ANSWERING THE CALL:

Virginia Tech Climate Action Living Laboratory Framework

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Honors Service Learning: Sustainability Living Laboratory

UH 3204

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INTRODUCTION AND PURPOSE

The past twenty years have proven to be a pivotal time for sustainable practices and policy as climate change continues to worsen. Climate change is “long-term shifts in temperatures and weather patterns” (United Nations, n.d.) that consequently impacts our livelihoods, including but not limited to health and wellbeing, the agricultural sector, and housing. Moreover, according to the Intergovernmental Panel on Climate Change (IPCC), “human activities, principally through emissions of greenhouse gases [*sic*] , have unequivocally caused global warming” (The Intergovernmental Panel on Climate Change n.d.).

Universities have unique opportunities and resources to address climate change with a “distinct freedom of action and influence”, which allows them to practice campus sustainability and foster social change within and beyond the campus (Washington-Ottombre et al., 2018, p. 565). Universities also have unique motivations for addressing climate change, including the ability to “stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities” (Breen, 2010, p. 686). One way that universities have attempted to address climate change is through living laboratories, which “couple academic rigor with applied learning on sustainability-related campus infrastructure projects” (Cohen & Lovell, 2013, p. 7). Virginia Tech is developing a Climate Action Living Laboratory (CALL), as outlined in goal 10 of the Virginia Tech Climate Action Commitment (VT CAC) “... to enhance offerings and build bridges between facilities and academic departments, facilitating and supporting opportunities” (VT CAC, 2020). Goal 10 emphasizes the opportunity for experiential learning and research while also addressing the climate crisis on our campus.

Dedication to service, ingenuity, and a transdisciplinary approach are all essential for meeting the challenge of climate change (Filho et al., 2017, p. 302). Universities have the position and the responsibility to be leaders of social change, especially land-grant institutions like Virginia Tech. These institutions have a mission to be of the people and for the people: affordable for the general population, providing education in relevant fields like agriculture, and dedicating resources to conducting research relevant to the pressing needs and interests of society.

While their establishment took place a century and a half ago, land-grant universities continue to receive federal support and bear a responsibility to provide quality education and research for the improvement of life in their immediate communities and beyond (Dooley, 2012-13). Universities educate and develop the changemakers of tomorrow, and they have a greater ability for experimentation and research than other organizations like governments and companies. Institutions of higher education, and the individuals within their communities, have historically embraced this role as leaders of social change. For example, higher education institutions were centers for individuals who opposed slavery and assembled to work against it. Later, these universities took a stance against Apartheid in South Africa through economic sanctions (Washington-Ottombre et al., 2018, p. 565). Universities provide both the floor for academic discourse and the resources to investigate new questions, creating a unique environment for both action and insight.

Virginia Tech incorporates the purpose and goals of the land-grant system into its own mission, asserting that through transdisciplinary education, innovative research, and a "collaborative environment…[Virginia Tech] can serve as a force for positive change around the commonwealth, the country, and the world" (Facts about Virginia Tech, 2023, para. 2). The pursuit of knowledge and impactful solutions holds a high priority, with Virginia Tech dedicating $650 million to research expenditures by most recent estimates (Research and Innovation, 2023). The university is committed to crossing disciplines and investigating relevant challenges to "provide a healthy, secure future for the nation and the world" (Research, 2023) (Executive Director, page 7, para. 5). The university has strong commitments to both research and teaching, and, as represented by their motto and in the land-grant mission, "Ut Prosim", service (Office for Strategic Affairs, 2022, para. 4).

The mission and values of Virginia Tech provide an environment in which the CALL can thrive. CALL projects depend on faculty and students (i.e., academic partners) working alongside staff (i.e., operational and administrative partners). The Office of Sustainability and the CALL team aim to engage faculty and students through adding climate and sustainability content to curriculum and research, specifically using the Virginia Tech campus and surrounding community as the context to work towards the 2020 VT CAC goals.

Beginning in fall 2023, the Honors College Service Learning course Sustainability Living Laboratory integrated Virginia Tech's student, staff, and faculty with hands-on engagement to develop a CALL framework, which will support future CALL projects and efforts. The course explores real world problems through unique experiential community-engaged service learning opportunities by working with and for staff mentors from the Climate Action, Sustainability, and Energy (CASE) team and Office of Sustainability. As students, we learned and developed deeper understandings of sustainability and climate change action—particularly on the VT campus and surrounding community—while simultaneously learning how to approach these problems in the real world and engaging in hands-on projects. The CALL provides opportunities for professional development by connecting us with mentors to guide us through our individual projects. The work in this course is complementary to that of the Office of Sustainability and CASE Team, who focus on expanding connections to the VT CAC through the curriculum. The course operates within Virginia Tech's academic programs, but it connects students with operational staff and the broader campus community. Through this course, we helped develop a CALL vision statement with and for the CASE Team:

The Virginia Tech Climate Action Living Laboratory (CALL) will integrate students and faculty with staff to achieve the goals of VT Climate Action Commitment through a collaborative framework. Through transformative research, teaching and learning, and service, the CALL will build a sustainable and equitable future for our campus and the surrounding community.

This Honors Service Learning CALL framework project includes multiple components and teams: Peer Benchmarking & Priority Alignment, Communications Plan, Showcase, Peer Benchmarking Extension, Project Menu & Staff Priorities, Faculty Toolkit, and Project Spotlights. Each team presents critical components for supporting VT's CALL, providing a foundation to meet VT CAC goals in the future. In this report, we provide a purpose, description of our approach, and outcomes for each project component. First, however, we begin with a general background on living laboratories, the history of the VT CAC, and the VT CALL to further ground our project components. Finally, we close our report with an overall conclusion on how our various components help build a CALL framework.

BACKGROUND

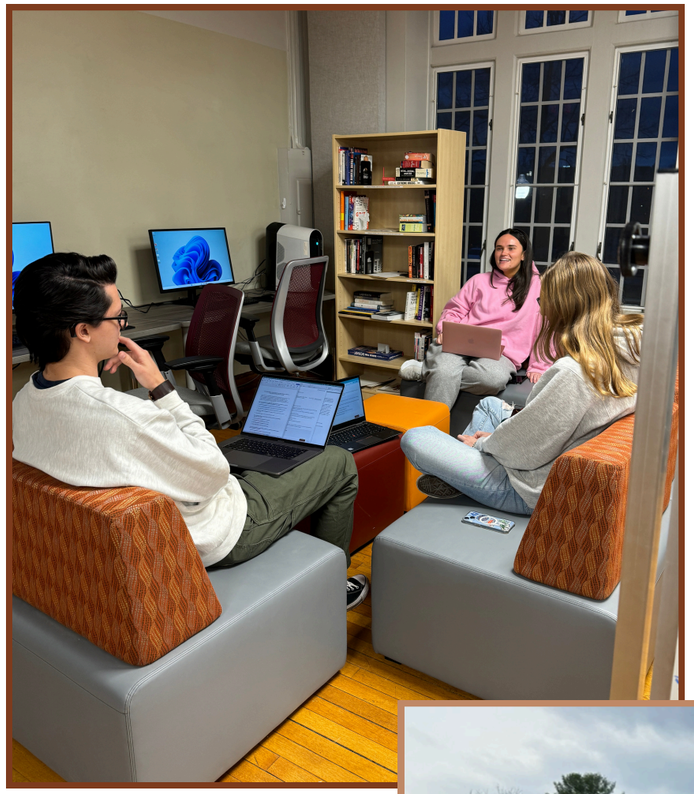
Higher education institutions that “[use] their campus buildings and grounds … for sustainability education” are “using the campus as a living laboratory” (Hansen, 2017, p. 225). Improved sustainable education can be a direct result of living laboratories, because they promote transdisciplinary collaboration between diverse disciplines within both academic and operational sectors of a university. As transdisciplinary fields, sustainability and climate action are “integrative, socially-relevant, and oriented around problem solving, while also drawing upon various disciplines” (Evans, 2015, p. 1). Such disciplines include both academic and non-academic stakeholders to provide a more holistic solution to these incredibly complex issues. Not only do living laboratories serve as a space for transdisciplinary collaboration and community engagement with various stakeholders, they are a type of service learning, combining community service and academic education (Hansen, 2017). Specifically, living laboratories provide efficient learning, a positive impact on the environment, and hands-on experiences (Cohen and Lovell, 2013). In this way, students can engage in substantive efforts to address complex issues like climate change and sustainability.

Virginia Tech Climate Action Commitment

Over the past decade, Virginia Tech has become a leader in seeking a sustainable future to mitigate the effects of climate change. A direct result of an ambitious “network of students, faculty, and staff from across operations, academics, and research, the university’s original Climate Action Commitment was endorsed by the Board of Visitors in 2009 and revised and reaffirmed in both 2014 and 2020” (In A Virtual Environment, 2020, para. 3). Following its approval, the “Virginia Tech Climate Action Commitment acts as the university's guiding framework around sustainability and energy efficiency in campus operations, facilities, curriculum, and research” (In a Virtual Environment, 2020, para. 3). Additionally, “President Tim Sands ensured the most stringent climate and sustainability standards are implemented as Virginia Tech continues to grow and seeks to be a leader in environmental stewardship when he called for the renewal and revision of the Climate Action Commitment” (In a Virtual Environment, 2020, para. 3). Examples of these sustainable efforts include: steam plant conversion, LEED-certified buildings, sustainable efforts in recycling and waste management, and the creation of the Office of Sustainability. Student engagement opportunities are key to these efforts, including activities such as the Green RFP program and the Internship Program through the Office of Sustainability (Decade of Virginia Tech Sustainability Achievements, n.d.).

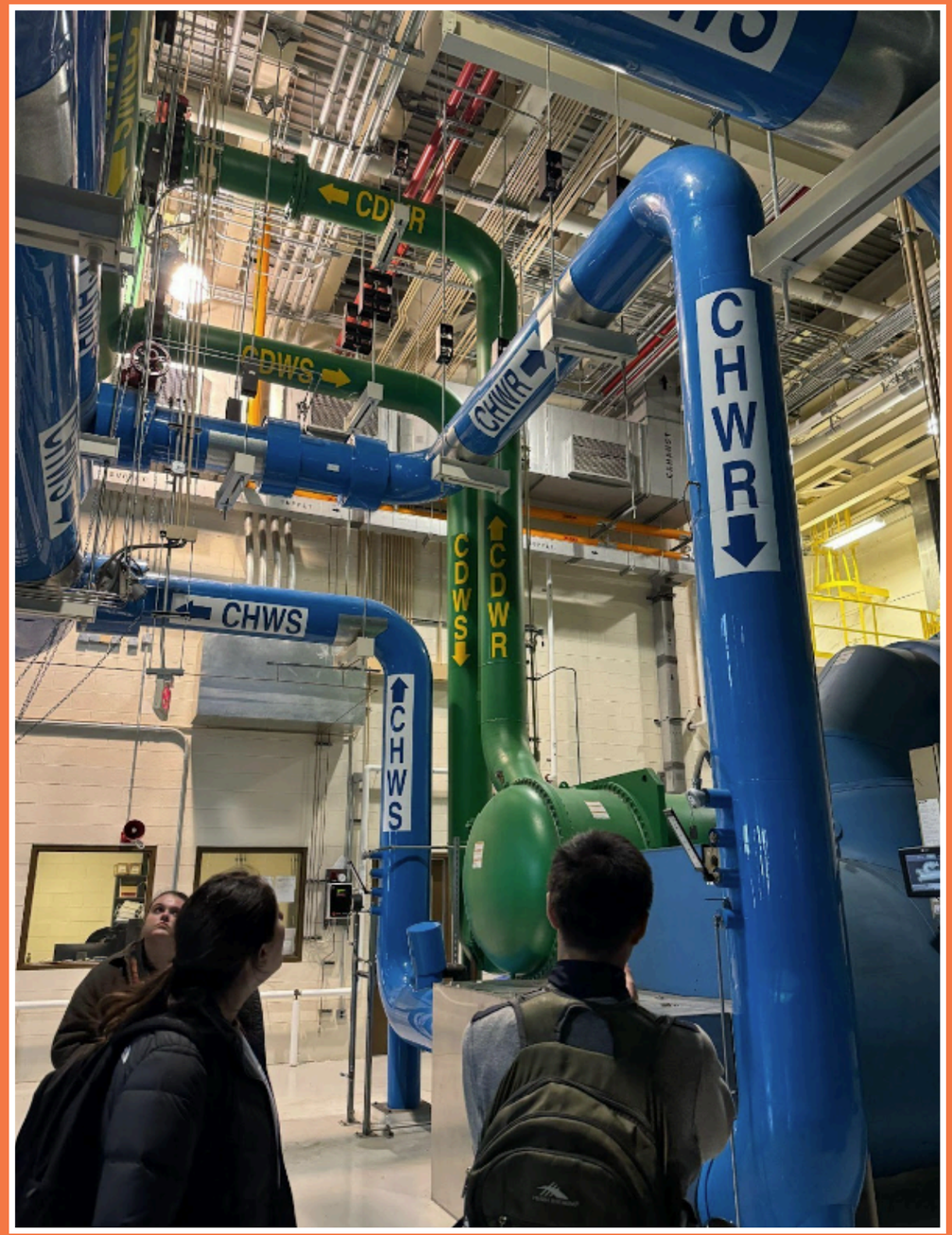
Virginia Tech Climate Action Living Laboratory

On September 17th, 2023, over fifty academic and operational leaders came together to discuss and brainstorm pathways to bring the new CALL to fruition through institutional and resource planning (Academics and Climate Action Living Laboratory, n.d.). The CALL seeks to elevate and coordinate climate related teaching, research, and outreach at Virginia Tech through a climate action-related curriculum. This curriculum includes clean energy, social equity, and innovative financing, which will be enhanced through experiential learning opportunities in Blacksburg campus and the surrounding community (Academics and Climate Action Living Laboratory, n.d.). The next steps for developing the CALL include establishing an institutional home; integrating the lab with university initiatives like Climate Action Commitment implementation and Sustainability Tracking, Assessment & Rating System (STARS), solidifying program leadership; and devising strategies to enhance coordination among and visibility of existing sustainability-related academic programs (Academics and Climate Action Living Laboratory, n.d.). In spring 2023, the CASE Team began collaborating with Dr. Budowle through a VT Engage faculty fellowship development grant to implement some of these next steps for CALL development. That project used the Honors College Service Learning course in the 2023-2024 academic year as a platform to develop a CALL framework and pilot best practices for CALL teaching and learning. Below, we share the project components that help build that framework.



Beginnings: Student group in Spring 2024 course has their first project meeting
Credit: Charlotte Cullen

UH 3204 (Spring 2024 course) takes a field trip to Homefield Farm, accompanied by mentors Jack Leff, Nathan King, and Kristina Cook
Credit: Emily Williams



Class field trip to VT's Chilled Water Plant; *Credit: Charlotte Cullen*

Dr. Budowle during a field trip to HomeField Farm
Credit: Keara Sosa-Ton

Catawba Sustainability Center

Credit: Charlotte Cullen

PROJECT COMPONENTS

Peer Benchmarking and Virginia Tech Priority Alignment (Fall 2023)

This project component identified established living laboratory programs at peer institutions and benchmarked them with the CALL at VT. To benchmark these programs, this team contacted stakeholders and reviewed websites at peer institutions to collect data and identified their program's key features and best practices. This component also connected the goals of the CALL with VT's broader goals and priorities, beyond sustainability. This team analyzed how the goals of the VT CALL overlap and align with other VT priorities to further situate its role and need beyond achieving VT CAC goals, specifically.

Project Approach

We began by identifying institutions to further our research into the CALL, while reviewing internal VT documents to identify how the VT CALL can align with VT's broader goals for the university, beyond sustainability.

To benchmark the CALL with other institutions, we identified nine institutions with living laboratories to research the successes and challenges of the living lab model, and intentionally chose an additional institution absent of a formalized living laboratory program to research how institutions without formalized living laboratories are enacting sustainability initiatives. We used AASHE STARS, a forum where institutions can self-report their sustainability initiatives and outcomes, to assist in identifying institutions with the highest STARS ratings that also had a living laboratory, keeping in mind to limit the number of institutions we researched from a particular U.S. state. For the institution which did not have a formalized living lab, we identified it on a list of institutions with the highest STARS ratings.

After identifying these 10 institutions, we emailed contacts at peer institutions with existing living laboratories to obtain more information on how they have successfully integrated a living laboratory into their campus and community.

We collected the following data: institution name, land grant university status, formal living laboratory status, primary contact's info and role, contact's involvement in the institution's living laboratory, STARS rating, percentage of courses and academic departments with sustainability course offerings, source of funding for the living laboratory, a description of living lab research areas or sources of living lab research, how students and faculty are connected with operational/administrative staff, the mission statement and goals of the living laboratory, obstacles/setbacks from running the living lab, an "anything else you want to share", and additional comments with relevant notes and links to the living lab websites. Then, we arranged these data in an Excel spreadsheet for mentors to easily access.

Additionally, we identified some of VT's top priorities and goals and analyzed whether and how the VT CALL aligns with these priorities. Through researching VT's most important relevant goals, extending beyond sustainability, we determined that VT's values can be organized into four overarching categories: (1) Service; (2) Accessibility and Affordability; (3) Diversity, Equity, and Inclusion; and (4) Experiential Learning. Under each of these categories, we found examples of already established programs and organizations at VT or future projects in the Campus Master Plan that relate to these values.

Outcomes

For Benchmarking, we identified 10 institutions in the U.S. that had living laboratory programs: Stanford University, Colorado State University, University of California Berkeley, Cornell University, University of California Merced, Dickinson College, University of Maryland, Furman University, University of Vermont, and Portland State University. Of these 10 institutions, six are land-grant universities. Nine of these institutions had a formalized living lab program, and four out of 10 institutions responded to the questions that we emailed to an appropriate primary contact at the institution. Of the 10 institutions, five had gold STARS ratings and five had platinum ratings. All 10 of these institutions had at least 12.95% of all courses at the institution offer sustainability coursework, with 72.00% of academic departments, overall, offer sustainability coursework.

Of the seven institutions with living labs that had information on funding support (Colorado State University, University of California Berkeley, Cornell University, Dickinson College, Furman University, and University of Vermont), we observed the following themes: (1) funding came from a sustainability fund; (2) funding was provided by a home department working for the living lab; (3) funding was provided by the institution's equivalent to an "Office of Sustainability"; and (4) funding was from a legislative bill.

Four institutions responded via email (Cornell University, Dickinson College, Furman University, and the University of Vermont), in addition to Stanford University (which had more in-depth information provided on a website). Each institution had different approaches to how faculty and students partner with operational staff. Common approaches include: (1) students are supported by staff and faculty who partner together to form advisory boards comprising of subject experts and industry professionals; (2) a sustainability coordinator or other individual with a relevant job title assists in answering inquiries directed at the facilities team and helps narrow the work that students and faculty do; (3) administrative staff directly supervise student interns, with each student intern having a faculty sponsor that serves as a mentor; and (4) students and faculty provide operations staff with recommendations from high-quality research projects.

Additionally, of the six institutions with living labs with relevant research info (University of California Berkeley, Cornell University, Dickinson College, Furman University, University of Vermont, and Portland State University), the following themes emerged: (1) living labs utilize faculty research; (2) living labs utilize course research to educate students on sustainability; (3) student-led research projects inform living labs about sustainability efforts; and (4) common research areas include environmental policy, carbon pricing, data analytics, landscape improvements, and beekeeping.

Of the four institutions that responded to our emails, we found the following obstacles: (1) not enough collaboration and coordination to meet the evolution of the initiative; (2) turnover and commitment of students, faculty, staff, and community volunteers; (3) failure to advance sustainability goals because the living lab's initiatives only offer surface-level information; and (4) identifying sources of funding; and (5) writing succinct purpose and objectives statements to be implemented into the living lab framework.

A future team should analyze a “best practices” data set, including how a particular living lab can implement and improve upon its performance. While we currently do not have a “best practices” data set available, we recommend beginning with the following established tips to build the CALL Framework and for future research: “(1) engage the right campus participants; (2) identify key collegiate programs; (3) build credibility through engagement and data; (4) integrate it into the curriculum; (5) expand beyond individual programs of study; (6) build partnerships with industry; (7) engage support beyond the campus; and (8) open your labs to the community” (Cohen & Lovell, 2013, pp. 9-21).

For Priority Alignment, we identified major priority categories. For the first priority category, we identified VT Engage and explained how it exemplifies service, and more specifically, the school’s motto Ut Prosim. For the second category, we included the Virginia Tech Advantage and specific ways that VT has made the campus more accessible. For the third category, we focused on InclusiveVT and their Principles of Community. For the fourth category, we included programs at VT that foster transdisciplinary and experiential learning, including the Bridge Experience program, specific campus developments, destination areas, and Pathways minors. In addition, we evaluated how the CALL also has the potential to align with each of these values and programs and suggested how the CALL may even work in collaboration with some of these VT priorities.

Our final deliverable for the Priority Alignment, a table created in Excel, shows that the CALL does align with all four of these top priorities. Figure 1 displays the first two columns of the table, which include VT’s four top priorities and identified VT programs and organizations that relate to these priorities. It also has the potential to work hand-in-hand with some of VT’s established programs, such as VT Engage or the Bridge Experience, which maximizes its ability to align with these values. As the campus continues to grow, the Office of Sustainability and/or future students may expand on these findings, including new VT priorities and efforts in this spreadsheet. They can decide how they fit into one of the aforementioned categories or establish a new category. Future research may also expand beyond VT priorities and align the CALL with the priorities and values in Blacksburg and the broader New River Valley community.

VT Priority	Subcategory
Service	
	Ut Prosim
	VT Engage
Accessibility & Affordability	
	The VT Advantage
Diversity, Equity, & Inclusion	
	Inclusive VT
Experiential Learning	
	Beyond Boundaries 2047: The Campus Plan
	The Bridge Experience Program
	Campus Developments
	Cross-Disciplinary Opportunities

Figure 1
The first two columns from the priority alignment deliverable, showing VT’s top priorities and specific plans/organizations that relate to these priorities.

Peer Benchmarking Extension (Spring 2024)

The Peer Benchmarking Extension project component aimed to provide recommendations and guidelines for how the VT CALL can further develop based on the challenges and success of other universities. Our project was built from a pre-existing Excel spreadsheet which was established by students in fall semester and began work to track other universities and their implementation of sustainability around campus. As an extension of prior work, we focused specifically on each university's efforts to transform its campus into a living laboratory, which incorporates both climate action and sustainable practices. To improve our own living laboratory, assessment of other universities is necessary. We directed questions to sustainability offices at other institutions to assess not only the strength of their living laboratory programs, but to also learn how they had developed a collaborative, interconnected living laboratory program.

Our benchmarking project is essential because it can help distinguish the university as a sustainable leader. Additionally, benchmarking has been widely promoted by organizations like the Association for the Advancement of Sustainability in Higher Education (AASHE) as a primary strategy for peer engagement and sustainable achievement. Peer benchmarking, as defined by AASHE, is essential to the decision-making process: “We suggest that institutions should start the climate decision-making process by benchmarking their current carbon and other environmental impacts. Simultaneously, academic institutions should devote resources towards better understanding the campus community’s preferences and perceptions towards climate change and other environmental issues” (Urbanski, 2016). Our findings and analysis of fellow campus programs will help to identify a path forward and set new goals for our living laboratory.

Project Approach

The approach to this project started with the foundation built by the UH 3204 Honors Service Learning Fall 2023 Peer Benchmarking project component. This Benchmarking group established the Excel spreadsheet, reviewed web information, and began to reach out to a few universities. While that information was useful, an extension was necessary to focus attention on living laboratories and their best practices.

The continuation of the project began with us evaluating the successes and shortcomings of last semester’s project. We met with our mentors, Nathan King and Jack Leff; prioritized the types of institutions we needed to connect with; and identified ways to adapt and extend the pre-existing spreadsheet. From there, we created a list of priority institutions to reach out to. These institutions fit into specific categories: R1 universities, land-grant universities, local universities, high-ranking AASHE STARS institutions, and SCHEV (State Council of Higher Education for Virginia) peers.

R1 Universities:

- The Pennsylvania State University
- Ohio State University
- University of Maryland
- University of Virginia
- North Carolina State University
- Colorado State University
- George Mason University
- Virginia Commonwealth University
- Stanford University

Land-grant Universities:

- The Pennsylvania State University
- Ohio State University
- North Carolina State University
- Colorado State University
- University of Maryland

Local Universities:

- James Madison University
- Radford University
- University of Virginia
- North Carolina State University
- George Mason University
- Virginia Commonwealth University

High AASHE STARS Rating (Platinum and Gold) Institutions:

- Stanford University (Platinum)
- Colorado State University (Platinum)
- Ohio State University (Platinum)
- North Carolina State University (Gold)
- University of Virginia (Gold)
- University of Maryland (Gold)

State Council of Higher Education for Virginia (SCHEV) Peers:

- George Mason University
- James Madison University
- Radford University
- University of Virginia
- Virginia Commonwealth University

A future team should analyze a “best practices” data set, including how a particular living lab can implement and improve upon its performance. While we currently do not have Upon the list's completion, we created a template email to send to the determined institutions, which consisted of the following questions about their institution’s sustainability living laboratory:

1. Do you have an explicit sustainability or climate action “living/learning laboratory” program or effort?
2. What is the structure of your program (department/unit, staff/faculty devoted to it, etc.)?
3. What is your role?
4. What success have you experienced in establishing your program?
5. What barriers or challenges have you experienced in establishing your program?
6. How is your program funded?
7. How much funding and how is it distributed?
8. Does your program focus on undergraduate education, graduate education, faculty research, and/or service? What partnerships or connections did you establish within the university to help facilitate this?
9. How are students/faculty connected with operational/administrative staff?
10. What are broader program goals?
11. Is there any additional information on the program you would like to share?

We compiled the information we received via email responses and Zoom meetings into the master spreadsheet as an easy and accessible tool for comparison. We sorted our findings and analyzed them to present recommendations on best practices, opportunities, and possible challenges to strengthen VT’s CALL development.

Outcomes

The universities that we contacted included the University of Virginia (UVA), North Carolina State University (NCSU), Penn. State University, James Madison University (JMU), Colorado State University (CSU), Radford University, George Mason University (GMU), Virginia Commonwealth University (VCU), the University of Maryland (UMD), Portland State University, Stanford University, and the Ohio State University (OSU).

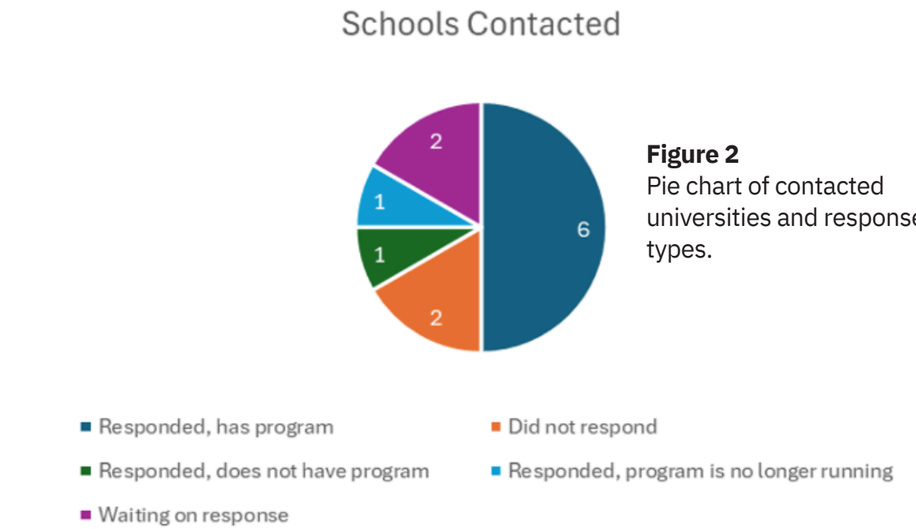


Figure 2
Pie chart of contacted universities and response types.

Out of the 12 schools contacted, we received responses from eight. The four institutions considered “unresponsive” (Stanford, JMU, OSU, and Portland State) either did not respond to the initial emails or could not give responses in time for inclusion in this report.

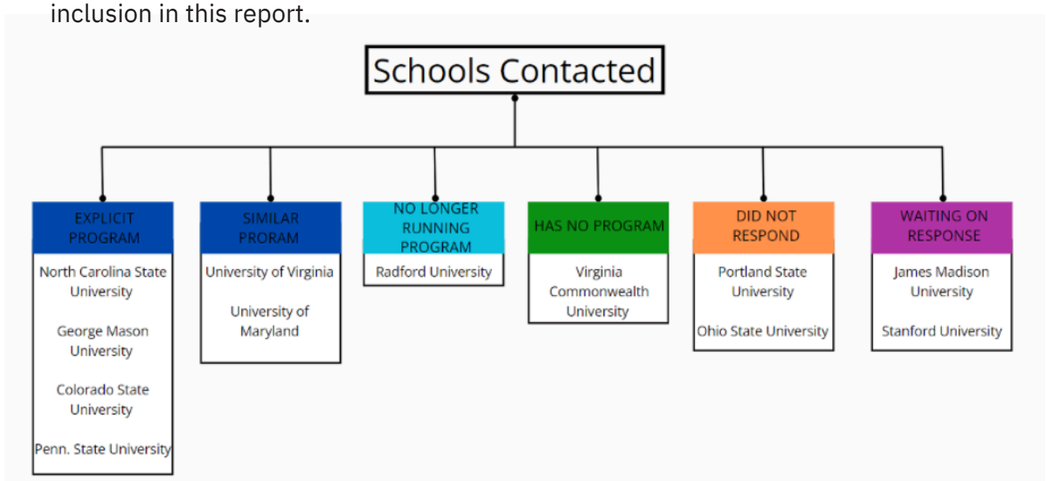


Figure 3
Breakdown of universities' responses about their overall program (with corresponding colors to Figure 2).

Of the eight universities that provided responses, categories of answers included Explicit Program, Similar Program, No Longer Running Program, Has No Program, Did Not Respond, and Waiting for Response (see Figure 3 for the breakdown by university). The first two categories are based on similarity to the VT CALL vision statement.

The category that we deemed most beneficial for analysis was experienced barriers or challenges. We discovered similar barriers from across the contacted universities. The most noticeable trend was that sustainability lacks funding, staff and ultimately, time. This puts pressure on what these living laboratory programs can do. However, GMU was an outlier with a budget of around $1 million. They expressed that they feel well-staffed and well-funded, which is rare for sustainability offices. Future developments in this project may involve contacting and setting up a meeting with GMU to understand the intricacies of their funding source and approach.

Getting people to understand sustainability was also a common barrier. Though people in the department or office may understand its significance, to administrations and the rest of the university, sustainability holds little to no weight. This causes the topic to be put on the back burner or to not be considered at all. Many universities we spoke to struggled to get their program integrated into administrative efforts. A GMU representative, for example, noted that they constantly find their department trying to convince people why they should care about sustainability. UMD's program challenges this idea and makes itself an outlier. As seen in Figure 3, they have a similar program but do not have an explicit living lab. UMD takes a school-wide approach to sustainability. Specific faculty and staff are not allocated to these projects but rather distributed administratively and supported by the Office of Sustainability. One recommendation based on PSU's response is to create a direct link to sustainability so that it is better understood by the student body and university. By clearly identifying sustainability and related projects, the university can see the need for the integration of sustainability. PSU strives to connect students, staff, and faculty directly with sustainability projects that have clear paths.

In general, benchmarking may benefit by expanding data collection to other universities. Specific next steps include following up with currently explored universities as noted:

- Radford University- determine what happened to their program and if there were pitfalls that can be avoided.
- George Mason University- learn how they receive their funding to possibly apply that to Virginia Tech's CALL
- University of Maryland- ask about how they facilitate relationships with undergrad and graduate students and faculty
- Penn. State University- contact to join the sustainability board shared by several institutions to learn more about what other programs are doing and share what we have learned
- James Madison University- stay in touch with the program since they should be sending responses shortly after their graduation
- Stanford University- follow up for responses that may emerge after this course.

From a comparative lens, Virginia Tech has a solid program. Especially with classes like this one, our program is budding. The connection between students, faculty and staff is crucial for the success of a grassroots program. Seeing that many of the successful programs listed above mention the trajectory of grassroots into administrative efforts, Virginia Tech is on the right track.

Communications Plan (Fall 2023)

The primary purpose and goal for this project component was to develop a basic CALL communications plan that will serve the Office of Sustainability now and in the future. This project assists in grounding the message of the CALL in marketable material and branding that can reach the academic community, connecting faculty and students with staff in operations at Virginia Tech. This project outlines communication strategies and provides basic templates and language, presented together in a final communications packet containing a brief, a preliminary logo and slogan, a newsletter spotlight about this Honors Service learning course as a template for spotlighting other CALL projects, a draft web page outline with sample language, and poster and social media templates.

Project Approach

We intended to inform people at Virginia Tech about the CALL, and encourage them to get involved where possible. We identified multiple media methods and designed a range of content that can be used by the Office of Sustainability and the Honors College Sustainability Living Lab in the future.

We worked with our mentors, Kristina Cook and Jack Leff in the Office of Sustainability, to identify key goals and communications themes of connecting faculty and staff (i.e., academic) with staff (i.e., operational/administrative) to build bridges through the CALL. At the beginning of this project, we first had to become familiar with the existing Office of Sustainability communications infrastructure. This allowed us to determine their most pressing needs and areas for improvement. We also learned about the structural dynamics and relationships involving the Office of Sustainability, operations teams, and Virginia Tech administration more broadly. A major goal of the CALL is to build bridges between Virginia Tech's academic communities and operations departments, so it was important to gain perspective on what relationships currently exist and how the Office of Sustainability operates. We gained insight on these dynamics by interviewing our staff mentors who work within the Office of Sustainability and are, therefore, aware of its needs, goals, and potential.

With their support, we also developed an interview protocol/general questions about communications best practices. As the Office of Sustainability currently lacks full communications support, we met with Erin Dietzel, communications specialist for the Honors College, to better understand what needed to be incorporated in the CALL communications plan and how to go about facilitating it. Erin provided a formal communications brief and plan template that we used. We used these templates to define the purpose of their project, to ground the messaging, and to organize necessary resources. After meeting with mentors and our instructor, we identified our goals and target audiences for each piece of the communications plan and assembled them in a final communications packet. We ultimately compiled these materials into a central Google Drive folder to serve as a hub for VT CALL communications.

Outcomes

Ultimately, we created the following elements for our communications plan packet, based on guidance and iterative feedback from our mentors,Erin Deitzel, and instructor:

- Communications brief and template packet - The communications plan and brief serve as a guide on how to effectively communicate the CALL and why it needs to be promoted within Virginia Tech and its surrounding community.

A combined slogan/logo - Logos and graphics are essential elements of any brand, and something the Office of Sustainability has lacked overall and for the CALL, specifically. These are simple and appealing visual pieces that can draw an audience and effectively convey a message:

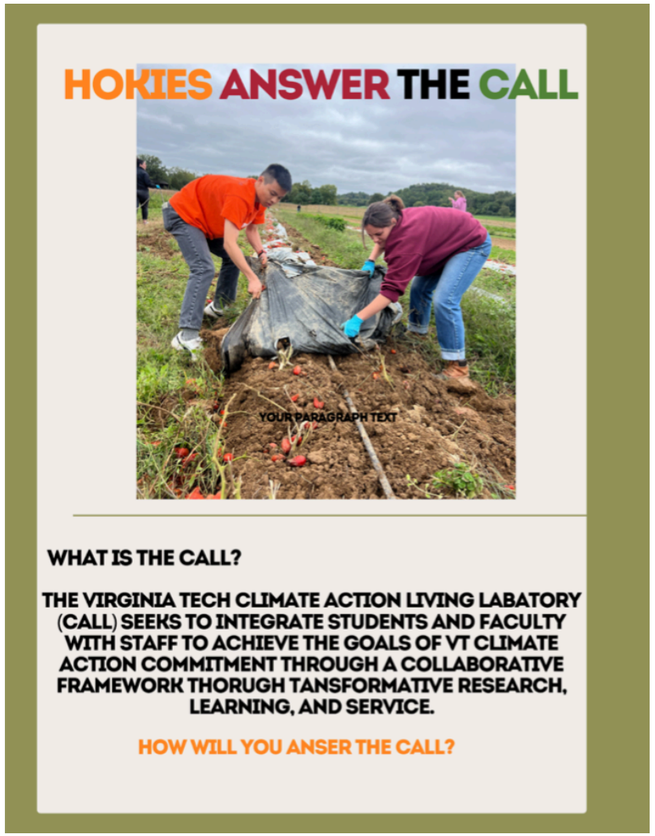


Figure 4
CALL Communications team social media post/poster template.

- Spotlight - The spotlight write-up serves as a brief yet informative explanation of a specific CALL project or effort. This write-up in turn could be used in a variety of communications platforms, including newsletters or even on the website itself. The Communications Team hopes the first spotlight is shaped around the Fall 2023 Honors Service Learning course.
- Interest form - The interest form will allow us as CALL team members to engage with and communicate with individuals who are not yet involved. It will allow people to contact the Office of Sustainability and express their interest to work with the CALL. The interest form will record contact information, including the primary academic unit and the individual's particular interests around sustainability and the CALL. It was designed to be short, succinct, and easy to follow in order to maximize engagement and be accessible for a broad audience.
- Webpage revisions- To further develop the webpage, the communications team relied on the framework of the preexisting CALL webpage as a template. From here, we developed an updated website outline that addresses both content (e.g., including the new CALL vision statement) and aesthetic needs.
- Social media/Poster template - We created a template for potential social media/physical flyers to provide a basis on what language, tone, and message the Office of Sustainability can use to inform and encourage students, faculty, and staff to join the CALL.
- CALL photo archive - We launched a photo archive for Honors Service Learning to capture moments in the Fall 2023 semester featuring students actively participating in the CALL. The Communications Team hopes the photo archive can grow from future Service Learning classes to document student involvement in the CALL.
- Elevator pitch - This brief description of the CALL will help spark interest and inform the student body, faculty, and staff on what the CALL is and why it came into existence.

Moving forward, the Office of Sustainability will use the communications packet to promote the CALL and encourage participation from students, faculty, and staff. The Office of Sustainability intends to work with the Facilities communication team to incorporate the interest form, the webpage updates, and the spotlight onto the webpage. Additionally, the Honors College can use the spotlight to promote the Honors Service Learning class in Spring 2024.

Social media posts regarding the CALL can begin immediately, and should be posted to the Virginia Tech Office of Sustainability Instagram.

Together, these elements will support the Office of Sustainability to create greater connections and build academic and operational bridges for the CALL now and in the future. By developing this communications plan, the Fall 2023 team provided foundational material for all future CALL mentors, faculty, staff, and students to expand upon and further develop. The language used in the communications packet can easily be interpreted by anyone regardless of discipline and background, which satisfies the CALL's goals of encouraging transdisciplinary participation by stakeholders.

CALL Showcase (Fall 2023)

The Showcase, which ultimately occurred in spring 2024, aimed to be a public event to celebrate the development of a more formal CALL framework and other CALL-relevant teaching, research, and service activities at VT. Through involvement in the showcase, faculty and students (i.e. academic) connected with staff (i.e., operational and administrative) to coordinate and begin accomplishing VT CAC goals through teaching, research, and service. This project component includes scheduling, event logistics, and identifying potential speakers and guests. An information packet with sample emails, timelines, and other templates assisted the Office of Sustainability staff who continued planning and ultimately hosted this event in April 2024.

Project Approach

The majority of this project approach included multiple informational and planning sessions with our mentor, Jack Leff. In planning sessions, we determined that the Showcase should be less of an academic conference, and instead focus on celebrating and sharing best practices around existing CALL-related research projects and courses, showcasing students' work (including from this course), and connecting academic and operational stakeholders for future CALL efforts. We also worked with Honors College Assistant Dean Vandyke to book a space, date, and time for the event. Throughout the semester, we worked with our mentor to plan all logistics and communication pieces necessary to host the CALL Showcase.

Outcomes

The CALL Showcase took place in the Honors College Discovery Studio in Squires Hall on Friday, April 19, 2024 from 1:00-5:00pm (with additional set up time beginning earlier in the day). This date was chosen intentionally, because it is directly before Earth Week and due its proximity to the final presentations for the spring 2024 UH 3204 students. This date allowed those students to present their work in the Showcase's poster session. The Showcase included a welcome and keynote speech from the Office of Sustainability and the Honors College, a student-led poster session, faculty panel, information session on VT's greenhouse gas emissions inventory, and a facilitated activity.

The final packet included the following elements:

- Cover Letter
- A Note From the Organizer
- Description of the Showcase
- Event Planning Timeline
- Schedule for the Day
- List of Potential Speakers/Distinguished Attendees
- Email Script for the Invitation to the Potential Keynote Speakers
- Email Script for the Invitation to the Potential Distinguished Attendees
- Email Script for the Thank You to All Guests
- Flier for the Showcase

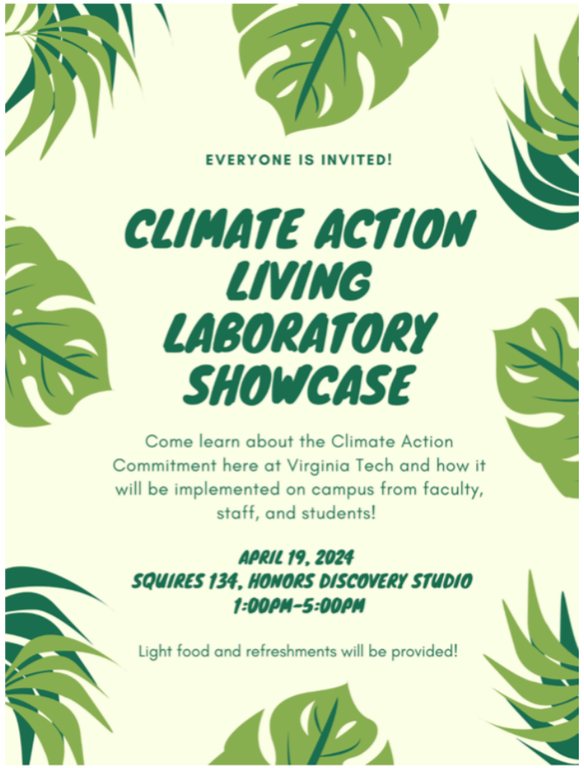


Figure 5
Flier for the Showcase.

Planning efforts during the Fall 2023 semester substantially reduced the burden on Jack Leff and the Office of Sustainability to plan and host the Showcase in the spring. The CALL interns, who were selected from the group of students in the Fall 2023 course, helped implement the activities described in the timeline for the Spring 2024 semester. These interns had guidance from Jack Leff and Dr. Budowle with additional support from other staff in the Office of Sustainability.

The Showcase provided space for faculty to share research and classes that address climate action goals at VT. Additionally, students and student-led groups presented their projects and programs as they relate to the CALL, especially the students in UH 3204 Honors Service-Learning courses. Finally, it served as an exchange platform, wherein sustainability staff shared their VT CAC and CALL needs, and VT faculty shared their teaching, research, and/or service opportunities that could support those needs. Ideally, the Showcase acted as a catalyst for CALL actions taken by those it connected, and these actions will ultimately help reach VT CAC goals. By bringing partners together in a CALL event like this, we celebrated shared efforts and concrete work being done with the intention of helping the Office of Sustainability solidify and expand the VT CALL. A more detailed summary of the Showcase Event may be found at the end of this report.

CALL Project Menu & Staff Priorities (Spring 2024)

The CALL Project Menu & Staff Priorities project component developed potential initiatives that focus on the objective of infusing education with campus sustainability outlined in the VVT CAC. The project aimed to develop a comprehensive menu of potential CALL projects, with specific attention to staff's needs and priorities. This involves staff whose work may overlap with VT CAC goals, such as the Office of Sustainability and other administrative/operational staff. This project is significant to the overall encouragement of a cultural environment focused on sustainability through the integration of academics and sustainable work on campus aligning with VT CALL goals. The emphasis on engagement within the campus and the surrounding community reflects an organized approach to integrating sustainability efforts into the institution's routine operations. Evans emphasized the importance of campus living laboratories becoming essential beacons of diverse knowledge that may be located throughout campus, whether it be in a classroom or hands-on project settings (Evans, 2015).

This supports the idea that living laboratories serve as a place where research can be applied, and real-world opportunities are provided to support the collaboration of students, faculty, staff, and other stakeholders who work with sustainability.

The importance of staff input in developing the initiatives in the project menu and the overall goals was emphasized throughout the project. Operational and administrative staff are responsible for how the university functions daily. Staff input plays a crucial role in guiding faculty and students to align priorities and develop projects that meet the needs of staff, thereby enabling students and faculty to focus on these projects in their courses and research endeavors. Through collaboration with operational staff from the Office of Sustainability and input from VT faculty, the Project Menu outlines the staff priority sustainability projects needed on campus.

Project Approach

Our project revolved around gathering information from and conducting interviews with key offices and staff members at VT, aiming to understand and document their sustainability efforts aligned with CAC goals. To ensure organized and effective execution, our approach strategically divided tasks, beginning with creating spreadsheets and progressing to conducting interviews. This culminated in analyzing survey responses to develop feasible yet realistic projects.

Our initial focus was prioritizing and categorizing offices based on their relevance to the CAC goals. We focused on units and individuals closely associated with our mentors in the Office of Sustainability and Energy Management. We refined a set of survey/interview questions to categorize the who, what, where, when, how, and why sections. Our mentors collectively refined and prioritized a few of these questions for maximum impact. They emphasized the importance of categorizing questions into past, present, and future components for each department, for a 'help us help you' approach. We aimed to gather information on what projects offices have accomplished, what they are currently working on, who they have worked with in the past, who they are currently collaborating with, and who they hope to work with and why. Additionally, we aimed to identify potential barriers to partnering faculty/staff with the Office of Sustainability to best assist them in their day-to-day work.

We developed an email template for interview requests and a succinct elevator pitch to introduce our project. We first focused on interviewing staff from the Office of Sustainability and emailing other offices questions with an informative and introductory email. They communicated that it may be an easier approach to give them more time to consult as a team and think of feedback as a whole department. We revised initial interview questions to prioritize 3-5 prompts encouraging lengthier responses via email as shown in Figure 6.

VIRGINIA TECH

Advancing Sustainability in Higher Ed

Name/Position:
Date:

Past Achievements:
What innovative ideas, projects, or practices has your department explored or implemented to enhance sustainability? How might these initiatives contribute to the broader sustainability goals outlined in the CAC? Can you provide insights into collaborations with stakeholders such as students (work-study, intern), faculty, etc. to achieve sustainability goals? We'd love to hear about the tangible impact your department has made.

Present Impact:
What ongoing sustainability projects or initiatives is your department currently involved in? We're eager to understand how these initiatives align with Virginia Tech's 15 Climate Action Commitment Goals.

Envisioning the Future:
Where do you envision the greatest potential for sustainability improvements within your department, and why? Could you share a specific list of projects aimed at addressing these areas? When do you anticipate implementing these initiatives, and can you identify potential barriers or challenges that might hinder their execution? Are there ways that faculty and students could support your program? Your thoughts will help us align resources more effectively.

Figure 6
Revised Email Questions.

We then narrowed priorities and interests in the Excel spreadsheet, emphasizing sustainability departments and individuals closely associated with each of the 15 CAC goals. We finalized the prompt document and adjusted the email template to align with our new approach and clearly state the purpose of our project and emphasize the importance of the input provided by the participants. Our emails with the attached survey were then sent accordingly to each office or recipient. We copied our mentors and Dr. Budowle, so staff would place more urgency and interest in responding to our request. To facilitate timely responses, we created a backup plan including a follow-up email offering a group Zoom meeting with the departments and our mentors for further clarification or if our respondents preferred this mode of communication. We established a spreadsheet to keep track of who responded to our inquiries and who we needed to follow up with, as shown in Figure 7.

Office/Department/Committee	Position	CAC	Priority	Response	Input
Energy Management	Manager & CASE Assistant Director	1-5, 13	High	✓	✓
CAIA	Director	6	Medium	✓	✓
CASE	Program Coordinator	13	High	✓	✓
Division of IT	Vice President	4	High	✓	✗
Energy & Utilities	Associate Director for Power Plant	3,15	Medium	✗	N/A
Student Affairs	Vice President	10	Medium	✓	✓
Student Engagement	Director	12	Medium	✓	✓
CASE	Building Automations Systems Supervisor	1-5	High	✓	✓
CASE	Sustainability Coordinator	13	High	✓	✓
Sustainability	Campus Sustainability Manager	8-14,15	High	✓	✓
Dining Services	Sustainability Manager	7	High	✓	✓
Grounds	Waste & Recycling Manager	7	High	✓	✓
Grounds	Urban Forestry Manager/University Arborist	6	Medium	✓	✓
Capital Construction	Associate Director	5	Medium	✓	✓
VTES	Engineering Manager	1, 2	Medium	✗	N/A
Athletics	Senior Associate Director	9	Low	✗	N/A
Sustainable Transportation	Transportation Network Manager	9	High	✓	✓
Student Affairs	Director of Facilities & Operations	7	Medium	✗	N/A
Recreational Sports	Director	9	Low	✓	✓

Figure 7
Contact list spreadsheet.

After sending the survey, we coordinated interviews with the Office of Sustainability. Our interview process was structured to maximize efficiency and clarity. We designated specific roles for each team member to streamline the conversation. Typically, one member led the interview, guiding the discussion with prepared questions, while another took detailed notes, capturing key insights and nuances. While the surveys provided a broad overview of easily accessible responses, there was a lot of variability in the length of our responses, emphasizing the need for follow up through interviews. The few interviews that we conducted allowed us to delve deeper, enhancing the depth and quality of our data.

We maintained a single Google document containing all received responses, facilitating easy reference and collaboration among the team. From this document, we distilled pertinent information into the Potential Project Spreadsheet, presenting data concisely in bullet points or expanding on responses where necessary. This process ensured a comprehensive overview of priorities, goals, barriers, and potential areas for student and faculty involvement.

Outcomes

As stated in our project description, our project revolved around conducting interviews with key offices and staff at Virginia Tech. We aimed to understand, document, and aid their sustainability efforts that align with the CAC goals to develop potential student and faculty project opportunities that support staff and to expand the CALL at Virginia Tech.

Our final deliverables included a survey, contact list spreadsheet, and Potential Project Spreadsheet. The latter encapsulates our analysis of survey responses, offering a holistic overview of our findings and recommendations for future projects. Our project allowed us to identify two main themes relating to staff's operational sustainability needs: (1) Data and Benchmarking and (2) Student Engagement and Outreach. Within these two themes, we found several opportunities for student and faculty engagement.

(1) Data and Benchmarking:

- Dr. Robin White (Associate Professor, School of Animal Sciences & Associate Director, Center for Advanced Innovation in Agriculture): Student-led research projects focused on methane mitigation and renewable energy.
- Nathan King (Campus Sustainability Manager): Student research into ways to track and report various GHG emissions. Matching student interest with various units/departments that need help with tracking their GHGs.
- Emily Vollmer (Sustainability Coordinator): (a) Analysis of historical and current data regarding water use and billing information for projects related to identifying trends and creating hypotheses for certain peaks and valleys in our campus water usage. (b) Benchmarking, researching, and interviewing universities that perform well in the Campus Race to Zero Waste to develop a better strategy for Virginia Tech's own participation.

(2) Student Engagement and Outreach:

- Jamie King (Urban Forest Manager and University Arborist): Advocating for natural resource management and urban forestry management with the undergraduate student senate and BOV (Board of Visitors), or directly contacting Campus Planning, Infrastructure, and Facilities (CPIF) to express support for the Urban Forest Master Plan and Tree Policy.
- Emily Vollmer (Sustainability Coordinator): Students could develop a campaign that includes an initial waste audit followed by targeted marketing measures.
- Teresa Sweeney (Waste Recycling Manager): Support the waste and recycling program by learning what items are recyclable in the VT program. With students and faculty from diverse backgrounds worldwide, waste management practices vary, thus understanding specific waste and recycling guidelines is key.
- Emily Williams (Housing/Dining Service): Volunteer program for Homefield Farm and advocating through both student and faculty collaboration.

The CALL Project Menu & Staff Priorities outcomes successfully identify key university staff members' sustainability needs via the above themes and goals. Additionally, we outline two specific potential projects to expand the CALL at Virginia Tech:

1. To address the slow move toward electric vehicles for university use, we identified a potential partnership between the Office of Sustainable Transportation and the Virginia Tech Department of Economics to conduct Total Cost Ownership calculations on all combustion vehicles purchased by the university to look for benefits in electric substitutes. (Aligns with VT CAC goals 1,4 and 6).
2. Incorporate student living with sustainable composting in residential buildings in partnership with Housing and Dining Services. This project would require student leadership and a designated faculty member to ensure proper execution and annual continuation. (Aligns with VT CAC goals 1, 10, and 14).

Despite several potential projects and overall themes for staff sustainability and CALL priorities, the data collected from our contacts also revealed several patterns regarding department needs and challenges as depicted in the pie graph below. More than half of our participants mentioned funding as one of their biggest necessities for project execution, followed by the closely related obstacle of staffing and resources. Very few had worked in partnership with a student group. For those who engaged student involvement in the past, student interest and active participation was a recurring problem.

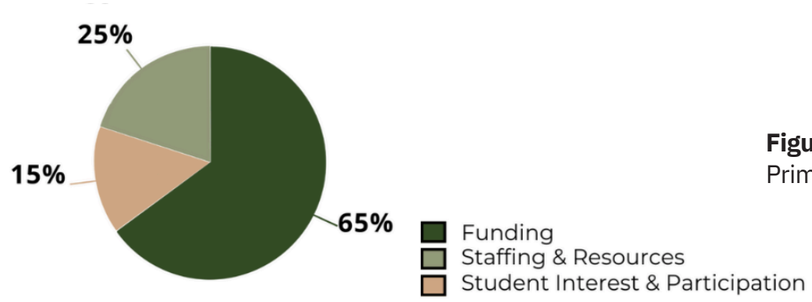


Figure 8
Primary obstacles.

Reflecting on our data collection and the obstacles we encountered, we pinpointed areas where enhancements were needed in our survey methodology. One adjustment consisted of emphasizing opportunities for student and faculty involvement within each aspect of the prompts, rather than phrasing it as a follow-up question. This tweak allowed us to receive more targeted responses from participants. Another limitation we identified was the lack of a mechanism to ensure collective responses from departments or offices as a team.

This gap impaired our ability to mitigate potential biases or obtain comprehensive perspectives, particularly from individuals with varying backgrounds or positions. Also, most of our interviewees held higher positions within their respective offices or departments, which inadvertently may have skewed our data towards certain perspectives. However, while incorporating inputs from a broader range of staff members would have been ideal, logistical constraints, such as time limitations, made it less attainable. Lastly, the inability to record Zoom meetings made it harder to ensure that we captured all the main points.

The next step for future students is to use these outcomes to expand partnerships and tackle these ongoing staff priorities. The data we received point to the opportunity for many projects and partnerships in the future. Through the CALL Project Menu & Staff Priorities, the opportunity to expand the CALL is broad and within reach. Our project only scratches the surface of the sustainable possibilities at Virginia Tech. We met our mentors' needs by contacting various departments or offices to understand their needs and priorities for potential CALL projects at VT. Through collaboration with operational staff from the Office of Sustainability and input from other VT staff and faculty, the Project Menu outlines the staff priority sustainability projects needed on campus. Potential projects are formatted in a manner that is both comprehensive and practical. This menu will help lay the foundation to expand the CALL at VT while lightening the burden of current staff who promote sustainability.

CALL Project Spotlights (Spring 2024)

This CALL Project Spotlights serve as a template for current and future spotlights/stories that the Office of Sustainability can use for various communication efforts. These spotlights summarize existing CALL projects and can be used to communicate them to potential CALL partners while simultaneously providing the Office of Sustainability with an inventory of completed projects. This project aims to create awareness and education for VT individuals and communities about the impacts of their actions on the environment and the positive changes that they could contribute towards, specifically related to VT CAC goals. The project spotlights offer transparency between the Office of Sustainability and students, faculty, and other operational/administrative staff so the campus can be aware of VT’s measures to promote sustainability while providing examples of how to get involved.

Creating spotlights with past sustainability projects and individuals who have contributed can facilitate conversations and collaborations among networks. Documenting project outcomes and challenges can provide valuable insights to the reader, potentially preventing replication in CALL efforts and identifying challenges to avoid in the future.

Project Approach

To highlight these programs as models for future CALL projects' design and documentation, this project collected narratives, or "spotlights," from important faculty, staff, and students. We identified participants in other projects relevant to the CALL, who have, therefore, worked to advance progress to reach the VT CAC goals. We created questions for interviews/surveys in Microsoft Forms. Through our meetings with our mentor, Emily Vollmer, we created a list of potential interviewees for spotlights. Initially, we aimed to interview CALL course mentors, Jack Leff and Emily Vollmer; our instructor, Dr. Rachael Budowle; members from the three other project components in the Honors Service Learning Course; Office of Sustainability interns; and our two Teaching Assistants, Bella O’Brien-Gonzalez and Charlotte Cullen given their participation in the course and CALL Framework projects last semester. Dr. Budowle, Jack Leff, and Emily Vollmer pointed us toward other key faculty to connect with. These faculty included Dr. Shannon Bell, Dr. Matthew James, and Dr. Grant Hamming.

To keep track of the interviewees/participants, as well as which group members handled the interview, we created an Interviewing Schedule in Excel. On this Excel sheet, we recorded the names, emails, and phone numbers of participants we chose as well as the name of the group member responsible for the interview and/or emailing. We also added the date the interviewee was contacted and the scheduled date of the interview. We created a separate Excel sheet in which we ranked our Stakeholders based on level of priority for their participation. We created these Excel sheets to document our progress throughout the semester and remain on track for our end goals.

To identify project summaries and outcomes, and which VT CAC goal(s) the project helped to achieve, we conducted interviews and exchanged emails with potential participants. For those faculty, staff, and students who did not have time for an interview, we created a Microsoft Form survey to capture the relevant information.

Interview and survey information included:

- Full Name (Last Name, First Name)
- Contact Information: Email
- Contact Information: Phone number
- What course, research, and/or service effort was this project associated with? (Course title & number; Overall effort name)
- What was the title of your CALL Project?
- Please list the names of any staff members who partnered on this project. (full name, email)
- Please list the names of any faculty members who partnered on this project. (full name, email)
- Please list the names of any students who partnered on this project. (full name, email)
- Please elaborate on your contributions to your CALL Project, providing details on what you did, when, and where you did it.
- What steps did you take to make your CALL project a success?
- What were the outcomes/results of your CALL project?
- Why did you choose this specific CALL Project to work on?
- What VTCAC goals does your project align with? (Select all that apply)
- Any Additional Comments and/or Details
- Please upload any photos or graphics from your project you would be willing to share!
- Please provide any credits you'd like us to include for the uploaded images/photos above.

To align with the VT CAC timetable, we concentrated on projects finished in 2020 or later. This included but was not limited to student intern projects from the Office of Sustainability and projects completed in courses such as the UH 3204 Fall 2023 and Spring 2024 courses. For these previous and ongoing projects, we developed a standard framework and design for the spotlights to create a collection that the Office of Sustainability may utilize on its webpage, social media, etc. In addition to inputting information from each project, we created a template that, once finished, the Office of Sustainability can apply to other CALL projects.

Outcomes

Through our project, we created a collection of spotlights for use on social media, webpages, etc. to inform and showcase to others the dedication and accomplishments relating to previous sustainability and climate action projects. The spotlights created summarize past CALL projects while highlighting faculty, staff, and student partnerships, project summaries, and the purpose, or outcomes of each project.

We completed project spotlights based on information obtained during interviews with Dr. Matthew James and Dr. Grant Hamming and through the Microsoft Form for Bella O'Brien & Charlotte Cullen, Dr. Rachael Budowle, and Dr. Shannon Bell.

To showcase our spotlights, we completed a spotlight template on Canva to ensure uniformity. We developed the spotlight template for future students and faculty to use to showcase their CALL projects. Our spotlight template includes:

- Project Title
- Faculty, Staff, and Student Partners
- Project Summary
- Purpose Outcome
- CAC Goals
- Relevant Tags
- Website

With our responses, we ultimately created four spotlights by the end of the course highlighting:

- Dr. Grant Hamming: instructor for AAD 1214 - Acting Locally
- Dr. Shannon Bell: instructor for Sociology 3204 - Environmental Justice
- Dr. Rachael Budowle: instructor for UH 3204 - Honors Service Learning
- Bella O'Brien & Charlotte Cullen: completed UH 3204 in Fall 2023 (see Figure 9).

VT Climate Action Living Laboratory Framework

Faculty partners: Rachael Budowle (rbudowle@vt.edu)
Staff partners: Nathan King, Emily Vollmer, Kristina Cook, Jack Leff, Steve Durfee, Erin Deitzel
Student partners: Bella O'Brien, Alex Sing, Charlotte Cullen, Keara Sosa-Ton, Brenna Stiles

As part of the Fall 2023 UH 3404: Honors Service Learning, five students in this course worked on 3 different project components to contribute to their VT CALL Framework. These included Benchmarking and Alignment, Communications, and Showcase.

Benchmarking and Alignment: This team contacted stakeholders at peer institutions to collect data and identify their program's key features and best practices This component also connected the goals of the CALL with VT's broader goals and priorities, beyond sustainability. This team analyzed how the goals of the VT CALL overlap and align with other VT priorities to further situate its role and need beyond achieving VTCAC goals. The team identified and reached out to 10 institutions to gather the following categorical data: stakeholder's name and contact information, STARS rating, percentage of courses and academic departments with sustainability course offerings, stakeholder's role and involvement in the institution's living laboratory, source of funding for the living laboratory, who is contributing research to the living laboratory, how students and faculty are connected with operational/administrative staff, the mission statement and goals of the living laboratory, and obstacles/setbacks. For priority alignment they determined that VT's values can be organized into four overarching categories: 1. Ut Prosim; 2. Accessibility and Affordability; 3. Diversity, Equity, and Inclusion; and 4. Experiential Learning. Their final deliverable for the priority alignment shows that the CALL does align with all four of these top priorities, and also has the potential to work hand-in-hand with some of VT's established programs.

Communications: The primary purpose of this component was to develop a basic communications plan that would help the VT Office of Sustainability. This team formulated a CALL Communications packet which intends to be utilized by the Office of Sustainability as the CALL Team to effectively communicate the CALL's mission to Virginia Tech faculty, staff, and student body. This included a creative brief, communications outline, CALL Graphic/Slogan ideas, an anticipated semester timeline, a CALL interest form, and a CALL webpage elements and language document.

Image Credit: Charlotte Cullen and Keara Sosa

Showcase: The Showcase celebrated the development of a more formal CALL framework, and other CALL-relevant teaching, research, and service activities at VT. This project included setting up dates, times, speakers, and guests for the Showcase and an information packet to assist the students in the future class in setting up for the event. This team worked directly with Jack Leff to help him with the logistics surrounding it and while it did not happen in the Fall 2023 semester, the VT CALL Showcase is scheduled in Squires for April 19, 2024, from 1:00 pm-5:00 pm.

CAC Goals: Goal 10: Integrate the Climate Action Commitment into Virginia Tech's educational mission through the Climate Action Living Laboratory beginning in 2021

Relevant Tags: #Communication #VTCAC #ServiceLearning #HonorsCollege #Data #Benchmark #Sustainability #Showcase

Website: https://www.facilities.vt.edu/sustainability/office-of-sustainability.html

Figure 9
CALL Project Spotlight example.

Specifically, these spotlights focus on projects in teaching, research, and courses where faculty and students collaborated with the Office of Sustainability to achieve the 2020 goals set by the VT CAC. Future students and/or mentors can extend spotlights to Office of Sustainability internship projects and other faculty identified by our mentors in the near-term. Moreover, this project provides a concrete product for the Office of Sustainability and the Honors Service Learning: Sustainability Living Laboratory course to use in the future.

CALL Faculty Toolkit (Spring 2024)

Community engaged service learning (CE-SL) aims to engage students in service-learning projects that are mutually beneficial to them, their faculty, and the community in which they engage. This project created a toolkit for Virginia Tech faculty to learn how to incorporate CE-SL into their curricula. Specifically, it aimed to support faculty to better engage with community partners and campus sustainability partners in a mutually beneficial manner. We worked with one of our mentors, Jessica Baty-McMillan, at VT Engage to provide faculty and staff with the best practices and strategies to connect to community partners within Blacksburg and the New River Valley, with the aim of establishing long-term community engaged partnerships. These partnerships should exist within participating faculty's courses to be mutually beneficial to both the community and the university. VT Engage is Virginia Tech's on-campus connection to community partners throughout Blacksburg, Christiansburg, and the New River Valley. Its mission is to invest in enriching partnerships, develop leaders, and advance community-engaged scholarships. A central part of this mission is connecting students, faculty, and staff on campus to on and off campus partners; the toolkit is specifically designed to further this goal by expanding the resources already provided by VT Engage to faculty. Our other mentor, Jack Leff, aided us in specifying these strategies to the VT Climate Action Living Laboratory (CALL). The end goal was for sustainable change to occur within the VT CAC through increased faculty participation in CALL-centered experiential learning, aided by the information provided in our toolkit.

The project deliverable was an infographic that faculty can easily refer to as a source to connect their students to and better work with community partners. Faculty serve as a long-standing connection between the community and students, as students cycle out of the university and community engagement every few years. However, when engaging in CE-SL, faculty can often overburden community partners, so it was important for us to emphasize best practices that are beneficial to the faculty, students, and community partners. Community-based participatory research projects and similar community-university partnerships for local climate action demonstrate the necessity of attending to "academic supremacy," wherein faculty and academic partners often have more power and resources than do other community and campus (Budowle et al., 2021; Porter & Wechsler, 2018). Such projects aim to engage and partner with the community in more equitable ways.

The “Faculty-Toolkit” project is intended to provide VT faculty with an accessible resource to aid in the creation of community-engaged, service-learning, and/or living laboratory experiences for students. While the CALL presently exists on campus instead of within the broader community, it is inherently in conjunction with a non-academic campus operational partner: the Office of Sustainability. This toolkit can support faculty to better work with operational staff to achieve the VT CAC goals . A key component of CE-SL and living laboratory experiences is the relationship between VT faculty and other campus or community members. These relationships allow for students to utilize the greater Blacksburg community and campus as a classroom, and aims to provide the Blacksburg community with the opportunity to utilize VT in a way that is equally advantageous for them. For this reason, the toolkit will include resources to ensure faculty understand how to have quality relations with those internal and external to VT for their intended CE-SL opportunity.

Project Approach

To fully understand intentions for the CALL Faculty Toolkit, our team discussed core goals and ideal final deliverables with our mentor. We laid out components of our project that we would focus on in different stages and ultimately bring together to make an infographic. This infographic will be added to Jessica Baty-McMillian's faculty resource canvas page for faculty’s easy access to information, including examples of successful CE-SL, outside resources, related contacts, and ways for community engagement to occur in experiential learning spaces.

Our team researched institutions comparable to VT based on general factors such as population, student-to-faculty ratio, location, and land-grant status. We utilized universities’ websites that posted information regarding experiential learning, but more specifically living laboratories, community engagement, and service learning. After more discussion with our mentor via email and Zoom calls, she provided us with a list of Virginia Tech’s State Council of Higher Education for Virginia (SCHEV)-Approved Peers. Using this resource, we conducted research on these closely related institutions. To properly equip and create the final deliverables for the VT Faculty Toolkit, our team prioritized researching comparable universities’ existing CE-SL-centered programs as our first steps.

Next, we developed plans for reaching out to faculty and staff members for interviews to gain insight on lingering questions regarding how sustainability and CE-SL initiatives can be approached in a classroom setting, experiential learning, and overall advice from our mentors. We created an Excel spreadsheet to rank potential contacts by criteria of accessibility and relevance to our research. We interviewed Jack Leff, Climate Action Fellow; Heather Cox, Senior instructor in Human Nutrition, Foods and Exercise (HNFE); Jenny Lo, Senior instructor in the Department of Engineering Education; Nikki Lewis, Collegiate Associate Professor for Honors; Nicolin Grimes-Grieco, Senior Instructor in HNFE; Jessica Taylor, Assistant Professor in the History Department; Heath Furrow, Advisor for the History Department; Rachael Budowle, Collegiate Assistant Professor for Honors; and Jessie Baty-McMillan, Assistant Director for Service Learning. After conducting interviews, we synthesized our external research with the information from the interviews to create the final toolkit.

For our final deliverables, we planned to create a “cheat sheet” for faculty members interested in learning more about CE-SL. We first designed a Canva infographic draft that holds subsections to guide faculty. These include “What is Community-Engaged Service Learning?”, “Why Should I Engage in Community-Engaged Service Learning?”, “How can I Incorporate the CALL?”, “What are Some Examples of Successful Community-Engaged Service-Learning Opportunities?”, and “How do I Collaborate with Community Partners and Staff?”. We finalized our deliverable, the Faculty Toolkit Infographic, based on our research and interview phases.

In our deliverable, shown in Figure 10, we included an explanation of CE-SL, links for grants and pedagogical resources internal and external to Virginia Tech, and tips from professors who have previously participated in CE-SL. Overall, the toolkit is intended to show faculty why creating an opportunity like this can be fruitful. CE-SL opportunities can be beneficial for students and faculty by creating a more engaging experience for all involved. Our toolkit compiles resources from VT and beyond to inform faculty of these opportunities.

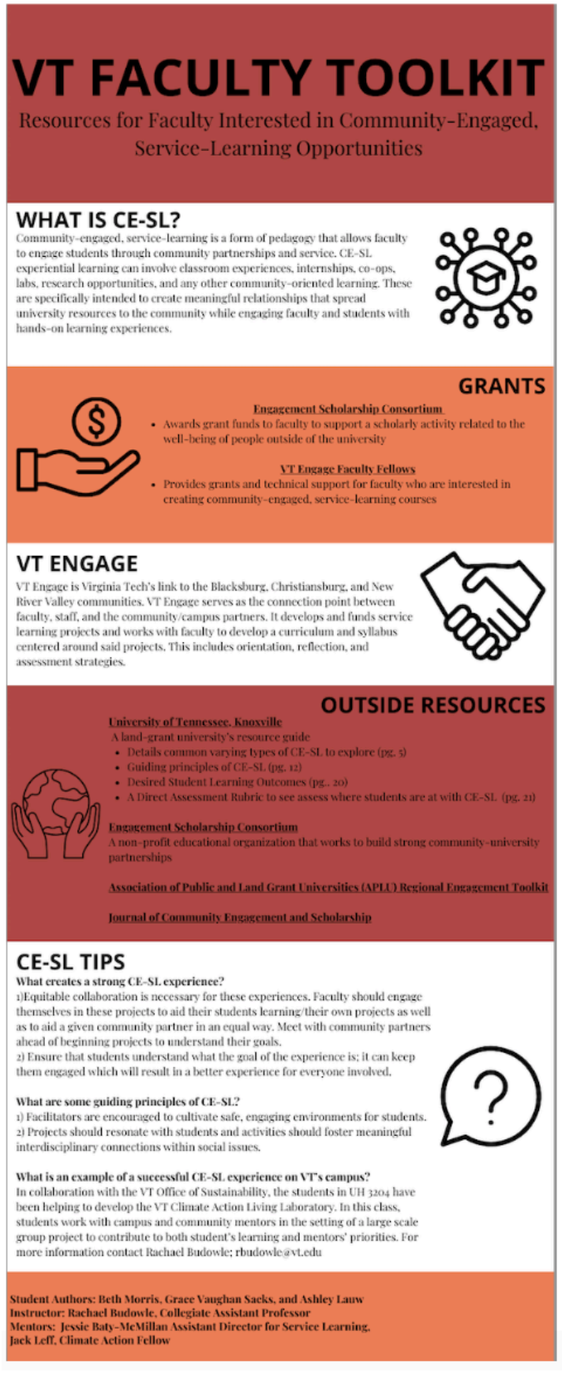


Figure 10
VT CALL Faculty Toolkit.

In our investigation of external resources and other universities, we learned that Penn State has PACE (Professional and Community Engagement) programs that encourage student-to-community engagement, and that the University of Maryland provides paid administrative leave for staff, an initiative that serves as a noteworthy incentive for faculty to participate in projects that increase their community's well-being. Furthermore, one of our most prominent findings was the University of Tennessee's resources for faculty interested in implementing CE-SL into their pedagogy. Their website provides an "Experience Learning" webpage that provides numerous links, resources, and personnel to contact when interested. This subpage provides a QEP (Quality Enhancement Plan) Report that details common varying types of CE-SL, guiding principles to lead the classroom by, and a Direct Assessment Rubric that offers a clear method for assessing one's classroom regarding CE-SL. Accordingly, we included this kind of further information on these and other outside resources, such as the Engagement Scholarship Consortium, of which VT is a member, in our infographic..

Moreover, we interviewed VT Faculty from our respective fields of study as aforementioned in our approach. We learned from the interviews that they would like an accessible liaison to aid in planning projects and to connect them to community partners; VT Engage is the liaison needed by faculty. We learned from this that VT Engage requires more exposure, coverage, and accessibility to ensure faculty are fully aware of the resources available to them, hence the creation of the VT Faculty Toolkit. Additionally, we discovered that there is a lack of incentives and ample resources for faculty to jumpstart CE-SL projects. Many reported that they were afraid of not implementing CE-SL correctly into their pedagogy and are often only incentivized towards their discipline's research. Furthermore, from the STEM portion of our interviews, we learned that increased project relevancy would foster quality engagement and learning. Few CE-SL opportunities seemed to be centered around STEM disciplines. Incorporating STEM properties into projects about environmental conservation, sustainability, health and wellness, agriculture, and renewable energy will help bolster student engagement and strengthen association with community partners and the CALL.

Using what we learned, we developed a final version of our VT Faculty Toolkit infographic.

First, it opens with a “What is CE-SL?” section that informs the viewer of what it is, how it would typically look like, and how they are beneficial to both classrooms and communities. Next, a “Grants” section. This portion provides resources such as the Engagement Scholarship Consortium that faculty can investigate and see if it would be useful to them. Following that, we included a VT Engage section to explain what it is, what its goals are, and how it can help faculty incorporate CE-SL into their pedagogy. We also included an “Outside Resources” portion that lists links and journals such as the APLU (Association of Public and Land Grant Universities) Regional Engagement Toolkit and Journal of Community Engagement and Scholarship that can give faculty an idea of how to approach CE-SL. Lastly, the “CE-SL Tips” section serves as an “FAQ” that faculty can quickly look over in case they had any of the questions already in mind. We derived the questions from the uncertainties that our interviewees had and made sure that they were addressed in our infographic.

For further development of VT Faculty Toolkit, we encourage future students to continue researching comparable universities’ existing CE-SL centered programs, conduct more interviews with faculty from varying sectors at VT, and to create similar toolkits for staff and community partners alike to incorporate into Jessica Baty-McMillan's Faculty Resources Canvas page. During the CALL Showcase, we received direct feedback from faculty on their opinions regarding the VT Faculty Toolkit. They expressed that they appreciate the toolkit and that there is a Canvas page dedicated to helping jumpstart the beginnings of CE-SL in their classrooms. Lastly, faculty also expressed that the infographic was an approachable and accessible way of sharing CE-SL information amongst themselves; with this in mind, our mentors and future members should improve, add on to, and share the infographic, as it was well-received.

CALL Intern-Led Showcase Results Compilation (Spring 2024)

Ultimately, 72 individuals across a variety of academic, operational, and administrative units attended the Showcase event. These included approximately two individuals from VT administration, 13 faculty members, 14 staff members, and 41 students. We hosted an array of students and professionals, providing them the space to boast about their CALL-related work, share ideas, and hopefully develop new partnerships.

Nine different student projects were presented during the poster session, led by students from the Fall and Spring cohorts of the UH 3204 course and interns from the Office of Sustainability. The presented projects included:

Fall 2023 UH 3204 Service Learning Course	
Building the CALL Framework	*Bella O’Brien-Gonzalez, Charlotte Cullen, Keara Sosa-Ton**
Spring 2024 UH 3204 Service Learning Course	
CALL Peer Benchmarking Extension	*Reagan Armstrong, Molly Meehan, Cade Young*
CALL Project Menu & Staff Priorities	*Kaylee Rodriguez, Morgan Cayea, Will Ferguson*
CALL Project Spotlights	*Grace Leszczak, Chloe DuPont, Sofia Quilaqueo, Catherine Resta*
CALL Faculty Toolkit	*Grace Vaughan Sacks, Beth Morris, Ashley Lauw*

Table 1
Student Projects Presented at the Showcase.

Office of Sustainability Intern Projects	
Green Labs Freezer Challenge	*Kathleen Smith, Amy Poyner, Renee Sarmiento, Jaedyn Williams, Tristan Frantz (Energy Team)*
Connecting Community with Food Sustainability	*Emily Murray, Susan Sale, Addie Gaudet, Elayna Ealy, Lauren Phan (Food Team)*
How Does VT Reduce Waste?	*Julianne Cerato, Amelia Giurintano, Sylvie Gobs, Madison Norman, Tamir Zharmagambetov (Waste Team)*
Stroubles Creek: Developing a Streamkeepers Program	*Meghan Childress, Leilani Hyatt, Jordan Lavey, Avery Krivis, Hannah Worthy (Water Team)*

Table 1 Cont.
Student Projects Presented at the Showcase

*These students also presented their project at VT's Dennis Dean Undergraduate Research and Creative Scholarship Conference in April, 2024. They were honored with the Service Learning and Research Award for their presentation.

To begin the event, Dr. Paul Knox, Honors College Dean, welcomed participants and highlighted the Honors College as a testbed for CALL teaching, learning, and scholarship, followed by a more thorough introduction to the CALL by the Office of Sustainability. Following student poster presentations, three faculty members, Dr. Rachael Budowle, Dr. Ralph Hall, and Dr. Ron Meyers, participated in a panel to present their CALL-relevant research and teaching and answer audience questions. The event also featured a presentation on the most recent Virginia Tech greenhouse gas emissions inventory, presented by Simona Fried, an operational partner from Energy Management, and Sean McGinnis, an academic partner, from Green Engineering. They identified ongoing CALL needs and opportunities emerging from the inventory and highlighted its relevance to the CALL as a student project integrated into a course. At the conclusion of the event, all attendees participated in an activity facilitated by Jessie Baty-McMillan, Assistant Director of Service-Learning at VT Engage. For this activity, white boards displayed each VT CAC goal, and individuals in an academic role (students/faculty) were asked to brainstorm and record ways in which their work may contribute to achieving the goals through the CALL. Similarly, individuals in an operational/administrative role (staff, administrators) record their priority projects and needs that could benefit from support from academic partners through the CALL. The responses from this activity are summarized in Table 2 on the following pages:

Bella O'Brien-Gonzalez, Keara Sosa-Ton, and Charlotte Cullen presenting their CALL Framework project at the Dennis Dean conference
Credit: Rachael Budowle

VT CAC Goal	Operational/Administrative	Academic
Goal 1: *Achieve a carbon neutral campus by 2030*	• Urban forest master plan and tree policy adopted • “Eat-in” initiatives; reusables, plastic to compostable transitions • Redouble on commitment and progress	• AI-hands approach • Fund action-oriented transdisciplinary teaching and research
Goal 2: *Achieve 100% renewable electricity by 2030*	• Build a utility-scale solar/APV facility	• Improve sitting processes to gain public support • Vision 2030-47 • Create class
Goal 3: *Complete and 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*		
Goal 4: *Reduce building energy consumption to enable carbon neutrality by 2030*	• Implement room-light sensors across campus • Implement Freezer Challenge, Green Office and Lab Certification, Smart Labs Program across campus • Implement “low flow” sinks, toilets • Consider building energy use and renewable alternatives	• Capstone projects for related disciplines

Table 2
Facilitated Activity Responses

VT CAC Goal	Operational/Administrative	Academic
Goal 5: *Operations of new buildings initiated by 2030 will be carbon neutral*	• Benchmark and research net zero energy buildings in higher education • Share building energy information with managers and users; increase awareness • Provide incentives for energy reduction • Increase funding	• Senior design projects for building energy audits
Goal 6: *Agricultural, forestry, and land use operations will be carbon neutral by 2030*	• Service opportunity for pollinator habitat maintenance or establishment • Implement solar powered irrigation • Establish proper composting • Implement wind and hydropower • Electrify agriculture fleet, charge with onsite solar	• Partner with Sustainable Land Development CEE senior design course (taught by Claire White and Kevin Young) • Partner with Sustainable Land Development Master's students and faculty for research
Goal 7: *Virginia Tech to become a zero-waste campus by 2030*	• Waste diversions (compost/food security) • Plastic to compost transitions • Education/outreach training • Reusable containers; reuse and recycling of plastic packaging • Urban wood utilization • Research and benchmark hard-to-recycle products, find outlets • Race to Zero waste awareness and participation • Partnerships with athletics for green games • Recycling of Styrofoam and other lab materials	• UH 3204 could support a related project each semester • Offer more courses on circular economy • Offer green chemistry/sustainable biomaterials courses focusing on waste management • Research on developing consistent messaging and signage for use across campus

Table 2 Cont.
Facilitated Activity Responses

VT CAC Goal	Operational/Administrative	Academic
Goal 8: *Establish the Sustainable Procurement Policy by 2022*	• Research and benchmark green purchasing policies to create a system • Create tracking mechanism for green purchasing • Research community wealth building (CWB) • Procurement that supports local/green businesses • Improve avenues for “buying green”	• Offer classes that focus on establishing proper policy • Provide research and support for CWB
Goal 9: *Reduce single-occupancy vehicle commuting to campus by 20% and reduce transportation-related GHG emissions by 40% by 2030*	• Long-term bike rental program through VT Office of Transportation/Bike Hub • Improve accessibility across campus • Increase EV charging stations • Improve bus stops and stop locations, increase bus frequency • Increase bike lanes, separate • Encourage development of Christiansburg Amtrak	• Partner with VT Transport Institute (VTTI) for research
Goal 10: *Integrate the CAC into VT’s educational mission through the Climate Action Living Laboratory (CALL)*	• Class partnerships, experiential learning opportunities • Urban Forestry Academy collaboration across campus	• Continued support from UH 3204 course; research between faculty and partners to develop “how-to” models and workshops for other faculty to integrate into course and research • Create “renewable energy” certificate in SPIA
Goal 11: *Establish Climate Justice as a core value of the CAC*	• Place importance on environmental equity • Climate justice education and integration tips for faculty and staff • Ensure staff and students have base needs met; establish sense of safety and belonging	• Honors “Justice Challenge” courses in 2024-25 academic year • Focus Spring 2025 UH 3204 course on Climate Justice on campus; develop key question/criteria for justice for any VT CAC effort

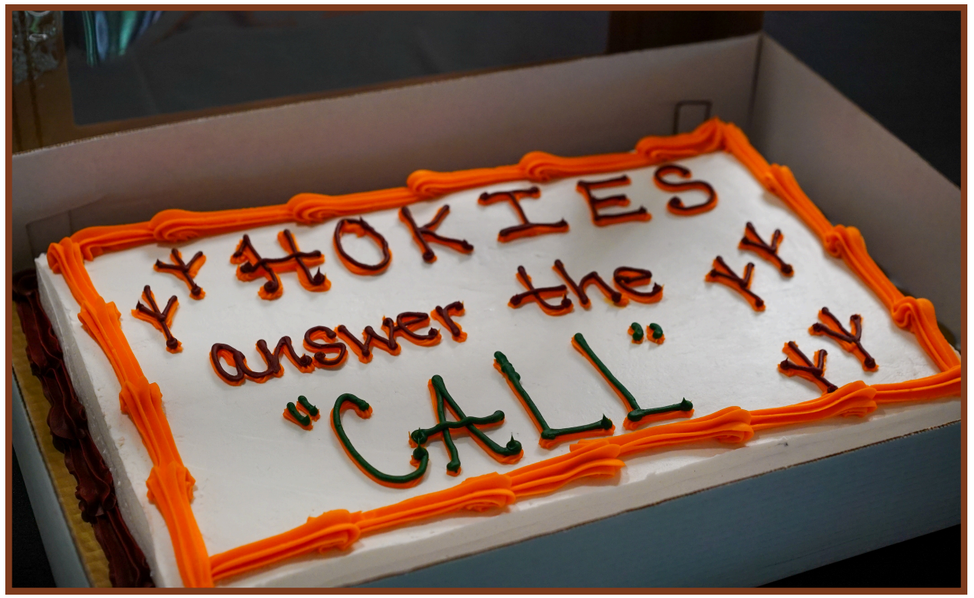
Table 2 Cont.
Facilitated Activity Responses

VT CAC Goal	Operational/Administrative	Academic
Goal 12: *Diminish barriers to sustainable behaviors through institutional change, education, and campus culture*	• Train student leaders; internal trainings for faculty/staff • Increase signage to educate and spread awareness • Partner with LLCs and other campus groups; create an on-campus LLC focused on sustainability • Collect recycling at tailgates	• Incorporate sustainability as a core value of VT in First Year Experience (FYE) courses; implement sustainability-related projects • UH 3204 to support a project each semester • Incorporate sustainability into ALL design and planning studios capstones • Create a paid faculty training program so they may learn how to incorporate sustainability into curriculum
Goal 13: *Implement VT CAC at high level of university administration and governance, by integrating goals and stakeholder engagement*	• Stakeholder (vendor) communication: goals and expectations • Appoint a high-level “Chief Sustainability Officer” • Adopt Urban Forest Master Plan and tree policy • Continue to build out of CASEC subcommittees	• Faculty senate • CALL faculty group to write letters/templates for senates
Goal 14: *Develop innovative budgeting and financing to generate funding and staffing to achieve CAC goals*	• “Green free” strategic plan goal • University wide collaborations • Term PPA solar contract • Drastically increase funding; utilize Giving Day to connect with alumni • Maintain open communication with VT Budget and Finance; establish a sustainable finance committee • Corporate network funding	• Vision 2030-2047
Goal 15: *Develop pathways after 2030 to eliminate fossil fuels and carbon offsets by 2050*	• Purchase solar power credits to offset carbon emissions	• Utilize Honors SuperStudio • EEP Capstone Studio • CSE Pathways Minor Capstone

Table 2 Cont.
Facilitated Activity Responses

CONCLUSION

Throughout this year, the Honors Service Learning courses developed the framework for the CALL at Virginia Tech, as outlined in the VT CAC. The CALL will work to build a sustainable and equitable future for our campus through service work, experiential learning, and collaboration between students, faculty, and staff. Through our work this year, from completing the various project components (CALL Peer Benchmarking & Alignment, CALL Peer Benchmarking Extension, CALL Communications Plan, CALL Showcase, CALL Project Menu and Staff Priorities, CALL Project Spotlights, and CALL Faculty Toolkit), meeting and collaborating with mentors, and participating in field trips, we have been able to learn about and participate directly in the CALL, fostering its development. Our project components all play key roles in the development of the CALL's framework through a transdisciplinary, community-engaged service learning opportunity, providing a foundation for future students to build upon. We hope that this report can support the Office of Sustainability and CASE Team and serve as an example across the university and beyond.



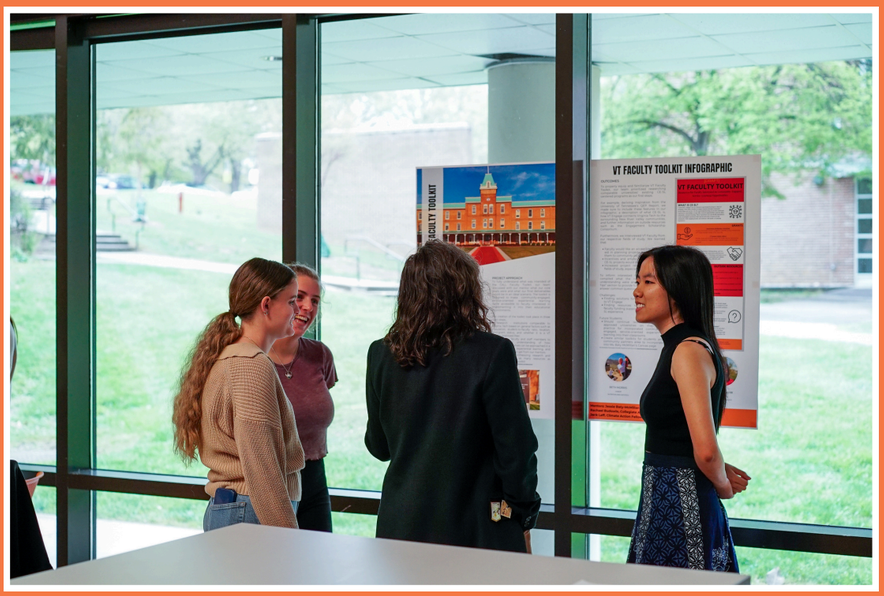
Cake for the CALL Showcase; *Credit: Erin Deitzel*

Photos from the CALL Showcase event; Credit: Erin Deitzel

Dean Knox Introduces the Showcase

Reagan Armstrong, Cade Young, and Molly Meehan present their Peer Benchmarking Extension Project to Stephen Durfee

Beth Morris, Grace Vaughan Sacks, and Ashley Lauw present their Faculty Toolkit project to Jessica Baty-McMillan



Simona Fried and Dr. Sean McGinnis present VT's greenhouse gas emissions inventory

Photos from the CALL Showcase event; Credit: Erin Deitzel

Faculty Panel featuring Dr. Ron Meyers, Dr. Ralph Hall, and Dr. Rachael Budowle

Catherine Resta and Sofia Quilaqueo stand with their CALL Project Spotlights poster

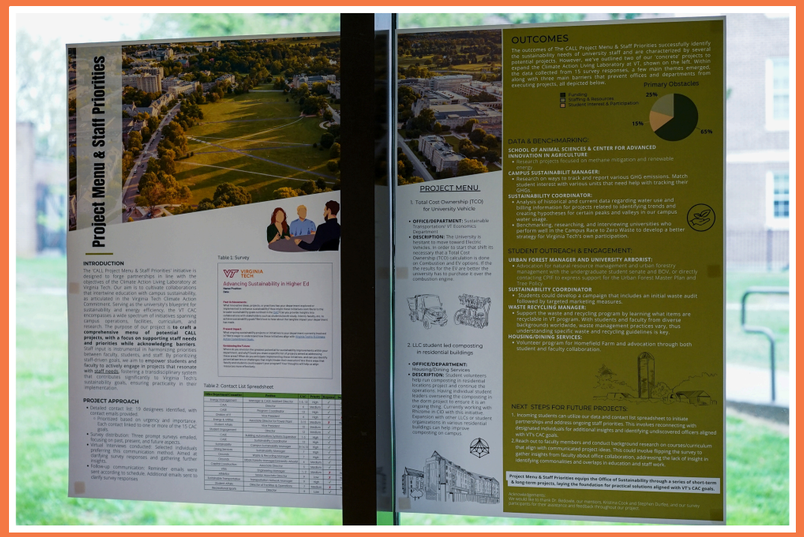
Jessie Baty-McMillan introduces the Facilitated Activity

Emily Williams and Rachael Budowle add responses during the Facilitated Activity

Photos from the CALL Showcase event; Credit: Erin Deitzel

Group discussion following the Facilitated Activity

Student poster on CALL Project Menu & Staff Priorities



Participants discuss their responses together

Emily Vollmer and Nathan King participate in the facilitated activity

Photos from the CALL Showcase event; Credit: Erin Deitzel

Kristina Cook talking with Dr. Ron Meyers and Dr. Ralph Hall after the facilitated activity

CALL interns Charlotte Cullen and Bella O'Brien-Gonzalez present their project poster to Jack Leff

Alex Sing (of UH 3204 Fall 2023 course) writes responses during the facilitated activity

Dr. Todd Schenk delivers closing remarks

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