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Lea Marie Quilitz

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Toward Sustainable Campus Operations in Europe. A Case Study on the Universities of Goettingen and Uppsala*

Lea Marie Quilitz**

Abstract

Sustainable development as a concept and principle aims to find solutions to balance the needs of people worldwide with the resources and limits of the Earth's ecosystems. Given their social responsibility in educating future generations and their status as societal role models, higher education institutions are increasingly expected to foster sustainable development on different levels. Against this backdrop, two major renowned European higher education institutions, the Universities of Goettingen (Germany) and Uppsala (Sweden), have committed themselves to driving sustainability in their operations. Hence, this exploratory case study critically examines the universities' paths to greener campus operations as one facet of their sustainability approach, contributing to an area of research that is still limited. Using qualitative tools like content analysis, different data are analyzed to assess the status quo of measures to drive sustainability on campus.

The research yields mixed results. A significant finding of the study is that at both Uppsala and Goettingen University, various external parties are responsible for implementing sustainability, meaning university leadership itself does not have a direct influence on all aspects of the necessary processes. All in all, Uppsala University appears to have a more strategic approach to promoting sustainable development overall and benefits from partly very committed stakeholders involved in campus operations. At the University of Goettingen, dissent among some stakeholder groups impedes progress on sustainable energy supply.

The paper concludes that transparency, documentation, and communication must be enhanced at both higher education institutions to further foster sustainable campus operations. A common and clearly communicated sustainability strategy including milestone planning to which all stakeholders commit would also be beneficial.

Keywords: sustainable development, higher education institutions, Uppsala University, University of Goettingen, campus operations

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* This paper is a significantly reduced and altered version of the author's master's thesis entitled "Sustainability at Higher Education Institutions: Paradox or Pioneering? A Case Study on the Universities of Goettingen and Uppsala."

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I. Introduction

Sustainable development (SD) is one of the pervasive concepts of our time that aims to find solutions to the great and majorly manmade problems facing the world today, such as hunger, poverty, scarcity, and unequal distribution of resources. Furthermore, the various consequences of global warming like extreme weather events, droughts and floods, have also moved into the focus of the global community.[1] Another long-underestimated phenomenon of the Anthropocene is the great loss of biodiversity, which, among other things, can have life-threatening effects on global public health as we have all learned at the latest from the still ongoing COVID-19 pandemic.[2] All these challenges, risks and negative changes are a reality that humans have to face and need to find solutions for. Consequently, SD, in simple terms, can be understood as an umbrella term for all measures aimed at fighting these threats and realizing durable improvement of the living conditions on Earth. This interpretation would correspond to the all-time present definition of SD by Norwegian prime minister Doctor Gro Harlem Brundtland: "[Sustainable development means] meeting the needs and

[1] For a comprehensive introduction into the topic of global warming effects, see Kent E. Pinkerton and William N. Rom, eds., *Climate Change and Global Public Health*, Respiratory Medicine (Cham: Springer International Publishing, 2021), https://doi.org/10.1007/978-3-030-54746-2.
[2] Sara Platto et al., "Biodiversity Loss and COVID-19 Pandemic: The Role of Bats in the Origin and the Spreading of the Disease," *Biochemical and Biophysical Research Communications* 538 (January 2021): 2–13, https://doi.org/10.1016/j.bbrc.2020.10.028.

aspirations of the present generation without compromising the ability of future generations to meet their needs."[3]

In the context of higher education institutions (HEIs), the notion of SD is accordingly used very broadly and can refer to one or all of its three popular pillars; the ecological, social, and economic dimension.[4] However, an implied but not explicitly stated focus is often on environmental sustainability (ES). This can be seen, for example, in the fact that the literature frequently refers to *sustainable* or *green* universities, with both attributes being used redundantly.[5] As the focus of this work is on campus operations, an area that is clearly linked to the environmental dimension, in this work, the notions of sustainable development or sustainability likewise refer to ES, which can be defined as

> […] as a condition of balance, resilience, and interconnectedness that allows human society to satisfy its needs while neither exceeding the capacity of its supporting ecosystems to continue to regenerate the services necessary to meet those needs nor by our actions diminishing biological diversity.[6]

Although the question of who is ultimately responsible for fostering SD in general appears not to have been fully answered, it is commonly recognized that it must be a shared task. This is emphasized in the ever-popular 17 UN Sustainable Development Goals (SDGs) stipulated in a celebrated resolution named *Transforming our world: the 2030 Agenda for Sustainable Development* that was adopted by the United Nations (UN) General Assembly in 2015.[7] Hence, it is not surprising that, according to its website, the University of Goettingen (UGOE), one of the most renowned universities in Germany, also bases its activities on the *Brundtland Report* and refers to the UN SDGs.[8] Pursuant to the university's sustainability strategy, the UGOE "is committed to its societal role model function to contribute to sustainable development."[9] Uppsala University (UU), Sweden's oldest university and one of the most prestigious schools

[3] Gro Harlem Brundtland, "Our Common Future—Call for Action," *Environmental Conservation* 14, no. 4 (1987): 292, https://doi.org/10.1017/S0376892900016805.

[4] Ben Purvis, Yong Mao, and Darren Robinson, "Three Pillars of Sustainability: In Search of Conceptual Origins," *Sustainability Science* 14, no. 3 (May 2019), 682, https://doi.org/10.1007/s11625-018-0627-5.

[5] Silvia Fissi et al., "The Path toward a Sustainable Green University: The Case of the University of Florence," *Journal of Cleaner Production* 279 (January 2021): 1-9, https://doi.org/10.1016/j.jclepro.2020.123655.or Yong Geng et al., "Creating a 'Green University' in China: A Case of Shenyang University," *Journal of Cleaner Production* 61 (December 2013): 13–19, https://doi.org/10.1016/j.jclepro.2012.07.013.

[6] John Morelli, "Environmental Sustainability: A Definition for Environmental Professionals," Journal of Environmental Sustainability 1, no. 1 (November 1, 2011): 5, https://doi.org/10.14448/jes.01.0002.

[7] United Nations, *Transforming Our World: The 2030 Agenda for Sustainable Development*, Pub. L. No. A/RES/70/1 (2015), accessed May 10, 2021, https://bit.ly/UN2030AgendaTranformingOurWorld.

[8] "What is sustainable development?" University of Goettingen, accessed May 10, 2021, https://www.uni-goettingen.de/en/623493.html.

[9] "Sustainability at the University of Goettingen. Sustainability," University of Goettingen, accessed May 10, 2021, https://www.uni-goettingen.de/en/589246.html.

in Scandinavia, also reviews its contribution to SD with the help of the SDGs.[10] Similar to UGOE's affirmation, the UU's *Mission, Goals and Strategies* declaration reads, "Uppsala University aspires to a leading role in the transition to a more sustainable society."[11]

With these statements, both universities acknowledge the special societal role researchers emphasize higher HEIs play in this context. As "catalysts"[12] or "change agents"[13] they are expected to drive SD through research aiming at finding solutions to a variety of fundamental challenges, but also by educating the next generation of decisionmakers, entrepreneurs and experts of any field. Hence, there is no question that HEIs have an important influence on the future and development of society.

This case study thus aims to contribute to a growing body of research by providing an overview of the measures taken to drive sustainable development at the Universities of Goettingen, Germany, and Uppsala, Sweden, as two large, renowned, and traditional universities in Europe.[14] By exploring the ways of how SD has been incorporated in the areas of campus energy and catering, this paper gives insights into the path toward becoming sustainable universities that many HEIs around the world find themselves in. In identifying the status quo of associated change processes, this research intends to contribute to further internal or external implementation efforts on a practical level. It can also form the basis for further academic research on the respective institutions or at the meta-level, e.g., comparing different universities on a particular topic related to sustainable campus strategies.

The paper begins with a short literature review on sustainability in higher education (HE). Next, the underlying methodology of this qualitative work will be presented and reflected upon. This is followed by the findings focusing on the implementation of SD at the universities of Uppsala and Goettingen by looking at two main areas in the framework of campus operations: energy supply and catering. The paper concludes with a conclusion referring back to the central research question: Do Uppsala University and the University of Goettingen have sustainable campus operations? Furthermore, possible follow-up studies are proposed.

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[10] Uppsala University, *Uppsala University Rapid Review. United Nations Agenda 2030 & Sustainable Development Goals. January 2017* (Uppsala: Uppsala University, 2017), accessed June 24, 2021, https://bit.ly/UUSDGRR.

[11] Uppsala University, *Mission, Goals and Strategies,* UFV 2018/641 (Uppsala: Uppsala University, 2019), 5, accessed June 30, 2021, https://bit.ly/UUMissionGoalsStrategies.

[12] Noah Pollock et al., "Envisioning Helps Promote Sustainability in Academia: A Case Study at the University of Vermont," *International Journal of Sustainability in Higher Education* 10, no. 4 (September 18, 2009), 343, https://doi.org/10.1108/14676370910990693.

[13] Jennie C. Stephens et al., "Higher Education as a Change Agent for Sustainability in Different Cultures and Contexts," *International Journal of Sustainability in Higher Education* 9, no. 3 (July 11, 2008), 317, https://doi.org/10.1108/14676370810885916.

[14] The original master's thesis this paper is based on, also looks at the areas of institutional framework and government, as well as student initiatives in the field of sustainability at both universities. The full thesis is available at: https://bit.ly/SustainabilityAtHigherEducationInstitutionsParadoxOrPioneering.

II. Literature Review

Given the need for widespread change toward more sustainability, an ever-growing number of publications address the overarching issue of HEIs and their efforts to become more sustainable. Most works in the form of scientific papers are published in one of a few specialized journals including the *Journal of Cleaner Production, Sustainable Development*, *Energy,* the *International Journal of Sustainability in Higher Education,* and *Sustainability*. Due to the many possible approaches and thematic orientation, the literature situation becomes more and more manifold, including theoretical works as well as a great number of case studies. The following section therefore aims to introduce the body of available literature relevant to this field of research and the framework of this paper. While this paper focuses on campus energy and catering, it must be emphasized that more comprehensive approaches to mapping SD implementation processes at HEIs are strongly encouraged.

Generally, it makes sense to divide publications into different categories. First, there are several studies dealing with the general status quo of SD implementation processes in HE. For instance, Amaral et al. reviewed academic works on initiatives to drive sustainability in overall campus operations.[15] Moreover, Lozano et al., provide a comprehensive overview of how HEIs around the world address sustainability by categorizing their efforts into different areas of impact. Among others, institutional framework, campus operations, education, and assessment and reporting play a role.[16] To date, little case studies deal with SD implementation efforts by HEIs in an inclusive way by looking at more than one area of impact. For instance, Ramísio et al. conducted a nine-year case study at the University of Minto monitoring the institution's approach to SD.[17] A less extensive case study on the University of Florence that investigated six dimensions of efforts to drive SD was carried out by Fissi et al.[18]

Following the proposed literature categorization scheme by Lozano et al., governance and institutional structures are dealt with in different studies, for instance by Velazquez et al. who developed a comprehensive management model for HEIs to address SD by collecting data from 80 different schools.[19] Niedlich et al. propose a

[15] Ana Rita Amaral et al., "A Review of Empirical Data of Sustainability Initiatives in University Campus Operations," *Journal of Cleaner Production* 250 (March 2020): 1-16, https://doi.org/10.1016/j.jclepro.2019.119558.
[16] Rodrigo Lozano et al., "A Review of Commitment and Implementation of Sustainable Development in Higher Education: Results from a Worldwide Survey," *Journal of Cleaner Production* 108 (December 2015): 3, https://doi.org/10.1016/j.jclepro.2014.09.048.
[17] Paulo J. Ramísio et al., "Sustainability Strategy in Higher Education Institutions: Lessons Learned from a Nine-Year Case Study," *Journal of Cleaner Production* 222 (June 2019): 300–309, https://doi.org/10.1016/j.jclepro.2019.02.257.
[18] Silvia Fissi et al., *Sustainable Green University*.
[19] Luis Velazquez et al., "Sustainable University: What Can Be the Matter?" *Journal of Cleaner Production* 14, no. 9–11 (January 2006): 810–19, https://doi.org/10.1016/j.jclepro.2005.12.008.

systemic tool for sustainability governance,[20] while Bauer et al. ask how different organizational cultures influence sustainability governance in HEIs.[21] Leal Filho et al. also examine the role of governance in relation to the successful implementation of measures to improve the sustainability performance of universities and conclude that, in spite of a highly diverse range of opinions, there is overall agreement on the importance of governance instruments.[22]

Furthermore, many publications are solely concerned with campus operations like the present work, most of which are case studies reporting on individual projects and approaches. Within this category, there are many possible sub-areas, e.g., campus greening measures as studied for Romanian universities by Sima et al.[23] or for Ball State University by Koester et al.[24] Mobility within or en route to campus is also explored in various works, e.g., by assessing the status quo or presenting projects to promote sustainable mobility. For example, Ribeiro et al. showed that the private car is still the main mode of transport for students and staff at the University of Minho in Portugal, proving that more attention needs to be paid to providing viable alternatives to reduce the carbon footprint from transport.[25] A contribution on Brazilian university campuses suggests space syntax studies to optimize the design of urban spaces to drive sustainability by decreasing the need for motor vehicles.[26]

Additionally, an American study undertook an efficiency analysis with regard to campus energy supply at Texas State University.[27] Energy consumption and potentials for reduction and utilization optimization at North China University Of Science and Technology was also the subject of a study by Luo et al.[28] Interesting in the context of

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[20] Sebastian Niedlich et al., "Assessment of Sustainability Governance in Higher Education Institutions—A Systemic Tool Using a Governance Equalizer," *Sustainability* 12, no. 5 (February 28, 2020): 1-17, https://doi.org/10.3390/su12051816.

[21] Mara Bauer et al., "Interdependencies of Culture and Functions of Sustainability Governance at Higher Education Institutions," *Sustainability* 12, no. 7 (April 1, 2020): 1-21, https://doi.org/10.3390/su12072780.

[22] Walter Leal Filho et al., "Governance and Sustainable Development at Higher Education Institutions," *Environment, Development and Sustainability* 23, no. 4 (April 2021): 6002–20, https://doi.org/10.1007/s10668-020-00859-y.

[23] Mihaela Sima, Ines Grigorescu, and Dan Bălteanu, "An Overview of Campus Greening Initiatives at Universities in Romania," *International Journal of Sustainability in Higher Education* 20, no. 3 (March 4, 2019): 410–22, https://doi.org/10.1108/IJSHE-01-2019-0036.

[24] Robert J. Koester, James Eflin, and John Vann, "Greening of the Campus: A Whole-Systems Approach," *Sustainability In Higher Education: What Is Happening?* 14, no. 9 (January 1, 2006): 769–79, https://doi.org/10.1016/j.jclepro.2005.11.055.

[25] Paulo Ribeiro, Fernando Fonseca, and Tânia Meireles, "Sustainable Mobility Patterns to University Campuses: Evaluation and Constraints," *Case Studies on Transport Policy* 8, no. 2 (June 2020): 639–47, https://doi.org/10.1016/j.cstp.2020.02.005.

[26] Roberta Prosini Cadena et al., "The Pursuit of a Sustainable and Accessible Mobility on University Campuses," *Transportation Research Procedia* 48 (2020): 1861–80, https://doi.org/10.1016/j.trpro.2020.08.220.

[27] Milad Mohammadalizadehkorde and Russell Weaver, "Quantifying Potential Savings from Sustainable Energy Projects at a Large Public University: An Energy Efficiency Assessment for Texas State University," *Sustainable Energy Technologies and Assessments* 37 (February 2020): 1-13, https://doi.org/10.1016/j.seta.2019.100570.

[28] Ruijiang Luo, Ying Han, and Xuejie Zhou, "Characteristics of Campus Energy Consumption in North China University of Science and Technology," *10th International Symposium on Heating, Ventilation and Air Conditioning, ISHVAC2017, 19-22 October 2017, Jinan, China* 205 (January 1, 2017): 3816–23, https://doi.org/10.1016/j.proeng.2017.10.098.

this work because of its geographical proximity to UGOE is also the contribution by Opel et al. who report on the Leuphana University of Lueneburg's switch to renewable energies in 2014 as a best-practice example. Likewise located in Lower Saxony, the Leuphana not only considered campus energy supply, but also emissions from cars and business travel in their model.[29]

One area that has received little attention so far is campus catering, which is surprising in that canteen operations of large institutions such as universities clearly play a significant role in sustainability performance. This paper therefore also likes to contribute to overcoming this gap and urges further research on the sustainability of food and beverage services at HEIs. Nevertheless, an interesting case study on the Ghent University canteen by Schaubroeck et al. demonstrates the researchers' efforts to develop a four-part scheme to measure both environmental and nutritional values for meals offered to students and staff.[30] Moreover, Eatmon et al. documented efforts by the Allegheny College in Pennsylvania to use campus food production to drive sustainability by engaging different stakeholders in a comprehensive approach.[31]

III. Methodology

3.1 Research Design

Due to the interdisciplinary, manifold, and still emerging character of the thematical context of SD at HEIs, this research is of exploratory, novel, and investigative nature. For this reason, the case study method was chosen that allows for in-depth exploration of a complex phenomenon in its real context aiming to reach an understanding of the same.[32]

For the design, a mixed variant of an exploratory and an explanatory case study as proposed by Berg and Lune was adopted which appeared to be suitable for research on compound institutions as the universities in question as well as the overarching sustainability theme.[33]

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[29] O. Opel et al., "Climate-Neutral and Sustainable Campus Leuphana University of Lueneburg," *Energy* 141 (December 2017): 2628–39, https://doi.org/10.1016/j.energy.2017.08.039.

[30] Thomas Schaubroeck et al., "A Pragmatic Framework to Score and Inform about the Environmental Sustainability and Nutritional Profile of Canteen Meals, a Case Study on a University Canteen," *Journal of Cleaner Production* 187 (March 2018): 672–89, https://doi.org/10.1016/j.jclepro.2018.03.265.

[31] Thomas Eatmon, Eric Pallant, and Samantha Laurence, "Food Production as an Integrating Context for Campus Sustainability," in *Implementing Campus Greening Initiatives: Approaches, Methods and Perspectives*, ed. Walter Leal Filho et al. (Cham: Springer International Publishing, 2015), 325–36, https://doi.org/10.1007/978-3-319-11961-8_24.

[32] Helena Harrison et al., "Case Study Research: Foundations and Methodological Orientations," *Forum: Qualitative Social Research* 18, no. 1, Art 19. (2017): 28–33.

[33] Bruce L. Berg and Howard Lune, *Qualitative Research Methods for the Social Sciences*, Ninth edition, Books a La Carte (Boston: Pearson, 2017), 176.

In general, a variety of different research techniques, tools, and data types can be used for a case study, allowing for great flexibility.[34] For the present study, various kinds of data were collected mainly between November 2020 and July 2021 and analyzed consequently. The starting point for the data collection and integral source during the whole process was the analysis of the university websites and those of other stakeholders. Furthermore, different types of documents build another important part of the data body. Since the information provided in these written sources were often insufficient, phone calls, email exchange and web-based interviews with selected persons were conducted additionally for complementation purposes. These interviews only aimed at enriching already present data and increase the validity of the results through triangulation.

The analysis tools vary depending on the data. Especially for documents and university publications, content review and analysis build the backbone of the findings. In this context, the partly investigative character of the case study and thus also of the data collection should be emphasized.

3.2 Limitations and Error

In regard to possible limitations of this work, several aspects must be considered. For an attempt to answer the central research question of whether Uppsala University and the University of Goettingen have sustainable campus operations, attention was paid to campus operations, more specifically campus energy and catering.

That said, this approach naturally results in a limited picture of the universities' areas of action with respect to SD. This is especially true for the universities' key domains of teaching and research, where data collection and evaluation attempts were particularly difficult. Therefore, this work does not consider these areas and wants to encourage further research focusing particularly on ESD implementation processes. Additionally, this paper neglects the areas of institutional framework and governance of the respective universities as well as student initiatives aiming to foster sustainability. Both areas are considered in a longer version of the paper.[35]

Generally, the design of this case study is largely based on the presence, availability, and presentation of data. Since neither of the universities have a coherent sustainability strategy in place, the relevant data is being spread over countless

[34] Marta Strumińska-Kutra and Izabela Koładkiewicz, "Case Study," in *Qualitative Methodologies in Organization Studies*, ed. Malgorzata Ciesielska and Dariusz Jemielniak (Cham: Springer International Publishing, 2018), 13 f., https://doi.org/10.1007/978-3-319-65442-3_1.
[35] See footnote 12.

sources. This makes data acquisition time-consuming and vulnerable to distortions.[36] In addition, available information is often not up to date, resulting in an inaccurate account of reality. Finally, sustainability is a topic that is receiving increasing attention and is rapidly gaining momentum, especially due to media presentation. Short-term and potentially far-reaching changes are thus possible at almost any time. This was also evident during the investigation of UGOE. However, because every data collection must close at some point, spontaneous developments cannot be incorporated after a certain point. Timely follow-up on the results is therefore considered important.

Another restraint to the research and at the same time a potential source of error derives from the consequences of the COVID-19 pandemic which had a major impact on nearly all areas of university operations around the world.[37] While it is beyond the scope of this paper to examine what the specific consequences have been for the affected universities and their SD efforts, it is reasonable to assume that the implementation processes have slowed since the 2020 outbreak. Nonetheless, while there have been major changes in all spheres of university life, the research attempts to map how the universities address sustainability in general, assuming that most operations will return to pre-pandemic states eventually. However, a partially distorted image cannot be completely avoided under given circumstances.

IV. Findings

The University of Goettingen (German: *Georg-August-Universität Göttingen*) is geographically located in the center of Germany in the city of Goettingen in Lower Saxony. Founded in 1737, it is one of the country's long-established and well-known research universities. Like UU, UGOE is publicly owned by the state of Lower Saxony.[38] UGOE currently offers 231 academic subjects, including bachelor's, master's, teaching, and doctoral programs. Of these, 42 are taught in English.[39] In 2018, the total revenue was almost 1.29 billion euros, with approximately 763 million attributable to

[36] Rachel Shawe et al., "Mapping of Sustainability Policies and Initiatives in Higher Education Institutes," *Environmental Science & Policy* 99 (September 2019), 84–86, https://doi.org/10.1016/j.envsci.2019.04.015.

[37] The full impact of the pandemic on the HE sector cannot yet be estimated due to the ongoing nature of the situation. Nevertheless, more and more studies are emerging on this topic from different angles, although the focus is mostly on digital learning. See, for instance, Bob Blankenberger and Adam M. Williams, "COVID and the Impact on Higher Education: The Essential Role of Integrity and Accountability," *Administrative Theory & Praxis* 42, no. 3 (July 2, 2020): 404–23, https://doi.org/10.1080/10841806.2020.1771907; Shazia Rashid and Sunishtha Singh Yadav, "Impact of Covid-19 Pandemic on Higher Education and Research," *Indian Journal of Human Development* 14, no. 2 (August 2020): 340–43, https://doi.org/10.1177/0973703020946700; Giorgio Marinoni, Hilligje van't Land, and Trine Jensen, "The Impact of Covid-19 on Higher Education Around the World. IAU Global Survey Report" (Paris: International Association of Universities (IAU), May 2020), https://bit.ly/IAUImpactofCovid19.

[38] In Germany, education and hence public higher education is the responsibility of the 16 federal states or *Länder*.

[39] "Studienfächer von A bis Z - Georg-August-Universität Göttingen," University of Goettingen, accessed June 22, 2021, https://bit.ly/UGOESubjects.

the University Medical Center (UMG) and thus only flowing into the clinic's budget. With nearly 31,000 students enrolled for the winter term 2019/2020, UGOE is one of the bigger German universities. In the same period, over 4,000 were registered as international students. In 2020, UGOE counted 13,390 staff members which is more than double UU's number. However, over 8,000 staff work at the UMG and around 5,330 are employed at the university itself. [40]

The second HEI investigated in this paper is Uppsala University (Swedish: *Uppsala Universitet*), the oldest university in Sweden and the Nordic countries, founded in 1477. The research-intensive school consists of three main disciplinary domains: humanities and social sciences, medicine and pharmacy, and science and technology. In 2020, over 28,000 full-time students were enrolled across the nine faculties and over 60 departments. In the same year, there were approximately 6,400 full-time employees at the university, including nearly 2,000 teaching and 2,100 other academic staff. The annual turnover of the state-owned institution is approximately SEK 7 billion which, at the time of writing, equals to around 687 million euros.[41] UU is spread over 12 campuses, with 11 of them located in the urban area of Uppsala municipality, which lies around 71 km north of Stockholm. Since 2013, the university also owns the Gotland campus in Visby, which is located on the island Gotland south of Stockholm.[42] The total area of the facilities is almost 400,000 square meters.[43] The buildings are rented out to UU by *Akademiska Hus* (AH), a public real estate company owned by the government which is the landlord to many universities in Sweden.

4.1 Campus Operations: Catering

The consideration of sustainability aspects in the area of campus operations is playing an increasingly important role for HEIs. This is not surprising, considering that the duties of a university involve a large amount of built-up space and serving thousands of people.[44] Therefore, in the following section, campus catering as an integral but often neglected part of HEIs' support functions will be looked at to examine UU's and UGOE's sustainability work in this field.

[40] The 2018 figures are the newest numbers available. "Zahlen – Daten – Fakten - Georg-August-Universität Göttingen," University of Goettingen, accessed June 21, 2021, https://www.uni-goettingen.de/de/626482.html.
[41] David Naylor, "Quick Facts about Uppsala University - Uppsala University, Sweden," accessed August 25, 2021, https://www.uu.se/en/about-uu/quick-facts/.
[42] Ibid., "Campuses - Uppsala University, Sweden," accessed August 25, 2021, https://www.uu.se/en/about-uu/campus/.
[43] Ibid., "Quick facts."
[44] Amaral et al., Sustainability initiatives, 3.

4.1.1 University of Goettingen

At the University of Goettingen, the *Studentenwerk* (student support association) *Goettingen* is responsible for the catering of the students and employees of the University of Goettingen. The Studentwerk (StW) is a foundation under public law in the service sector whose main tasks are campus hospitality and accommodation rental for students.

The cost-covering operation of the StWs differs significantly from profit-oriented commercial companies. The resulting favorable prices benefit students and staff. On the other hand, the legal mandate naturally also imposes limits which may make it difficult to implement sustainability strategies. Introducing greener but more costly solutions for food and beverages has also its limits as it can bear the risks of interfering with the mandate of offering affordable products to the students who often have limited financial resources. However, according to their own agenda, German StWs "in their activities, strive to meet high standards in terms of their customers' needs, but also in terms of their social and societal responsibility."[45]

Before the COVID-19 pandemic began, in Goettingen's StW, about 200 people were employed in the 14 food service operations. On weekdays, around 10,000 meals were sold daily. Each canteen or cafeteria offers a vegetarian and often a vegan dish daily. The demand for vegetarian and vegan options has been steadily increasing for years.[46]

When it comes to sourcing food, those in charge rely on the motto "regional before organic" and have had some success in recent years in terms of switching to regional and thus more sustainable sourcing of ingredients. The pork offered in the dining halls and cafeterias, for example, is sourced from straw pigs in the region. A similar solution for the supply of beef is also in the focus of those responsible but has not been successful yet. As public foodservice operations are generally regarded as being one of the most significant markets for local food producers, Goettingen's strategy is in line with common approaches in this sector.[47] In the case of vegetables and fruit, preference is given to seasonal produce whenever possible. Frozen products complement the product range.[48]

Still, there are many obstacles on the way to sustainable campus catering and that on several levels. Generally, a university canteen of Göttingen's size faces particular

[45] Translated to English. German original: „Die Studentenwerke sind bei ihrer Tätigkeit darum bemüht, hohe Standards im Sinne der Bedarfe ihrer Kunden, aber auch in ihrer sozialen und gesellschaftlichen Verantwortung zu erfüllen." Deutsches Studentenwerk, *Studenten – und Studierendenwerke im Zahlenspiegel 2018/2019*, 35.
[46] Interviewee 2, 2020, telephone call with author, December 7, 2020. Interviewee 2 was consulted over the phone as the manager of the Campus Catering Department of the Goettingen Studentenwerk to provide additional information to that available on the Foundation's website (https://www.studentenwerk-goettingen.de/campusgastronomie).
[47] Ulla Lehtinen, "Sustainability and Local Food Procurement: A Case Study of Finnish Public Catering," *British Food Journal* 114, no. 8 (August 3, 2012): 1054, https://doi.org/10.1108/00070701211252048.
[48] Interviewee 2, 2020.

challenges, as many sustainable solutions in terms of product selection are difficult to realize due to the enormous quantities required. This shows that an existing problem is the dependence on supply chains and wholesalers. Particularly problematic is the procurement of poultry as well as fish and seafood. For the latter, the StW Goettingen only uses products certified by the Marine Stewardship Council (MSC) which, however, does not yet seem to be an ideal solution to the head of campus catering.[49] On the same note, supply of poultry products from animal-friendly or even organic livestock farming poses problems for many canteens, simply because large quantities are not available from e.g., organic farms.

In addition, the operators also see the consumers, in this case the students and employees of the university, as having a responsibility to influence the products offered. The design of the product range in the sense of increasing sustainability therefore still also follows the principle of supply and demand. Eliminating or reducing the use of certain products (e.g., products from ruminants or products from factory farms) to reduce GHG emissions or ensure animal welfare has therefore considered to be difficult for the longest time as to not jeopardize the public mandate. After all, traditionally, a wide range of meal options, including meat as a standard option, is also common to meet the mandate for a balanced and varied diet for students in Germany.[50]

Nevertheless, the StW decided to "massively reduce the proportion of meat-based dishes on offer and at the same time increasing the proportion of attractive vegetarian and vegan dishes" permanently from 2021 on.[51] What this means exactly and how this measure will be answered by the customers remains to be seen when the canteens work full capacity again which will take longer than expected due to the ongoing pandemic.

Moreover, in the context of a so-called "climate protection statement," published by UGOE and UMG, the Goettingen StW similarly took the decision to make further announcements. According to this, it plans to switch to green electricity for all its facilities by 2025. Furthermore, energy-saving opportunities are to be considered in the course of building renovations.[52]

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[49] In fact, criticism of MSC certification is widespread, and environmentalists complain about the NGO's involvement with the private sector and multimillion-dollar companies, as well as the partly misguided labeling policy. See e.g., Daniel Zwerdling and Margot Williams, "Is Sustainable-Labeled Seafood Really Sustainable?," *NPR*, February 11, 2013, https://www.npr.org/2013/02/11/171376509/is-sustainable-labeled-seafood-really-sustainable.

[50] Philip Oltermann, "Berlin's University Canteens Go Almost Meat-Free as Students Prioritise Climate," *The Guardian*, August 31, 2021, sec. World news, http://www.theguardian.com/world/2021/aug/31/berlins-university-canteens-go-almost-meat-free-as-students-prioritise-climate.

[51] Interviewee 2, 2021, email to author, May 20, 2021.

[52] University of Goettingen, *Klimaschutzstatement der Georg-August-Universität*, 3, last modified June 4, 2021, https://bit.ly/UGOEKlimaschutzStatement.

In the case of Goettingen, one could say that, within the bounds of what deemed possible, much has already been done to act more sustainably regarding catering itself. Thus far, the measures taken are largely in line with the general principles of action of all German StWs, which are, of course, implemented very differently at the local level.[53] Nonetheless, the recent developments and announcements by the Goettingen StW are promising and indicate that it acts rather progressive. Having said that, as also true in other contexts, the question of who is responsible for a greener direction of the operations is also inevitable here: In the end, are consumers the ones who decide? Should operators simply dictate what is on the menu? Should the legislator impose stricter requirements?

On that note, a study on sustainable nutrition on German canteens of the public sector showed that German StWs perceive themselves as mainly "non-political" actors and see this status as preventing them from being more proactive about sustainability in terms of food offer.[54] This is not surprising, since a more sustainable diet for the society as a whole, especially with regard to reducing livestock products, is not promoted in Germany either by state or federal policy.[55] Considering the immense impact of livestock farming on the environment and climate,[56] policies regulating the hitherto existing value chains for meat and animal products are urgently needed. Ultimately, changes in human consumption behavior are necessary for change to sustainable systems and should be significant also for UGOE to reach their declared goal of becoming climate neutral by 2030.[57] After all, estimates suggest that, for example, a switch to flexitarian diets for overall society would lead to a 27% reduction in total CO2 emissions in Germany compared to the current diet.[58]

As in much of the public sector, more progressive changes often fail due to voluntarism and the lack of more stringent regulations that would need to be imposed by authorities. The same applies to the authenticity of the StWs' ever-present claim that their options are limited because they must spare the students' wallets. On that note, one could also ask why the salaried employees are not asked to pay reasonably higher prices.[59] Consequently, the sticking point here is certainly the rigidity of the

[53] Deutsches Studentenwerk, Studenten – und Studierendenwerke, 35.
[54] Samyra Hachmann et al., "Maßnahmen zur nachhaltigen Ernährung in oeffentlichen Kantinenzwischen Bevormundung und Mündigkeit," *Thesys Discussion Paper* No. 2019-1. *Humboldt-Universität zu Berlin, Deutschland,* (November 2019), 7.
[55] Ibid., 1.
[56] For instance, according to estimations, livestock farming accounts for approximately 15% of global CO2 emissions. See Emanuela Tullo, Alberto Finzi, and Marcella Guarino, "Review: Environmental Impact of Livestock Farming and Precision Livestock Farming as a Mitigation Strategy," *Science of The Total Environment* 650 (February 2019): 2754, https://doi.org/10.1016/j.scitotenv.2018.10.018.
[57] University of Goettingen, *Klimaschutzstatement*, 1.
[58] WWF Deutschland, *Klimaschutz, landwirtschaftliche Fläche und natürliche Lebensräume* (Berlin: WWF Deutschland, 2021), 56, accessed May 19, 2021, https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/kulinarische-kompass-klima-zusammenfassung.pdf.
[59] In German university canteens, there are usually three different prices for a dish: students pay the smallest price, employees (of any kind) pay a little more, and guests who do not fall into either category pay the highest price. In

long-established systems themselves and not the unwillingness to change of the individuals involved. Nevertheless, that there can be far-reaching changes is shown by the example of the StW Berlin, which has just announced that it will massively reduce the range of meat and fish dishes in the future in response to student requests. This shows not only that customers can indeed have a massive influence on what public canteens offer, but also that feasible solutions to promote sustainability in campus catering can be found if different stakeholders work together ambitiously.[60]

4.1.2 Uppsala University

At Uppsala University, campus catering is organized very differently compared to Goettingen as canteens are ran by private businesses which is standard practice in the Swedish HE sector. That means that the universities usually do not have direct influence on the restaurants but can enter into exchange to stimulate changes.[61]

As of June 2021, there are 12 restaurants and cafes alongside several smaller food outlets, operating on the different campuses which are ran by eight different owners.[62] Compared to Goettingen, the canteens are smaller, serving considerably less food per day.[63]All facilities offer at least one vegetarian dish, and vegan options are often available as well. Biodegradable lids for coffee-to-go cups and salad bowls are among the details that give the impression that sustainability is being considered in some of the canteens.[64]

For research on food outlets at UU, the operators' websites were the primary source of information. However, some operators do not have a website at all, and most others provide only very basic information using that channel. That said, *Nordrest*, the company behind *Hoegskolerestauranger*, which operates several canteens and dining services at Uppsala University, appears to be very committed to implementing the concept of sustainability in its operations. *Nordrest* is a restaurant concern operating not only in the public sector but also for large private companies such as Volvo and Vattenfall.[65] Furthermore, *Hoegskolerestauranger* operates canteens at nine other HEIs in Sweden, making it one of the biggest players in the business.

On their website, information on the business' SD approach is provided, revealing an extensive sustainability strategy including eco-certification of all restaurants, a zero-

Goettingen, however, the prices do not exceed 4 euros per dish in any case which is unprecedentedly inexpensive. See "Mensa," University of Goettingen, accessed May 19, 2021, https://www.uni-goettingen.de/de/24891.html.

[60] Oltermann, "Berlin's University Canteens."

[61] Interviewee 4, 2021.

[62] "Restaurants at the University", Uppsala University, accessed June 3, 2021, https://katalog.uu.se/organisation/?orgId=X53.

[63] Due to a lack of data, this assumption is based on the author's own experience as a student in Uppsala.

[64] Ibid.

[65] "Om oss", Nordrest, accessed June 2, 2021, https://www.nordrest.se/17/8/om-oss/.

waste strategy for vegetables, using free-range eggs only, measuring waste and food waste regularly, a cooperation with the *Karma app* which organizes the selling of leftover food for a reduced price, as well as a strict environmental policy for all contractors.[66]

An even bigger transnational enterprise stands behind *Food and co.* that operates another of the restaurants at UU: the *Compass Group Sweden*. The *Compass Group* is a Fortune Global 500 company and the largest contract foodservice company in the world, headquartered in England.[67] As a business of this size, the *Compass Group* has an extensive corporate responsibility strategy in place, referring to their impact on all 17 SDGs.[68] While it is beyond the limits of this work to evaluate how SD is realized by the enterprise in detail, it can be said that the *Compass Group* has ambitious goals for their restaurants in Sweden. For instance, they aim to reduce the average carbon footprint per meal to no more than 0.5 kg CO2/meal by 2025.[69] In addition, plastic packaging used in the restaurant is planned to be 100% recyclable by 2025.[70] To name a few policies already in place, only organic milk, organic and/or ethically labeled coffee, MSC-labeled wild-caught fish and seafood, organic bananas, and free-range eggs are offered in all catering facilities.[71] However, there are no specific guidelines for meat products, except that restaurants must meet the Swedish Food and Consumer Product Safety Agency's requirements for good animal husbandry, and that the pork must also be sourced from Sweden.[72]

Considering the policies valid for *Food and co.* and *Hoegskolerestauranger* restaurants in Uppsala, the assumption is that while there is a lack of communicating SD agendas and other information over the internet, for most operators in Uppsala, this must not necessarily mean an absence of the same. In addition, the fact that campus catering is pivoted in Sweden, unlike in Germany, can also be seen as an advantage regarding the embodiment of SD considering the extensive policies of *Nordrest* and the *Compass Group.* Nevertheless, there are major differences between the restaurant operators at UU, ranging from small family businesses to large companies which have advanced possibilities in enhancing their SD approach due to their financial situations and market positions.

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[66] "Hållbarhet," Nordrest, accessed June 2, 2021, https://www.nordrest.se/17/7/hallbarhet/.

[67] In 2020, the Compass Group had around 10% of the global market share in the sector. See Compass Group, *Annual Report 2020* (Chertsey: Compass Group PLC, 2020), 10, accessed June 3, 2021, https://bit.ly/CompassGroupAR2020.

[68] Ibid., Corporate Responsibility Report, 60-69.

[69] This amount is proposed by the WWF Sweden project "One Planet Plate". See "Klimatsmart," Compass Group Sverige, accessed June 2, https://www.compass-group.se/hallbarhet/klimatsmart/. For information on *One Planet Plate*, see https://www.wwf.se/mat-och-jordbruk/one-planet-plate/#om-one-planet-plate.

[70] "Cirkulärt," Compass Group Sverige, accessed June 2, 2021, https://www.compass-group.se/hallbarhet/cirkulart/.

[71] "Ansvarsfulla inköp," Compass Group Sverige, accessed June 2, 2021, https://www.compass-group.se/hallbarhet/ansvarsfulla-inkop/.

[72] Ibid.

In summary, the insufficient data available does not allow any sound conclusions to be drawn about the widespread existence of sustainability efforts throughout the campus catering facilities. Nevertheless, the statements and actions by *Nordrest* and *Compass Group* are important, since the businesses are responsible for a considerable part of the campus restaurants. It is therefore reasonable to assume that the other operators are simultaneously at least aware of the importance of sustainability and the demands of their customers in this respect. Generally, it appears that food operators in Swedish HEIs have more freedom in realizing SD measures, as they are not part of the public sector. Of course, whether the partly enormous companies standing behind the UU restaurants are really acting on their immense responsibility related to the size of their businesses remains to be questioned. Nevertheless, overall, it appears that the larger operators contribute to the HEI's improved sustainability performance in terms of catering. The smaller companies should also follow this example within the bounds of their possibilities and, for instance, place more emphasis on regionality. Communicating openly and accessibly about sourcing and sustainability goals should likewise be envisioned to ensure exchange and stimulation around the topic.

Following that thought, at both institutions, certainly more could be done in terms of educating and informing their customers about their possibilities to enhance SD in terms of their own food choices. A good example is the idea of calculating and promoting the CO2 emissions of meals on offer which was tried out in one of the canteens in Uppsala.[73] The positive aspect of such an approach would be that it would shift the responsibility for making greener choices directly to the customer, without requiring operators to explore the limits of what they can do without harming the business or violating their mandate.

But there are even more far-reaching examples in European campus canteens like the implementation of an additional meal category, as introduced by the StW Berlin. Next to vegetarian or vegan dishes, the HEI canteens in Berlin also offer a so-called "Klimaessen" (climate meal) for which they "never use products which lead to a high ecological footprint during cultivation and production."[74]

4.2 Energy supply

Universities of the size like Goettingen and Uppsala resemble small cities. Considering that around 6% of CO2 emissions worldwide can be attributed to energy needed for buildings, there is an undeniable importance of looking at energy consumption and

[73] Interviewee 4, 2021.

[74] "A guide through our menu icons," Studierendenwerk Berlin, accessed June 10, 2021, https://www.stw.berlin/en/dining-facilities/themen/menu-icons.html.

supply on campus.[75] Regarding sustainability, firstly, the actual state, i.e., available data on energy supply can be analyzed. Secondly, the extent to which investments are made in sustainable energy supply can and should also be considered, as the process of changing existing systems in this area can require a substantial amount of time and other resources. As the analysis will show, the key factors here are willingness to act and compromise, commitment, and long-term investment. This section is therefore not viewed through a technical lens but is also based here on framework conditions.

4.2.1 University of Goettingen

The main energy supply in Goettingen comes from the university's own combined heat and power plant (CHP), which provides electrical power and heating energy based on a gas turbine. A large part of the campus is connected to a district heating network. According to the university's website, this plant produces about 65% of the total energy consumed by UGOE, the clinic and university-related facilities such as the StW or the Max Planck Institutes.[76] The figure below illustrates the energy flow in Goettingen, confirming that the main energy share comes from natural gas:

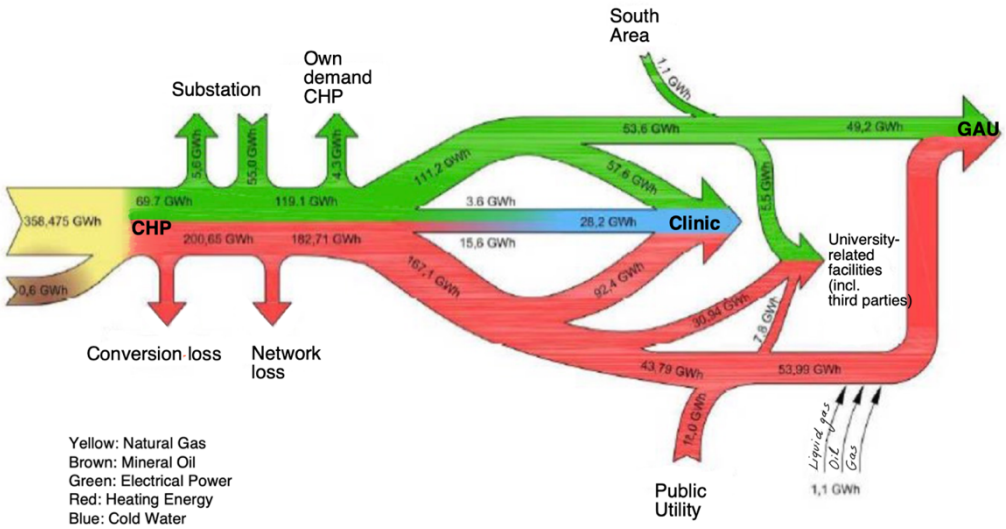

Figure 1: Energy flow in Goettingen.
Source: Scheme adopted from University of Goettingen, Energiebericht 2018. Translated by author.

In 2018, the total demand for gas and oil combined amounted to approximately 360 GWh. Compared to other German universities of similar size, this is a high energy

[75] "Verteilung der energiebedingten CO2-Emissionen weltweit nach Sektor im Jahr 2018," IEA, chart by Statista, October 28, 2020, https://bit.ly/CO2EmissionsWorldwide.
[76] "Energieversorgung des Campus," University of Goettingen, accessed June 16, 2021, https://www.uni-goettingen.de/de/energieversorgung+des+campus/507241.html.

demand.[77] One reason for this dimension is the UMG which accounts for around 34% of the heating energy and 19% of the power demand.[78] Nevertheless, there is certainly a lot of room for improvement in terms of consumption reduction and energy optimization, which is why the university introduced campaigns to encourage staff and students to save electricity, e.g., by switching off lamps or using radiators consciously.[79] Other projects aiming at energy optimization were the shift to LED lamps in the university's fish farm halls and on major parts of the campus, the replacement of heating circulation pumps in the clinic or the installation of a heat recovery system at the Institute of Forestry.[80] While these rather small-scale projects contribute to a more efficient usage of the energy needed in the specific fields, savings of a further 20% of the current energy requirement are possible and necessary according to estimates.[81]

For this to be achieved, energy-saving potential must be identified. As the renovation of existing buildings for the purpose of better insulation, etc., cannot be considered economically viable, other measures must be in focus.[82] Great opportunities for this are offered, for example, by new buildings such as a clinic building, the construction of which will begin soon. According to the KS, constructional measures helping to reduce climate impacts shall be considered here, although the "implementation of the concepts for university and hospital operations will depend on the legal and financial framework."[83] Generally, there have been many difficulties in reconciling the views of the various parties involved, so that energy-optimized construction will probably only be implemented to a limited extent after all.[84]

Greater commitments to switch to other forms of energy would be necessary to achieve meaningful changes in terms of sustainable energy supply. It is true that supplying natural gas is somewhat more environmentally friendly than generating energy from coal or oil, although the latter is used in Goettingen during peak heating periods only. Nevertheless, natural gas is also responsible for an immense share of greenhouse gas emissions.[85] As a fossil fuel, it is not an alternative to renewable energies. Although it

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[77] For example, the Free University Berlin (FU Berlin) consumed 118.6 GWh in 2019. See "Energiebilanzen und Kennzahlen," FU Berlin, accessed June 17, 2020, https://bit.ly/FUEnergie. The Technische Universität Dresden (TU Dresden) consumed a total of around 120 GwH of energy in 2019. See TU Dresden, *Umweltbericht 2020* (Dresden: TU Dresden, 2020), 22, accessed June 17, 2021, https://bit.ly/TUDresdenUmweltbericht2020.

[78] University of Goettingen, *Energiebericht 2018*, 2.

[79] "Energieverbrauch und Treibhausgasemissionen," University of Goettingen, accessed June 27, 2021, https://bit.ly/UGOEEnergieverbrauch.

[80] University of Goettingen, *Energiebericht 2018*, 14–22.

[81] Interviewee 7, 2021.

[82] Julia Doerks, "Critical Compilation of Sustainable Energy Supply Concepts and their Integration into the University of Göttingen Campus," Master's thesis (University of Goettingen, 2020), 66.

[83] Translated to English. German original: „Die Umsetzung der Konzepte für den Universitäts- und Klinikbetrieb wird von den rechtlichen und finanziellen Rahmenbedingungen abhängen." University of Goettingen, *Klimaschutzstatement,* 2.

[84] Interviewee 7, 2021.

[85] In 2019, per capita CO2 emissions by gas amounted to 2.1 tons in Germany and 0.2 tons in Sweden, compared to 2.8, respectively 0.8 tons by coal, and 3.2 tons by oil in Germany and 3 tons in Sweden. See Global Carbon

appears to be a controversially discussed topic within the university, some staff are engaged with finding alternative solutions. Thus, eight photovoltaic systems have been installed on campus since 2009 to date, and two more are planned. According to UGOE, a power supply of around 282 MWh and a CO2 avoidance of more than 70 tons can be achieved in this way.[86] Nevertheless, this is hardly significant in terms of the university's total consumption and emissions but can be viewed as an important part of initiating a green campus strategy.

The most important and promising project is therefore the research on the use of geothermal energy and the use of enhanced or engineered geothermal systems (EGS) in Goettingen. For EGS, thermal energy stored in the Earth is harnessed for energy supply. As a non-intermittent, low-carbon, abundant and universally available form of energy production, geothermal energy hence belongs in the realm of renewable energy.[87] In theory, the Earth's geothermal resources are sufficient to provide for humanity's energy need, but only a very small portion can be profitably exhausted and is bound to certain geological conditions.[88] To date, while continuously rising, geothermal energy is only used to a very limited amount and mainly for heating energy, often in private households. The application possibilities are, however, very broad.[89] While approximately 6,230 GWH of heating energy was provided by geothermal energy in Germany in 2010, this figure had risen to 17,460 in 2020.[90] This trend is expected to be continuing in the future.[91] For electricity generation, the situation is similar: Within 10 years, gross electricity generation from geothermal energy in Germany has increased from 28 GwH to 217 GwH annually.[92] Experts estimate that by 2050, geothermal energy plants could account for 4 to 7% electrical generation in Europe.[93]

To generate energy with EGS, heat exchange systems are used. Fluids are injected into the ground and heated by the energy stored in the earth. Pumps bring the heated liquid back to the surface, where it is recovered for energy production.

Project, *Global Carbon Project, 2020*, Supplemental data of Global Carbon Budget 2020 (Version 1.0) [Data set], distributed by Global Carbon Project, https://doi.org/10.18160/gcp-2020.

[86] University of Goettingen, *Anlagensteckbriefe für vorhandene PV-Anlagen* (Goettingen: University of Goettingen, modified April 2020), https://bit.ly/UGOEAnlagensteckbriefe.

[87] Diego Moya, Clay Aldás, and Prasad Kaparaju, "Geothermal Energy: Power Plant Technology and Direct Heat Applications," *Renewable and Sustainable Energy Reviews* 94 (October 2018): 889f, https://doi.org/10.1016/j.rser.2018.06.047.

[88] Bruno Baruque et al., "Geothermal Heat Exchanger Energy Prediction Based on Time Series and Monitoring Sensors Optimization," *Energy* 171 (March 2019): 49, https://doi.org/10.1016/j.energy.2018.12.207.

[89] Read further on: Francesco Dalla Longa et al., "Scenarios for Geothermal Energy Deployment in Europe," *Energy* 206 (September 2020): 1-10, https://doi.org/10.1016/j.energy.2020.118060.

[90] "Geothermienutzung zur Wärmebereitstellung in Deutschland in den Jahren 2000 bis 2020 (in Gigawattstunden)," BMWi, chart by Statista, March 5, 2021, https://bit.ly/GeothermieWärme.

[91] Dalla Longa et al., Scenarios for Geothermal Energy Deployment in Europe, 1.

[92] "Geothermienutzung zur Bruttostromerzeugung in Deutschland in den Jahren 2003 bis 2020 (in Gigawattstunden)," BMWi, chart by Statista, March 5, 2021, https://bit.ly/GeothermieStrom.

[93] Dalla Longa et al., *Scenarios for Geothermal Energy Deployment in Europe*, 5.

Within the EU-funded research project MEET (**M**ultidisciplinary and multi-context demonstration of **E**nhanced Geothermal Systems exploration and **E**xploitation **T**echniques and potentials), which consists of 16 partners in five European countries, the UGOE's campus is being studied as a demo site. Since 2011, an exploration of the area has been ongoing to learn about the preconditions of the site in relation to high and deep geothermal use.[94] While much is still unknown about the geological conditions in Goettingen, all required studies have been completed thus far prior to the start of an EGS project. Researchers have identified the metrics that would need to be met to make a project economically viable and estimate that, in such a setting, around 20% of heating energy needs and 6% of cooling needs could be provided by EGS.[95] Combined with other energy conservation models, geothermal energy could thus account for a significant portion of the total energy required by UGOE.

Nevertheless, it remains unclear if, when and to what extent these plans will be realized. Romanov and Leiss have identified general public acceptance, government support and effective collaboration among all stakeholders as the most crucial prerequisites for launching an EGS project in Goettingen.[96]

In summary, UGOE holds great potential to move toward greener energy supply and to use energy resources more sustainably and responsibly in the future. Nevertheless, it must be said that decisionmakers in Goettingen have so far been hesitant to invest in expanding and changing the existing structures. When UGOE decided to focus on independence from external energy supply by building its own CHP plant, the direct responsibility for investing in sustainable energy also shifted to the university itself. Looking at the commitment in this area to date, one has the impression that this responsibility was clearly not recognized at the time – and is only acknowledged to a limited extent to date. Considering that the university currently accounts for 11% of the total GHG emissions of the Goettingen municipality alone, it must be clear that UGOE need to pursue its newly formulated climate targets more forcefully.[97] However, this cannot be achieved by the university management alone, but also requires commitment from the clinic leadership and fruitful cooperation between researchers and administration.

4.2.2 Uppsala University

[94] "Universitätsenergie Göttingen GmbH," MEET – Multi-sites EGS demonstration, accessed June 18, 2021, https://www.meet-h2020.com/demonstration-sites/universitatsenergie-gottingen-gmbh/.
[95] Dmitry Romanov and Bernd Leiss, "Analysis of Enhanced Geothermal System Development Scenarios for District Heating and Cooling of the Göttingen University Campus," *Geosciences* 11, no. 8 (August 19, 2021), 16 f., https://doi.org/10.3390/geosciences11080349.
[96] Ibid., 17.
[97] "«Göttingen im Klimawandel – Was tun wir?» 3. Veranstaltung," Deutsches Theater Göttingen, Youtube video, 11:38, May 21, 2021, https://www.youtube.com/watch?v=RwYGg5d9TzY.

As mentioned earlier, UU does not own the campus buildings like UGOE, but rents them from AH, a governmental enterprise that possesses 61% of all HE properties in Sweden.[98] Consequently, energy supply is the responsibility of AH whereas tenant and landlord need to collaborate on these topics. As a state-owned company, AH is obliged to act in accordance with statutory requirements. Therefore, the Swedish Parliament reformulated AH's mission in 2013, including the fact that it "shall promote the long-term sustainable development of university and higher education areas."[99] Consequently, the company has its own sustainability policy in place and states that it wants to achieve climate neutrality in internal operations and in external properties by 2025 as well as in new property projects by 2045.[100] Concerning their plans for UU, unfortunately, little information can be extracted from websites and publicly available documents.

However, the energy report provides some information about consumption and, to an extent, supply. In 2020, the overall energy consumption of UU totaled approximately 104 GWh which corresponds to 16,3 MWh per employee and 216 kWh per square meter. Heating accounted for around 42% (44 GWh), electricity for 47% (49 GWh) of total consumption. The remaining energy is attributed to cooling operations (around 11 GWh). The figures for 2019 and 2018 also show that there has been an overall decrease of about 3 GWh per year, which is relatively evenly distributed across all energy utilization categories.

The RM does not indicate which energy sources are included in the energy composition for UU, but the share of renewable energy in the total consumption. Accordingly, electric power came from 100% renewable energy sources (hydropower) in recent years, while heating and cooling had a 55% renewable energy share in 2020. The portion of renewable electricity is apparently contractually determined with AH. The latter figure was not as consistent, which will be due to changes in the overall energy mix for district heating.[101]

Sweden is traditionally a large energy consumer, which is linked to the dark and cold winters. Nevertheless, emissions, especially from electricity generation, are lower than in other countries, as about 40% comes from nuclear power. In addition, Sweden is one of the countries in Europe with the largest share of renewable energy, mainly because of hydropower, which was responsible for another 39% of electricity

[98] Akademiska Hus, *Annual and Sustainability Report 2019* (Gothenburg: Akademiska Hus, 2020), 2, accessed July 1, 2021, https://www.akademiskahus.se/globalassets/dokument/ekonomi/ekonomiska-rapporter/annual_report_2019.pdf.

[99] Translated to English. Swedish original: "Akademiska Hus ska verka för en långsiktigt hållbar utveckling av universitets- och högskoleområden." "Vår verksamhet," Akademiska Hus, accessed June 30, 2021, https://www.akademiskahus.se/om-oss/var-verksamhet/.

[100] "Climate Targets," Akademiska Hus, accessed July 5, 2021, https://www.akademiskahus.se/en/sustainability/climate-targets/.

[101] Uppsala University, *Redovisning,* 11.

generation in 2018.[102] The scheme below also shows that Sweden itself is a major producer of fossil energy. A large part of the fossil fuels is exported, but within Sweden, especially the transport sector, heating systems and industry are also still very dependent on these energy sources while biofuels play an increasing role, too.

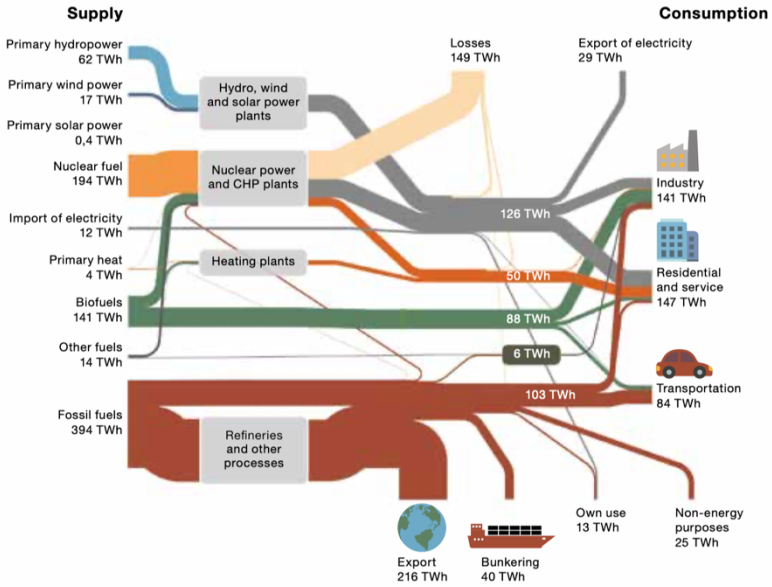

Figure 2: Swedish energy system 2018.
Source: Scheme adopted from Swedish Energy Agency, Energy in Sweden 2020. An overview, 3.

As mentioned earlier, UU plans to cut total energy consumption by 7% by the end of 2021. While it is not clear if this goal will be reached, according to the environmental report, there is a pilot project at Engelska Parken[103] involving an investment of SEK 6.5 million in energy supply measures, resulting in a 12% reduction of power consumption at this campus. These measures are based on an agreement with AH whereby the price of electricity is now included in a 10-year lease, allowing the landlord to make larger investments. Such a contract has also been agreed upon for another large campus, the Ekonikum. What is more, within another cooperation agreement with AH, large-scale installations of solar cells are currently underway. In 2020, UU itself fed over 36 MWh into the power grid. It can be assumed that solar

[102] The 2018 figures provided in the 2020 report are the most recent ones available at the time of writing. Swedish Energy Agency, *Energy in Sweden 2020. An overview* (Esklistuna: Swedish Energy Agency, 2020), 3, accessed July 6, 2021, https://energimyndigheten.a-w2m.se/Home.mvc?ResourceId=5794.
[103] Engelska Parken or the English Park Campus is home to UU's Centre of Humanities. It consists of buildings built in the 19th and 20th century and newer parts, the most recent was opened in 2017. "Besök Engelska Parken," Uppsala University, accessed July 3, 2021, https://www.engelskaparken.uu.se/besok-engelska-parken/.

technology plays a significant role here, but unfortunately it is not specified how the energy was produced.[104]

There is no data that indicates that UU respectively AH plan on larger independence from the local district heating network by investing in their own power plant. Therefore, the questions of how and when more renewable energy will find its ways into the campuses power supply lies primarily with the responsible for local and nationwide energy supply. As one stakeholder, Uppsala municipality has set up the *Energy Programme 2050* and the *Uppsala Climate Protocol*. Notwithstanding that UU is also an important actor in these projects, the scope of this work does not allow for an analysis of the actions implied here.

V. Conclusion

As the world community is facing major threats endangering the planet and live on Earth, the concept of sustainable development aiming at finding solutions to major issues has become increasingly popular and urgent over the last decades. Acknowledging the important role education and research play in fostering SD, many HEIs have thus committed not only to contribute to the promotion of the concept through their core disciplines, but also to act as role models and implement sustainability in their own institutional structures.[105] This development is evident in the ever-growing number of publications dealing with facets of the supraordinate topic of HEIs and SD. This case study therefore contributes to this emerging field of research by asking the question: Do Uppsala University and the University of Goettingen have sustainable campus operations? By investigating UU's and UGOE's commitment in driving SD within their campus operations, this research can provide impetus to reignite the debate on effective sustainability strategies and necessary changes for HEIs.

The presented results of this case study provide a mixed picture on how far UGOE's and UU's campus operations are advanced in regard to sustainability implementation. At UU, there is a tradition of dealing with SD not only within the institution, but also with related stakeholders such as the private catering companies on campus and the landlord, resulting in overall good outcomes.

Hence, the results on campus catering and energy suggest that progress is being made in these areas to promote SD. Again, it must be underlined that these areas are not

[104] Uppsala University, *Redovisning av miljöledningsarbetet 2020 Uppsala universitet* (Uppsala: Uppsala University, 2021), 16, accessed July 3, 2021, https://bit.ly/UUEnvironmentalReport.
[105] Usha Iyer-Raniga and Karishma Kashyap, "Sustainable Higher Education Institutions: Promoting a Holistic Approach," in *Handbook on Teaching and Learning for Sustainable Development* (Cheltenham, UK: Edward Elgar Publishing, 2021),75-92, https://www.elgaronline.com/view/edcoll/9781839104640/9781839104640.00012.xml.

within the university's purview and therefore cannot be directly influenced by the school's management. Nonetheless, UU seems to be using its influential power, at least as far as energy supply is concerned and pushes for sustainable alternatives. Naturally, there is still potential for improvement here as well, but this is largely dependent on superordinate changes in district and nationwide energy supply. In addition, the poor and opaque data situation should be highlighted, which sometimes makes it difficult to take stock of the actual sustainability practices of the various stakeholders. This applies in particular to the privately owned campus catering outlets. While benefits in terms of large-scale sustainability strategies could be identified, the privatization of this area of campus operations also results in a lack of accountability.

In Goettingen, a central problem is the compartmentalizing and only intermittent monitoring of measures, especially concerning campus energy. This goes hand in hand with the difficulty of convincing different actors to cooperate which can likewise be attributed to a lack of governance practice. Consequently, a recommendation deriving from the findings for UGOE would be to verbalize concrete goals in an action plan or similar document including specific follow-ups on the implementation status. While feasibility should always be paramount, publicly articulating ambitious goals seems important for UGOE to generate enough traction for future sustainability strategies to stand up even to critics. Altogether, UGOE needs to invest in effective sustainability governance to avoid further loss of resources through scattered measures and discontinued initiatives. Therefore, it should be made very clear that announcements and theoretical discussion are an important starting point. In the end, however, implementation must be proactive and timely.

All in all, the results of this work largely confirm the findings of other case studies by noting, inter alia, a lack of holistic strategies, governance practices and ongoing commitment, vague and imprecise objectives as well as inadequate internal and external communication regarding the SD approaches of the two universities studied. An additional finding is the lack of accessible data reflecting the current status quo for both universities' campus operations.

Regarding the research question, the following is to say: Generally speaking, the idea of sustainable campus operations can never be an absolute goal with predetermined universal objectives, as neither the complexity and ever-evolving nature of the sustainability concept nor the extremely heterogeneous structures of universities allow for this. However, the realistic implicated question is rather if UU and UGOE as well as other stakeholders are already sufficiently advanced in their engagement with the issue. Critically reflecting on the findings, one must say that there is still much room for improvement for both universities. Since campus energy is a major part of a

HEI's sustainability performance, UGOE is currently facing greater challenges than UU.

This study provides only a limited picture of both universities' campus operations as major parts are not considered such as water and waste management, as well as mobility. Hence, further research in these areas is encouraged. In addition, the methodology used here also has limitations that should be supplemented by more specific research in individual areas and by other instruments. For instance, in-depth interviews with staff and experts could be used to identify specific obstacles in the two institutions to derive detailed recommendations for action. Furthermore, the present research would also be useful from another disciplinary perspective, such as that of organizational psychology or economic sciences. This could also help to analyze existing problems from a different angle and to develop solutions and incentives for more groups and individuals to get involved with SD. On that note, assessment and reflection should also be on the HEIs' internal agendas to foster the development of effective sustainability measures. Finally, conducting the evaluation again at intervals of about 1-2 years would be interesting to map the implementation progress of the announced measures, the results of restructuring and new initiatives. In addition, this would provide a period of study that is not significantly influenced by the COVID-19 pandemic.

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