Tampere University
Tampere University of Applied Sciences

Tampere Universities Carbon Footprint 2019: Carbon Calculation Report

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March 2021

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Introduction

With its reports, the Intergovernmental Panel on Climate Change (IPCC) has shown that human-induced climate warming and the resulting climate change are global threats, which must be fought as quickly as possible. The Paris Agreement on climate change mitigation from 2015, achieved by UN member states, is the first climate agreement signed by nearly all countries of the world. One of the most important goals of the agreement are rapid actions against climate change. Anthropogenic carbon emissions must be reduced, and large organisations have a central role in making these cuts. As organisations focusing on teaching, research and societal impact, higher education institutions have massive potential for making the necessary changes happen.

A central part of reducing carbon emissions is calculating carbon footprint, which then acts as a tool towards the goal of carbon neutrality. Carbon neutrality is also a goal and commitment for Tampere Universities, which aim to be carbon neutral by the year 2030. In addition to the Paris Agreement, guiding principles in the carbon neutrality mission are the UN Sustainable Development Goals (Agenda 2030 programme), the 2035 carbon neutrality goal set by the Finnish Government, carbon neutrality by 2030 goal that the ministry of Education has set for Finnish Universities, 'Theses on sustainable development and responsibility' by Universities Finland (UNIFI) and the sustainable development principles of The Rectors' Conference of Finnish Universities of Applied Sciences (Arene). Moreover, the Tampere University Strategy states "We work together to build a sustainable world" and the Tampere University of Applied Sciences strategy that strongly addresses climate change identifies an operational value "We work in a globally responsible manner".

The first clear step towards carbon neutrality in Tampere Universities was to calculate the carbon footprint of the community. In the first round, the data and calculations focused on 2019, which was the first operating year of the new Tampere Universities. Based on the results, the largest source of carbon emissions in 2019 at Tampere Universities was work-related travel. However, the results show also differences between the two universities. These are presented and discussed in more detail below in the section designated to calculation results.

This report focuses on describing the overall process of calculating Tampere Universities' carbon footprint for 2019 as well as the calculations of different emission sources. The report also discusses insecurities related to the calculations and suggests improvements that could and should be done in the next round of calculations. Calculating the carbon footprint is an operation which will be repeated annually from now on. In connection to the footprint, Tampere

Universities start identifying possibilities for decreasing carbon emissions and discussing how the remaining emissions could be compensated in a sustainable manner.

The carbon footprint calculation in question is the first one completed in Tampere Universities, and collecting data has not been possible in every detail or the collected data contains some uncertainties (e.g. the precise ingredients of catered food, data collection after the emissions occurred). Moreover, carbon footprint calculation methods in general and particularly in the higher education sector are still evolving. As a result of these uncertainties, it is clear that the calculation in question is a rough estimate of the carbon footprint, and thus it is best to focus on the general picture it offers about overall emissions and emissions in different categories. Despite the uncertainties, determining the carbon footprint brings sustainable development goals to operational level in the universities and enables knowledge-based development of operations in the future. Knowledge is the key to change.

Terminology

There are several terms, abbreviations and measurement units related to this report and to carbon calculations in general. These are listed and explained below.

Units of Measurement

brm^2	Gross area, the overall area of all floors in a building, which also includes outer walls and technical facilities, maintenance corridors, etc.
m^2	Net room area, surrounded by room walls.
tCO2eq	Carbon dioxide equivalent ton, a unit used to describe the climatic warming effect of greenhouse gases.

Carbon Footprint Calculations

carbon calculator	E.g. Hiilifiksu calculator (developed by University of Helsinki Forestry Department and The Finnish Innovation Fund Sitra): a carbon calculation tool that allows to convert data into information about climate-warming emissions.
carbon footprint	The overall calculated carbon emissions of a certain limited entity.
carbon handprint	Describes the positive climate effect of a service or product.

carbon sink	Action or process, which removes carbon dioxide from the atmosphere. For example, woodlands, oceans or a wetland ecosystem can be carbon sinks.
carbon storage	A product or a process that stores carbon, e.g. trees, wood products, soils. Carbon storage in a forest consists of carbon in the soil and vegetation. This storage will grow, if the amount of carbon fixed in photosynthesis overlaps the amount of carbon released in the forest. Then the forest becomes a carbon sink.
greenhouse gas	Gas that captures solar radiation into the Earth's atmosphere (e.g. water vapor, carbon dioxide and methane). These occur naturally in the atmosphere, but their concentrations have increased due to human actions and this causes excessive warming.
emission factor	The amount of emissions created in relation to the produced good or service. A tool used in carbon calculations.

Abbreviations

Arene	Rectors' Conference of Finnish Universities of Applied Sciences, co-operation forum for Universities of Applied Sciences
NTNU	Norwegian University of Science and Technology, has developed carbon footprint calculation protocols and emission factors that can be applied in the carbon calculations of Finnish higher education institutions
SYK	University Properties of Finland, manager and developer of university properties, co-owned by Finnish universities and the State of Finland
TAU	Tampere University
TAMK	Tampere University of Applied Sciences
Tamko	Students' Union of Tampere University of Applied Sciences
TREY	Student Union of Tampere University
UNIFI	Universities Finland, a co-operational organisation for Finnish universities

Calculation Process

Carbon Neutral Universities was a group set to direct the carbon neutrality work in the Tampere Universities community. The group started its work in September 2020 and the group secretary as well as person in charge of completing the 2019 Tampere Universities carbon footprint calculation was Sustainable Development Coordinator Max Liikka. The calculation process was completed during autumn 2020. The group members were specialists from different areas of university functions, and they gathered data from their own sectors while the group together determined the necessary details and limits. Coordinator Max Liikka collected the overall data and completed the calculations while consulting the group specialists and sustainable development specialists from other Finnish universities.

Members of the Carbon Neutral Universities Group

Chairpersons

Marja Sutela, TAU, Vice President for Education

Kirsi Viskari, TAMK, Vice Rector

Specialists

Niina Broman, TAU, Communications

Max Liikka, TAU, Coordinator, Carbon Group Secretary

Eeva-Liisa Viskari, TAMK, Impact Area Leader

Eveliina Asikainen, TAMK, Lecturer

Procurements

Raimo Ojala, TAMK, Head of Purchasing Services (Facilities Services)

Jenni Lehtola, TAU, Procurement Manager (IT Services)

Juulia Koivisto TAU, Procurement Specialist

Properties

Saana Raatikainen, Petri Ojala, Pertti Iso-Mustajärvi, Facilities Services

Sannamari Hellman, Taina Vimpari, Campus Development

Ari-Pekka Lassila, SYK

Laboratories

Petteri Malkavaara, Anja Rovio, Kari Mattila, Pekka Savolainen (TAU Laboratories)

Jarno Kilponen, TAMK Laboratory Services

Digital Services

Juha Herrala, TAU, Research Infrastructures

Juha Nisso, TAU, Head of Unit, Capacity Services

Mikko Uusitalo TAMK, Senior Adviser

Travel

Pirjo Ahonen, TAMK, Travel Team

Miia Sippola-Knuuttila, Taina Torvinen, Elena Viikki TAU, Travel Team

Events

Kristiina Tattari, Marjut Kemiläinen and Kristiina Tuokko (TAU)

Ursula Helsky (TAMK)

Student Representation

Milka Hanhela, later Ilona Taubert, TREY

Kia Kauppinen, Tamko

Guiding Principles

The carbon footprint calculation work at Tampere Universities was strongly guided by the example set by the University of Turku. University of Turku has been the first Finnish university to calculate its carbon footprint, so their model and their chosen emission sectors formed a natural starting point for the work. The example set by Turku was accompanied by the calculation guidelines that Arene had created for Finnish universities of applied sciences. Moreover, the sustainable development group of Universities Finland (UNIFI) has agreed that for comparisons to be made, all Finnish universities should calculate their carbon footprint according to the model set by University of Turku. During the calculation process, discussions

were also held with specialists from University of Jyväskylä, University of Helsinki, Aalto University and University of Eastern Finland.

The guiding principle behind the Tampere Universities carbon footprint calculations was to follow the example set by Turku so that the results would be as comparable as possible. This being said, things could be done differently, if it was possible to do calculations in a more precise manner. For example, data collected from certain subcategories in Tampere was more precise than in Turku, which led to a more accurate result in the carbon footprint. Similarities in calculations resulted from using the same emission factors when possible and using the same emission subcategories. In order to achieve nationally uniform, comparable results, it is important to complete the carbon footprint calculations in a similar manner in all universities.

For the calculations, six subgroups were formed from the Carbon Neutral Universities Group. Each of these groups gathered data from their own sector. This data was then converted into emissions with the help of carbon calculators and emission factors. The calculations are the most accurate when the collected data describes consumption with precise units, for example units of measurements (kWh, m^3) or numbers of goods. In Tampere Universities calculations, this type of data has been used always if it has been available. In addition to this, expense-based calculations have been done in cases where no other options have been possible. If possible, euro-based calculations should use sums without taxes (VAT) because tax added to a price changes the price of the product and then the final result by adding to the emissions.

Unlike the carbon footprint of University of Turku and University of Eastern Finland, the carbon footprint of Tampere Universities has not taken into account campus food that the universities have not paid for. The decision for not including this type of food in the footprint is based on the fact that student and staff food choices are individual choices, and they cannot be defined by the universities. Nevertheless, campus restaurants are working on their carbon footprint in 2021 so that with their actions they could reduce carbon emissions and improve the choices available for individual customers in the restaurants.

Tampere Universities Carbon Footprint 2019

Based on the calculations, in 2019 the carbon footprint of Tampere Universities was approximately 29 000 tCO2eq. In comparison, the carbon footprint of University of Turku in 2019 was 21 680 tCO2eq and the same in University of Eastern Finland was 16 000 tCO2eq. Thus, the carbon footprint of Tampere Universities falls into the same order of magnitude with them. The largest contributor to emissions in Tampere Universities was travel, which totalled to

about 41%. Following travel, significant emissions were also produced in the categories of properties (27%) and research infrastructures (23%).

In the university-specific results travel is still the largest source of emissions in Tampere University (42%), but in the Tampere University of Applied Sciences the greatest emissions result from properties (43%) and travel (34%) only after that. In both universities the third largest source of emissions was research infrastructure: 25% in TAU and 9% in TAMK. It is noteworthy that three remaining subcategories combined form less than 10% of the total footprint.

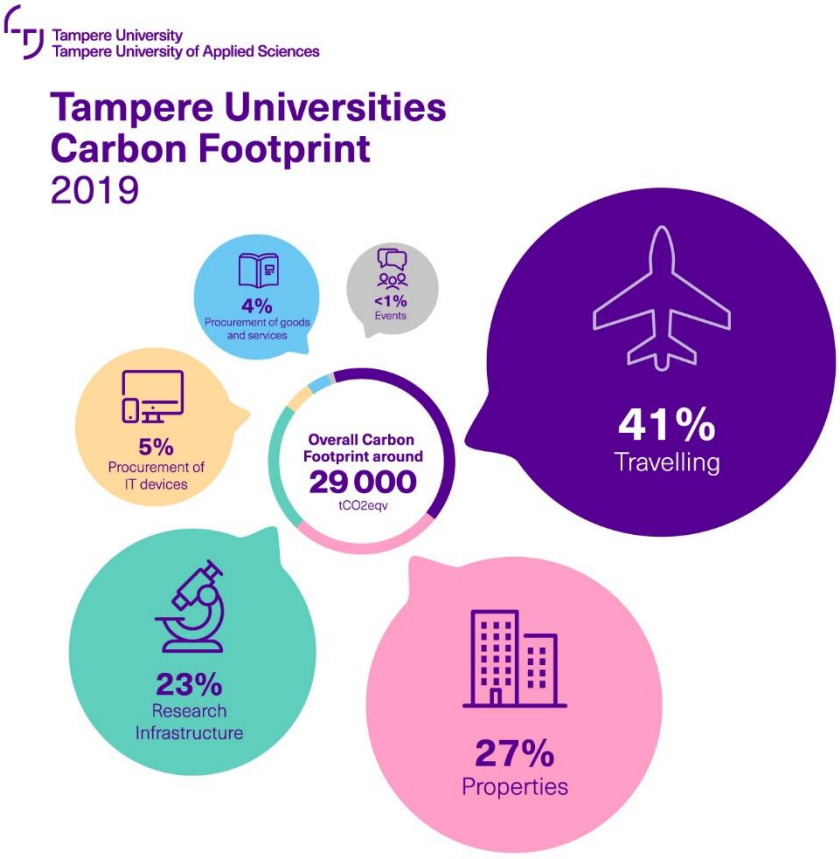

Image 1: The carbon footprint of Tampere Universities in 2019. The image shows total emissions and the share of different subcategories of the total. Over 90% of the emissions are formed in the three largest categories, which include travel, research infrastructure and properties. The three other subcategories, procurement of IT-devices, procurement of goods and services, and events, produce less than 10% of the total emissions.

The share of Tampere University of the total carbon footprint is approximately 25 000 tCO2eq, and the share of Tampere University of Applied Sciences is about 4 000 tCO2eq. Thus, the grand majority of emissions comes from Tampere University, but this difference is explained by the number of properties, staff and students between the two universities: Tampere University of Applied Sciences has considerably fewer properties, staff and students (2019 TAU staff 3594, students 15 855, TAMK staff 683, students 8238).

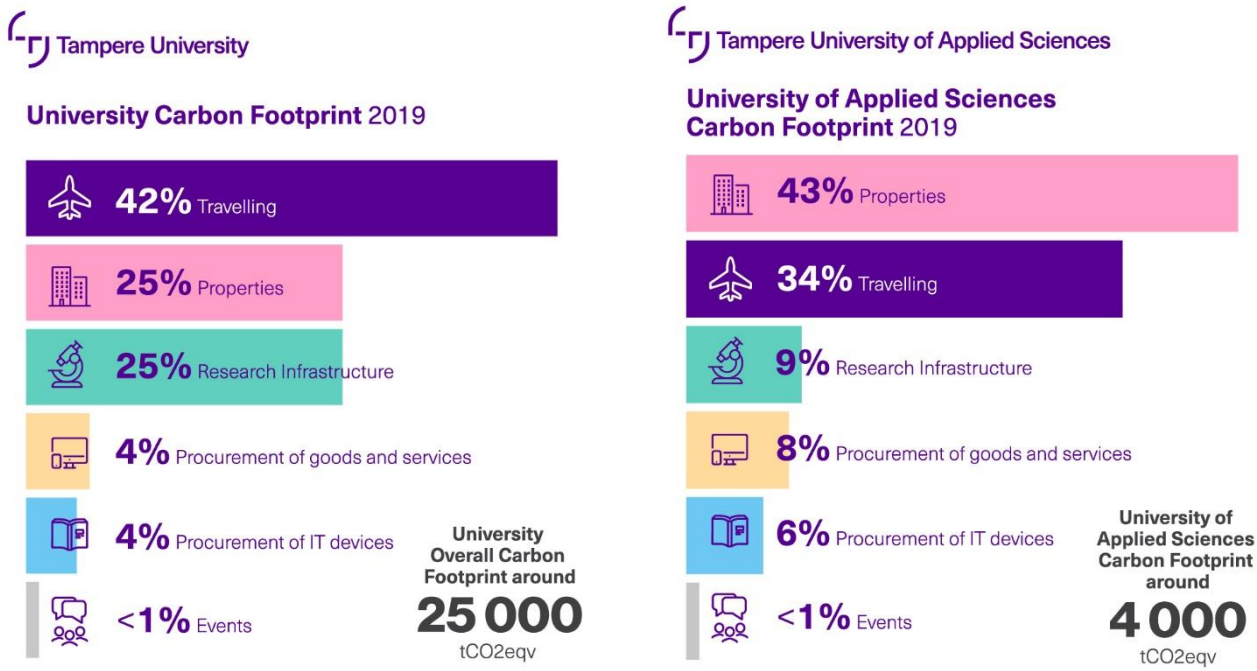

Image 2: University-specific carbon footprint results in 2019. The three largest sources of emissions in both universities are the same as in the combined results.

After the footprint calculations were completed, the results were presented in the executive boards of both universities and they were also communicated to members of the community in intranet. As part of the openness of the process the results were also presented outside the Universities in public websites and in national medias.

Carbon Footprint Subcategory Calculations

As the overall results presented above show, in order to complete the calculations it was necessary to look at the emissions with the help of smaller entities. Following the example set by University of Turku, Tampere Universities divided the 2019 carbon footprint calculation task

into six subcategories: travel, properties, research infrastructure, procurement of IT devices, procurement of goods and services, and events. All these subcategories are a vital part in the functioning of the Universities and form the basis for their day-to-day processes. Data collection, possible limitations and challenges as well as specific calculation methods of each subcategory are presented below.

In order to make the emission sources easier to understand, there are tables that list items in each subcategory, their impact, and the grand total. The table data is in percent form because the raw data of carbon footprint calculations varies in units and does not necessarily represent the absolute truth. Due to raw data variability and its error margins it is not useful to represent the information as precise tonnes of CO2eq because this would then repeat the possible error. Thus, instead of individual figures, for the total footprint as well as for subcategories the most important aspect is the order of magnitude in emissions and their share of total.

Travel

Travel was clearly the largest cause of carbon emissions at Tampere Universities in 2019, and it formed 41% of the Tampere Universities carbon footprint. However, the travel footprint does not contain information about travels between home and workplace because these travels were determined to be part of the personal carbon footprint of each community member. Therefore, travel covers pre-planned work-related travel, for which expenses have been reimbursed according to submitted travel invoices. The data also covers the travels of opponents in doctoral defences and event speaker travels that the Universities have reimbursed.

For calculation purposes, information about flights, driven kilometres, public transportation, ship travel and hotel nights have been collected from travel invoices. Flights have been divided into three categories: short flights (less than 463 km), long flights/Europe (more than 463 km) and long-distance flights. Flight kilometre data is based on information retrieved from travel agency CWT Kaleva Travel. In addition to this, kilometres from independently bought flights have been taken into account by converting the expense in euros into kilometres according to the proportion of flights bought from the travel agency. The emissions have been calculated by using the kilometre data with the help of Hiilifiksu carbon emissions calculator aimed at organisations. This calculator is well developed (comprehensive, contains research-based references, includes emission factors) and works well with university functions.

Driving covers both distances driven with own cars and taxi journeys, which have been reimbursed according to travel invoices. Moreover, emissions from cars also include data from travels driven with cars owned by Tampere University of Applied Sciences. However, the car

data has not specified the fuel used except for a small number of kilometres from TAMK cars, where the fuel could be identified as diesel. The number of Tampere University car kilometres has been calculated with the help of emission factors by using expense data from the travel invoices. However, kilometre data from TAMK invoices could be used without conversions. Based on the kilometre data, the carbon footprint of driving has been calculated with the Hiilifiksu calculator.

Public transportation data collection covered bus travels (local and long-distance journeys) and trains. Information from train travels has been determined by doubling the fare data from travel agency's files by two, since the travel team estimated that approximately one half of the tickets are bought via the travel agency and the other half directly from the VR train company's app. Expense data from the travel invoices has been converted into kilometres with the help of an emission factor, and the emissions have been calculated with Hiilifiksu calculator. The ship travels done by Tampere University employees were so few that they were included in the public transportation emissions. However, the ferry and cruise ship travels of employees from Tampere University of Applied Sciences was calculated separately with the help of Hiilifiksu calculator.

The carbon footprint of hotel nights has been calculated from the total number of nights in accommodation and the mean price per night, based on the estimate by the Finnish Environment Institute SYKE on the carbon footprint of accommodation services. The latest research by SYKE from 2019 defines the emission factor of a hotel night as 0.4. According to travel invoices, the mean expense of a hotel night at Tampere Universities in 2019 was 136€ per night.

Travel, carbon footprint and the emission sources			
	TAU	TAMK	TAU+TAMK
Flights	82%	10%	91%
Driving	<1%	<1%	<1%
Public transport	<1%	<1%	<1%
Ships	*included in public transportation/TAU	<1%	<1%
Hotels	7%	<1%	8%
Total	89%	11%	ca 11 900 tCO2eq = 100%

Table 1: The emission sources in travel subcategory and their share of the total travel footprint. The impact of flying stands out clearly in the results.

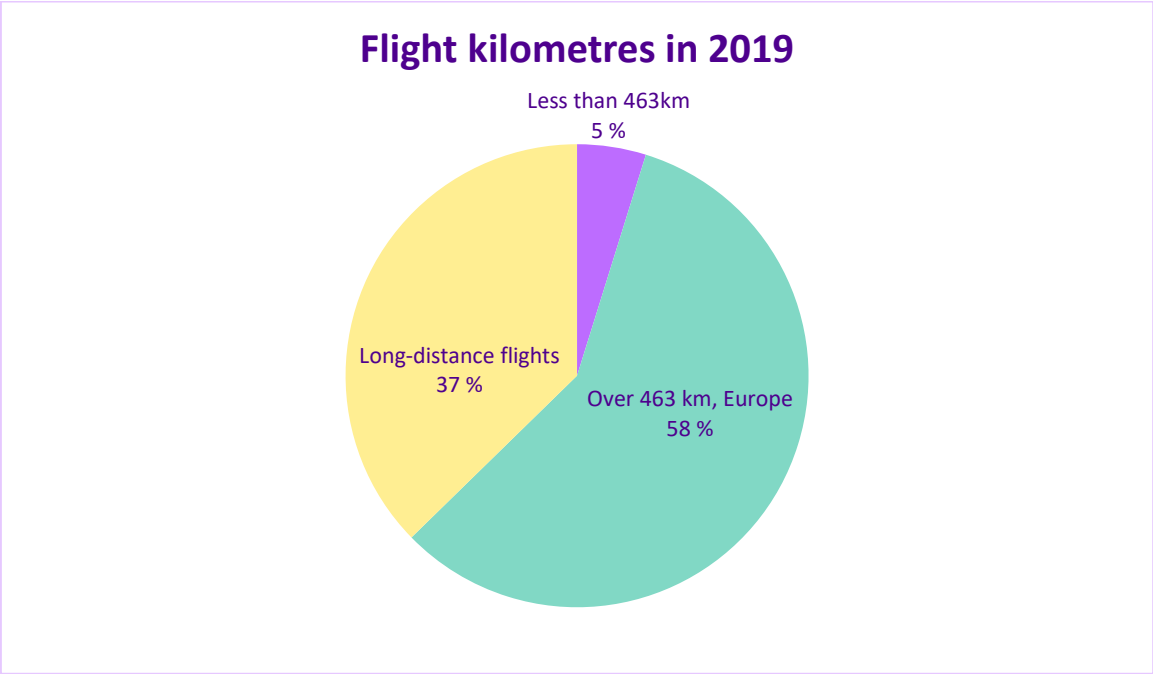

Image 3: The flight kilometres of Tampere Universities in 2019 divided according to flight type. More than half of the flight kilometres resulted from longer flights within Europe.

The largest share of the travel carbon footprint accumulated from flights. The flight type that produced most of the flight emissions was longer flights within Europe. Nevertheless, the share of long-distance flights was also prominent. In total, the Tampere Universities carbon footprint was calculated to contain emissions from 33 million flight kilometres in 2019.

Properties

Properties were the second largest source of emissions in the Tampere Universities carbon footprint (about 8000 tCO2eq) and the second largest source of emissions in the carbon footprint of Tampere University of Applied Sciences. However, there is a significant difference in the amount of properties between the two universities: Tampere University uses 271 653 brm^2 and TAMK 79 079 m^2. A large number of Tampere University properties, 227 338 brm^2, are rented from University Properties of Finland (SYK). The rest are either capital properties (Arvo I, Linna, Virta) or rented (Pori campus and Seinäjoki campus). The surface area of TAMK in the calculations consists of two owned buildings, Kuntokatu 3 and Kuntokatu 4, as well as rented area in five different destinations: Mediapolis, Proakatemia, Hämeenkatu 28, Satamakatu 17 and Kauppi Sports Center. The calculations are based on gross area data as far as this data has been available. However, the data from the properties rented by TAMK has been in the form of net room area.

Properties used by Tampere Universities in 2019	
TAU	**TAMK**
Arvo I (capital)	Kuntokatu 3 (own)
Linna (capital)	Kuntokatu 4 (own)
Virta (capital)	Mediapolis (rented)
Hervanta campus (SYK)	Proakatemia (rented)
City Centre campus (SYK)	Hämeenpuisto 28 (rented)
Kauppi campus (SYK)	Satamakatu 17 (rented)
Normaalikoulu (SYK)	Kauppi Sport Center (rented)
Pori campus (rented)	
Seinäjoki (rented)	

Table 2: Properties used by Tampere Universities and their governance in 2019.

The emissions of properties in calculations consisted of heat consumption, electricity consumption, water consumption, coolants (adding and disposal), waste, building and maintenance. Data and emission factors provided by SYK concerning the properties they manage formed a basis for the calculations. The consumption of electricity covers both property electricity as well as other electricity consumption in the properties. The carbon footprint of heating has been calculated with the emission factor 0.177 tCO2/MWh determined by the Tampereen Sähkölaitos electricity company for district heating in 2019, and the factor for electricity is 0 because all the Tampere Universities' electricity contracts are green electricity. The emission factor of water in the calculations was 0.69 kg/m^3 determined by SYK for its properties. The factor comes from the Bionova One Click LCA tool, which is used for evaluating the lifecycle of buildings. Following the example set by University of Turku, if no accurate consumption data was available, the emissions of properties outside SYK governance were calculated with square meter average values that were based on SYK data.

According to the calculations, heating of the properties formed the largest portion of property carbon footprint. However, the situation will be improved by the fact that already a large proportion of the district heat from Tampereen Sähkölaitos electricity company is already produced with renewable energy resources. Since 2020, SYK has compensated the emissions of properties they manage, which in the future will also reduce the carbon footprint of Tampere Universities. The largest consumption in Tampere University properties occurred on Hervanta campus, but this can be explained by the large campus area as well as the research facilities on the campus, which increase, for example, the consumption of water, heat and electricity. In Tampere University of Applied Sciences, the largest consumption levels were in Kuntokatu 3. In

the future, the campus development strategy will strongly guide the development of Tampere Universities properties and their emissions along with the development actions by SYK.

Research Infrastructure

Research infrastructure can be defined as tools, equipment, materials and services, which enable research at universities. The calculated 2019 carbon footprint of Tampere Universities research infrastructure was based on utility goods, depreciation of equipment, small-scale procurements, equipment beyond the depreciation limit and hazardous waste in the laboratories. For all of these, the data was collected in euros and converted into emissions with the help of factors.

The factor 0.5 kg CO2eq/€ used for utility goods, depreciation and small-scale procurements was a factor defined by the Norwegian University of Science and Technology (NTNU). This general factor has been used in the calculations when more precise data concerning the emission source has not been available and when no other emission factors exist for the source. The factor 1.41kg CO2eq/€ applied for hazardous waste was used by the University of Eastern Finland in their calculations, and it originates from the climate calculator of World Wide Fund for Nature (WWF). A significant share of the research infrastructure emissions originates from utility goods and procurement of research equipment, which are calculated as depreciations. Depreciations are used to even out the large sudden costs of acquiring research infrastructure. The difference between the two universities results from the research intensity at Tampere University and the fact that there are large research facilities particularly on Hervanta and Kauppi campuses.

Research infrastructure, carbon footprint and the emission sources			
	TAU	TAMK	TAU+TAMK
Utility goods	33%	1%	34%
Equipment depreciation	53%	3%	56%
Small-scale procurement and depreciation	8%	1%	10%
Hazardous waste	<1%	<1%	<1%
Total	95%	5%	ca 6800 tCO2eq=100%

Table 3: The emission sources in research infrastructure subcategory and their share of the total subcategory footprint of Tampere Universities in 2019. The depreciations of Tampere University equipment form a central part of the research infrastructure carbon footprint.

Procurement of IT devices

In the initial working phase, the Carbon Neutral Universities Group identified three major areas related to digitality: procurement of IT devices, electricity consumption of IT devices and purchased IT services. The only area of these included in the 2019 calculations was the procurement of IT devices because IT electricity consumption (e.g. in computer classrooms) is included in the electricity consumption of properties from which it is difficult to separate. Furthermore, data about purchased IT services was not comprehensively available. IT procurements were calculated separately from procurement of other goods and services because their procurement and governance is under the responsibility of university IT-services, which is not the case for other procurements. In the model set by the University of Turku, IT procurement is included in other procurements because there the acquisitions are controlled from the same portal.

The procurement of IT devices consisted of two subunits: IT devices and IT equipment. IT devices includes data about mobile phones, tablets, laptops, desktop computers, monitors and printers. The value of these items in euros and their numbers was collected (exact numerical data was not available for all items, which is why data in euros was also used). The calculation of emissions based on the number of items used factors from the WWF climate calculator and the procurements in euros were estimated to follow the same division into different items. IT equipment are, for example, wires and components. For calculating their footprint, the NTNU general factor of 0.5 was used. This same factor has been used by the University of Turku and the University of Eastern Finland, so the results are comparable.

Procurement of IT devices, carbon footprint and emission sources			
	TAU	TAMK	TAU+TAMK
IT devices	65%	18%	83%
IT equipment	12%	4%	17%
Total	77%	23%	ca 1400 tCO2eq=100%

Table 4: The emission sources in the procurement of IT devices subcategory and their share of the total subcategory footprint of Tampere Universities in 2019.

The calculation results show that in Tampere Universities over 80% of IT device procurement carbon footprint results from IT devices. In both subunits the emissions of Tampere University are much higher than in TAMK, but the reason lies once again in the greater number of staff and students.

Procurement of Goods and Services

Goods and services subcategory in the calculations included logistics, cleaning, furniture and supplies, and library books. The 2019 calculations did not include the carbon footprint of maintenance and care of machines, equipment and properties, since there were no factors available for calculating their footprint. Logistics covered transport, moving, courier and cargo transport services outside the Campusta service agreement that provides the majority of property and support services at the Universities, mail services, fuel for cars owned by the Universities, leasing and insurance payments for the cars and communal bus cards. Cleaning consists of cleaning contracts, hygiene products, textiles, additional cleaning, and waste disposal costs. Furniture and supplies covered furniture, small procurements, office supplies, coffee products, kitchen supplies and other products and small items.

The data was collected in euros and emission factors were used to calculate the footprint. The factor used for calculating transport, moving, courier and cargo transport was the same that was used in the calculations of University of Eastern Finland and University of Jyväskylä. For mail and leasing service calculations the NTNU general factor 0.5 was used. The footprint of using university-owned cars and bus cards was calculated with the help of Hiilifiksu calculator. Finally, the footprint of cleaning, furniture and supplies was calculated by using the NTNU general factor except for furniture, where factors acquired from the Exiobase database could be applied.

The Tampere Universities carbon footprint for procurement of goods and services in 2019 was approximately 1200 tCO2eq. Notably, the share of library books, which was calculated according to the model of University of Eastern Finland, was only about 15 tCO2eq of the subcategory footprint. The share of Tampere University in the subcategory footprint was approximately 80% and about 20% remained for TAMK. Based on the calculations it was evident that most of the emissions in the subcategory in Tampere University resulted from office supplies, furniture and cleaning. In TAMK the most emissions in the subcategory resulted from furniture, cleaning, office supplies and car rentals.

Events

The carbon footprint of events was calculated by collecting data of event-related materials, catering and other possible procurements. The 2019 data from the events team covers events that recur annually in Tampere Universities. Outside this data remain events organised by units and faculties themselves, e.g. doctoral defences, for which food and materials are also acquired. The effect of these types of events to the overall event carbon footprint was evaluated

in the 2019 calculations by multiplying the results with 1.3, which was based on an estimate of the events team. In the future, more detailed data concerning these other events should be gathered as part of total data about events, even though their impact on the footprint will most likely remain much smaller than the effect of the large-scale productions organised by the events team.

The materials acquired for events included papers, fabric bags, T-shirts and various printed materials. Specific methods based on number of items were used for calculating the footprint of bags and T-shirts. The emission factor for fabric bags came from a Danish study and the T-shirt calculations benefitted from a research article focusing on the carbon footprint of textile and clothing products. For the other materials, the calculations have been completed by converting the cost data into emissions with the help of NTNU factors.

Event catering covered food (divided into meat, fish and vegetarian/vegan options) and drinks served to event participants (alcohol, soft drinks). First the number of different types of food portions and drink servings has been listed, and then carbon footprint has been calculated with the Hiilifiksu calculator factors. Other materials related to events contain vehicle fuel and disposable tableware, and their footprint has also been calculated with Hiilifiksu. Their impact on the total event footprint was fairly minor.

Events, carbon footprint and emission sources			
	TAU	TAMK	TAU+TAMK
Materials	37%	7%	45%
Catering	53%	2%	55%
Other	<1%	<1%	<1%
Total	90%	10%	ca 63 tCO2eq=100%

Table 5: The emission sources in events subcategory and their share of the total subcategory footprint of Tampere Universities in 2019.

At Tampere University the majority of event emissions resulted from catering, but at TAMK the materials formed most of the footprint. However, in the total 2019 carbon footprint of Tampere Universities the share of events remains under 1 percent.

Conclusions

Calculating the Tampere Universities carbon footprint for 2019 is the first step towards reducing carbon emissions and to achieving carbon neutrality. It is strongly connected to the larger context of carbon work and advancing sustainable development goals in the community. The

next phase is to look into how and to what extent the emissions could be cut in different subcategories. A timetable and follow-up mechanisms are determined for the reductions and community members will be actively involved in the process. A roadmap to support sustainable development work is drafted in spring 2021, and actions reducing carbon footprint are included in the annual planning of the Universities. Cutting emissions should be integrated in existing processes and strategies throughout the organisations. As part of the roadmap work the carbon impact of investments will also be examined.

The Carbon Neutral Universities Group continues its work in supporting the carbon neutrality work. In spring 2021 the group discusses goals as well as indicators and criteria of success in more detail. Emission reductions and their compensations will also be discussed. Reducing the carbon footprint is a central part of sustainable change, and the changes must be justifiable, carefully considered and they must serve new, better ways of acting in the community, not simply the goal for carbon neutrality. Achieving cuts in emissions is a cultural change, and reductions should be made in a fashion that does not compromise the vital functions of Tampere Universities. Some examples of possible reductions are increasing the efficiency in use of space, decreasing travel by flying and low-emission food in event catering.

In the future, carbon compensation will also be discussed and evaluated. Compensations are a complex mechanism, strongly tied to goals and values. Knowledge of different compensation possibilities and the effectiveness of different approaches is developing while research on the topic is being conducted. Compensations should not be thought as a free pass that allows to achieve carbon neutrality fast and easily. Instead, they should be seen as the last resort after making as many reductions in emissions as possible. Furthermore, when considering compensation actions, it is also important to consider their social sustainability.

The discussions about reducing emissions and compensations carry to the future. The next phase in Tampere Universities carbon footprint calculations focuses on the year 2020. The aim is to develop calculation accuracy by improving the preciseness of data collected from different functions and by reducing the share of cost-based calculations by substituting them with calculations based on number of goods and consumed amounts, for example, in laboratories and procurement of goods and services. The emission factors will also be examined, since their availability and accuracy are constantly evolving. Moreover, future calculations of Tampere Universities must also take into consideration the aim of unified methods in determining carbon footprint at Finnish universities. Currently, the universities are calculating their carbon footprint and aiming towards sustainability with slightly different methods (for example, campus food, travel), which weakens the comparability of the results. Furthermore, it is important that

calculations are made as thoroughly and openly as possible and with justifiable methods. Optimisation in calculation procedures, which leads to ostensibly good results is not real work towards sustainability.

In addition to carbon footprint and related actions, it is also important to remember the carbon handprint of Tampere Universities: the climate-positive actions that the organisations produce with research, tuition and societal impact. The links of research and tuition to sustainable development will be examined, recognized and increased. A small carbon footprint and a large carbon handprint will form the basis of a sustainable Tampere University Community.