

Environmental Sustainability and University Leadership

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Abstract

This paper investigates the environmental sustainability of UK universities. In the first part of the analysis, we focus on the effects of vice-chancellor (VC) characteristics and of governance structures in determining environmental sustainability. We document two main sets of results. First, leadership matters: younger, longer-tenured, Oxbridge educated, with no previous business background and foreign VCs are associated with better sustainability metrics. Second, governance design plays a significant role: larger audit committees and the presence of a dedicated sustainability committee improve sustainability performance, whereas more frequent council meetings are associated with poorer outcomes. We interpret the results within the context upper echelons theory and focus on public value/stakeholder perspective. Our findings extend prior research on environmental sustainability, which has not examined universities yet.

Keywords: University governance; Vice-chancellor characteristics; Environmental sustainability; Sustainability committees; Responsible management education

JEL codes: I23 – Higher Education; G34 – Corporate Governance; M14 – Corporate Social Responsibility

1. Introduction

Universities bear a unique responsibility and possess unique capabilities to foster a sustainable future through their dual role as educators and community leaders. For example, the recent ‘A Bright Future’ manifesto, by the UK’s Russell Group, underscores the sector’s commitment to environmental sustainability (Russell Group, 2024). Moreover, the integration of sustainability into university operations is increasingly seen as crucial for maintaining relevance and competitiveness in a global educational market that values environmental stewardship. Initiatives such as the Russell Group’s Environmental Sustainability Network (Russell Group, 2019) exemplify collaborative efforts to share best practices, set ambitious carbon reduction targets, and implement cutting-edge solutions to waste management, recycling, and energy use. These efforts are aligned with governmental and global objectives, such as those outlined in the UK’s ‘Greening Government Commitments’ and the educational sector’s specific strategies under the ‘Sustainability and Climate Change Strategy’.¹

However, despite these ambitious goals and the proactive stance of many institutions, challenges remain, particularly in achieving set targets for carbon emissions and operational sustainability. The majority of UK universities are reportedly struggling to meet their environmental targets, which indicates a significant room for improvement and the need for rigorous research into the factors that enhance or impede progress in university-led sustainability efforts (Bryant, 2021). This persistent gap between rhetoric and performance echoes wider concerns about whether current initiatives represent genuine epistemic change

¹ Policy paper on Green Government Commitments 2021-2025: <https://www.gov.uk/government/publications/greening-government-commitments-2021-to-2025/greening-government-commitments-2021-to-2025>. Policy paper on “Sustainability and Climate Change Strategy”: <https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy>.

or institution-level greenwashing.

In this paper, we focus on the UK HE sector and investigate how the characteristics of the university Vice-Chancellors (VCs) and those of university governance affect a university's environmental sustainability, which we measure based on energy consumption, carbon emissions, water usage, and waste management. Our study aims to provide actionable insights that can help universities not only to enhance their environmental performance but also to lead societal transformation towards sustainability.

We interpret our results based on upper echelons theory. We identify two groups of mechanisms, that is, the leadership and governance levers that set the conditions under which sustainability efforts either flourish or stall. In universities, those leverage points reside with VCs and governing councils whose decisions shape strategic priorities, resource allocation, and institutional logics (Campbell and Carayannis, 2013). Upper-echelons theory predicts that organisational outcomes mirror top managers' values and cognitive frames (Hambrick and Mason, 1984). The first mechanism we examine is related to the characteristics of VC. We argue that VC's background, tenure, or education can translate, through strategic choices, into measurable differences in environmental sustainability metrics (Shahab et al., 2020). The second mechanism we identify is related to board design. A growing governance literature finds that dedicated sustainability committees, board independence, and diversity serve as structural conduits through which environmental expertise and stakeholder concerns reach executive decision-making (Walls et al., 2012; Aguilera et al., 2021; Driss et al., 2024). Within organisations, sustainability logics are most likely to cascade downward into operational practices when they are first adopted, legitimised, and resourced by actors at the

apex of governance, such as CEOs or boards, who shape strategic intent and institutional framing (Aguilera et al., 2007; Strand, 2014). Whether universities have begun to enact such a logic shift remains an open empirical question.

This paper contributes to at least two streams of research. First, we add to the literature, in the fields of leadership and corporate governance, on environmental sustainability. The bulk of existing evidence comes from for-profit organisations. Prior studies show that various CEO characteristics influence corporate sustainable development outcomes (e.g. Manner, 2010; Huang, 2013; Shahab et al., 2020). At the governance level, empirical studies consistently show that the board and the committees can affect the sustainability performance of a company (e.g. Kassinis et al., 2016; Ben-Amar et al., 2017; Appuhami and Tashakor, 2017; Li et al., 2023). To the best of our knowledge, prior academic research has not yet examined the determinants of university environmental sustainability. This paper applies insights from corporate governance research to the university context, thereby extending upper-echelons theory beyond the corporate domain. In addition, we bridge upper echelons theory with epistemic governance, offering a novel lens on how senior decision-makers shape environmental performance in complex, non-market institutions such as universities. We empirically operationalise the concept of epistemic governance (Campbell and Carayannis, 2013) by showing how leadership characteristics and board structures serve as high-leverage points for climate action.

2. Motivation: Environmental Sustainability in Universities and Management Education

Previous research on organizational leadership and sustainability has predominantly focused

on the characteristics of company CEOs and their impact on corporate sustainability outcomes, with a significant body of work examining the characteristics of CEOs (e.g., Huang, 2013; Saha et al., 2023; Venugopal et al., 2023; Mahran and Elamer, 2024) and corporate governance (Hussain et al., 2018; Aguilera et al., 2021; Beji et al., 2021; Ludwig and Sassen, 2022) on corporate sustainability. While some studies have explored the relationship between VC characteristics and university performance, particularly in terms of academic achievement and financial health (e.g., Cheah et al., 2024; Elmagrhi and Ntim, 2024; Khoo et al., 2024), there is a noticeable lack of research on the characteristics of university leadership that influence university sustainability.

Universities are not only centers of learning and research but also large operational enterprises that consume significant resources and produce substantial environmental footprints. Therefore, the strategic decisions made by the university leaders contain influential implications for their institution's sustainability. This includes decisions regarding resource allocation, campus development, areas of research focus, and the incorporation of sustainability into the curriculum. Considering the key role universities play in shaping a sustainable future, this research is of critical importance.² Our study intends to explore how university governance affects the environmental sustainability of HE institutions (HEI). Specifically, we examine the mechanisms operating at the highest levels of university governance, which shape institutional values, priorities, and capacities. We argue that, as the highest executives and policy-setters, university VCs and governance bodies serve as key

² We note that the incentives of university leaders are different from those of for-profit corporations. University leaders operate in a unique environment where academic freedom, public accountability, and non-commercial values play significant roles. While corporate CEOs might prioritize profit maximization and shareholder value, university governance must balance sustainability with educational and social missions.

determinants, directly influencing institutional strategies, resource allocation, and the cultural and epistemic orientations towards sustainability.

This study explores three core questions: (1) To what extent, and in what ways, do specific leadership traits of university VCs such as age, gender, educational background, tenure, graduation institution, nationality, honorary titles affect environmental sustainability? (2) How do university governance characteristics, including board diversity, independence, the presence of sustainability committees, audit committee size, and council meeting frequency affect environmental sustainability?

Overall, this study seeks to empirically investigate which leadership characteristics and governance structures within universities effectively catalyse genuine epistemic change towards sustainability, ultimately reflected in measurable environmental outcomes. By doing so, we not only fill a critical research gap but also offer valuable guidance for universities and management educators. This guidance emphasises the necessity of embedding sustainability at the governance level, suggesting concrete strategies for institutionalising sustainability logics within the core epistemic frameworks of higher education institutions. In addition, our research demonstrates how governance interventions can enable universities to authentically learn to manage the climate crisis through meaningful epistemic transformation.

3. Theoretical Framework and Hypotheses Development

3.1 Theoretical Framework

The importance of VC characteristics can be explained by upper echelons theory (UET) (Hambrick and Mason, 1984). Originally developed in the corporate context, UET argues that executives' observable traits (such as age, education, tenure, functional background) and

cognitive bases shape strategic choices and performance outcomes, especially in areas like innovation or corporate social responsibility (Wang et al., 2016; Bhaskar et al., 2023). Indeed, applying UET to higher education has gained traction as VCs increasingly act like CEOs in steering strategy. Applied to environmental sustainability, upper echelons theory suggests that a university's sustainability performance will mirror the personal characteristics and cognitive frames of its Vice-Chancellor.

Two complementary lenses are the public value and stakeholder perspectives, which reframes universities as multi-principal, mission - driven institutions tasked with creating value for society, not only for customers or funders. Public value scholarship argues that contemporary public administration is moving beyond the narrow efficiency-effectiveness focus of New Public Management (NPM) toward an approach that foregrounds democratic and societal values, recognizes government's role as a guarantor of public values, and treats value as co-created across sectors through inclusive dialogue and collaboration (Bryson et al., 2014). This public value governance perspective highlights multi-faceted accountability to citizens, communities, and future generations, an orientation that aligns naturally with universities' sustainability mandates. By emphasizing values the public cares about and what adds value to the public sphere, it legitimizes performance criteria that are broader than short-term financials and supports leadership choices that privilege long-horizon investments such as decarbonization roadmaps. Because climate mitigation is a grand challenge that exceeds the remit of any single organisation, a public value perspective complements stakeholder-governance arguments and organisational-design insights on public – private collaboration and long-horizon investment, offering a rationale for universities to remain

accountable for societal results (Amis et al., 2020; George et al., 2024). Another relevant lens is stakeholder theory, which views organisations as systems of relationships that must create value with and for multiple stakeholder groups, not only capital providers (Freeman, 1984; Laplume et al., 2008). Universities serve multiple stakeholders (students, faculty, society, government, etc.), and leaders who embrace a stakeholder-oriented mindset are likely to prioritize sustainability as a key social responsibility. Mitchell et al. (1997) advanced stakeholder theory by introducing the salience model, arguing that stakeholders gain managerial attention based on their possession of power, legitimacy, and urgency, with higher salience when multiple attributes are combined. This dynamic framework clarified “who really counts” and integrated normative and descriptive perspectives into stakeholder analysis. In universities, there are multiple salient stakeholders, which possess power, legitimacy and urgency, making climate-related claims hard to ignore (Mitchell et al., 1997; Rowley, 1997). Beyond its normative force (Donaldson and Preston, 1995), stakeholder theory also has an instrumental logic: cultivating trust-based stakeholder relationships improves performance and reduces non-market risk (Jones, 1995; Henisz et al., 2014). Empirically, environmental demands reach decision makers through institutional and networked stakeholder pressures, shaping governance and managerial practices (Delmas and Toffel, 2008; Parmar et al., 2010). Accordingly, a stakeholder-oriented VC and board are expected to integrate environmental objectives into strategy and oversight (e.g., dedicated sustainability committees, audit oversight), thereby extending university success metrics beyond finances and rankings to include environmental performance and public value (Harrison and Wicks, 2013; Ralph and Stubbs, 2014). In practice, a VC or board guided by stakeholder values may invest more in

green campus infrastructure or curriculum changes to address societal challenges like climate change.

Epistemic governance theory reinforces this view, arguing that top leaders in higher education shape the “knowledge paradigms” and institutional logics of their universities (Campbell and Carayannis, 2013). In other words, VCs occupy a position where they can redefine organizational priorities, allocate resources, and embed sustainability into the university's mission (or conversely, neglect it) through their goal-setting and policy decisions.

UET , the public value and stakeholder logic provide a coherent theoretical justification for focusing on leadership characteristics in explaining environmental performance in higher education. UET clarifies who leads and why their values and cognitive frames matter under ambiguity. Stakeholder theory clarifies why environmental performance is decision-relevant in universities: multiple stakeholders confer power, legitimacy and urgency, making climate and environmental impact core obligations rather than discretionary add-ons (Freeman, 1984; Donaldson and Preston, 1995; Mitchell et al., 1997). Public value governance specifies the objective function and accountability regime in hybrid, democratically legitimated organisations. Success is judged not solely by finances or academic rankings but by demonstrable contributions to collectively valued outcomes, including environmental performance, which justifies the integration of sustainability metrics into strategy, oversight and resource allocation (Moore, 1995; Bryson et al., 2014). In summary, UET identifies variance in executive preferences, while stakeholder and public-value logics explain the demand and accountability context that makes environmental outcomes part of core performance.

3.2 Who Leads Matters: Personal Characteristics and Climate Commitment

VCs in the UK, as the chief executives of universities, play a pivotal role in setting strategic priorities, including sustainability. Recent empirical research increasingly treats VCs as the university equivalent of corporate CEOs and examines how their characteristics relate to institutional outcomes. Lucey et al. (2022) and Roberts et al. (2024) explicitly note that in UK higher education institutions, VCs are increasingly taking on roles similar to those of CEOs, and their personal traits influence the outcomes of the institutions. This underscores that a VC's commitment to sustainability (or lack thereof) can cascade through the organization via strategy, resource allocation, and campus culture.

Empirical research in corporate settings supports that CEO attributes (age, education, tenure, gender, etc.) have measurable effects on firms' environmental and social performance (Manner, 2010; Huang, 2013; Shahab et al., 2020; Mahran and Elamer, 2024). These findings align with upper echelons theory in emphasizing that who occupies the top position matters greatly for sustainability. In short, the VC is a key actor: their personal background and mindset set the tone for institutional climate action (or inaction), much as CEOs drive sustainability agendas in corporations. Aguilera et al. (2007) propose a multi-level model suggesting that meaningful and sustained social change through CSR occurs when top management and boards integrate CSR into the organization's core values and strategy, ensuring it is supported with real commitment and resources. In other words, sustainability logics are far more likely to cascade down into operational practices when adopted by actors at the apex of governance (such as VCs or boards). Unless the CEO and directors genuinely prioritize environmental, social, and governance (ESG) goals, lower-level efforts may remain

superficial or get overridden by traditional profit-driven logics. Thus, both theory and practice indicate that VCs, as the upper echelon of universities, are crucial “levers” for institutional change toward sustainability. Their characteristics can be seen as mechanisms that either enable or constrain the deep organizational shifts needed to improve environmental performance.

3.2.1 Cognitive and experiential background

Building on upper echelons theory (Hambrick and Mason, 1984), this section explores how cognitive and experiential traits of VCs, including age, tenure, educational background, and elite academic affiliation, influence strategic interpretations and decisions related to sustainability. These traits are known to affect leaders’ values, attention to long-term outcomes, and responsiveness to environmental challenges (Carpenter et al., 2004; Wang et al., 2016).

Age. In the context of companies, previous papers indicate that younger CEOs are more likely to adopt measures enhancing environmental performance than relatively older ones (Borghesi et al., 2014; Shahab et al., 2020; Le et al., 2024). In the context of HEI, Elmagrhi et al. (2021) find a negative link between VC age and disclosure, suggesting older VCs may be more conservative or less responsive to stakeholder demands. Given rising climate expectations, younger VCs are motivated by stronger normative pressures and longer career horizons, and may be more inclined to lead sustainability efforts, pursue decarbonisation, and promote transparent, ethical governance.

Tenure. In the context of companies, CEO tenure has a positive impact on

environmental management (Wang et al., 2024; Liao and Wu, 2024). Within of HEIs, Elmagrhi et al. (2021) finds that VC tenure was positively associated with more extensive disclosure, implying that longer-serving leaders may foster a culture of openness and accountability which can extend to honest reporting on sustainability. CEO tenure has been shown to influence an organization's strategic direction, including its commitment to CSR and environmental performance. This reasoning extends to universities, where sustainability initiatives typically require multi-year planning, resource alignment, and stakeholder buy-in. Therefore, it is inferred that in the context of higher education, the tenure of VCs also positively affects the sustainability performance of the institution.

Education Background. Within companies, some empirical evidence has been discovered regarding the educational background of CEOs and the sustainable performance of companies. Some empirical studies have shown that CEOs with business education background are more likely to prefer short-term financial returns and relatively neglect environmental and social responsibilities (Manner, 2010; Ying and He, 2020; Sun et al., 2021; Menla et al., 2024; Kang et al., 2025). In HEIs, a VC's educational background, particularly their field of study and academic discipline, can shape their worldview, values, and priorities, thereby affecting institutional approaches to sustainability. Given the structural and functional parallels between the roles of corporate CEOs and university VCs, VCs with a background in fields more traditionally aligned with profit maximization, such as business, might not prioritize sustainability, potentially affecting the university's environmental performance negatively.

Oxbridge Affiliation. CEOs with elite education (e.g., top universities) often bring

unique social capital and worldviews that shape firm outcomes (Gounopoulos et al., 2021). Upper echelon theory suggests educational prestige influences openness to innovation and new practices (Hambrick & Mason, 1984; Barker & Mueller, 2002). In the UK HE, the idea that elite education enhances leadership effectiveness may extend to sustainability. Thus, an Oxbridge-educated VC, like elite-trained CEOs, may steer institutions toward sustainability through their networks, prestige, and values, potentially fostering bold action on societal challenges.

Overall, these cognitive and experiential characteristics, through their influence on values, strategic attention, and time horizons, are expected to shape how vice-chancellors engage with environmental sustainability. Based on this theoretical grounding, we hypothesize that specific traits such as age are systematically related to sustainability outcomes as follows:

***Hypothesis (H1).** Vice-chancellors with younger age, longer tenure, Oxbridge/elite academic backgrounds or business education background are more likely to foster environmental sustainability.*

3.2.2 Values and social orientation

Beyond cognitive traits, leadership values and social orientations, captured through characteristics such as gender, nationality, and public honours, can shape how vice-chancellors interpret stakeholder demands and ethical responsibilities. Prior research suggests that leaders with stronger stakeholder sensitivity and prosocial orientation are more likely to prioritise environmental goals (Glass and Cook, 2018; Bertrand et al., 2021), leading us to expect systematic variation in sustainability outcomes based on these traits.

Gender. Research within the corporate sector has shed light on the influence of leadership

gender on environmental performance. In the corporate context, female CEOs exhibited a positive correlation with environmental performance (e.g. Manner, 2010; Post et al., 2015; Galbreath, 2018; Glass and Cook, 2018) . In the context of HEI, the gender of the VC could also play a critical role. Recent UK evidence shows female VCs embrace wider stakeholder agendas (Cheah et al., 2024). Female VCs might be more predisposed to integrating sustainability into the university's core operations and ethos.

Knighthood/Damehood. In the corporate context, CEO reputation and celebrity status have been studied in relation to CSR. For example, some studies find that celebrated CEOs often engage in more visible CSR activities, arguably as a form of impression management (Lee et al., 2020). Similarly, a VC with a knighthood may be particularly attuned to the symbolic value of bold sustainability commitments (e.g., pledging carbon neutrality or launching high-profile green campus projects) as a way to reinforce their prestige and fulfill what they perceive as a stewardship role. Thus, a VC's knighthood or similar honor could be hypothesized to positively influence sustainability outcomes, serving as a mechanism by which personal stature aligns the university's agenda with broader societal expectations for responsible leadership.

Nationality. Foreign-born CEOs often face a "liability of foreignness," prompting them to champion pro-social causes to gain legitimacy (Bertrand et al., 2021), often reflected in higher ESG scores. UK VCs face similar pressures, especially from stakeholders concerned with universities' environmental impact. Without the cultural capital of domestic peers, foreign VCs are incentivized to signal commitment through bold sustainability initiatives (such as net-zero pledges, campus retrofits, transparent carbon

reporting), both to build trust and drive change, aligning with upper-echelon views on outsider leadership and strategic transformation.

Overall, these value-oriented characteristics, such as gender, nationality, and knighthood, serve as signals of a leader's social identification, ethical stance, and responsiveness to stakeholder expectations. Based on the above theoretical and empirical insights, we thus hypothesize that these traits are systematically associated with variation in universities' environmental sustainability outcomes as follows:

***Hypothesis (H2a).** Universities led by female VCs will show better sustainability performance.*

***Hypothesis (H2b).** Universities led by VCs holding a knighthood/damehood will show better sustainability performance.*

***Hypothesis (H2c).** Universities led by foreign-born VCs will show better sustainability performance.*

3.3 Corporate governance characteristics

While the VC provides executive leadership, the governance structures of a university, primarily the governing board (often called the University Council or Board of Governors) and its committees, establish the framework within which sustainability is embedded in oversight and strategy. Governance in UK higher education follows a model somewhat akin to corporate governance, with independent board members, various subcommittees, and responsibilities for ensuring the long-term success of the institution (which now explicitly includes sustainability in official guidelines).

3.3.1 Board gender diversity

Diverse boards bring a variety of perspectives and are less prone to “groupthink,” potentially fostering more ethical, community-oriented discussions. In corporations, numerous studies have linked board gender diversity to stronger environmental and CSR performance. Empirical evidences show that gender diversity on boards has a significant positive impact on corporate social and environmental performance (e.g. Liao et al., 2015; Kassinis et al., 2016; Glass et al., 2016; Ben-Amar et al., 2017; Nuber and Velte, 2021). Given the resource-based argument and relevant empirical evidence, the presence of women directors is expected to enhance mitigation efforts and reduce greenhouse gas emissions.

As diversity becomes more embedded through the Committee of University Chairs (CUC) code and regulatory emphasis, its impact on sustainability may strengthen. Since 2017, the Higher Education Code of Governance has framed inclusion and diversity as core values alongside sustainability, positioning them as drivers of good governance. From a resource-based view, increasing female representation on boards is expected to enhance GHG reduction and sustainability in universities.

Therefore, the following hypothesis is proposed:

Hypothesis (H3a). *Board gender diversity is positively related to environmental sustainability.*

3.3.2 Board independence

According to stakeholder theory, it is expected that a company's board of directors should act independently of management, so the inclusion of non-executive board members is associated with better stakeholder accountability (Ezzamel and Watson, 2005). Empirical evidence from

previous studies largely shows that the increase in the proportion of independent directors has a positive impact on environmental sustainability performance (Chau and Gray, 2010; Mallin and Michelon, 2011; De Villiers et al. 2011; Ben-Amar et al., 2017). Independent boards are more likely to recognize climate risks, support long-term carbon initiatives, and monitor progress.

In UK universities, boards typically comprise external lay members tasked with oversight and public accountability. Elmagrhi et al. (2021) found that greater board independence was linked to more voluntary governance disclosures, suggesting that independent members promote transparency and may push for stronger environmental strategies to enhance institutional resilience.

Therefore, the following hypothesis is proposed:

***Hypothesis (H3b).** Board independence is positively related to environmental sustainability.*

3.3.3 Board meetings

Agency theory views board meeting frequency as a proxy for board diligence (Vafeas, 1999). Frequent meetings can enhance oversight and decision-making efficiency (Laksmana, 2008; Lipton and Lorsch, 1992). From a stakeholder perspective, they also help address diverse risks, including environmental ones (Hussain et al., 2018). Empirical findings are mixed: Jizi et al. (2014) found a positive link between meeting frequency and CSR disclosure in U.S. banks, while other studies report varied results (Garcia-Sanchez et al., 2014; Giannarakis, 2014; Liao et al., 2018).

In HEIs, councils play key strategic roles but operate amid competing demands and limited control over daily environmental operations. While frequent meetings may signal

active governance, they don't always reflect a strategic focus on sustainability, and may even distract from it or indicate difficulty in addressing environmental challenges effectively.

Therefore, we hypothesize:

Hypothesis (H3c). *The frequency of board meetings is negatively correlated with environmental sustainability.*

3.3.4 Sustainability committee

Board-level sustainability or CSR committees are key governance tools for improving environmental performance. Studies show firms with such committees perform better on environmental metrics. For instance, Li et al. (2023) found that Australian firms with sustainability committees had higher ESG ratings, while Driss et al. (2024) reported better carbon disclosure quality in 35-country data, emphasizing these committees' substantive, not symbolic, role. Meqbel et al. (2025) further linked committee presence and meeting frequency to lower carbon emissions, highlighting the value of active oversight.

Many UK universities have formed dedicated sustainability or environment committees that report to senior management or the governing board. They help formulate sustainability strategy and monitor implementation. While little academic literature has directly evaluated the effectiveness of such university committees, analogies to corporate boards are illuminating. By analogy, a university that embeds sustainability in its governance structure signals a commitment that likely translates to better environmental outcomes on campus. It creates accountability, which means that administrators must report on sustainability progress to the committee, which in turn updates the full board.

Hypothesis (H3d). *The existence of sustainability committees is positively correlated with*

environmental sustainability.

3.3.3 The size of audit committee

The size of the audit committee (AC) refers to the number of its members. In the context of enterprises, Li et al. (2012) used data from 100 UK listed companies and found a positive correlation between AC size and knowledge capital disclosure. Similarly, the research found that the size of AC is positively correlated with earnings management (Cornett et al., 2009; Yang and Krishnan, 2005). Appuhami and Tashakor (2017) conducted a multiple regression analysis on the annual report data of 300 listed companies and found that the scale of AC has a significant positive impact on the level of CSR information disclosure.

Universities face analogous monitoring challenges. A larger AC can therefore supply the specialised oversight and continuity needed to hold senior management accountable for sustainability targets.

***Hypothesis (H3e).** The size of audit committees is positively correlated with environmental sustainability.*

4. Methodology

4.1 Data collection

We focus on the UK HEIs from 2017 to 2023 and obtain the data for the calculation of the environmental sustainability measures from the Higher Education Statistics Agency (HESA) database. Data on the VCs is obtained from the public personal homepage and the official websites of each university. Data on corporate governance characteristics are derived from annual reports of HEIs. For those universities whose data on governance could not be

obtained in the annual reports, we contacted the Freedom of Information office to obtain the relevant data.

4.2 Variables and the model

4.2.1 Environmental sustainability (ES)

Although the QS World University Rankings: Sustainability was initially regarded as a potential proxy for university sustainability performance, it was ultimately not used in this study for several reasons. Firstly, the ranking only starts from 2022/23, so the available time series is very short. Secondly, not all British universities are included in every version (for instance, 67 in 2023, 93 in 2024, and 109 in 2026). This has led to a large amount of data loss and inconsistent coverage of institutions over the years. Thirdly, since the initial 2023 pilot version, the ranking method has changed, and subsequently, the indicators and their weights have been adjusted, which means that the scores cannot be fully comparable over time.

We employ two measures to capture environmental sustainability: environmental sustainability (ES) and carbon efficiency (CE). ES is based on the measure of environmental sustainability, developed by Hummel and Schlick (2016). It is a composite measure that evaluates a university's overall environmental impact across four key dimensions: energy consumption, water usage, greenhouse gas (GHG) emissions, and waste management. Below, we define each component specifically.

Energy consumption. It reflects the total amount of energy used by the university, both direct and indirect, relative to its workforce. This measure helps to understand the energy efficiency of the institution.

Water withdrawal. It tracks the total water usage normalized by the number of employees,

which highlights the university's efforts in managing water resources sustainably.

Greenhouse gas emissions. These include both Scope 1 and Scope 2 emissions, are measured per employee to provide insight into the carbon footprint of the university's operations.

Waste management. The total weight of waste produced is normalized by the number of employees, serves as an indicator of how well the institution manages waste and reduces its environmental impact.

All values are transformed into a continuous [0, 1] scale by assigning 0 to the worst and 1 to the best performance indicator values and by rescaling all other values proportionally. The final ES score is calculated as the arithmetic mean of these environmental performance indicators.

We note that a higher value of ES denotes higher environmental sustainability.

4.2.2 Carbon efficiency (CE)

CE is based on the measures of carbon emissions used by Eskander and Istiak (2023). It assesses a university's carbon efficiency by dividing total CO2 emissions by the total number of full-time equivalent students to obtain per-capita emissions, which are then converted to log form. The final score is then multiplied by -1.

We note that a higher value of CE denotes higher carbon efficiency (and higher environmental sustainability).

4.2.3 The model

To examine our main research questions, the econometric model we employ is as follows:

$$ES/CE_{i,t} = \beta_0 + \beta_1 VCGEN_{i,t} + \beta_2 VCAGE_{i,t} + \beta_3 TNURE_{i,t} +$$

$$\begin{aligned} & \beta_4 OXB_{i,t} + \beta_5 VCEDU_{i,t} + \beta_6 KNIGHT_{i,t} + \beta_7 BRITISH_{i,t} + \\ & \beta_8 Controls_{i,t} + \sum Year\ dummy + \sum Country\ dummy + \varepsilon_{i,t} \end{aligned} \quad (1)$$

$$\begin{aligned} ES/CE_{i,t} = & \beta_0 + \beta_1 VCGEN_{i,t} + \beta_2 VCAGE_{i,t} + \beta_3 TNURE_{i,t} + \\ & \beta_4 OXB_{i,t} + \beta_5 VCEDU_{i,t} + \beta_6 KNIGHT_{i,t} + \\ & \beta_7 BRITISH_{i,t} + \beta_8 ACSIZE_{i,t} + \beta_9 SC_{i,t} + \beta_{10} MEET_{i,t} + \\ & \beta_9 BDGEN_{i,t} + \beta_{10} BDIND_{i,t} + \beta_{11} Controls_{i,t} + \\ & \sum Year\ dummy + \sum Country\ dummy + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where i denotes HEI and t year. ES (environmental sustainability) and CE (carbon efficiency) are environmental performance. VCGEN, VCAGE, TNURE, OXB, VCEDU, KNIGHT, and BRITISH are the VC characteristics (gender, age, appointment years, elite education, educational background, knighthood or damehood, nationality) and ACSIZE, SC, MEET, BDGEN and BDIND are variables related to governance (the size of audit committee, presence of a sustainability committee, frequency of council meeting, the percentage of women in council, the percentage of lay members in council).

Controls is a vector of HE-specific control variables. We control for number of general HEI characteristics to reduce the possibility of omitted variable bias. These variables are: externally audited environmental management system (CA); size of audit firm (BIG4); dummy for political orientation of the main campus location (LEFTWING); dummy for location of the main campus (SOUTH); HEI year (HEIAGE); HEI size (HEISZ); tuition fees and donation income (CFUND); dummy for post-1992 (PST92); dummy for Russell Group

(RUSG); research grants (RA); full-time students (FT); total income (AT); total expenses (ER); student satisfaction score (NSS); number of buildings (BUD); staff costs (SR); days ratio of total net assets to total expenditure (DR); and external borrowing (EB). Country dummy refers to the four regions of the UK: England, Scotland, Wales, and Northern Ireland. Definitions of all the variables used in our analyses can be found in the Appendix.

5. Empirical results

5.1 Descriptive Statistics and Correlation Analysis

Table 1 presents the descriptive statistics. The mean score for overall environmental sustainability (ES) across universities is 0.784 with a standard deviation of 0.125. The carbon efficiency measure (CE), represented as the negative log of per-capita emissions, shows an average score of -6.496 and a standard deviation of 0.659. In terms of leadership characteristics, only about 30.7% of VCs (VCGEN) are female, highlighting a gender imbalance at the senior leadership level. The average age of VCs (VCAGE) is approximately 60 years, suggesting that most university leaders belong to a similar age cohort. VCs hold their positions for an average tenure of around 6.3 years. Elite educational backgrounds, specifically Oxbridge affiliations (oxb), characterize about 22.6% of VCs, suggesting that a meaningful portion of leadership positions is filled by individuals from prestigious institutions. Additionally, about 16.5% of VCs hold honorary titles (knighthood or damehood), implying significant recognition and prestige among a notable minority of leaders. The majority (92.8%) of VCs are of British nationality, pointing towards limited international diversity in institutional leadership. Regarding governance characteristics, boards exhibit moderate gender

diversity, with an average of 41.4% female representation (BDGEN). Board independence (BDIND) averages around 59.1%. University councils meet frequently, averaging 5.4 meetings per year (MEET). The audit committees typically consist of around five members (ACSIZE). Nevertheless, only 12% of universities have formally established dedicated sustainability committees (SC). Finally, the key control variables offer further context. Roughly half (51.1%) of the institutions are categorized as post-1992 universities (PST92), reflecting a balanced mix of newer and traditional universities, while only 16.1% belong to the elite Russell Group (RUSG).

[Insert Table 1 about here]

The correlation analysis (Table 2) reveals several noteworthy relationships among key variables. ES (environmental sustainability) and CE (carbon efficiency) exhibit a significant positive correlation ($r=0.516$), confirming their conceptual alignment. VC knighthood negatively correlates with both sustainability measures, particularly CE ($r=-0.174$), indicating that honorary recognition of vice-chancellors does not necessarily translate into better environmental performance. Board independence (BDIND) positively correlates with both ES ($r=0.227$) and CE ($r=0.352$), suggesting effective independent oversight promotes better sustainability outcomes.

[Insert Table 2 about here]

5.2 The characteristics of VCs, governance, and sustainability performance

The results of the analysis of the determinants of university sustainability are presented in Table 3. In Models 1-2, we only examine the characteristics of the VC, whereas in Models 3-4 we also investigate the characteristics of the boards.

[Insert Table 3 about here]

In all the models, VC age (VCAGE) consistently demonstrates a negative and highly significant association with both sustainability measures, ES and CE, across all models. Older VCs appear less inclined to prioritize sustainability initiatives, perhaps indicating a generational effect or differing risk attitudes, consistent with upper echelons theory, suggesting that younger leaders may adopt more progressive environmental strategies. In all the models, VC tenure (TENURE) is positively and significantly associated with both ES and CE measures. Longer-serving VCs likely possess greater institutional influence and familiarity, allowing them to effectively implement longer-term sustainability agendas. This finding aligns with literature highlighting that stable leadership can reinforce strategic continuity in sustainability (Hambrick and Mason, 1984). Oxbridge affiliation (OXB) emerges significantly positively associated with both ES and CE after controlling for governance characteristics (Models 3-4), suggesting that VCs educated at elite institutions such as Oxford or Cambridge may utilize their networks and resources more effectively in sustainability efforts. This is also consistent with upper echelons literature, which identifies educational prestige as influential in strategic decision-making (Barker and Mueller, 2002). In addition, the empirical results in all the models, show that universities led by VCs with a business educational background (BUSINESS) tend to have lower environmental-sustainability performance, compared to universities led by VCs from other fields. This is consistent with prior corporate research suggesting that leaders trained in business disciplines often prioritise short-term performance metrics over environmental or social objectives. Collectively, these results support H1: VCs with younger age, longer tenure,

Oxbridge/elite academic backgrounds or business education background are more likely to foster environmental sustainability.

As for stakeholder-oriented traits (H2), we find that female VCs (VCGEN) are positively associated, albeit at the 10% significance level, with CE. Nationality also plays a role; British nationality (BRITISH) is negatively and significantly related to CE, implying that international or non-British VCs might bring diverse experiences and global sustainability practices to UK universities, enhancing carbon efficiency. This is also consistent with corporate studies suggesting that foreign CEOs positively influences CSR performance (Bertrand et al., 2021). The coefficient on KNIGHT is insignificantly different from zero. The results about gender and nationality are significant using CE but not using ES; overall, they tend to support H2, which argues that VCs with more stakeholder- or value-oriented traits are associated with better sustainability outcomes.

Moving to the governance variables, we find that the coefficient on board gender diversity (BDGEN) is statistically insignificant across all models. This finding does not support H3a and suggests that simply increasing female representation on governing councils does not automatically translate into stronger environmental outcomes in the university context. Board independence (BDIND) is positively and significantly associated with ES, while it is insignificantly associated with CE. The finding aligns with H3b, which argues that independence improves oversight when information asymmetries are reduced. We also find that increased board meetings (MEET) negatively affect both ES and CE, which is consistent with hypothesis H3c, indicating that excessively frequent meetings may reduce governance efficiency or signal underlying management issues affecting sustainability. In addition, the

existence of a sustainability committee (SC) and larger audit committee size (ACSIZE) are significantly and positively associated with both ES and CE, which is consistent with H3d and H3e. These variables likely reflect increased institutional accountability and structured sustainability oversight, resonating with corporate governance literature where sustainability committees correlate with stronger environmental disclosures and performance (Walls et al., 2012). From a public value standpoint, dedicated committees and audit capacity institutionalise polycentric accountability, and can make environmental and social outcomes auditable and salient, whereas compositional diversity without deliberative design or oversight architecture may be insufficient to shift decisions.

The control variables provide additional context. Institutions in left-wing governed localities (LEFTWING) and those with externally certified environmental management systems (CA) significantly outperform others on sustainability measures, reinforcing the critical role of supportive external governance and structured environmental management practices. Universities established post-1992 (PST92) generally outperform older institutions on both sustainability indicators, potentially reflecting newer infrastructure and flexible governance structures that are more conducive to adopting modern sustainability practices.

6. Discussion and Conclusion

In this paper, we examine environmental sustainability in the UK HE sector. We document two main results. First, leadership matters. Younger, longer-tenured, Oxbridge educated, with no business education background and foreign VCs are associated with better environmental sustainability performance. Second, governance structures play a significant role. A dedicated

sustainability committee and a larger audit committee can raise environmental sustainability. These results indicate that both who leads and how oversight is structured shape sustainability performance in mission-driven, professional-bureaucratic organizations.

These findings align with the UET, stakeholder theory, and public value governance. UET predicts that organisational outcomes mirror top managers' values and cognitive frames. Stakeholder theory clarifies why environmental issues are decision-salient in universities: multiple stakeholder groups possess power, legitimacy, and urgency, creating both normative and instrumental incentives to deliver measurable environmental performance. Public value governance specifies what universities are accountable for and how: as democratically legitimated, mission-oriented institutions, universities are expected to create social and intergenerational benefits; governance mechanisms such as specialized committees and audit oversight convert those expectations into performance criteria and managerial routines.

Our results extend prior research in at least two ways. First, we add to the literature on the determinants of environmental sustainability. Ours is the first paper to examine the determinants of environmental sustainability in the HE sector. Previous research on organizational leadership and sustainability has examined how firms' environmental sustainability is affected by the characteristics of CEOs (e.g., Huang, 2013; Saha et al., 2023; Venugopal et al., 2023; Mahran and Elamer, 2024) by corporate governance features (Hussain et al., 2018; Aguilera et al., 2021; Beji et al., 2021; Ludwig and Sassen, 2022). Our results add that, in higher education institutions, leader characteristics and board design interact to produce environmental performance under multi-principal accountability. Second, this paper extends prior work on UET and governance for sustainability beyond private firms to a hybrid

public setting where organizational objectives explicitly include public and intergenerational value creation.

Overall, our findings enhance the concept of epistemic governance (Campbell and Carayannis, 2013) by empirically demonstrating how leadership attributes and board structures collectively influence institutional sustainability, filling a critical knowledge gap regarding universities' non-market environmental governance mechanisms. By showing the nuanced interplay between leader demographics, educational backgrounds, and governance structures, our study enriches theoretical perspectives on leadership-driven epistemic shifts towards sustainability.

The results also carry practical implications for university leaders and policymakers. For example, installing or strengthening sustainability committees with clear mandates, relevant expertise, and direct reporting lines to the governing body can institutionalize environmental oversight. Moreover, supporting VCs with demonstrated long-horizon orientation can counter short-termism.

Finally, we identify three limitations of our paper, which we believe could represent fruitful avenues for future research. First, we focus on measures of environmental sustainability at university level, which are calculated using data from the HESA. It would be interesting to examine the sustainability of the single departments of the universities. These data are not publicly available and such an analysis could be conducted using surveys. Second, to investigate the individuals at the head of universities, we concentrate on VCs, who effectively play a role similar to that of a CEO. Future research could examine the effect, as well as the interaction with VCs, of other individuals leading the organisation, for example

the heads of departments, on environmental sustainability outcomes.

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Table 1. Descriptive Statistics

	Mean	Std. Dev.	p25	p50	p75
ES	.784	.125	0.720	.808	.870
CE	-6.496	.659	-6.966	-6.432	-6.012
VCGEN	.307	.461	0	0	1
VCAGE	59.899	4.730	57	60	63
TENURE	6.266	4.482	3	5	9
OXB	.226	.418	0	0	0
KNIGHT	.165	.372	0	0	0
BRITISH	.928	.259	1	1	1
BDGEN	.414	.099	0.350	.421	.478
BDIND	.591	.121	0.520	.600	.682
MEET	5.427	1.469	4	5	6
ACSIZE	5.199	1.473	4	5	6
SC	.120	.325	0	0	0
LEFTWING	.611	.488	0	1	1
SOUTH	.601	.490	0	1	1
CA	.603	.490	0	1	1
BIG4	.633	.482	0	1	1
HEIAGE	57.810	98.811	14	28	55.500
HEISZ	7.410	.998	6.864	7.491	8.069
CFUND	.624	.179	0.496	.671	.774
PST92	.511	.500	0	1	1
RUSG	.161	.367	0	0	0
RA	.047	.054	0.008	.024	.074
NSS	80.521	6.392	76.685	81.885	85
DR	375.906	253.446	216	354.500	490
SR	.575	.097	0.519	.568	.630
FT	9.160	.962	8.799	9.443	9.799
BUD	115.253	115.560	33	79	144
EB	33.818	27.616	16.450	30.500	46.250
AT	.589	.197	0.451	.557	.687
ER	1.002	.090	0.951	.989	1.045

Notes: The statistics are based on the observations available for universities in the years 2017-2023. See the Appendix for the definition of the variables. All the continuous variables are winsorized at the 1% level.

Table 2. Pairwise Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) ES	1.000												
(2) CE	0.516* (0.000)	1.000											
(3) VCGEN	-0.016 (0.667)	0.031 (0.382)	1.000										
(4) VCAGE	0.016 (0.664)	-0.034 (0.349)	0.012 (0.745)	1.000									
(5) TENURE	0.047 (0.203)	0.090* (0.010)	-0.159* (0.000)	0.420* (0.000)	1.000								
(6) OXB	0.075* (0.042)	0.044 (0.215)	-0.155* (0.000)	0.060 (0.096)	0.022 (0.526)	1.000							
(7) KNIGHT	-0.084* (0.021)	-0.174* (0.000)	0.028 (0.417)	0.240* (0.000)	0.131* (0.000)	0.032 (0.360)	1.000						
(8) BRITISH	0.032 (0.381)	0.065 (0.062)	-0.108* (0.002)	-0.006 (0.867)	0.069* (0.048)	0.062 (0.076)	0.124* (0.000)	1.000					
(9) BDGEN	0.025 (0.500)	0.101* (0.004)	0.052 (0.144)	0.020 (0.576)	-0.094* (0.007)	0.041 (0.251)	-0.001 (0.988)	-0.008 (0.824)	1.000				
(10) BDIND	0.227* (0.000)	0.352* (0.000)	0.022 (0.542)	-0.044 (0.238)	0.117* (0.001)	-0.152* (0.000)	-0.190* (0.000)	0.041 (0.258)	0.028 (0.432)	1.000			
(11) MEET	-0.021 (0.594)	-0.042 (0.269)	0.054 (0.148)	-0.014 (0.711)	-0.138* (0.000)	0.040 (0.281)	-0.041 (0.270)	0.005 (0.901)	-0.007 (0.844)	-0.059 (0.118)	1.000		
(12) ACSIZE	0.029 (0.453)	0.152* (0.000)	0.022 (0.541)	0.133* (0.000)	-0.034 (0.351)	-0.004 (0.908)	-0.007 (0.839)	-0.024 (0.518)	-0.015 (0.677)	-0.044 (0.233)	0.156* (0.000)	1.000	
(13) SC	0.076* (0.000)	-0.006 (0.951)	-0.047 (0.541)	0.104* (0.000)	0.056 (0.351)	-0.084* (0.000)	0.086* (0.000)	0.046 (0.518)	0.094* (0.000)	0.008 (0.951)	0.067 (0.000)	0.044 (0.541)	1.000

	(0.037)	(0.869)	(0.179)	(0.004)	(0.111)	(0.017)	(0.013)	(0.190)	(0.007)	(0.820)	(0.071)	(0.228)
*** p<0.01, ** p<0.05, * p<0.1												

Notes: This is a table for the correlation analysis of the main variables. The statistics are based on the observations available for universities in the years 2017-2023. See the Appendix for the definition of the variables. All the continuous variables are winsorized at the 1% level. The symbols ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3. The Determinants of University Sustainability

	ES <i>Model 1</i>	CE <i>Model 2</i>	ES <i>Model 3</i>	CE <i>Model 4</i>
VCGEN	-0.01 (0.008)	0.00 (0.030)	0.01 (0.009)	0.06* (0.034)
VCAGE	-0.00*** (0.001)	-0.01*** (0.003)	-0.00** (0.001)	-0.02*** (0.004)
TENURE	0.00** (0.001)	0.01*** (0.004)	0.00** (0.001)	0.01*** (0.004)
AXB	0.01 (0.008)	0.04 (0.027)	0.02** (0.008)	0.06** (0.029)
KNIGHT	-0.01 (0.011)	0.04 (0.037)	0.00 (0.011)	0.06 (0.042)
BRITISH	-0.02 (0.012)	-0.09** (0.042)	-0.01 (0.013)	-0.10** (0.045)
BDGEN			0.04 (0.034)	0.08 (0.118)
BDIND			0.06** (0.031)	-0.01 (0.118)
SC			0.03*** (0.009)	0.13*** (0.036)
ACSIZE			0.01*** (0.003)	0.04*** (0.011)
MEET			-0.01** (0.002)	-0.02* (0.009)
LEFTWING	0.04*** (0.008)	0.14*** (0.027)	0.03*** (0.009)	0.16*** (0.034)
SOUTH	0.02** (0.008)	0.07** (0.031)	0.01 (0.009)	0.04 (0.034)
CA	0.03*** (0.009)	0.11*** (0.039)	0.01 (0.010)	0.03 (0.045)
BIG4	-0.00 (0.008)	-0.07** (0.032)	-0.02* (0.009)	-0.13*** (0.034)
HEIAGE	-0.00** (0.000)	-0.00*** (0.000)	-0.00 (0.000)	-0.00** (0.000)
HEISZ	0.11*** (0.022)	-0.48*** (0.110)	0.11*** (0.021)	-0.49*** (0.106)
CFUND	0.33*** (0.055)	1.24*** (0.179)	0.17*** (0.055)	0.92*** (0.193)
PST92	0.03** (0.013)	0.15*** (0.045)	0.04** (0.017)	0.21*** (0.059)
RUSG	0.06***	0.08	0.02	0.01

	(0.016)	(0.057)	(0.016)	(0.058)
RA	-0.72***	-1.95***	-0.42*	-0.89
	(0.217)	(0.583)	(0.228)	(0.608)
NSS	-0.00***	-0.01**	-0.00***	-0.01***
	(0.001)	(0.003)	(0.001)	(0.003)
DR	0.00***	0.00***	0.00***	0.00***
	(0.000)	(0.000)	(0.000)	(0.000)
SR	0.19***	0.44	0.28***	0.79***
	(0.070)	(0.275)	(0.067)	(0.275)
FT	-0.08***	0.57***	-0.08***	0.56***
	(0.018)	(0.087)	(0.017)	(0.082)
BUD	-0.00***	-0.00***	-0.00***	-0.00***
	(0.000)	(0.000)	(0.000)	(0.000)
EB	-0.00*	-0.00	-0.00	0.00
	(0.000)	(0.000)	(0.000)	(0.001)
AT	0.06*	0.20	0.14***	0.47***
	(0.035)	(0.128)	(0.031)	(0.122)
ER	-0.11*	-0.25	-0.17***	-0.50**
	(0.064)	(0.241)	(0.063)	(0.244)
ENGINEERING	-0.00	-0.10	-0.02	-0.14**
	(0.017)	(0.064)	(0.016)	(0.059)
BUSINESS	-0.04**	-0.13**	-0.04**	-0.14**
	(0.017)	(0.055)	(0.019)	(0.057)
SOCIALSCIENCE	0.02	0.09*	0.01	0.07*
	(0.013)	(0.047)	(0.013)	(0.043)
MATH	0.01	-0.01	0.02	-0.05
	(0.016)	(0.056)	(0.019)	(0.061)
NATURAL	0.00	0.04	0.00	0.03
	(0.011)	(0.042)	(0.010)	(0.037)
Constant	0.71***	-8.10***	0.86***	-7.26***
	(0.124)	(0.460)	(0.125)	(0.505)
YEAR FE	YES	YES	YES	YES
COUNTRY FE	YES	YES	YES	YES
Observations	666	684	570	587
Adjusted <i>R</i> -squared	0.528	0.786	0.562	0.814

Notes: OLS regression relating environmental sustainability (ES and CE) to VC characteristics (age, gender, tenure, Oxbridge education, knighthood/damehood, nationality, education background, business background) and university governance characteristics (board diversity, board independence, size of audit committee, existence of sustainability committee, frequency of board meeting). All variables are defined in the Appendix. *, ** and *** indicate statistical significance at the 10%, 5% and 1%, respectively. Robust standard errors in parentheses.

Appendix: Variable descriptions

Panel A. Measures of environmental sustainability	
Environmental sustainability (ES)	It is defined as the arithmetic mean of four environmental performance indicators, that is: $ES = (energy_normalized + water_normalized + ghg_normalized + waste_normalized) / 4$
Energy consumption	It is defined as the sum of (Direct + indirect energy consumption) divided by the number of employees, as follows: $energy_normalized = \frac{max(energy_consumption) - energy_consumption}{max(energy_consumption) - min(energy_consumption)}$
Water withdrawal	It is defined as the total water withdrawal minus cooling water), divided by the number of employees, that is: $Water_normalized = \frac{max(water_withdrawal) - water_withdrawal}{max(water_withdrawal) - min(water_withdrawal)}$
GHG emissions	It is defined as the sum of GHG protocol scope 1 and scope 2 emissions), divided by the number of employees, that is: $ghg_normalized = \frac{max(ghg_emissions) - ghg_emissions}{max(ghg_emissions) - min(ghg_emissions)}$
Waste management	Total weight of waste is defined as the total weight of waste divided by the number of employees, that is: $waste_normalized = \frac{max(Total\ weight\ of\ waste) - Total\ weight\ of\ waste}{max(Total\ weight\ of\ waste) - min(Total\ weight\ of\ waste)}$
Carbon efficiency (CE)	$(-1) * \log(CEPS)$.
Carbon Emissions Per Student (CEPS)	CEPS is defined as the total carbon emissions (kg), divided by the total of teaching student FTE and Research student FTE.
Panel B. Measures of Vice Chancellor's characteristics	
VCGEN	A dummy variable that equals 1 if the VC is female, 0 otherwise.
VCEDU	A continuous variable that is awarded a value between 1 and 6 (e.g., medicine, engineering, accounting/finance/business/management, social sciences, computing/math/statistics, and humanities/natural

	sciences backgrounds). The natural logarithm is taken to normalize this variable.
VAGE	Measured as the natural log of vice chancellor (VC) age.
TENURE	Measured as the total number of years since a vice chancellor (VC) of a HE institution is appointed.
OXB	Dummy variable that equals 1 if the VC is a graduate of the University of Oxford or Cambridge, and 0 otherwise.
KNIGHT	Dummy variable that equals 1 if the VC has been awarded a British knighthood or damehood (i.e., holds the title "Sir" or "Dame"), and 0 otherwise.
BRITISH	Dummy variable that equals 1 if the VC is a British national, and 0 otherwise.

Panel C. University governance characteristics variables

ACSIZE	The number of audit Committee members.
SC	Dummy variable that equals 1 if the university has a sustainability committee, otherwise 0.
MEET	The number of meetings of the council during this year
GBGED	Computed as the percentage of women in a HE institution council.
GBIND	Measured as the percentage of lay members in a HE institution council.

Panel D. Control variables

CA	1 represents the implementation of an externally audited environmental management system (e.g., ISO14001, EMAS, Ecocampus, Green Dragon, IEMA Acorn program [BS8885]), and 0 represents none.
BIG4	An indicator variable that equals 1 if a HE institution is audited by Deloitte, PwC, KPMG, and EY, 0 otherwise.
LEFTWING	Political orientation of the main campus location. A dummy variable equal to 1 if the local government where the university's main campus is located is led by a left-wing political party, and 0 otherwise.
SOUTH	Location of the main campus. A dummy variable equal to 1 if the main campus is located in the southern region, and 0 otherwise.
HEIAGE	Measured as the natural log of the number of years since a HE institution is established.
HEISZ	Measured as the natural log of the total number of staff.
CFUND	Measure as the proportion of total revenues from funding councils to total income.
PST92	An indicator variable that equals 1 if a HE institution is established after 1992, 0 otherwise.
RUSG	An indicator variable that equals 1 for Russell Group universities, 0 otherwise.
COUNTRY	Country dummies for each of the UK four countries, namely, Scotland, Wales, Northern Ireland, and England.
RA	Natural logarithm of research grants to total assets.

FT	Sum of full-time UG and PG students.
AT	The total income scaled by total assets.
ER	Total expenses scaled by total revenue.
NSS	The score measured by student satisfaction.
BUD	The number of buildings in the campus.
SR	Staff costs divided by total income.
DR	Days ratio of total net assets to total expenditure.
EB	External borrowing as a % of total income.