Second Nature

Higher Education Complementarity for Climate Action

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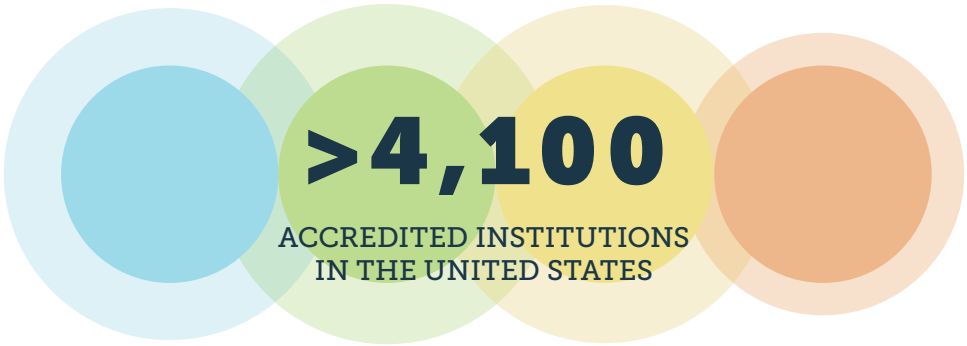
I. Executive Summary

Mitigating and adapting to the impacts of global climate change requires a whole-of-society solution. All sectors need to utilize resources in the most effective and efficient way possible if progress is to be made at the magnitude and speed that is necessary. This is true for higher education as well, as it has vast opportunities to harness the diverse strengths within the sector to expedite climate solutions. A scaled, whole-of-higher-education approach to climate action involves network designs that identify complementary strengths across institution types and personnel roles. This paper showcases the varied approaches, responsibilities, and actions undertaken by institutions across classifications and affinities in addressing climate challenges. It also considers the dynamics of different individual roles within higher education institutions that drive action.

This publication is designed as an inspirational and foundational resource for those working within higher education institutions and those from outside the sector - to facilitate learning and better collaboration among institutions and individuals. We hope this publication enhances those synergies by identifying how complementary strengths can foster collaboration and partnerships for more effective climate action.

II. Higher Education Institution Types

The higher education sector plays a crucial role in shaping the economic, social, and political landscape of a nation. There are more than 4,100 accredited institutions of higher education in the United States, ranging from very small specialized institutions, to sprawling research campuses. The diversity of these institutions serves as the foundation of academic excellence, research and innovation, cultural diversity, and critical thinking skills of the next generation of leaders. There is a college or university for every student - whether they are gaining skills for the clean energy workforce, researching new technologies to solve the biggest challenges of our time, or taking online courses while in the later stages of their career. While the first part of this paper addresses the primary institution types in the Carnegie Classification system, we recognize that there are limits to general categorizations. All of the more than 4,000 institutions of higher education in the United States serve distinct roles in their communities and appeal to different types of students – nuances not entirely captured by Carnegie descriptions. We do think it is helpful, however, to understand how the typology provided by Carnegie helps us generally consider how the major classifications can complement one another.



Challenges across all institution types

The higher education sector faces myriad challenges today across all types of campuses. There is a decline in student enrollment attributed to **demographic shifts** and for many tuition-driven institutions this creates significant financial stress. Many public universities grapple with **reduced state funding**, which also impacts their financial sustainability. Overall trust in higher education has declined due to concerns about **affordability**, **accessibility**, and **perceived politicization**.

Rising tuition costs, coupled with **student debt burdens**, have disillusioned many students and parents. There is also a disconnect between the conventional academic model and today's **workforce demands**, raising questions about the **relevance** of traditional higher education. As international programs strengthen, lower world rankings for American institutions pose a **reputational challenge**, while a notable decline in international student enrollments further compounds the sector's global competitiveness and diversity.

Addressing these issues is crucial for higher education institutions' continued success and viability. One way to demonstrate competitiveness, relevance, and value to prospective students is through rigorous and meaningful climate programs that cut across many of these challenges.

Masters Colleges and Universities

Masters Colleges and Universities primarily focus on **undergraduate education anchored in a regional identity**, making them instrumental in shaping the next generation of climate-conscious citizens. They emphasize **teaching and integration of climate principles into various academic disciplines**.

These institutions excel in climate education and community engagement. They often incorporate climate-related programs into their curricula, enabling students to develop a deep understanding of issues within their regional contexts. Their commitment to teaching often results in a strong connection between faculty and students, fostering mentorship and collaboration on climate projects. Moreover, their size and accessibility within a regional economy enables them to **shape climate programs specific to their geographic context** as many of the students are recruited regionally and stay in the region after graduation.

Baccalaureate Colleges (Liberal Arts Colleges)

Baccalaureate institutions are known for their **small size and focus on a liberal arts education** - providing students with a well-rounded education, including a strong emphasis on critical thinking, ethics, and civic responsibility. This prepares graduates to be informed and proactive advocates for climate action no matter what career path they may enter. Baccalaureate colleges often offer **interdisciplinary environmental studies programs**, facilitating a comprehensive understanding of climate challenges. These institutions are successful in fostering a sense of stewardship among students and frequently engage in local conservation and advocacy efforts.

Many Baccalaureate Colleges are also considered "Liberal Arts" colleges, but it is important to note that not all are. Baccalaureate colleges may offer a more diverse range of programs, including professional degrees, while Liberal Arts colleges prioritize a holistic education in the liberal arts and sciences.

Doctoral Universities

Doctoral universities, whether public or private, play a crucial role in advancing climate action. Their research-intensive environments are instrumental in driving innovative solutions and technologies for mitigating climate change.

These institutions have **well-established research programs** that contribute to climate solutions by conducting research in many different areas such as renewable energy, climate science, policy and economics, and sustainability. They often have **substantial resources for climate initiatives**, including state-of-the-art laboratories and access to research funding. Additionally, the size of their **diverse student bodies** and interdisciplinary programs allow for a holistic approach to addressing climate challenges.

Associate's Colleges (Community Colleges)

Associate's colleges, including community and technical colleges, play a pivotal role in climate action by offering **accessible and affordable education to a diverse student population**, including many first-generation students and non-traditional learners. They provide numerous climate career pathways by equipping students with **practical skills in the clean economy**. They also serve as a foundation for climate education programs for those students looking to transfer to a similar program at a four-year institution.

Community colleges often provide **specialized training programs** in renewable energy, sustainable construction, and environmental technologies, addressing workforce demands in the green sector. Their focus on **serving local communities and sourcing students from local communities** allows them to directly impact regional sustainability initiatives. Additionally, they embrace practical, hands-on climate projects and often serve as valuable resources for local environmental education and outreach.

For more information about these Carnegie Classifications, see the Appendix

III. Complementarity and Compatibility

OVERVIEW

Articulating the difference and diversity in institution types and roles is valuable for unifying higher education's climate action if this can lead to opportunities for collaboration. In this section, we will discuss how to apply principles of complementarity and compatibility across some of the major Carnegie institution types described in **Section II**. These descriptions provide a framework for institution types to more effectively and efficiently understand how they can mobilize all of the higher education sector's assets to meet society's climate goals, not just those that are found at their own institution. It also provides insights to those outside of the higher education sector on ways they may want to partner with institutions based on these diverse strengths.

We are not attempting to represent every single institution type that exists, or suggest that the current climate practices in higher education reflect intentional designs that maximize these collaborative opportunities. Instead, we are looking forward to a future, better state for the sector where not every institution invests in all climate actions equally, as that does not need to be the case in order for society's climate goals to be met. In fact, it may be counterproductive for certain institution types to attempt climate activities that they are not set up to do efficiently or effectively.

We describe the conceptual basis for this approach, and then use a series of vignettes to illustrate how different institution types may put these concepts into practice around climate solutions according to five distinctive areas: research, student experiences, community connections, workforce development, and public-private partnerships.

COMPLEMENTARITY, COMPATIBILITY, AND COOPERATION: BASIC CONCEPTS

When different organizational strengths are expressed by two or more independent institutions working in the same topical space, it is easy to assume that it is intrinsically beneficial for these institutions to figure out ways to work together. If a company runs a ski instruction business, but doesn't own any ski mountains, it will probably figure out how to work with another company who does own a ski mountain so that they both benefit. This type of complementarity is commonly referred to as the **"resource-based view"** of organizational cooperation[1] and is a quite common experience in private sector industries.

Research has also shown that in addition to complementarity, for strong institutional partnerships to form, they also need to exhibit *compatibility*[2]. This may not seem to logically follow from the resource-based view of complementarity and cooperation, but without some foundational shared institutional characteristics around organizational structure, language, values, and culture, there is little chance that institutions will collaborate. Sticking with our example, an SAT tutor won't collaborate with that ski mountain because they don't share anything in common.

Higher education institutions, particularly in the United States where there are over 4,100 institutions, exhibit many characteristics of both complementarity and compatibility which position them well for collaborative activity. Specialized pieces of climate research equipment are often

1 Beerkens, E., & van der Wende, M. 2007. The paradox in international cooperation: Institutionally embedded universities in a global environment. Higher Education 53: 61-79.

2 Williams, J. (2017), "Collaboration, alliance, and merger among higher education institutions", OECD Education Working Papers, No. 160, OECD Publishing, Paris, https://doi.org/10.1787/cf14d4b5-en.

under the control of research universities and other institutions who are looking to access this equipment can enter into partnership agreements to benefit from the investment that the large institutions have already made. Given that many of the masters and associates colleges source their student populations from close regional geographies and many of these graduates end up staying in the region, the community connectedness from this student "service area" is a key strength. Other institutions from outside the region may be looking to disseminate knowledge or test interventions in these surrounding communities, so they may find collaborative opportunities in partnering with masters and associates colleges that have highly embedded credibility from this flow of students.

While higher education exhibits diversity in these resource-based areas, they also exceed a minimum threshold for compatibility in their core missions and characteristics. For example, even though there is large variation in how students, faculty, departments, schools, institutes, etc., are configured, there is significant conceptual alignment around these roles and structures in nearly every institution's educational mission. Local geographies provide an additional element of compatibility, and many examples of multi-institutional climate initiatives take place in a highly concentrated geography such as a city or urban area.

One key limitation to functional complementarity is that oftentimes, while institutions understand at a conceptual level that there are different strengths between institution types, most are still heavily siloed within their internal structures. Individuals barely know what resources are within their own institutions, let alone what the distinctive resources are at other institutions that might be accessible and could be used in complementary ways. While this knowledge gap will always be a challenge, it can be overcome with clear and consistent inter-institutional communications. In metropolitan areas, for example, this can take the form of **inter-institutional working groups** that form around a city's articulated goal, like a city-wide climate action plan. In both **Pittsburgh** and **Boston**, place-based higher education collaboratives have helped their cities meet various parts of the government's climate plan with different institutional types and strengths being represented within the working groups. There is also an opportunity to refine online tools, such as **asset maps** or resource guides that have been developed regionally, to help institutional stakeholders, or stakeholders outside of higher education, quickly and efficiently understand where the general distinctions between institution types exist.

COMPLEMENTARITY AND COMPATIBILITY FOR CLIMATE ACTION ACROSS INSTITUTION TYPES

While the basic concepts of complementarity, compatibility, and cooperation among higher education institutions can be generally understood, applying these ideas across the major institution types to climate action areas is a relatively novel exercise. Instead of relying on case studies, we demonstrate this potential through a series of vignettes that can provide examples and visual representations of how institutional complementarity and compatibility can help align and unify the sector's strengths to accelerate climate action. We do this in five areas:

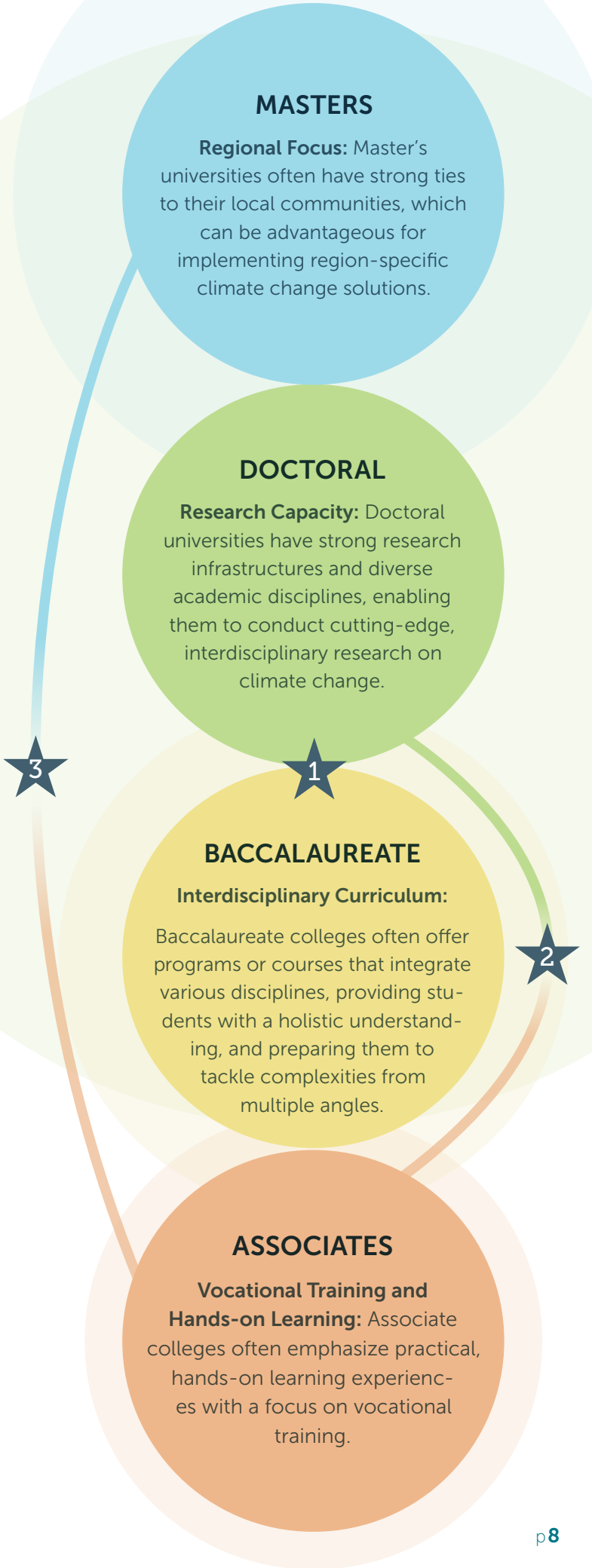
- **research**,
- **student experiences**,
- **community connections**,
- **workforce development**, and
- **public-private partnerships**.

Our hope with these vignettes is that we'll spur new thinking about the ways that higher education institutions, and the higher education sector as a whole, can use its diverse strengths in more effective and efficient ways.

Research

VIGNETTE #1

In the Pacific Northwest, a pioneering research collaboration has emerged among Evergreen Research University, Cascade Liberal Arts College, Pacific Technical College, and Northwest Regional State University to forge a comprehensive strategy against climate change. Evergreen Research University historically had been viewed as the leader with a basic climate and scientific research groundwork for climate solutions, but hadn't focused on how this new knowledge was being translated in the real world. ★1 Cascade Liberal Arts College enriched this foundation by partnering with Evergreen to weave climate change research into its interdisciplinary curriculum, emphasizing policy and societal engagement with students from across disciplinary majors. ★2 Pacific Technical Institute adapted its vocational training to spotlight the research underlying renewable energy technologies, transforming Evergreen's research into practical, hands-on solutions that could be deployed in the region. ★3 Northwest Regional University, using the place-based ethos of regional comprehensive universities with a strong focus on community collaboration and sustainability, crafted a specialized program in climate change adaptation and mitigation. This initiative combined academic rigor with real-world applicability, preparing students to spearhead effective climate response strategies in their hometowns across the northwest. Together, these institutions built off the research foundation to create a dynamic network, combining education and practical implementation to drive regional climate action.



Student experiences

VIGNETTE #2

In the Southwest, Desert Bloom Baccalaureate College spearheads a student-driven climate action initiative, co-created with the faculty during a student-initiated "year of climate." Students from all majors across the campus worked on shared climate projects like solar installations and water-efficient landscaping that provided neighborhood residents energy, shade, and connection to native landscapes. 1 This experience broadens as Desert Bloom students team up with Cactus Ridge Community College, integrating technical sustainability skills with interdisciplinary learning through joint workshops and projects. 2 The initiative deepens with input from Sun Valley Research University, where researchers and graduate students engage with the community sites established by Desert Bloom to deploy new technology provided for free to the residents and providing critical new data on renewable energy research, adding scientific depth to the projects. 3 Finally, a collaboration with Sierra Vista State University is formed around internships and policy workshops, where masters students from Sierra Vista, who grew up in the region, are drawn to their management program because their lived experiences have demonstrated the economic challenges of implementing these climate solutions. This multifaceted educational journey, rooted in the liberal arts ethos of Desert Bloom and extended through inter-institutional partnerships, equips students, faculty, and administration with a comprehensive understanding of climate action, showcasing the effectiveness of a holistic and applied student approach to address the complexity of climate issues.

MASTERS

Practical Engagement: Masters universities offer hands-on learning through internships and policy workshops and often draw students from the region with community ties and interests.

3

DOCTORAL

Research Opportunities: Doctoral universities offer students extensive research opportunities in climate action initiatives. This includes conducting fieldwork, data analysis, and collaborating with faculty on cutting-edge research projects.

2

BACCALAUREATE

Community Engagement: with strong ties to their local communities, students engage in community-based climate action projects that foster collaboration and a sense of shared responsibility for addressing climate change.

1

ASSOCIATES

Experiential Education: allows students to apply classroom learning to real-world issues through projects, workshops, and partnerships. Students develop critical thinking and problem-solving skills necessary for effective climate action.

Community connections

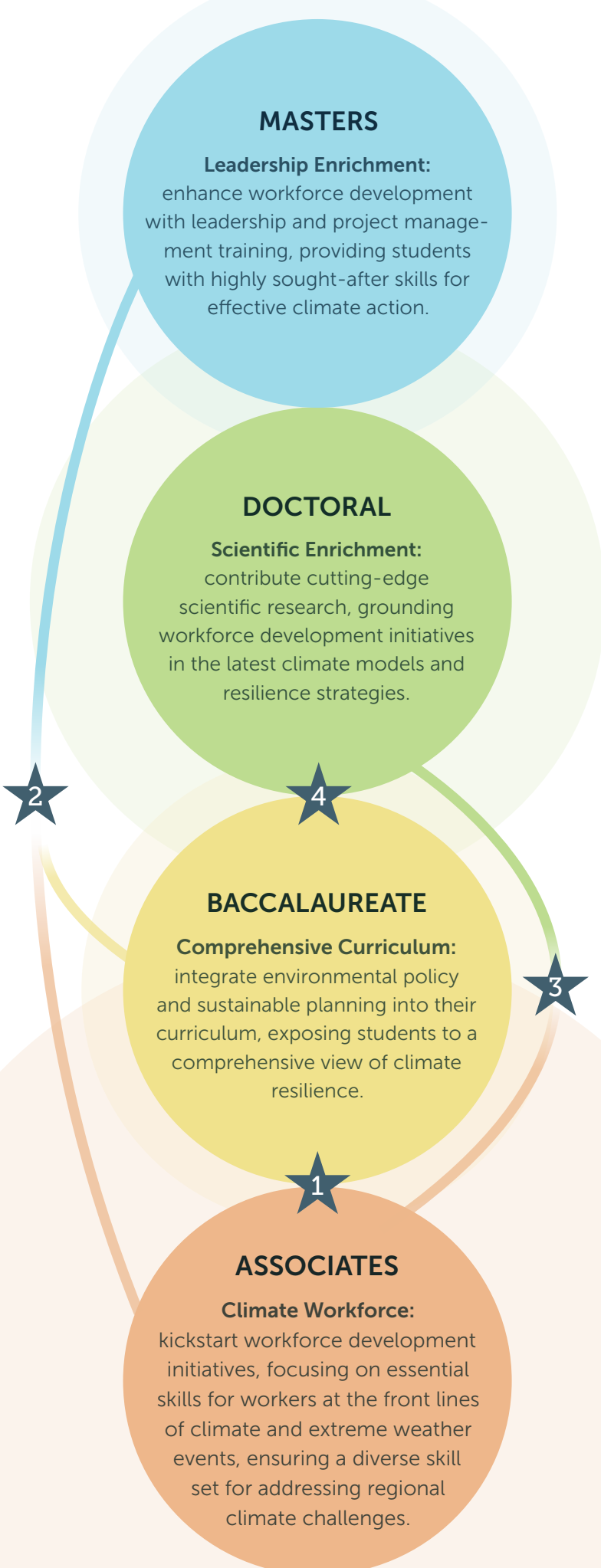
VIGNETTE #3

In the Midwest, a groundbreaking climate action initiative emerges, led by Riverbend Community College with its innovative green technology workforce programs. With a long-established and flexible curriculum focused on a suite of green technologies co-developed with industry partners in building technology and agrivoltaics, Riverbend students apply their technical training directly to local challenges. 1 This work inspires Willowbrook Baccalaureate College students, who find workforce connections to their training in environmental policy and social sciences, conducting workshops that elevate community engagement and policy-making that the governor's office then permanently incentivizes in its annual budget. 2 The momentum builds as Prairie Fields University steps in to offer research capacity to further enhance the projects creating collaborative studies on green roofs and climate adaptation and bridging academic research with practical application. 3 Midwest State University rounds out the partnership, with its master's students contributing leadership and project management skills, a direct application of their in-class experience. They not only support the ongoing projects but also connect with wider environmental networks in the community, broadening the initiative's impact. This collective effort across educational levels showcases a model for community-based climate solutions, leveraging the strengths of associates colleges, baccalaureate colleges, doctoral universities, and masters institutions.

Workforce development

VIGNETTE #4

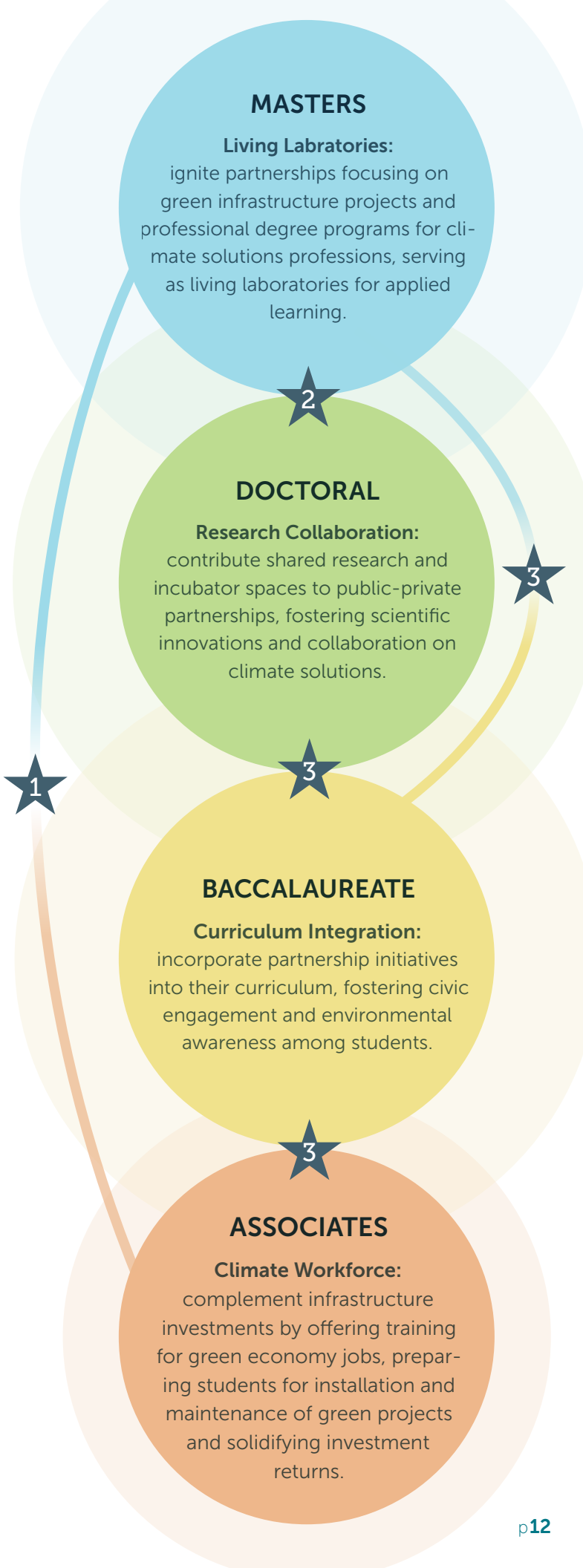
In the Southeast, Coastal Technical Community College kickstarts a climate workforce preparedness initiative, focusing on essential skills for workers at the front lines of helping communities recover from climate and extreme weather events such as rising sea levels and hurricanes. [1] This effort quickly expands, drawing in Southern Pine Baccalaureate College, which integrates environmental policy and sustainable planning into its curriculum for all of its students, exposing these students to a comprehensive view of climate resilience that spans technical, social, and policy dimensions in addition to the on-the-ground responses. [2] Gulf Coast Masters University, an HBCU, joins the initiative, enhancing it with leadership and project management training within its highly sought-after environmental sustainability degree as many of the students in this program are from the region and have first-hand lived experiences of these events. [3] Atlantic Research University contributes cutting-edge scientific research, grounding the initiative in the latest climate models and resilience strategies. This collaboration enriches the training programs at Coastal Technical and [4] Southern Pine, ensuring they are scientifically robust and innovative and the cross-institutional effort forms a complete climate workforce preparedness pathway, equipping a new generation of professionals with a diverse skill set for addressing the Southeast's climate challenges, and paving the way for a resilient and sustainable future for the region.



Public-private partnerships

VIGNETTE #5

In the Northeast's urban landscape, Metro Green Masters University ignites a public-private partnership for climate action, focusing on land the University has owned within the city that is part of the city's neighborhood revitalization plan. The plan supports green infrastructure projects like rooftop gardens, permeable pavements, and net zero buildings, which also serve as a living laboratory for Metro Green's growing professional degree program for climate solutions professions. ★1 Industrial Tech Community College complements this infrastructure investment by offering training for the installation and maintenance of these green projects, preparing their students for the green economy jobs that also are providing solid investment returns. ★2 Urban Research University adds to the collaboration with a shared research and incubator space in the same revitalization zone, where scientific innovators and climate entrepreneurs can collaborate on new ideas. ★3 Meanwhile, Cityscape Baccalaureate College incorporates these initiatives into its curriculum, fostering civic engagement and environmental awareness among students as they live, work, and study in the area. This partnership exemplifies a comprehensive approach to urban sustainability, combining the strengths of academia and the private sector to promote climate action, economic growth, and community well-being.



IV. Affinity Classifications

While Carnegie classifications divide institutions according to the types of degrees granted and amount of research produced, there are other "affinity" classifications that refer to institutions serving specific demographics. The categories below are all Minority Serving Institutions (MSIs). MSIs are traditionally defined in one of two ways: by historical designation or by enrollment. Historically defined MSIs were established with the express purpose of providing access to higher education for a specific minority group. Others are federally designated based on student enrollment demographics and institutional expenditure thresholds.

TRIBAL COLLEGES AND UNIVERSITIES (TCUs)

Tribal Colleges and Universities (TCUs) play a significant role in climate action and their unique perspectives on environmental stewardship fosters a holistic approach to the climate change challenges faced by Indigenous communities. TCUs often integrate traditional knowledge and cultural perspectives into their curricula and research. Indigenous communities have a deep connection to the land and ecosystems, and TCUs leverage this traditional wisdom to inform climate-related initiatives. They prioritize community engagement, involving local Indigenous communities in climate action planning and initiatives. TCUs recognize the interconnectedness of language, culture, and the environment and make efforts to preserve and revitalize Indigenous languages that contribute to the transmission of traditional ecological knowledge and reinforce the importance of sustainable relationships with the environment. TCUs can be located in remote areas and may face logistical challenges in terms of accessibility and transportation.

TCUs are chartered by tribal governments and primarily serve Native American populations. In 2016, there were 34 Tribal Colleges and Universities (TCUs), enrolling 16,677 undergraduate students. Of these, 25 (73.5 percent) were public two-year colleges. American Indian or Alaska Native students represented the majority of undergraduate students enrolled at TCUs.

Note: TCUs are different from Native American Serving Non-Tribal Institutions (NASNTI). NASNTIs have an undergraduate enrollment of at least 10 percent Native American students. NASNTIs are not controlled by tribes, but they serve a percentage of American Indian and Alaska Native students. The organization that supports TCUs is the **American Indian Higher Education Consortium**.

HISTORICALLY BLACK COLLEGES AND UNIVERSITIES (HBCUs)

Historically Black colleges and universities (HBCUs) are institutions that were established prior to the Civil Rights Act of 1964 with the principal mission of educating Black Americans. With a rich history dating back to the mid-19th century, these institutions have played a vital role in providing access to higher education for African American students and have served as centers for academic excellence, cultural preservation, and community empowerment within the African American community. HBCUs play an important role in climate action by addressing environmental justice issues and fostering diverse perspectives on sustainability. HBCUs excel in environmental justice research and are often at the forefront of addressing environmental disparities in marginalized communities. Climate action projects at HBCUs are often community-focused, engaging local populations to tackle sustainability issues. These institutions

offer diversity-focused climate education programs that inspire future leaders to address environmental challenges from an inclusive and equitable standpoint. Many HBCUs are classified as Baccalaureate, Master's, or Doctoral institutions.

In 2016, Black or African American students represented the majority of undergraduates enrolled in the nation's 107 HBCUs. Almost three-quarters of all undergraduate students enrolled at HBCUs were Black (73.8 percent). Over one in 10 (11.4 percent) were white, and 5.1 percent were Hispanic or Latino. The remaining 9.7 percent were from other backgrounds, including 2.5 percent who were international students. The organization that has historically supported HBCU's is **UNCF**.

PREDOMINANTLY BLACK INSTITUTIONS (PBIs)

Predominantly Black Institutions (PBIs) are institutions that were founded after 1964 and meet a number of criteria defined by federal statute, including having at least 40% African American students. Similar to HBCUs, PBIs play a vital role in climate action by addressing environmental justice issues and fostering diverse perspectives on sustainability. In 2016, the 104 PBIs enrolled over 403,982 undergraduate students—more than half (53.8 percent) were public two-year colleges. Black or African American students represented nearly half of all students enrolled at PBIs. PBIs excel in environmental justice research and are often at the forefront of addressing environmental disparities in marginalized communities. They also provide unique perspectives on sustainability, taking into account diverse cultural backgrounds and experiences.

While both HBCUs and PBIs serve a significant Black student population and contribute to the advancement of Black education, HBCUs have a distinct historical mission rooted in addressing historical injustices and segregation. The number of HBCUs does not change. PBIs represent a broader classification based on student demographics without necessarily having the same historical context, and the numbers of PBIs can fluctuate based on enrollment demographics. The organization that supports PBIs and HBCUs is the **National Association for Equal Opportunity in Higher Education**.

HISPANIC SERVING INSTITUTIONS (HSIs)

Hispanic Serving Institutions (HSIs) are at the forefront of efforts to increase educational access and success for the nation's Hispanic population. HSIs are defined under the Higher Education Act (HEA) as colleges or universities where at least 25% of the undergraduate, full-time enrollment is Hispanic, and at least half of the institution's degree-seeking students must be low-income. One of the fastest-growing classifications, HSIs represent 16% of all higher education institutions and serve 65% of all Hispanic students. The cultural focus within HSIs is leveraged to implement initiatives that resonate with the community of their students and faculty, fostering a sense of ownership in addressing environmental challenges. With strong ties to local communities, HSIs engage in community outreach, promoting environmental awareness, sustainable practices, and community resilience. In 2016, there were 375 HSIs enrolling about 3.5 million undergraduate students. Of this number, almost half (48.5 percent) were public two-year colleges. Hispanic or Latino students represented just under half of all students enrolled in HSIs. The organization that supports HSIs is the **Hispanic Association of Colleges and Universities**.

ASIAN AMERICAN AND NATIVE AMERICAN PACIFIC ISLANDER SERVING INSTITUTIONS (AANAPISIs)

Asian American and Native American Pacific Islander Serving Institutions (AANAPISIs) are defined under the Higher Education Act (HEA) as colleges

or universities with an undergraduate enrollment that is at least 10 percent Asian American and Native American Pacific Islander. Additionally, at least half of the institution's degree-seeking students must be low-income. In 2016, there were 120 Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs) enrolling over 1.3 million undergraduate students. Of this number, 54 were public two-year colleges. Across all AANAPISIs, Asians and Native Hawaiians or other Pacific Islanders represented nearly one in five undergraduate students. This relatively new classification, established by Congress in 2007, has broadened opportunity for underserved AA and NHPI communities, many of whom are low income and the first in their families to attend college. The AANAPISI designation is lesser known than HSIs and HBCUs, and this lack of awareness may be rooted in the pervasive "model minority" myth, that wrongly portrays Asian American and Native Hawaiann and Pacific Islander communities as uniformly affluent, high achieving and facing fewer socioeconic hurdles than other minority groups. In reality, this myth has led to oversimplified depictions of AA and NHPI individuals in higher education, obscuring significant disparities in student outcomes and experiences. There isn't one singular organization that supports all AANAPISIs, but the **National Council of Asian Pacific Americans** serves to represent the interests of the greater Asian American (AA) and Native Hawaiian Pacific Islander (NHPI) communities and to provide a national voice for AA and NHPI issues, including education.

V. Roles and Collaborations

A campus's commitment to climate action benefits from the active engagement of multiple roles and functions across the institution. Climate action efforts are not the sole responsibility of sustainability offices or departments, but involve a collaborative approach that incorporates diverse perspectives from across the campus community. Presidents and chancellors set the tone for an institution's commitment to climate action through signing decarbonization commitments, strategic leadership, and fostering a sense of shared responsibility across all the campus communities. Administrators can advance climate-friendly policies, manage resources efficiently, and invest in physical climate solutions like energy efficiency or renewable energy. Facilities and operations teams play a pivotal role in adopting climate-forward infrastructure and practices. Academic departments can integrate climate and sustainability principles into the curriculum and research. Student organizations and advocacy groups bring enthusiasm and innovation to climate initiatives, mobilizing the campus community to act faster and farther than they would otherwise.

When these various roles on campus share a commitment to climate action, the impact is more comprehensive and lasting and creates a campus culture where a responsibility to climate action is woven into the fabric of daily operations, academic pursuits, and community engagement.

SUSTAINABILITY STAFF

The sustainability profession has evolved significantly on campuses, particularly over the last 15 years. Today, sustainability professionals on campus are pivotal in stewarding climate initiatives and priorities. This leadership role ensures the integration of climate action and sustainable practices in campus operations, the inclusion of sustainability activities in student experiences, and the development of campus-wide policies that demonstrate a campus's climate leadership. With the authority to implement comprehensive strategic initiatives, sustainability professionals facilitate collaboration across departments, engage stakeholders, and navigate complex sustainability challenges. Their expertise is instrumental in developing and achieving climate mitigation goals, fostering a culture of shared responsibility, and positioning the institution as a climate leader. The organizations supporting these professionals include **Second Nature** and the **Association for the Advancement of Sustainability in Higher Education**.

Chief Sustainability Officers (CSOs)

CSOs are responsible for overseeing the overall sustainability strategy and initiatives of the university. They are situated closer to the cabinet-level in campus leadership and work to provide leadership and direction.

Sustainability Directors/Managers/Coordinators

These positions are responsible for overseeing day-to-day sustainability operations, managing sustainability programs, and coordinating efforts across different departments to achieve sustainability goals.

Integrated Sustainability/DEI Positions (Diversity, Equity, and Inclusion)

These collaborative positions combine sustainability and DEI practices to promote justice and equity on campus and in the community.

PRESIDENTS

University presidents, chancellors, and system heads have pivotal roles in driving climate action on campus. They are responsible for prioritizing a clear climate and sustainability vision and strategy, allocating institutional resources to support climate initiatives, and championing climate and sustainability efforts both within and outside the institution. Leading by example, they can influence the entire campus community and demonstrate a strong commitment to action to mobilize others throughout the organization's hierarchy. The organization supporting these professionals depends on the institution type and includes the **American Council on Education**, the **Association of Public and Land-Grant Universities**, the **National Association of Independent Colleges and Universities**, the **Association of State Colleges and Universities**, and the **American Association of Community Colleges**.

FACULTY

Faculty are academic professionals responsible for teaching, conducting research, and contributing to the intellectual and institutional life of the university. They typically hold advanced degrees in their field of expertise and may have different ranks, including professors, associate professors, and assistant professors.

Faculty members, regardless of tenure status, play crucial roles in supporting climate action on campus by integrating sustainability into their courses and curriculum, conducting climate-related research, providing guidance and mentorship to student sustainability initiatives, actively participating in campus climate and sustainability efforts, collaborating with local communities on climate and sustainability issues, and advocating for climate action and environmental stewardship at local, regional, and national levels. An organization supporting these professionals overall is the **American Association of University Professors** and many of the faculty belong to discipline-specific societies.

STUDENTS

Students have the potential to drive meaningful change on campus and beyond in the fight against climate change. Their influence can extend far beyond their time as students as the impact of these formative years for students in higher education can produce a lifelong commitment to climate action in their personal and professional lives. As students, their role in climate action on campus involves advocating for climate awareness and sustainable practices, participating in sustainability organizations, conducting climate-related research and projects, educating peers, and embracing eco-friendly personal practices. There are a number of organizations that focus on student climate advocacy including, **Our Climate**, **350.org**, and the **Sunrise Movement**.

ALUMNI

By leveraging their networks and influence, alumni can raise awareness and advocate for sustainable practices at their alma mater. Alumni networks serve as a powerful platform for collaboration, enabling the pooling of resources and mobilization of awareness among a strong affinity group for impactful climate projects. Those with expertise in relevant fields can contribute to research and innovation, while others in influential positions can shape policies and fundraising practices. Alumni can mentor students, advocate for policy changes including divestment, and engage in community initiatives. The organizations supporting these professionals depend on the institutions' type and include **Council for the Advancement and Support of Higher Education (CASE)**.

OTHER ADMINISTRATIVE STAFF

The campus professionals below also play an important role in advancing climate action on college and university campuses.

Alumni and Development Officers

Alumni and development officers leverage financial support, build networks, engage alumni in sustainability initiatives, and promote environmentally responsible practices within the university community. The organization supporting these professionals is the **Council for the Advancement and Support of Higher Education (CASE)**.

Finance and Business Officers

Chief Financial Officers (CFOs) and Chief Business Officers (CBOs) direct financial resources, shape long-term investment strategies, manage financial risks, and integrate climate action into the institution's overall business operations. Their leadership is crucial for ensuring that climate priorities are not only a goal but also a financially sound and integral aspect of the university's mission. The organization supporting these professionals is the **National Association of College and University Business Officers (NACUBO)**.

Investment and Endowment Officers

Investment and endowment officers shape investment strategies that align with sustainable practices. Their decisions not only contribute to the fight against climate change but also have significant implications for the long-term financial health and reputation of the institution. The **Intentional Endowments Network** is an organization focused on intentionally designed endowments – those that seek to enhance financial performance by making investments that advance an equitable, low-carbon, and regenerative economy.

Facilities and Planning Professionals

Facilities and planning professionals integrate climate priorities into campus infrastructure, operations, and development. Their decisions and initiatives have a direct impact on the environmental footprint of the institution and contribute to the overall commitment to a more sustainable and resilient campus environment. The professional associations supporting these roles are **APPA: Leadership in Educational Facilities** and the **Society of College and University Planning (SCUP)**.

Trustees and Governing Boards

Trustees and governing boards play a crucial role in advancing climate action at colleges and universities due to their oversight, policy-setting, and strategic decision-making responsibilities. One of the professional organizations that supports this group is the **Association of Governing Boards (AGB)**.

COMPLEMENTARITY OF INSTITUTIONAL ROLES

The research is less clear about theories to drive complementarity and compatibility between roles within higher education. Studies have focused on the tradeoffs and complementarity of the types of work within academic positions (e.g. do research activities enhance or detract from that same person's teaching activities?) finding some beneficial complementarity between the different functions[6]. In these cases, resources (including knowledge and time) involved in performing one task also can be used in the execution of another, and this functional complementarity has a beneficial spill-over effect until the different work demands begin competing with each other[7]. People simply don't have the time to do everything.

We can apply similar principles by way of analogy as we do with the institutions, even if they may not be as functionally significant for informing collaborative work on climate issues. Any organization will have specialization between the different roles, like what is identified in **Section V**. What makes higher education institutions distinct is that they contain a system of distributed governance that creates a significant divide particularly between the administrative and the academic sides of the institutions. In general, the administrative side includes the offices of presidents, finance and administration, student affairs, athletics, and operations. The major parts on the academic side include the offices of the provost, research, academic affairs, colleges, and academic departments. Even though every role individually has different strengths, responsibilities, and job performance incentives, it is this larger divide between the academic and non-academic positions that shows the most promise for applying principles of complementarity as shown in **Table 1**.

Table 1

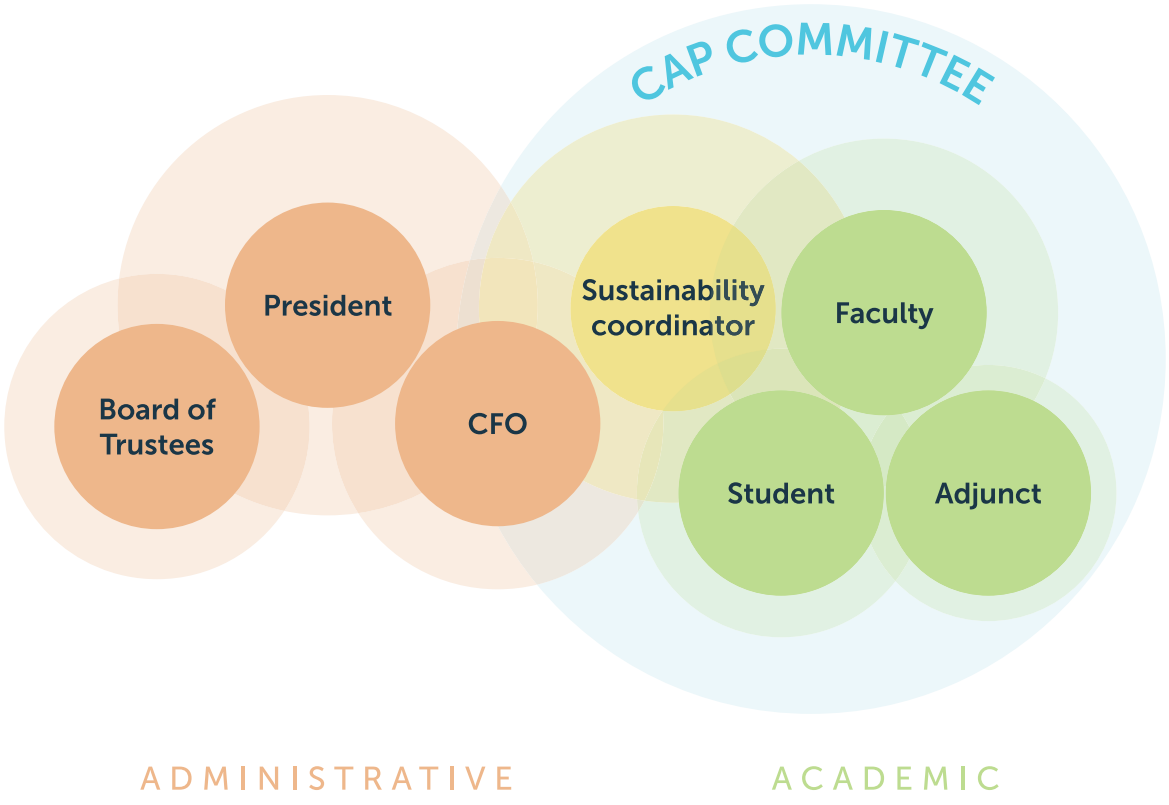
	ACADEMIC	NON-ACADEMIC
ROLES	Faculty, research staff, students	President, sustainability staff, energy managers, finance
STRENGTHS	Knowledge creation, knowledge transfer, innovation	Community leadership, institutional strategy, donor relationships, operational expertise
COMPLEMENTARITY POTENTIAL	Thought leadership, idea generation, motivated workforce	Practical applications, political influence, fundraising

3 Carli, G. and M. Tagliaventi. 2023. Can you do all in one professional label? Complementarity, substitution, and independence effects in academic life. Higher Education 85: 837-863.

4 Reymert, I. and T. Thune. 2023. Task complementarity in academic work: a study of the relationship between research, education and third mission tasks among university professors. The Journal of Technology Transfer 48: 331-360.

A VIGNETTE ON ROLES

Eager to maintain its competitive edge among peer institutions, the newly appointed **President** of a Southern Summit College is calling on her campus to update its Climate Action Plan (CAP) to be holistic and aggressive in its decarbonization goals. As she rallies support from the **Board of Trustees** and surrounding community partners, she has empowered her team of campus professionals to bring their respective strengths to the planning process. Leading the coalition is the **campus sustainability director**, a well-known and respected consensus builder on campus. She understands the operational functions of the college and effectively facilitates collaboration across various campus roles. She coordinates a coalition that establishes key plan components, areas of focus and sets deadlines to complete the plan. She organizes a **CAP Committee** by inviting broad and inclusive participation from campus stakeholders. An essential stakeholder is the **Chief Financial Officer (CFO)** responsible for the institution's long-term fiduciary health. The CFO presents the Committee with forecasts of the financial implications of various projects to ensure that the plan is economically sound. Faculty members and students complement the administrative functions of the Committee. The **tenured professor**, whose research is in energy systems, advises on the best technologies for the campus's energy transitions. An **adjunct faculty member** in the social sciences amended their curriculum to include experiential learning through behavior change and brought those findings back to the Committee for policy recommendations. Rounding out the Committee are student representatives - the lifeblood of the College. The **students** bring passion, energy, and fresh perspectives to the discussions. From Committee meetings to grassroots advocacy, they are champions of progress, bridging the gap between ambition and action. Together, these individuals prove a formidable team, united in their pursuit of their common goal of a more sustainable future. Through collaboration and determination, they craft a Climate Action Plan for the College that is both ambitious and achievable.



VI. Conclusions

With more than 4,100 higher education institutions in the United States, the sector plays a crucial role in shaping future leaders committed to climate action. There is a college or university for every student - whether they are gaining skills for the clean energy workforce or researching new technologies to solve the biggest challenges of our time. Second Nature's strategic initiative, "Diversity to Unify," aims to capitalize on this vast array of strengths within the higher education sector to drive climate solutions forward. By fostering collaboration across diverse institutions in areas like research, student experiences, community engagement, workforce development, and public-private partnerships, we're facilitating initiatives and collaborations that move beyond our traditional focus solely on operational decarbonization.

We invite and challenge colleges and universities to embrace principles of complementarity and imagine new models of collaboration. If you're unsure where to begin, explore networks that exist in your community or state. For example, the **Georgia Climate Project** is a network of higher education institutions across the state to advance practical, science-based solutions that reduce risks and maximize opportunities associated with a changing climate. **San Diego Climate Partners** is a team of multidisciplinary experts from research and masters universities, non-profit and corporate partners developing a new model for educating high-profile decision-makers, community leaders, and the general public in the San Diego region about climate science. The **Texas Regional Alliance for Sustainability** is a network of faculty members, students, and sustainability professionals supporting higher education in Texas by implementing climate change and sustainability solutions across campus operations, academic curriculum, and off-campus fields of influence. The **Upper Midwest Association for Campus Sustainability** is a network of administrative staff, faculty, and students from colleges and universities working together to promote sustainability throughout the Upper Midwest. Attend events with colleagues from similar institutions to grow your community of peers, like the **HBCU Climate Change Consortium** hosted by the Deep South Center for Environmental Justice.

As we reflect on the examples highlighted in this paper, it is evident that responses to the urgency of the climate crisis can be much more comprehensively mobilized, particularly within the higher education sector which has so many different types of assets and strengths that can contribute to climate solutions. That's the challenge before us that no single institution can address in isolation. To quote Mahatma Ghandi, ***"Our ability to reach unity in diversity will be the beauty and the test of our civilization."*** By embracing the principles of complementarity and compatibility, and finding unity in the diversity of our extraordinary colleges and universities, we can accomplish society's collective goals and inspire new climate solutions in ways that we can only imagine today.

Higher education statistical resources

- **Integrated Postsecondary Education Data System**, National Center for Educational Statistics, U.S. Department of Education
- **Carnegie Classification of Institutions of Higher Education**, American Council on Education
- **Spotlight on Minority Serving Institutions**, American Council on Education
- **Data USA**
- **The Chronicle of Higher Education**
- **Inside Higher Ed**

Appendix: Additional Information on Carnegie Classifications

DOCTORAL UNIVERSITIES

SUMMARY

Doctoral universities, whether public or private, play a crucial role in advancing climate action through their research-intensive environments. Their high research activity is instrumental in driving innovative solutions and technologies for mitigating climate change.

These institutions have well-established research programs that contribute to climate solutions by conducting research in renewable energy, climate science, and sustainability. They often have substantial resources for sustainability initiatives, including state-of-the-art laboratories and access to research funding. Additionally, the size of their diverse student bodies and interdisciplinary programs allow for a holistic approach to addressing climate challenges.

CLIMATE ACTION CHALLENGES

Bureaucratic challenges: Larger institutions may face bureaucratic hurdles in implementing swift and comprehensive climate action plans and connecting with others on their campus.

Resource allocation: Balancing research priorities with climate initiatives can be a challenge, especially when funding is limited. Being a publicly-funded institution can make planning more complex.

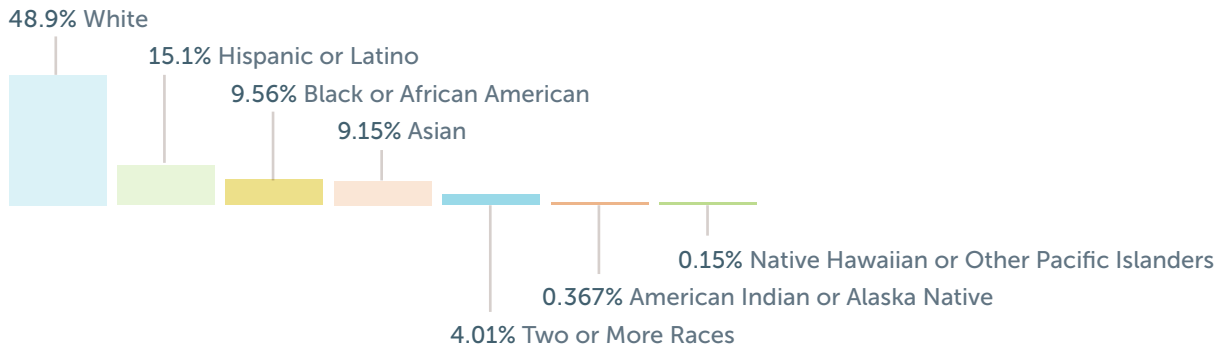
CLIMATE ACTION STRENGTHS

Extensive research capabilities: Doctoral universities often have robust research programs, providing opportunities for cutting-edge climate research and innovation.

Expertise across disciplines: These institutions have many types of academic departments and academic centers, allowing for interdisciplinary and transdisciplinary approaches to climate change solutions.

Public partner partnerships: Doctoral universities often engage in public-private partnerships (PPPs) to enhance their research capabilities and foster innovation. These collaborations bring together the resources and expertise of academia with solutions providers practical applications and funding.

STUDENT DEMOGRAPHICS



ENROLLED STUDENTS: ***13,590,568*** *ENROLLED FULL TIME:* ***76.6%***

MASTERS COLLEGES AND UNIVERSITIES

SUMMARY

Masters Colleges and Universities primarily focus on undergraduate education anchored in a regional identity, making them instrumental in shaping the next generation of climate-conscious citizens. They emphasize teaching and integration of sustainability principles into various academic disciplines.

These institutions excel in sustainability education and community engagement. They often incorporate sustainability-related programs into their curricula, enabling students to develop a deep understanding of climate issues. Their commitment to teaching often results in a strong connection between faculty and students, fostering mentorship and collaboration on climate projects. Moreover, their size and accessibility enable them to implement sustainable practices on campus, such as energy-efficient infrastructure and waste reduction programs.

CLIMATE ACTION CHALLENGES

Limited resources: Master's colleges may have fewer resources compared to larger universities, making it challenging to invest in major sustainability initiatives.

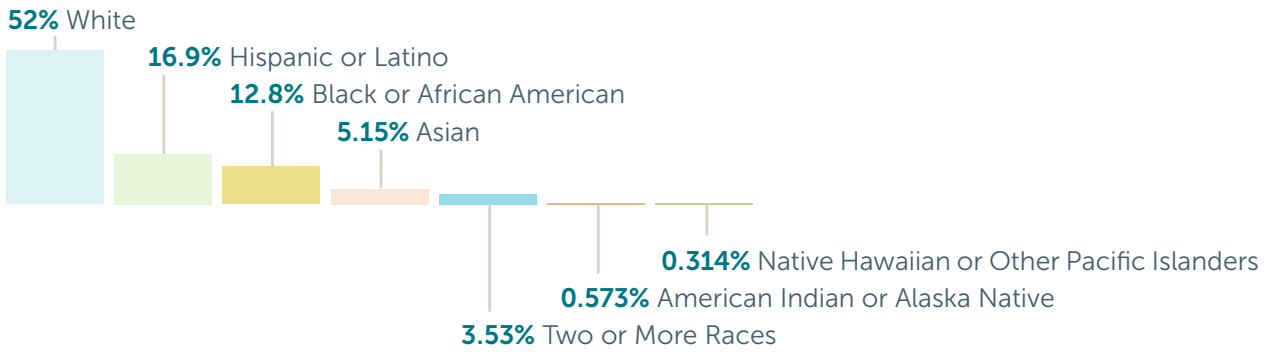
Faculty workload: Teaching-focused institutions may have faculty with heavy teaching loads, limiting time available for research and climate action projects.

CLIMATE ACTION STRENGTHS

Significant emphasis on continuing education: With a greater emphasis on teaching, these institutions may be more agile in incorporating sustainability into their curricula.

Robust community engagement: Given the student populations, these institutions often have closer ties to local communities and policy, facilitating collaborative climate action efforts.

STUDENT DEMOGRAPHICS



ENROLLED STUDENTS: ***8,382,326*** *ENROLLED FULL TIME:* ***68.3%*** *ENDOWMENT SIZE* ***$50.4M***

BACCALAUREATE COLLEGES (LIBERAL ARTS COLLEGES)

SUMMARY

Baccalaureate institutions are known for their small size and focus on a liberal arts education. providing students with a well-rounded education, including a strong emphasis on critical thinking, environmental ethics, and civic responsibility. This prepares graduates to be informed and proactive advocates for climate action.

Liberal arts colleges often offer interdisciplinary environmental studies programs, facilitating a comprehensive understanding of climate challenges. These institutions are successful in fostering a sense of stewardship among students and frequently engage in local conservation and advocacy efforts.

CLIMATE ACTION CHALLENGES

Limited research capacity: Investment in research may not be as extensive as at larger institutions.

Resource constraints: Similar to master's colleges, baccalaureate colleges may have limited resources for sustainability initiatives, relying on student and faculty initiatives.

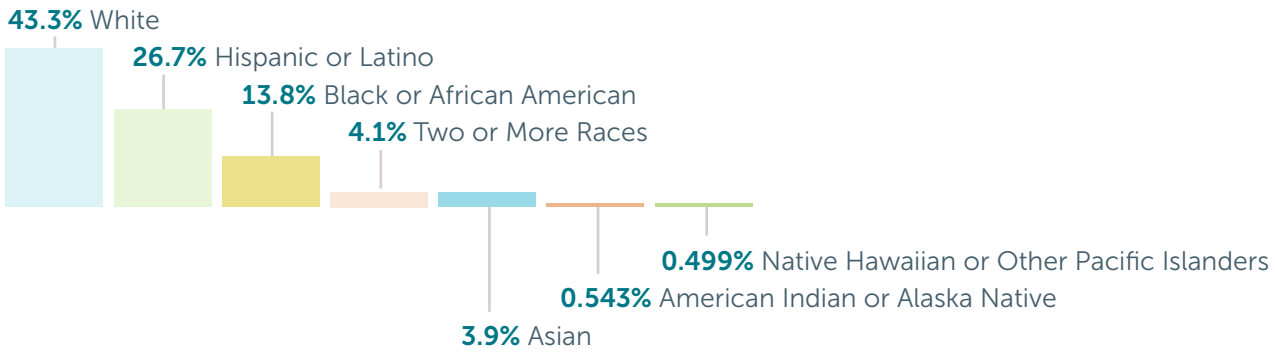
CLIMATE ACTION STRENGTHS

Close-knit communities: Baccalaureate colleges often have smaller populations, fostering a sense of community that can be leveraged for collective climate programs and projects.

Financial control: Small baccalaureate or liberal arts campuses are often operated as private non-profits and therefore may have more control over their campus budgets.

Flexibility and adaptable priorities: These institutions may have more flexibility in adapting curricula to include sustainability-focused courses, responding to urgent climate needs.

STUDENT DEMOGRAPHICS



ENROLLED STUDENTS: ***1,501,476*** *ENROLLED FULL TIME:* ***42.4%*** *ENDOWMENT SIZE* ***$14.5M***

FOOTNOTES: Many Baccalaureate Colleges are also considered "Liberal Arts" colleges, but it is important to note that not all are. Baccalaureate colleges may offer a more diverse range of programs, including professional degrees, while Liberal Arts colleges prioritize a holistic education in the liberal arts and sciences.

ASSOCIATE'S COLLEGES (COMMUNITY COLLEGES)

SUMMARY

Associate's colleges, including community and technical colleges, play a pivotal role in climate action by offering accessible and affordable education to a diverse student population. They equip students with practical skills, including green workforce training.

Community colleges often provide specialized training programs in renewable energy, sustainable construction, and environmental technologies, addressing workforce demands in the green sector. Their focus on serving local communities allows them to directly impact regional sustainability initiatives. Additionally, they embrace practical, hands-on sustainability projects and often serve as valuable resources for local environmental education and outreach.

CLIMATE ACTION CHALLENGES

Limited resources: Community colleges face significant resource constraints, limiting their ability to invest in comprehensive sustainability programs. As higher education sees a decline in enrollment overall, the resources available to these institutions decrease.

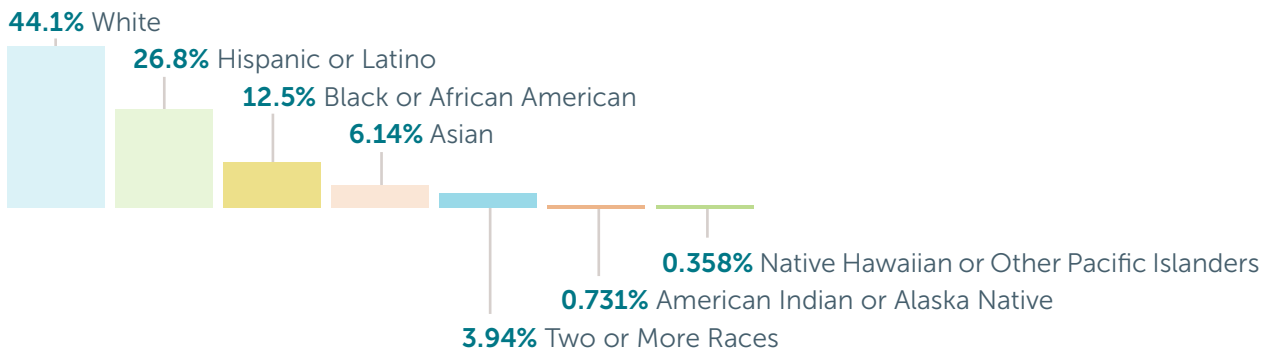
Varied missions and changing student body: Since most community college populations consist of commuters, often with full-time jobs outside of their coursework, some cultural and extracurricular initiatives may vary in success.

CLIMATE ACTION STRENGTHS

Local impact: Associate's colleges are more representative of the local population than many other campus types making them well-positioned for community-based climate initiatives. Associates colleges are uniquely positioned to provide skilled real-world training for the emerging green-jobs economy.

Accessibility: With a focus on providing accessible and affordable education, these institutions can play a crucial role in educating a broad range of individuals about climate issues. They provide technical and vocational education programs in renewable energy, energy efficiency, sustainable agriculture, and green building practices.

STUDENT DEMOGRAPHICS



ENROLLED STUDENTS: ***10,499,794*** *ENROLLED FULL TIME:* ***32.5%*** *ENDOWMENT SIZE* ***$5.29M***

Second Nature is committed to accelerating climate action in, and through, higher education.

We do this by mobilizing a diverse array of higher education institutions to act on bold climate commitments, to scale campus climate initiatives, and to create innovative climate solutions. We align, amplify, and bridge the sector's efforts with other global leaders to advance urgent climate priorities.

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