Carbon neutral higher education institutions: a reality check, challenges and solutions

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Abstract

Purpose – Calculating an organization's carbon footprint is crucial for assessing and implementing emission reductions. Although Finnish higher education institutions (HEIs) aim for carbon neutrality by 2030, limited research exists on plans to reach a similar target in any country. This paper aims to address the shared and individual challenges Finnish HEIs have with carbon footprint calculations, reductions, resources and offsetting.

Design/methodology/approach – A survey was targeted to sustainability experts in all 38 HEIs in Finland to identify key patterns and trends in the focus fields of the study. SWOT analysis was used to classify main strengths, opportunities, weaknesses and threats, based on which a series of policy recommendations was drafted.

Findings – Finnish HEIs are committed to carbon footprint tracking (97%, annually by 87%). The lack of standardization and the number of external stakeholders complicate accounting indirect emissions, impeding comparability and reliability. Only 39% had set separate emission reduction targets, suggesting a preference for carbon footprint over other environmental impact indicators. Insufficient monetary and human resources emerged in 23% of institutions, especially those smaller in size. Only 52% had clear offsetting plans, with shared concerns over trust and responsibility.

Originality/value – By including both research universities and universities of applied sciences, the findings provide an unprecedented outlook into the entire Finnish HEI sector. The policy recommendations guide HEIs both locally and globally on how to improve their transparency and scientific integrity, reflect on core successes and weaknesses and how they complete their objectives of education, research and social impact while promoting stronger sustainability.

Keywords Carbon footprint, Higher education institutions, Sustainability, Corporate sustainability, Carbon accounting, Carbon neutrality

Paper type Research paper

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1. Introduction

Higher education institutions (HEIs) act as hubs of science, innovation and societal discussion. However, the sustainability and carbon footprint of HEIs themselves has been an understudied topic until recent years (Leal Filho *et al.*, 2021; Helmers *et al.*, 2021; Valls-Val and Bovea, 2021). Studies have mainly centered around the USA (Clabeaux *et al.*, 2020) or the UK (Robinson *et al.*, 2015), but there is a growing interest in carbon neutrality in HEIs globally, e.g. in Northern Europe (Larsen *et al.*, 2013), South Africa (Letete *et al.*, 2011) and New Zealand (Butt, 2012). In addition, co-operative organizations have worked toward a shared emission accounting standard, such as the World Resources Institute and World Business Council for Sustainable Development with their joint greenhouse gas (GHG) protocol for organizations (WRI and WBCSD, 2004).

Yet, HEIs still appear divided. Although some institutions show remarkable ambition, sustainability work in HEIs is often considered "siloed", with a focus on singular actions such as campus greening or energy savings over comprehensive sustainability (Sterling *et al.*, 2013). Even if institutions show willingness in theory, challenges such as cost, time or long-term commitment may limit actions in practice (Leal Filho, 2015). As sustainability concerns include ecological, social and economic factors (Bruntland, 1987), a thorough grasp of these difficulties necessitates collaboration between a variety of disciplines. Thus, there is an increasing need for an interdisciplinary approach to ensure that HEI policies are informed by insights from economics, sociology and other fields, making them more practical, successful and achievable.

Several legal frameworks guide HEIs in their work. The Green Deal of the European Union states that Europe is to be the first climate neutral continent by 2050 (European Commission, 2019), and the Corporate Sustainability Reporting Directive sets standards for sustainability reporting for companies of over 500 people and points a path toward the normalization of carbon footprint calculation (European Parliament, 2022). Countries within the EU work toward achieving their individual climate targets, but here the focus is on Finland: the 2035 carbon neutrality target of the Finnish Government is the most ambitious in the world (Finnish Government, 2021). Even more determined is the target set by the Finnish Ministry of Education and Culture, (2020), aiming for carbon neutrality within Finnish HEIs by 2030. In addition, Finnish HEIs follow the carbon neutrality roadmaps drafted by the Rector's Council of Finnish Universities (UNIFI) and the Rector's Council of Finnish Universities of Applied Sciences (Arene). Arene has settled on an annual calculation model for universities of applied sciences. Research universities instead are aiming for a set of minimum requirements and the transparent development of carbon calculations, so that they can be replicated by other institutions. A key focus lies especially on indirect emissions.

These progressive efforts place Finnish HEIs in a globally unique position. HEIs play a visible role in society due to their large size (Wright and Nyberg, 2017): in 2022, present students and university employees accounted for 6.4% of the Finnish population (Education Statistics Finland, 2022; Statistics Finland, 2023). However, the carbon neutrality efforts of Finnish HEIs remain limited to a few studies (El Geneidy *et al.*, 2021; Kiehle *et al.*, 2023) and have been largely focused on research universities. As of Spring 2024, there are 38 HEIs in Finland (14 research universities and 24 universities of applied sciences). Their wide geographic distribution, combined with Finland's cold climate, pose additional challenges, particularly when it comes to emissions from transport and heating.

1.1 Assessing carbon neutrality in higher education institutions

The most common metric used to assess carbon dioxide (CO_2) emissions is the carbon footprint, which measures CO_2 released by the activities of an individual, an organization, a process, or a product, both directly and indirectly (Wiedmann and Minx, 2007). As this definition includes only CO_2 and omits other GHGs, some such as Wright *et al.* (2011) and Heinonen *et al.* (2020) have

questioned that this could lead to deceptive and oversimplified results. Thus, the definition of carbon footprint should also include methane, nitrous oxide and certain synthetic chemicals that contribute to climate change. Wiedmann and Minx (2007) suggest that the term "climate footprint" could encompass all GHG emissions. However, the current popularity of the climate footprint compared to the carbon footprint is low – possibly due to the lack of consensus even when it comes to carbon footprint reporting (Matuštík and Kočí, 2021).

In the organizational context, direct and indirect emissions are often called Scopes. According to the GHG Protocol, Scope 1 emissions are defined as direct emissions controlled by a company or an organization, such as institution-owned vehicles. Scope 2 emissions are indirect emissions generated through electricity or heating. Scope 3 refers to other emissions beyond these two scopes (WRI and WBCSD, 2004). Building on the GHG Protocol, the Corporate Value Chain (Scope 3) Standard issues guidelines on assessing organization's entire value chain emissions. It divides Scope 3 emissions into 15 upstream and downstream emissions categories, namely, purchased goods and services, capital goods, fuel- and energy-related activities, upstream transportation and distribution, waste generated in operations, business travel, employee commuting, upstream leased assets, downstream transportation and distribution, processing of sold products, use of sold products, end-of-life treatment of sold products, downstream leased assets and franchises and investments (WRI and WBCSD, 2011).

As Scope 3 emissions are located outside the organization's direct sphere of influence, they are the most difficult to calculate. This is a challenge, because Scope 3 emissions can make up a significant part of an institution's carbon footprint (Ozawa-Meida *et al.*, 2013). When it comes to methods for calculating carbon footprint, environmentally extended input–output analysis (EE-IOA) is often used for indirect, especially procurement-caused emissions from annual financial statements. In the HEI context, EE-IOA uses a top-down approach to measure the organization's carbon footprint through the entire supply chain (Wiedmann, 2009). However, it lacks detail compared to life-cycle assessment (LCA), which assesses the impact of individual products based on bottom-up data (Ozawa-Meida *et al.*, 2013). These methods can also support one another and hybrid LCAs are commonly used to use the strengths of several methods (Crawford *et al.*, 2018; Hellweg *et al.*, 2023; Nakamura and Nansai, 2016).

So far, few universities worldwide have declared achieving carbon neutrality, namely, the London School of Economics and Political Science in the UK (LSE, 2021), the Pontifical Bolivarian University in Colombia (Osorio *et al.*, 2022), the Charles Sturt University and the University of Tasmania in Australia (Sen *et al.*, 2021), using a combination of Scope 1, Scope 2 and selected Scope 3 emission categories (commonly business travel and waste). This lack of standardization, both locally and globally, poses an important challenge to the carbon neutrality work of HEIs.

All institutions above relied on carbon offsetting: a market mechanism that allows organizations and individuals to invest in emission reduction or removal projects equal to their emissions. However, offsetting raises important questions regarding the validity and transparency of projects (Finnwatch, 2021). Generally, offsetting should follow a set of minimum criteria or a common standard. Still, no certification alone is infallible nor can always guarantee quality (Cames *et al.*, 2016), which is why a combination of certification criteria is recommended (Finnwatch, 2021). The Oxford Principles for Net Zero Aligned Carbon Offsetting acknowledge the significance of emission reductions and carbon removals. Emission reductions include emissions avoided, e.g. renewable energy, whereas carbon removals remove CO_2 directly from the atmosphere, for example, through tree planting or bioenergy with carbon capture and storage. Although emission reductions are the most common type of offsets, it is recommended that organizations continuously

increase the share made up by carbon removals in their offsetting portfolio, eventually purchasing them exclusively to maintain long-term net zero (Allen *et al.*, 2020).

Building on the discussions and reports on the carbon footprints of Finnish HEIs, and a survey targeted for their sustainability personnel, in this article, the authors have strived to identify the key strengths and weaknesses of carbon footprint calculation, emission reductions and the carbon neutrality of Finnish HEIs. The findings are then used to come up with policy recommendations that institutions both locally and globally can use to develop their carbon footprint calculations uniformly and sustainably.

To do so, the article focuses on the following research questions:

RQ1. What actions have Finnish HEIs taken individually or collectively to (a) track, (b) decrease and (c) offset their carbon footprint?

RQ2. What resources do the HEIs have for aiming toward carbon neutrality?

RQ3. What are the most common impediments to the HEIs' carbon neutrality?

2. Methodology

2.1 Research context

This research aims to provide an in-depth understanding of a case study within Finland. Focusing on a single country allows researchers to delve deeply into the unique circumstances, policies and institutional factors that influence the phenomenon under investigation. Furthermore, this study aspires to serve as a cornerstone for shaping local and national policies in Finland.

2.2 Data collection

To investigate the carbon footprint of Finnish HEIs, their public reports were scrutinized and when not publicly available, directly acquired from the respective sustainability specialist of the HEIs. The raw data on the institutions' carbon footprints, the number of staff and categories accounted for was analyzed with the goal of determining the key factors influencing the size of the carbon footprint.

To gain deeper insights about the climate policies and calculations, a 28-question survey was sent to all 38 Finnish HEIs. The survey was implemented with Webropol 3.0 software and was open between December 20, 2021 and February 15, 2022. Mixed-method surveys offer both quantitative and qualitative data about the respondent's views on the topic, in this case HEIs (Creswell and Creswell, 2018). Similar nationwide surveys are not abundant the context of carbon footprint of HEIs and analyses have mainly focused on public reports and interviews (Klein-Banai and Theis, 2013; Li *et al.*, 2021; Mazhar *et al.*, 2021; Schmidt, 2022). Even though many HEIs publicly report their carbon footprint assessments, public reports do not reveal the hidden incentives that guide HEIs toward carbon neutrality targets. In addition, the survey was chosen to limit the workload of the analyses compared to alternative methods, such as interviews, because it was necessary to give HEIs the chance to reflect on the results at their own pace. To gain further insights about the development of HEIs' carbon footprint management in the coming years, it will be easier to conduct the survey again for comparison. The survey could also be replicated for use in other countries, particularly those with similar systems of higher education, such as Sweden or Norway.

2.3 Participants

The target group comprised personnel in charge of the environmental responsibilities of HEIs. Multiple people from the same HEI could answer the same survey so that, e.g. the sustainability team could work through the answers together. Due to this and the fact that the survey was sent through formal channels, the responses can be seen as the position of the HEI itself. Questions were both multiple choice and open and designed together by the authors to ensure objectivity (Creswell and Creswell, 2018). See Appendix for details.

The demographics of the respondents are presented in Table 1. Note that percentages are counted within each group (type of institution; institution size; type of staff).

2.4 Data analysis

The questions were split evenly between all the authors, who looked for trends and key messages in the responses. A strengths, weaknesses, opportunities and threats (SWOT) analysis was then created to visualize the key findings. SWOT is a widely used analytical tool which can be used to identify the key strengths and weaknesses of an organization or its equivalent. The traditional model also identifies the factors based on whether they are internal (strengths and weaknesses) or external to the organization (opportunities and threats). However, one of the limitations to this model is the difficulty inherent in placing the factors into simply one of the four categories, which is why the simplified model of combined categories may help reduce this error (Pickton and Wright, 1998; Stacey, 1993). As an outcome, a series of policy recommendations was drafted, based on the findings of the SWOT analysis and the extant literature.

3. Results

3.1 Tracking, decreasing and offsetting the carbon footprint

This section looks through the responses that aim to answer *RQ1*.

3.1.1 Tracking. The results show that Finnish HEIs are collectively committed to tracking their carbon footprint, with 30 of the 31 institutions having undertaken calculations and the remaining institution planning on implementing calculations. Annual calculations were the most common, with only three institutions calculating biannually.

However, there are variations between the institutions in terms of tools, emission factors and methods used to track carbon footprint. The Arene calculator was the most used (15 respondents, 12 of which were universities of applied sciences). Research universities have no similar common framework and mentioned a plethora of other calculators, such as the World Wide Fund for Nature (WWF) Green Office Climate Calculator, Exiobase, the Hiilifiksu calculator and the GHG Protocol. It is notable that only 23% mentioned just one

Respondent type	Response rate (%)
All HEIs	82
Research universities	39
Universities of applied sciences	61
Small institutions (<300 employees)	29
Intermediate institutions (300–999)	52
Large institutions (>1,000)	19
Administrative staff	48
Teaching and research staff	33
Other sustainability staff	19

Source: Authors' own work

Table 1. Response rate of the participants of the study

calculation method: instead, it was common for an institution to use several forms of calculation, depending on the categories being accounted for (Table 2).

A further investigation into the number of categories compared to the total carbon footprint revealed no clear trend between the total carbon footprint and the categories that were tracked (Figure 1). Similarly, institution size alone did not fully determine the size of the carbon footprint, as was revealed in the per capita comparison (Figure 2).

The survey also sought to understand whether HEIs considered emission calculations to be their own or a shared responsibility. The results revealed that tracking was seen as a shared effort between HEIs and external stakeholders. Fourteen categories of external stakeholders were identified (Figure 3).

3.1.2 Reduction. As a part of their efforts to reduce and neutralize emissions, 71% of the institutions had set a separate carbon neutrality target. However, there was no collectively agreed target year: the most common year was 2030 (64% of respondents), followed by 2025 (23%), as well as single replies for 2023, 2024 and 2028. One-third of the institutions had not set their own target year and were instead following the 2035 target set by the Finnish Government. This was especially the case with universities of applied sciences, seven of which had not set their own target.

Emission reduction targets were much less prevalent, with 42% of research universities and 37% of universities of applied sciences having set them. In addition, 58%/42% were planning to do so, and 21% did not have or did not plan to set emission reduction targets.

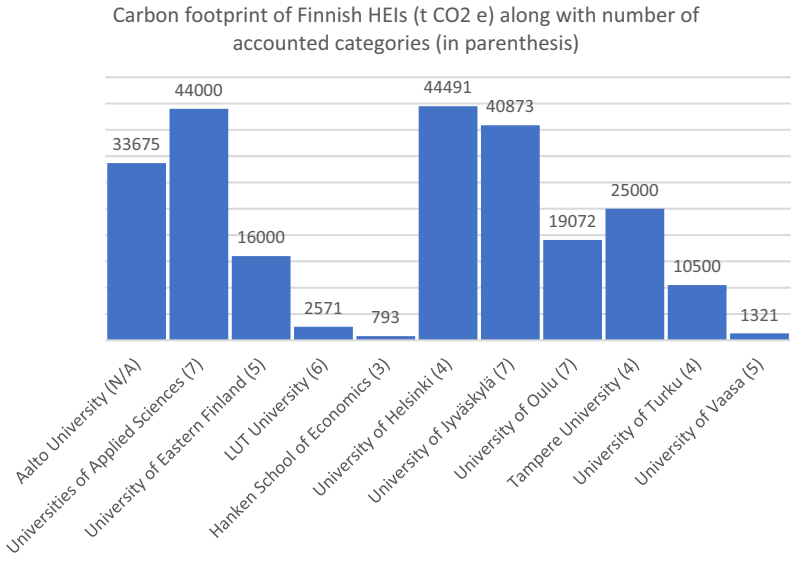
One difficulty emerged in setting a baseline. The most common baseline year was 2019 but several HEIs had not yet set a baseline due to the pandemic. Some HEIs also stated that they had already taken the most significant measures to reduce emissions or that an emission reduction target considered unnecessary alongside a carbon neutrality target. Overall, 47% considered the effectiveness of their institution to be more important than carbon footprint reductions. Regardless, emission reductions were stated to be an important part of sustainability communication:

> The positive effects/handprint of HEIs are especially important from the aspect of solving challenges of the world and society [. . .] The carbon footprints of HEIs are very small compared

Table 2.
Categories HEIs included in their carbon footprint

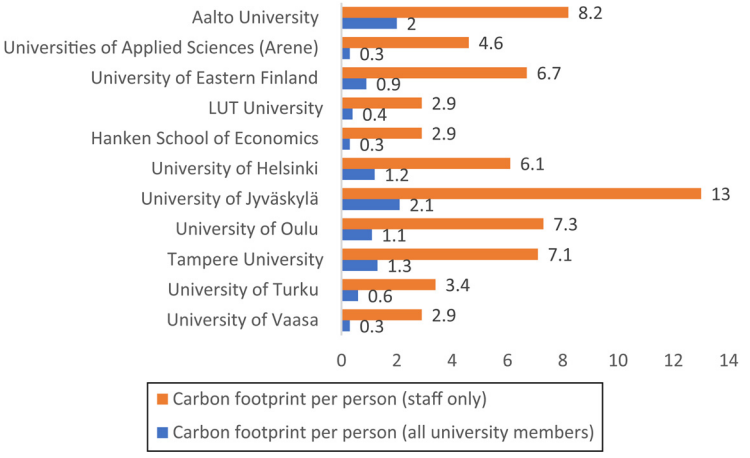
Category name	*N*	Scope	%
Electricity	31	2	100.0
Heat	31	2/3*	100.0
Business travel	31	3	100.0
Water	30	2	96.8
Waste	30	3	96.8
Procurement	30	3	96.8
Real estate maintenance	28	2	90.3
University's vehicles	25	1	80.6
Construction	24	3	77.4
Refrigerants	16	2	51.6
Canteen services	12	3	38.7
Commuting	7	3	22.6
Student exchanges	7	3	22.6
Investments	7	3	22.6
Other	10	3	32.3

Note: *Depending on contract
Source: Authors' own work



Source: Authors' own work

Figure 1.
Carbon footprints of Finnish HEIs, along with number of categories accounted for



Source: Authors' own work

Figure 2.
Carbon footprints of Finnish HEIs per capita in 2019 for institutions that provided it ($t\ CO_2\ e$)

to many other fields, although the reduction of footprint plays a role when it comes to leading with example.

Finally, 36% of Finnish HEIs used or had not planned to use other environmental impact indicators besides the carbon footprint. Those that used of planned to use alternative metrics mentioned the Green Metric World University Ranking (three mentions), the UN Sustainable Development Goals (one mention) or the WWF Green Office metrics (one). The remaining HEIs

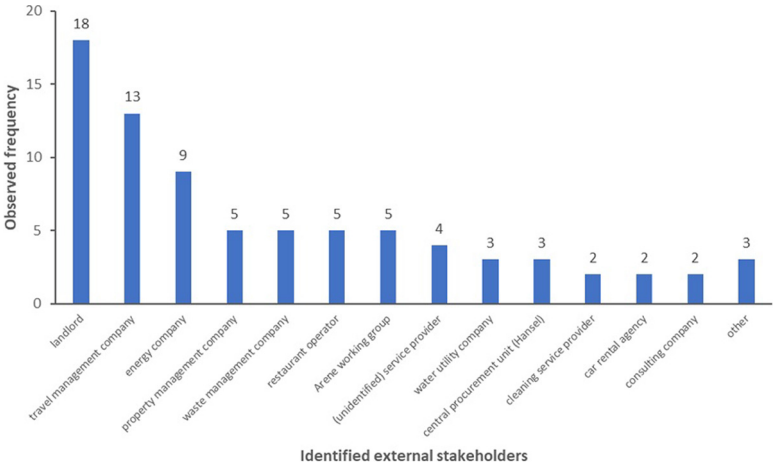


Figure 3.
External stakeholders identified in carbon footprint calculations at Finnish HEIs

Source: Authors' own work

gave single mentions to various indicators such as biodiversity impacts and nature risks, energy efficiency, recycling rate and waste management, as well as water footprint and carbon handprint.

3.1.3 Offsetting. A majority of HEIs (52%) did not have offsetting plans. Full offsets were planned by 6%, partial offsets by 26% and no offsets by 16%. Research universities had gone further in their plans, with 50% planning to offset, compared to the 21% of universities of applied sciences.

No collective consensus existed on which categories to offset. When asked which categories should not be included in the offsetting responsibility of HEIs commuting (68%), investments (48%) and student exchanges (39%) stood out. According to the replies to this question, these are also the categories which HEIs have the least control over. However, 26% of the HEIs stated that all the categories presented fall under the offsetting responsibilities of HEIs (Figure 4).

When it came to funding offsets, no decision had been made by 50% of the respondents. The offsets of the remaining 50% were funded either externally (20%), e.g. via the city or the ministry, or internally through investments (30%). Generally, HEIs emphasize the use of offsetting as a last resort, after sufficient reductions have been made. Regardless of this, offsetting was seen as being important in reaching carbon neutrality goals:

> We are only planning to offset our carbon footprint once we have reduced our emissions as much as possible. The main reason for pushing back offsets is to encourage us to work faster in our own reductions [. . .]

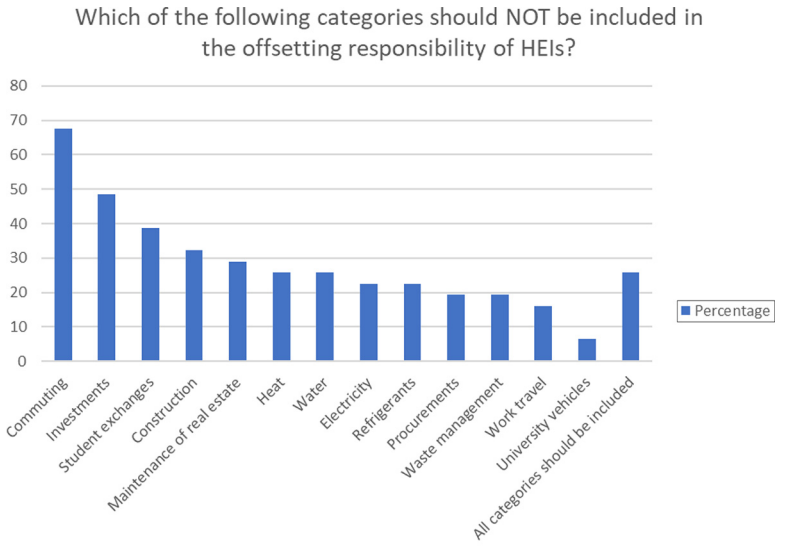
Responses also stated that offsetting may have other positive impacts. In addition, internal carbon offsetting and the carbon handprint were brought up as solutions.

> The balancing act at its best could be an internal offsetting model, in which the higher pricing of internal procurements would press down the carbon footprint and the revenue could be used to produce a positive impact.

3.1.4 Summary. Table 3 summarizes the key information collected through *RQ1*.

3.2 Resources

This section presents the results aiming to answer *RQ2*.



Source: Authors' own work

Figure 4.
List of potential offsetting categories and whether they should not be included in the HEIs offsetting responsibility

The survey identified both financial resources (such as consultants) and human resources (such as calculations by university staff) related to carbon neutrality. The main resource for carbon footprint calculations were working groups (67%), ranging from 2 to 12 people from both academic and administrative staff groupings. In addition, 42% mentioned that the calculations were carried out by a sustainability coordinator, but having both a coordinator as well as a supporting working group was common. Other resources, such as external consultants or the help of teachers/students, were mentioned by 4%. Only 13% specified the size of their budget (a few thousand euros).

Although 77% considered that their university had sufficient resources for carbon footprint calculations, almost 23% expressed the view that their resources were inadequate. The number of HEIs regarding their resources as insufficient was higher among universities of applied sciences (26%) than research universities (16%) and only one of these institutions was large. The open responses suggest that smaller institutions struggle, especially with scattered human resources and limited time: *experts have limited time to look into the backgrounds, making a time for carbon footprint calculation among other work is challenging* and *lack of responsible person/organization.* Financial resources were generally considered sufficient – apart from offsetting.

3.3 Obstacles to carbon neutrality

This section introduces the responses to *RQ3.*

Figure 5 presents the key challenges identified in carbon footprint calculations.

Most issues were related to data collection, data reliability and lack of standardization:

> [. . .] the structure of the data doesn't support emission calculations (e.g., EEIOA analysis), a lot of "handiwork" is needed to figure out the proper components for calculation.

The word "handiwork" was often repeated. This highlights the need for a more systematic approach, particularly with research universities, which have not yet received instructions

Institution	Carbon footprint (t CO_2 e)	Accounted categories	No. of staff	No of non-staff (students, grant researchers)	Carbon neutrality target year	Institution has an emission reduction strategy	Intention of offsetting
Aalto University	33,675	N/A	4,124	15,960	2030	N/A	Yes
Åbo Akademi University	N/A	V, BE, P	1,021	5,223	2030	TBA	N/A
Hanken School of Economics	793	BE, BT, P	265	2,256	2030	Yes	Yes
LUT University	2571	V, BE, BT, C, P, F	944	4,947	2024	Yes	N/A
Tampere University (2019)	25,000	V, BT, BP, P	3,506	19,395	2030	TBA	Yes
Universities of Applied Sciences (22 HEIs)	44,000	V, BE, BT, C, P, F, I	9,500	144,576	ID	ID	ID
University of Eastern Finland	16,000	V, BE, BT, P, F	2,391	14,553	2025	TBA	Yes
University of Helsinki	44,491	V, BE, BT, P	7,256	29,106	2030	TBA	Yes
University of Jyväskylä	31,857	V, BE, BT, C, P, F, I	2,459	12,870	2030	TBA	N/A
University of Lapland	N/A	V, BE, BT, P	528	4,098	N/A	Yes	N/A
University of Oulu	19,072	V, BE, BT, C, P, F, I	2,628	14,691	N/A	Yes	N/A
University of the Arts Helsinki	N/A	V, BE, BT, P, F	730	1,839	N/A	TBA	N/A
University of Turku	10,500	V, BE, BT, P	3,103	15,465	2025	No	N/A
University of Vaasa	1321	V, BE, BT, P, F	454	4,542	N/A	Yes	Yes

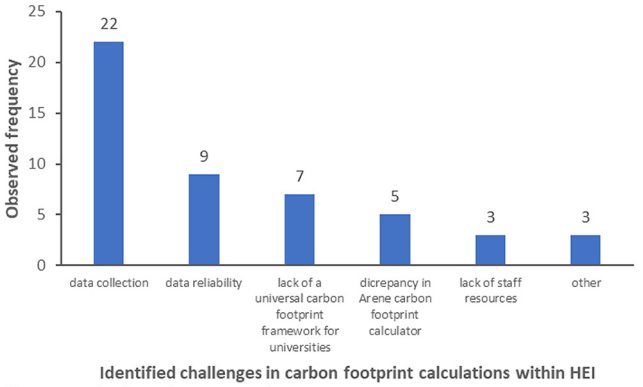
Table 3.
Carbon footprint and number of community members in Finnish HEIs in 2019

Notes: Statistics acquired from Education Statistics Finland. The Universities of Applied Science are grouped into one row because of the large number of them and the lack of data from individual institutions. Category abbreviations are V: Vehicles, BE: Buildings and energy use, BT = Business travel, C = Commuting, P = Procurement, F = Food, I = Investments. N/A = Not announced, TBA = to be announced, ID = institution dependent
Source: Authors' own work

from UNIFI. Universities of applied sciences referred to Arene, which has given instructions regarding carbon footprint calculations (Arene, 2020). However, some discrepancies could still be seen:

> In the case of travel, the standardization between the Arene CO_2 calculation table and the calculations used by travel agencies. Which of the different modifiers should we use?

Some challenges arose from the lack of clarity of decision-making. Almost half (43%) felt that the decision-making processes and responsibilities in the context of environmental responsibility were clear, or somewhat clear (20%), suggesting that HEIs have managed to integrate the process into university strategies at least partly. The remaining 37% were just beginning. In these responses, the importance of having a person officially in charge was emphasized. If no one had been officially appointed, then the process was dispersed into different units, which complicated operative work.



Source: Authors' own work

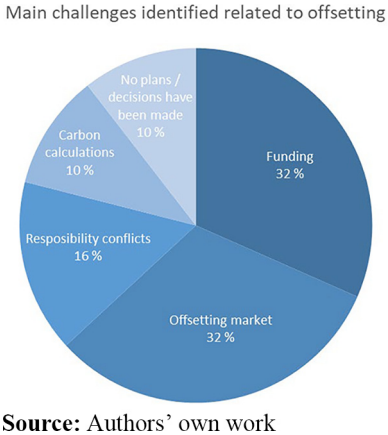
Figure 5. Challenges identified in HEIs' carbon footprint calculations

Figure 6 presents the main challenges related to offsetting. The most common challenges were funding and the uncertainties of the offsetting market: how offsetting could be funded so that it does not lead to cuts in the core functions of the university, as well as issues related to effectiveness, quality, transparency and trustworthiness of offsets, as well as greenwashing, carbon leakage and double counting. Other categories mentioned in the responses included issues of offsetting responsibility: who should be responsible, what categories fall under it, as well as carbon calculations and their inaccuracy and difficulty. The remaining responses highlighted that no official decisions had yet been made on offsetting.

Only five HEIs elaborated on the reasons why their institution had not yet intended to offset. The central concern of the HEIs was funding, as for public funds, respecting the specified purpose would be paramount. Finally, other reasons included the lack of standards and a preference for emission reductions over offsets:

> HEIs should find a shared set of principles for offsetting. HEIs are in different positions to each other e.g., through the structure of scientific fields and ownership of buildings.

> The guidelines from the Ministry state that we must firstly focus on reducing our own emissions.



Source: Authors' own work

Figure 6. Main offsetting-related challenges identified by the respondents

Generally, the challenges identified were divided evenly between research universities and universities of applied sciences and institutions of different sizes, with the exception of funding concerns, of which 86% occurred in intermediate-sized institutions. Among the research universities, no such trend occurred.

4. Discussion

To understand the collective and individual states Finnish HEIs are in in terms of reaching carbon neutrality, the authors identified the key successes/opportunities as well as the weaknesses/threats surrounding the four target areas of the study. These findings act as the basis for a series of policy recommendations, which HEIs, offsetting providers and organizations, both domestically and internationally, can use as a basis for development of their carbon neutrality and sustainability work (Figure 7).

The results show that Finnish HEIs are highly successful in *tracking their carbon footprint* and willing to openly share their calculations. Yet, there is a lack of standardization in the calculation methodology and the number of accounted categories, and research universities lack a framework like that of the Arene carbon footprint calculator. As UNIFI emphasizes transparency and replicability of calculations over standardization due to the

Figure 7.
Policy recommendations identified from the four focus areas of the study

Source: Authors' own work

large differences of carbon footprint caused by institutional factors (Larsen *et al.*, 2013), recommending the use of a uniform calculation framework would necessarily not benefit research universities. However, institutions and their various disciplines could increasingly work together to come up with a set of minimum requirements for accountable categories to increase comparability between HEIs. In addition, the large number of stakeholders involved complicated the calculations. Thus, increased co-operation with the stakeholders could clarify and streamline the process.

Weaknesses were also identified with tracking Scope 3 emissions. The results of this article agree with Robinson *et al.* (2018), who show that imported energy, combustion and waste are not only the most often calculated categories among HEIs, but also the ones with the most reliable data, whereas Scope 3 categories frequently lack accuracy or are incompletely calculated (Wynes and Donner, 2018). However, a surprising result was that the number of categories alone did not determine the footprint of a HEI. Similarly, institution size did not necessarily mean the carbon footprint followed in the same fashion. Thus, comparing institutions through mere carbon footprint alone is insufficient. However, it seems meaningful to analyze carbon footprint within a single institution to track progress toward carbon neutrality targets, assuming that consistent methodologies are used (WRI and WBCSD, 2004). Thus, it would be vital for institutions to settle on the consistent use of a single standard, such as the GHG protocol.

In terms of *emission reductions*, all HEIs in Finland have pledged to follow the 2035 carbon neutrality targets of the government. The authors' findings reveal even higher ambitions, with most HEIs pledging themselves to the 2030 target of the Ministry of Education and Culture, or to targets as early as 2024. As all Finnish universities have agreed to UNIFI's ideas about sustainable development and responsibility (Unifi, 2020), this level of commitment is globally unique. However, the tight timeframe for achieving net zero also poses a risk that HEIs may cut corners in sustainability to reach carbon neutrality through means that later prove to be unreliable or unethical – particularly as many institutions already struggle with existing sustainability actions, such as setting a baseline or following standards. Thus, carbon neutrality targets should be critically assessed in terms of realism, such as by setting smaller sub-targets for different parts of their carbon footprint (e.g. business travel or investments).

HEIs also agreed that targets and reductions play a role in the sustainability communication of HEIs. Regardless of this, emission reduction targets were less prevalent than carbon neutrality targets, with one-third of institutions having no environmental impact indicators other than the carbon footprint. As past research (Kiehle *et al.*, 2023; Wright *et al.*, 2011) and the results suggest that carbon footprint alone does not tell the full story of the sustainability of a HEI, increasingly including other indicators, such as the carbon handprint (Pajula *et al.*, 2021) or climate footprint (Wiedmann and Minx, 2007) could help support stronger sustainability.

The key challenges and opportunities in terms of *resources* were twofold. Although resources related to carbon footprint calculation were generally found to be adequate, 23% of HEIs still considered them to be insufficient. This was especially the case in small or intermediate universities of applied sciences. Thus, there is a challenge of unequal resource allocation between Finnish HEIs. Lack of time and a responsible entity were all mentioned as things adding to the "handiwork" done by institutions. Limited monetary resources were also mentioned as something to impede offsetting. The reconsideration of which type of funding can be used for offsetting and the reallocation of human resources may thus be appropriate.

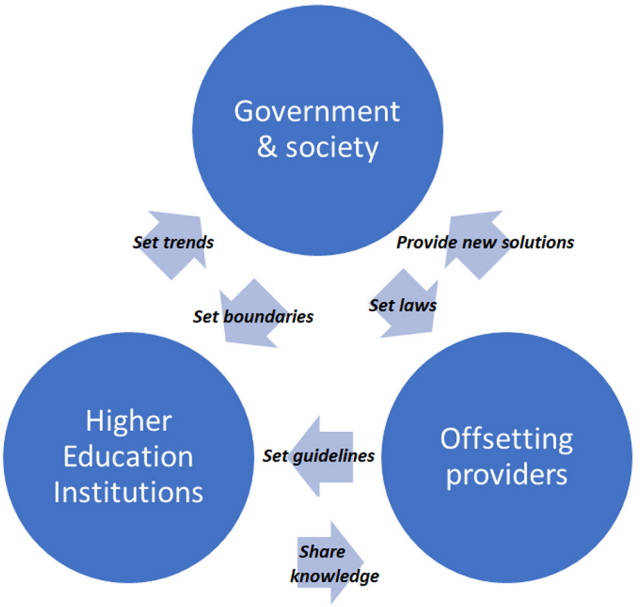
With *offsets*, key weaknesses and threats emerged in the form of an unsystematic approach, with shared concerns over responsibility and reliability. Using an external verifier could allow better examination of offsetting providers. Some suggestions brought up by the

participants were domestic (Wynes and Donner, 2018) and internal offsetting (insetting) (Davies, 2016). These could increase trust and lead to a greater return on investment due to co-benefits happening closer to the university (Tipper *et al.*, 2009). However, it would necessitate a clear definition and criteria for insetting (Davies, 2016). Improved quantification and an official registry based on best-known practices and international minimum criteria (Niemistö *et al.*, 2021; Finnish Government, 2023) could help.

On the flipside, HEIs saw offsets as a good transition period alternative, with a positive effect on sustainability communication. It is notable that the role of HEIs is intertwined with that of the government and society and offsetting providers. The government and society set boundaries for HEIs and offsetting providers through carbon neutrality targets and legalization. By following these targets, HEIs fulfill their task to the government and qualify for government funding (Finnish Ministry of Education and Culture, 2020). However, HEIs can also act as trendsetters in society by meeting the targets earlier than the government has intended, thus showcasing their societal impact. Through research, HEIs can educate offsetting providers with knowledge that they can use to improve their scientific integrity. Thus, providers can draft better guidelines for institutions and offer new solutions to fulfill carbon neutrality targets (Figure 8). As the private sector plays an important part in innovation for climate change mitigation, global decision-making and multi-stakeholder participation (Andrade and Puppim de Oliveira, 2015), this presents institutions with an opportunity to turn decarbonization attempts into credibility in the eyes of the public (Müller, 2023), offering the institutions a potential social and economic advantage.

4.1 Limitations and next steps

Despite the overall high response rate, certain inquiries received limited feedback. However, the open-ended responses proved to be rich in material and provided insight into the



Source: Authors' own work

Figure 8.
Interaction between the government and society, HEIs and offsetting providers

practicalities of sustainability initiatives among various levels of employees, thereby enhancing the interpretive value of the findings despite the modest sample size. Moreover, it is important to acknowledge that survey design inherently permits variability in open-ended response length (Creswell and Creswell, 2018). Future investigations may benefit from supplementing survey data with in-depth interviews, particularly for delving into the climate policies of individual HEIs.

An additional constraint lies in the temporal dimension of the responses. As most HEIs have only recently begun calculating their carbon footprint, the methods, data availability and accuracy levels are subject to change over time. It is also possible that current plans will evolve due to challenges related to credibility or financing of carbon offsets.

The study is also limited by self-report bias (Bound *et al.*, 2001). This means that respondents might have presented their university's sustainability endeavors with subjectivity, potentially overstating their effectiveness. This can occur due to institutional pride, desire to conform to perceived expectations or misunderstanding the criteria being assessed. Such bias underscores the need for future research to use diverse methodologies, including objective measurements to mitigate potential discrepancies.

Finally, the strong practical focus of this study limits its theoretical contribution. Although the results offer an outlook into the current state of carbon neutrality in Finnish HEIs and the SWOT-based policy recommendations provide institutions a tool for their policy development, future studies could benefit from a stronger theoretical focus, e.g. on how the current state of carbon neutrality came to be, to which socio-scientific theories such as the theory of change (Brest, 2010; Jackson, 2013) may provide a solution.

5. Conclusions

This article investigated the collective and individual efforts undertaken by Finnish HEIs to monitor, decrease and offset their carbon footprints, as well as the resources required for the work.

The key discovery was that Finnish HEIs stand in various positions when it comes to fulfilling their carbon neutrality goals. The level of commitment to the governmental targets is high and resources for sustainability work are largely considered sufficient. However, smaller HEIs and universities of applied sciences struggle with resources, whereas larger research universities are challenged with tracking their large carbon footprints due to multiple stakeholders and Scope 3 categories. The lack of standardization is a shared issue in terms of carbon footprint calculations and carbon offsetting, and the low variety in environmental impact indicators poses a problem for institutions of all kinds.

The authors' policy recommendations offer suggestions for HEIs on reducing discrepancies between the HEIs and normalizing carbon footprint reporting to the Finnish Ministry of Education and Culture. The stakeholders involved, such as offsetting providers, can benefit from increased collaboration with HEIs, which may lead to better utilization of their resources or new technological or economic innovations. Policymakers can benefit from the increased clarity, transparency and efficiency offered by the recommendations. Finally, through the results, the scientific community gains more understanding of the state of sustainability in Finnish HEIs, as well as the challenges and opportunities of conducting a survey-based study spanning the entire HEI sector of a country. The results also demonstrate that establishing ambitious goals alone is insufficient. Institutions should increasingly "walk the talk"; if those in society with the most knowledge of environmental damage do not practice what they preach, who will?

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Appendix. Survey to HEIs

(1) Name of HEI

(2) Has your HEI implemented a carbon footprint calculation?
- Yes/No/Is planning to

(3) How often is your institution planning to undertake carbon footprint calculations?
- Annually/Biannually/Every three years/Other/No decisions made

(4) The main external stakeholders in your HEI's carbon footprint calculation?

(5) The biggest challenges in calculating your HEI's carbon footprint?

(6) What resources does your HEI have for carbon footprint calculation?

(7) Are these resources sufficient?

(8) What are the main reasons why your institution has not or does not intend to implement a carbon footprint calculation?

(9) Which of the following categories have you included/intend to include in your carbon footprint?
- Canteen services/Commuting/Construction/Electricity/Heat/Investments/Real estate maintenance/Procurements/Refrigerants/Student exchanges/University vehicles/Waste/Water/Work travel/Other

(10) What tools, emission factors and methods are used to calculate the carbon footprint?

(11) Has your HEI set a separate carbon neutrality target?
- Yes/No/Is planning to

(12) If not, why does your HEI not intend to set a separate carbon neutrality target?

(13) Has your HEI set emission reduction targets?
- Yes/No/Is planning to

(14) If not, what are the main reasons why your HEI has not set emission reduction targets?

(15) Explain more about your university's emission reduction targets: size of reductions, benchmark, milestones, which categories apply?

(16) Does your HEI offset or intend to offset its carbon footprint?
- Fully/Partially/Not intending to offset/No plans yet

(17) What are the main reasons why your HEI is not planning to offset?

(18) How is your HEI planning to fund offsetting?

(19) What are the main offsetting-related challenges at your HEI?

(20) Which categories is your HEI planning to offset?
- Commuting/Construction/Investments/Real estate maintenance/Procurements/Student exchanges/Waste/Work travel

(21) Which categories should not be part of a HEI's offsetting responsibilities?

(22) Other thoughts regarding offsetting responsibility?

(23) Who is responsible for the decision-making considering carbon footprint?

(24) Are the sustainability-related decision-making processes and responsibilities clear at your HEI?

(25) How would you balance between reducing the carbon footprint and increasing the effectiveness of climate related solutions?

(26) Has your HEI taken into consideration other environmental impact indicators?

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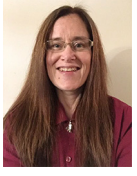

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