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Climate Change and Sustainability Drive in Higher Education Institutions: Policy Lessons for Carbon Neutrality from the Global North and Global South

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Abstract

Higher Education Institutions (HEIs) play a critical role in addressing climate change through sustainability initiatives and carbon neutrality commitments. This study examines the sustainability practices of universities in the Global North and Global South, focusing on their environmental impact and strategies for achieving carbon neutrality. It draws on data from the QS World University Rankings: Sustainability 2026 and adopts a comparative case study approach to analyse 10 universities selected based on their Environmental Impact scores, with 5 institutions representing each region. The analysis considers key indicators including environmental sustainability, environmental education, and environmental research, along with institutional sustainability initiatives and climate targets. The findings conclude that despite notable differences in resources, governance frameworks, and technological capacity between universities in the Global North and Global South, the institutions in both regions demonstrate increasing commitment to sustainability through green campus initiatives, renewable energy adoption, and climate research. The study provides insights into best practices and policy lessons for advancing carbon neutrality in higher education globally.

Keywords: HEIs, Climate Change, Carbon Neutrality, Sustainability, Global North, Global South

Introduction

Higher Education Institutions (HEIs) play a fundamental role in knowledge creation, innovation, and social development. They act as catalysts for education and research and significantly contribute to policymaking, leadership capacity building, and social transformation.[1] In the contemporary world, HEIs have emerged at the forefront in addressing the climate crisis at the domestic and global levels by adopting and promoting sustainable governance.[2] Universities and colleges

[1] Maia Chankseliani and Tristan McCowan, "Higher Education and the Sustainable Development Goals," *Higher Education* 81 (2021): 1–8, https://doi.org/10.1007/s10734-020-00652-w.

[2] Abd Rahman Ahmad, "Systematic Literature Review on the Sustainability of Higher Education Institutions (HEIs): Dimensions, Practices and Research Gaps," *Cogent Education* 12, no. 1 (2025): 2549789, https://doi.org/10.1080/2331186X.2025.2549789.

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play an integral role in national progress by producing skilled graduates, undertaking research, and enabling critical thinking.

Furthermore, they are committed to advocating sustainable practices and environmental stewardship, fostering principles of equity and accountability. It can be argued that the role of HEIs is not confined to education and research purposes. It has been changing rapidly due to various political, economic, social, technological, and environmental factors.[3] The idea of sustainability evolved in the 21st century with complex and dynamic challenges of the modern world, specifically climate change. Various governmental and non-governmental organizations are advancing climate action through policy frameworks. To address the climate crisis, the United Nations has devised the policy agenda UN 2030 Agenda Goals.[4]

HEIs in the Global North have set early standards and are setting the pace for decarbonization.[5] HEIs in the Global South frequently try to emulate the efforts of their Global North counterparts. Five universities from the Global North and the Global South, respectively, have been chosen for this discussion because of their dedication to sustainability.

This study encompasses different parts and integrates them with each other in a systematic way. The first part highlights the contemporary role of HEI's and the climate crisis around the globe. The second elaborates the rationale of the study, followed by a detailed research design covering the scheme of data collection, sampling, and data analysis in the third part. The fourth reviews the evolution of sustainability governance in HEIs. The fifth part uncovers the research findings by highlighting the key sustainability initiatives at the campus level, both from the Global South and the Global North, and highlights the carbon-neutral climate targets. The last part concludes the discussion.

Rationale of the Study:

Climate change is one of the grave challenges in the history of mankind. It has deteriorated not only the planet's health but also jeopardized the lives of human beings. This situation demands proactive measures for adaptation and mitigation of climate change. HEIs are taking several steps to reduce their carbon footprints worldwide. Numerous academic institutions have achieved carbon-neutral status. Most institutions in the Global North are actively reducing their emissions. This study seeks to draw lessons from universities in the Global North and Global South concerning their approaches to carbon-neutral policies and sustainability governance. More precisely, the study aims the following.

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[3] Rómulo Pinheiro, Gerald Wangenge-Ouma, Elizabeth Balbachevsky, and Yuzhuo Cai, "The Role of Higher Education in Society and the Changing Institutionalized Features in Higher Education," in *The Palgrave International Handbook of Higher Education Policy and Governance*, ed. Jeroen Huisman, Harry de Boer, David D. Dill, and Manuel Souto-Otero (London: Palgrave Macmillan, 2015), 225–242, https://doi.org/10.1007/978-1-137-45617-5_13.

[4] United Nations, "Transforming Our World: The 2030 Agenda for Sustainable Development," retrieved from, https://sdgs.un.org/2030agenda.

[5] Walter Leal Filho et al., "Decarbonising University Operations: Strategies and Challenges for Higher Education Institutions," *Environmental Sciences Europe* 38, art. 82 (2026), https://doi.org/10.1186/s12302-026-01358-z.

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- To compare sustainability initiatives and carbon neutrality commitments between Global North and Global South HEIs.
- To examine how institutional resources and governance shape carbon-neutral policy outcomes.
- To identify transferable policy lessons for advancing carbon neutrality across both regions.

Research Design:

This study employs a comparative case study research design to analyze sustainability initiatives and carbon neutrality commitments in higher education institutions (HEIs) across the Global North and Global South.[6] The study supported by secondary database obtained from the *QS World University Rankings: Sustainability 2026* and official policy frameworks, plans of the respective selected HEIs.

The comparative case study method is appropriate for this research because it allows for an in-depth examination of institutional sustainability policies and practices in different geographical and socio-economic contexts.[7] By comparing universities from the Global North and Global South, the study identifies similarities and differences in sustainability governance, environmental initiatives, and carbon neutrality strategies.

The study, therefore, relies primarily on secondary data sources. The core dataset used in the analysis is the QS World University Rankings: Sustainability 2026, which evaluates universities based on their contributions to environmental sustainability, social impact, and governance.[8] The ranking includes nearly 2,000 universities worldwide and provides detailed indicators related to sustainability performance.

A purposive sampling strategy is used to select case study universities from the QS Sustainability Rankings dataset.[9] The selection is based on the following criteria:

- Environmental Impact performance: Universities with the highest Environmental Impact scores were prioritized.
- Regional representation: Institutions were categorized according to the Global North and Global South, following the UN development studies classification.[10]

[6] Robert K. Yin, *Case Study Research and Applications: Design and Methods*, 6th ed. (Thousand Oaks, CA: SAGE Publications, 2018), 34–42.
[7] Charles C. Ragin, *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies* (Berkeley: University of California Press, 2014), 68.
[8] "QS World University Rankings: Sustainability 2026," *QS Quacquarelli Symonds.* November 18, 2025, https://www.topuniversities.com/sustainability-rankings
[9] Sharan B. Merriam and Elizabeth J. Tisdell, *Qualitative Research: A Guide to Design and Implementation*, 4th ed. (San Francisco: Jossey-Bass, 2016), 96–98.
[10] The United Nations technically does not use "Global North" and "Global South" as official classifications in its statistical databases under United Nations Statistics Division. Instead, it uses "Developed" and "Developing" geographic regions. For instance, *United Nations Statistics Division*, https://unstats.un.org/sdgs/indicators/regional-groups/

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- Country diversity: To avoid geographical bias, only one university per country is included in each group from the top order.
- Availability of sustainability documentation: The selected universities have publicly available sustainability reports and climate strategies.

Based on these criteria, ten universities are selected for analysis: Five Global North universities with the highest Environmental Impact scores and Five Global South universities representing leading sustainability initiatives in developing or emerging economies. This selection enables a balanced comparison between universities operating in different institutional and economic contexts.

The five universities of the Global North include Lund University, the University of Toronto, University College London, the University of New South Wales, Sydney, and ETH Zurich University, based on the QS Sustainability ranking 2026. The five Global South Universities include the University of Cape Town, the Indian Institute of Technology (IIT) Delhi, Fudan University, the American University of Beirut, and Chulalongkorn University.

Additional qualitative information on sustainability initiatives and climate targets is collected from the sources, e.g., university sustainability reports and climate action plans, official university websites and sustainability offices, institutional environmental strategies and policy documents, and peer-reviewed literature and sustainability assessments.[11]

Limitations of the Study

Despite providing valuable insights, the study has several limitations.

- First, the analysis relies primarily on secondary data, which may vary in quality and reporting standards across institutions.
- Second, sustainability rankings reflect relative performance within a specific framework, which may not fully capture all aspects of institutional sustainability practices.
- Third, the study focuses on a limited number of universities selected from global rankings and therefore may not represent the entire higher education sector worldwide.

Future research could incorporate primary data, interviews, or surveys with university sustainability officers to provide deeper insights into institutional sustainability strategies.

Evolution of Sustainability Governance in HEIs

Higher education institutions (HEIs) make contributions to society and the environment by training future sustainability practitioners, tackling the climate emergency, and fostering nature-positive initiatives through research. HEIs are vital for promoting sustainability, and there is increased emphasis on their responsibility to be sustainable in various roles, including research,

[11] John Creswell and J. David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed. (Thousand Oaks, CA: SAGE Publications, 2018), 180–183

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education, campus operations, community engagement, organizational structure, and the assessments they perform to report their activities.[12]

The UN played a leading role, as in 2000, the UN launched eight Millennium Development Goals (MDGs), an indicator-focused strategy intended for global achievement by 2015, which subsequently set the stage for the 17 Sustainable Development Goals (SDGs), another indicator-driven framework that serves as a guide for achieving a sustainable future.[13] Institutions of higher education play a crucial role in achieving the goals set by the United Nations' 2030 Agenda. They tackle sustainability in all their missions, encompassing education, research, innovation, campus organization, and administration. This report indicates that European universities are becoming more strategic in this domain, with many adopting a holistic approach to the UN's Sustainable Development Goals, which extends beyond just climate and environmental concerns.[14]

In the 1980s and 1990s, learning centers started implementing sustainable governance, which at first concentrated on environmental preservation before developing into a broad, complex framework that takes social and economic factors into account. In order to prepare students for a sustainable future and make a positive impact on the world, HEIs have now integrated sustainability into their operations, research, and educational programs. This has been made possible by student advocacy, academic research, and international initiatives like the Rio Conference (1992) and the Brundtland Report (1987).[15]

The Talloires Declaration, signed in 1990 at an international conference in Talloires, France, committed university administrators to combining environmentally conscious learning with sustainable governance.[16] It was the first formal proclamation by university presidents and chancellors committing to the notion of sustainable governance in higher education. In 2006, several colleges and universities agreed to cut carbon emissions in their campus operations as part of The

[12] Ana Marta Aleixo, Sandra Leal, and Ulisses M. Azeiteiro, "Conceptualizing Sustainable Higher Education Institutions, Roles, Barriers, and Challenges for Sustainability: An Exploratory Study in Portugal," *Journal of Cleaner Production* 172 (2018): 1664–1673, https://doi.org/10.1016/j.jclepro.2017.11.010.

[13] Tomas Hak, Sandra Janouskova, and Bedrich Moldan, "Sustainable Development Goals: A Need for Relevant Indicators," *Ecological Indicators 60* (2016): 565–573, https://doi.org/10.1016/j.ecolind.2015.08.003.

[14] European University Association, *Sustainability and Greening in European Higher Education* (Brussels: European University Association, 2025), retrieved from, https://www.eua.eu/publications/reports/sustainability-and-greening-in-european-higher-education.html.

[15] Thomas Macintyre, Daniella Tilbury, and Arjen Wals, *Education and Learning for Sustainable Futures: 50 Years of Learning for Environment and Change* (London: Routledge, 2025), https://doi.org/10.4324/9781003467007.

[16] University Leaders for a Sustainable Future (ULSF), *Talloires Declaration*, retrieved from, https://ulsf.org/talloires-declaration/.

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American College and University Presidents' Climate Commitment (ACUPCC). Currently, approximately 700 institutions worldwide have signed this commitment.[17]

Furthermore, organizations such as the Green Metrics Index assess HEIs based on their commitment to environmental initiatives. Universities can be viewed as compact cities engaged in climate action, playing a critical role in developing resilience to the climate catastrophe. Higher Education Climate Action strives to bring together students, professors, institutions, and systems in a collaborative effort to achieve a climate-safe, equitable, and vibrant future. So the principles of sustainable governance go beyond merely state and government legislation; many Higher Education Institutions (HEIs) around the world are incorporating sustainability standards into their campus functions. A carbon-neutral university uses sustainable methods to reduce its carbon footprint. Higher education may make a big contribution to climate resilience by implementing carbon-neutral practices. These policies include activities such as green building, waste reduction, switching to paperless office operations, and the use of electric vehicles to reduce carbon emissions.

Findings: Discussion and Analysis

The analysis focuses on evaluating the role of universities in promoting sustainability and carbon neutrality through the Environmental Impact indicators provided by QS. The following themes were used to compare the selected institutions:

- **Environmental Sustainability**: Institutional environmental management systems, green campus initiatives, and sustainable infrastructure.
- **Environmental Education**: Integration of sustainability into curricula, sustainability-focused academic programs, and student engagement initiatives.
- **Environmental Research**: Research output and innovation related to climate change, environmental science, and sustainability.
- **Institutional Sustainability Initiatives**: Programs implemented by universities to promote energy efficiency, renewable energy adoption, waste reduction, and sustainable campus management.
- **Carbon Neutrality and Climate Targets**: Institutional commitments to reduce greenhouse gas emissions, adopt renewable energy systems, and achieve net-zero carbon targets.

A comparative thematic analysis is conducted to identify patterns, strengths, and differences between universities from the Global North and Global South in implementing sustainability strategies and carbon neutrality initiatives. Five universities from the Global North and five from the Global South are examined to gain deeper insights into the dimensions of carbon-neutral policies and their manifestation within Higher Education Institutes (HEIs).

Sustainability and HEIs: Cases from the Global North

[17] United Nations Department of Economic and Social Affairs, *American College & University Presidents' Climate Commitment*," retrieved from, https://sdgs.un.org/partnerships/american-college-university-presidents-climate-commitment.

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The Global North has historically been at the forefront of institutionalizing sustainability within higher education due to greater access to financial resources, mature governance frameworks, and established research infrastructure. The following five universities in the Global North, selected on the basis of their leading Environmental Impact scores in the QS World University Rankings: Sustainability 2026 are actively working toward sustainability and carbon neutrality. Table 1 summarizes their comparative performance on the QS Environmental Impact indicators, while Table 2 outlines their key sustainability initiatives and carbon neutrality targets, before each case is discussed in detail in the sections that follow.

Table 1: Top 5 Global North Universities by Environmental Impact (EI)

Overall Global Rank	EI Rank	University	Country	ES*	EE**	ER***
1	1	**Lund University**	Sweden	99.7	99.8	99.8
2	3	**University of Toronto**	Canada	98.9	99.2	98.8
3	4	**University College London (UCL)**	United Kingdom	98.9	98.4	98.7
7	6	**University of New South Wales (UNSW Sydney)**	Australia	98.5	97.8	98.1
11	8	**ETH Zurich**	Switzerland	98.4	98.6	99.5

Source: *QS World University Rankings: Sustainability 2026*

*** Environmental Sustainability** **** Environmental Education**

***** Environmental Research**

Table 2: Key Sustainability Initiatives and Carbon Neutral Targets by HEIs of the Global North

HEIs	Key Sustainability Initiatives	Carbon Neutrality / Climate Targets
Lund University, Sweden	• Sustainability Forums • Coordinating interdisciplinary climate research • Green campus initiatives • Energy-efficient buildings • Integration of sustainability across curricula	• Commitment to climate neutrality aligned with Sweden's national net-zero emissions target by 2045 • Agenda 2030 and the university's climate action strategies
University of Toronto, Canada	• Climate Positive Campus initiative • Nano-composite-based solar panel coating • Smart de-icing coating technology • Renewable energy adoption • Sustainable building standards and climate research leadership	• Target of achieving net-zero greenhouse-gas emissions by 2050, with significant interim reductions • Climate Positive strategy • Project Leap aims to cut greenhouse gas (GHG) emissions by over 50%
University Col-	• Sustainable UCL strategy	• Sustainability Plan 2025-35

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lege London, United Kingdom	• Travel Expense Policy • Low-carbon buildings and energy efficiency • Climate research • Sustainability integration into education and research	• Commitment to achieve net-zero carbon emissions by 2030 across campus operations
University of New South Wales, Sydney, Australia	• UNSW Net Zero Initiative • Active Travel Masterplan • Renewable energy projects, i.e., Sunraysia Solar Farm • Monitoring ecosystem conservation progress • Sustainable infrastructure development, • Climate innovation research	• Living Campuses • Institutional target of achieving net-zero emissions by 2050, • Strong emphasis on renewable energy transition
ETH Zurich, Switzerland	• Energy Science Center, • Green campus programs, • Sustainable infrastructure, i.e., Green Labs initiative • World-leading climate research • Air travel project	• Institutional climate strategy aligned with Switzerland's net-zero emissions target by 2050, • Reduction of campus emissions

Lund University, Sweden:

Lund University stands first in the QS World Rankings in sustainability in 2026. Around 2000 universities from 100 countries are included in this ranking, which measures the contribution of HEIs to a sustainable future through education, research, and campus operations.[18]

Lund University fosters sustainability through education, research, institutional growth, and community engagement by adhering to the 'Agenda 2030'. The university has devised a plan to reinforce sustainability management on a routine basis throughout the university. Lund University Sustainability Plan 2020-2026 set a target and strategized sustainability across four cycles: education, research, external engagement, and management. The university has committed to achieving sustainability through transition within and outside the university premises and to employing knowledge and expertise effectively. The plan is devised to ensure not only a sustainable organization but also a sustainable society.

Additionally, the university has prioritized interdisciplinary research and partnerships with various actors of society to contribute to dealing with the challenges of sustainability at the global level. It is pertinent for any university to produce the knowledge that meets the demands of society. For that purpose, Lund University aims to produce knowledge in the realm of sustainable development, which should be highly relevant to social demands.

[18] "Lund University ranked best in the world in sustainability," *Lund University*, last modified November 18, 2025, https://www.lunduniversity.lu.se/article/lund-university-ranked-best-world-sustainability.

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Lund University aims to reduce its carbon footprint by around 50%. The university is also dedicated to the Climate Framework for Higher Education institutions. It shows the university's commitment to achieving the target of a 1.5-degree temperature rise by around 2030 and, consequently, to achieving zero emissions by 2050. The university also aims to become an overall climate-neutral organization by 2045, in line with Sweden's climate goals.

The process of procurement is one of the most significant steps towards achieving sustainable development. Lund University focuses on purchasing and procurement as per the Public Procurement Act. The university has a comprehensive goal in setting long-term goal-oriented standards by adhering to the sustainability criteria during goods and services procurement by mainly focusing on some key areas, including sustainable catering, restaurants, cafes, and the circular economy, to reduce its carbon footprint.

Furthermore, the university, its affiliated organizations, and leadership consider various factors during decision-making. These factors are known as ESG, such as Environmental, Social, and Governance, to promote the SDGs of the UN. The university has audited its carbon footprint because of its travel. As per the stats, business travel and transport contribute 5% of the university's total carbon footprint. The university has planned to reduce this percentage by a smart strategy, such as digital meetings, if a trip is not essential.[19] While understanding the significance of energy transition, Lund University emphasizes that the role of energy transition is apparent, and various targets must be achieved by means of a green transition.

University of Toronto, Canada:

The University of Toronto (UoT) has set a goal to reduce its carbon footprint by 2030. The university issued its policy framework to deal with carbon emissions in 2019 and aimed to achieve its goals by 2030. UoT ranked 2nd globally and 3rd in the EI Ranking.

UoT has set a goal of an energy transition to achieve net zero. Climate Positive Energy, a cornerstone of the energy transition, is fostering energy projects, including new clean energy initiatives and the modernization of existing energy infrastructure, such as grids and energy storage. For instance, the UoT has increased its solar energy production by 5% through nano-composite-based solar panel coating. It minimizes light reflection and is also dust repellent. Moreover, to enhance energy production through wind turbines, the UoT has installed smart de-icing coating technology comprising ice sensors, heaters, and de-icing coating.[20]

Additionally, UoT is developing a new Grid Modernization Centre under the Climate Positive Energy strategy. This project aims at the acceleration of clean energy integration. The Grid Modernization Centre is not confined to the campus, as it is supported by $10 million in federal funding aimed at advancing decarbonization, digitalization, and decentralization. The center will offer expertise to enterprises and municipalities in testing, developing, and commercializing green

[19] Lund University, *Sustainability Plan Lund University 2020–2026,* retrieved from, https://www.staff.lu.se/sites/staff.lu.se/files/2026-01/sustainability-plan-for-lund-university-2020-2026-rev-2025.pdf

[20] Lawson Climate Institute, "Energy," *University of Toronto*, https://lci.utoronto.ca/climate-positive-research-projects/energy/.

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technologies. This initiative reflects the UoT's proactive role in fostering community development.[21]

The concept of green building for sustainability has gained importance in campus operations. UoT has achieved LEED Gold status by fulfilling the ranking standards. For instance, in 2016, the Environmental Science and Chemistry Department (ESCD) buildings achieved high scores due to their sustainable building designs. A green building incorporates sustainable design principles, including energy and water conservation, improved indoor air quality, and a reduced carbon footprint. The Environmental Science and Chemistry Department (ESCD) building features an earth tube ventilation system that supplies fresh outdoor air, geothermal heat pumps for heating and cooling, rooftop rainwater harvesting for storage, and laboratory ventilation systems to monitor and maintain air quality. [22]This is not a one-time initiative, as the UoT reviews its building design standards annually to ensure their continued relevance and alignment with both university and industry requirements.[23]

In terms of research, the UoT has established the Lawson Climate Institute to strengthen the university's capacity to promote policies and technologies aimed at facilitating global net-zero goals. This institute will spur and integrate a multidisciplinary approach, promote collaboration with government bodies and public–private partnerships, and advance research on sustainable solutions as well as efficient and equitable climate policies.[24]

By implementing campus-wide sustainability solutions, like modernizing heating and cooling systems, Project Leap seeks to reduce greenhouse gas (GHG) emissions by more than 50% by the end of 2027. It entails making use of the recently built geo-exchange system beneath Front Campus, which collects and stores heat for use in the winter. Electricity will eventually take the place of natural gas for heating. In order to lower emissions and energy consumption, 37 buildings have installed energy-efficient LED lighting. It also covers energy optimization for the air distribution systems of large research institutions. With these changes, Project Leap will cut annual greenhouse gas emissions by about 50,000 metric tons, or more than 10,000 homes' worth of energy. Project Leap is supported by the governments of Ontario and Canada as well as the Canada Infrastructure Bank.[25] Additionally, by incorporating every local community, the Sustainability Offices on the three campuses are working to develop and promote a sustainable culture and a variety of programs. They act as centers for sustainability awareness, services, and co-

[21] "U of T's Grid Modernization Centre receives $10 million in federal funding to advance energy transition," *University of Toronto News*, July 29, 2024, https://www.utoronto.ca/news/u-t-s-grid-modernization-centre-receives-10-million-federal-funding-advance-energy-transition.

[22] "LEED Gold Sustainable Design Awarded to U of T Research Building," *University of Toronto News*, retrieved from, https://www.utoronto.ca/news/leed-gold-sustainable-design-awarded-u-t-research-building.

[23] "Annual Update to U of T Building Design Standards," *Facilities & Services, University of Toronto*, retrieved from, https://www.fs.utoronto.ca/news/annual-update-uoft-building-design-standards/.

[24] Lawson Climate Institute (LCI) Home Page," *Lawson Climate Institute, University of Toronto,* retrieved from, https://lci.utoronto.ca/.

[25]"Project LEAP," Facilities & Services, *University of Toronto*, retrieved from, https://www.fs.utoronto.ca/projects/project-leap/.

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operation, motivating staff, instructors, and students to effect positive change both on and off campus.[26]

University College London (UCL), United Kingdom:

University College London (UCL) has long been at the forefront of sustainability initiatives by demonstrating strong commitments through proactive policies, the promotion of a circular economy, and the integration of sustainability into research and education. UCL has developed its Plan 2025–2035. It reflects the institution's long-term commitment to addressing the global climate emergency and advancing environmental sustainability at the institutional level. This plan builds upon the foundation of the university's previous strategy, i.e., Change Possible (2019–2024), which outlined measurable goals to promote climate action, sustainability in education and research, biodiversity conservation, and responsible consumption.[27]

UCL has made significant progress toward its sustainability goals, including an approximately 53% reduction in carbon emissions. The university has also expanded its academic engagement with sustainability by offering a wide range of sustainability-focused modules, including 188 related to sustainability and 115 specifically focused on climate issues.[28] These initiatives reflect the institution's strong commitment to promoting the United Nations Sustainable Development Goals (SDGs).

Moreover, UCL has introduced the Sustainable Travel initiative as part of its broader strategy to reduce carbon emissions associated with travel activities. Travel remains the third-largest source of carbon emissions, which contributed approximately 11% of total emissions in 2019. To further reduce carbon emissions, UCL has developed a Travel Expense Policy and implemented the Clarity Travel system to monitor and calculate carbon emissions generated through travel activities. In addition, the university encourages virtual communication and online meetings in place of physical travel when engaging with international partners, thereby supporting more sustainable and low-carbon institutional practices.[29]

It is pertinent to mention that UCL has launched a sustainable buildings initiative by implementing Sustainable Building Standards across its construction projects. These standards encompass the design, construction, maintenance, and monitoring of university buildings to ensure environmentally responsible development. The initiative is aligned with the objectives outlined in UCL's Sustainability Plan 2025–2035, reflecting the institution's long-term commitment to sus-

[26] "Sustainability," *University of Toronto*, retrieved from, https://sustainability.utoronto.ca/.
[27] "Our Sustainability Plan," *University College London (UCL)*, retrieved from, https://www.ucl.ac.uk/about/sustainability/our-sustainability-plan.
[28] "Campus Sustainability Initiatives: Showcasing UCL's Efforts and Student Engagement," *University College London (UCL)*, retrieved from, https://www.ucl.ac.uk/population-health-sciences/news/2024/mar/campus-sustainability-initiatives-showcasing-ucls-efforts-and-student-engagement.
[29] "Sustainable Travel," *University College London (UCL)*, retrieved from, https://www.ucl.ac.uk/sustainable/what-ucl-does/campus-and-operations/sustainable-travel.

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tainability and climate-conscious infrastructure.[30] In the context of clean energy, UCL has installed solar panels on several of its buildings to support renewable energy generation and reduce carbon emissions. This initiative reflects the university's commitment to adopting cleaner energy solutions and advancing its broader sustainability objectives.[31]

University of New South Wales (UNSW) Sydney, Australia:

The University of New South Wales (UNSW) Sydney is the top university in Australia in the QS Sustainability ranking and 7th globally.[32] UNSW has emerged as one of the global sustainability leaders, setting targets of net-zero emissions by 2050 and restoration of 30% of the ecosystem. The university has devised the Environmental Sustainability Plan, which focuses on the three major areas: climate action, living campuses, and resource efficiency. The goal of climate action is to achieve net-zero emissions across value chains and campus operations, as combating climate change is the university's top priority. UNSW's climate action themes primarily focus on reducing Scope 1 and Scope 2 carbon emissions. To achieve these targets, the university is transitioning to renewable energy sources and installing EV charging stations across campus. It has also addressed Scope 3 emissions by working to reduce emissions across its value chain. The university aims to reduce its total Scope 1, 2, and 3 emissions in line with a 1.5°C pathway, targeting a 30% reduction by 2025, a 50% reduction by 2030, and net-zero emissions by 2050.[33]

UNSW is strengthening its resilience to climate change through initiatives such as Living Campuses. This initiative aims to develop healthy and sustainable learning environments where both people and nature can flourish. The primary objective is to encourage active lifestyles, preserve ecosystems, and foster stronger connections between students, staff, and the natural environment through the Living Campuses framework. The initiative contributes to ecosystem protection while promoting a healthier environment for the university community. These efforts are being advanced through strategies such as the Active Travel Masterplan, enhancement of campus facilities, monitoring ecosystem conservation progress, integrating sustainable practices into building renovation and construction projects, and implementing the Laboratory Assessment Framework to improve energy, water, and waste conservation.[34]

Another objective embedded in the plan of UNSW is resource efficiency. This objective focuses on conserving natural resources by minimizing consumption, encouraging reuse, and ensuring

[30] "UCL Sustainable Building Standard," *University College London (UCL) Estates*, retrieved from, https://www.ucl.ac.uk/estates/policies/2026/apr/ucl-sustainable-building-standard.

[31] "Harnessing Sun Power at UCL," *UCL Sustainable Development Goals*, retrieved from, https://www.ucl.ac.uk/sustainable-development-goals/case-studies/2020/oct/harnessing-sun-power-ucl.

[32] "UNSW Tops the Nation in Social Impact and Environmental Rankings," University of New South Wales Newsroom, retrieved from, https://www.unsw.edu.au/newsroom/news/2025/11/unsw-tops-the-nation-in-social-impact-and-environmental-rankings.

[33] "Sustainability Climate Action," *University of New South Wales*, retrieved from, https://www.sustainability.unsw.edu.au/our-plan/climate-action.

[34] "Living Campuses," *UNSW Environmental Sustainability*, retrieved from, https://www.sustainability.unsw.edu.au/our-plan/living-campuses.

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responsible resource management. It seeks to improve the energy and water performance of buildings, strengthen recycling practices, and promote environmentally responsible behaviors aimed at reducing waste and preserving natural resources.[35]

UNSW, Sydney, has developed its own renewable energy infrastructure through the Sunraysia Solar Farm located in Balranald, enabling the university to achieve 100% solar-powered electricity usage.[36] Researchers at UNSW have developed an innovative device capable of generating electricity from infrared heat radiation. This technology enables scientists to capture thermal energy differences from the surrounding environment before the heat dissipates. Since moonlight does not provide heat in the same way as sunlight for conventional energy generation, the device offers a breakthrough by harvesting energy from infrared radiation during nighttime. [37]

ETH Zurich, Switzerland:

ETH Zurich is one of the leading universities in the Global North, undertaking sustainability initiatives across ecological, social, and economic dimensions. The university is closely aligned with the United Nations' Sustainable Development Goals (SDGs) and actively incorporates them into its policies, research, and institutional practices.[38] ETH Zurich has adopted a net-zero program aimed at reducing carbon emissions by 2030. The program is impact-oriented and covers the period from 2024 to 2030, focusing on reducing climate-relevant emissions across the campus as well as within teaching and research activities at ETH. The university is striving to achieve net zero by avoiding and minimizing emissions to the greatest possible extent, ensuring that only unavoidable emissions remain.[39]

ETH Zurich launched an air travel project in 2017 with the aim of reducing greenhouse gas emissions from air travel by approximately 50% by 2030. The university's calculations revealed that business-related air travel accounted for nearly 95% of air travel activities and contributed around 7% of the total greenhouse gas emissions measured at ETH Zurich, amounting to approximately 15,000 tons of CO_2 equivalent.[40]

ETH Zurich has introduced the Green Labs initiative in recognition of the environmental impact of laboratory operations. The project operates under the Sustainability Office of ETH Zurich and

[35] "Resource Efficiency," *UNSW Environmental Sustainability*, retrieved from, https://www.sustainability.unsw.edu.au/our-plan/resource-efficiency.
[36] "UNSW Sydney Campus Fully Powered by Its Own Solar Tech," *UNSW Newsroom*, https://www.unsw.edu.au/news/2024/09/unsw-sydney-campus-fully-powered-by-its-own-solar-tech.
[37] Digby Werthmuller, "University of New South Wales researchers make renewable energy breakthrough with radiant infrared heat sources," *ABC News*, September 27, 2024, https://www.abc.net.au/news/104344544.
[38] "Sustainability," *ETH Zurich*, retrieved from, https://ethz.ch/en/the-eth-zurich/sustainability.html.
[39] "Net Zero," *ETH Zurich*, retrieved from, https://ethz.ch/en/the-eth-zurich/sustainability/net-zero.html.
[40] "Business Travel (Air Travel)," *ETH Zurich*, retrieved from, https://ethz.ch/en/the-eth-zurich/sustainability/net-zero/air-travel.html.

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focuses on promoting sustainable management and operation of laboratories. To improve its greenhouse gas balance, the university administration emphasizes smart procurement practices and resource-efficient operations. The initiative also serves as a platform for exchanging ideas, implementing sustainable measures, and encouraging responsible and resource-efficient working practices within laboratories.[41]

To achieve sustainability, the production of renewable energy is essential. ETH Zurich adopts a holistic approach to sustainable energy development in support of Switzerland's net-zero target for 2050. The ETH Zurich Energy Science Center contributes to Switzerland's energy transition by offering innovative solutions through research, teaching, and knowledge transfer initiatives. The Energy Science Center seeks to promote the adoption of sustainable energy solutions that are environmentally responsible, low-risk, dependable, economically feasible, and socially acceptable.[42]

Sustainability and HEIs: Cases from the Global South

The HEIs in the Global South are increasingly asserting themselves as sustainability leaders in their own right, often achieving notable results despite operating under tighter financial and infrastructural constraints than their Global North counterparts. The following five universities in the Global South are selected because of their high score among developing/least developing countries. The Table 3 summarizes their comparative performance on the QS Environmental Impact indicators, while Table 4 outlines their key sustainability initiatives and carbon neutrality targets.

Table 3: Top 5 Global South Universities by Environmental Impact (EI)

Overall Global Rank	EI Rank	University	Country	ES*	EE**	ER***
59	55	**University of Cape Town**	South Africa	79.9	97.2	90.0
205	224	**Indian Institute of Technology (IIT) Delhi**	India	73	90.9	88.8
140	120	**Fudan University**	China	60.8	94.3	94.2
176	136	**American University of Beirut**	Lebanon	79.5	85.3	78.8
165	148	**Chulalongkorn University**	Thailand	80.0	75.8	88.0

Source: *QS World University Rankings: Sustainability 2026*

*** Environmental Sustainability** **** Environmental Education**

***** Environmental Research**

[41] "GreenLabs," *ETH Zurich*, retrieved from, https://ethz.ch/en/the-eth-zurich/sustainability/net-zero/greenlabs.html.
[42] "Energy Science Center (ESC)," *ETH Zurich*, retrieved from, https://esc.ethz.ch/.

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Table 4: Key Sustainability Initiatives and Carbon Neutral Targets by HEIs of the Global South

University	Key Sustainability Initiatives	Carbon Neutrality / Climate Targets
University of Cape Town, South Africa	• Environmental Management Working Group • Environmental Sustainability Strategy • University of Cape Town Green Campus Action Plan • Water-saving retrofits • Energy monitoring	• Khusela Ikamva Sustainable Campus initiative • Target of becoming net-zero • Water and waste-to-landfill campus by 2050 under Vision 2030 sustainability strategy
Indian Institute of Technology Delhi (IITD), India	• Centrally Funded Technical Institutes • Solar photovoltaic installations, • Campus energy-efficiency programs, Waste-management	• Climate Action Plan • Long-term institutional sustainability programs • Reducing carbon emissions and increasing renewable energy use on campus
Fudan University, China	• Green campus construction, • lead-free, environmentally friendly solar cell technologies • low-carbon transportation programs • environmental research centers focusing on climate and sustainability	• Alignment with China's national carbon neutrality target for 2060 • Institutional initiatives to reduce campus emissions
American University of Beirut, Lebanon	• Campus Sustainability Initiative, • Data-informed Bio-Solar Vertical System • Energy-efficient buildings, • Waste reduction and water management programs	• Institutional sustainability roadmap aiming to reduce greenhouse-gas emissions • improve campus energy efficiency
Chulalongkorn University, Thailand	• Smart and sustainable campus development • renewable energy adoption • green transportation • urban sustainability research	• *Chula* 2030 Net Zero Transition • Target to achieve carbon neutrality by 2040, • Renewable energy and green infrastructure initiatives

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University of Cape Town, South Africa:

University of Cape Town (UoCT) promotes environmental sustainability by encouraging the active participation and commitment of all stakeholders toward long-term sustainable development. The university became a signatory to the Talloires Declaration in 1990 and reaffirmed its commitment in 2001. To strengthen its sustainability efforts, the university established the Environmental Management Working Group (EMWG), which oversees sustainability practices within university operations, including energy conservation, landscaping, and grounds management. In 2008, the university council formally approved the Green Campus Policy Framework, which outlines institutional responsibilities regarding resource management and environmental sustainability.[43]

The University of Cape Town Green Campus Action Plan (2008) provides a strategic roadmap for advancing environmental sustainability across the institution. It developed under the Properties and Services Department. The plan emphasizes short-term, high-impact interventions across operational, maintenance, and infrastructural domains to generate early momentum for broader institutional change. It sets out key priorities across ten functional areas, including energy efficiency, carbon emissions reduction, water conservation, waste recycling, and sustainable procurement practices. The framework also proposes the establishment of a dedicated Green Campus Unit, along with a localized revolving funding mechanism to support and coordinate sustainability initiatives across the university.[44]

UoCT launched the *Khusela Ikamva* Sustainable Campus initiative in 2020, meaning "secure the future," as part of its Vision 2030 framework. The initiative reflects the university's broader commitment to environmental, social, and institutional transformation, positioning UCT as a living model of sustainability in practice. It fosters collaboration across the entire university community by engaging students, academics, staff, and surrounding communities to encourage inclusivity, participation, and innovation in sustainability efforts. The program is structured around five key focus areas: energy use and carbon emissions, sustainable water management, waste reduction, biodiversity and wildlife conservation, and social responsiveness.[45]

Indian Institute of Technology (IIT) Delhi, India:

As a leader in India's shift to a sustainable, carbon-neutral future, the Indian Institute of Technology (IIT) Delhi has demonstrated a strong commitment via comprehensive policies, noteworthy achievements, and ambitious ambitions. The institute has developed a thorough Climate Action Plan that outlines its plan to achieve net-zero emissions by 2070 or earlier, in line with India's national climate targets. Important subjects including emissions, resource consumption, and en-

[43] "Introduction to Sustainability," *University of Cape Town*, retrieved from, https://uct.ac.za/explore-uct-sustainability/introduction-sustainability.

[44] "UCT Green Campus Action Plan 2009," *University of Cape Town*, retrieved from, https://uct.ac.za/sites/default/files/content_migration/uct_ac_za/39/files/UCT_Green_Campus_Action_Plan_2009.pdf.

[45] "Khusela Ikamva Sustainable Campus Project," *University of Cape Town*, retrieved from, https://uct.ac.za/transformation-sustainability-sustainability-projects/khusela-ikamva-sustainable-campus-project.

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vironmental impact are covered in this extensive strategy. The integration of renewable energy sources is a key component of IIT Delhi's carbon neutrality goal.

Among India's Centrally Funded Technical Institutes (CFTIs), the institute led the way by using electricity to cut its carbon impact by almost 50%. This has been made possible by large investments in rooftop solar photovoltaic (PV) systems, which generate about 3.5 MWp between its main and Sonipat locations. By signing a bilateral power purchase deal for 2 MW of hydropower from a generator in Himachal Pradesh, which will offset roughly 14,000 tons of CO2 emissions annually, IIT Delhi increased the scope of its green power portfolio. This coordinated strategy for acquiring green energy shows a strong dedication to moving away from reliance on fossil fuels.[46]

In addition to its remarkable shift to renewable energy, IIT Delhi's operational architecture is deeply rooted in the ideals of carbon neutrality through several focused projects and environmental initiatives. While progressively modernizing its infrastructure, the institute has made significant energy efficiency measures a top priority. This entails installing high-efficiency air conditioning systems in new and renovated buildings and swapping out traditional lighting fixtures for energy-efficient LED lights

Another essential component of its sustainability is waste management, which includes precise source segregation, comprehensive recycling programs, composting all horticulture waste to preserve soil carbon, and creative biogas production from biodegradable waste. One noteworthy project in this area is the campus's pilot-scale biogas production plant, which reduces potent methane emissions while converting kitchen trash into biogas and compressed biogas (CBG).[47]

Moreover, IIT Delhi supports environmentally friendly transportation across its expansive campus. Initiatives to promote the use of green transportation include making it possible to rent bicycles, introducing hybrid rickshaws, buses that operate on compressed natural gas (CNG), and creating an expanding network of EV charging stations. Beyond its local location, the institute has established a vibrant culture of research, innovation, and cooperation as part of its commitment to sustainability. It has worked with groups like the Border Roads Organization (BRO) to investigate methods of reducing carbon emissions in major infrastructure projects across India. In order to support India's general transition to a green economy, IIT also actively fosters an entrepreneurial atmosphere by encouraging its instructors and students to found start-ups that concentrate on creating and expanding sustainable technology and climate change solutions.[48]

Fudan University, China:

The sustainability initiatives at Fudan University are coordinated through its Sustainable Development Institute (SDI), which functions as a central platform for sustainability-related research and policy engagement. The institute concentrates on issues such as climate governance, China's carbon reduction objectives, and ESG-related transformations, with particular attention to chal-

[46] IIT Delhi, *IIT Delhi Climate Action Plan*, 2024, retrieved from, https://home.iitd.ac.in/climate-action-iitd.php
[47] *Ibid.*
[48] "BRO Signs MoU with IIT Delhi for Sustainable Road Construction," *The Economic Times*, March 15, 2023, https://economictimes.indiatimes.com/news/bro-iit-delhi-partnership.

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lenges faced by countries in the Global South. The institute builds its expertise from diverse fields, including economics, public health, and environmental studies, and promotes interdisciplinary research on urban sustainability, environmental management, and the transition toward cleaner energy systems. Its work supports the university's broader commitment to sustainable development and evidence-based policymaking.[49]

To strengthen sustainability leadership and international collaboration, Fudan University, The University of Hong Kong, and The University of Sydney entered into a Memorandum of Understanding (MoU) with an enhanced focus on sustainability cooperation. The partnership aims to develop a collaborative research hub that brings together the expertise and resources of the three institutions. A key objective of this alliance is to support the development and implementation of university-wide carbon neutrality commitments within each institution. The agreement also promotes collaborative learning through sustainability-focused student exchange programs, fostering knowledge sharing and capacity building across partner universities.[50]

Fudan University actively collaborates with international organizations, including the United Nations Framework Convention on Climate Change (UNFCCC), to contribute to global climate governance efforts. As part of this engagement, the university organized a workshop addressing climate change issues, with a particular emphasis on the scientific knowledge and technical expertise needed to support effective climate action.[51]

In the field of sustainable energy innovation, Fudan University is advancing the development of lead-free, environmentally friendly solar cell technologies aimed at addressing the environmental and health risks associated with conventional lead-based solar cells. This research represents a significant step toward cleaner energy production by reducing reliance on toxic materials while maintaining high performance. The university's lead-free solar cells have achieved a power conversion efficiency of 17.7%, marking one of the highest efficiencies reported for this category of photovoltaic materials. Such advancements demonstrate Fudan University's commitment to promoting sustainable and safer renewable energy solutions.[52]

Its green campus development incorporates sustainable design, ecological construction practices, and green energy initiatives throughout its Shanghai campus. These efforts include energy-efficient retrofitting, environmentally friendly research facilities, and the integration of urban living with green spaces. The university has met its green campus objectives through major improvements across its four campuses, including new construction projects and the renovation of

[49] "Sustainable Development Institute," *Fudan Development Institute (FDDI), Fudan University*, retrieved from, https://fddi.fudan.edu.cn/fddien/SustainableDevelopmentInstitute/list.htm.
[50] "Fudan University, University of Hong Kong and University of Sydney to sign MoU on Sustainability and Carbon Neutrality Initiatives," *The University of Hong Kong*, retrieved from, https://www.hku.hk/press/news_detail_26273.html.
[51] "Fudan University Hosts UNFCCC Workshop on Climate Change and Risk Governance," *Fudan University*, retrieved from, https://www.fudan.edu.cn/en/2024/0814/c344a141822/page.htm.
[52] "Fudan University – Innovation / Clean the Sky Initiative," *Clean the Sky*, retrieved from, https://www.cleanthesky.com/innovation/fudan-university-1.

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existing buildings, resulting in a modern, sustainable, and aesthetically refined campus environment.[53]

American University of Beirut (AUB), Lebanon:

The Nature Conservation Center of the American University of Beirut (AUB) launched its 2023–2030 Strategic Vision to advance climate change mitigation and adaptation efforts in Lebanon and the MENA region. It aligns with AUB's VITAL 2030 strategy; the roadmap builds upon two decades of participatory and nature-based community research to address contemporary socioeconomic and environmental challenges. The center's long-term vision is guided by five key strategic pillars: promoting academic leadership and innovation through interdisciplinary research, strengthening institutional capacity and knowledge retention, fostering community and stakeholder engagement, and enhancing climate action through accessible training, education, and knowledge-sharing initiatives.[54]

To achieve net-zero emissions and promote clean energy production while maintaining comfort, the Masri Institute and the Physical Plant Department at AUB are implementing a strategy that combines innovative clean energy solutions with measures to reduce power consumption.[55]

Furthermore, AUB has undertaken various initiatives to lower its carbon emissions; however, progress toward net-zero targets is constrained by limited space and insufficient data resources on campus. To address these challenges, a project has been developed that introduces a Data-informed Bio-Solar Vertical System, integrating photovoltaic (PV) panels with vegetated green walls on building facades. This approach aims to enhance renewable energy generation while improving the environmental performance and visual appeal of campus infrastructure. Another initiative focuses on advancing circular economy practices in waste management to improve resource efficiency and reduce waste generation. The project begins with waste audits, stakeholder consultations, and strategic assessments to identify existing gaps and potential opportunities for improvement. Another project, Distributed Control and Data-Driven Optimization of Robust Wind Turbines and Wind Farms, focuses on the distributed control and data-driven optimization of wind turbines and wind farms. It aims to develop AI-driven optimization and control strategies to improve turbine performance, enhance coordination among turbines, mitigate wake effects, and maximize energy generation across wind farms. [56]

[53] "International Cooperation in Green and Low-Carbon Development," *Shanghai Municipal Education Commission*, retrieved from, https://edu.sh.gov.cn/study_en_news/20240820/4d7cfae3dfb64d338abaf70d473275d2.html.

[54] "AUB-NCC Strategic Vision 2023," *American University of Beirut – Nature Conservation Center*, retrieved from, https://aub.edu.lb/natureconservation/Documents/AUB-NCC%20Strategic%20Vision%202023%20-%20Final.pdf.

[55] "Towards Net-Zero Showcase," *American University of Beirut – Masri Institute of Energy and Natural Resources*, retrieved from, https://www.aub.edu.lb/masri_institute/Pages/Towards%20Net-Zero%20Showcase.aspx.

[56] "Driving Innovation Toward a Carbon-Negative Campus: Masri Institute Awards Four Transformative Projects," American University of Beirut – Masri Institute of Energy and Natural Resources, retrieved from, https://www.aub.edu.lb/masri_institute/news/Pages/Driving-

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Chulalongkorn University, Thailand:

Chulalongkorn University is achieving carbon-neutral policies through its commitment to net-zero greenhouse gas emissions and is aligned with the 1.5 °C pathway under UNFCCC and COP 26. The university has positioned itself as a regional and global leader in accelerated climate action among higher education institutions. The university has devised its five-strategy "Chula 2030 Net Zero Transition" framework. The university has established ambitious goals of achieving carbon neutrality by 2027 and net-zero greenhouse gas emissions by 2030.[57]

The carbon neutrality initiatives also include an energy transition through solarization. To support this, the university has partnered with the Metropolitan Electricity Authority (MEA) to implement rooftop solar projects, including installing solar panels on 62 campus buildings. By 2025, solar panels had been installed on 20 buildings, with full implementation expected to replace approximately 25% of the campus's electricity consumption. Chulalongkorn University enhances energy efficiency by upgrading outdated electrical infrastructure with energy-saving technologies, including LED lighting and high-efficiency air conditioning systems. The university also incorporates heat monitoring sensors and optimized ventilation systems to improve energy performance further. [58]

Moreover, Chulalongkorn University invests in green technologies and engages in national and international collaborations to advance carbon-free innovation. Through its Bio-Circular-Green Economy Technology & Engineering Center, it works with government, industry, and public partners under the Thailand CCUS Consortium to apply Carbon Capture, Utilization, and Storage (CCUS) technologies that convert CO_2 into useful products. Moreover, Chulalongkorn University promotes sustainable transportation by offering electric buses, bicycles, electric tuk-tuks, and e-scooters for students and staff.[59]

Conclusion

Higher Education Institutions (HEIs) function much like modern city-states, characterized by their autonomous governance, distinct policy frameworks, and diverse internal communities. This unique structure allows them to act as living laboratories where innovative sustainability policies can be tested and refined before being scaled up nationally. By observing these academic ecosystems, governments can derive critical insights to design more effective public policies for sustainability at large. Ultimately, 21st-century HEIs have transcended their traditional educational roles to emerge as essential frontrunners and catalysts for global sustainable development.

Innovation-Toward-a-Carbon-Negative-Campus--Masri-Institute-Awards-Four-Transformative-Projects.aspx.

[57] "Chulalongkorn University's Accelerated Net Zero Commitment – Achieving Net Zero Greenhouse Gas Emissions by 2030," *Chulalongkorn University for Sustainable Development*, retrieved from, https://sustainability.chula.ac.th/report/4528/.

[58] "Chulalongkorn University's Policy and Investment for Net Zero Greenhouse Gas Emissions," *Chulalongkorn University for Sustainable Development*, retrieved from https://sustainability.chula.ac.th/report/3895/..

[59] *Ibid.*

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The Global North and the Global South regions can be understood within their distinct economic and geographical contexts. Higher Education Institutions (HEIs) in the Global North have made considerable progress towards carbon neutrality, largely owing to their greater availability of resources and strong institutional commitments. Consequently, they tend to adopt a more proactive approach to sustainability initiatives. In contrast, HEIs in the Global South often operate under financial constraints and continue to advocate for climate justice. Nevertheless, these institutions demonstrate their commitment to sustainability through various climate adaptation measures and environmental strategies.

Higher Education Institutions (HEIs) in both the Global North and Global South have undertaken a range of sustainability initiatives, including Green Campus programs, low-carbon transportation systems and electric vehicles (EVs), the adoption of clean energy through solar photovoltaic installations, the development of energy-efficient buildings, waste reduction and water management strategies, the integration of sustainability into academic curricula, and the implementation of environmentally conscious travel and expense policies. HEIs experiencing constraints in advancing sustainability initiatives due to policy gaps can benefit from the experiences of leading institutions by analyzing their policy frameworks and climate action plans. For example, institutions in the Global South may draw lessons from other leading HEIs within the region by adapting strategies that are more responsive to their geographical and contextual realities.

The study synthesizes the key sustainability themes across the ten case-study institutions, drawing out points of convergence and divergence between the Global North and Global South in advancing carbon-neutral policies.

Table 5: Comparative Summary: Global North vs. Global South

Theme	Global North HEIs	Global South HEIs
Renewable Energy Adoption	• UNSW: 100% solar-powered electricity via the Sunraysia Solar Farm • UoT: nano-composite solar panel coating and de-icing technology to boost solar and wind output • ETH Zurich: net-zero program with Energy Science Center and GreenLabs initiative	• IIT Delhi: 3.5 MWp rooftop solar PV plus a 2 MW hydropower purchase agreement • Chulalongkorn: rooftop solar rollout across 62 buildings via MEA partnership • Fudan: lead-free solar cell research and AUB's Bio-Solar Vertical System combining PV with green walls
Green Buildings & Infrastructure	• UoT: LEED Gold ESCD building and annually reviewed Sustainable Building Standards • UCL: Sustainable Building Standard under the 2025–2035 Sustainability Plan	• UCT: Green Campus Action Plan spanning ten functional areas of the campus • Fudan: green campus construction and energy-efficient retrofitting across four campuses
Carbon Neutrality / Climate	• Lund: climate-neutral by 2045, aligned with a 1.5°C	• Chulalongkorn: carbon neutral by 2027, net-zero GHG

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Targets	pathway by 2030 • UNSW & ETH Zurich: net-zero by 2050 and 2030 respectively, with staged interim targets	by 2030 • IIT Delhi: net-zero by 2070 (or earlier); Fudan aligned with China's 2060 national target
Dedicated Research Institutes / Centers	• UoT: Lawson Climate Institute for net-zero policy and technology research • ETH Zurich: Energy Science Center driving cross-disciplinary energy research	• Fudan: Sustainable Development Institute focused on climate governance and ESG • AUB's Masri Institute and Chulalongkorn's Bio-Circular-Green Economy Technology & Engineering Center
Sustainable Transport	• UCL: Travel Expense Policy and Clarity Travel emissions-tracking system • UNSW: EV charging stations and the Active Travel Masterplan	• IIT Delhi: bicycle rentals, hybrid rickshaws, CNG buses, and EV charging network • Chulalongkorn: electric buses, tuk-tuks, and e-scooters for the campus community

To conclude, taken together, these patterns show that Global North institutions tend to lead on institutionalized climate strategy, dedicated research infrastructure, and near-term net-zero targets, while Global South institutions demonstrate comparable innovation and ambition within tighter resource constraints, often achieving significant results through targeted renewable energy procurement, circular-economy waste initiatives, and locally adapted low-carbon transport solutions.