

Greenhouse Gas (GHG) Subcommittee

SEAN MCGINNIS, JOHN RANDOLPH, KRAY LUXBACHER,
ROB LOWE, LOWELL JESSEE, MARY-ANN IBEZIAKO,
CONOR DOANE, DREW HARRIS, VALENTINA D'ATRI,
DANIEL WEBB, OWEN CALLAHAN, ALEX DE JONG,
NATALIE KOPPIER, JACK LEFF, ALLIE KAHL

CLIMATE ACTION COMMITMENT UPDATE
PROCESS – SPRING 2020



VIRGINIA TECH™

GHG Subcommittee:

- 9 Students
- 3 Faculty
- 3 Staff

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Sean McGinnis, Faculty, Materials Science and Engineering (MSE)

John Randolph, Faculty, Chair - VT 2020 CAC Working Group

Kray Luxbacher, Faculty, Mining and Minerals Engineering (MINE)

Mary-Ann Ibeziako, Staff - Facilities, Associate Vice President for Utilities

Lowell Jesse, Staff - Facilities, Energy Engineer

Rob Lowe, Staff – Environmental Health and Safety, Senior Environmental Engineer

Allie Kahl, Graduate Student, Urban Affairs and Planning (UAP)

Jack Leff, Graduate Student, Science and Technology Studies (STS)

Valentina D'Atri, Undergraduate Student, Environmental Engineering (CEE)

Owen Callahan, Undergraduate Student, Psychology (PSYC) and Statistics (STAT)

Alex de Jong, Undergraduate Student, Materials Science and Engineering (MSE)

Conor Doane, Undergraduate Student, Civil and Environmental Engineering (CEE)

Drew Harris, Undergraduate Student, Mechanical Engineering (ME)

Natalie Koppier, Undergraduate Student, Environmental Policy and Planning (EPP)

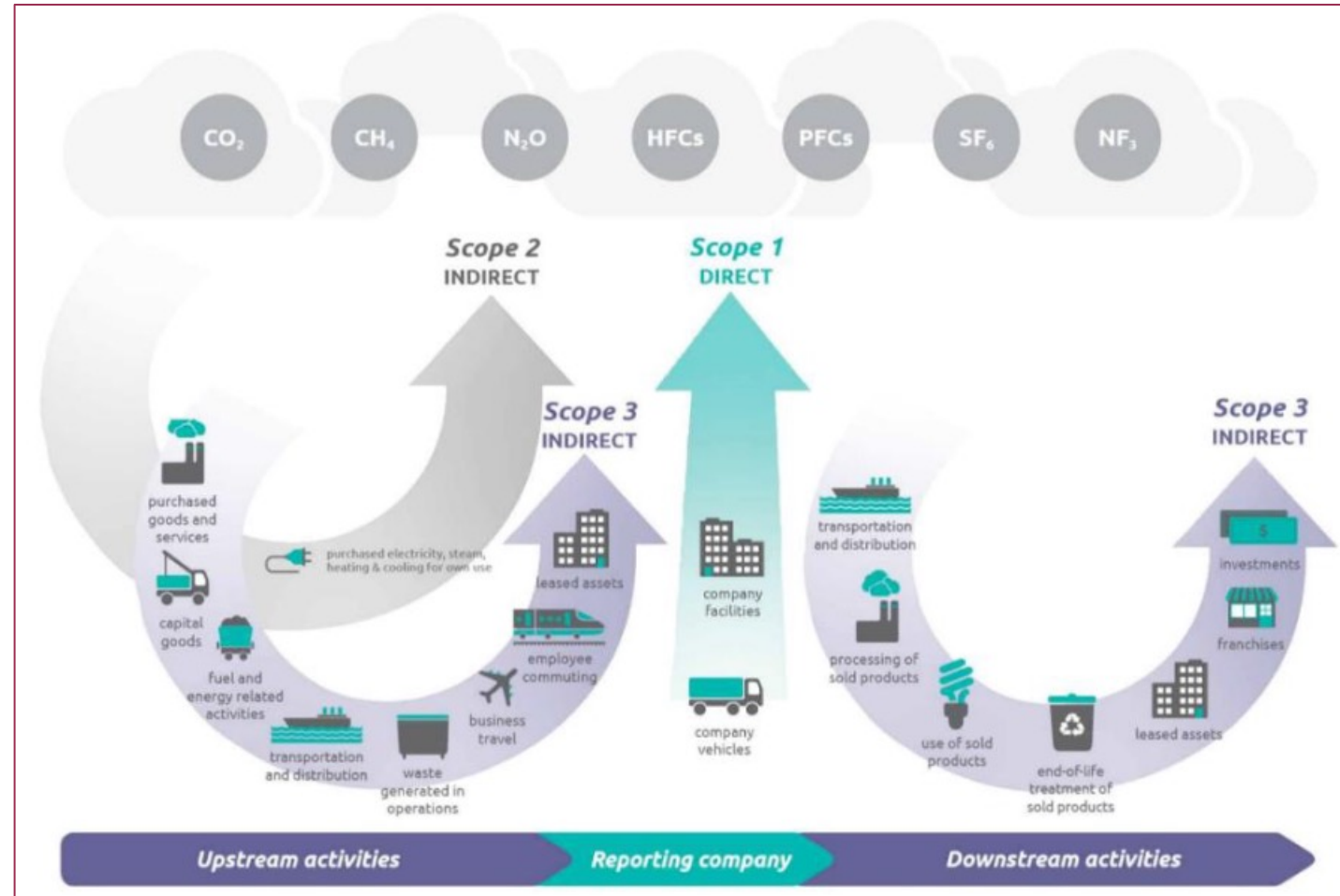
Daniel Webb, Undergraduate Student, Electrical & Computer Engineering (ECE)

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Purpose:

- Review historical VT GHG assessment scope, methodology, emissions and progress toward 2013 CAC Goals
- Benchmark peer institutions' GHG scope, methodology, goals, and progress
- Develop enhanced scope and protocols for future GHG emissions assessments
- Develop new estimates of current VT GHG emissions considering a broader scope that more accurately captures campus emissions
- Support other subcommittees by providing estimates of GHG reductions for potential recommendations and actions

Schematic of GHG Assessment Scope and Activities

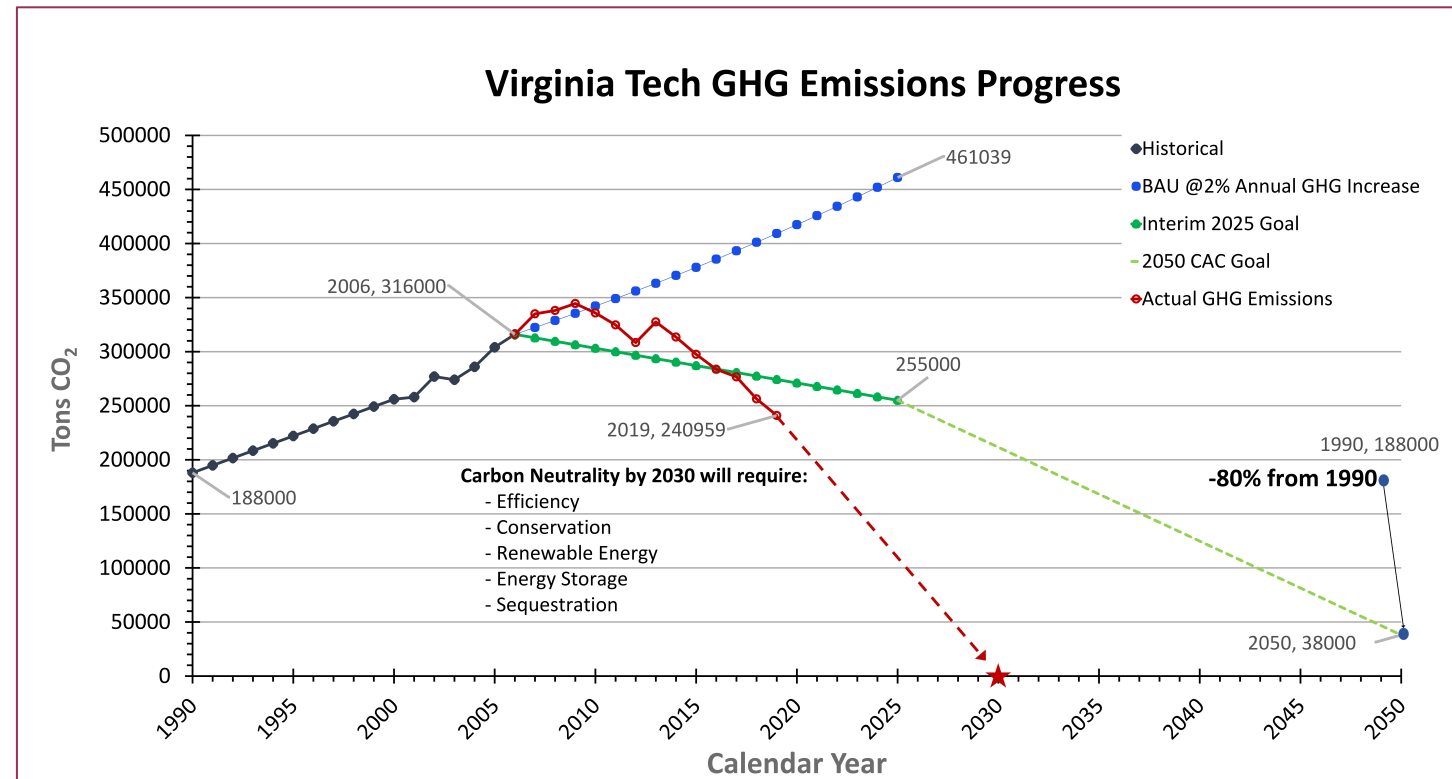


Source: https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf

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GHG HISTORICAL ANALYSIS

- VT GHG Assessments have been done since 2006. In recent years, these assessments have been completed by VT Facilities using an internal spreadsheet for data analysis and graphs
- VT GHG Emissions have been reduced 24% since 2006 while campus has grown by 20%.
- More than 95% of the emissions reduction is due to changes in the utility and VT Steam Plant fuel mix and reduced energy demand (efficiency/conservation).
- This analysis has only included carbon dioxide (CO₂) emissions, and not other greenhouse gases like methane (CH₄) and nitrous oxide (N₂O)
- This analysis primarily includes main VT campus buildings, but has not accounted for many VT-occupied spaces on and near campus.

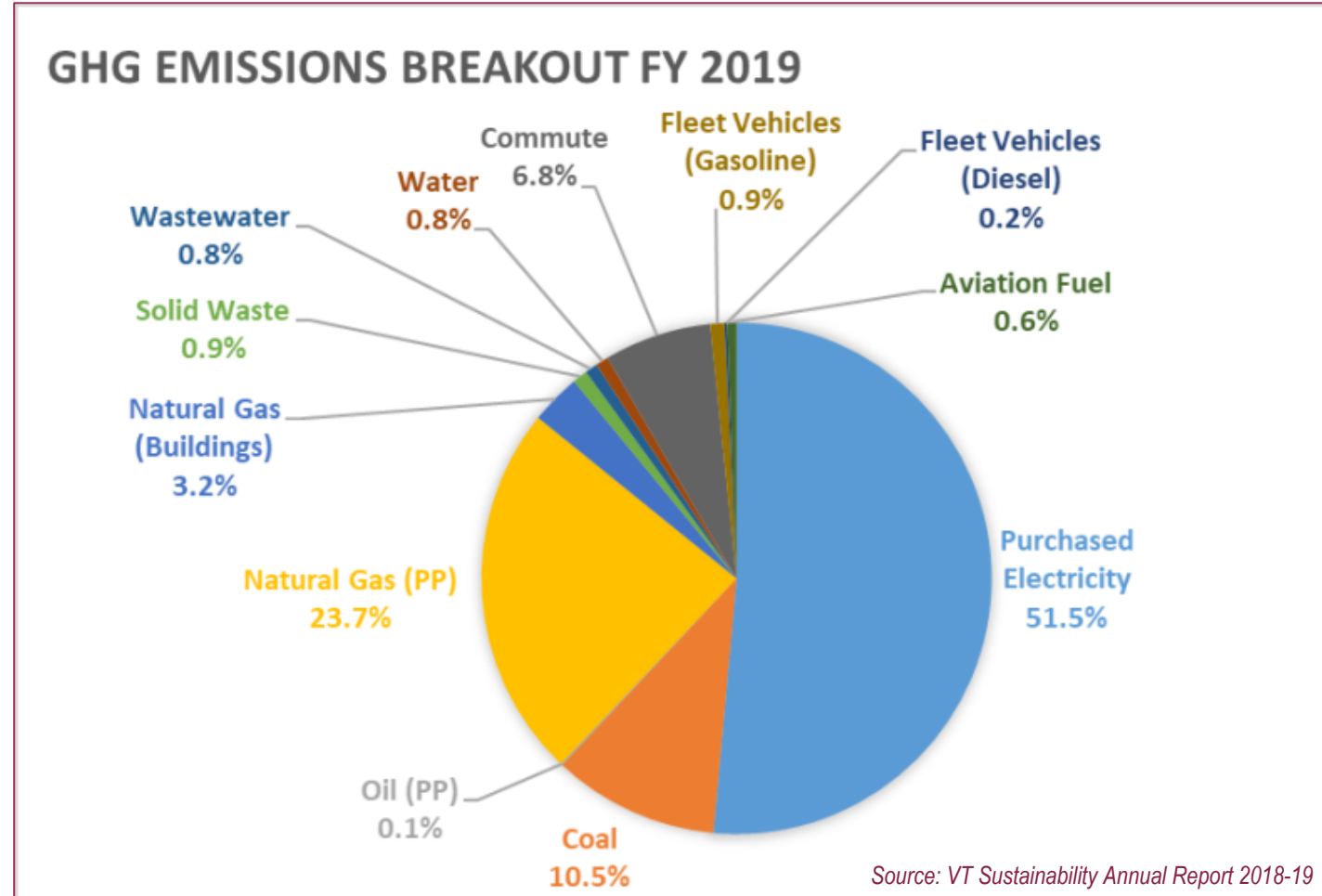


- **A consistent method and thorough data set are required to determine the baseline carbon footprint that VT must offset to truly claim carbon neutrality in the future.**

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GHG HISTORICAL ANALYSIS

- The fiscal year (FY) 2019 data shows that more than half of the GHG emissions come from purchased electricity.
- One-third of the GHG emissions are due to fuels used in the VT steam plant for electricity and steam generation. This number is higher if you include natural gas upstream leakage.
- Students, faculty, and staff have few options to directly reduce campus operations, but they can make personal commuting and transportation choices that contribute up to 7% of GHG emissions. These options will become more important as we transition to renewable energy sources.

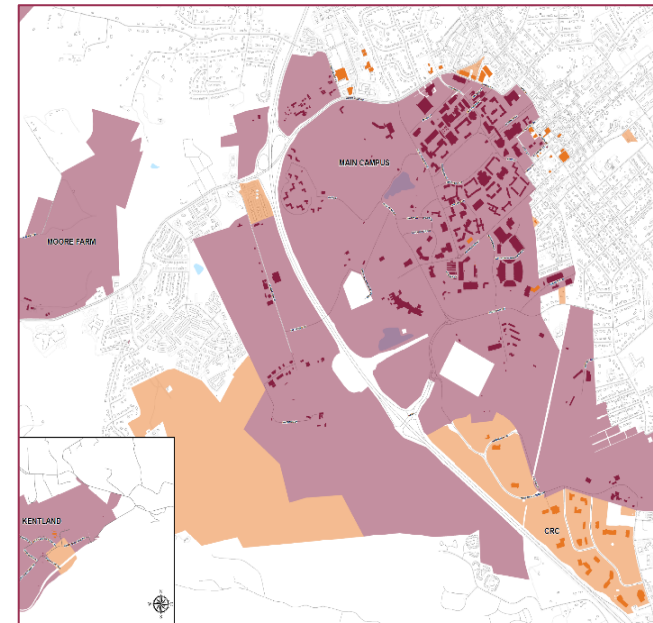


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VT SCOPE BOUNDARIES (GEOGRAPHICAL)

- Previous GHG assessments included mainly campus buildings shown in purple on the map
- Some off-campus facilities will continue to be out-of-scope in the short term, but decision-makers in these spaces will be encouraged and assisted in the use the new protocols to complete the assessments themselves.
- Additional leased spaces representing at least 1.4 million square feet and shown in the map in orange will be added for future assessments. This includes well-know spaces such as:
 - *The Corporate Research Center (CRC), The Math Emporium, The North End Center, The Virginia Tech Transportation Institute (VTTI)*

Scope Boundaries	Old VT Scope	New VT Scope
Main Campus	In	In
Athletic Facilities	In	In
University Airport	In	In
Agricultural Facilities	In	In
VT Foundry	In	In
VT Architectural Research Building	In	In
International Campus Sites	Out	Out
Virginia Tech Carilion School of Medicine	Out	Out
VT Leased and Foundation Properties/Buildings	Out	Some In
Fralin Biomedical Research Institute at VTC	Out	Out
Virginia Tech Roanoke Center	Out	Out
Virginia Tech Foundation	Out	Out
Hotel Roanoke and Conference Center	Out	Out
Agricultural Research Extension Centers (ARECS)	Out	Out



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VT SCOPE BOUNDARIES (ACTIVITIES)

- Missing from the VT GHG assessment, and included by some of our peer institutions, are Business Air Travel, Dining Hall Food, Agriculture and Forest Operations, and Utility electricity transmission/distribution losses.
- Not included in any of the peer institution GHG reports is upstream leakage of methane from natural gas extraction, processing, and distribution. This GHG gas has a global warming potential 25 – 30 times more efficient than CO₂.
- The table shows the preliminary recommendations for new scope items to be added to the VT GHG assessment for the future.

Scope Items	Scope Type	Old VT Scope	New VT Scope
Coal (steam plant)	1	In	In
Oil (steam plant)	1	In	In
Natural Gas (steam plant)	1	In	In
Natural Gas (Buildings)	1	In	In
Fleet Vehicles (Gasoline and Diesel)	1	In	In
Maintenance/Landscape Vehicles	1	??	TBD
Aviation Fuel (university planes)	1	In	In
Diesel for Generators	1	Out	Out
Refrigerant Management	1	Out	Out
Purchased Electricity	2	In	In
Purchased Electricity T&D losses	3	Out	In
Upstream Natural Gas Drilling/Distribution	3	Out	Likely
Solid Waste	3	In	In
Wastewater	3	In	In
Water	3	In	In
Faculty/Staff/Student Commute	3	In	In
University Bus System	3	Out	In
Faculty/Staff Business Travel (airlines)	3	Out	Likely
Dining Hall Food	3	Out	TBD
Compost/Landfill/Recycling	3	Out	In
Campus Consumables (Paper)	3	Out	Out
Agricultural Operations (fuel and livestock)	3	Out	In
Agricultural Fertilizers	3	Out	In
Agriculture/Forest Land Use	3	Out	In

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GHG NEW SCOPE PRELIMINARY ESTIMATES:

- Estimates of additional GHG emissions which in the past were out-of-scope are more than 40%.
- Dining and Food Service data is available, there is so much data that it is very difficult to handle for food GHG estimates. This work will continue over the summer and next fall.
- Business Airline data is a different problem, with data in several different locations, some accessible by database and other data not easily obtained. Work to get information that might be used will also continue over the summer and next fall.
- It is unrealistic and counter-productive to try to get all GHG data for assessments due to time and data access. A cut-off value, in the range of several percent, will be recommended below which the data will not be collected and assessed.

2019 FY GHG Emissions:	248,851	tCO2e
	GHG Emissions (tCO2e)	
	2019	2020 (%)
Scope Additions:		
BT Bus System (diesel)	2,918	1.2%
BT Bus System (gasoline)	187	0.1%
On-campus Food		
VT Occupied Spaces	28,337	11.4%
Agricultural Operations	11,049	4.4%
Business Travel (flights)		
AEP New Emissions Rate	16,761	6.7%
Upstream Electricity T&D losses	7,263	2.9%
Upstream Methane Leakage	36,450	14.6%
Campus Expansion (bldgs)	-	
Total GHG emissions	102,965	
% Increase	41.4%	

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GHG RECOMMENDATIONS

- **Develop actionable plans to transition VT to a Carbon-Neutral campus by 2030**
 - Carbon-neutral means zero net emissions of CO₂, CH₄, and N₂O through reductions, renewable energy credits (RECs) and carbon offsets.
- **Add the following scope elements, as data allows, for future GHG assessments**
 1. *Methane and nitrous oxide emissions*
 2. *VT-occupied spaces leased from the VT Foundation*
 3. *Blacksburg (BT) Transit*
 4. *Dining Hall Food*
 5. *Agricultural/Forest Operations and Land Use*
 6. *Business Airline Travel*
 7. *Utility transmission and distribution losses*
 8. *Upstream natural gas leakage*
- **Purchase a formal GHG assessment software platform to replace the VT-internal analysis spreadsheet**

CLIMATE ACTION COMMITMENT UPDATE

Thank you for your attention. We invite you to engage. Please visit the CAC website to:

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

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