Open Session Minutes

BUILDINGS AND GROUNDS COMMITTEE

Monday, November 18, 2024

Open Session Tour

The Buildings and Grounds Committee of the Board of Visitors of Virginia Polytechnic Institute and State University convened on Monday, November 18, 2024 at 1:30 p.m. in open session to depart for a tour of university facilities. A quorum of the Committee was present. Mr. Horsley presided as Acting Committee Chair in Ms. Long's absence.

Board members present: Ed Baine (Rector), David Calhoun (Vice Rector), Donald Horsley (Acting Committee Chair), Nancy Dye, Bill Holtzman, Anna James, Starlette Johnson, Ryan McCarthy, J. Pearson, Jeanne Stosser, Janice Austin (A/P Faculty Representative), LaTawnya Burleson (Staff Representative), Rachel Miles (Faculty Representative), Leslie Orellana (Undergraduate Student Representative), William Poland (Graduate and Professional Student Representative)

University personnel and guests: President Tim Sands, Ted Acord, Noah Alderman, Cassidy Blackmore, Cyril Clarke, Meghan Marsh, Nam Nguyen, Kim O'Rourke, Todd Robertson, Jeremiah Ruley, Brennan Shepard, Dwyn Taylor, Chris Tedder, Jon Clark Teglas

1. **Tour of University Facilities:** The Committee participated in a tour of university facilities.

    a. **Power Plant:** The Power Plant opened in 1901 and is located on the Blacksburg campus at the intersection of Barger and Turner Streets. The Power Plant generates an annual steam output of approximately 943 billion BTUs (British thermal units) and provides campus buildings with a portion of their heat, hot water, and electricity needs. There are six boilers at the plant that produce the steam necessary for operations. The extensive network of underground steam tunnels provides heat to more than 6.8 million square feet of campus buildings. Operating the plant to maintain everyday activities of the university is facilitated by stringent safety and environmental protection protocols, including safety training, annual equipment inspections, close monitoring of nitrogen oxide (NOx) output levels, and more.

    b. **Southwest Chiller Plant:** The Southwest Chiller Plant opened in 2014 and is located in the Life Sciences District of the Blacksburg campus in the Duckpond Drive parking lot. The Southwest Chiller Plant has three machines that produce and distribute chilled water to the southwest portion of campus. Completed in 2021, the Chiller Plant Phase II capital project connected the Southwest and North Chiller plants. This improved the water

capacity on campus as well as added and updated equipment to maximize the existing plant footprint and optimize chilled water flow.

The tour concluded and the Committee returned to the Inn at Virginia Tech and Skelton Conference Center at 3:20 p.m.

****

Tuesday, November 19, 2024

Open Session Meeting

The Buildings and Grounds Committee of the Board of Visitors of Virginia Polytechnic Institute and State University met in open session on Tuesday, November 19, 2024 at 10:00 a.m. in Latham Ballroom A of the Inn at Virginia Tech and Skelton Conference Center in Blacksburg, Virginia. A quorum of the Committee was physically present. Mr. Horsley presided as Acting Committee Chair in Ms. Long's absence.

Board members present: Ed Baine (Rector), Donald Horsley (Acting Committee Chair), Nancy Dye, Bill Holtzman, J. Pearson, Jeanne Stosser, Leslie Orellana (Undergraduate Student Representative), William Poland (Graduate and Professional Student Representative)

**One Board member participated remotely from their home for medical reasons in accordance with Code of Virginia §2.2-3708.3(B).*

University personnel and guests: President Tim Sands, Lynsay Belshe, Cassidy Blackmore, Cyril Clarke, Al Cooper, April DeMotts, Mark Gess, Emily Gibson, Dan Givens, Dee Harris, Frances Keene, Lu Liu, Rob Mann, Megan Marsh, Jeff Mitchell, Nam Nguyen, Jeff Orzolek, Mark Owczarski, Charlie Phlegar, Amy Sebring, Brennan Shepard, Ken Smith, Mike Staples, Matt Stolte, Dan Sui, Dwyn Taylor, Jon Clark Teglas, Chris Wise, Chris Yianilos,

2. **Welcome and Introductions:** Mr. Horsley convened the meeting and provided welcoming remarks.

3. **Consent Agenda:** The Committee accepted the Consent Agenda as presented and approved the items it contained.

   a. **Minutes from the August 2024 Committee Meeting:** The Committee approved the minutes from its August 2024 meeting.

   b. **Acceptance of the Capital Project Status Report:** The Committee accepted the quarterly capital project status report. The current active portfolio of projects includes 18 authorized projects – active and complete (within a 1-year warranty phase) – with a total value of approximately $1 billion, adds approximately 1.2

million gross square feet of new construction, and renovates nearly 298,000 gross square feet of existing space.

c. **Annual Report on Sustainability:** The Committee accepted the annual report on sustainability. Virginia Tech serves as a model community for a sustainable society and is committed to advancing sustainability in academics (curriculum and research), engagement, operations, planning, and administration. The university maintains a gold rating from the Association for Advancement of Sustainability in Higher Education (AASHE) using the Sustainability Tracking, Assessment, and Rating System (STARS).

 # + **Overview of Energy and Utilities:** The Committee received an overview of the university's energy and utilities portfolio from Nam Nguyen, Executive Director for Energy and Utilities. One of four primary business lines within the university's Facilities Division, the Energy and Utilities team includes the Power Plant, Chilled Water Plant, Virginia Tech Electric Service, Mechanical Utilities, and Office of Energy Management. Core focus areas for the team include safety, reliability, asset management, energy conservations, and energy efficiency.

 # + 5. **Update on the Utilities Master Plan:** The Committee received an update on the Utilities Master Plan from Matt Stolte, University Engineer. In 2018, Virginia Tech completed its most recent campus master planning effort resulting in 'Beyond Boundaries 2047: The Campus Plan. In 2020, Virginia Tech revised its Climate Action Commitment, setting sustainability goals and milestones thru 2050. The Utilities Master Plan will provide a comprehensive utilities framework to ensure that future programmatic needs are met and that the university remains a leader in the field of higher education infrastructure. The project is underway and expected to be completed in 2025.

6. **Future Agenda Items and Closing Remarks:** The Committee discussed potential topics for inclusion on future meeting agendas.

There being no further business, the meeting adjourned at 10:59 a.m.

****

Joint Open Session with the Finance and Resource Management Committee

The Buildings and Grounds Committee and the Finance and Resource Management Committee of the Board of Visitors of Virginia Polytechnic Institute and State University convened on Tuesday, November 19, 2024 at 8:15 a.m. in joint open session in Latham Ballroom B of the Inn at Virginia Tech and Skelton Conference Center in Blacksburg, Virginia. A quorum of the joint Committee was present.

Board members present: Ed Baine (Rector), David Calhoun (Vice Rector), Sandy Davis*, Nancy Dye, Don Horsley, Anna James, Starlette Johnson, Ryan McCarthy, Jim Miller, J. Pearson, John Rocovich, Janice Austin (A/P Faculty Representative), LaTawnya

Burleson (Staff Representative), Leslie Orellana (Undergraduate Student Representative)

**One Board member participated remotely from their home for medical reasons in accordance with Code of Virginia §2.2-3708.3(B).*

University personnel and guests: President Tim Sands, Simon Allen, Beth Armstrong, Mac Babb, Callan Bartel, Lynsay Belshe, Jeff Earley, Thomas Feeley, Suzanne Gooding, Kay Heidbreder, Tim Hodge, Andrew Jessup, Anne Keeler, Frances Keene, Sharon Kurek, Katie Lynch, Rob Mann, Elizabeth McClanahan, Nancy Meacham, Laurel Minor, Mike Mulhare, Kim O'Rourke, Mark Owczarski, Charlie Phlegar, Amy Sebring, Brennan Shepard, Ken Smith, Mike Staples, Michael Stowe, Dan Sui, Monecia Taylor, Dwyn Taylor, Jon Clark Teglas, Mike Walsh, Jake Wierer

1. **Approval of Resolution for a Capital Planning Project for a New Virginia Tech Rescue Squad Facility:** The Committees reviewed for approval a resolution for a $2 million capital planning project for a new Virginia Tech rescue squad facility, to be located on Oak Lane. This project is for an approximately 12,500 gross square foot building and the estimated total project cost is $16 million.

   The Committees recommended the Resolution for a Capital Planning Project for a New Virginia Tech Rescue Squad Facility to the full Board for approval.

There being no further business, the meeting adjourned at 8:22 a.m.

****

Open Session Agenda

BUILDINGS AND GROUNDS COMMITTEE

Monday, November 18, 2024

Tour begins at 1:30 p.m. at the Power Plant.

		Agenda Item	Reporting Responsibility
	1.	Tour of University Facilities	Dwyn Taylor
		a. Power Plant	
		b. Southwest Chiller Plant	

Tuesday, November 19, 2024

Open session meeting begins at 10:00 a.m. in Latham Ballroom A of the Inn at Virginia Tech and Skelton Conference Center.

		Agenda Item	Reporting Responsibility
	2.	Welcome and Introductions	Donald Horsley
	3.	Consent Agenda	Donald Horsley
		a. Minutes from the August 2024 Committee Meeting	Dwyn Taylor
		b. Acceptance of the Capital Project Status Report	
		c. Annual Report on Sustainability	
# +	**4.**	Overview of Energy and Utilities	Nam Nguyen
# +	**5.**	Update on the Utilities Master Plan	Matt Stolte
	6.	Future Agenda Items and Closing Remarks	Donald Horsley

*** Requires Full Board Approval**
 # Discusses Enterprise Risk Management Topic(s)
+ Discusses Strategic Investment Priorities Topic(s)

Attachment D

Open Joint Session Agenda

FINANCE AND RESOURCE MANAGEMENT COMMITTEE
AND BUILDINGS AND GROUNDS COMMITTEE

8:15 a.m.
Latham Ballroom B, the Inn at Virginia Tech

November 19, 2024

		Agenda Item	Reporting Responsibility
*	1.	Approval of Resolution for a Capital Planning Project for a New Virginia Tech Rescue Squad Facility	Simon Allen Dwyn Taylor Rob Mann

*** Requires full Board approval**
 # Discusses Enterprise Risk Management topic(s)
+ Discusses Strategic Investment Priorities topic(s)

Tour of Power Plant

BUILDINGS AND GROUNDS COMMITTEE

Monday, November 18, 2024

Location Summary

The Power Plant opened in 1901 and is located on the Blacksburg campus at the intersection of Barger and Turner Streets. The Power Plant generates an annual steam output of approximately 943 billion BTUs (British thermal units) and provides campus buildings with a portion of their heat, hot water, and electricity needs.

There are six boilers at the plant that produce the steam necessary for operations. The extensive network of underground steam tunnels provides heat to more than 6.8 million square feet of campus buildings.

Operating the plant to maintain everyday activities of the university is facilitated by stringent safety and environmental protection protocols, including safety training, annual equipment inspections, close monitoring of nitrogen oxide (NOx) output levels, and more.

Tour of Southwest Chiller Plant

BUILDINGS AND GROUNDS COMMITTEE

Monday, November 18, 2024

Location Summary

The Southwest Chiller Plant opened in 2014 and is located in the Life Sciences District of the Blacksburg campus in the Duckpond Drive parking lot. The Southwest Chiller Plant has three machines that produce and distribute chilled water to the southwest portion of campus.

Completed in 2021, the Chiller Plant Phase II capital project connected the Southwest and North Chiller plants. This improved the water capacity on campus as well as added and updated equipment to maximize the existing plant footprint and optimize chilled water flow.

CAPITAL PROJECT STATUS REPORT

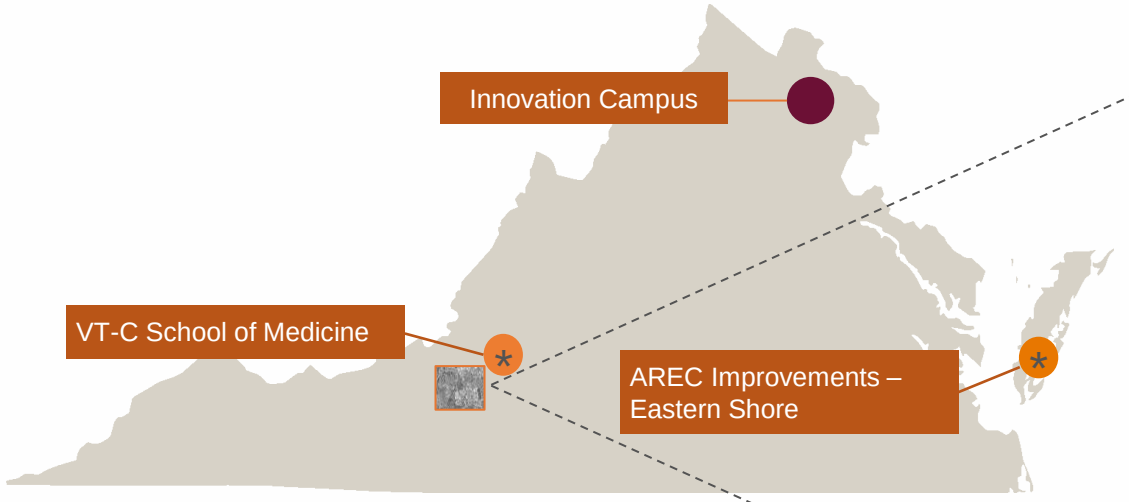
PREPARED FOR THE BUILDINGS AND GROUNDS COMMITTEE OF THE BOARD OF VISITORS

November 19, 2024

CAPITAL PROJECT PORTFOLIO

- 18 authorized projects -- active and complete (w/in 1-year warranty phase)
- Total value of ~$1.0B
- Generates ~1.2M gross square feet (GSF) of new construction
- Renovates nearly 298K GSF of existing space

CAPITAL PROJECT PORTFOLIO



LEGEND

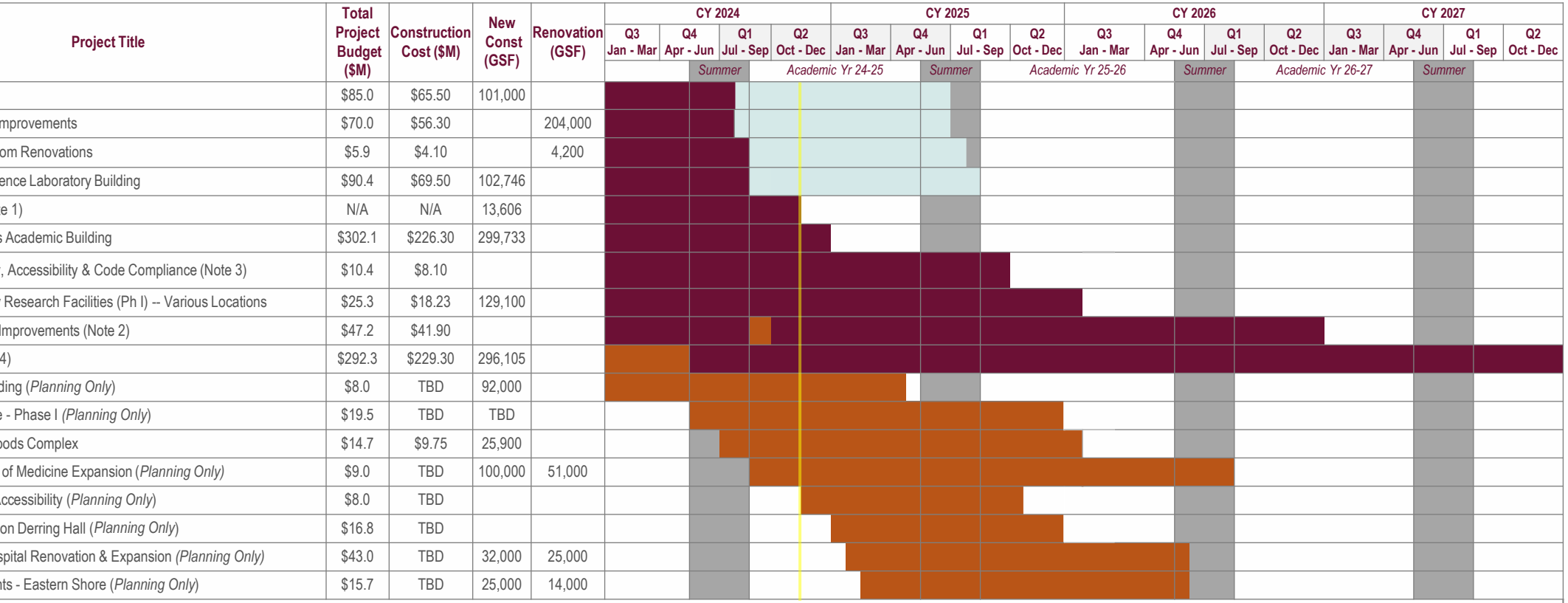
- In Design
- Under Construction
- Warranty/Complete
- * Planning Authorization Only

Blacksburg Campus

CAPITAL CONSTRUCTION EXECUTIVE SUMMARY (PROGRESSIVE)

Date Prepared: 31 OCT 2024

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)
HITT Hall	$85.0	$65.50	101,000	
Student Wellness Improvements	$70.0	$56.30		204,000
Football Locker Room Renovations	$5.9	$4.10		4,200
Undergraduate Science Laboratory Building	$90.4	$69.50	102,746	
Transit Center (Note 1)	N/A	N/A	13,606	
Innovation Campus Academic Building	$302.1	$226.30	299,733	
Life, Health, Safety, Accessibility & Code Compliance (Note 3)	$10.4	$8.10		
Livestock & Poultry Research Facilities (Ph I) -- Various Locations	$25.3	$18.23	129,100	
Building Envelope Improvements (Note 2)	$47.2	$41.90		
Mitchell Hall (Note 4)	$292.3	$229.30	296,105	
New Business Building (*Planning Only*)	$8.0	TBD	92,000	
Student Life Village - Phase I *(Planning Only)*	$19.5	TBD	TBD	
Improve Center Woods Complex	$14.7	$9.75	25,900	
VT-Carilion School of Medicine Expansion (*Planning Only)*	$9.0	TBD	100,000	51,000
Improve Campus Accessibility (*Planning Only*)	$8.0	TBD		
Envelope Restoration Derring Hall (*Planning Only*)	$16.8	TBD		
CVM Teaching Hospital Renovation & Expansion *(Planning Only)*	$43.0	TBD	32,000	25,000
AREC Improvements - Eastern Shore (*Planning Only*)	$15.7	TBD	25,000	14,000
TOTALS	$1,063.30		1,217,190	298,200



LEGEND	Design	Construction	Warranty	Construction Phase TBD

NOTE 1 Non-Virginia Tech project

NOTE 2 Building Envelope Improvements includes four (4) phases: (1) Lane Stadium (complete), (2) Torgerson (construction procurement underway), followed by (3) Hahn, and (4) Inn at Virginia Tech which are currently unscheduled

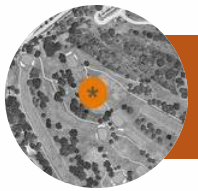
NOTE 3 Life, Health, Safety Acc. & Code Compliance includes three (3) phases: (1) Exterior Elevator Towers (complete) followed by Green Link Priorities 2 (construction underway) & 3 (construction procurement underway)

NOTE 4 Multiple GMPs results in design/construction overlap (fast track)

IN DESIGN

PROJECTS IN DESIGN

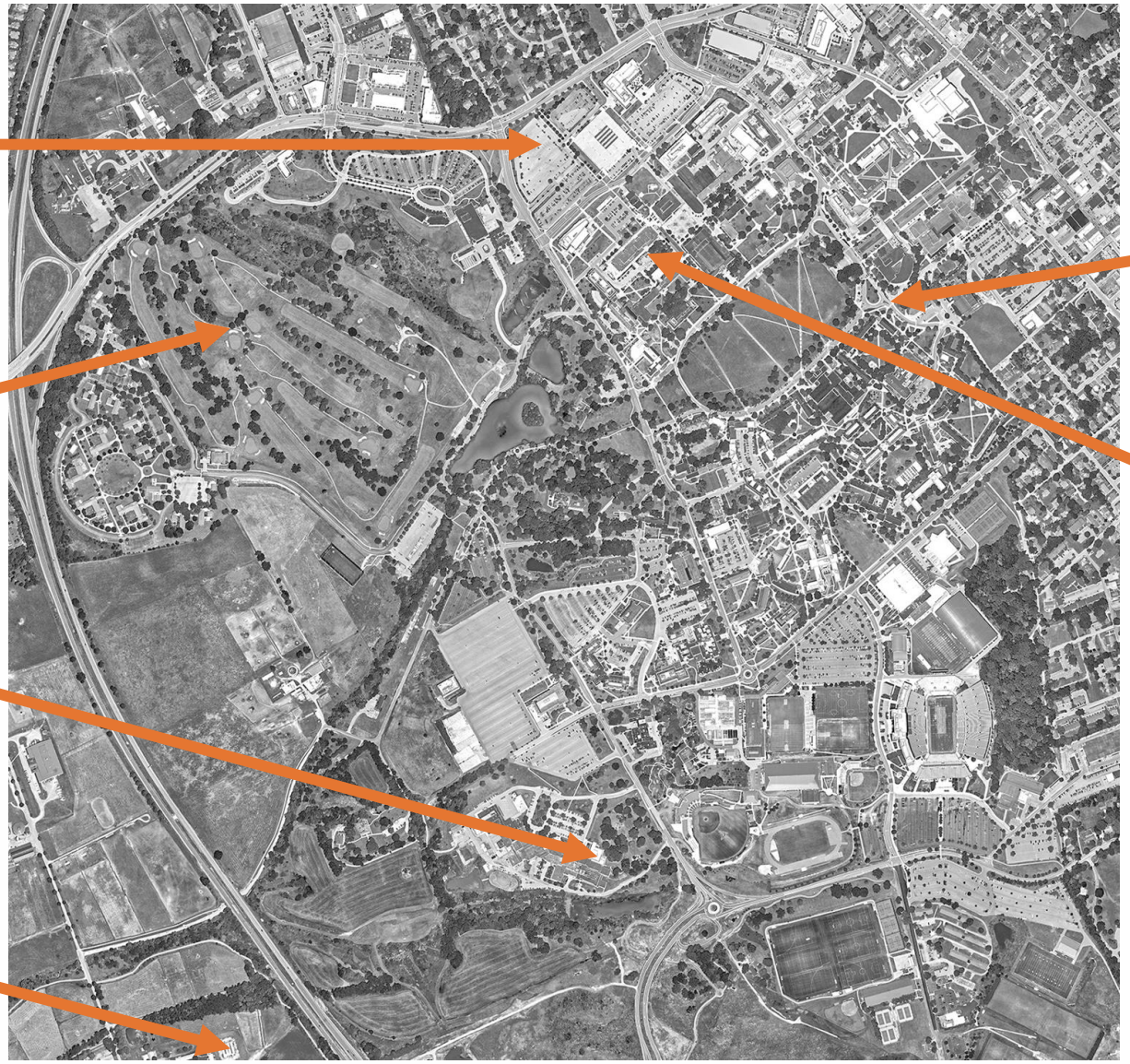
New Business Building*



Student Life Village Phase I*

CVM Teaching Hospital Renovation & Expansion*

Improve Center Woods Complex



Improve Campus Accessibility*

Envelope Restoration Derring Hall*

Virginia Tech-Carilion School of Medicine Expansion* *(Roanoke, VA)*

AREC Improvements – Eastern Shore* *(Painter, VA)*

* Planning Authorization Only

NEW BUSINESS BUILDING

CM at Risk – BOV Authorized

Status

- Finalizing Preliminary Design / Transitioning to Working Drawings

Next Actions

- Targeting BOV Review March 2025

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
New Business Building (*Planning Only*)	$8.0	TBD	92,000																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Moseley

Builder: Kjellstrom & Lee

STUDENT LIFE VILLAGE – PHASE 1

CM at Risk – BOV Authorized

Status

- Schematic Design ongoing
- CMaR pre-construction services ongoing

Next Actions

- Continue design efforts

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Student Life Village – Phase I (*Planning Only*)	$19.5	TBD	TBD																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Little/Boudreaux

Builder: Clark

IMPROVE CENTER WOODS COMPLEX

Design-Bid-Build – State Authorized

Status

- Finalizing Schematic Design / Transitioning to Preliminary Design

Next Actions

- Continue design efforts

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Improve Center Woods Complex (*Planning Only*)	$14.7	$9.75	25,900																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: WPA

Builder: TBD

VT-CARILION SCHOOL OF MEDICINE EXPANSION

CM at Risk – State Authorized

Status

- Schematic Design ongoing
- Procurement of CMaR pre-construction services ongoing

Next Actions

- Finalize procurement of CMaR contract

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
VT-Carilion School of Medicine Expansion (*Planning Only*)	$9.0	TBD	TBD																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: VMDO/Ballinger

Builder: TBD

IMPROVE CAMPUS ACCESSIBILITY

Design-Bid-Build – State Authorized

Status

- Procurement of design services ongoing

Next Actions

- Finalize procurement of design services contract

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Improve Campus Accessibility (*Planning Only*)	$8.0	TBD																		

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: TBD

Builder: TBD

ENVELOPE RESTORATION DERRING HALL

Design-Bid-Build – State Authorized

Status

- Procurement of design services ongoing

Next Actions

- Finalize procurement of design services contract

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Envelope Restoration Derring Hall (*Planning Only*)	$16.8	TBD																		

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: TBD

Builder: TBD

CVM TEACHING HOSPITAL RENOVATION & EXPANSION

Design-Bid-Build – BOV Authorized

Status

- Procurement of design services ongoing

Next Actions

- Finalize procurement of design services contract

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
CVM Teaching Hospital Renovation & Expansion (*Planning Only*)	$43.0	TBD	32,000	25,000																

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: TBD

Builder: TBD

AREC IMPROVEMENTS – EASTERN SHORE

Design-Bid-Build – State Authorized

Status

- Procurement of design services ongoing

Next Actions

- Finalize procurement of design services contract

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
AREC Improvements – Eastern Shore (*Planning Only*)	$15.7	TBD	25,000	14,000																

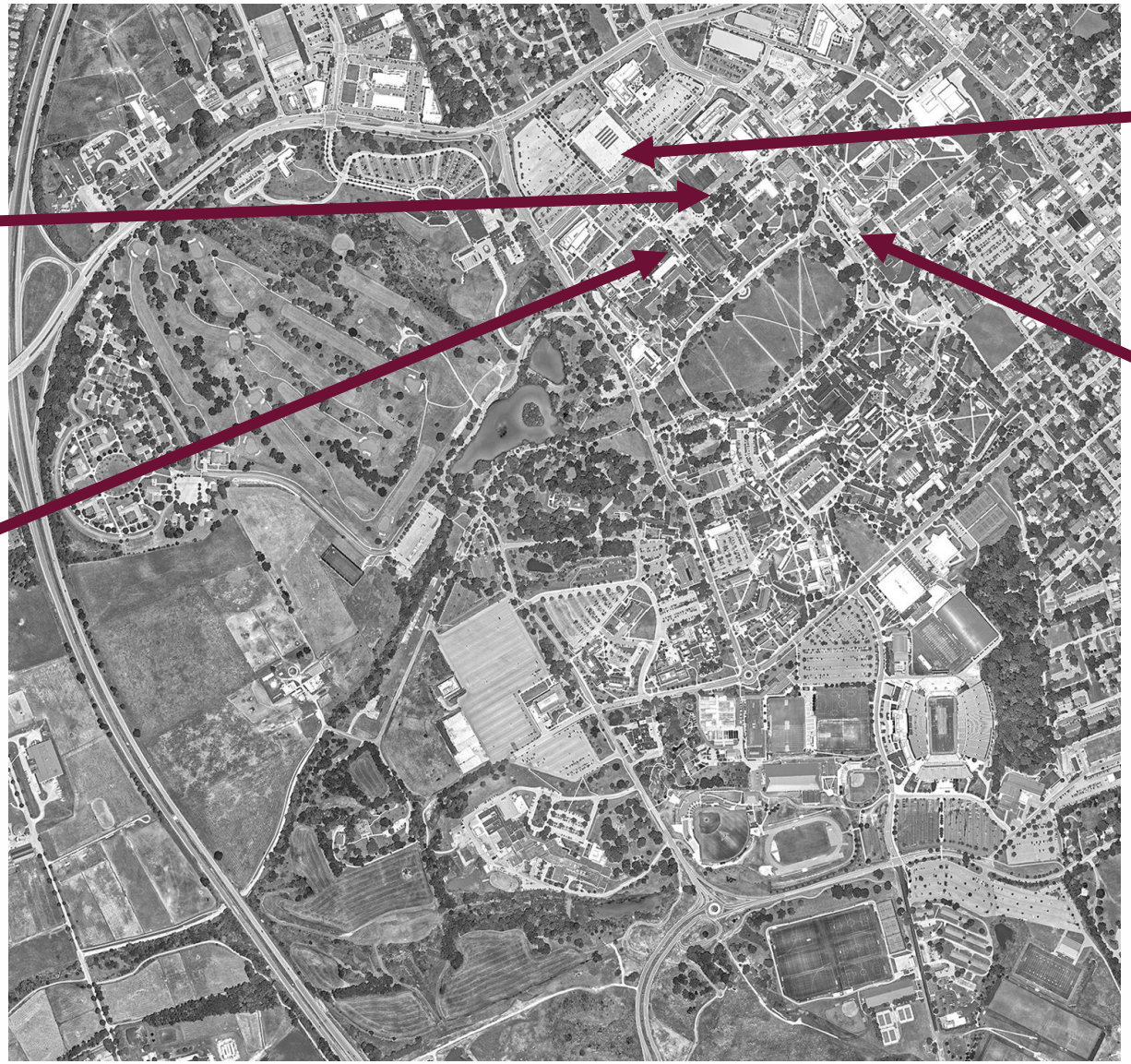
LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: TBD

Builder: TBD

UNDER CONSTRUCTION

ACTIVE CONSTRUCTION PROJECTS



Mitchell Hall

Life, Health, Safety, Accessibility, & Code Compliance

Livestock & Poultry Research Facilities Phase I
(Various Locations)

Transit Center
(ToB project)

Building Envelope Improvements

Innovation Campus Academic Building
(Alexandria, VA)

INNOVATION CAMPUS – ACADEMIC BUILDING

CM at Risk – State Authorized

Status

- Construction 92% complete

Next Actions

- Anticipated completion December 2024

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Innovation Campus Academic Building	$302.1	$226.3	299,733																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: SmithGroup

Builder: Whiting-Turner

LIVESTOCK & POULTRY RESEARCH FACILITIES – PHASE I (BID PACKAGE 5)

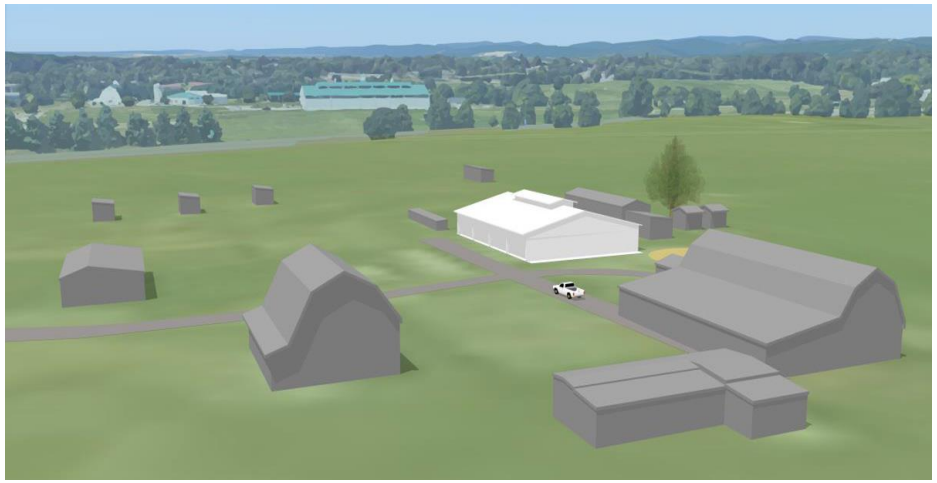
Design-Bid-Build – State Authorized

Status

- Bid package #5: Two of three barns under construction (45% complete)

Next Actions

- Complete 3 barns in sequence



Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Livestock & Poultry Research Facilities – Phase I – Various Locations	$25.3	$18.2	129,100																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Spectrum Design

Builder: Various

LIFE, HEALTH, SAFETY, ACCESSIBILITY, & CODE COMPLIANCE

Design-Bid-Build – State Authorized

Status

- Priority 1 Exterior Elevator Towers construction complete
- Priority 2 Green Link construction underway (50%)
- Priority 3 Green Link construction procurement underway

Next Actions

- Complete Priority 1 close-out
- Continue Priority 2 construction
- Begin Priority 3 construction

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Life, Health, Safety, Accessibility & Code Compliance	$10.4	$8.1																		

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Various

Builder: Various

BUILDING ENVELOPE IMPROVEMENTS

Design-Bid-Build – BOV Authorized

Status

- Envelope improvements planned for four buildings
- Lane Stadium complete
- Torgersen Hall construction underway

Next Actions

- Second building targeted for completion winter 2026

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Building Envelope Improvements	$47.2	$41.9																		

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: WJE

Builder: Various

MITCHELL HALL

CM at Risk – State Authorized

Status

- GMP-1 (demolition & early site package) underway
- GMP-2 (building construction) in development

Next Actions

- Finalize GMP-2 and issue permits for construction

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Mitchell Hall	$292.3	$229.3	296,105																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Perkins & Will

Builder: Skanska

TRANSIT CENTER

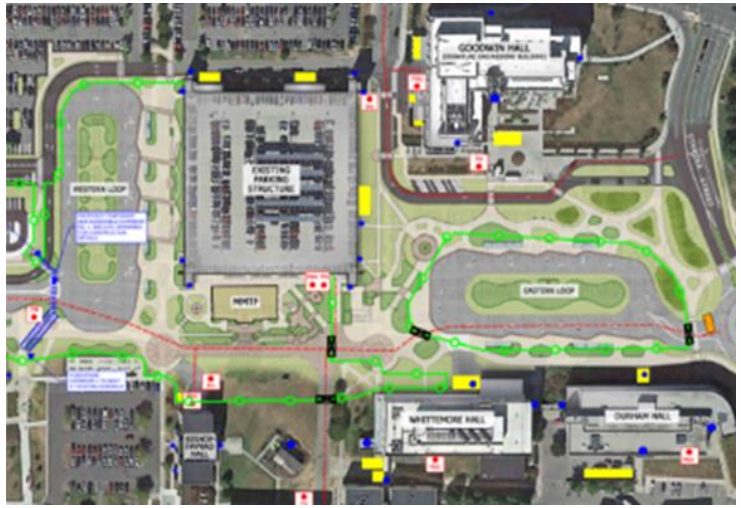
Design-Bid-Build – Town of Blacksburg (ToB)

Status

- Construction 98% complete
- Bus loops operational

Next Actions

- Anticipated Transit Center building completion fall 2024



Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Transit Center	N/A	N/A	13,606																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Wendel (ToB Contract)

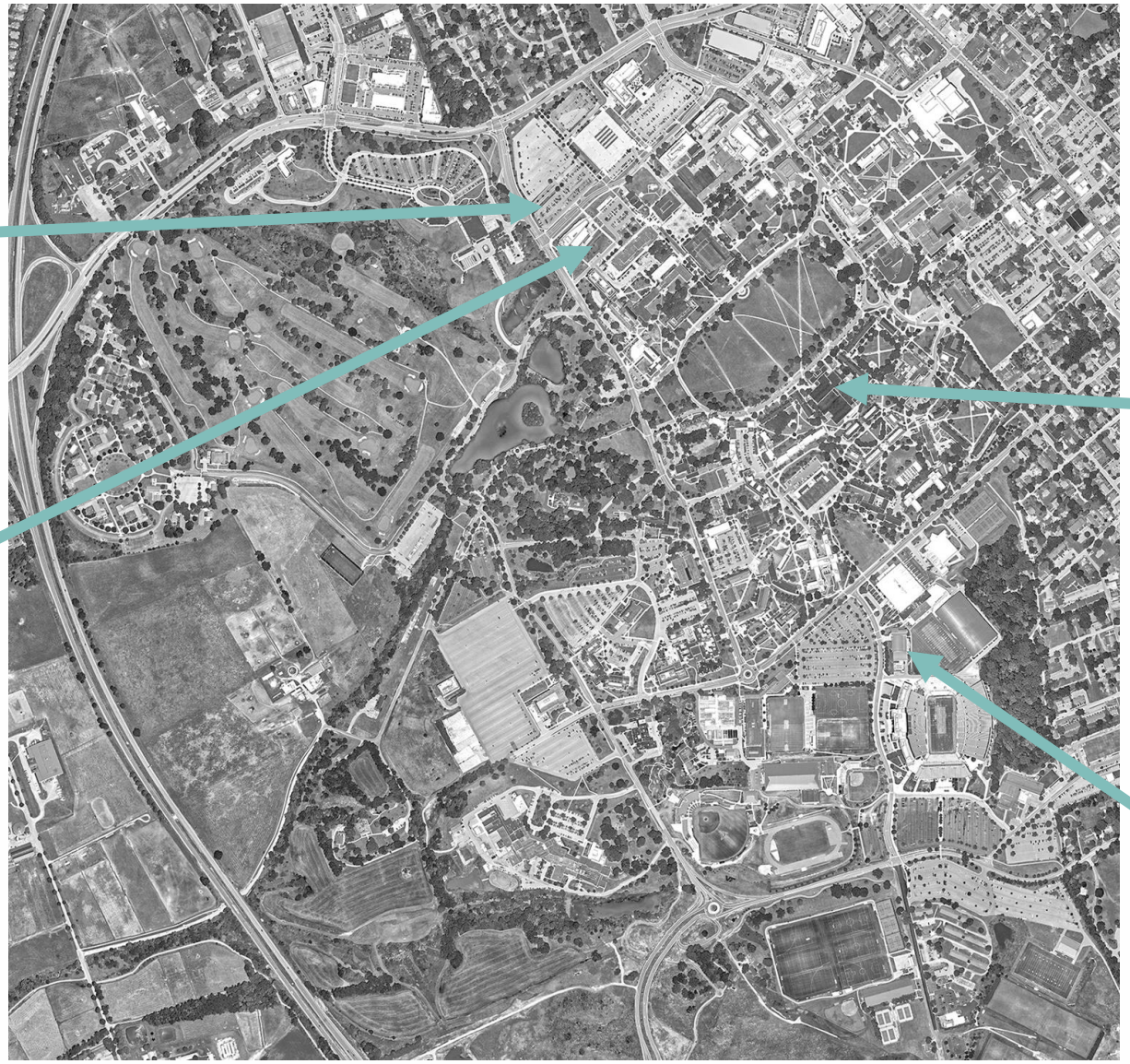
Builder: WM Schlosser (ToB Contract)

PROJECTS UNDER WARRANTY

PROJECTS UNDER WARRANTY

Undergraduate Science Laboratory Building

HITT Hall



Student Wellness Improvements

Football Locker Room Renovation

HITT HALL

CM at Risk – BOV Authorized

COMPLETE

Status

- Project complete

Next Actions

- Close out project

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
HITT Hall	$85.0	$65.5	101,000																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Cooper Cary

Builder: WM Jordan

STUDENT WELLNESS IMPROVEMENTS

CM at Risk – BOV Authorized

COMPLETE

Status

- Project complete

Next Actions

- Close out project

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Student Wellness Improvements	$70.0	$56.3		204,000																

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: Cannon Design

Builder: Whiting-Turner

FOOTBALL LOCKER ROOM RENOVATION

Design-Bid-Build – BOV Authorized

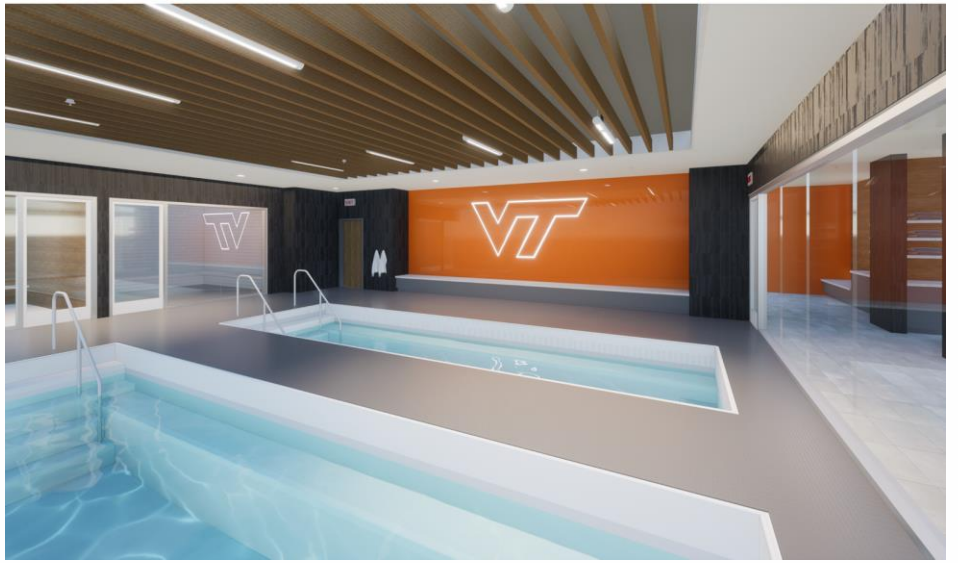
COMPLETE

Status

- Project complete

Next Actions

- Close out project



Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Football Locker Room Renovation	$5.9	$4.1		4,200																

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: HNTB

Builder: Thor

UNDERGRADUATE SCIENCE LABORATORY BUILDING

CM at Risk – State Authorized

COMPLETE

Status

- Construction complete

Next Actions

- Close out project

Project Title	Total Project Budget ($M)	Construction Cost ($M)	New Const (GSF)	Renovation (GSF)	CY 2024				CY 2025				CY 2026				CY 2027			
					Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec	Q3 Jan - Mar	Q4 Apr - Jun	Q1 Jul - Sep	Q2 Oct - Dec
						Summer	Academic Yr 24-25			Summer	Academic Yr 25-26			Summer	Academic Yr 26-27			Summer		
Undergraduate Science Laboratory Building	$90.4	$69.5	102,746																	

LEGEND	Design	Construction	Warranty	Construction Phase TBD

Designer: ZGF

Builder: Skanska

DEFINITIONS

AUTHORIZATION:

- **State Authorized:** Authorized and funded (whole or in part) by the Virginia General Assembly
- **BOV Authorized:** Authorized and funded by the Virginia Tech Board of Visitors

DELIVERY METHODS:

- **Schematic Design Phase =** 0% to approximately 20% design complete
- **Preliminary Design Phase =** Approximately 20% to approximately 50% design complete
- **Working Drawing Phase =** Approximately 50% to 100% design complete

- **GMP =** Guaranteed Maximum Price

CONSTRUCTION METHODS

DESIGN-BID-BUILD (DBB):

- A/E completes full design
- Invitation For Bid (IFB) issued
- Contract awarded to lowest bidder

CONSTRUCTION MANAGER AT RISK (CMaR):

- A/E completes full design
- Prospective CMaR's compete for project during early stage of design
- CMaR selected based upon "best value" during Schematic Design phase
- When final designs are complete CMaR develops Guaranteed Maximum Price (GMP)

DESIGN-BUILD(D/B):

- A/E completes partial design ("criteria docs")
- D/B team (builder + A/E) compete for project and propose full price for project delivery
- Selection based upon "best value"
- D/B team completes design and executes construction.

Attachment D

SUSTAINABILITY

2023-24 Annual Report

FACILITIES
VIRGINIA TECH

EXECUTIVE SUMMARY

Since the approval of Virginia Tech's first Climate Action Commitment in 2009, Virginia Tech has demonstrated a strong commitment to becoming a leader in sustainability. Now, under Virginia Tech's 2020 Climate Action Commitment, the university is accepting the challenge of reaching higher, pushing harder, and accomplishing more in the realm of sustainability. The 15 goals outlined in the Climate Action Commitment are meaningful and challenging and they will require support, hard work, and innovation across the university to achieve.

These efforts have been recognized globally in the past year. In 2024, Virginia Tech completed its sixth Sustainability Tracking, Assessment, and Rating System (STARS) report, receiving a Gold rating for the fourth time with a score of 73.17. This is the highest score Virginia Tech has received, keeping the university in the running of top sustainable institutions in Virginia and the Atlantic Coast Conference. Virginia Tech's Tree Campus Higher Education status has been maintained for a sixteenth consecutive year. This work is happening alongside and in tandem with our Bee Campus USA certification efforts. Virginia Tech has also once again performed well in the Times Higher Education Impact Rankings, scoring in the top 200 universities worldwide.

The overarching goal of the Climate Action Commitment is for Virginia Tech's Blacksburg campus to become carbon neutral by 2030. This is no small task at an institution the size of Virginia Tech. Meeting this aggressive goal will require decreasing the university's carbon emissions and energy consumption while simultaneously increasing its portfolio of renewable energy and sustainability-oriented educational programs. Working collectively to create a shift in campus culture is key. The major milestones to meet this ambitious climate action target are split between the 15 goals of the Climate Action Commitment, progress towards each of which is presented in this report.

To meet both the infrastructural and behavioral goals outlined in the Climate Action Commitment, the Office of Sustainability has been hosting collaborative meetings bringing together key stakeholders in the areas of climate action, sustainability, energy, waste, dining, transportation, and academics to discuss progress and challenges. Additionally, the Climate Action, Sustainability, and Energy Committee has continued to grow this past year and take on even more responsibility for Climate Action Commitment implementation through the work of its many targeted subcommittees. This collaborative spirit of working in tandem with the many areas of campus that directly touch sustainability is key to continued success.

The university's efforts for waste reduction and minimizing contamination in its waste stream are paying off. In 2022, Virginia Tech saw an 84 percent waste diversion rate. Keeping waste out of the landfill either through recycling, donation, avoidance, thoughtful procurement, repair, or repurposing is key to achieving a zero-waste campus.

The completion of the Transit Center will support significant reductions in transportation emissions from commuting members of campus as well as improving quality of life and connectivity within and between the Virginia Tech campus and the Town of Blacksburg. The Transit Center and new bus loops, along with many other programs supported by the Sustainable Transportation Department, will provide Virginia Tech with the infrastructure and targeted behavioral messaging to help reduce scope three emissions.

The Climate Action Living Laboratory (CALL) has continued moving towards a more formalized structure. Over 150 faculty members are part of a network working towards providing valuable educational experiences for students that also improve the sustainability of campus, solve real world problems, and bring together stakeholders for meaningful work. In the 2023-24 academic year, the Office of Sustainability partnered with 12 classes from a variety of colleges and departments across campus.

The Virginia Tech 2023-24 Sustainability Annual Report begins with a broad overview of the university's ongoing sustainability efforts. It presents the 15 goals of the Climate Action Commitment and showcases sustainability highlights and progress along the way.

INTRODUCTION

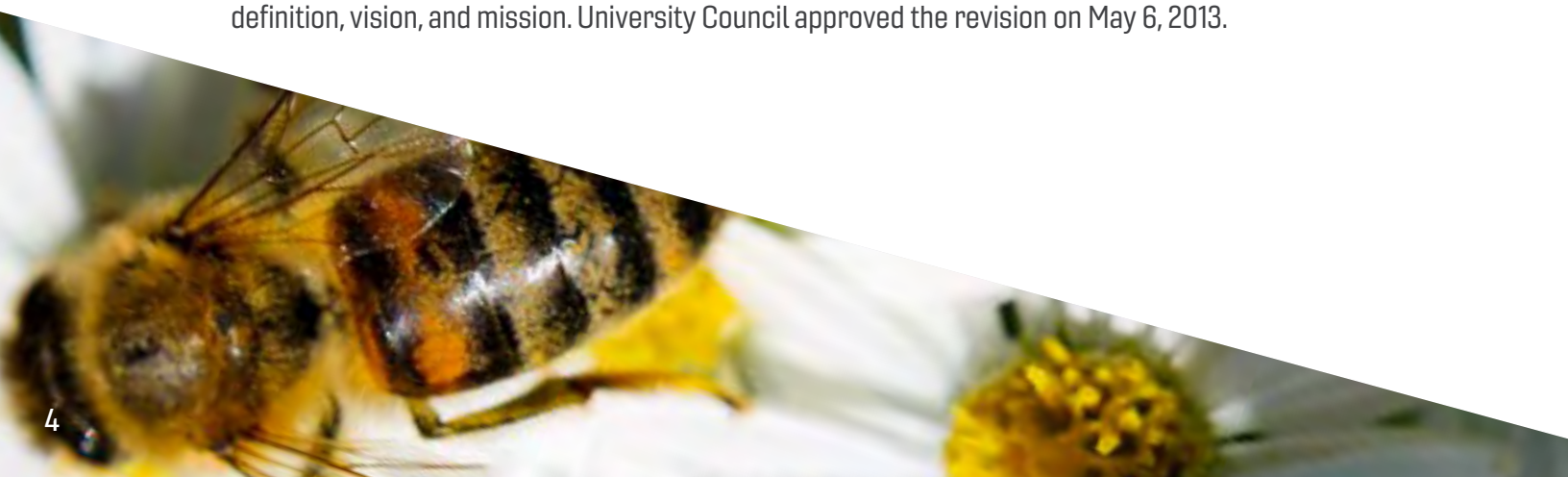
Virginia Tech's Climate Action Commitment defines sustainability as the simultaneous pursuit of environmental quality, economic prosperity, and social justice and equity. The goals of the Office of Sustainability and the university's Climate Action Commitment are to achieve this pursuit through action, education, and engagement to address current needs without compromising the ability to meet the needs of future generations. Virginia Tech's sustainability vision is to be a leader in climate action in service to its community, the commonwealth, and the world.

Virginia Tech's sustainability mission is to achieve carbon neutrality by 2030 through changes to the university's physical infrastructure, collective and individual behaviors, and educational mission; to engage everyone in creating a culture of sustainability; and to accomplish these objectives through just and equitable means. This will require significant infrastructural changes, cultural shifts, and strategic planning to ensure success.

Additionally, the university has adopted major initiatives to increase affordability and access for students and to become a top 100 global research university. The Climate Action Commitment is an essential bridge policy for achieving both of these goals and represents a core pillar of the university's land-grant mission.

Virginia Tech Climate Action Commitment History

During Earth Week in April 2008, as a result of student and faculty advocacy efforts, former university President, Charles W. Steger, charged the Energy and Sustainability Committee to develop a climate commitment and accompanying sustainability plan that was unique to Virginia Tech. On April 22, 2009, the University Council voted to recommend approval of Virginia Tech first Climate Action Commitment and accepted the accompanying Sustainability Plan. On June 1, 2009, the Virginia Tech Board of Visitors unanimously approved the Virginia Tech Climate Action Commitment, and it became Presidential Policy Memorandum 262. The commitment included 14 sustainability goals, objectives, and aspirations. In academic year 2012-13, the Energy and Sustainability Committee revised the commitment and added a sustainability definition, vision, and mission. University Council approved the revision on May 6, 2013.



On November 8, 2019, Virginia Tech President Tim Sands released a statement that included a charge to update the Virginia Tech Climate Action Commitment; "...climate change represents one of the world's most pressing problems and as a global land-grant university, Virginia Tech has a duty to respond," he said.

In response, the Virginia Tech 2020 Climate Action Commitment Working Group was established consisting of over 150 students, faculty, staff, and community members. The group worked to produce the Virginia Tech 2020 Climate Action Commitment which was presented to the Board of Visitors on November 15, 2020. Over the next three months, a dozen key operations and finance personnel at the university conducted a high-level review of the costs to implement the commitment. This financial analysis was presented to the Virginia Tech Board of Visitors on March 21, 2021, and the Climate Action Commitment was approved unanimously. The 2020 Climate Action Commitment includes 15 goals for advancing long-term university sustainability over the next ten years.

The actualization of the 15 goals depends on comprehensive planning, unparalleled collaboration, and a shared pledge to advancing sustainability. Through broad university participation and collaboration, Virginia Tech has made tremendous progress, but still has more to do. The Sustainability Annual Report provides an update on the university's progress towards each of the goals.

Sustainability Plan

Virginia Tech adopted the Association for the Advancement of Sustainability in Higher Education's (AASHE) and its Sustainability Tracking, Assessment, and Rating System (STARS) protocol as the foundation of its Sustainability Plan. The STARS report consists of over 60 topical areas which fall into one of four categories: academics, engagement, operations, and planning and administration. Additional credit is earned for unique initiatives that are not otherwise covered in the STARS report. Data and information submitted are measured against a national standard and points are earned for each credit. Total points earned yield an overall rating of Bronze, Silver, Gold, or Platinum.

Virginia Tech has received six STARS ratings: Silver in 2011, Silver in 2013, Gold in 2014, Gold in 2017, Gold in 2021 and Gold in 2024. For the 2024 Gold rating, Virginia Tech earned 73.17 points; this is the highest score Virginia Tech has received, continuing the trend of self-improvement that has been observed since the submission of Virginia Tech's first report in 2011. The STARS Gold rating is valid for three years. When it is time to pursue STARS again in 2027, a new version will be available that raises the standard for sustainability in higher education.

Office of Sustainability

On June 1, 2009, following the approval of the original Virginia Tech Climate Action Commitment, the university established the Office of Sustainability. Recognized as the university department overseeing climate action initiatives, the Office of Sustainability has the following duties and responsibilities:

- Coordinate programs for campus sustainability
- Oversee implementation of the Virginia Tech Climate Action Commitment and Sustainability Plan
- Monitor annual electricity/energy use and Greenhouse Gas (GHG) emissions in collaboration with the Office of Energy Management
- Work with faculty and departments to develop programs that utilize the campus as a sustainability laboratory
- Coordinate communication regarding campus sustainability initiatives and programs to the university community and external audiences

Climate Action, Sustainability, and Energy Committee

Virginia Tech established the Energy and Sustainability Committee on April 30, 2007 as part of adopting the university's original Climate Action Commitment. At the time, the committee was unique in that it had the broadest membership of any committee and included four student representatives rather than two. As part of the 2020 Climate Action Commitment, the Energy and Sustainability Committee was reevaluated, restructured, elevated, and renamed to the Climate Action, Sustainability, and Energy (CASE) Committee.

The CASE Committee's charge is "To provide guidance to the university administration on implementation of the university's Climate Action Commitment and opportunities to enhance Virginia Tech's pursuit of environmental quality and social sustainability. The committee makes recommendations regarding the application of policies; infrastructural and operational changes; educational strategies and modifications; and other steps intended to foster broad engagement with the university's environmental goals. The committee oversees subcommittees that each carry out aspects of the committee's charge." The committee makes recommendations regarding the application of policies; infrastructural and operational changes; educational strategies and modifications; and other steps intended to foster broad engagement with the university's environmental goals. The committee oversees

ten subcommittees that each execute aspects of the committee's charge. In addition to broadening the charge, the committee also reevaluated and expanded its membership to include members from underrepresented and economically disadvantaged groups in line with Virginia Tech's commitment to frontline communities and climate justice, which is unique among all shared governance entities and reflects a commitment to climate justice.

During the 2023-24 academic year, the CASE Committee oversaw ten subcommittees to target implementation strategies, policies, and planning efforts for the goals of the 2020 Climate Action Commitment. These subcommittees are strategically essential for making progress toward the top-level goal of carbon neutrality by 2030. Additionally, they include members from across the university, including some who are outside of the core CASE Committee membership, which helps to institute climate action as a broader priority and communicate Climate Action Commitment progress across the institution.

Office of Sustainability Partners

UNIVERSITY COLLEGES AND DEPARTMENTS

The Office of Sustainability collaborates with faculty and staff in virtually all of the colleges at Virginia Tech to include:

- College of Agriculture and Life Sciences
- College of Architecture, Arts, and Design
- Pamplin College of Business;
- College of Engineering
- College of Liberal Arts and Human Sciences
- College of Natural Resources and Environment
- College of Science
- Virginia-Maryland College of Veterinary Medicine
- Honors College

STUDENT ORGANIZATIONS

The Office of Sustainability works with many student organizations including:

- Undergraduate Student Senate
- Graduate and Professional Student Senate
- Residence Hall Federation
- Environmental Coalition
- Food Justice at Virginia Tech
- Galileo Living Learning Community
- Hypatia Living Learning Community
- Students for Sustainable Practices
- Sustainable at Virginia Tech
- Art for Environmental Justice
- Student Chapter of the American Water Resources Association
- Campus Kitchens at Virginia Tech
- United Feminist Movement
- Outdoor Club
- Virginia Tech for Climate Justice

COMMUNITY GROUPS

The Office of Sustainability collaborates with the Town of Blacksburg; the local citizens' group and nonprofit Sustainable Blacksburg; the Blacksburg Farmers Market; Citizens Climate Lobby; Live, Work, Eat, Grow; the YMCA; the Blacksburg Public Library; and Blacksburg Parks and Recreation.

Awards and Recognition

Virginia Tech consistently demonstrates its commitment to being a leader in campus sustainability and has received awards and recognition at both the state and national levels.

TIMES HIGHER EDUCATION IMPACT RANKINGS

TOP 10% of worldwide participating schools in 2024

After making its debut in the Times Higher Education Impact Rankings in 2021, Virginia Tech now finds itself ranked in the 101-200 range out of 2,152 institutions worldwide, claiming its spot in the top ten percent of participating schools for 2024. The Times Higher Education Impact Rankings are the only global performance metrics that assess universities against the United Nations Sustainable Development Goals (SDGs). The rankings use calibrated indicators to compare universities across four areas: research, stewardship, outreach, and teaching.

Virginia Tech's ranking was supported by the university's high marks in six individual SDGs, with a top ranking of No. 32 globally in the SDG of Zero Hunger. This ranking considers a university's research on hunger, their teaching of food sustainability, a commitment to tackling food waste, and a commitment to addressing hunger on campus and locally.

In addition, Virginia Tech ranked No. 80 for the SDG of Reduced Inequalities and ranked in the top 200 for Clean Water and Sanitation (SDG 6), Sustainable Development (SDG 11), Responsible Consumption and Production (SDG 12), Climate Action (SDG 13), and Life on Land (SDG 15). Virginia Tech ranks in the top 75th percentile of participating universities in the above-mentioned SDGs.

VIRGINIA TECH DINING SERVICES

Dining Services continues to lead the campus community in sustainability efforts. Dining Leadership remains on the National Association of College and University Food Services (NACUFS) Sustainability Awards Committee. This taskforce at NACUFS works to create a framework for the national award parameters in the sustainability field. The Dining Services team is proud to support a program that promotes sustainable efforts across various universities.

45-50k

pounds of Homefield Farm organic campus-grown produce is used on campus

Additionally, Dining Services reports on sustainability efforts that align with AASHE STARS every three years. This information is shared with the Office of Sustainability for inclusion in a comprehensive analysis of campus sustainability. This past year, the sustainable dining team has worked extensively to track local and organic food purchases internally, through Dining's food production system. Through this project, Dining Services can report that approximately 10 percent of their annual food and beverage purchases are products that are locally or sustainably sourced. This percentage is based off Dining's primary food vendor, which comprises roughly 90 percent of their food expenditures. In addition to this total, Dining Services utilizes about 45,000–50,000 pounds of campus-grown produce from their organic Homefield Farm location.

VIRGINIA TECH SUSTAINABLE TRANSPORTATION

The Sustainable Transportation Department seeks to meet all the travel needs of students, faculty, and staff in healthy and environmentally friendly ways. Virginia Tech has been named one of the 2024 Best Universities for Commuters. Best Universities for Commuters demonstrate that options for commuting such as public transit, carpools, vanpools, and teleworking are economically and environmentally beneficial, yielding value to workers, employers, and our communities.

Virginia Tech was also awarded a Gold ranking as a Bicycle Friendly University through the League of American Bicyclists in fall 2023. This is an improvement from the previously held Silver ranking. Virginia Tech has been recognized as a Bicycle Friendly University since 2013.

TREE CAMPUS HIGHER EDUCATION

For the sixteenth consecutive year, Virginia Tech has been recognized for its best practices in campus urban and community forestry through the Arbor Day Foundation's Tree Campus Higher Education program. Launched in 2008, Tree Campus Higher Education is a national program that honors colleges and universities for effective campus urban forest management and engaging students, faculty, and staff in conservation goals. Virginia Tech achieved Tree Campus Higher Education recognition by meeting five national standards, which include maintaining a tree advisory committee, operating a campus tree-care plan, dedicating annual expenditures toward trees, organizing an Arbor Day observance, and executing student service-learning projects. Thousands of trees have been planted across campus since 2008 and they serve as one of the most visible representations of Virginia Tech's commitment to environmental stewardship.

BEE CAMPUS USA

Virginia Tech earned Bee Campus USA certification in spring 2022. This initiative is sponsored by the Xerces Society for Invertebrate Conservation. Bee Campus USA requirements serve as a guideline for affiliated campuses to increase their commitment to preserving these native pollinators. This is achieved through developing a long-term plan to increase native pollinator habitat, provide pollinator nesting sites, reduce pesticide use on campus, and develop pollinator conservation education and outreach opportunities for the campus community. The Virginia Tech Bee Campus Standing Committee is composed of dedicated and enthusiastic students, faculty, and staff from multiple disciplines across campus.

2023-24 SUSTAINABILITY PROGRESS

1. Carbon Neutrality

"Achieve a carbon neutral campus by 2030."

Carbon neutral is defined as net-zero emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxides (N_2O) by Virginia Tech operations on the Blacksburg campus based on the greenhouse gas (GHG) inventory outlined in the 2020 Climate Action Commitment. The initial scope of the 2020 Climate Action Commitment includes all Virginia Tech-owned lands and buildings on the main campus, buildings leased by university departments in Blacksburg, and agricultural/forestry operations and lands in the Blacksburg region. The GHG scope includes:

- **Scope 1** emissions from campus direct fuel use,
- **Scope 2** emissions related to purchased electricity (generation CO_2 and N_2O transmission/distribution losses), and
- **Scope 3** emissions related to campus behavior (commuter driving, transit bus fuel, waste/recycling/compost, water/wastewater, aviation fuel, and commercial business travel).

ANNUAL CO_2 EMISSIONS

The following figures show the change in GHGs from calendar years (CY) 2013 to 2022. CY 2022 shows a 10 percent reduction in total emissions from CY2021. When compared to the baseline year of 2019, there was an 8.5 percent decrease in total emissions.

Figure 1. Annual CO_2 Emissions (Calendar Year)

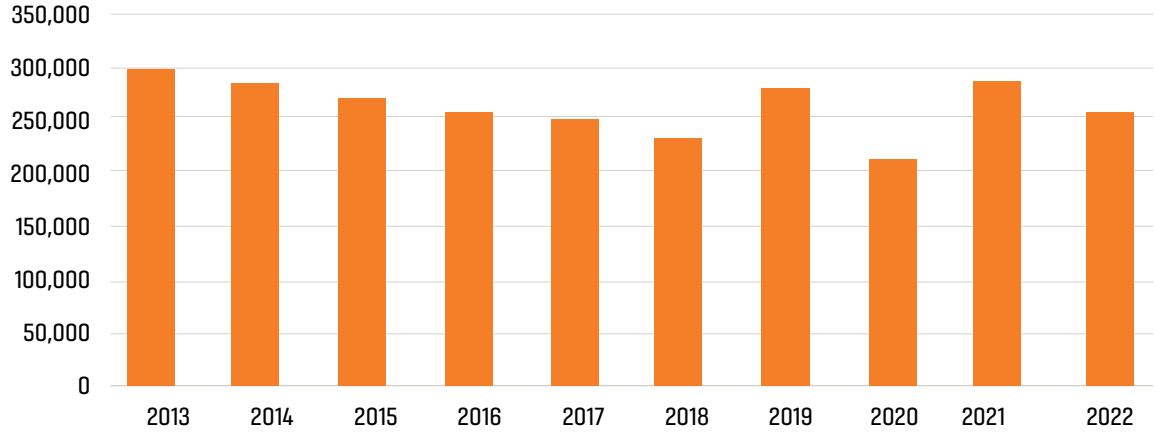


Table 1. Summary of Annual Greenhouse Gas Emissions by Scope (Calendar Year)

	2019 (MTCDE)	2021 (MTCDE)	2022 (MTCDE)
Scope 1	115,021	96,317	102,609
Scope 2	124,166	152,823	127,842
Scope 3	42,148	36,474	26,986
Total	**281,335**	**285,614**	**257,437**

The decrease in CY2022 compared to previous years is due to a couple of reasons:

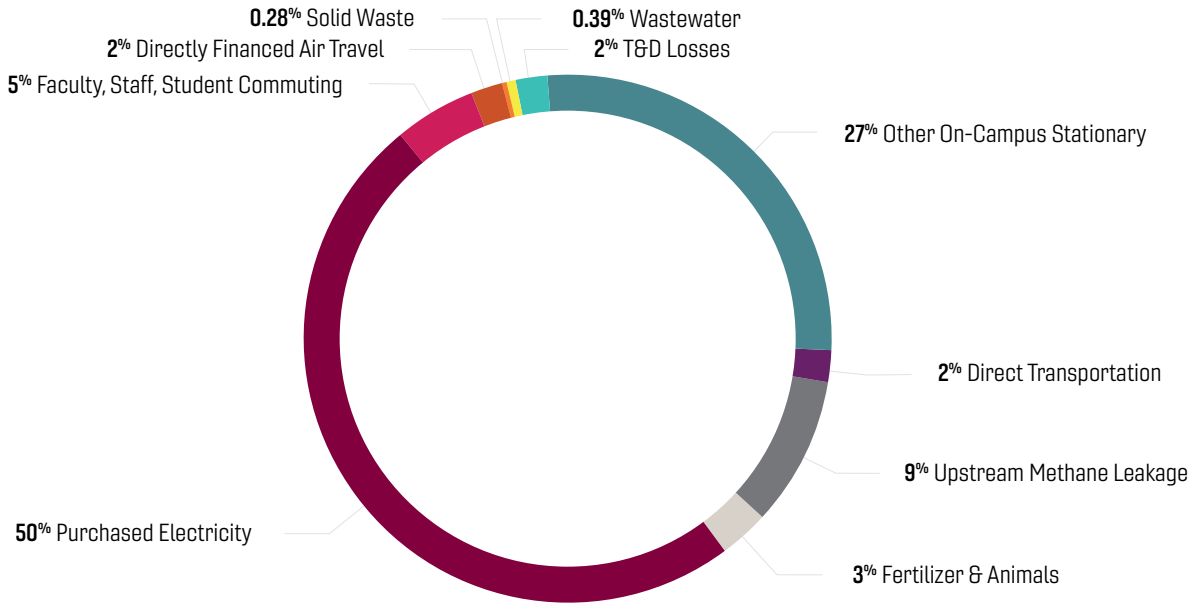
1. Scope 2 emissions were 25,000 Metric Tons of Carbon Dioxide Equivalents (MTCDE) lower in CY2022 compared to CY2021. Greenhouse gas emissions for purchased electric decreased 16 percent from CY2021 to CY2022. This is largely due to a reduction in purchased campus electricity. In addition to several Energy Action Plan projects that reduced energy consumption (discussed below), the power plant cogeneration system was online for the year. In addition to the overall purchased electricity reduction, the electric grid emissions factors (kilograms CO_2/kWh) decreased by nine percent in the New River Valley region.

2. Transportation greenhouse gas emissions have been reduced across multiple categories including direct transportation; faculty, staff, and student commuting; and directly financed air travel. These reductions in calendar year 2021 to 2022 have reduced the campus footprint by about 8,000 MTCDE.

3. The use of fertilizers and animals on campus has decreased. When compared to the baseline year, 2019, emissions were reduced by 5,500 MTCDE.

The pie chart (figure 2) shows the distribution of GHG emissions by source for the 2022 calendar year. The largest source of GHG emissions is purchased electricity (50 percent) followed by natural gas (27 percent).

Figure 2. GHG Emissions Breakout CY2022



GREENHOUSE GAS INVENTORY AND ASSESSMENT REPORT

Since 2007, Virginia Tech has been monitoring GHG emissions from direct and indirect sources to assess its carbon footprint. In general terms, it is the amount of carbon dioxide (and other gases) that are produced or emitted during normal campus operations. It is often associated with the burning of fossil fuels for energy or transportation, but GHG emissions can result from many other sources. The Greenhouse Gas Inventory and Assessment Report is a quantitative analysis, critical for driving planning, policies, and operations that will continue to result in emissions reductions across the university. As state, national, and worldwide leaders seek to limit or reduce GHG emissions by 2030, Virginia Tech is well positioned to do its part. As we transitioned the GHG emissions accounting to encompass the 2020 CAC broadened demands, we spent time creating a new protocol so that we can have strong and consistent data to work with over the next decade.

The Greenhouse Gas Inventory and Assessment Report also serves as a great resource for students, faculty, and staff to learn more about their associated impacts on the environment. As part of the 2020 CAC, the carbon we account for with the Greenhouse Gas Inventory and Assessment Report has been broadened to include Scopes 1 and 2 emissions (direct and indirect energy usage) fully as well as a significant portion of Scope 3 emissions. Scope 3 emissions correspond to activities that many of us can influence through our choices, such as commuting, purchasing, and waste management. The university will need dedicated action and support from the entire campus community to meet our goal of carbon neutrality by 2030. The GHG Assessment uses SIMAP, the Sustainability Indicator Management and Analysis Platform, developed by the University of New Hampshire.

The Office of Energy Management, the Office of Sustainability, and Sean McGinnis, associate professor of practice in materials science engineering have collaborated to develop these inventories. Its reporting methodologies continue to advance. Historically, this project has received contributions through an experiential learning program for students. The 2023 Greenhouse Gas Inventory and Assessment Report will be published in Nov. 2024 at **vt.edu/sustainability/reports.**

LOCAL AND CAMPUS SOURCED FOOD

Virginia Tech Dining Services is focused on utilizing locally sourced and sustainable food products. The Dining Sustainability team has continued to create transparency and open communication regarding local, organic, and sustainable food expectations and goals with vendors. A new internal system has been implemented that requires all new products to be tagged and local and/or organic before entering campus. This new requirement allows the Dining Sustainability team to better track sustainable purchases. Sourcing locally allows Virginia Tech to reduce food miles that relate to greenhouse gas emissions.

NEW GENERATORS AND COOLING TOWERS

New generators and cooling towers were installed on Virginia Tech's Blacksburg campus. Additionally, as part of the effort, 66 new trees were planted.

STUDENT AFFAIRS PRITCHARD AND NEWMAN GENERATOR REPLACEMENTS

New natural gas generators were installed outside of Pritchard and Newman Halls. These will provide improved safety, quieter operation, and cleaner emissions.

2. 100 Percent Renewable Electricity

"Achieve 100 percent renewable electricity by 2030."

SOLAR PROJECT DEVELOPMENT

A solar energy power purchase agreement (PPA) will help boost Virginia Tech's Climate Action Commitment implementation efforts toward 100 percent renewable electricity by 2030. The solar PPA project is currently in the construction phase for installations at the Sterrett Facilities Complex and other campus building rooftops. Approximately 1.3 MW of generation are anticipated to be in operation in 2025.

UTILITIES MASTER PLAN

Virginia Tech is laying the groundwork for being fossil fuel free by 2050. Currently, a Utilities Master Plan (UMP) is under development which will provide a comprehensive road map to align campus-wide utility systems with the strategies of the Campus Master Plan and the sustainability goals of the Climate Action Commitment. The university operates and maintains numerous utility systems that will all be managed through this detailed plan. The Division of Facilities began this effort for the university's utilities in 2023. The first stage of developing the UMP involved taking an inventory of all current utilities infrastructure and noting its condition. Once that was finished, the planning sessions expanded to include three meetings in the fall that were focused on addressing the CAC (decarbonization, air emissions, and measures of success). Consultant group Wiley and Wilson conducted research and presented multiple options for the UMP to support achieving CAC goals, such as carbon neutrality and 100 percent renewable electricity by 2030. Furthermore, alternative technologies were explored, such as geoexchange, low temperature hot water (LTHW), solar power, and several others. The discussions resulted in funding geoexchange as a potential

alternative energy source. The final CAC-focused session challenged Virginia Tech to think deeply about the future and opportunities to strategically position our utilities infrastructure for success in a low carbon world. The UMP effort is still ongoing with several more sessions planned through 2024.

3. Energy System Efficiency and Total Steam Plant Conversion to Natural Gas

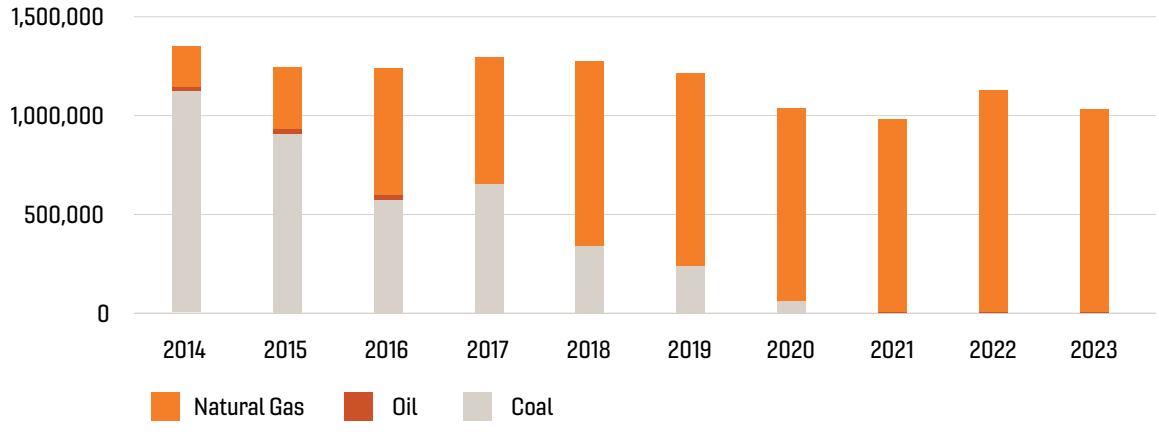
"Complete the total conversion of steam plant fuel to natural gas by 2025, plan for full transition to renewable steam plant fuel after 2025, and continue to improve efficiency of campus energy systems."

VIRGINIA TECH POWER PLANT

The Virginia Tech Power Plant is a co-generation asset that produces centralized steam and simultaneously uses some of the steam as a byproduct to generate up to 6.25 MW of electricity. The steam-turbine powered generator produced 13,197,748 kWh of electricity at the plant from January 2023 to June 2023. The turbine was taken offline for the remainder of 2023 for improvements. That electricity production offsets the electricity purchased by the university for distribution across campus and within Blacksburg. Co-generation increases the thermal efficiency of the Virginia Tech Power Plant which reduces greenhouse gases and other harmful emissions.

The nearby figures show power plant fuel consumption and GHG emissions between calendar year 2014 to 2023. Power plant GHG emissions have been reduced significantly since the change in fuel source to natural gas. Fuel consumption at the power plant decreased 8 percent in calendar year 2023. This can be attributed to building retrocommissioning projects and power plant efficiency improvements like steam trap repairs/replacements.

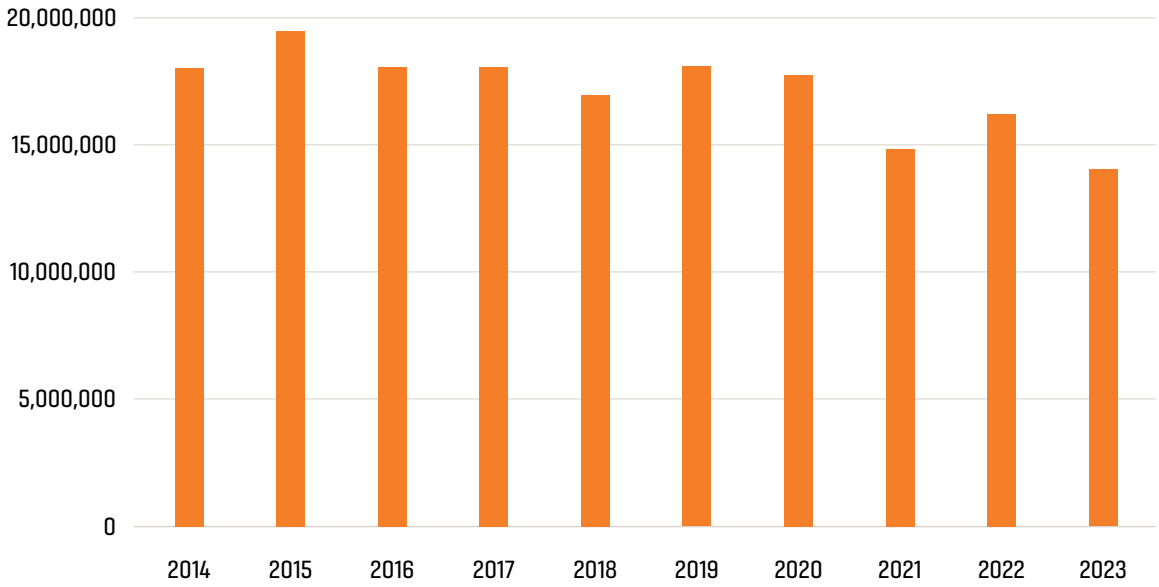
Figure 3. Power Plant Fuel Consumption (Calendar Year)



CAMPUS CENTRAL CHILLED WATER SYSTEM

Virginia Tech continues to improve the campus chilled water infrastructure and operations.

Figure 4. Chilled Water Plant Electric Consumption (Calendar Year)



From calendar year 2022 to 2023 there was a 12 percent reduction in electricity consumption at the chilled water plant. In addition to fewer cooling degree days, this load reduction can be attributed to system optimization efforts and strategies such as free cooling.

DEMAND SIDE MANAGEMENT

The Office of Energy Management guides the energy efficient operation of university energy and utilities systems to achieve tangible reductions in energy consumption on campus through the development and implementation of various Demand Side Management (DSM) policies and investments into energy efficiency measures, initiatives, projects, and programs.

DSM promotes energy efficiency through upgrading, retrofitting, and commissioning of energy and utilities mechanical systems for steam and chilled water, lighting systems, building automation systems, and electrical systems in university buildings. While DSM is primarily concerned with reducing on-site energy consumption and related costs, it also supports the university's commitment to sustainability. The benefits gained from the program include carbon footprint reduction, improvement of indoor air quality, asset upgrading and conservation of resources. The DSM program will help the university to be less vulnerable to sudden changes in the energy market and sets the way toward a net zero energy future.

VIRGINIA TECH GUIDELINES FOR ENERGY EFFICIENT DESIGN

The university's Design and Construction Standards Manual (DCSM) outlines the philosophy, standards, recommendations, and requirements for the design and construction of campus buildings. As a component of the DCSM, the Guidelines for Energy Efficient Designs address the energy efficiency and on-campus renewable energy utilization requirements for our campus buildings. The latest update of the DCSM ensures that the design and construction of buildings at Virginia Tech complies with the Virginia Energy Conservation code and ASHRAE 90.1.

DATA-DRIVEN ENERGY OPTIMIZATION

Using data to guide decisions and achieve energy efficiency at scale is at the core of the Energy Action Plan. The Office of Energy Management utilizes a combination of a central energy management platform and building-level energy data spreadsheets to monitor certain energy usage in real-time. New buildings are added to the energy management platform during construction and the platform helps to visualize real-time parameters of energy use. Building energy data spreadsheets enable detailed building energy performance analytics, particularly for measurement and verification of energy project investment.

Through smart meter and sub-meter infrastructure, energy data is stored in various campus systems that enable the Office of Energy Management and other users to identify potential projects and track energy usage per building. Practitioners can then identify energy consumption patterns to optimize lighting, ventilation, heating, and air based on demand. Data visualization can also help detect irregular spikes in energy usage.

The Office of Energy Management has completed a study of current campus energy metering and has begun developing a Master Metering Program. Enhanced metering capability on campus will enable more detailed and accurate cost accounting and budgeting for campus building users, along with providing more granular data for analysis. Upgrades to metering, controls, and data management are underway. Several buildings have migrated to a modernized platform that enables advanced building automation and energy savings initiatives. Additionally, all metering data has migrated to the newly developed Operations Data Warehouse (ODW) system. This has improved real-time access to utility performance data through extensive dashboards and advanced analytics.

VIRGINIA TECH ELECTRIC SERVICE

Few universities serve the electrical needs of their surrounding communities – and none to the extent of Virginia Tech and the Virginia Tech Electric Service (VTES). VTES has been in the business of providing primary electrical distribution service to the campus and other customers for more than 100 years. VTES is the electric utility provider for the Blacksburg campus and about 7,000 residential and commercial customers in the Town of Blacksburg. VTES continues to retrofit campus street lighting to LED technology and upgrade real-time electric metering.

4. Existing Building Energy Efficiency

"Reduce building energy consumption to enable carbon neutrality by 2030."

ENERGY ACTION PLANS (EAP) 6-8

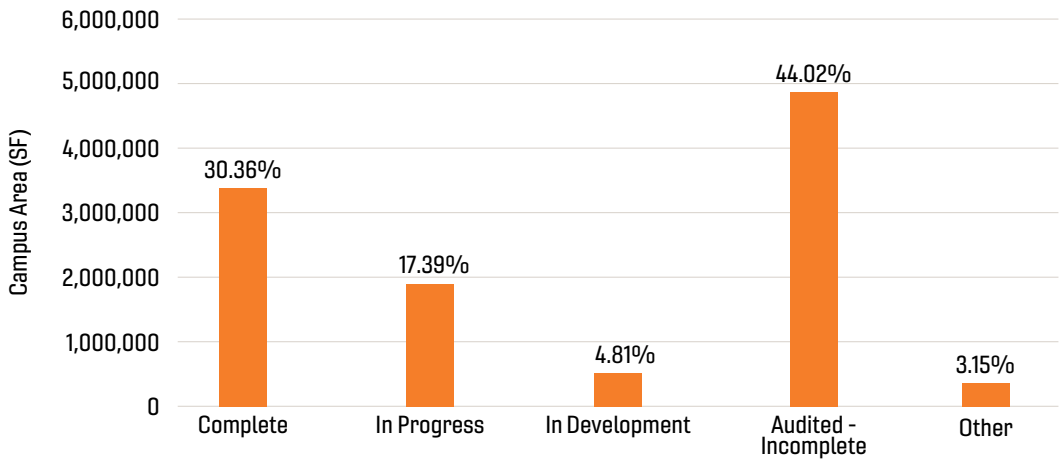
The Office of Energy Management is developing the eighth phase of the Energy Action Plan (EAP) to continue efforts for the implementation of the Virginia Tech 2020 Climate Action Commitment. The Office of Energy Management is completing the sixth phase of the Energy Action Plan. The EAP 6 projects include the conversion of one building to a new and advanced Building Automation System (BAS) platform, an LED lighting overhaul of ten E&G buildings, various retro-commissioning projects, additional energy metering installations, and chilled water system optimization. EAP 7 is also in progress and projects include the development of a steam trap performance management program, an occupancy-based temperature and ventilation control project, and an investment grade energy audit as part of the Energy Service Performance Contract (ESPC), and an LED lighting overhaul for 20 E&G buildings.

LED LIGHTING UPGRADES

~44% of campus building area remains in the lighting conversion project

Currently, 30 percent of the Blacksburg campus has been converted to LEDs. The current phase of LED lighting upgrade projects (EAP 7) includes the conversion of 20 buildings (~1.5M sq. ft.). This project is expected to save 2M kWh (~$300,000). This equates to 1,376 pounds of carbon dioxide, the impact of removing 400 cars off the road.

Figure 5. Campus Lighting Conversion to LED, Progress by Campus Area
Retro-Commissioning Efforts



Goodwin Hall and Williams Hall were retro-commissioned (RCx) in fall 2023 under the EAP 6 budget. RCx is a systematic process applied to existing buildings for identifying and implementing operations and maintenance improvements within the heating, ventilation, and air conditioning systems to ensure their continued high performance over time. RCx continues to be a major contributor to reducing energy consumption on campus and will be instrumental in Virginia Tech meeting its energy efficiency goals in the updated Climate Action Commitment.

LABORATORY OPTIMIZATION PROJECTS

Laboratory buildings are some of the greatest energy users on campus. In spring 2023, the Office of Energy Management inventoried ~780 fume hoods in 45 campus buildings. From this study, 11 laboratory buildings (879,214 sq. ft.) were selected for a project which included HVAC retro-commissioning, recalibrating airflow monitors and TAB (Testing and Balancing). In addition to improving the energy efficiency of these labs, these projects verified safety and indoor environmental quality. This project yields a four percent annual energy reduction on campus and will have a two-year simple payback period upon completion in fall 2024.

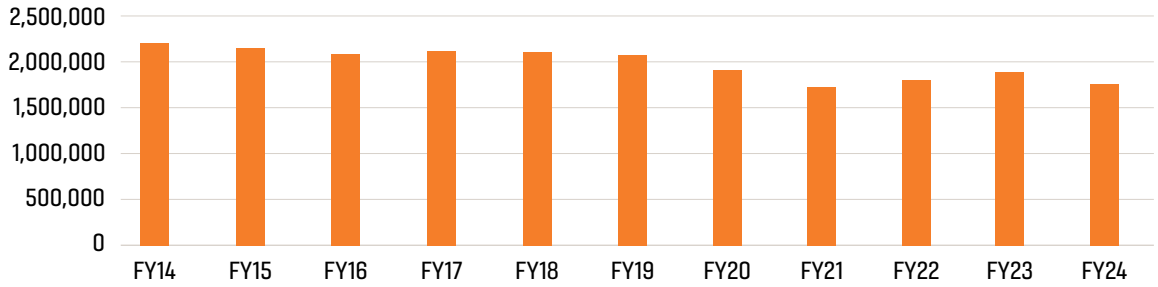
ENERGY SERVICE PERFORMANCE CONTRACT (ESPC)

In conjunction with the Energy Action Plans, Virginia Tech campus stakeholders are utilizing the Virginia Department of Energy's program for Energy Savings Performance Contracting (ESPC), which would provide additional funding and resources for energy efficiency measures that also provide infrastructure and asset upgrades. Using funding from EAP 7, three million square feet of campus will undergo an investment-grade energy efficiency audit. This audit will prioritize the energy intensive E&G buildings on campus.

SUBGOALS 4.1 AND 4.2

4.1 *By the end of 2022, reduce electricity consumption (kWh) by 10 percent and electricity intensity (kWh/gsf) by 20 percent below 2006 levels.*

Figure 6. Campus Electricity Consumption (kWh)/Area (SF) (Fiscal Year)



4.2 *By 2030, employ energy management retrofit to reduce total energy consumption (Btu+kWh) in all buildings by 10 percent and EUI (Btu+kWh/gsf) by 20 percent below 2020.*

Figure 7. Campus energy consumption (MMBTU/Area (SF)) (Fiscal Year)

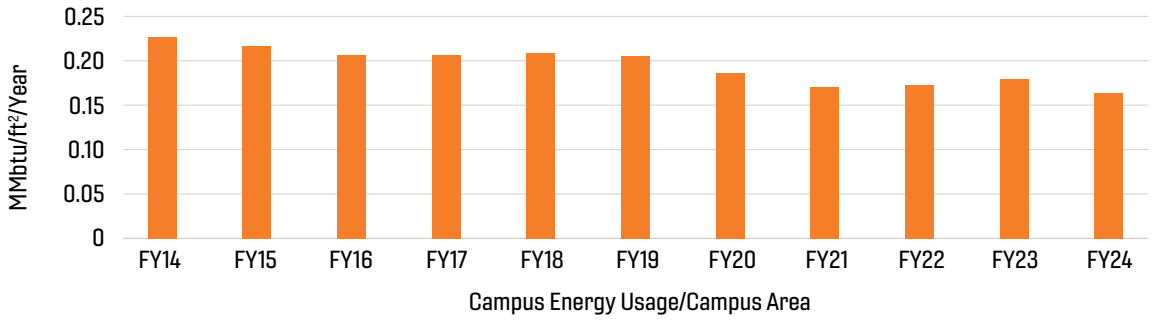
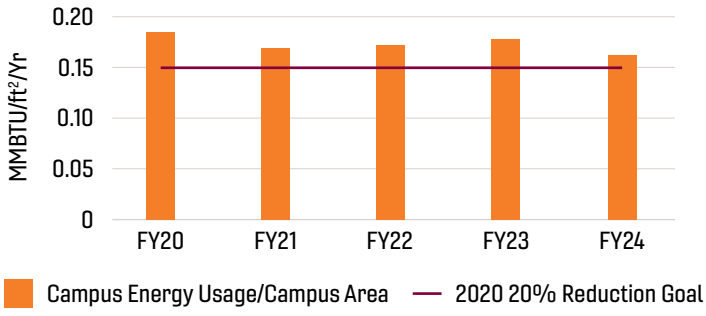


Figure 8. Progress towards Goal 4.2 (Fiscal Year)



The energy reduction intensity of 20 percent of the 2020 EUI is demonstrated in Figure 8. Virginia Tech is targeting this goal (0.15 MMBTU/Sq. Ft./Yr) by 2030.

DINING FACILITIES UPGRADES

This summer, in collaboration with Student Affairs Facilities and Operations, the Dining Services team finalized renovations at Owens Hall, the Graduate Life Center, and Squires Student Center. The new concepts house lighting upgrades to include LED fixtures, energy-efficient appliances, and recycled materials.

STUDENT AFFAIRS FACILITIES AND OPERATIONS

Student Affairs Facilities and Operations (SA FacOps) worked continuously through the summer to upgrade and improve student housing, dining facilities, student centers, and recreational sports facilities. Over the past academic year, the Student Affairs Facilities and Operations team completed 16 total projects. Many of these projects focused heavily on reducing energy consumption to enable carbon neutrality for the university.

Environmental Quality and Ventilation

New Residence Hall East and Peddrew-Yates Air Handlers

Two new air handler units were installed in two residence halls to improve indoor air quality and efficiency. These upgrades will significantly increase energy savings.

Johnson Restroom Ventilation

The Student Affairs Facilities and Operations team enhanced the supply and exhaust systems in Johnson Hall's bathroom ventilation system, resulting in a 300 percent increase in performance. Completion of this project has provided valuable insights, which will be applied to future restroom projects to reduce energy consumption while maintaining comfort and health standards.

McComas Hall Cooling Towers

The Student Affairs Facilities and Operations team installed new, energy-efficient cooling towers at McComas Hall. The decommissioned towers were then diverted from the landfill through a recycling facility, supporting efforts for a zero-waste campus.

Renovations, Lighting Upgrades, and Materials

Donaldson Brown Graduate Life Center and Squires Student Center Dining Renovations

In redesigning the dining venue at Donaldson Brown Graduate Life Center with Dining Services, the SA FacOps team reduced energy consumption by upgrading to LED light fixtures and incorporating energy efficient design elements. Additional upgrades at Squires Student Center included enhanced plumbing, mechanical systems, and ventilation for better energy efficiency.

Hillcrest Hall Laundry and Restroom Renovation

The SA FacOps team identified an underutilized space in Hillcrest Hall and transformed it into a modern laundry facility. The new venue contains LED lighting, energy efficient machines, and improved ventilation. Hillcrest Hall also received improvements to two restrooms to enhance accessibility and ventilation and add LED lighting and low-flow fixtures.

Squires Student Center Restrooms

The Squires Student Center restrooms were upgraded to include LED lighting, motion sensor hardware, 1.6 GPF valves, environmentally friendly ceramic tiles, low VOC paints, and energy efficient exhaust fans. These changes will decrease energy consumption and water usage while also improving comfort and air quality.

Peddrew-Yates Hall, Vawter Hall, and Oak Lane Restrooms

The Student Affairs Facilities and Operations team upgraded 18 restrooms in Oak Lane housing, half of the restrooms in Vawter Hall, and all showers in Peddrew-Yates Hall. Units will see energy efficient, low-flow fixtures and new LED lighting. Vawter Hall will also receive new ventilation systems to enhance air quality and energy efficiency.

Owens Hall Food Court Restrooms

Currently in progress, the restroom facilities supporting Dining Services' Owens Hall food court are being renovated. These facilities are being modernized to include energy efficient fixtures, LED lighting, and improved ventilation.

Main Campbell Hall and Main Eggleston Hall Laundry

The laundry facilities in Main Campbell and Main Eggleston Halls were renovated. During renovations, all light fixtures were converted to LEDs, ventilation systems were improved, and lint filtration systems were enhanced. These changes improve energy efficiency, comfort, and air quality.

Ambler Johnston Hall Flooring

Carpet squares in Ambler Johnston Hall student rooms were replaced with luxury vinyl tile (LVT) during summer 2024. The selected LVT contains a minimum of 39 percent recycled content. A thicker LVT was chosen to eliminate the need to replace baseboards, thereby reducing landfill waste.

Peddrew-Yates Hall and O'Shaughnessy Hall Green RFP

The Student Affairs Facilities Operations team, Sustainable Housing, and the Office of Sustainability completed a Green RFP to target energy reduction in two residence halls. "Switch Off" reminders were installed on light switches in all rooms and common spaces in Peddrew-Yates Hall and all common spaces in O'Shaughnessy Hall. These labels are intended to address human behavior in the form of a reminder to turn off the lights when exiting a room – thereby reducing energy consumption in these spaces.

Slusher Hall Lounges

The Student Affairs Facilities Operations team upgraded light fixtures in the Slusher Hall lounges to support LEDs. Dimmers were also added to reduce electrical load. Both upgrades assist with reducing the electrical usage in these common spaces.

5. New Building Energy Efficiency

"Operation of new buildings initiated by 2030 will be carbon neutral."

LEED STANDARDS

Designing for high energy efficiency in new buildings is necessary to achieve and maintain carbon neutrality and sustainable operations. The U.S. Green Building Council provides a green building certification known as Leadership in Energy and Environmental Design or LEED. This program scores buildings on their overall sustainability based on a points system which scores the building on various criteria such as energy and water efficiency, waste reduction, sustainable transportation options, and many others.

Currently, Virginia Tech has 25 LEED-Registered buildings and an additional 11 in-progress LEED building projects (five pending certification, six under construction) totaling over 3.3 million gross square feet. The university has specified that all new buildings entering the design phase of construction that are greater than 5,000 gross square feet, or the renovation of such buildings where the cost of renovation exceeds 50 percent of the value of the building, shall conform to LEED Silver standards or better.

		LEED Project	GSF
Gold Certified	★	Ambler Johnston Hall	269,463
	★	Goodwin Hall	154,935
	★	Henderson Hall Renovation and Theatre 101 Addition	38,750
	★	Human and Agricultural Biosciences Building I	93,860
	★	ICTAS Phase II	42,190
	★	Moss Arts Center	147,382
	★	O'Shaughnessy Hall Renovations	69,200
	★	Student Athlete Performance Center	25,800
	★	Holden Hall Renovation	101,240
	★	Baseball Facilities Improvements	49,872
	★	Chiller Plant Phase I (Southwest Chiller Plant)	16,655
	★	Davidson Hall	44,845
	★	Davidson Hall (RRAB)	25,151
Silver Certified	★	Football Locker Room Addition	42,145
	★	Lavery Hall	77,301
	★	Indoor Athletic Training Facility	91,600
	★	New Classroom Building	72,275
	★	Oak Lane Phase IV	20,508
	★	Pearson Hall East	111,191
	★	Pearson Hall West	108,765
	★	Vet Med Instructional Addition	24,600
	★	VT Carilion Biomedical Research Expansion	139,586
	■	CID LLC	224,500
	■	Corps Leadership and Military Sciences Building	60,500
	■	Data & Decision Sciences	120,000
	■	New Upper Quad Residence Hall	58,000
	■	Rector Field House	43,949
	●	Hitt Hall and New Dining Facility	112,000
	●	Innovation Campus Academic Building	300,000
	●	Mitchell Hall (Replace Randolph Hall)	284,000
	●	Multi-Modal Transit Facility	13,606
	●	Student Wellness Improvements	263,000
	●	Undergraduate Science Labs - New Construction	102,366
Certified	★	Liberal Arts Building (RRAB)	15,394
	★	Sandy Hall (RRAB)	19,889
	★	Visitors and Undergraduate Admissions Center	18,155

Status: ★ Complete ■ Pending ● Under Construction

DESIGN AND CONSTRUCTION STANDARDS

The university's Design and Construction Standards Manual (DCSM) outlines the philosophy, standards, recommendations, and requirements for the design and construction of campus buildings. As a component of the DCSM, the Guidelines for Energy Efficient Designs address the energy efficiency and on-campus renewable energy utilization requirements for our campus buildings. These standards apply to all new construction, additions, and renovations projects on campus and are essential for fostering sustainability among new building projects.

6. Agricultural, Forestry, and Land Use Operations

"Agricultural, forestry, and land use operations will be carbon neutral by 2030."

STROUBLES CREEK RESTORATION

Stroubles Creek is an approximately 12-mile-long stream that runs through the Town of Blacksburg, the Virginia Tech campus, and Montgomery County until it empties into the New River. Virginia Tech, in partnership with the Stroubles Creek Restoration Initiative and students from many organizations across campus, has been working to repair the riparian area along the segment of the stream leaving campus since 2014. Restoration efforts are partially funded through proposals submitted via the Green RFP program.

In spring of 2024, 20,668 native trees and shrubs were planted with the help of over 600 volunteers. Thirty-seven different native species were planted along the stream. Total planted stream bank length equals 11,043 linear feet or 2.09 miles. Total planted riparian acreage from this spring's planting efforts totals 14.66 acres.

OWENS HALL GREASE INTERCEPTOR

Student Affairs Facilities and Operations identified that the sewer main serving Owens Hall was discharging grease into the sewer system. A new grease trap was installed that will extend the life of the sewer system and will continue to protect the Stroubles Creek watershed from contamination.

BEE CAMPUS USA

Virginia Tech earned Bee Campus USA certification in spring 2022. Bee Campus USA certification requirements serve as a guideline for affiliated campuses to increase their commitment to preserving native pollinators. Certification is achieved and maintained through developing a long-term plan to increase native plant habitat, providing pollinator nesting sites, reducing pesticide use on campus, and hosting pollinator conservation education and outreach opportunities for the community.

The Bee Campus Standing Committee worked to create a new pollinator habitat located at the Visitors Center with the help of volunteers during Earth Week. This work replaced the annual flower beds with perennials, which were selected based on their compatibility with native pollinators. This effort also expanded the habitat present at the site. The committee also worked to maintain existing pollinator habitats, weeding the Hillcrest Hall and Drillfield roundabout plantings throughout the year. These efforts helped reduce the use of herbicides on the sites, further benefiting pollinators. Lastly, Bee Campus efforts were presented to members of the Blacksburg community through a Sustainable Blacksburg lunch and learn at the Blacksburg Library.

URBAN FORESTRY

Virginia Tech takes a holistic approach to campus urban forestry and management of university lands. This approach, rooted in planning, collaboration, education, and community engagement, helped the university earn Tree Campus Higher Education recognition for the 16th consecutive year in 2023.

Leading Virginia Tech's urban forestry efforts is Urban Forest Manager and University Arborist Jamie King, who joined the Division of Facilities in 2019. "Trees play an integral part in maintaining a sustainable campus. They help support air quality, water quality, energy conservation, stormwater management, carbon capture and storage, wildlife habitat, and community wellbeing, all while creating spaces on campus that serve as a living learning lab," said King. Trees are among the most visible representations of Virginia Tech's commitment to environmental stewardship and tree preservation, reforestation, and education. Thus, these assets are prescribed throughout a number of key university frameworks, including the Campus Master Plan, the 2020 Virginia Tech Climate Action Commitment, and the Virginia Tech Blacksburg Campus Urban Forest Master Plan (UFMP), which is currently under Facilities leadership review.

Since 2008, more than a thousand canopy and ornamental trees have been planted on the Blacksburg campus and thousands more have been planted in riparian areas on Virginia Tech lands. Over the 2023-2024 planting season, more than 92 landscape trees were planted across the core campus as part of tree replacement programming and capital projects. More than 14,000 riparian and reforestation trees were planted along Stroubles Creek and at key sites in the Residential District in spring 2024 as part of the annual Big Plant. Many of these trees were planted by the Division of Facilities' Urban Forestry Team with support from the Office of Sustainability, the College of Natural Resources and Environment (CNRE), and the Virginia Department of Forestry offering students immersive learning experiences and public service opportunities, all centered around urban forest management and environmental stewardship on campus. These programs include hands-on academic sessions at campus trees and forests, tree planting events throughout the year, and urban forestry student internships.

Figure 10. Aerial Photograph with Campus Tree Overlay

Figure 11. Campus District Overlay and 2020 i-Tree Canopy Study Data

District	Acres	UTC %	Impervious %	Plantable %	District	Acres	UTC %	Impervious %	Plantable %
Ag Belt	209	16	1.7	64.7	North Academic	70.2	10.1	42	14.3
Athletics and Recreation	196.4	4.5	37.8	13.5	Student Life	64.8	17.3	30	12.7
Creativity and Innovation	37.4	16.5	32.9	10.6	Northeast and Upper Quad	29.9	8.2	36.5	9.4
Drillfield	23.1	23.4	12.5	12.5	Oak Lane	38.7	28.4	33	12.5
Life Sciences and Technology	125.3	18.4	48.2	13.5	21st Century Living Learning	43.3	19.4	2	59.2
Meadow	67.9	27.8	8.7	29.6	**All Campus**	**1,051**	**16.9**	**24.4**	**26.6**

Replacement Value of the Blacksburg Campus Urban Forest

$30,622,817

Carbon stored in campus trees:

4,573 TONS = $566,214

When we utilize urban wood resources from campus, we store this carbon for much longer.

Carbon sequestered every year:

59.75 TONS = $7,751

Campus trees and other VT forests offset university carbon emissions by ~3%

Stormwater mitigated every year:

257,072 FT^3 = $17,184

Slower runoff = Healthier VT Streams

Air pollution removed every year:

2.7 TONS = $6,459

Cleaner air = Healthier VT community

A complete field inventory of trees on Virginia Tech's Blacksburg campus was completed in 2018 and the report can be obtained on the Virginia Tech website. A collaboration among the Division of Facilities and CNRE, the inventory includes tree identity, precise location, measurements, health, and condition details for trees all over campus. As of June 3, 2024, the Blacksburg campus is home to approximately 11,527 living trees and these assets are logged in the Core Campus Tree Inventory.

The graphical representation of the Campus Tree Inventory is seen in Figure 10. Each dot represents campus urban trees including the trees located in the old growth forest near Lane Stadium. Some urban trees and various larger forests are not included and require future inventory and assessment. This resource helps guide tree preservation and maintenance as well as promoting education and awareness as the Campus Tree Inventory and Interactive Tree Map is available online for public access.

The total value of the structural and environmental benefits provided by the trees on the Blacksburg campus was included in the 2018 inventory and analysis. The data collected as part of this project was analyzed with software developed by the United States Forest Service called i-Tree Eco, a tool that models the structure of an urban forest and how trees influence the world around them. The software then analyzes the results and quantifies the environmental benefits provided by the inventoried trees to the community.

Virginia Tech's trees sequester and store enough carbon every year to offset approximately 3 percent of the carbon produced through total university operations. As trees are removed through management operations, the wood may be utilized for student academic projects, construction and woodcraft, wildlife habitat, or mulching materials, continuing the storage of carbon, sometimes for many generations. These trees also slow the runoff of stormwater on campus, reducing severe flooding events and improving water quality. The leaves on campus trees filter particulates and pollution from the air; this air quality improvement allows the community to experience fewer respiratory health challenges.

If Virginia Tech were to replace every tree recorded in the Blacksburg Campus Tree Inventory with the largest commonly available planting stock, the expense would amount to almost $31 million. This analysis does not account for the generations required for trees to mature and provide the benefits the Virginia Tech community enjoys today. These assets require continued investment in maintenance and protection to maximize tree benefits, including carbon capture and storage, for generations to come.

According to a 2020 study by Hwang and Wiseman in the College of Natural Resources and Environment, the urban tree canopy (UTC), the percentage of surface area covered with tree leaves during the growing season, at Virginia Tech is 14.7 percent. In 2019, 20.9 percent of colleges and universities in the U.S. reported having a campus tree cover goal (8.7 percent) or were currently developing one (12.2 percent). The UFMP proposes a Virginia Tech Tree Policy that establishes an UTC goal of 25 percent, an increase of tree leaf area equivalent to 108 acres, by 2050. This goal supports carbon capture and storage on campus and will contribute significantly towards campus carbon neutrality while providing all of the other environmental and social benefits described in detail above.

Another assessment, conducted in 2019-2020 by students in the Urban and Community Forestry course at CNRE, utilized a sample-based photo interpretation method to determine UTC of specific campus districts. The students utilized an application called i-Tree Canopy, a software developed by the United States Forest Service, that combines aerial photographs with ecosystem models to determine estimates of land cover types and the ecosystem services provided by UTC cover at specific locations. This land cover data is created through a process called sample-based photo interpretation where analysts classify land cover types through statistical point sampling, allowing fast and inexpensive UTC reports. The i-Tree results report 16.9 percent UTC campus wide, allowing comparison of UTC and ground cover data between districts across the campus. The results only differ slightly from the earlier Hwang and Wiseman 2020 study (14.7 percent campus wide) due to differences in imagery dates and analysis methods. The final report illustrates the UTC relative to other ground covers in each zone on campus and the results of the primary campus districts are illustrated in Figure 3. Districts with high UTC include Oak Lane (28.4 percent or 10.9 acres), Meadow (27.8 percent or 18.9 acres), and Drillfield (23.4 percent or 5.4 acres). The Drillfield district tree canopy is relatively high when considering the canopy is restricted to the edges of the Drillfield district. These districts show great contrast when compared to districts with low UTC like Athletics and Recreation (4.5 percent or 8.3 acres), North Academic (10.1 percent or 7 acres), and Northeast and Upper Quad (8.2 percent or 2.4 acres). This assessment informs tree planting and preservation priorities across the campus so tree benefits, including carbon capture and storage, are maximized as more complete tree planting and preservation plans are developed to maximize plantable space tree protection in districts with challenging constraints.

In fall 2023 Urban Forestry Team intern, Madeline Bryant, requested Tree Campus Higher Education application submittal data from the Arbor Day Foundation (ADF). The ADF provided data from the 14 years of the Tree Campus program for all participating land-grant institutions and Virginia Tech's SCHEV (State Council of Higher Education for Virginia) peer institutions. The data included total expenditures for urban forestry management and student populations for each year of participation in the program. The analysis revealed that Virginia Tech invests approximately $250,000 less in urban forestry than peer institutions.

Table 2. Average yearly total and per capita urban forestry expenditures at SCHEV Approved Peer Institutions and Land-Grant Institutions compared to Virginia Tech's average urban forestry expenses 2008 - 2022. All data reported as part of Arbor Day Tree Campus application requirements.

Tree Campus Higher Ed. Institutions	Total Expenditures	Total Per Capita Expenditures
SCHEV Peer Institutions	$403,289	$9.23
Land Grant Institutions	$392,259	$9.50
Virginia Tech	$135,072	$4.16

Each year the University Arborist office conducts tree assessments focused on safety and preservation within the old growth forest by Lane Stadium and across the campus. These risk assessments are scheduled and executed as a means to continue the preservation of campus trees and help ensure the safety of the campus community. The proactive assessments focus on trees adjacent to pathways and campus thoroughfares. Ongoing inspections, tree risk assessments, and maintenance activities are critical tools in advancing Virginia Tech's tree preservation commitment, natural resource management goals, and the Climate Action Commitment. These assessments and operations are conducted in close alignment with the University Urban Forestry Advisory Committee and the Virginia Tech community.

For Arbor Day 2024, the Urban Forestry Team partnered with CNRE, the Earth Week Committee, and Students for Sustainable Practices to host a tree planting event at the Sterrett Center planting strip, a site in much need of tree benefits. Participants learned how tree-planting sites are selected and prioritized and tree-planting technique was demonstrated before groups planted 14 new trees between the Sterrett Center and Fleet Services.

7. Zero Waste Campus

"Virginia Tech to become a zero waste campus by 2030."

2023 RECYCLE RATE REPORT

In compliance with Virginia's Department of Environmental Quality, Virginia Tech completes an annual recycling rate report. These reports provide details on specific materials collected on campus. For CY2023, Virginia Tech reported 1,052 tons of principal recyclable materials which included 297 tons of food waste, 296 tons of paper, and 189 tons of commingled materials (single-stream recycling). Virginia Tech reported 5,194 tons of municipal solid waste (trash). The university's recycling rate was 17 percent and the waste diversion rate (waste kept out of the landfill) was 84 percent.

Y-TOSS

Coordinated by the YMCA at Virginia Tech, the Y-TOSS program collects gently used items, such as furniture and clothing, from the residence halls during student move-out. Those items are then made available to students during a fall move-in sale at greatly reduced prices. All of the profits from the sale support YMCA student programs.

Collection was held from May 3-8, 2024. Ten PODS storage containers were set up across the residential side of campus to collect donated goods, which was an increase from the usual eight containers. With the help of 70 volunteers, over 34,000 pounds of donations were collected. This program has been in place since 2006.

RACE TO ZERO WASTE

Virginia Tech participated in Race to Zero Waste, a competition between universities in the U.S. and Canada to reduce waste and increase recycling from January through March of 2024. Participating in this challenge helped raise awareness about waste management practices on campus and educated people on the roles they play within the larger system of waste at Virginia Tech. The competition offers different levels of participation depending on a university's goals. Virginia Tech participates in three categories: diversion, per capita recycling, and food organics.

DINING COMPOST AND WASTE REDUCTION

Since 2009, Dining Services has made composting a core foundation in their waste management systems. Roughly 300-500 tons of compost is sent from Virginia Tech's dining units to Royal Oak Farm (ROF) each year. ROF is a local, family-owned business that converts composted materials into rich soil.

Last year, Dining Services completed efforts back of house (BOH) to improve waste management through the use of color-coded waste bins and labels. As a complement to that program, front of house (FOH) audits and updates began this year. The team completed a yearlong process of updating all signage in FOH dining areas in summer 2024. Self-sort units now include unique product icons, color coding, and bold visuals to assist with accurate and efficient waste sorting. At we-sort-for-you units, new signage is in place at dish room conveyor belts to inform guests of the waste management taking place BOH. New labels and signage boast a color-coded system that correlates with BOH progress from last year. This universal Dining project aims to increase efficiency, improve training mechanics, and promote proper waste sorting.

Southgate Center acquired a biodigester to further support waste reduction in Dining Services. This technology can digest 50 pounds of compostable waste per hour, on average, from the pre-prep facility. Through a naturally occurring aerobic process, materials that are "fed" to the machine are broken down into gray water that then passes through the plumbing system. Since acquiring the technology in January 2024, the biodigester has processed close to 25,000 pounds of waste. This is equivalent to carbon sequestered by over six acres of U.S. forests.

DINING SERVICES SUSTAINABLE PRODUCTS

Since 2014, Dining Services has been offering a free reusable-to-go program across campus. These green containers allow customers to take a reusable container with them and return it at their next visit – reducing the amount of single use clamshells to-go containers in Virginia Tech's waste streams. Audits indicate that low return rates were hindering the success of this program. Since summer 2023, Dining Services has been building a partnership with a company that will help track and recover reusable containers on campus. During summer 2024, those plans came to fruition as arrangements are finalized for a pilot at West End Market in fall 2024.

An ongoing effort in Dining Services is the conversion of single-use plastic products to compostable single-use products. This transition supports campus zero waste goals by diverting items from the landfill. In the past several months, several products have completed

this transition: 9" plates, Picnic Packs, Sandwich Paper Wraps, Standard Straws, 9 oz cold cups, and 12 oz cold cups. All mentioned items are now BPI certified compostable products across campus. At Southgate, all cold cups and lids are now 100 percent compostable products. In addition, all dining centers have transitioned to PFAS free BPI Certified compostable clamshells. Clamshells are now being sourced from a local, woman, veteran, and minority owned company.

STUDENT AFFAIRS ZERO WASTE EFFORTS

Battery Recycling

Annually, electronic access doors throughout the residential halls receive new batteries. This ensures that students have continuous access to their halls and rooms without system failure concerns. This maintenance results in approximately 45,000 AA used batteries in need of disposal. These are collected and sent for recycling.

Slusher Tower Lounges

Furniture in Slusher Tower was replaced this summer with new, modular units that can be reused, repurposed, and eventually recycled. These modular units have removable parts, allowing for fabric updates over the decades without replacing the entire unit.

8. Sustainable Procurement Policy

"Establish the Sustainable Procurement Policy and Procedures by 2022."

SUSTAINABLE PROCUREMENT POLICY

The Virginia Tech Sustainable Procurement Policy states that, in accordance with the Virginia Tech Climate Action Commitment, the Virginia Tech Procurement Department recognizes its responsibility to support the university in its efforts to minimize negative impacts on health and the environment while supporting a vibrant campus community and local economy. The Procurement Department recognizes that products and services have inherent social health, environmental, and economic impacts, and that the department should make procurement decisions that embody the university's commitment to sustainability whenever possible.

UNIVERSITY POLICY 5505: CAMPUS ENERGY, WATER, AND WASTE REDUCTION

University Policy 5505 plays an integral part in Virginia Tech's procurement process. This policy ensures that Virginia Tech follows the three R's of waste reduction (reduce, reuse, recycle) by minimizing waste on the front end through procurement of sustainable products as opposed to just focusing efforts on products' end-of-life disposal.

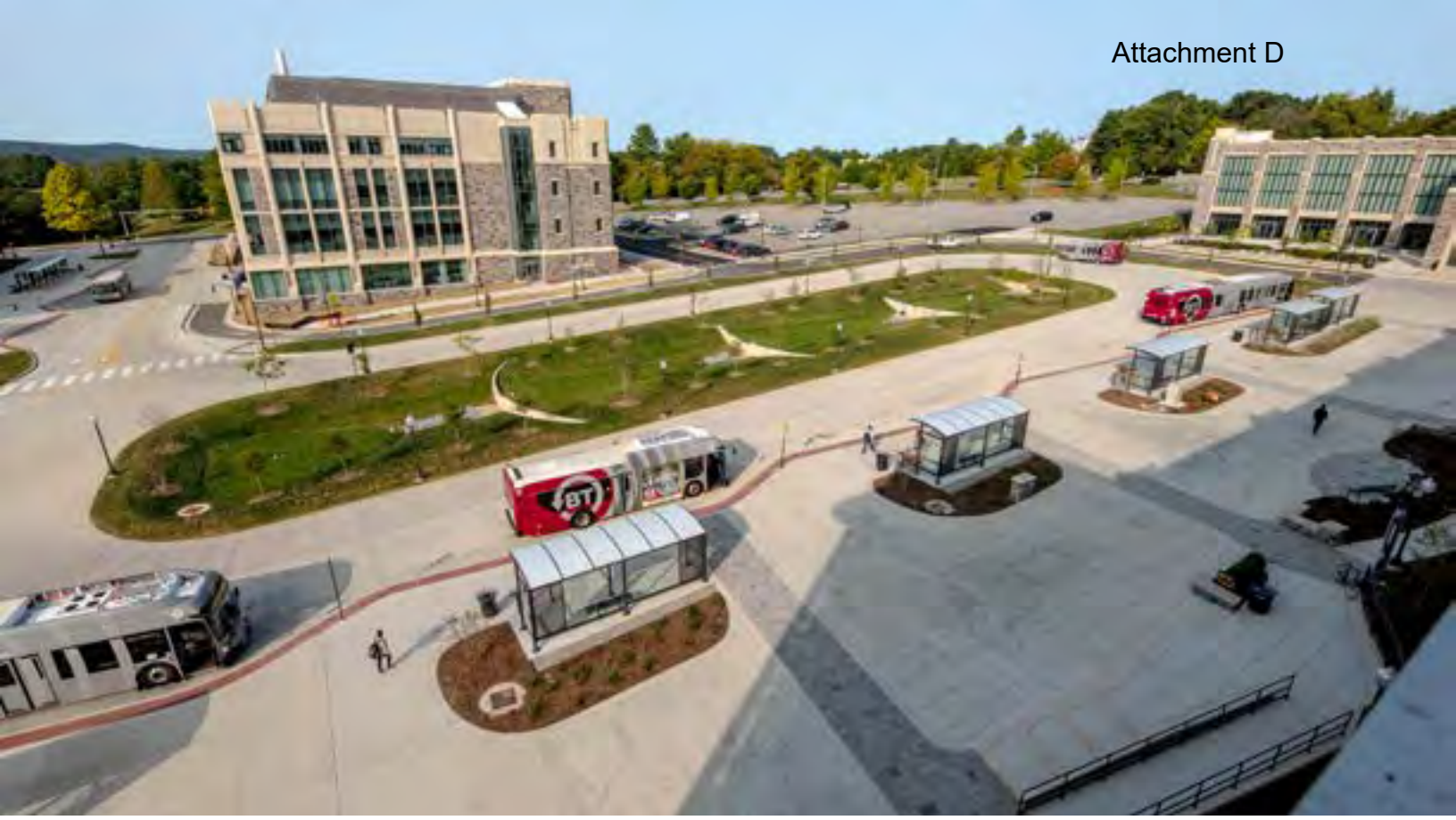
DESIGN AND CONSTRUCTION STANDARDS MANUAL

Virginia Tech's Design and Construction Standards Manual (DCSM) outlines the philosophy, standards, recommendations, and requirements for the design and construction of campus buildings. The DCSM requires that life cycle cost and energy analyses are conducted and that their results should inform purchasing decision for materials used within projects. The goal of these guidelines is to have more sustainability-minded design practices implemented throughout the building process.

LOCAL AND CAMPUS SOURCED FOOD

Virginia Tech Dining Services is focused on utilizing locally sourced and sustainable food products. The Dining Sustainability team has continued to create transparency and open communication regarding local, organic, and sustainable food expectations and goals with vendors. A new internal system has been implemented that requires all new products to be tagged as local and/or organic before entering campus. This new requirement allows the Dining Sustainability team to better track sustainable purchases. Sourcing locally allows Virginia Tech to reduce food miles that relate to greenhouse gas emissions.

Homefield Farm, Dining Services' 12-acre organic produce farm, is one of many campus-based producers. The College of Agriculture and Life Sciences produces eggs, milk, and various protein products (beef, lamb, and pork) that Dining chefs consistently add to their menus.



9. Transportation GHG Emissions Reduction

"Reduce single-occupancy-vehicle commuting to campus by 20 percent by 2025 and reduce transportation-related GHG emissions by 40 percent by 2030."

TRANSIT CENTER

The product of decades of planning led by the Town of Blacksburg, in close coordination with Virginia Tech, the Transit Center's Orange and Maroon loops opened in late June 2024. During the first two weeks of operation, Blacksburg Transit saw a four percent increase in ridership over the same period the previous year. This is likely due to the introduction of the new Campus Shuttle route, which circulates around campus. Almost all other routes only stop at one of the Transit Center Loops before turning around and heading back off campus.

Before the start of the fall 2024 Semester, regional transit services transitioned to the loops, making one central location for all transit service on campus. A student Green RFP will add a bicycle locker for additional storage for riders near the Transit Center.

3,380

Visits to the Hokie Bike Hub this fiscal year

5% **Increase in visits over the previous fiscal year**

TOP 5 reasons for visiting the Hokie Bike Hub last year

+ pumping/repairing flat tires
+ routine maintenance
+ brake issues
+ parts replacement
+ cleaning

GOBBLER GEARS

Sustainable Transportation launched a long-term bike rental program, called Gobbler Gears, at the beginning of the 2024 spring semester. The program allows students to rent bikes in one or two semester periods. The bikes come equipped with front and rear lights and a U-lock. Renters receive a helmet that is theirs to keep after the rental period, as well as free maintenance and repair during the rental period. Before renting a bicycle, participants are required to complete the online Heads Up Hokies course, which provides basic knowledge on how to bicycle predictably in different types of cycling infrastructure. For the spring semester, seven of the ten bikes in the fleet were rented.

HOKIE BIKE HUB

The Hokie Bike Hub is a free bike repair and maintenance workshop for Virginia Tech students, faculty and staff. Cyclists have access to tools and one-on-one help for self-service bike repair.

They can also attend bike maintenance workshops and other cycling-related classes. The Hokie Bike Hub has become the home of bicycling on campus and serves as a social space for cyclists to interact and learn from one another. Having a space like this available for free on campus encourages and supports the use of bicycles as a mode of transportation.

BIKE CENSUS

The bike census is an annual analysis of bike parking conditions on campus. Sustainable Transportation performed this year's bike census on Sept. 14, 2023. The purpose was to evaluate the condition of the bike racks around Blacksburg's campus, determine the utilization percentage at each rack, as well as update any other information necessary. From the census, Sustainable Transportation identified highly utilized bicycle racks that need an increase in capacity. Additionally, opportunities for bike rack improvements were identified.

FLEET SERVICES' ELECTRIC VEHICLE

In April, Fleet Services introduced a Chevrolet Bolt electric utility vehicle (EUV) into its daily rental fleet. Faculty, staff, and students can rent the EV for university-related business. This represents the first EV in the university's fleet that isn't solely dedicated to research purposes.

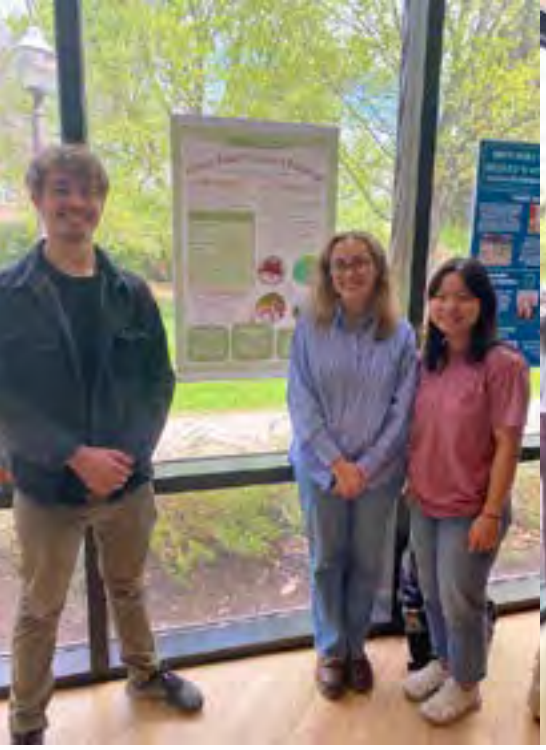
ELECTRIC VEHICLE CHARGING STATIONS

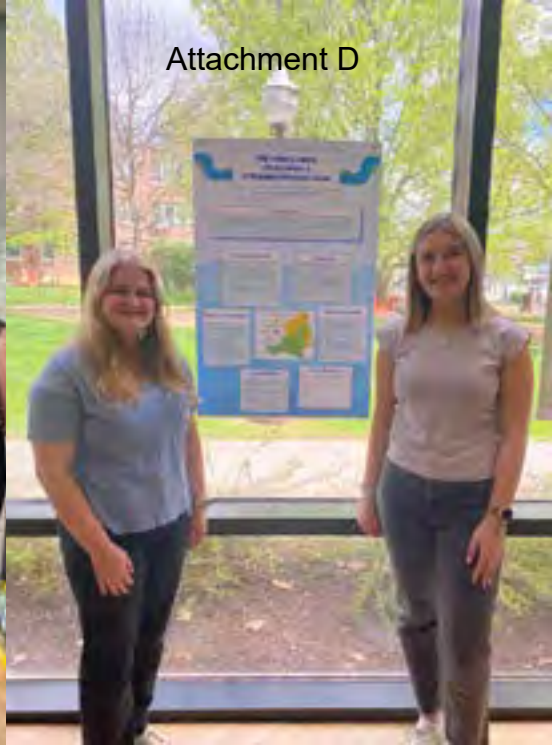
An EV charging station was installed at Fleet Services in April. With it, Virginia Tech now has four publicly available EV charging stations on campus (three already existed in the Squires Lot). All of the units are level 2 charging stations with two plugs each. One of the parking spaces at Fleet Services is assigned to their new EV, while the other space is public.

During FY24, the charging stations recorded over three thousand charging sessions from over 500 unique drivers. Both numbers represent an increase over the previous fiscal year. Campus EV charging station utilization has resulted in the avoidance of 37,153 kg of GHG emissions during FY24; 27,765 kg of emissions were avoided in FY23.

SUSTAINABLE TRANSPORTATION FAIR

Sustainable Transportation hosted the Sustainable Transportation Fair on Aug. 24, 2023 to communicate transportation options available to all faculty, staff, and students at the start of the fall semester. The fair highlighted current programs and explored future opportunities for transportation. Representatives from the Office of Sustainability, Hokie Wellness, the Virginia Tech Police Department, Valley Metro, RIDE Solutions, and more were on hand to talk to attendees about the services they offer and answer any questions. People had the opportunity to learn how Sustainable Transportation is promoting modes of transportation beyond single occupancy vehicle commuting to decrease Virginia Tech's greenhouse gas emissions and improve campus life.





10. Climate Action Living Laboratory

"Integrate the Climate Action Commitment into Virginia Tech's educational mission through the Climate Action Living Laboratory (CALL) beginning in 2021."

The Climate Action Living Laboratory, or CALL, was designed as a way to integrate the operational and academic arms of the university in order to: (1) improve experiential learning opportunities for students, (2) elevate research projects by using campus as a laboratory, and (3) facilitate the infrastructural transition to a more sustainable built environment. The vision of the CALL is to "integrate students and faculty with staff through a collaborative framework to achieve the 2020 Climate Action Commitment. Through transformative research, teaching & learning, and service, the CALL will support a sustainable, equitable built and cultural environment for campus and the surrounding community."

CLIMATE ACTION LIVING LABORATORY SHOWCASE

Organized by the Office of Sustainability and the Honors College, the Climate Action Living Laboratory (CALL) Showcase featured an array of presentations from students, faculty, and staff across the university. During a poster session, students presented projects related to

the CALL and climate action across campus. Faculty from across the university took part in a panel discussion about integrating climate action into their research and teaching. The faculty and staff involved in creating Virginia Tech's Greenhouse Gas Emissions Inventory also presented their work, recontextualized within the framework of the CALL. At the end of the showcase, a facilitated activity helped participants envision future CALL partnerships and collaboration to support a sustainable, equitable future. The success of the initial showcase speaks to the broad interest for the CALL framework from faculty, staff, and students. Most of the discussion during the event centered on next steps and trying to identify what future CALL projects will look like.

EXPERIENTIAL LEARNING PARTNERSHIPS

The Office of Sustainability has continued its long history of working with staff, faculty, and students to build climate action learning opportunities. In the 2023-24 academic year, the Office of Sustainability partnered with 12 classes from a variety of colleges and departments across campus. Some of these partnerships were continuations of annual projects while others provided new opportunities for creative problem solving and unique educational experiences.

Fall 2023

Bowman Sustainable Land Development Seminar – The Office of Sustainability staff provided the opening seminar presentation for the class and discussed the development of a composting facility at Kentland Farms. This was a seminar series for graduate students and industry professionals to receive professional development credit.

CEE 4994 Undergraduate Research – The Office of Sustainability and Office of Energy Management staff partnered with Dr. Michael Biscotte, assistant professor of practice, to help mentor his class as they developed a Green RFP for an LED lighting upgrade in Patton Hall. The semester-long project was submitted and successfully funded through the Green RFP.

ENGR 4974 Independent Study - The Office of Energy Management worked with Dr. Sean McGinnis, associate professor of practice and director of green engineering program, for a green engineering course that looked at the university's Greenhouse Gas Inventory. Together, the office and McGinnis refined the new protocol for the inventory and collected additional data on transportation and other scope three greenhouse gas emissions sources. Simona Fried, manager of energy projects and analytics, and McGinnis presented the results of this work and its connections to experiential learning at the spring CALL Showcase.

ENGE 1215 Foundations of Engineering - Students worked in groups to accomplish project-based learning objectives. There was a broad set of challenges the students sought to address including waste management strategies, energy reduction, and transportation safety initiatives. At the end of the semester, the students had a poster presentation of their work for the College of Engineering community.

HNFE 4624 Community Nutrition – The Office of Sustainability connected students in Research Scientist Sarah Misyak's course with sustainability experiential learning opportunities across campus. This included partnering with local food production at Homefield Farms and the New River Valley chapter of the Sierra Club. They then reported back to the Office of Sustainability about their initiatives and how they impacted the local community.

UAP 3354 Environmental Planning & Policy - The Office of Sustainability staff presented on sustainable development in facilities and introduced Associate Professor of Urban Affairs and Planning Todd Schenk's class to the Green RFP program. The class worked with staff throughout the semester to develop their own Green RFP ideas and submit them for consideration.

UH 3204 Honors Service Learning – Students worked in small groups to tackle projects centered around developing and formalizing the structure of the CALL. These included: benchmarking peer institutions' living laboratories, developing a communication

plan for onboarding new CALL members, planning out a draft of a CALL website, and developing the CALL showcase. At the end of the semester the students presented these projects to the Honors College as a whole and then in the spring had the opportunity to present them through the CALL showcase.

Spring 2024

AAD 1214 Acting Locally – Student groups worked in partnership with the Office of Sustainability to develop phased designs for pollinator habitat in support of Virginia Tech's Bee Campus USA certification and created an educational video on the impacts of the fast fashion industry which was shown at the Sustainable Fashion Show in April. Students also worked with partners from Sustainable Dining, the University Arborist, and the Sustainability Manager from the Town of Blacksburg to complete projects in line with the CALL.

ENGE 1215 Foundations of Engineering - Students worked in groups to accomplish project-based learning objectives. There was a broad set of challenges the students sought to address including waste management strategies, energy reduction, and transportation safety initiatives. At the end of the semester, the students had a poster presentation of their work for the College of Engineering community.

ME 3034 Mechanical Engineering Discourse - Office of Sustainability staff presented to the students on the Green RFP program and guided them through what a successful Green RFP submission looks like. Afterwards, the students developed their proposals and submitted them to the instructor with consultation from the Office of Sustainability. The top proposals were submitted to the Green RFP program for funding consideration.

UH 3204 Honors Service Learning - Students worked in small groups to tackle projects centered around developing and formalizing the structure of the CALL. These included: developing one-page spotlights of previous CALL projects and their impacts, benchmarking peer institutions' living laboratories, developing a faculty toolkit to help faculty engage in mutually beneficial CALL community partnerships, and interviewing staff members' needs surrounding sustainability work. These projects culminated in students presenting to the broader CALL community through the CALL showcase at the end of the semester.

Summer 2024

ME 3034 Mechanical Engineering Discourse - Staff presented to the students on the Green RFP program and guided them through what a successful Green RFP submission looks like. Afterwards, the students developed their proposals and submitted them to the instructor with consultation from the Office of Sustainability. The top proposals were submitted to the Green RFP program for funding consideration.

RESEARCH PARTNERSHIPS

One of the main drivers for CALL success is the ability to leverage internal expertise from both faculty and operational staff to use the campus built environment to advance the research mission of the university and the goals of the Climate Action Commitment. In the 2023-24 academic year, several pilot projects were advanced to implement this ambitious idea. The goal was to pilot substituting external expertise with internal knowledge of university operations and subject matter experts.

The most successful of these pilot projects was the Catawba Sustainability Center site survey for potential solar development. The resulting report is available to read through the Virginia Tech library and additional publications are in development.

The Catawba solar research project also piqued the interest of a group of researchers in the College of Agriculture and Life Science for the possibility of agrivoltaics solar development at the Kentland Farms facility. This has led to the creation of a research team between the College of Agriculture and Life Sciences, College of Liberal Arts and Human Sciences, and the Office of Sustainability that intends to explore agrivoltaics possibilities locally to Blacksburg. This project is still very much in its early stages, but nonetheless shows how CALL projects ripple outwards to build intercollege and interdepartmental partnerships that advance the university's sustainability mission.

Additional insights gained into CALL faculty research projects include a need for summer funds, course releases, and eventually fellowship opportunities. While faculty are willing to

work on projects that closely align with their research, truly successful projects will require incentivized participation at several levels. Currently these pilot projects are funded using one-off funding, but having more stable funding structures will be essential in the future for driving additional research projects. While there is a potential cost, these research partnerships also offer opportunities to save the university significant resources as it diverts expensive external expertise towards supporting internal knowledge structures.

CLIMATE ACTION, SUSTAINABILITY AND ENERGY COMMITTEE'S CLIMATE ACTION LIVING LAB SUBCOMMITTEE

One of the main hurdles with developing the CALL was creating an active network to carry it forward. There was a need to develop a more formal structure and easier way for faculty, students, staff, and others to plug into the CALL. Part of the solution to this problem was the formalization and development of the CALL subcommittee. This group reports to the CASE Committee and serves as the main hub for CALL efforts.

The major way that onboarding has been streamlined is through the development of a QuestionPro survey that helps track CALL involvement each year. With over 50 faculty respondents opting to participate in the CALL, this survey has collected data on the past three years of CALL involvement, developed a set of CALL faculty organized around areas of interest, and created an open forum to get plugged into CALL work. By filling out the QuestionPro survey, any faculty member, staff member, or student will also get access to the biweekly email that contains CALL events and opportunities.

11. Climate Justice

"Establish climate justice as a core value of the Virginia Tech Climate Action Commitment."

CLIMATE ACTION, SUSTAINABILITY, AND ENERGY COMMITTEE'S CLIMATE JUSTICE SUBCOMMITTEE

The principle of climate justice is one of the elements of Virginia Tech's 2020 Climate Action Commitment (CAC) that set it apart from other universities. It commits the university to consider frontline communities and principles of equity when making infrastructural decisions.

Virginia Tech uses the below definition of climate justice:

- Sharing the benefits and distributing the burdens of climate change mitigation and adaptation efforts equitably within and among communities and nations
- Engaging currently or previously marginalized groups as participants in decision-making processes aimed at mitigating and adapting to climate change
- Maximizing opportunities for marginalized groups to survive and thrive now and in the future
- Repairing historical harms against marginalized groups in the development of climate mitigation and adaptation efforts

From this four-part definition, there was a focus on two main goals: inclusion and accountability. Climate justice is an ongoing and always incomplete ethical process. Unlike many of the infrastructural CAC goals, climate justice requires consistent re-commitment and Virginia Tech's practice of it will naturally evolve over time as the shape of the university changes.

Inclusion was a major goal for implementing the principle of climate justice. It was provisioned that two members of the Climate Action Sustainability and Energy (CASE) committee would come from frontline communities. The intent was to include community voices that are deeply tied to the effects of climate change as a way to include much needed expertise surrounding the effects of climate change into university governance.

The second major initiative for climate justice was the development of accountability. The idea is that all major infrastructural projects, whether conceived as sustainability projects or not, would be assessed for areas for alignment with the principles of climate justice. This would help embed sustainability thinking into all elements of university design and build confidence that there is strong vetting of the ethics of any proposed university project.

The recommendation from the climate justice subcommittee is to put additional resources towards teaching and learning for climate justice and community engagement projects. Several faculty-led efforts have shown the benefits for adopting principles of climate justice. The Holler2Holler project led by Rebecca Hester, assistant professor of science, technology, and society and Emily Satterwhite, professor of religion and culture sent mutual aid to frontline former coalfield communities in Kentucky. These areas were experiencing severe flooding as a result of climate change. This also was a valuable experiential learning opportunity for students who traveled to the site in Kentucky and learned about the on-the-ground effects of climate change for frontline communities while exercising

their commitment to service at the same time. Additionally, climate justice projects like the Monuments Across Appalachian Virginia project have brought in grant money to the institution while at the same time contributing vital historical preservation work for our surrounding community. This Mellon Foundation project is led by Katy Powell, meat lab employee in the school of animal sciences, and Emily Satterwhite, professor of religion and culture, who are exploring the idea of historical preservation of collective struggle in the application of climate justice. Projects like this showcase how climate justice furthers the missions of the university while also contributing meaningfully to the fair and equitable treatment of frontline and historically marginalized communities. There have also been a number of successful Climate Action Living Laboratory (CALL) class partnerships that forward the principle of climate justice. Adopting climate justice may increase the quality of experiential learning opportunities and provide a stronger educational experience for participating students.

12. Sustainable Choices and Behavior

"Diminish barriers to sustainable behaviors through institutional change, education, and social marketing."

SUSTAINABLE CAMPUS CULTURE, ENGAGEMENT, AND SUSTAINABLE CHOICES SUBCOMMITTEE

Over this past academic year, the Sustainable Campus Culture, Engagement, and Sustainable Choices (SCCESC) subcommittee met twice. The first meeting was held in fall 2023. At the first subcommittee meeting of 2023-24, two new members were welcomed. All the members reacquainted themselves with each other and reviewed the previous year's action points, followed by a brief discussion on the way forward. The next meeting was held in spring 2024 and involved a more in-depth discussion on sustainable behavior on campus. The members aligned on the subcommittee goals and brainstormed ideas on advancing them. Some of the

most important discussions revolved around understanding barriers to sustainable behavior and cultivating a sustainable culture on campus.

The subcommittee's goal is to eliminate barriers to sustainable behavior on campus. Engaging students, faculty, and staff is deemed an essential component in creating a culture that supports sustainable choices on campus. Keeping these goals in mind, the members of the subcommittee decided to first understand the real barriers students, faculty and staff face before discussing the policies that theoretically make practicing sustainability on campus attainable. The focus shifted from discussing how to remove barriers to understanding the barriers themselves.

As the Green Lab Working Group is housed under the subcommittee, discussions around programs such as Green Office and Green Labs Certification are often brought up to increase awareness and mobilize participation.

Several subcommittee members graduated in spring 2024. It was discussed to spread the word about the subcommittee to others interested and grow the membership by including more faculty members and students passionate about understanding and diminishing these barriers.

Future Action Points:

Looking ahead, the members of the SCCESC subcommittee will be working on the following action points:

- **Understanding real barriers –** Focus on capturing real barriers to sustainable behavior on campus through surveys and other interactive methods to gauge the campus's support for existing sustainable programs.
- **Sustainable purchasing –** Members will reach out to their respective department heads to understand how needs are assessed before placing purchase orders.
- **Outreach for programs –** Continue efforts to increase participation in the Green Office and Green Lab Certification Programs.
- **Engaging experts and enthusiasts –** Reach out to additional faculty members and students, especially those with expertise or interest in social psychology and cognitive/behavioral sciences, to help drive the subcommittee's goals with a focus on using social marketing to understand and diminish barriers to sustainable behavior on campus.

WEEKS OF WELCOME

Weeks of Welcome is part of Virginia Tech's extended orientation and transition experience. It serves as an opportunity for students to find their place at Virginia Tech and meet people while learning about the campus community. At the start of both the fall and spring semesters, Dining Services, Sustainable Transportation, and the Office of Sustainability gave a joint presentation to students covering sustainability on campus.

GREEN OFFICE CERTIFICATION

The Green Office Certification Program gives faculty, staff, and students the tools they need to become greener Hokies working in more sustainable office areas. The goal of the program is to help employees reduce their footprint and improve the overall well-being of our planet. Virginia Tech's Climate Action Commitment outlines goals surrounding energy efficiency, waste minimization, and greenhouse gas reductions. By participating, employees can directly help the university achieve its climate action goals while saving money and resources for their office.

This program was redeveloped and relaunched in the fall of 2020. Offices can participate by identifying a Green Representative who completes a training session through the Office of Sustainability. In this training, they gain the skills and knowledge needed to create a greener workplace. Once the Green Representative completes training, they unlock the Green Office Certification check sheet, which they use to work with their colleagues to complete tasks and become more sustainable. Offices are scored in the following categories: Recycling and Events, Energy, Purchasing, Waste Reduction, Transportation, and Innovation. Offices will then be awarded either Bronze, Silver, Gold, or Platinum Green Office Certification. There are currently 14 certified offices across the campus. Over the past academic year, two offices received Platinum certification and two received Gold certification.

GREEN LAB CERTIFICATION

Officially launched in January 2022, the Green Lab Certification Program is a self-assessment tool that empowers, encourages, and recognizes labs that are engaging in sustainable practices. The program provides faculty, staff, and students with the tools needed to go green in their labs. There are over 1,200 labs across Virginia Tech's Blacksburg campus, so there are many opportunities to improve energy efficiency and conservation and waste and recycling efforts in labs. A year into its launch, 30 labs had been certified, and the numbers continue to grow.

Originally developed by a graduate student in 2020, the efforts to get labs green certified continue to be spearheaded by students and supported by principal investigators as well as lab managers. The Green Labs Tool, which assesses the laboratory's sustainability efforts spanning 11 different topic areas, was modified to suit the emerging needs of labs on campus. The Green Lab Working Group, formed in spring 2023, consists of various stakeholders around campus. This working group was instrumental in vetting the modified survey questionnaire and revamping the Green Labs Tool to make the certification process user friendly. The earlier questionnaire consisted of 100 questions which were brought down to 60 to make it more user friendly and timesaving to recognize a lab's sustainability efforts. Before going live, the survey was also piloted with a few lab managers and principal investigators. This effort was primarily done in partnership between Virginia Tech Environmental Health and Safety and the Office of Sustainability.

As part of strengthening the sustainable culture in labs, the staff and interns at the Office of Sustainability worked to raise awareness about the International Laboratory Freezer Challenge. Carried out each year, the Freezer Challenge is a competition aimed at making labs' cold storage more energy efficient, improving sample accessibility, and saving energy costs. This year, four labs from the Blacksburg campus participated and recorded a total of energy savings of 59.15 kWh/day. Efforts are underway to expand participation in the Freezer Challenge in the coming years to advance sustainability and efficiency within lab spaces.

OFFICE OF SUSTAINABILITY STUDENT INTERNSHIP PROGRAM

The mission of the Student Internship Program is to provide students with valuable opportunities to create lasting, sustainable change at Virginia Tech while developing their professional skills and expanding their knowledge of the inner workings of the university. The program encourages ownership, creativity, and collaboration to solve some of the toughest sustainability challenges the world is facing today. There is a focus on experiential learning opportunities which blend real-world projects with practical, skills-based

professional development workshops to prepare students for an ever-changing career in the sustainability field. The projects the students complete, paired with professional development classes and other training, allow them to sharpen and expand their environmental and professional skill sets. Intern teams work on a variety of tasks including:

- **Partner Projects:** Teams partner with various departments such as the Office of Energy Management, Site and Infrastructure Development, Dining Services, and Residential Well-Being to complete technical projects.
- **Education and Outreach:** Teams plan and execute outreach events in partnership with campus and community organizations.
- **University-wide Campaigns:** Teams assist in executing large-scale campaigns including Earth Week, Campus Race to Zero Waste, the Freezer Challenge, and Giving Day.

The projects that the Office of Sustainability's intern teams worked on during the 2023-24 academic year include:

- **Water Team:** Developed a streamkeepers program for the portion of Stroubles Creek between the Duck Pond and West Campus Drive; hosted a stream and Duck Pond clean up and walking tour.
- **Food Team:** Hosted a series of sustainability forums throughout the academic year that brought guest speakers from Virginia Tech and beyond to talk about sustainability in their positions and to host workshops; presented on food insecurity to the Undergraduate Student Senate; analyzed data on campus food sourcing; organized and hosted The Big Clean, a campus and community litter cleanup event.
- **Waste Team:** Continued collection of soft plastics for specialized recycling through the NexTrex program; hosted the Sustainable Fashion Show to educate students on the impacts of fast fashion and to showcase outfits that were thrifted or handmade.
- **Energy Team:** Assisted in the promotion of the Heads Up Hokies campaign and created a video on pedestrian safety; supported the Freezer Challenge by engaging with labs across campus on opportunities to get involved; worked with College Mentors for Kids to host a week of activities surrounding sustainability.

EARTH WEEK

Virginia Tech's annual Earth Week events are led by the Environmental Coalition at Virginia Tech and the Office of Sustainability with support from over 30 student, university, and community groups. Earth Week 2024 was held from Thursday, April 18 through Wednesday, April 24. The events held during Earth Week change from year to year, but the basic mission to celebrate and take action for a sustainable campus is carried throughout. This year, the Office of Sustainability's partners held 25 events throughout the weeks. Some events of note include the Bee Campus habitat creation at the Visitors and Undergraduate Admissions Center, the second annual Sustainable Fashion Show, the first annual Climate Action Living Lab (CALL) Showcase, and a campus/community litter cleanup event.

GAME DAY GREEN TEAM

The Game Day Green Team promotes tailgate recycling during home football games by having volunteers walk around the high impact parking lots surrounding Lane Stadium educating tailgaters on what can and can't be recycled. The Game Day Green Team is led by students who manage supplies, recruit volunteers, and work with the Division of Facilities on waste collection at each home game.

GREEN GRADUATES

The Green Graduates of Virginia Tech program asks graduating students to take a personal sustainability pledge to think about the environmental impacts of their jobs, travel, and other adventures after leaving the university. By pledging, students are committing to fostering sustainable behaviors both in their own lives and in the lives of their friends, family, and coworkers. To honor the students who take the pledge, the Office of Sustainability awards each student a free green cord to wear at graduation. All undergraduate and graduate students are eligible to participate. The Virginia Tech Green Graduates program has been running for nine years straight now.

HOMEFIELD FARM

Homefield Farm is a partnership between Dining Services and the School of Plant and Environmental Sciences. A 12-acre farm that grows vegetables, fruits, and herbs for Virginia Tech Dining Services; it is the only certified organic operation owned by a university in Virginia. The farm produces roughly 45,000 pounds of produce annually. This partnership serves as a site for experiential learning, research, service, and community outreach. The overarching goal is to produce locally and educate students on the source of their food. Homefield Farm is a supporter of sustainable events on campus and can also be found in the Xpress Lane in the fall.

This spring, the farm onboarded a new Assistant Farm Manager to assist with oversight of day-to-day activities at the farm. This position offers the opportunity for educational expansion as well as increased communication from farm to table.

The farm's volunteer and internship programs are now fully implemented. These positions open the opportunity for students to learn at the farm firsthand.

STUDENT AFFAIRS STUDENT LEADER EDUCATION EFFORTS

The sustainable housing team, the marketing team for housing, and Residential Well-Being collaborated on a new educational initiative for Student Leaders. An interactive sustainability training video has been added to Student Leaders' onboarding requirements. The training video outlines useful tips such as: where/how to recycle in residence halls, suggestions on reducing energy and water usage, and other sustainable living habits on campus.

13. Climate Action Commitment Implementation and Engagement

"Implement the Virginia Tech Climate Action Commitment at a high level of university administration and governance; by integrating goals for facilities, education, and campus culture; and with stakeholder engagement for evaluation of goals and progress."

HOKIE WELLNESS AND BENEFITS FAIR

The Climate Action, Sustainability, and Energy team tabled at the Hokie Wellness and Benefits Fair to educate faculty and staff on the goals of the Climate Action Commitment. After teaching members of the Virginia Tech community about the goals of the CAC, they were invited to vote for which sustainability topic was most important to them or to answer a trivia question related to sustainability on campus. The top three areas of interest were clean water, waste reduction, and green spaces. Through this activity, the Office of Sustainability was able to engage approximately 500 employees.

STRATEGIC PLAN DASHBOARD INCLUSION

Virginia Tech's strategic planning dashboard showcases metrics and milestones that are used to track progress towards achieving the goals of the strategic plan. The strategic planning dashboard provides the most recent available information on outcomes in each of the identified milestones. In fall 2021, milestones were added to the strategic planning dashboard relating to sustainability, illustrating the university's commitment to sustainability and the connection between sustainability and Virginia Tech's strategic plan. The sustainability goal being tracked on the strategic planning dashboard is focused on Virginia Tech's efforts to achieve an annual net reduction of campus greenhouse gas emissions.

CLIMATE ACTION, SUSTAINABILITY, AND ENERGY (CASE) COMMITTEE ACCOMPLISHMENTS AND PROGRESS

The CASE Committee welcomed nine new members and 20 returning members for the 2023-2024 academic year.

Two new subcommittees were formed to aid in implementation efforts of Virginia Tech's 2020 Climate Action Commitment. An Energy subcommittee was launched in the fall with representatives from the Office of Energy Management, Virginia Tech Electric Service (VTES), Office of Sustainability, Green Engineering Program, Capital Construction, the College of Engineering, Division of Student Affairs (DSA), and Athletics. A Water subcommittee formed early in the spring semester with representatives from the Office of Sustainability, Site and Infrastructure Development, Office of Energy Management, and Grounds.

Subcommittee conveners provided updates in the fall and again in the spring encompassing:

- Sustainable Campus Culture, Engagement, and Sustainable Choices
- Carbon Neutral Commuting and Carbon Neutral Fleet
- Zero Waste
- Agriculture, Forestry, and Land Use Operations (notes used from Virginia Tech Urban Forestry Advisory Committee)
- Climate Action Living Laboratory (CALL)
- GHG Inventory and Carbon Offsets/Management
- Virginia Tech-Blacksburg Sustainability Collaboration (notes used from Sustainable Blacksburg)
- Climate Justice
- Energy
- Water

In March, CASE Committee had its first in-person meeting opportunity since the COVID-19 pandemic. It was a hybrid committee meeting at the Fralin Life Science Institute auditorium with a Zoom option. 21 attendees were there in-person and 29 attendees joined over Zoom. The meeting was organized by the Office of Sustainability graduate assistants.

The following presentations were received at committee meetings over the course of the academic year:

- Zero Waste Consultant Update (Reduction in Motion)
- Virginia Tech's Green RFP Updates and Vote
- 2023 Virginia Tech Climate Action, Sustainability, and Energy Progress Update
- Experiences of Office of Sustainability team members at the SDG Action Weekend (convened by the UN General Assembly) September 16-17, 2023 in NYC
- General subcommittee updates in the fall
- 2020 CAC Implementation Progress Updates in the spring
- Virginia Tech/VTES Energy and Utilities (delivery goals, emissions by source, historical loads, 2027 supply contract, market projections, and Virginia REC Price Trend)
- Virginia Tech's Urban Forest Master Plan
- Virginia Tech GHG Emissions Presentation
- 2025 CAC Revisions and Timeline
- Virginia Tech's Earth Week 2024 Updates and Overviews

Additionally, during the announcement portions of meetings the following Virginia Tech and community programs/initiatives were highlighted and promoted:

- Green Graduates
- Campus Race to Zero Waste 2024
- Sustainable Blacksburg Lunch and Learns
- Sustainability Literacy and Culture Assessment
- The International Laboratory Freezer Challenge
- Bee Campus USA
- Virginia Tech Employee Food Access and Wellbeing Survey
- Virginia Tech's Giving Day and Sustainability Fund
- Y-TOSS

LIFELONG LEARNERS INSTITUTE

In fall of 2023, the Office of Sustainability in partnership with other areas of the Division of Facilities, worked with the Lifelong Learners Institute (LLI) to organize an 8-week course on sustainability at Virginia Tech. The LLI program provides an opportunity for retired community members and other individuals who want to continue their education to learn about engaging

subjects. Throughout the semester, presentations were given on topics of university energy use and conservation efforts, waste streams, and climate justice programming. The administrator for the program, Anne McNabb, professor emerita of biological sciences and associate dean emerita of the graduate school, commended Virginia Tech's work. Several presenters were invited to give presentations in subsequent seminar series.

This work also represents how the CALL initiative engages the local community in order to build support for Virginia Tech initiatives. The LLI series has a significant alumni presence and among the retirees who were involved in the program there was a strong interest in advancing the sustainability mission of Virginia Tech.

14. Innovative Financing

"Develop innovative budgeting and financing mechanisms to generate funding and staffing to achieve Climate Action Commitment goals."

GIVING DAY

Giving Day was held February 21-22, 2024, and served as a special opportunity for Hokies to unite and give back to their favorite departments, programs, student organizations, and teams. The Office of Sustainability was able to promote the Division of Facilities' Sustainability fund during this time. This was the third year of fund raising for sustainability efforts through Giving Day. These funds go towards projects on campus that support Climate Action Commitment implementation efforts.

GREEN RFP PROGRAM

Student engagement and leadership are important aspects in advancing sustainability at Virginia Tech. The Green Request for Proposal (RFP) Program gives students the opportunity each year to submit a proposal for a sustainable idea that they would like to see implemented on the university's Blacksburg campus. For proposals to be considered for approval, they must support one or multiple goals of the Climate Action Commitment. Since its initiation in academic year 2010-11, the Green RFP program has provided $2.18 million in funding support for 135 student sustainability proposals. During academic year 2023-24, two proposals were approved for a total of $98,600.

Hahn Horticulture Garden rain barrel

15. Fossil Fuel Free by 2050

"Develop pathways after 2030 to eliminate fossil fuels and carbon offsets by 2050."

Virginia Tech is laying the groundwork for being fossil fuel free by 2050. Currently, a Utilities Master Plan (UMP) is under development which will provide a comprehensive road map to align campus-wide utility systems with the strategies of the Campus Master Plan and the sustainability goals of the Climate Action Commitment. The university operates and maintains numerous utility systems that will all be managed through this detailed plan. The Division of Facilities began this effort for the university's utilities in 2023. The first stage of developing the UMP involved taking an inventory of all current utilities infrastructure and noting its condition. Once that was finished, the planning sessions expanded to include three meetings in the fall that were focused on addressing the CAC (decarbonization, air emissions, and measure of success). Consultant group, Wiley and Wilson, conducted research and presented multiple options for the UMP to support achieving CAC goals, such as carbon neutrality and 100 percent renewable electricity by 2030. Furthermore, alternative technologies were explored, such as geoexchange, low temperature hot water (LTHW), solar power, and several others. The discussions resulted in funding some geoexchange as a potential alternative energy source. The final CAC-focused session challenged Virginia Tech to think deeply about the future and opportunities to strategically position our utilities infrastructure for success in a low carbon world.

Conclusion

Virginia Tech demonstrates a strong commitment to tackling the challenges of climate change through its adoption of the 2020 Climate Action Commitment in March 2021. Efforts made throughout the past academic year highlight substantial progress towards meeting the goals laid out in this commitment. The overarching goal of carbon neutrality by 2030 is complex and will require the entire university community to be on board with making the necessary improvements happen.

Sustainability at Virginia Tech extends beyond campus life and is a partnership between colleges, departments, units, faculty, staff, students, and the local community. All Hokies can be climate action champions, contributing to making Blacksburg and the Commonwealth a more sustainable place.

The Office of Sustainability has been producing Sustainability Annual Reports since 2010. For access to all prior reports, please visit vt.edu/sustainability.

ACKNOWLEDGEMENTS

The 2023-24 Sustainability Annual Report was prepared by the Office of Sustainability:

Nathan King
Campus Sustainability Manager

Emily Vollmer
Sustainability Coordinator

Kristina Cook
Program Coordinator

Jack Leff
Climate Action Fellow

With assistance from:

Meghan Marsh
Director of Communications and Engagement

Larissa Gimmy
Graphic Designer

Sarah Myers
Web and Digital Content Specialist

With special thanks to the Virginia Tech and Blacksburg communities

APPENDIX

2020 Climate Action Commitment

Calendar Year 2023 Recycle Rate Report

Attachment D

VIRGINIA TECH™

2020 VIRGINIA TECH

Climate Action Commitment Working Group Final Report

EXECUTIVE SUMMARY AND OVERVIEW

November 2020

EXECUTIVE SUMMARY

From January to June 2020, the Virginia Tech Climate Action Commitment Working Group executed its charge to evaluate the university's current position and future role in addressing climate change.

This summary report and the much longer full 2020 Virginia Tech Climate Action Commitment Working Group Report, Subcommittee Reports, and associated appendices provide a clear road map for not only how Virginia Tech can do its part to address climate change, but also become a leader in taking bold action to combat this worldwide crisis.

Throughout 2020, a global pandemic brought unprecedented hardship and suffering, particularly for the most vulnerable among us. In this public health crisis, citizens are learning an important lesson: when experts are near unanimous in ringing the alarm bells on looming crises, society must take decisive action.

This unique time is engendering a tremendous spirit of innovation and collaboration that is highly applicable to the Climate Action Commitment revision process.

In late 2019 – prompted by the demands of students and other community members involved in climate strikes and resolutions from the Faculty and Staff Senates, Student Government Association, and Graduate Student Assembly – President Tim Sands and Senior Vice President and Chief Business Officer Dwayne Pinkney established a Climate Action Commitment Working Group comprised of 26 faculty, students, staff, and community members. In announcing the creation of the Working Group, President Sands stated that "climate change presents one of the world's most pressing problems...and Virginia Tech has a duty to respond."

The Working Group was charged to assess the university's progress in implementing the 2009/2013 Virginia Tech Climate Action Commitment, compare our experience to peer institutions, and develop a new commitment. Virginia Tech, like other universities, is facing both short-term fiscal challenges and long-term uncertainties in these challenging times. Nonetheless, the university remains committed to taking bold action to do its part to address the climate emergency.

Please read on to learn more about the 2020 Virginia Tech Climate Action Commitment. The full Working Group Report and other pertinent documents and information may be found at svpoa.vt.edu/index/VTCACRevision. Chapter references that follow are applicable to the full report.

WORKING GROUP PROCESS

In order to engage a broad range of expertise and perspectives from across the university and wider community and conduct an ambitious work program, the Working Group established 12 subcommittees including a total of 130 faculty, students, community members, and staff to investigate and discuss specific issues relevant to the commitment. Most of the subcommittees met weekly from early February through the end of May. The subcommittees included:

- Agriculture, Forestry, and Land Use
- Budget and Finance
- Buildings Opportunities
- Climate Justice
- Community Engagement
- Energy Opportunities
- Greenhouse Gas (GHG) Inventory
- Peer Institutions Comparison
- Renewables Opportunities
- Structuring Sustainable Choices
- Transportation Opportunities
- Waste-Recycling-Composting and Procurement

The Working Group developed several mechanisms to expand community involvement in the process, including a website and email address for comment and two online surveys. Plans for face-to-face town hall meetings and conference sessions had to be reimagined when the university shut down after spring break. In place of the in-person events, the Working Group hosted 12 Zoom Convening sessions in April, attended by over 220 participants who provided excellent feedback. In anticipation of these Convening sessions, the Working Group and its subcommittees also developed ten creative videos that describe the Climate Action Commitment proposals. Learn more about campus community engagement in the process and access videos at svpoa.vt.edu/index/VTCACRevision.

The Working Group's efforts have focused on developing effective strategies the university can advance to achieve meaningful climate action. Throughout the multitude of Working Group, subcommittee, and community Zoom meetings, discussions have also reflected on the important opportunity for Virginia Tech to reinvent itself, not only in its commitment to climate action, but also in its responsiveness to the needs of the world around us, in the spirit of *Ut Prosim.*

The recommended Climate Action Commitment is bold, aggressive, and comprehensive. Its goals range from necessary upgrades to the campus physical plant to reduce GHG emissions, to integrating those improvements into the educational mission through a Climate Action Living Laboratory, to engaging everyone in creating a culture of sustainability–all to position Virginia Tech as a leader as the clean energy economy evolves in the Commonwealth and the world.

PROGRESS IMPLEMENTING 2009 VIRGINIA TECH CLIMATE ACTION COMMITMENT

Virginia Tech has made considerable progress in implementing its 2009/2013 Climate Action Commitment (2009 Virginia Tech Climate Action Commitment) over the past decade. The 2009 Virginia Tech Climate Action Commitment and Sustainability Plan was a cutting-edge effort for its time, but a decade later it fails to prescribe what climate scientists recognize as necessary actions and also falls short of many peer universities' recent initiatives.

In many respects, however, Virginia Tech has been forging ahead beyond the 2009/2013 Climate Action Commitment. Virginia Tech is a recognized leader in campus sustainability with a Sustainability Tracking and Rating System (STARS) Gold score that is highest among Virginia and ACC peer institutions. Virginia Tech has won numerous awards and recognitions since 2010, including Princeton Review's top 50 Green Colleges (#12 in 2019), the Governor's Environmental Excellence Award (7 times), Best Workplaces for Commuters (every year, gold in 2019-20), Bicycle Friendly Campus (every year, silver level in 2019), Tree Campus USA certification (every year), and many others.

The university has reduced greenhouse gas (GHG) emissions by 24 percent from 2006-19, despite 22 percent growth in campus building size and enrollment. This reduction is faster than the 2009 Climate Action Commitment targeted trajectory. It resulted from investments in energy efficiency in existing and new buildings, and most importantly, from replacing coal with natural gas in the steam plant, which was enabled by a new gas pipeline. Virginia Tech now has 36 LEED-certified buildings constructed or in process, amounting to 30 percent of campus space, and in 2015-20 the university invested $14 million in energy efficiency improvements, resulting in energy and dollar savings with a 5-year payback.

Virginia Tech has done much to develop alternative transportation choices, including dual use trails, bike share, ride share, and car share programs. The university has had record ridership on its partner Blacksburg Transit and innovative plans for campus mobility. Virginia Tech has a functional, although fragmented, waste management program with an 80 percent waste diversion rate (waste diverted from landfill) and 40 percent recycling rate, although shy of the 50 percent by 2020 goal of the 2013 Virginia Tech Climate Action Commitment. In April 2020, the Procurement Department unveiled a Sustainable Procurement Policy; and in May, the Facilities Department produced new Design and Construction Building Standards, both reflecting the ideals of the Virginia Tech Climate Action Commitment.

The university has an enviable array of sustainability-related academic programs, majors, coursework, and research, in green engineering, natural resources, agriculture, power and energy systems, environmental policy, and smart and sustainable cities. In the STARS rating system, Virginia Tech scores 89 percent of possible points in academic categories. It also scores 95 percent of possible points in campus engagement. Virginia Tech has a rich campus life for students with a wide array of opportunities, including strong environmental student organizations. Indeed, these student groups have energized the university community to move forward on climate action, both in 2008 and in 2019.

The Division of Campus Planning, Infrastructure, and Facilities has embraced sustainability and climate action as part of its mission, and the Office of Sustainability is second to none, even with limited staff. The university has the highly unique and valuable Virginia Tech Electric Service (VTES), a university-owned electric energy utility system, which serves not only the campus, but also 6,000 Town of Blacksburg customers.

In other areas, however, the university is falling behind. Although the 2009/2013 Virginia Tech Climate Action Commitment was a leading effort for its time, from the perspective of 2020, it is limited in both scope and ambition. It did not include several sources of campus GHG, such as agriculture, business travel, and leased building space, the latter amounting to 13 percent of operational square footage. It did not mention renewable energy nor the human cost of climate change. Furthermore, its overall goal of an 80 percent reduction in GHG from 1990 levels by 2050, while a typical goal for its time, is not aggressive enough compared to the contemporary needs for climate action and the national movement of our peer institutions.

2020 VIRGINIA TECH CLIMATE ACTION COMMITMENT

The major product of the Working Group is a new Climate Action Commitment. It aims to be bold and visionary, but also comprehensive and pragmatic for a leading academic institution. Goals 1-9 target physical means to achieve carbon neutrality by 2030, Goals 10-14 address education, culture, social equity, and engaged implementation, and Goal 15 sets a longer-range goal of a fossil-fuel-fee campus. The Working Group also developed a set of potential pathways to achieve each goal. The table to the right lists the goals, and they are presented with summary pathways. More detailed pathways are presented in chapter 2.

Vision of the 2020 Virginia Tech Climate Action Commitment

In the spirit of *Ut Prosim,* Virginia Tech will be a leader in climate action in service to our community, the Commonwealth, and the world.

Mission of the 2020 Virginia Tech Climate Action Commitment

The mission of the 2020 Virginia Tech Climate Action Commitment is to achieve carbon neutrality by changing the university's physical infrastructure, collective and individual behaviors, and educational mission; to engage everyone in creating a culture of sustainability; and to achieve these objectives through just and equitable means.

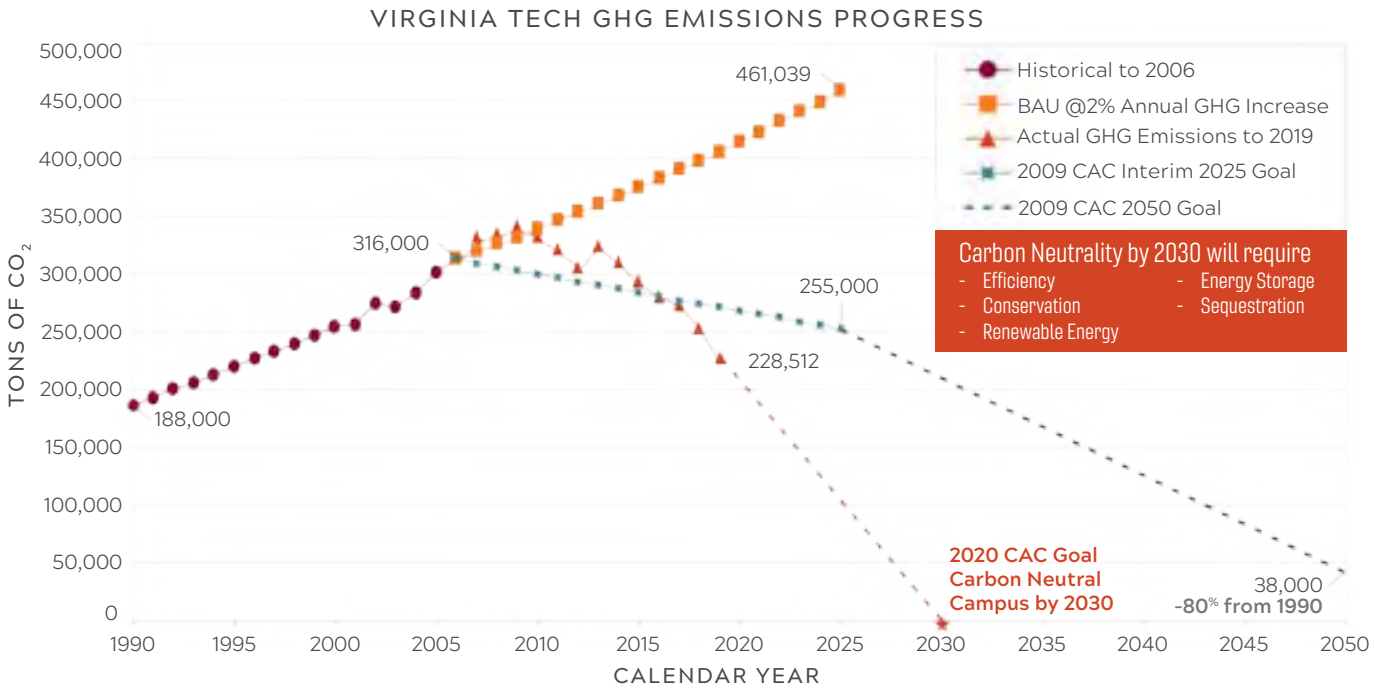
2020 VIRGINIA TECH CLIMATE ACTION COMMITMENT GOALS

1. Achieve a carbon neutral Virginia Tech campus by 2030.
2. Achieve 100 percent renewable electricity by 2030.
3. Complete the total conversion of steam plant fuel to natural gas by 2025, plan for full transition to renewable steam plant fuel after 2025, and continue to improve efficiency of campus energy systems.
4. Reduce building energy consumption to enable carbon neutrality by 2030.
5. Operations of new buildings initiated by 2030 will be carbon neutral.
6. Agricultural, forestry, and land use operations will be carbon neutral by 2030.
7. Virginia Tech to become a Zero-Waste Campus by 2030.
8. Establish the Sustainable Procurement Policy and Procedures by 2022.
9. Reduce single-occupancy-vehicle commuting to campus by 20 percent by 2025 and reduce transportation-related GHG emissions by 40 percent by 2030.
10. Integrate the Climate Action Commitment into Virginia Tech's educational mission through the Climate Action Living Laboratory beginning in 2021.
11. Establish climate justice as a core value of the Virginia Tech Climate Action Commitment.
12. Diminish barriers to sustainable behaviors through institutional change, education and social marketing.
13. Implement the Virginia Tech Climate Action Commitment at a high level of university administration and governance; by integrating goals for facilities, education,and campus culture; and with stakeholder engagement for evaluation of goals and progress.
14. Develop innovative budgeting and financing mechanisms to generate funding and staffing to achieve Climate Action Commitment goals.
15. Develop Pathways after 2030 to eliminate fossil fuels and carbon offsets by 2050.

2020 Virginia Tech Climate Action Commitment:

SUMMARY OF GOALS AND PATHWAYS

1. Carbon Neutral Virginia Tech Campus by 2030.



Carbon neutral equals net-zero emissions of CO_2, CH_4, and NO_2 from Virginia Tech operations at Blacksburg campus based on the geographic and GHG scope of the 2020 Climate Action Commitment.

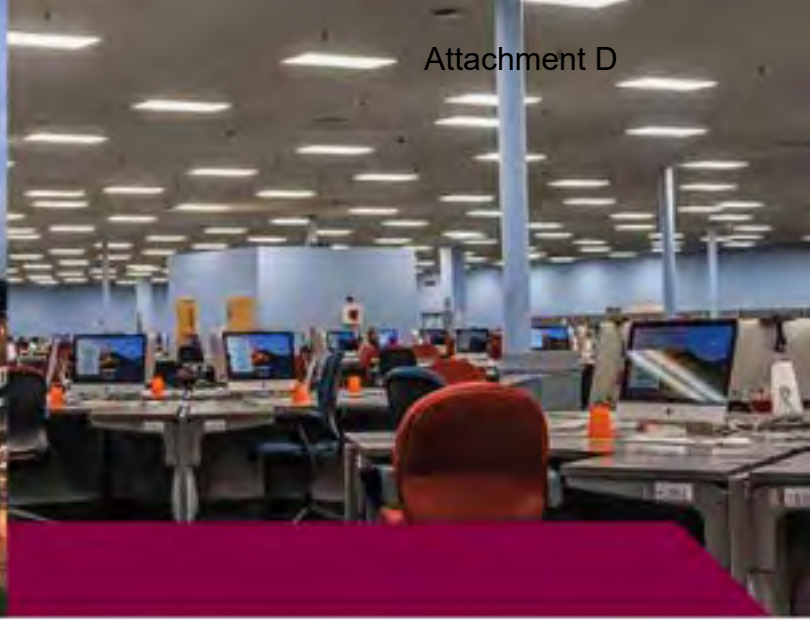
POTENTIAL PATHWAYS:

- 100 percent renewable electricity by 2030 can reduce emissions by 50 percent below 2019 levels.
- Total conversion from coal to natural gas in steam plant by 2025 can reduce GHG by 10 percent below 2019.
- Reduction of energy use in existing and new buildings can result in further emissions reductions of 10 percent, despite campus growth.
- Reduction of GHG from waste/recycling, transportation, and agriculture, forestry, and land use described below can reduce emissions by 10 percent.
- In 2030, remaining emissions can be negated by carbon offsets.

2. 100 Percent Renewable Electricity by 2030.

POTENTIAL PATHWAYS:

- 2020: achieve 30 percent renewable electricity via purchase of 20 percent renewable energy certificates (RECs) from APCO + APCO 10 percent renewable portfolio.
- 2020-2030: Achieve 100 percent renewable electricity by 2030 via combination of Virginia Tech rooftops/lands solar (15 MW), 3rd party owned PPA, and APCO owned SWVA PPA solar capacity (130 MW+15 MW=145 MW) to serve campus (95 MW) and town customers (50 MW) for 60 percent of needs plus 30 percent APCO renewable portfolio and 10 percent RECs to cover steam plant cogeneration.
- Integrate solar development into the Climate Action Living Laboratory (CALL) of academic instruction and research, including dual-use solar-farm production agrivoltaics; a 10-MW storage testbed/showcase project for smart micro-grid reliability and resilience research through Virginia Tech Electric Service and the Virginia Tech Power and Energy Center; and other instruction/research initiatives.
- As with all components of this Climate Action Commitment, full lifecycle analysis of renewables procurement should include the environmental and social justice costs and benefits of procured systems.
- The siting of renewable energy systems should employ best practices in public engagement to identify the most appropriate locations.



3. Complete the total conversion of steam plant fuel to natural gas by 2025, plan for full transition to renewable steam plant fuel after 2025, and continue to improve efficiency of campus energy systems.

POTENTIAL PATHWAYS:

- Addition of gas boiler #12 provides natural gas thermal capacity for all steam plant demand.
- VT's new natural gas service contract signed in summer 2020 and effective until 2025, provides favorable price and reliability terms and prospects for renewable gas.
- For reliability and resilience, a plan is needed for backup fuel (such as liquefied natural gas (LNG), biochar, or other fuel) when natural gas is unavailable, and boiler redundancy (so-called "n+1") in case of a boiler outage at a critical time.
- Improve chiller efficiency: By 2023 the Chiller Plant Phase II capital project will reduce central chiller energy usage by 20% from 2020; future campus growth needs for chilled water will be met from central plants where possible.
- Ten-year 2021-30 Energy Management Plan will improve efficiency of stand-alone chilled water plants
- Establish an online Climate Action Living Laboratory (CALL) Energy Dashboard for faculty, staff, and students to access and analyze campus facilities energy use data for instruction and research.
- After 2025, plan for transition to renewable energy in heating systems, considering renewable gas, geothermal and ground source heat pump systems, and other non-fossil-fuel options for heating existing and new districts of campus.
- Beginning with the CAC 2025 revision, develop a plan for full transition to renewable energy for campus heating systems. To promote zero emissions energy options in the plan, refine GHG inventory estimates of methane leakage from VT natural gas sources and include those estimates of methane leakage in the carbon neutral goal for 2035.

4. Reduce Building Energy Consumption to Enable Carbon Neutrality by 2030.

- By the end of 2022, reduce electricity consumption (kWh) by 10 percent and electricity intensity (kWh/gsf) by 20 percent below 2006 levels.
- By 2030, employ energy management retrofits to reduce total energy consumption in all buildings by 10 percent and energy use intensity (Btu+kWh/gsf) by 20 percent below 2020 levels.

POTENTIAL PATHWAYS:

- Implement an aggressive 2021-30 ten-year energy management plan updated annually to reduce total energy consumption in all buildings including auxiliaries by 10 percent.
- For leased buildings owned by the Virginia Tech Foundation, work with the Foundation to develop financial arrangements to improve efficiency and reduce emissions.
- By 2021, develop a campus-wide Climate Action Living Laboratory Green Lab program based on a pilot test-bed Green Lab to reduce energy, emissions, and materials in our most energy-intensive facilities.
- Reduce building energy and GHG emissions by smart operations, such as demand response, digital controls, thermostat settings, occupant behavior, and innovative space scheduling, especially in summer.
- Achieving these goals will require sufficient staffing in energy management.

CURRENT LEED REGISTERED BUILDINGS

GOLD:
Henderson Hall and Theatre 101, Institute for Critical Technology and Applied Science II, Ambler Johnston Hall, Moss Arts Center, Goodwin Hall, Human Agricultural Biosciences Building I

SILVER:
Football Locker Room, Vet Med Instructional Addition, Oak Lane Phase IV, Lavery Hall, Chiller Plant Phase I, Indoor Athletic Training, Pearson Hall, New Cadet Hall, New Classroom Building

CERTIFIED:
Davidson Hall, Visitor and Undergraduate Admission Center

5. Operations of New Buildings Initiated by 2030 will be Carbon Neutral.

- New building efficiency will conform to latest adopted LEED-Silver standards and ASHRAE 90.1 energy performance standards + 10 percent.
- By 2022, reduce total energy use intensity (EUI) in newly initiated buildings by 20 percent compared to 2020 existing buildings.
- By 2026, build a signature zero-net-energy (ZNE) building on campus as a showcase and learning model for the Climate Action Living Laboratory.
- By 2028, newly initiated buildings' efficiency improvements will reduce total energy use intensity (EUI) in new buildings by 40 percent compared to 2020 existing buildings.

POTENTIAL PATHWAYS:

- In 2021, identify candidate new buildings for a showcase zero-net-energy (ZNE) building and begin fundraising to attract donors to help fund the project to be completed by 2026.
- Electricity currently contributes 50 percent of total GHG emissions. One hundred percent renewable electricity by 2030 will reduce building CO_2 emissions by more than 50 percent.
- By 2030, all newly initiated building design will have carbon neutral operations through 100 percent renewable electricity, improved energy efficiency, and carbon offsets.
- Post-occupancy evaluation (POE) should become standard practice to fine tune building operations and engage occupants to better serve users and reduce emissions.
- New buildings offer opportunities for campus Climate Action Living Laboratory research and instruction by faculty and students through field testing and use of emerging technologies, monitoring energy use, air quality, and occupant perceptions, and other projects.
- Achieving these goals will require sufficient engineering and design staffing.

6. Agricultural, Forestry, and Land Use Operations Go Carbon Neutral by 2030.

POTENTIAL PATHWAYS:

- Develop the University Compost Facility at Kentland to provide benefits to campus organic waste management, help reduce animal waste GHG emissions, support soil health, and reduce need for new land for future land application of animal wastes.
- Adopt Campus Tree Policy to increase canopy cover from 16-to-25 percent and manage Virginia Tech trees, forests and woodlands to increase carbon sequestration and provide additional environmental benefits.
- Reduce agricultural and forestry net GHG emissions through more efficient operations, reduced animal enteric fermentation emissions, improved energy and fuel efficiency, possibly an anaerobic digester to produce usable methane, and other means.
- Use Virginia Tech agricultural lands to develop solar farms toward renewables goal, including co-use solar and farmland agrivoltaics for Climate Action Living Laboratory instruction and research.
- In 2030, offset any remaining net GHG emissions from agricultural/forestry operations with solar production from Virginia Tech agricultural land and/or by purchasing carbon offsets.

7. Virginia Tech to become a Zero-Waste Campus by 2030.

POTENTIAL PATHWAYS:

- Hire a zero-waste consultant to conduct a waste audit study and plan to evaluate organization, procedures, and staffing to enhance campus waste management.
- Based on consultant recommendations, consider hiring a campus waste manager.
- Engage personnel involved in campus waste management on a Waste/Recycling Council to help streamline operations and reduce redundancies.
- Develop University Compost Facility at Kentland to process campus organic waste from dining halls and athletics, veterinary and agriculture animal waste, yard trimmings, wood waste, non-recyclable soiled paper, and other compostables.
- Engage faculty, students, and staff in greater use of recycling/compost behavior using social marketing and media, incentives, and innovative approaches to advance Circular Economy and Pollution Prevention (P2) principles as part of the Climate Action Living Laboratory.
- Evaluate and improve as needed the management of specialty wastes, such as e-waste, laboratory waste, construction debris, and wastes from major sporting and other events.

8. Establish the Sustainability Procurement Policy and Procedures by 2022.

POTENTIAL PATHWAY:

- On a pilot basis, adopt, implement, and evaluate the 2020 Sustainable Procurement Policy.
- In 2022, the Energy & Sustainability Committee will assess the pilot project and work with the Procurement Department to formulate the Sustainability Procurement Policy v.2.

9. Reduce Single-Occupancy Vehicle (SOV) Commuting to Campus by 20 percent by 2025 and Reduce Transportation Related GHG Emissions by 40 percent by 2030.

POTENTIAL PATHWAYS:

- Promote walking/biking/transit as the preferred means of commuting to campus: Use parking policies, alternative transportation programs, campus mobility planning in collaboration with Town of Blacksburg, and encourage Blacksburg Transit (BT) programs to improve the safety and convenience of and promote walking, biking, and transit.
- Promote sustainable mobility choices through marketing, including social media, parking permit literature, gaming, university promotion literature and website, and student orientation.
- Promote non-commuting work and learning opportunities such as telecommuting, innovative online instruction, Internet conferencing, and other means.
- Improve infrastructure and traffic management to improve mobility choices and safety by reducing speed limits, improved bike and pedestrian path lighting, limiting/restricting vehicles in core campus, implementing current transportation plans, and coordinating with Town of Blacksburg plans.
- Improve vehicle efficiency and promote low-carbon emissions vehicles through Motor Pool purchases and development of electric vehicle charging stations on campus.
- Promote social equity in mobility and parking policies by developing effective and efficient commuting options for lower wage employees who cannot afford to live in Blacksburg, sliding-scale parking fees based on salary/wage, and collaboration with the Town of Blacksburg to provide affordable workforce housing proximate to campus.
- Reduce and negate business travel GHG emissions with carbon offsets.
- Establish an alternative mobility subcommittee of the Transportation and Parking Committee to recommend strategies to increase the non-SOV mode share on campus.

10. Integrate the Climate Action Commitment into Virginia Tech's Educational Mission through the Climate Action Living Laboratory (CALL) Beginning in 2021.

POTENTIAL PATHWAYS:

- Recognize the excellent opportunities for student learning, faculty and student technical research, and staff development. Benefits include learning from and innovating creative solutions in-house for Virginia Tech's climate initiatives and better engaging the entire university both in Blacksburg and other Virginia Tech locations in our quest for sustainable and just climate action.
- Establish the Climate Action Living Laboratory (CALL) in the new University Office for Climate Action and Sustainability (OCAS) to enhance offerings and build bridges between facilities and academic departments, facilitating and supporting opportunities.

- Alter norms and incentives to overcome traditional barriers and nurture cooperation between academic units (research and teaching) and operations units such as Division of Campus Planning, Infrastructure, and Facilities and auxiliary units including Dining Services, Housing and Residence Life, and Athletics. Greater collaboration between university units will help implement the Climate Action Commitment and integrate physical plant climate action with academics and campus life.
- Integrate Climate Action Living Laboratory (CALL) initiatives in other goals/pathways for renewables (2), energy materials, devices and systems (3), buildings (4, 5), agriculture (6), waste (7), transportation (9), climate justice (11), sustainable behaviors (12), and community engagement (13).
- Engage the university's land grant extension and outreach programs to reflect the principles of the Climate Action Commitment and help implement them throughout the Commonwealth.
- Integrate the physical infrastructure elements of the Climate Action Commitment into the fabric of the university's educational and research programs to expand funding opportunities for campus innovation from state and federal sources as well as foundations.

11. Establish Climate Justice as a Core Value of the Climate Action Commitment.

POTENTIAL PATHWAYS:

- Encourage an accelerated transition to carbon-neutral status as a climate-justice imperative.
- Ensure that the social impacts of Virginia Tech's climate mitigation choices (e.g. energy, land use, and waste) are identified and addressed to the greatest extent possible.
- Establish a Climate Justice Subcommittee of the revised Climate Action, Sustainability, and Energy (CASE) Committee by 2021 with representation from students, faculty, and community members from frontline groups.
- Ensure that Virginia Tech climate action implementation plans recognize and assist vulnerable or frontline groups adversely affected by those plans, including low-wage Virginia Tech employees, tuition-paying students, VTES town ratepayers, historically marginalized people of color and Indigenous communities, coalfield communities, and others.
- Establish education, research, and outreach programs to assist vulnerable and historically marginalized groups mitigate and adapt to climate change and thrive in the new energy economy. These efforts should specifically target Virginia Tribes, African Americans in the New River Valley, coalfield communities in southwest Virginia, and coastal Virginia communities threatened by climate-related hazards.

12. Diminish Barriers to Sustainable Behaviors through Institutional Change, Education, and Social Marketing.

POTENTIAL PATHWAYS:

- Implement infrastructural changes–from waste management to transportation to building operation–to make sustainable choices easier.
  - Identify structural, social and institutional barriers to sustainable behaviors.
  - Develop educational programs to foster pro-environmental behavior change.
- Design and implement choice architecture or "nudges" to promote sustainable behavior, while allowing for individual choice, using social media, gaming, and other means.
- Develop a shared toolkit of best practices in social marketing, rooted in behavioral sciences, for campus groups initiating sustainability initiatives.
- Nurture cross-campus partnerships to coordinate climate action and enhance sustainability initiatives.

13. Implement the Virginia Tech Climate Action Commitment.

... at a high level of university administration and governance;

... by integrating Climate Action goals for facilities, education, and campus culture; and

... with ongoing stakeholder engagement for evaluation of goals and progress.

POTENTIAL PATHWAYS:

- **Governance:** By fall 2021, restructure the university Energy and Sustainability Committee (E&SC), renaming it the Climate Action, Sustainability, Energy (CASE) Committee, and revising its charge, membership, and reporting, to oversee the implementation and review of the Climate Action Commitment goals and progress involving student, faculty, and staff stakeholders.
- **Implementation/operations:** Appoint a new university Chief Climate Action and Sustainability Officer (CCASO) to direct a reconstituted University Office of Climate Action and Sustainability (OCAS) to oversee Climate Action Commitment implementation and other campus sustainability initiatives. The CCASO would jointly report to the Senior Vice President and Chief Business Officer and to the Executive Vice President and Provost. The CCASO would chair the CASE Committee. The Facilities Division would, in parallel, appoint a director of strategic success to oversee a range of strategic Facilities issues including climate action and sustainability.
- **Learning:** Establish the Climate Action Living Laboratory (CALL) in the new OCAS to enhance offerings and build bridges between facilities and academic departments, facilitating and supporting opportunities (Goal 10).
- **Duties of Operations and Governance units:**
  - Collect data relevant to the Climate Action Commitment including GHG inventory and prepare an Annual Report of Climate Action Commitment progress each fall semester for the previous fiscal year.
  - Establish mechanisms to engage and educate the Virginia Tech community on the Climate Action Commitment and climate action.
  - Establish ad hoc committees to develop instructional, research and outreach programming for the Climate Action Living Laboratory (CALL).
  - Evaluate Climate Action Commitment goals according to best practices in light of new information and standards and direct update of the Climate Action Commitment on a five-year cycle.
  - Broaden the geographic scope of the Climate Action Commitment to all Virginia Tech properties in future iterations to include the entire university.
  - Advocate for allocation and prioritization of resources to support the Climate Action Commitment.
- **Annual review:** Conduct an in-depth annual review of the Climate Action Commitment goals and implementation, progress that involves student, staff, faculty, and community stakeholders. The results of this review will be shared publicly in an accessible and easy-to-read format.

14. Develop Innovative Budgeting and Financing Mechanisms to Generate Funding and Staffing to Achieve Climate Action Commitment Goals.

POTENTIAL PATHWAYS:

- Strategically invest university E&G and auxiliary funds to implement the 10-year Energy Management Plan at a level of $5 million/year in energy efficiency projects with a cumulative 8-year financial payback or 12 percent return on investment.
- Major investment is needed to implement the pathways for renewable electricity both on Virginia Tech buildings/lands and in the Southwest Virginia region, including the following options:
  - Virginia Tech-owned and developed projects on Virginia Tech buildings/land and
  - Utility or third party owned and developed projects on Virginia Tech buildings/land and in SWVA with Virginia Tech power purchase agreement (PPA).

The first option requires major Virginia Tech capital investment but provides greater long-term return and control, while the second requires no Virginia Tech capital but provides less long-term financial return. A combination of the two options may be used to meet the Climate Action Commitment renewables goal.

- As a unique power utility, VTES has opportunities for investment in renewable energy serving both campus and its town customers.
- The Virginia Tech Foundation helps the university achieve its goals and may be a valuable partner in implementing the Climate Action Commitment:

- As owner of most of the leased academic space off campus, the Foundation has already agreed to provide funding for an energy efficiency retrofit pilot project in Corporate Research Center buildings on a revenue neutral basis.
- Campus solar development provides another opportunity for Foundation investment with appropriate return on that investment.

- Additional sources of funds to implement the Climate Action Commitment include, federal and state grants, research funding in connection with the Living Laboratory, advancement donations, philanthropic organizations and foundations, and low interest revenue bonds by VTES and auxiliaries.
- In addition to project funding, implementation of the Climate Action Commitment will require upgrading the staff to rise to the needs of the commitment, especially in energy management, energy and utility systems, building analysis and design, waste management, university compost facility operation, and campus sustainability.

15. Develop Pathways After 2030 to Eliminate Fossil Fuels and Offsets by 2050.

POTENTIAL PATHWAYS:

- A long-term Utilities Master Plan should fully incorporate the goals of this Climate Action Commitment
- It is difficult to anticipate how technology, the economy, and public policy will evolve in the next 10-30 years, necessitating revisions along the way:
  - 2025: 5-year Climate Action Commitment revision review explore options for 2030-2040 timeframe.
  - 2030: 5-year Climate Action Commitment revision review explore options for 2040-2050 timeframe.
- Beginning with the CAC 2025 revision, develop a plan for full transition to renewable energy for campus heating systems. To promote zero emissions energy options in the plan, refine GHG inventory estimates of methane leakage from VT natural gas sources and include those estimates of methane leakage in the carbon neutral goal for 2035.
- Eliminating offsets and fossil fuels would require significant changes in Virginia Tech's physical plant. The university is dependent on natural gas in the steam plant and eliminating natural gas will require replacement by a non-carbon fuel (e.g. biogas, hydrogen, biochar) or a new heating system based not on steam but on hot water perhaps generated by renewable electricity and geothermal ground-source heat pump systems. Some universities are moving in that direction, and Virginia Tech will have much to learn from them about the prospects.

IMPLEMENTATION MILESTONES

The 15 goals and pathways include many target dates for actions or achievement as part of their implementation. They are summarized in the table below, with date, relevant goal number and action milestone.

DATE	ACTION MILESTONE	GOAL
2020	BOV approves 2020 Virginia Tech Climate Action Commitment	
	30 percent renewable electricity	2
2021	E&SC renamed Climate Action, Sustainability & Energy (CASE) Committee	13
	Operation plan for Climate Action Living Laboratory (CALL)	11
	Candidate identified for zero-net-energy new building to be built by 2026	5
	First year of 10-year 2021-30 Energy Management Plan	3,4
	Fishburn Forest student-led assessment	2
2022	2.3 MW solar PV on Virginia Tech rooftop and land	2
	VTES Solarize Program for Town customers, 250 kW net metered	2
	Electricity use 10% below 2006 (Governor's E.O. 43)	4
	Newly initiated buildings EUI 20% below 2020 existing average	5
	Sustainable Procurement Policy v.2. implemented	8
2023	Virginia Tech Foundation energy efficiency plan for leased buildings (CRC)	14
	VTES Community Solar project for Town customers 0.5-1 MW	2
2024	Chiller Phase II Upgrade complete	3
2025	Complete conversion of steam plant fuel to natural gas	3
	Begin planning transition to renewable steam plant fuel	3
	Five-year Climate Action Commitment update: Explore options for 2030-2040	15
	Recycling rate 55%; waste diversion rate 85%; reduce trash to landfil/capita by 25%	7
	Reduce single-occupancy-vehicle commuting by 20%	9
	10 MW solar PV on Virginia Tech lands	2
	Explore geothermal heat pump hot water heating options for new districts	3
2026	Signature Zero-Net-Energy (ZNE) building on campus	5
2027	10 MW battery storage for Virginia Tech Smart Grid research by VT PEC-VTES partnership	2
	35 MW solar PPA with APCO/third party in SWVA including coalfields	2
2028	Newly initiated buildings EUI 40% below 2020 existing average	5
2029	100 MW solar PPA with APCO/third party in SWVA including coalfields	2
2030	Five-year Climate Action Commitment update: Explore options for 2040-50	15
	Carbon neutral campus operations	1
	100% renewable electricity	2
	Total building energy use down 10%; EUI down 20% below 2020	4
	Newly initiated buildings carbon neutral operations	5
	Carbon neutral agriculture/forestry operations	6
	Zero-waste campus	7
	Transportation emissions reduced 40% from 2020	9
2050	Fossil fuel-free campus	15

COSTS AND BENEFITS OF 2020 VIRGINIA TECH CLIMATE ACTION COMMITMENT GOALS AND PATHWAYS

The Working Group assessed the impacts of the 2020 Virginia Tech Climate Action Commitment goals and pathways including GHG emissions, fiscal costs and benefits, and implications for Virginia Tech's educational mission, operations, policies and governance, and culture. These implications are far-reaching and are presented in Chapter 3.

Major benefits are reduction of GHG and enhanced university reputation, culture, and educational programs linked to campus climate action and sustainability.

To implement the Climate Action Commitment goals, there will be costs and benefits for the university:

- Some initiatives (e.g., upgrades to the steam plant) are part of the cost of doing business, and the added costs to incorporate climate action goals may be small.
- Others, such as energy efficiency retrofits, have a positive return on investment.
- Others, including solar electric projects, will require major investment; however, creative power purchase agreements can reduce capital cost and achieve cost-effective results.
- Finally, some projects (e.g., the proposed University Compost Facility at Kentland) require capital and operating expenditures but provide substantial operational and educational benefits.

Effective Climate Action Commitment implementation will require changes in operations and governance. Goal 13 recommends establishing a University Office for Climate Action and Sustainability (OCAS) directed by a Chief Climate Action and Sustainability Officer that reports jointly to the Senior Vice President and Chief Business Officer and the Executive Vice President and Provost.

The university's financial uncertainties resulting from the Covid-19 pandemic require flexibility in implementing the Climate Action Commitment. As presented on the next page, much can be done with limited investment.

IMMEDIATE NEAR-TERM INITIATIVES (2020-22)

Although the 2020 Virginia Tech Climate Action Commitment focuses on 2030 as the target date for its goals, the pathway to those goals begins the day the Climate Action Commitment is officially adopted by the university, if not before. The Working Group has identified a number of initiatives and projects that can and should be acted on in the short term from now until 2022 with full understanding of the current budget constraints of the university. The "shovel ready" initiatives aim to get a jump start on necessary action and to demonstrate the university's commitment. They are listed below sorted by (a) low-cost/no-cost/revenue-neutral initiatives, (b) ongoing and budgeted projects, and (c) new priorities in need of funding and/or approval. These initiatives are described in Chapter 9.

a. Low/no cost/revenue neutral project/policy/planning initiatives

- Establish framework for Climate Action Living Laboratory (CALL) through the Office of the Provost and Executive Vice President, college deans, and the Division of Campus Planning, Infrastructure, and Facilities.
- Restructure the Energy and Sustainability Committee to oversee 2020 Virginia Tech Climate Action Commitment, renaming it the Climate Action, Sustainability, and Energy (CASE) Committee.
- Establish an alternative mobility subcommittee of the Transportation and Parking Committee.
- Develop plan for steam plant resilience/redundancy needs to complete conversion to natural gas by 2025.
- Develop a Utility Master Plan.
- Develop a Campus Energy Dashboard.
- Initiate Student Project for Fishburn Wind Energy Assessment.
- Promote partnership between Virginia Tech Electric Service and the Virginia Tech Power and Energy Center as part of Climate Action Living Laboratory.
- Initiate partnership with APCO on renewable electricity development.
- Initiate community relations with VTES Town of Blacksburg customers.
- Identify candidates for a zero-net-energy building on campus and develop fundraising plan.
- Engage Virginia Tech Foundation in energy efficiency retrofit plan for leased buildings.
- Adopt a Campus Tree Policy.
- Seek external funding for agrivoltaics test array at Catawba Sustainability Center.
- Implement and evaluate Sustainable Procurement Policy.

b. Ongoing budgeted projects

- Implement ongoing steam plant and chiller upgrade projects.
- Evaluate new natural gas contract on implications for Climate Action Commitment goals and pathways.
- 2020 RECs for 30 percent renewable electricity, continue through 2022 as needed.
- Implement Design and Construction Standards in light of Climate Action Commitment Goals.
- Fill the Virginia Tech energy manager position and supplement staff as needed.
- Implement budgeted projects in the Parking and Transportation Plan.

c. New priority projects in need of funding/approval

- Establish the University Office of Climate Action & Sustainability (OCAS) and appoint a university Chief Climate Action and Sustainability Officer (CCASO).
- Develop University Compost Facility at Kentland.
- Initiate 10-year energy management plan, 2021-30, and develop first year projects.
- Develop solar projects on campus: 2.3 MW by 2022: Sterrett and other rooftop projects.
- Implement zero-waste management consultant study.
- Implement a Green Lab Program.
- Dedicate consistent, annual funds to maintain existing trails, sidewalks, bicycle infrastructure.
- Implement transportation infrastructure plans (e.g., MMTF).

COMMUNITY ENGAGEMENT

Engaging the university community in the Climate Action Commitment update was part of the Working Group's charge and a critical component of our effort. The process overall–with its robust network of subcommittees–may be considered a true 'collaborative' enterprise, with over 130 students, staff, faculty, and community members involved. In terms of wider outreach, the Engagement Subcommittee originally planned on holding a major half-day town hall event on campus. Unfortunately, COVID-19 made that impossible.

The group responded by deploying a range of 'physically distanced' engagement activities:

- Dedicated website portal introducing the Climate Action Commitment process and sharing committee materials.
- Dedicated email address for the initiative.
- A series of 10 videos sharing progress of the Working Group and the subcommittees.
- A survey distributed widely throughout the community with 242 respondents.
- A series of 12 hour-long Zoom "convenings," attended by at least 226 participants.

Each of these streams of engagement is detailed in Chapter 5, and insights and information collected through them is summarized. Key findings from these various engagement efforts include:

- The vast majority of participants/respondents believe that climate change is a serious threat, and thus support aggressive action on the part of the university. In fact, many feel that Virginia Tech is not doing enough.
- The importance of setting ambitious goals and sticking to them was emphasized.
- Emphasis was placed on systemic or "upstream" solutions rather than placing the onus on behavior change of individuals, given that many of the barriers to action are infrastructural and institutional (e.g., poor cycling infrastructure).

- The above notwithstanding, many did see individual actions as important and needing of attention. Creative ideas emerged around how to, for example, 'gamify' desired actions.
- Key champions are important for propelling further action, including potentially a higher-level champion within university administration. This may be achieved through a stronger OCAS (see recomendation #13).
- There is strong support for taking a more holistic view of understanding our greenhouse gas emissions, accounting for emissions associated with community behaviors like commuting.
- There is broad support for key actions proposed through the Climate Action Commitment update process, including:
  - A shift to carbon neutrality and 100 percent renewable energy, including integrating renewable energy infrastructure into campus design.
  - Alternative transportation and reductions in private automobile usage, including a ban on freshmen car parking permits.
  - Improved waste management, including a new compost facility, and reductions at the source through purchasing decisions that minimize waste and promote sustainability
  - The creation of a 'living laboratory' to foster partnerships between campus operations, local partners, and the academic (teaching and research) enterprise.
  - A green lab system, and similar programs to promote sustainable behaviors within work and student life spaces.
  - Optimize building design, including with energy, water, and waste monitoring.
  - The need to account for climate justice in any and all actions taken.
  - Stronger partnerships with other institutions, including the Town of Blacksburg.
  - There is a strong desire to see engagement continue as the university shifts to implementation.

COMPARISON WITH PEER UNIVERSITIES

One of the Working Group's deliverables is a comparison of Virginia Tech progress in climate action to peer universities, and this is presented in Chapter 8. There are three good reasons for doing this:

1. To offer an evaluative reference point (i.e., to see how we are doing),
2. To adopt effective plans and avoid ineffective ones (i.e., to borrow good ideas), and
3. To demonstrate that what the university is proposing is feasible and in line with similar universities (i.e., to show it is not far-fetched to have a bold and aggressive climate action plan).

Knowing that our perspective is comprehensive and that other universities have different strengths in different areas, the Working Group decided to have our thematic subcommittees select the peer and exemplary universities to assess in their specific areas.

Those areas include:

- Buildings
- Renewable Energy
- Energy Systems
- Transportation
- Carbon neutrality and GHG inventory
- Budget and Finance
- Climate Justice
- Waste-Recycling-Composting
- Agriculture, Forestry, Land Use
- Community Engagement

In most areas the Working Group selected 3-8 universities that they consider to be peers or to be exemplary in that area. Some are from Virginia, some are Land Grants, some are from the Atlantic Coast Conference, some are far away, but all offer good examples and benchmark our progress to-date and our aspirations for the 2020 Climate Action Commitment.

All in all, our peer reviews told us that, while our 2009 Climate Action Commitment was right for its time and has led to improved energy efficiency and reductions in GHG emissions, it now lags behind the actions of many of our peers. This deficiency is most notable in the quest for carbon neutrality, for renewable energy, for zero-waste, for zero-net-energy buildings, for alternative transportation, and for community engagement to advance climate action and sustainable behavior.

Many of our related programs do standup well in comparison to others, but if Virginia Tech is to regain its leadership role in climate action and sustainability, it needs to move to a new Climate Action Commitment that is right for this time. Of course, that is what it has set out to do, and the Working Group believes that it has found the right balance of aggressive, yet pragmatic, climate action. The group's goals are to achieve carbon neutrality by 2030, 100 percent renewable electricity by 2030, investment in energy efficiency in existing and new buildings, carbon neutral agriculture, a zero-waste campus, sustainable procurement practices, sustainable mobility, climate justice as a core value, community engagement, and the establishment of a Climate Action Living Laboratory that will integrate these goals into the fabric of the university.

Relative to the peer and exemplary universities reviewed in this analysis, this 2020 Virginia Tech Climate Action Commitment sets the stage for Virginia Tech to shine as an exemplar and leader in university climate action. Beyond our climate neutrality and zero-waste campus goals, six areas of the 2020 Climate Action Commitment stand Virginia Tech above the rest:

1. The detail and specificity of the pathways developed to achieve the Climate Action Commitment goals
2. Our own unique utility VTES leading our way to 100 percent renewable electricity, while most other universities are totally dependent on private utilities and companies.
3. Using our considerable land resources not only to manage our agricultural climate impacts, but also to sequester carbon and develop renewable energy.
4. Incorporating in our carbon neutral goal scope 3 GHG emissions relating to behavior (e.g., commuting, waste/recycling, water/wastewater, business travel), while most others include just scope 1 and 2.
5. Integrating our physical climate action into the university's educational mission through the Climate Action Living Laboratory (CALL).
6. Specifically addressing community engagement, sustainable behaviors, and social equity and justice as core elements of our climate action.

LEARN MORE

View the full Virginia Tech 2020 Climate Action Commitment Working Group Report and associated appendices at **svpoa.vt.edu/index/VTCACRevision**.

Questions may be addressed to **climateaction@vt.edu**.

VIRGINIA TECH™

Commonwealth of Virginia Locality Recycling Rate Report For Calendar Year 2023

Contact Information

Reporting Solid Waste Planning Unit: Virginia Tech

Person Completing This Form: Teresa Sweeney **Title:** Waste & Recycling Manager, Division of Facilities
Address: Virginia Tech, Sterrett Center, 180 Sterrett Drive, Blacksburg, VA 24061
Office Phone Number: (540) 231-9916 **Email Address:** msrecycle247@vt.edu

Summary: Virginia Tech, the Town of Blacksburg, the Town of Christiansburg, and Montgomery County represent the four jurisdictional members of the Montgomery Regional Solid Waste Authority (MRSWA). Located in Christiansburg, MRSWA operates a transfer facility that receives the majority of our principal recyclable materials (PRMs), and all of our municipal solid waste (MSW). Our region uses a "single stream recycling system" with Recycling & Disposal Solutions (RDS) in nearby Salem, Virginia serving as the "hub." Food waste is collected at all on campus dining facilities and stored, transported and processed into composting material by Royal Oak Farm (ROF) at their facility in Evington, Virginia. The New River Resource Authority (NRRA) located in Dublin, Virginia operates the local landfill. Virginia Tech owns and operates a Quarry that produces our famous "Hokie Stone," the Limestone-Dolomite stone for the exterior of most campus buildings. While recycling numbers decreased, our diversion rate increased. This is in line with our zero-waste commitment by 2030 Climate Action Commitment goal.

Virginia Tech achieved a 17% Recycling Rate and an 84% Waste Diversion Rate (percentage of waste kept out of the local landfill) for Calendar Year 2023.

Data in this report was collected from our recycling and solid waste facilities and other campus stakeholders. I certify that I have personally examined, and am familiar with, the information submitted in this form, and that based on my inquiry of the individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete.

Teresa Sweeney	Waste and Recycling Manager	3/22/24
Authorized Signature	Title	Date

Locality Recycling Rate Report — For Calendar Year 2023

Part A: Recycling Rate Calculation - Using the formulae provided below and the information reported on Pages 3, 4, and 5 to calculate your recycling rates.

Step 1: [(PRMs) / (PRMs + MSW Disposed)] X 100 = Base Recycling Rate %

1052	/	1052	+	5194	X 100 =	17	%
TONS		TONS		TONS			

Step 2: CREDITS calculation

a.	Total Recycling Residue	0	tons
b.	Total Solid Waste Reused	4822	tons
c.	Total Non-MSW Recycled	16,870	tons
	CREDITS	21,692	tons

Step 3: [(PRMs + CREDITS) / (PRMs + CREDITS + MSW Disposed)] X100 = Adjusted Recycling Rate #1*

1052	+	21,692	/	1052	+	21,692	+	5,194	X 100 =	82	%
TONS		TONS		TONS		TONS		TONS			

Step 4: ☐ **Source Reduction Credit does not apply; or**

☒ **Adjusted Recycling Rate #1 +2% SRP Credit = Adjusted Recycling Rate #2***

82	%	+ 2 %	=	84	%

Step 5: Final Recycling Rate* for Solid Waste Planning Unit = **17** %

* **Total credits resulting from Step 3 and 4 may not exceed 5 percentage points above the Base Recycling Rate achieved by the Solid Waste Planning Unit.**

Locality Recycling Rate Report For Calendar Year 2023

Part B: DATA

Part I: Principal Recyclable Materials (PRMs): Report only PRM material generated within the reporting SWPU and recycled, NOT imported PRMs for recycling.

PRM TYPE	RECYCLED AMOUNT (TONS)
Paper	296.31
Metal	213.17
Plastic	3.0
Glass	0
Commingled (also known as Single Stream)	188.93
Yard Waste (composted or mulched)	
Waste wood (chipped or mulched)	
White Goods	(included in metal)
Tires	11.47
Used Oil	2.61
Used Oil Filters	0.13
Batteries	0.53
Electronics	9.5
Fluorescent Bulbs & Ballasts	12.34
Food Waste Organic – Composting	297.00
Wasted Cooking Oil	17.00
TOTAL PRMs	1051.99

(Enter Total on Page 2, Step 1)

Listing of sources for PRM data

1. Solid waste facilities from Virginia Tech which MSW disposed/recycled data was collected:
   a. Heavy Equipment Crew - Facilities Division
   b. Facilities Operations (Buildings & Grounds) - Facilities Division
   c. Capital Construction & Renovation - Facilities Division
   d. Dining Services - Division of Student Affairs
   e. Environmental Health & Safety Department
   f. Fleet Services - Parking & Transportation Department
   g. Quarry - Facilities Division
   h. Library Services
2. Other facilities/operations (not included in #1 above) from which MSW disposed/recycled data was collected:
   a. Montgomery Regional Solid Waste Authority (MRSWA) - Christiansburg, VA
   b. YMCA at Virginia Tech - Blacksburg, VA
   c. Campus Kitchens Food Donation Program - VT Engage - Blacksburg, VA
   d.
   e.
   f.
   g.
   h.
   i.

Locality Recycling Rate Report **For Calendar Year 2023**

Part II: Credits by Category (See Credits Worksheet, Page 5)

A. Recycling Residue: "Recycling residue" means the (i) nonmetallic substances, including but not limited to plastic, rubber, and insulation, which remain after a shredder has separated for purposes of recycling the ferrous and nonferrous metal from a motor vehicle, appliance, or other discarded metallic item and (ii) organic waste remaining after removeral of metals, glass, plastics, and paper which are to be recycled as part of a resource recovery process for municipal solid waste resulting in the production of a refuse derived fuel. (§ 10.1-1400 of the Code of Virginia) (use only SWPU generation)

MATERIAL DESCRIPTION	FACILITY/OPERATION	TONS OF MATERIAL
	from	
	from	
	from	

TOTAL RECYCLING RESIDUE **0**

(Enter Total on Page 2, Step 2 a)

B. Solid Waste Re-used

MATERIAL DESCRIPTION	REUSE METHOD	TONS OF MATERIAL
Furniture/Appliances	YTOSS Program (Collected - Student Move-Out)	12.00
Food Donation Prgm	Partnership w/Dining Services & VT Engage Grp	10.00
Surplus	Auction	
4800.00		

TOTAL SOLID WASTE REUSED **4822.00**

(Enter Total on Page 2, Step 2b)

C Solid Waste Re-used

MATERIAL DESCRIPTION	RECYCLING METHOD	TONS OF MATERIAL
"Hokie Stone" Gravel	"Overburden" (Cuttings) from VT Quarry Ops	14,980
Milled Asphalt/Masonry Concrete	– Construction Projects	1,364
Mixed Recycling	Projects - Demolition and Construction	526

TOTAL NON-MSW RECYCLED **16,870**

(Enter Total on Page 2, Step 2c)

D. A credit of two (2) percentage points may be added to the Adjusted Recycling Rate #1 if the Solid Waste Planning Unit has implemented a Source Reduction Program (SRP). Examples of SRPs include Grass-cycling, Home Composting, Clothing Reuse, Office Paper Reduction (duplexing), Multi-Use Pallets, or Paper Towel Reduction. The SRP must be included in the Solid Waste Management Plan on file with the Department:

SRP description: Campus Kitchens Program is a partnership with VT Engage & Dining Svcs (Division of Student Affairs) to donate excess food to local community.

SRP description: YMCA at Virginia Tech's YToss Program collects reusable items from our students in residence halls during Spring Move Out for sale in the Fall 2024.

(Certify on Page 2, Step 4)

Exclusions: For the purposes of this report, the following materials are not considered solid wastes, and should not be included in any of the data categories utilized in calculating the recycling rate.

1. **Biosolids– industrial sludge, animal manures; or, sewage sludge (unless composted)**
2. **Automobiles – unless part of the Inoperable Vehicle Program (DMV)**
3. **Leachate**
4. **Soils – contaminated soils, soil material from road maintenance**
5. **Household hazardous waste**
6. **Hazardous Waste**
7. **Medical waste**
8. **Rocks or stone**
9. **Woody waste derived from land clearing for development, VDOT or easement tree trimming/clearing.**

Part III. Total Municipal Solid Waste (MSW) Disposed** - Report only MSW generated within the reporting jurisdiction(s), NOT imported wastes or industrial wastes.

MSW TYPE	TOTAL AMOUNT of MSW DISPOSED (TONS)
Household	
Commercial	
Institutional	5,194
Other (DO NOT INCLUDE INDUSTRIAL WASTES)	
TOTAL MSW DISPOSED	**5,194**

(Enter Total on Page 2, Step 1 and Step 3)

Note: MSW DISPOSED *for the purpose of this report means delivered to a permitted sanitary landfill, delivered to a waste-to-energy facility, or managed at a transfer station for transport to a landfill or waste-to-energy facility.*

Locality Recycling Rate Report — For Calendar Year 2023

Credits Worksheet

I. Reuse of any Solid Waste

✓	Material Description	Tons
	PRM	
	PRM	
	PRM	
	Industrial	
	Construction	
	Demolition	
	Debris	
X	Other Surplus	4,800
X	YToss Program Reusable Residence Hall Items	12
X	Campus Kitchen Food Donation w/ Dining Svcs	
	TOTAL TONS	4,822

(Enter data on Page 4, Solid Waste Re-Used)

II. Recycling of any Non-Municipal Solid Waste

✓	Material Description	Tons
X	Construction – Concrete Projects (D&DS)	1,364
X	Quarry Ops – Hokie Stone "Overburden"	14,980
X	Other – Mixed Recycling	526
	Other	
	TOTAL TONS	16,870

(Enter data on Page 4, Non-MSW Recycled)

III. Inoperable Vehicles Removed and Demolished - include number of vehicles that the localities received reimbursement from DMV under §46.2-1207 od the Code of Virginia.

# of vehicles removed/reimbursement received 0
Average tonnage per vehicle X 1 Ton each

Total Tons 0 **(enter data on Page 3, PRMs, as Inoperative Motor Vehicle Program)**

NOTE: Check "Exclusions" on Page 5 to avoid listing of those materials on this worksheet and/or in the data fields of this report.

Locality Recycling Rate Report For Calendar Year 2023

Amended Regulations for the Development of Solid Waste Management Plans (9 VAC 20-130-10 et seq.) require that Solid Waste Planning Units (SWPUs) in the Commonwealth develop complete, revised solid waste management plans. Section 9 VAC 20-130-120 B & C of the Regulations requires that a minimum recycling rate of the total municipal solid waste generated annually in each solid waste planning unit be maintained. It also requires that the plan describe how this rate shall be met or exceeded and requires that the calculation methodology be included in the plan. Section 9 V AC 20-130-165 D establishes that every solid waste management planning unit with populations over 100,000 shall submit to the department by April 30 of each year, the data and calculations required in 9 VAC 20-130-120 B & C for the preceding calendar year. SWPUs with populations of 100,000 or less are only required to report ever 4 years (CY years 2016 and forward.

NOTE: ONLY RECYCLING RATE REPORTS FROM AN APPROVED SOLID WASTE PLANNING UNIT (SWPU) WILL BE ACCEPTED FOR PROCESSING. JURISDICTIONS WITHIN A SWPU MUST SUBMIT THEIR RECYCLING DATA TO THE SWPU FOR INCORPORATION INTO THE ANNUAL REPORT.

It is requested that all amounts included on the form be listed in **tons (2,000 pounds)**. If actual weights are not known, volumes can be converted to weight estimates. To assist you with these estimates, a standardized volume-to-weight conversion table is attached.

Contact Information Section: Please provide information on the Reporting SWPU and information on the individual completing this form. Under Member Governments, please list the local governments identified in the applicable solid waste management plan.

Calculated Recycling Rate Section: Using the formulae provided, calculate your recycling rates for the reporting period from information identified in the Recycling Rate Calculations Section.

Signature Block Section: Please provide an authorized signature prior to submitting the completed form. Authorized signatories include Executive Officer, Administrator, or other legally designated representative of the SWPU reporting entity.

Recycling Rate Calculations Section: Please provide the requested information:

Part I: Principal Recyclable Material (PRM) - Report the amount in tons of each PRM collected for recycling in the named jurisdiction(s) during the reporting period. PRMs include paper, metal, plastic, container glass, commingled, yard waste, waste wood, textiles, tires, used oil, used oil filters, used antifreeze, batteries, electronics, and other materials approved by the Director taken from the Municipal Solid Waste (MSW) generation. A one ton credit may also be entered for each inoperable motor vehicle for which a locality receives reimbursement from the Virginia Department of Motor Vehicles under §46.2-1207 of the *Code of Virginia.* The total weight in TONS of all PRMs collected for recycling is represented as **PRMs** in the Recycling Rate Calculation. **New for CY 2015: Provide source information for the PRMs reported on the report (permitted and unpermitted facilities).**

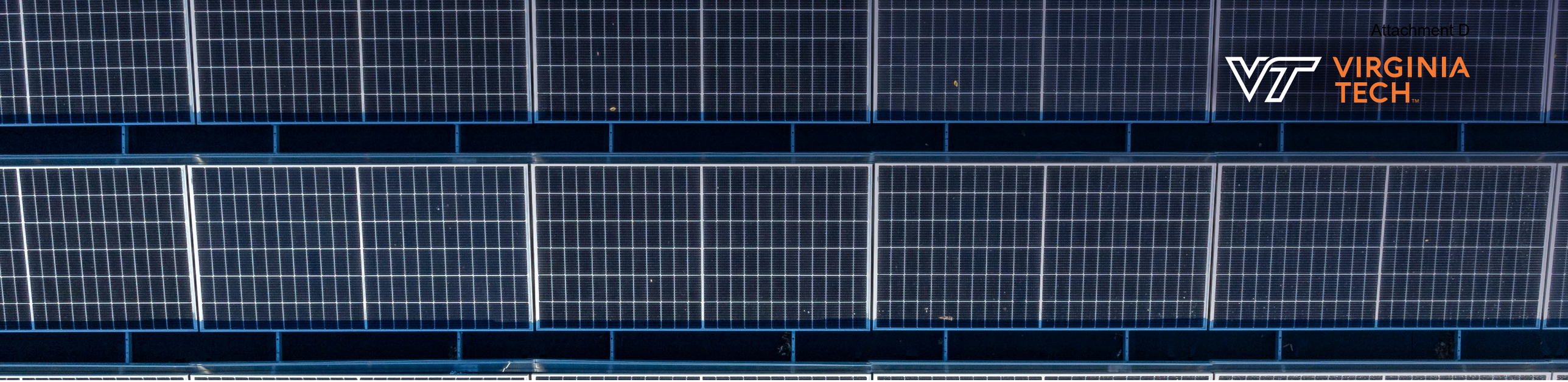
Part Il: Credits - Report the amount in **TONS** of each material for which recycling credit is authorized in § 10.1-1411.C of the *Code of Virginia:* (i) one ton for each ton of recycling residue generated in Virginia and deposited in a landfill permitted under §10.1-1408.1 of the *Code of Virginia*; (ii) one ton for each ton of any solid waste material that is reused; and, (iii) one ton for each ton of any non-municipal solid waste that is recycled. The total weight in **TONS** of all material for which credits are authorized is represented as **CREDITS** in the Recycling Rate Calculation. A credit of two percentage points of the minimum recycling rate mandated for the Solid Waste Planning Unit (SWPU) may be taken for a source reduction program that is implemented and identified in its Solid Waste Management Plan. Total credits may not exceed five percentage points above the Base Recycling Rate achieved by the SWPU.

Part Ill: Total Municipal Solid Waste (MSW) Disposed: Report the total amount in **TONS** of MSW that was disposed of by the Solid Waste Planning Unit (SWPU) during the reporting period for each of the source categories (Household, Commercial, Institutional, and Other). For the purpose of this report, "disposed," means delivery to a permitted sanitary landfill or waste incinerator for disposal, and excludes industrial wastes. Industrial waste and by-products should not be included in the MSW or Recycling calculation. The total weight in tons of MSW disposed is represented as **MSW Disposed** in the Recycling Rate Calculation.

Locality Recycling Rate Report Volume to Weight Conversion Table

Material	Volume	Weight in Pounds
Metal		
Aluminum Cans, Whole	Once cubic yard	50-74
Aluminum Cans, Flattened	One cubic yard	250
Aluminum Cans	One full grocery bag	1.5
Ferrous Cans, Whole	One cubic yard	150
Ferrous Cans, Flattened	One cubic yard	850
Automobile Bodies	One vehicle	2,000
Paper		
Newsprint, Loose	One cubic yard	360-800
Newsprint, Compacted	One cubic yard	720-1,000
Newsprint	12" stack	35
Corrugated Cardboard, Loose	One cubic yard	75-100
Corrugated Cardboard, Baled	One cubic yard	1,000-2,000
Plastic		
PETE, Whole, Loose	One cubic yard	30-40
PETE, Whole, Loose	Gaylord	40-53
PETE, Whole, Baled	30"x62"	500
Film, Baled	30"x42"x48"	1,100
Film, Baled	Semi-Load	44,000
Film, Loose	Standard grocery bag	15
HDPE (Dairy Only), Whole, Loose	One cubic yard	24
HDPE (Dairy Only), Baled	32" x 60"	400-500
HDPE (Mixed), Baled	32" x 60"	900
Mixed PET & Dairy, Whole, Loose	One cubic yard	32
Mixed PET, Dairy & Other Rigid (Whole, Loose)	One cubic yard	38
Mixed Rigid, No Film	One cubic yard	49
Glass		
Glass, Whole Bottles	One cubic yard	600-1,000
Glass, Semi-Crushed	One cubic yard	1,000-1,800
Glass, Crushed (Mechanically)	One cubic yard	800-2,700
Glass, Whole Bottles	One full grocery bag	16
Glass, Uncrushed to Manually Broken	55 gallon drum	125-500
Arboreal		
Leaves, Uncompacted	One cubic yard	200-250
Leaves, Compacted	One cubic yard	300-450
Leaves, Vacuumed	One cubic yard	350
Wood Chips	One cubic yard	500
Grass Clippings	One cubic yard	400-1,500
Other		
Battery (Heavy Equipment)	One	60
Battery (Auto)	One	35.9
Used Motor Oil	One gallon	7.4
Used Oil Filters (Uncrushed)	55 gallon drum	66 Lbs./Used Oil+ 110 Lbs./Ferrous Metal
Used oil Filters (Crushed)	55 gallon drum	16.5 Lbs./Used Oil + 368 Lbs./Ferrous Metal
Tire - Passenger Car	One	20
Tire - Truck, Light	One	35
Tire - Semi	One	105
Antifreeze	One gallon	8.42
Food Waste, Solid & Liquid Fats	55 gallon drum	412
Electronics: CRT/CPU/Laptop/TV	Each (avg wt from NCER)	38/26/8/49 respectively
This Table For General Guidance Only.		

VIRGINIA TECH™



ENERGY AND UTILITIES

NAM NGUYEN | Executive Director

November 2024

Energy & Utilities

Power Plant

Chilled Water Plant

VT Electric Service

Mechanical Utilities

OFFICE OF ENERGY MANAGEMENT

OEM

Office of Energy Management

Campus Infrastructure Network

Legend

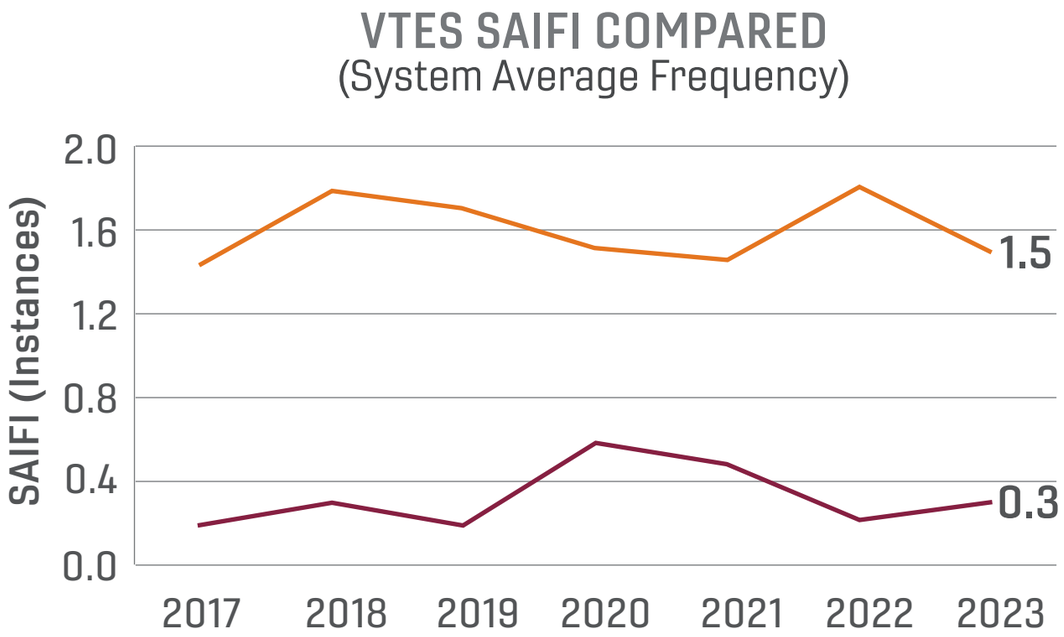
- Storm Water
- Steam Pipes
- Steam Tunnels
- Sanitary Sewer
- Natural Gas
- Hot Water
- Electrical
- Potable Water
- Chilled Water
- Buildings
- Campus Boundary

Virginia Tech Electric Service (VTES)

- 69kV delivery from AEP/APCO
- Four 12.5 kV substations
- Eight substation transformers (double redundancy)
- 1,283 distribution transformers
- 138 miles of underground cables
- All time peak - 65MW
- Average daily peak - 45MW

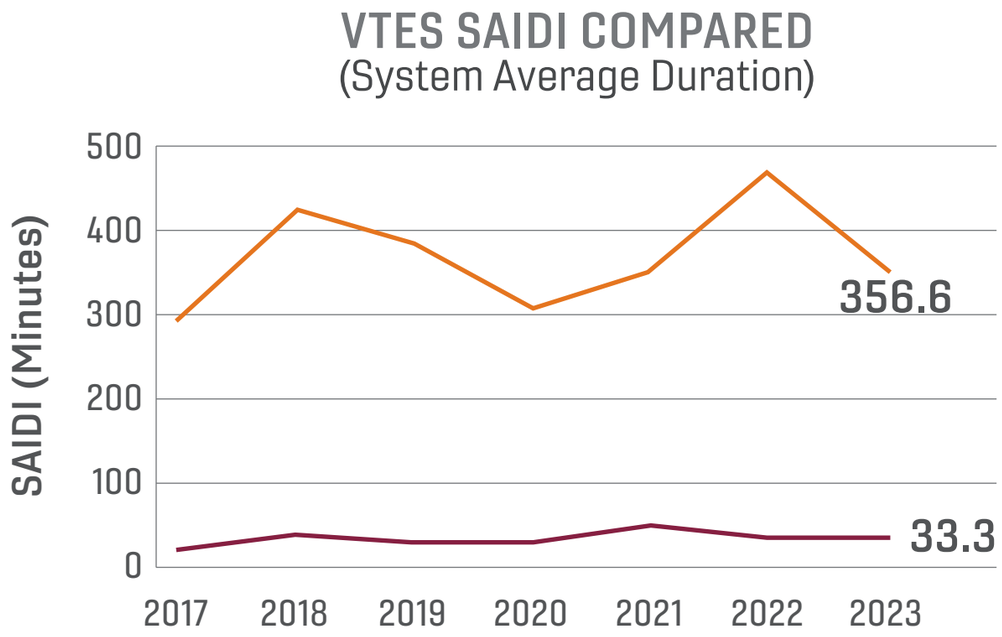
VTES Reliability Metrics

Annual average **number of times** that a VTES customer is out of power



SAIFI - System Average Interruption Frequency Index

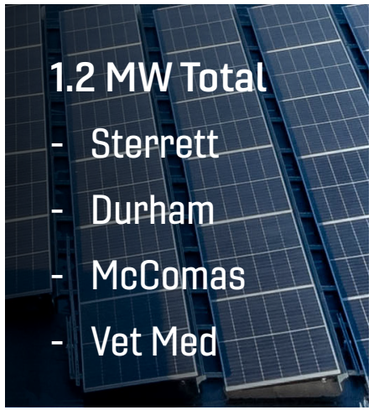
Annual average **minutes** that a VTES customer is out of power



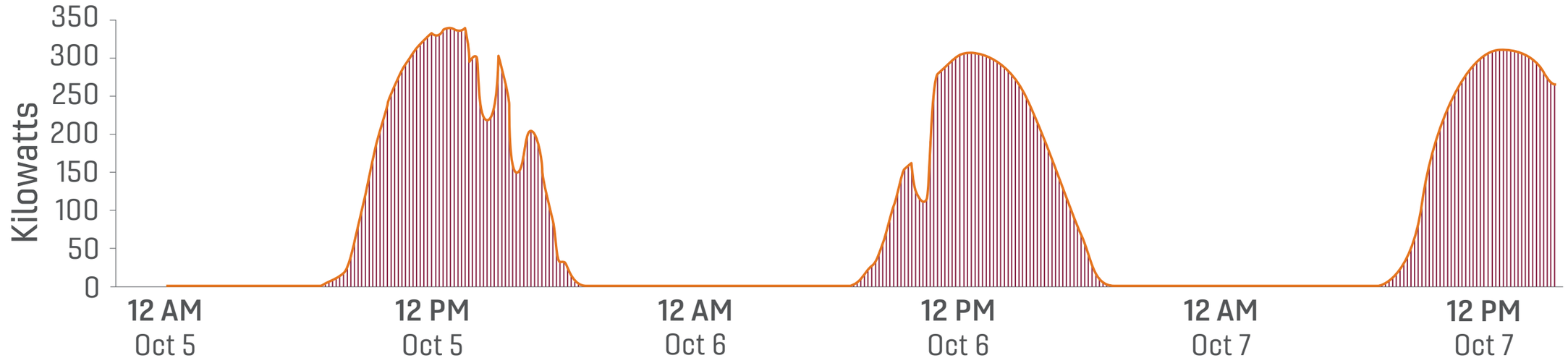
SAIDI - System Average Interruption Duration Index

APCO VTES

Rooftop Solar Arrays

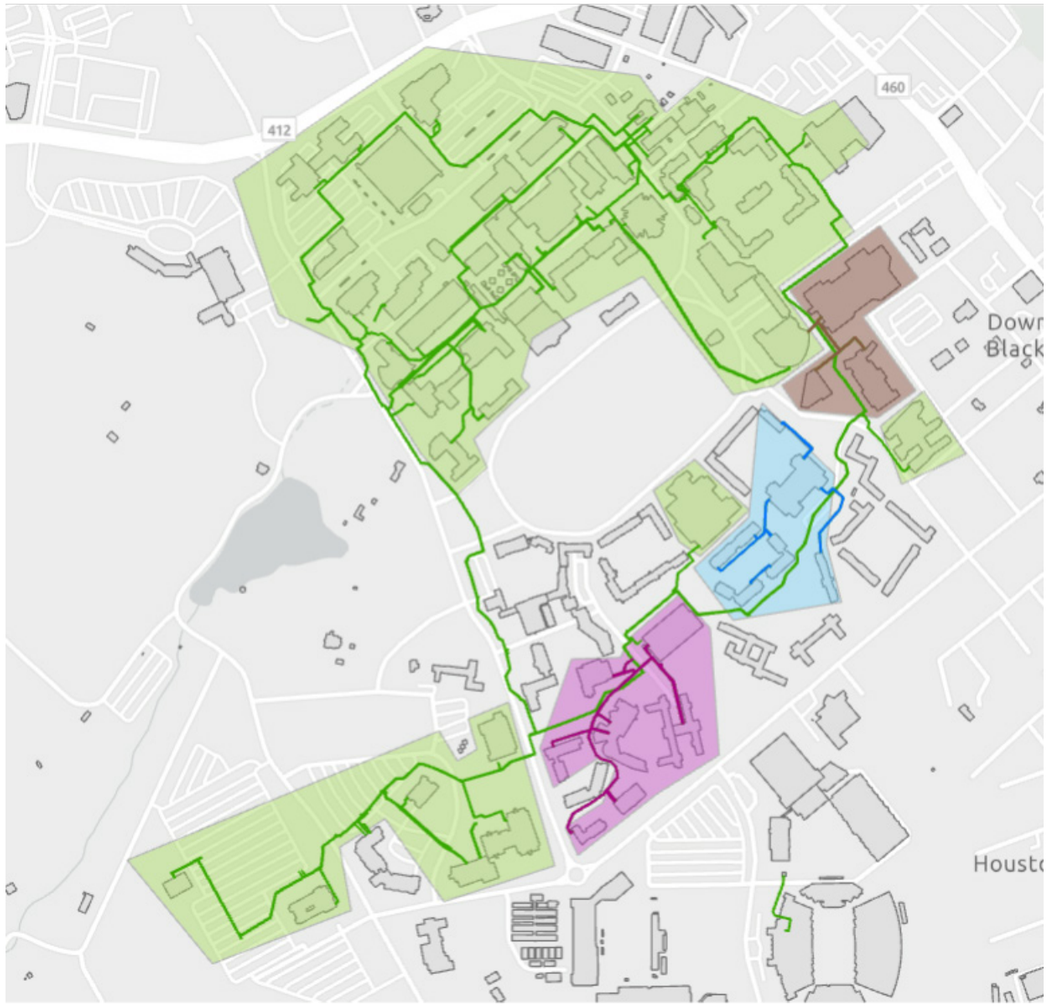


Solar arrays will produce the equivalent energy to power 215 average residential homes annually



Chilled Water System

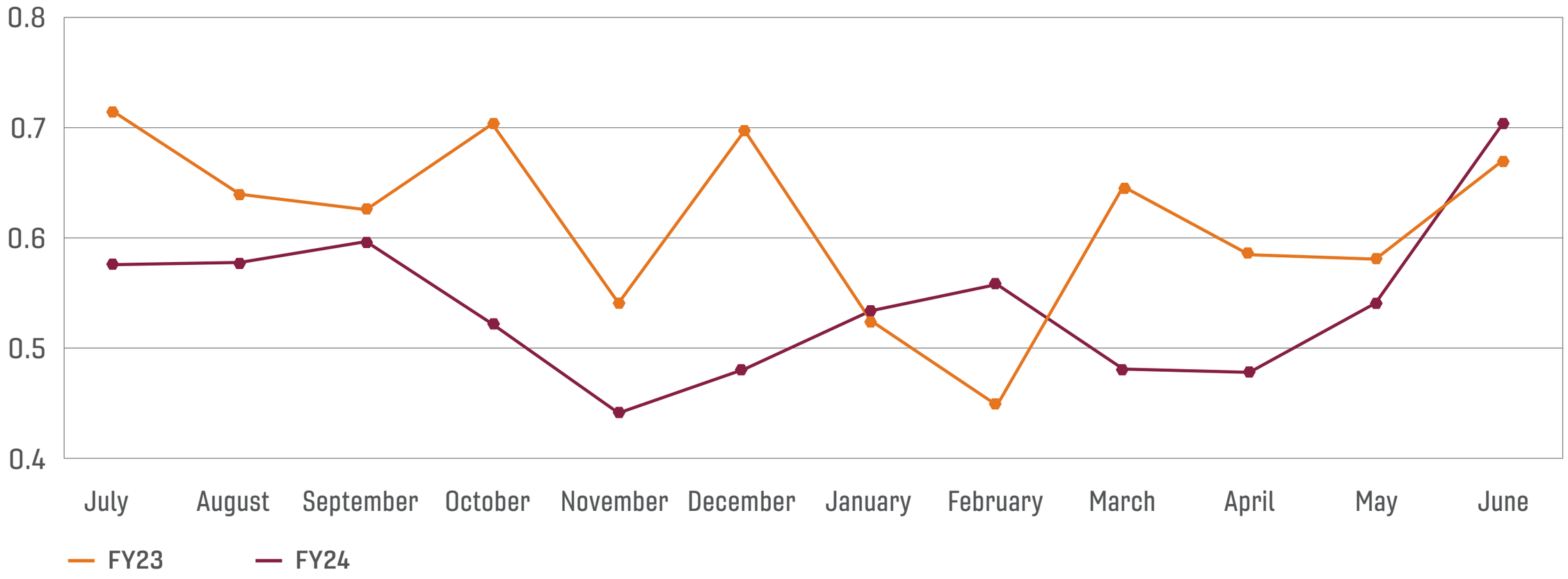
- Two central chiller plants
- 16,500 tons total cooling capacity
- Operate with 3,000 tons reserve
- 13.5 miles of chilled water piping
- Three small district chiller plants
- 52 distributed chillers across campus



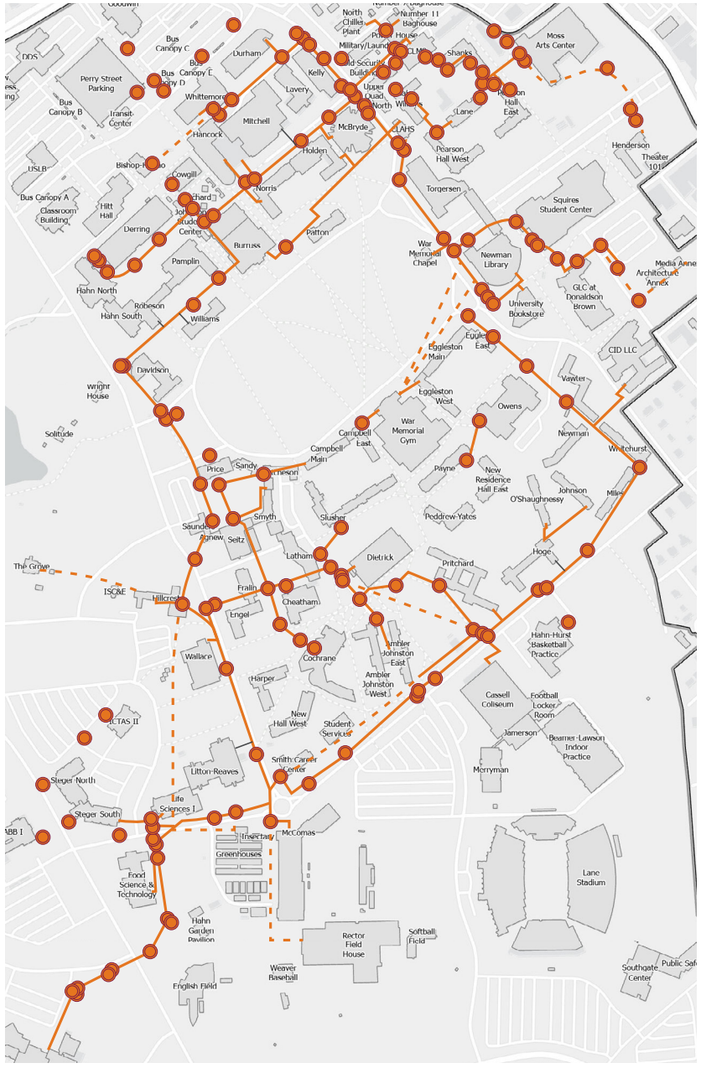
Chiller Plant Efficiency

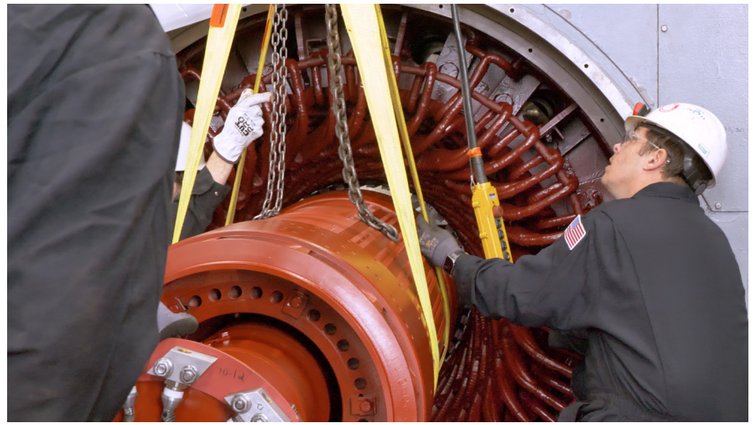
12% efficiency gains year-over-year

~$150k annual savings



CoGen Power Plant





- Total 330,000 lbs/hr capacity
- Four natual gas boilers
- Two coal boilers last operated in 2020 (to be decommissioned)
- 200,000 lbs/hr avg. winter hourly steam load
- 75,000 lbs/hr avg. summer hourly steam load
- 6.25 MW turbine generator

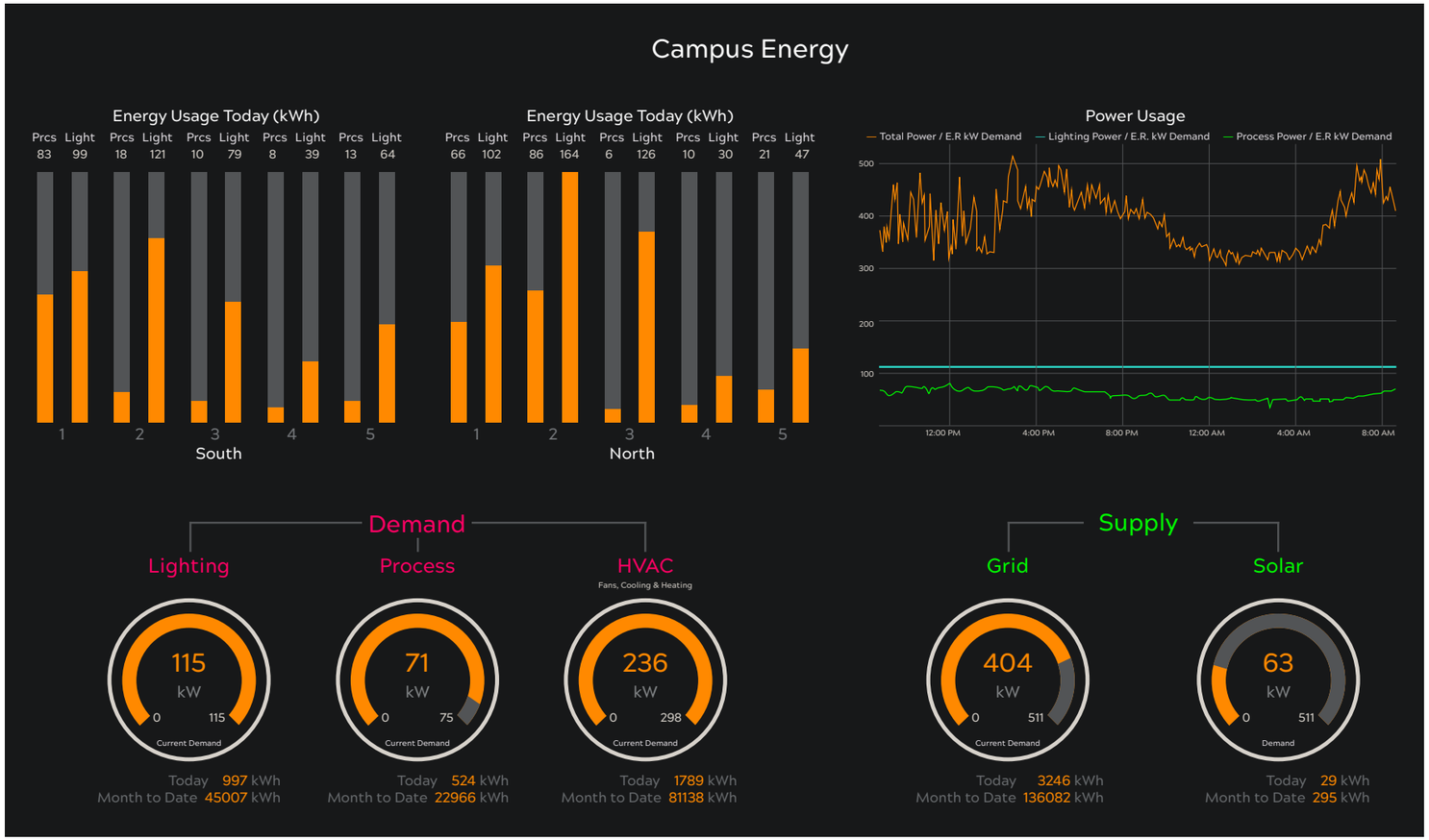
Mechanical Utilities

Over 100 miles of distributed infrastructure

- 16 miles of steam tunnels
- 7 miles of domestic water
- 13 miles of chilled water
- 40 miles of stormwater sewers
- 39 miles of potable water
- 30 miles of sanitary sewer

Office of Energy Management

Demand Side Management



Data Driven Energy Management

- LED lighting conversions
- Building retro-commissioning
- Building automation systems (BAS)
- Laboratory ventilation optimizations
- Occupancy-based HVAC controls
- Building optimizations
- Campus optimizations
- Energy Savings Performance Contracting (ESPC)

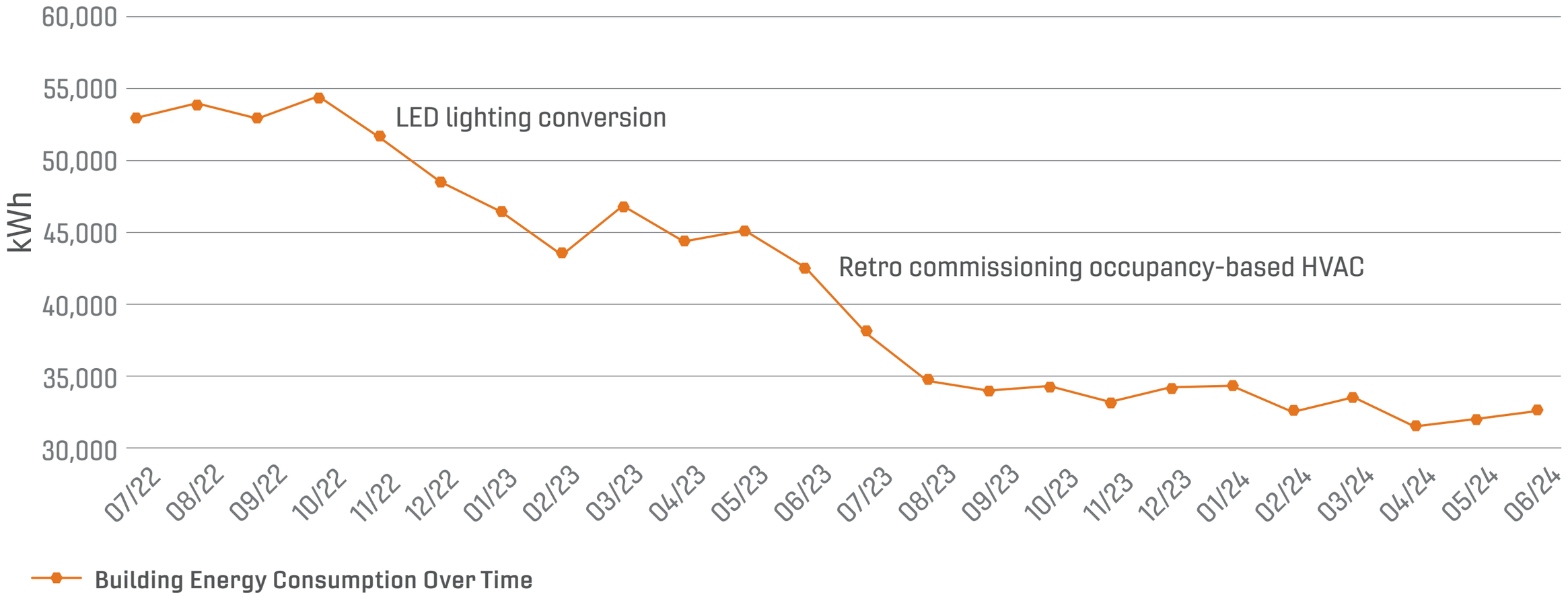
Building Efficiencies

VIRGINIA TECH

35% efficiency gains

~$45k annual savings

Williams Hall Energy Consumption

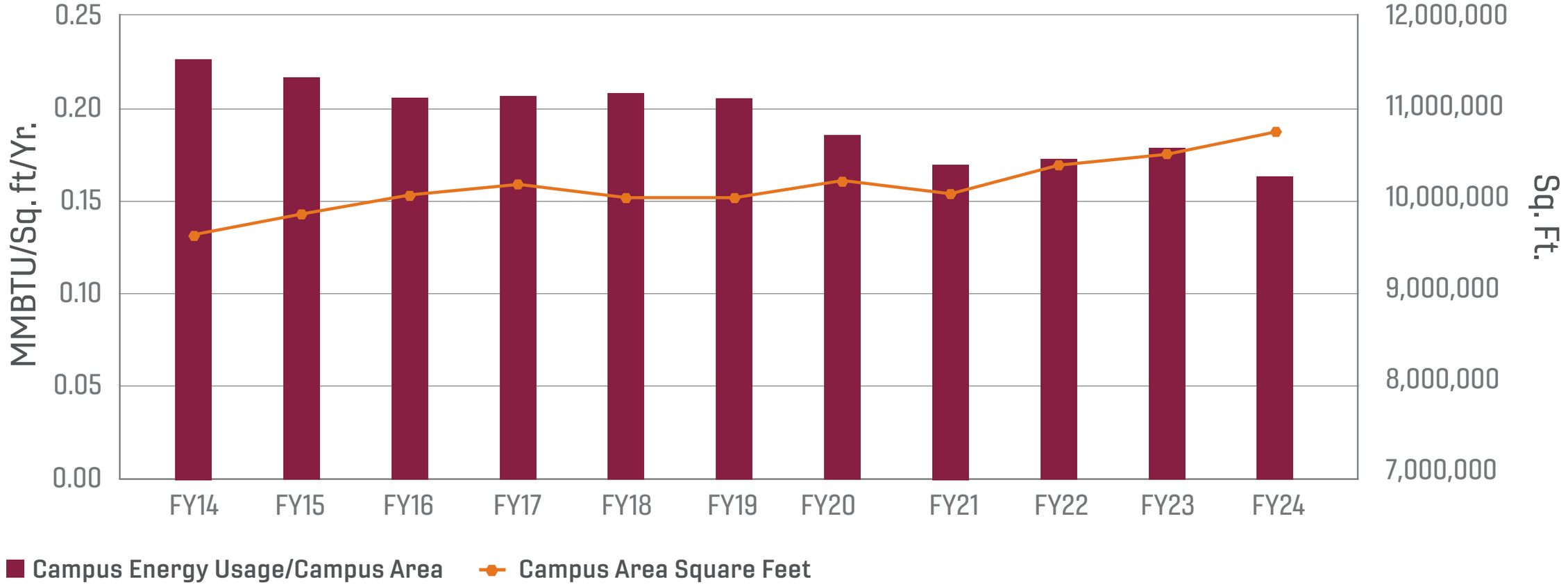


Campus Energy Usage Intensity (EUI)

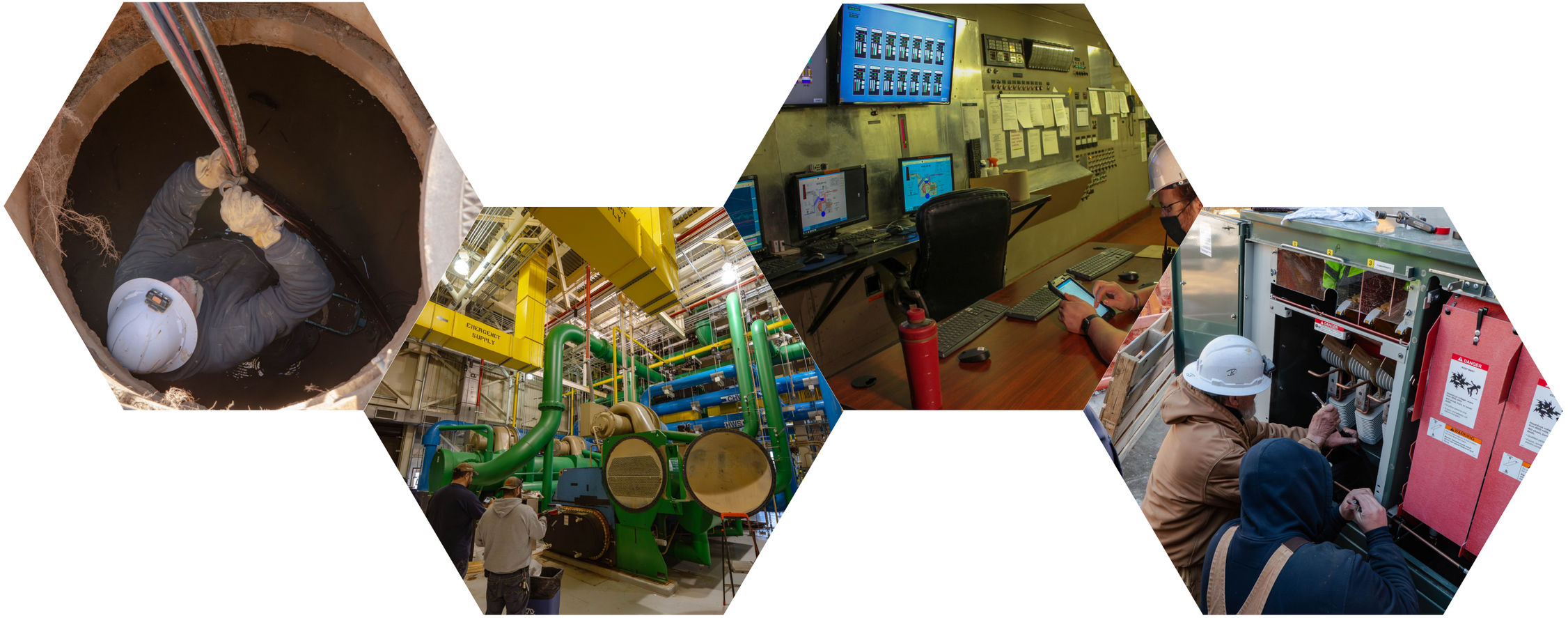
More Energy Efficient

Energy consumption per square foot improves even as campus grows by 1 million square feet

Campus Energy Consumption and Campus Area



Delivering Reliable Service



Safety | Reliability | Asset Management | Energy Conservation | Energy Efficiency

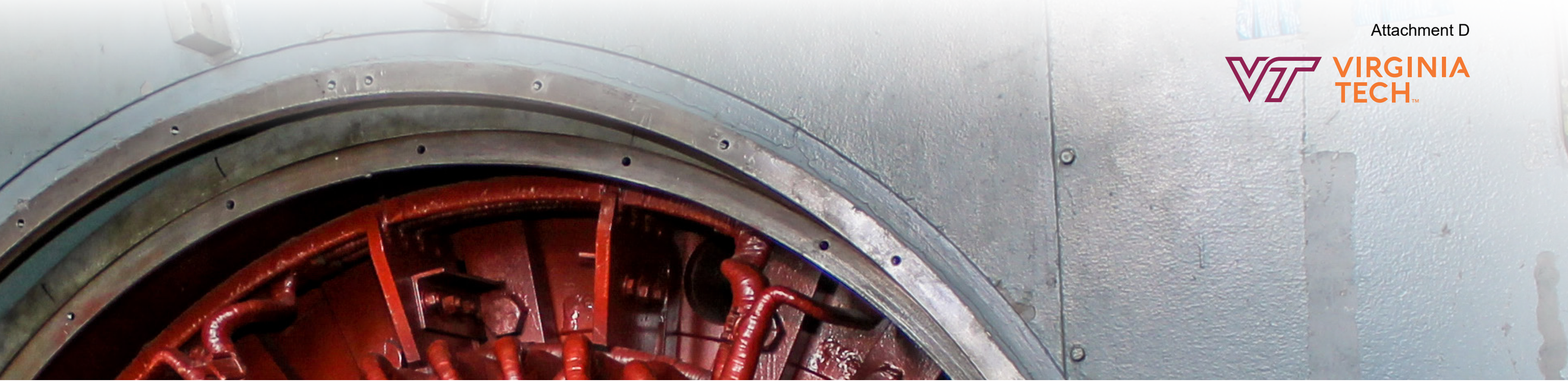
2020 Climate Action Commitment Implementation Milestone

Five year review and renew due in 2025

DISCUSSION

Attachment D

VIRGINIA TECH



UTILITIES MASTER PLAN

MATT STOLTE | University Engineer

November 2024

Utilities Master Planning Process

Levels of service

- Performance
- Sustainability
- Resilience

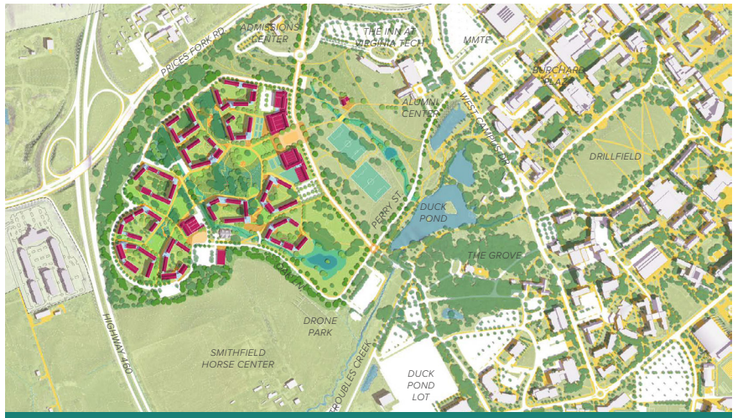
Systems

- Condition
- Capacity

Planning horizons

- 2024
- 6 year capital outlay plan
- 2047

2024 – Existing campus



6 Year capital outlay plan

2047 – Vision

Major Utility Services

COMPREHENSIVE NETWORK OF UTILITIES

Heating and Cooling	Water, Sewer, and Storm	Electricity	Telecommunication
▸ Heating 175,000 MBH ▸ 16,500 tons central plant capacity ▸ 30 miles of distribution pipes	▸ Potable water 1.0 MGD ▸ Domestic hot water 0.5 MGD ▸ Sewer collection 1.2 MGD ▸ Storm water facilities ▸ 100 miles of distribution pipes	▸ Distribute 30 MegaWatts (on campus) ▸ Generate 6.25 MegaWatts ▸ 96 miles of distribution lines (on campus)	▸ Telecom 35 Gb/sec ▸ Core ring 400 Gigabit links ▸ Distribution 10/40 Gigabit links ▸ 50 miles of distribution lines

Four Phases of the Utility Master Plan

Phase 1: Field Investigations

- Completed Summer 2023

Phase 2: Existing Conditions Assessment

- Completed Winter 2023

Phase 3: Capacity Analysis and Projections

- Completed Spring 2024

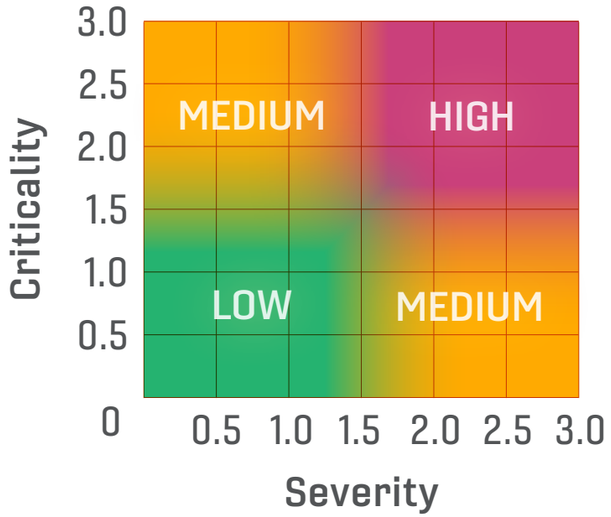
Phase 4: Utility Master Plan and Programming

- 85% Complete

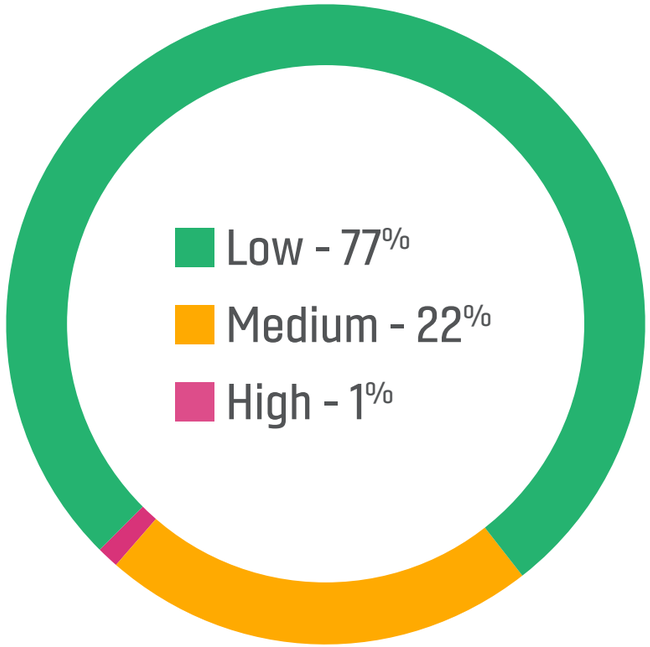
Condition Assessment of Existing Infrastructure

RISK, PRIORITY, AND SYSTEMS

Criticality vs. Severity



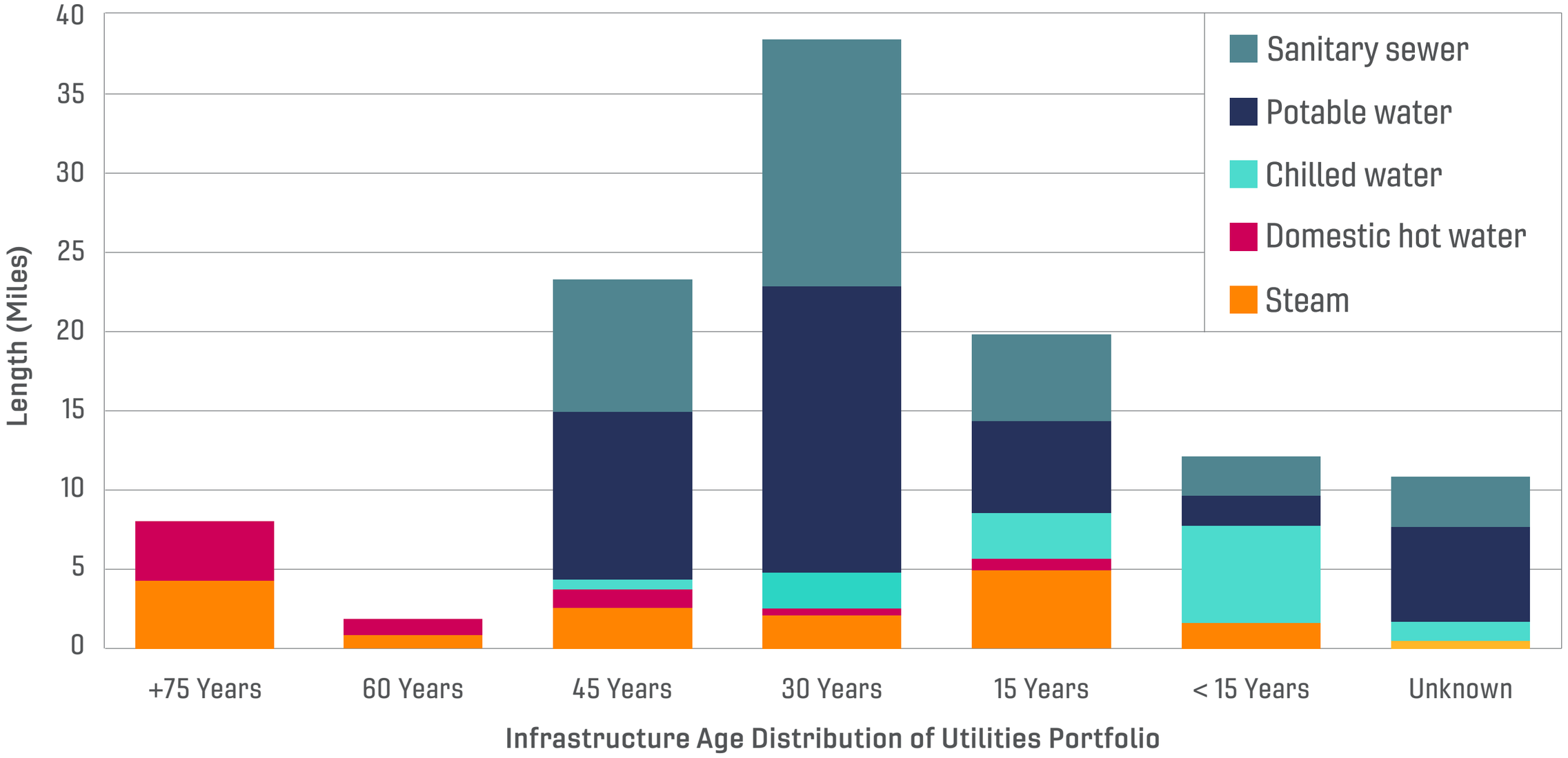
Utility System Condition Ranking



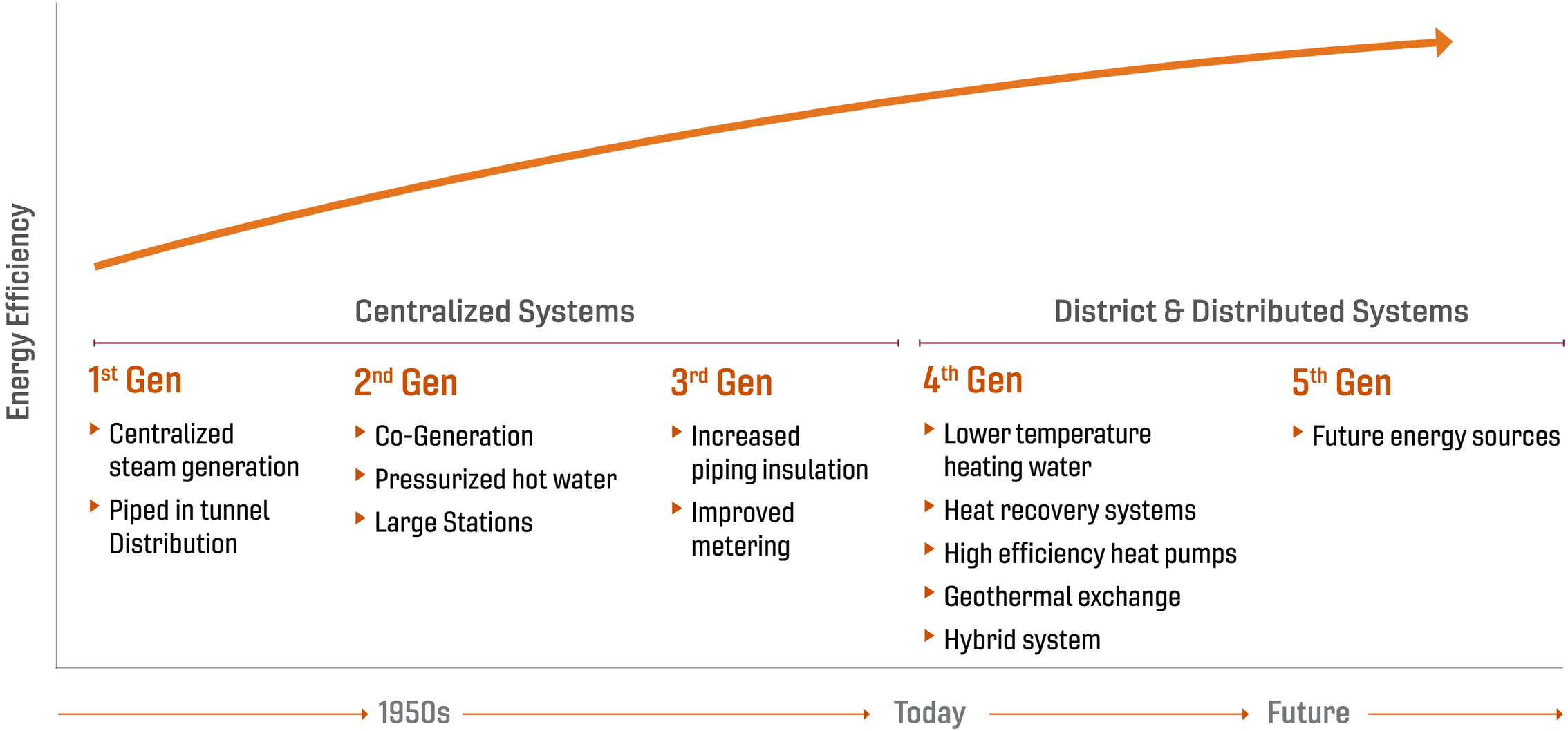
Renewal Strategy

- Steam distribution
- Hot water distribution
- Chilled water

Infrastructure Age and Condition

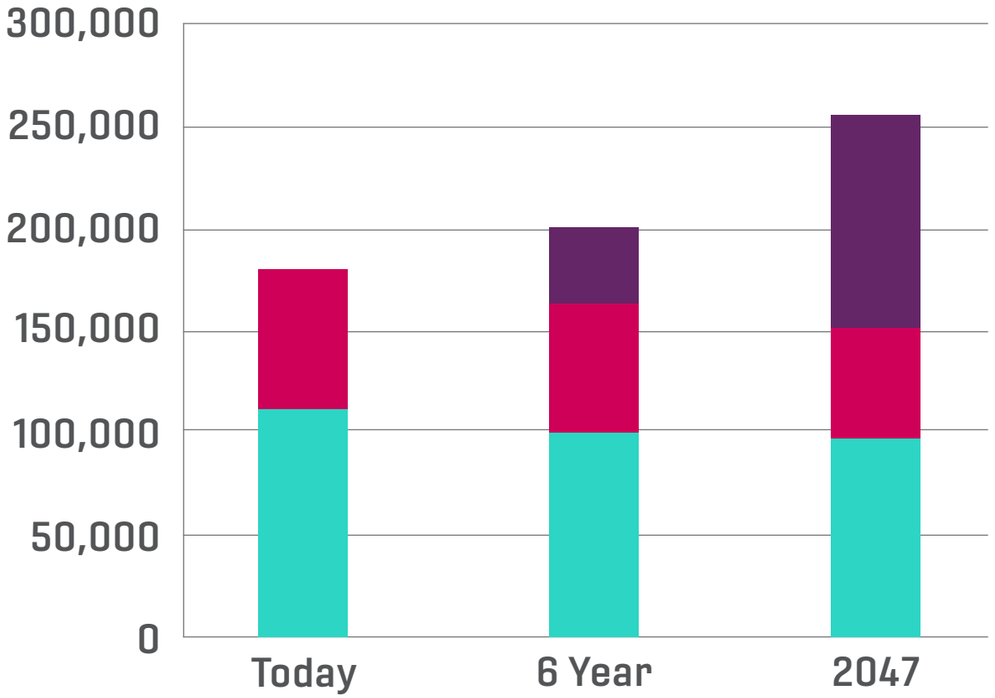


NextGen Heating Technologies

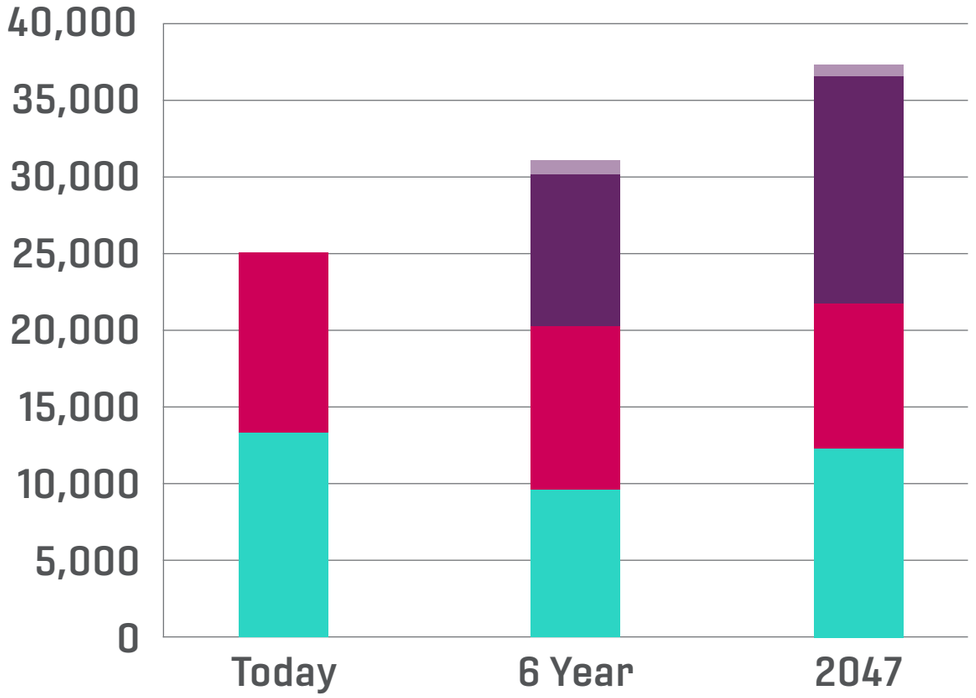


Transition Toward NextGen Technology

Heating Demand MBH



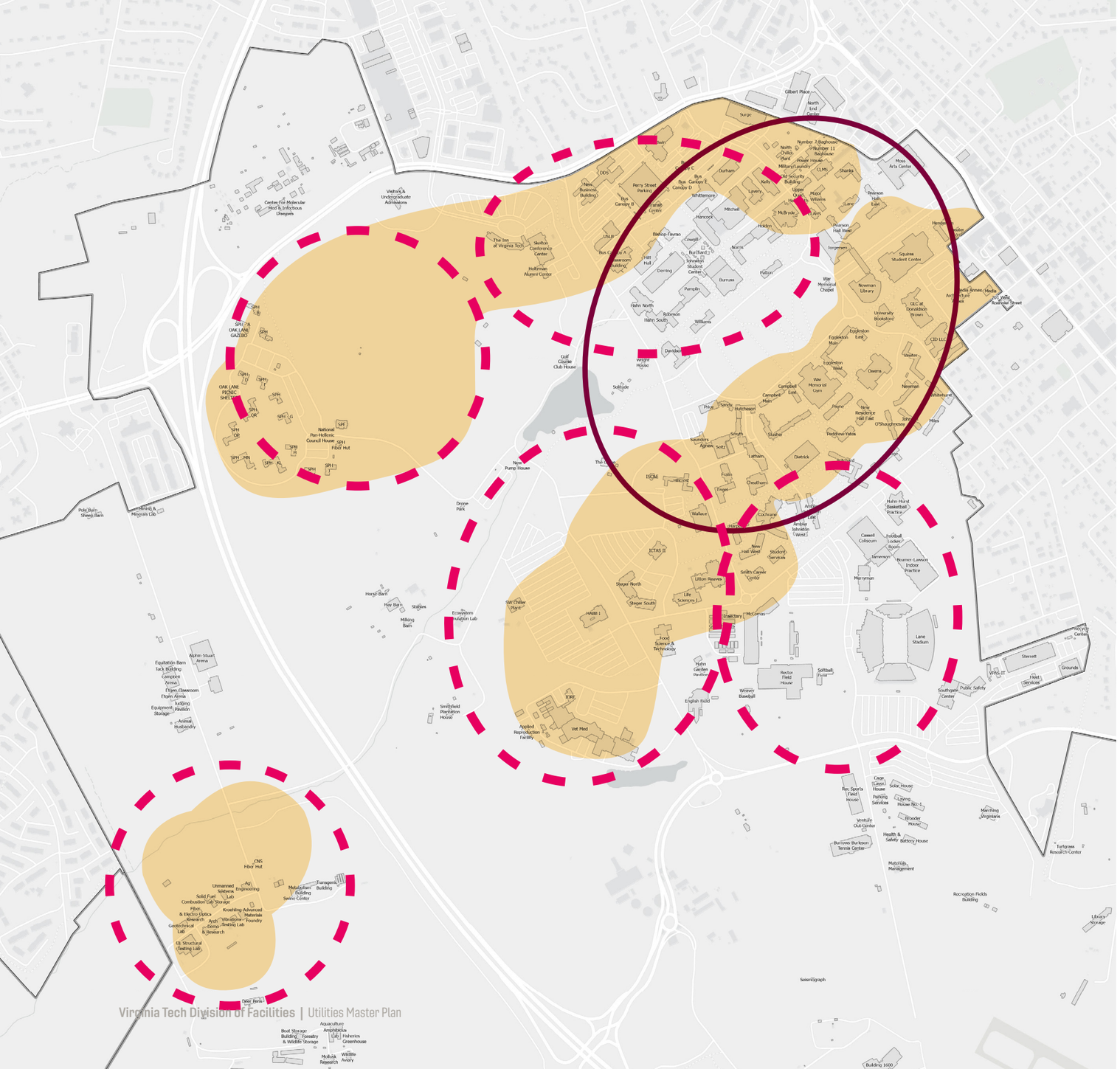
Cooling Demand Tons



Central plant Stand-alone NextGen Unconditioned

VIRGINIA TECH™

UMP Strategic Outlook



Central utility services

2047 vision

NextGen utility services

VIRGINIA TECH™

DISCUSSION

VIRGINIA TECH™

SUPPLEMENT

Goals and Objectives of the UMP

1. Stakeholder collaboration
2. Focus on asset management
3. Reduce risks in levels of service
4. Align with existing programs
5. Create a programmatic process

Schedule

Phases	2023												2024												2025		
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4			Q1		
Phase 1 Kickoff and Data Gathering	1																										
Phase 2 Existing Conditions					2	2			4																		
Phase 3 Analysis & Future State Projections					3						5		6		7												
Phase 4 Utilities Master Planning Process																	8		9		10		11		12		

1 Project kickoff meetings
2 Existing conditions workshops
3 2047 Campus Plan and CAC workshop
4 30% review meeting
5 CAC: Decarbonization
6 CAC: Air emissions
7 CAC: Measures of success
8 Project development workshops
9 Concept vetting workshop
10 90% review workshop
11 100% draft review meeting
12 100% plan presentation

Attachment D

Resolution for a Capital Planning Project for the Virginia Tech Rescue Squad Facility

ROB MANN
Assistant Vice President for Capital Budgeting and Financing

NOVEMBER 19, 2024

VIRGINIA TECH™

Resolution for a Capital Planning Project for the Virginia Tech Rescue Squad Facility

- The 2024-2030 Six-Year Capital Plan and University Debt Report include a capital project to construct a new Rescue Squad Facility
- The existing facility is under-sized, in poor condition and does not meet current and future needs

Virginia Tech Rescue Squad Conceptual Rendering (from Feasibility Study)

Resolution for a Capital Planning Project for the Virginia Tech Rescue Squad Facility

- Scope: envisioned as an approximately 12,500 GSF total project
- Target total project budget: $16 million
- Location: off Oak Lane
- Funding Plan: 100 percent non-general funds including auxiliary cash reserves earmarked for this project and debt serviced by the rescue squad component of the Student Health fee
- **Request: a $2 million planning authorization to complete designs through working drawings for the Viriginia Tech Rescue Squad facility**

New Virginia Tech Rescue Squad Facility to be located off Oak Lane

Resolution for a Capital Planning Project for the Virginia Tech Rescue Squad Facility

NOW, THEREFORE, BE IT RESOLVED, that the university be authorized to move forward with a $2 million planning authorization to complete designs through working drawings for the Virginia Tech Rescue Squad Facility.

Recommendation

That the resolution authorizing Virginia Tech to plan the Rescue Squad Facility project be approved.

NOVEMBER 19, 2024