

CLIMATE ACTION COMMITMENT UPDATE

Thank you for your attention.
We invite you to engage.

Please visit the CAC website (link below) to:

- Watch the other committee videos
- Read the CAC Interim Report
- Complete the climate action survey
- Register for a Zoom forum
- Engage through an online bulletin board
- Contact us

<https://svpoa.vt.edu/index/VTCACRevision.html>