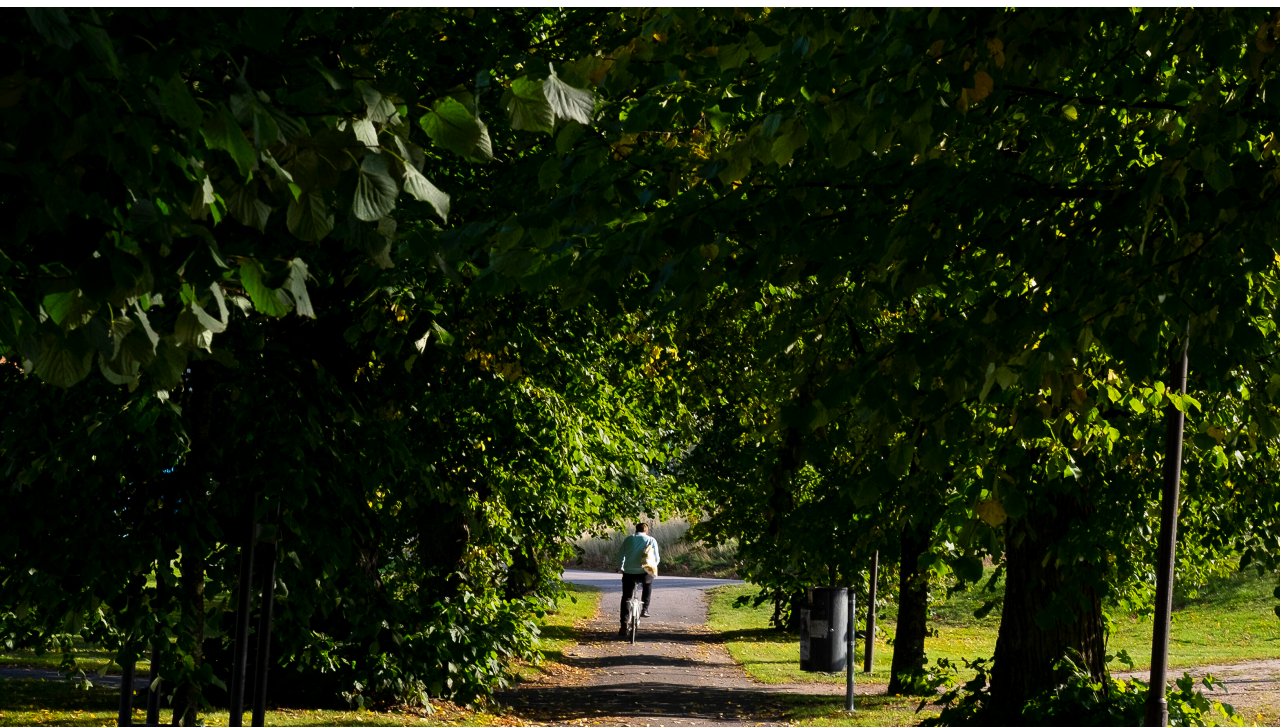

Carbon Roadmap

2023 - 2030



Aalto operative sustainability and emissions reduction strategy

A flourishing community and carbon neutral campus by 2030

- Carbon neutral by 2030 with regards to energy
- GHG emissions reduced by 50%
- Reduced impact on nature and increased space for biodiversity

Connecting our strengths to create solutions for grand challenges

- Local and global networks for nature positive solutions and data-centric impact tracking

Pioneering sustainable solutions in our operations

- Aalto as a 2030 carbon neutral living lab

Emissions calculation - Background

Aalto university calculates its carbon emissions **annually** and has a program in place to set and follow actions to increase sustainability of operations and **reduce GHG emissions**.

This calculation is for 2023 and presents the total amount of emissions and a comparison to previous years. Emission categories have stayed the same as in 2022.

Operational processes, GHG calculation methods and emissions data are constantly improved. Some emission factors have been changed to more accurate sources. Changes in emissions and emission categories are explained in the report. Emissions of procurements are calculated using the **spend-based method** with average emission factors for different goods and costs in the reporting year. Emissions calculated this way are in nature more general than emissions based on concrete units such as meals prepared, or electricity consumed.

Calculation methods

GHG Protocol

- The calculation has been conducted according to the internationally widely used **GHG Protocol method**, covering scopes 1 - 3 of the standard.
- Emission categories in the report are divided into scopes 1-3. Furthermore, scope 3 emission categories have been divided into 15 subcategories.
- Unless otherwise mentioned, all emission are **tons of carbon dioxide equivalent (tCO₂e)**. Most emission factors are from Ecoinvent 3.8 (2021) or from Exiobase (2019). Emission factors are mainly regional to Finland, but some are European averages.

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Main results

- Emissions decreased **17%** 2023 compared to 2022
- Main sources of emissions are **business travel, commuting, construction projects, energy and procurement**
- Emissions/FTE decreased from 1,32 tCO₂e to **1,04 tCO₂e**, while the number of student and staff increased roughly with 1000
- The total GHG emissions were **20400 tCO₂e** in 2023
- Calculation categories have been kept the same compared to 2022, but some emission factors have been changed to more accurate sources (mainly commuting, energy procurement)

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Main changes 2023 vs. 2022



Commuting: more detailed calculation method, taking into account means of public transportation and presence on campus (-62% students, -43% staff)



Energy procurement: -32% due to changes in energy producers' emissions coefficients and decrease in heat and electricity consumption



Procurement (other): -13% due to less procurement and more scrutiny



Renovation: -65% due to less spending on renovation projects

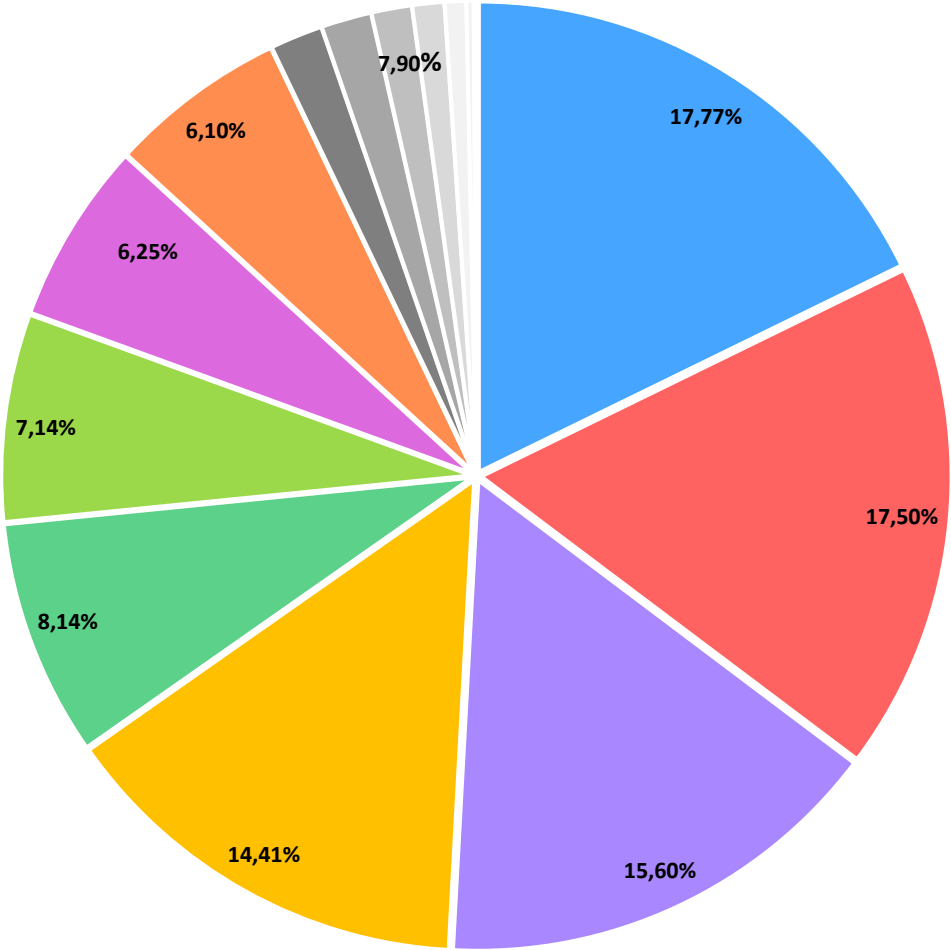


Construction: + 86% due to large construction projects (Marsio, Kide)

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Total emissions distributions 2023

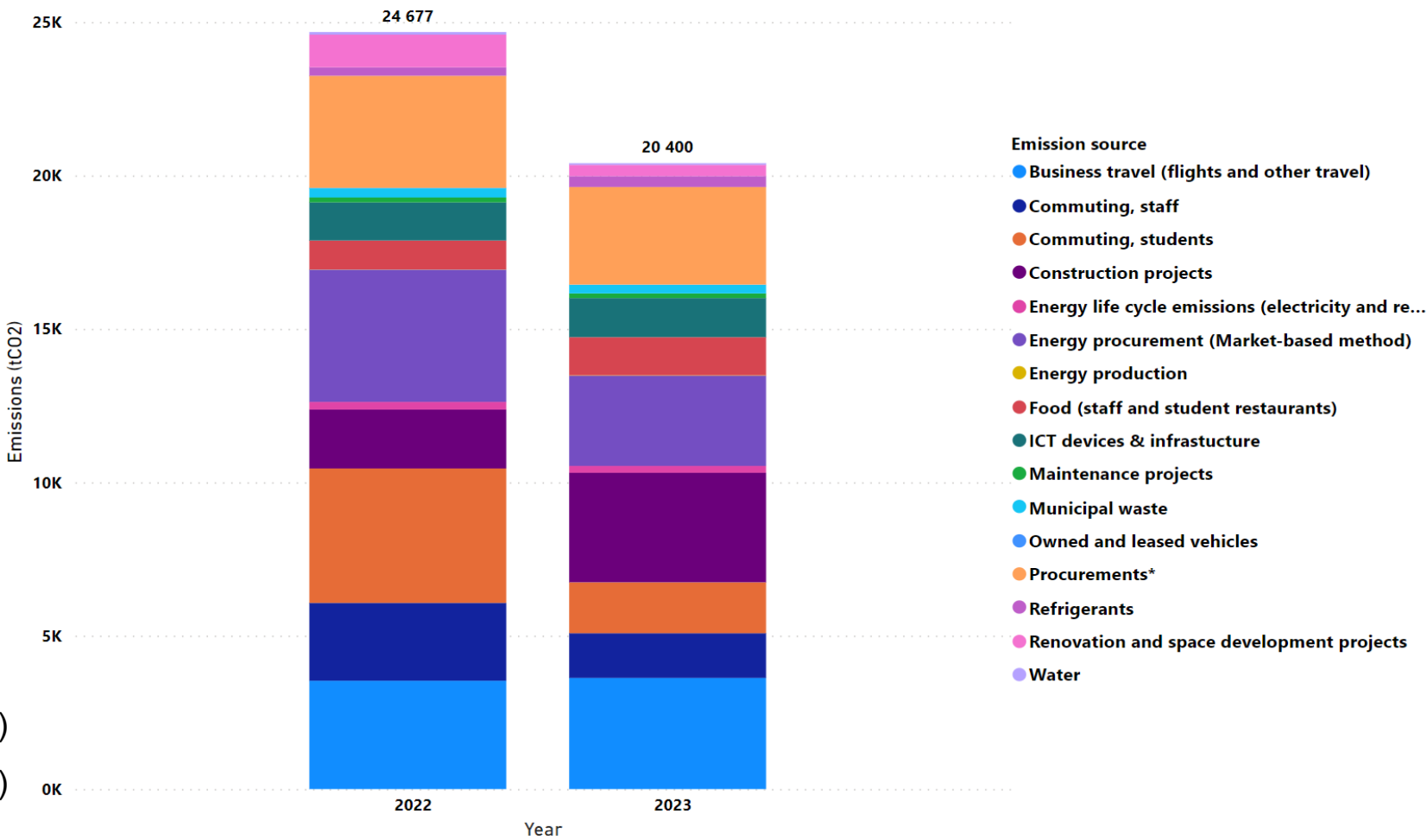
- Business travel (flights and other travel)
- Construction projects
- Procurements
- Energy procurement (Market-based method)
- Commuting, students
- Commuting, staff
- ICT devices & infrastucture
- Food (staff and student restaurants)
- Renovation and space development projects
- Refrigerants
- Municipal waste
- Energy life cycle emissions (electricity and renewable energy)
- Maintenance projects
- Water
- Energy production
- Owned and leased vehicles



Total 20400 tCO2

Comparison of annual emissions

*Procurements are based on spend-based emission factors. Procurement emission factors have been inflation-adjusted in 2022 and 2023.



Emissions per FTE

2023: 1,04 tCO₂/FTE (FTE = 19681)

2022: 1,32 tCO₂/FTE (FTE = 18672)



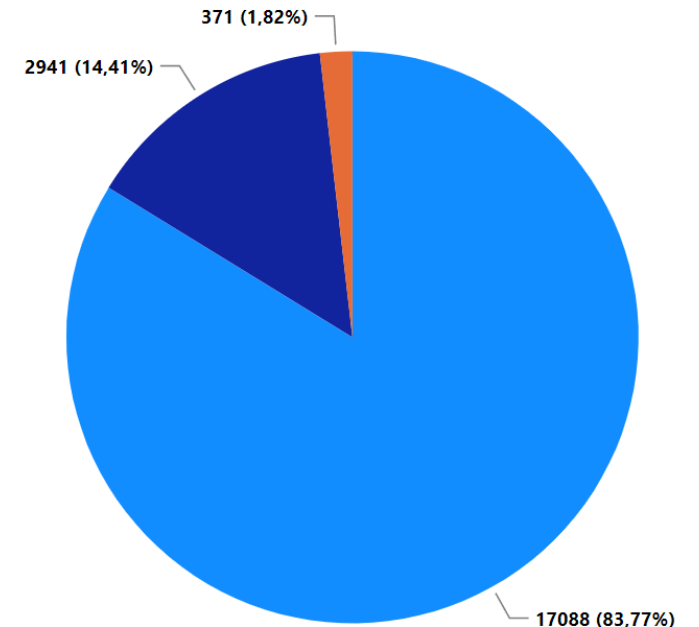
FTE= Full-time equivalent degree students and Aalto employees

Emissions by scope

84% of Aalto emissions are scope 3 emissions

- **Scope 1:** Energy production, refrigerants, fuel burning in owned and leased vehicles
- **Scope 2:** Energy procurement (Market-based method)
- **Scope 3:** Construction and renovation projects, Travel, Procurement, Commuting of staff and students, ICT, Food, Indirect energy life cycle emissions, Water consumption, Waste

Scope
● 3
● 2
● 1



Total emissions distribution 2023

Emission type	Emissions (tCO2)	Percentage	Scope
Business travel (flights and other travel)	3 624	17,77 %	3
Construction projects	3 570	17,50 %	3
Procurements	3 182	15,60 %	3
Energy procurement (Market-based method)	2 941	14,41 %	2
Commuting, students	1 660	8,14 %	3
Commuting, staff	1 456	7,14 %	3
ICT devices & infrastucture	1 274	6,25 %	3
Food (staff and student restaurants)	1 245	6,10 %	3
Renovation and space development projects	370	1,81 %	3
Refrigerants	353	1,73 %	1
Municipal waste	283	1,39 %	3
Energy life cycle emissions (electricity and renewable energy)	223	1,10 %	3
Maintenance projects	150	0,74 %	3
Water	51	0,25 %	3
Energy production	12	0,06 %	1
Owned and leased vehicles	6	0,03 %	1
Total	20400	100,00 %	



Map of ongoing actions

Energy	Construction & renovation	Travel	Commuting	Procurement
• Energy consumption - 20% • 0 energy emissions	• Reductions in carbon emissions from new construction (-25%) and renovation (-15%) compared to BAU. • Reduced impact on nature	• Reduction of flight travel emissions	• Facilitate sustainable commuting	• Reduced consumption • Sustainable procurement • Life cycle thinking
Low carbon energy procurement and production on campus Reduction of energy consumption	Efficient use of space and Improvement of campus utilization rate Low carbon construction policies Reduced impact on nature Increasing biodiversity on campus	Reduction of emissions through travel policies Co-operation with academic funders and society to reach sustainable goals Employees embrace responsibility of individual travel choices	Sustainable mobility action plan Easily accessible walking campus Sustainable mobility benefits for staff Bicycle friendly infrastructure and facilities Sustainability aspects included in relocation services	Scrutiny of necessity, scope and magnitude of procurements General and sector specific sustainable procurement competences Supplier and supply chain dialogue on sustainability practices, reporting and data Sustainable procurement guidelines and networks Sustainability criteria in procurement

ICT	Food	Waste
• Resource optimization • Lifecycle management • Green ICT practices	• Sustainable practices in operations and meal planning • Encouraging sustainable dietary choices	• 68% recycling rate (2025) • Lower incineration waste rates • Lower waste/m2 rates
Detailed ICT emissions calculation Energy efficiency Resource optimization Recycling, repurposing and extension of device lifetime Management of data lifecycle Green coding practices Sharing of infrastructure	Sustainable policy principles for student restaurants Sustainable event guidelines Sustainability in operations and meal planning Information on carbon footprint and climate friendly options Customer engagement, sustainability awareness and dialogues Minimize food waste	Streamlining and optimizing logistics Carbon neutral waste transport Plastics recycling Extending recycling to partner organisations Training and awareness campaigns

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Emissions by category

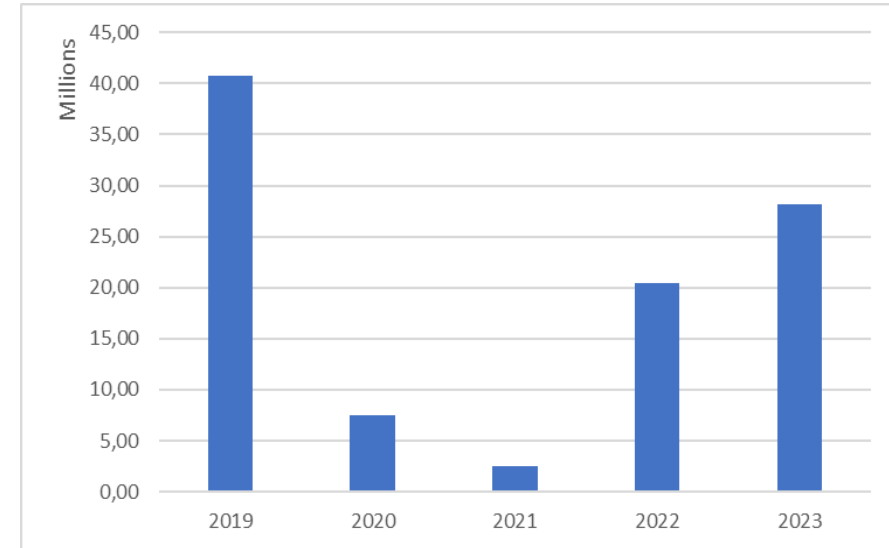
Ongoing actions, identified new actions
and estimated reduction potential by 2030

Travel

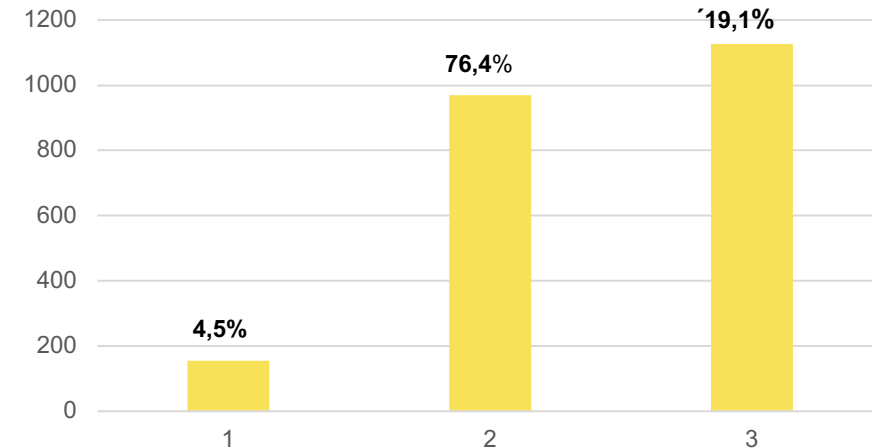
- **Business travel** is the biggest emissions category, dominated by flight travel
- Business travel has slightly increased since 2022, but is drastically **lower than pre-covid**
- Aalto travel policies guide users in evaluating the need for travel, the possibilities to replace the trip with alternative meeting methods. The climate-friendliness of different travel options are evaluated using a decision tree
- Discussions with academic funders on means to emphasize common sustainability goals are ongoing

- ❖ Further means to lower emissions include: setting carbon quotas to schools, banning domestic flights, decreasing the number of long-haul flights and participants per event, using only direct flights
- ❖ 2030 emissions reduction potential vs. 2023, **-25%**

Flight km 2019-2022

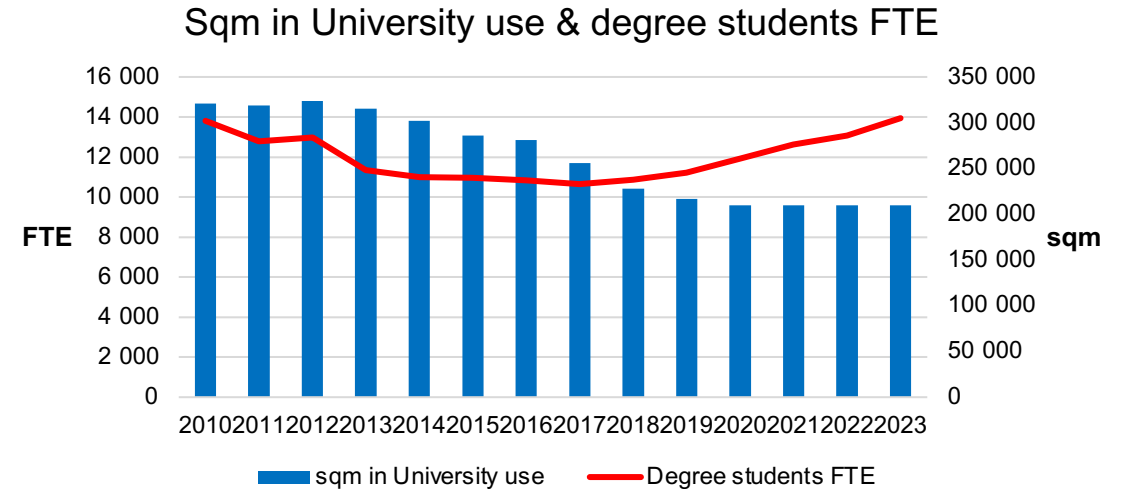


tCO2 and % of tickets



Construction and Renovation

- The amount of space used for university activities has stayed the same even though the Aalto community has grown.
- Ongoing monitoring and thoughtful improvement of the utilization rate of space increases **space efficiency** and enables **new ways of working** and studying on campus.
- Upcoming legislation requires carbon calculation from new construction. Similarly, material listings are required to be produced.
 - These advancements generate a basis for future carbon goal-setting as well as recycling of building materials
 - Aalto aims for **-15%-25%** reductions in carbon emissions of construction activities compared to a business as usual scenario
- Evaluation of the impact on nature and actions to increase biodiversity are included in campus development plans.

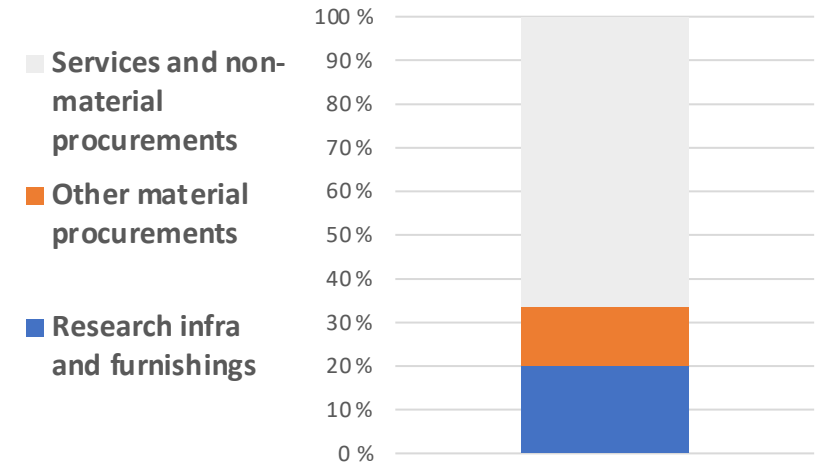


- ❖ Further emissions savings can be achieved by restricting new construction and through constant improvement of utilization rates.
- ❖ 2030 emissions reduction potential vs. 2023: **-55%**

Procurement

- Sustainability in procurements is driven by legal frameworks, Aalto code of conduct, procurement guidelines, sustainability requirements and sustainability dialogues with suppliers.
- Scrutiny of necessity, scope and magnitude of procurements support the achievement of sustainability goals
- Effort is put on the development of Aalto procurement and supplier processes, guidelines and sector specific competences. Aalto is also developing sustainability practices in co-operation with the Finn-ARMA and other networks.
- Emissions of different goods and services are mainly calculated using spend-based method based on accounting data. Emissions are based on average emissions factors, which create a high degree of uncertainty especially in the non-material and service category.
- Current emissions calculation includes research infrastructure and furnishings and is comparable with previous years. Reference calculations have also been made for other material and non-material procurements. Emissions factors for non-material procurements include a very high degree of uncertainty and need to be developed before taken into use.

Procurement emissions by type



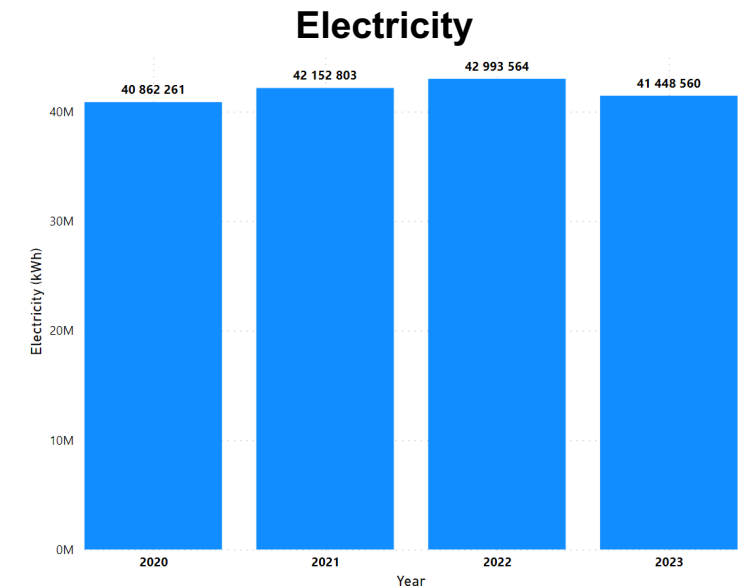
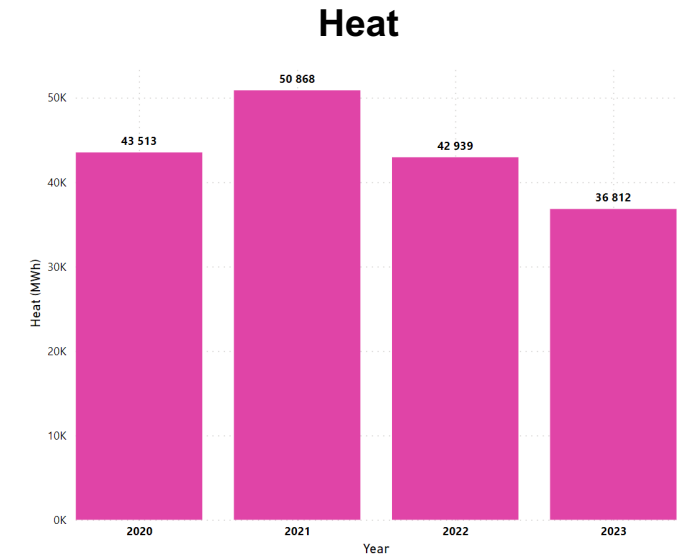
- ❖ Emissions can be further reduced through continued scrutiny of procurements, life cycle thinking and stricter sustainability criteria including certificates and ecolabels.
- ❖ 2030 emissions reduction potential vs. 2023: - **20%**

Energy Consumption

- Annual carbon dioxide emissions from energy consumption have halved since 2012. 14% decline in heat consumption and 3,6 % decline in electricity consumption was achieved 2023 vs. 2022.
- **Energy savings** are done in three broad categories: upgrades on building technology, optimizing the technology control logic and energy-conserving habits of the building users.
- The use of ground source heat pumps and solar power is incrementally expanded. In premises owned by Aalto, roughly 1% of the total electricity need is generated by 4 solar power plants. Geoenery used amounts to 5% of the total heating need and is produced in two sites. The Aalto Works low-temperature heating network in collaboration with Fortum collects excess heat from research processes and combines this with air-to-water heat pumps, covering roughly 6% of the total campus heating needs and releasing 0 GHG emissions.
- Actions towards carbon neutrality are described in [the Aalto University planning guidelines](#)

- ❖ Switching to green electricity enables significant emissions savings in the future
- ❖ 2030 emissions reduction potential vs. 2023: **-100%**

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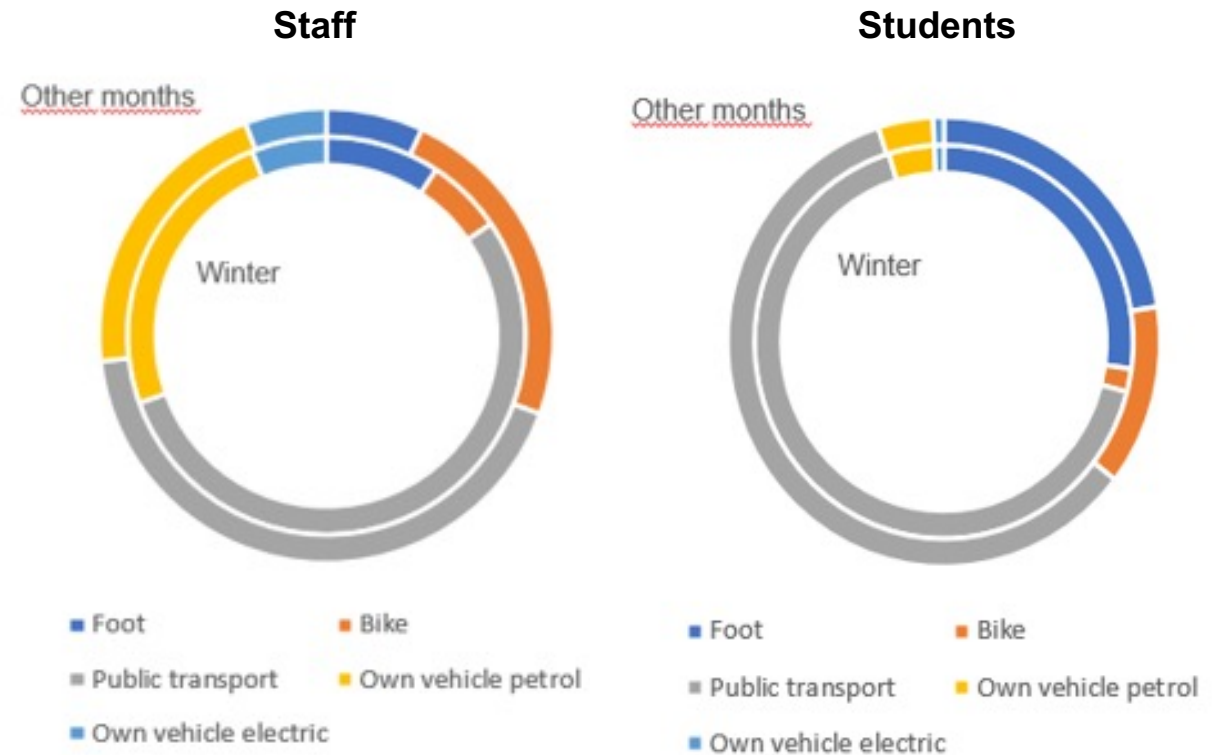
Commuting

Aalto aims to be a pioneer in sustainable mobility. The campus is **easily reached by sustainable means of transport** and has easy access to cycling and walking paths. Recreation and wildlife is also taken into consideration in the Aalto sustainable mobility action plan

- The majority of Aalto community commutes using **public transportation**
- Emissions of commuting are calculated based on distance, frequency and means of travel (surveyed).
- Staff emissions are higher/FTE mainly due to higher use of cars

- ❖ Emissions reduction potential: increased public transport benefits, metered parking, electric cycling benefits and increased number of storage facilities
- ❖ 2030 emissions reduction potential vs. 2023: **-35%**

Means of commuting



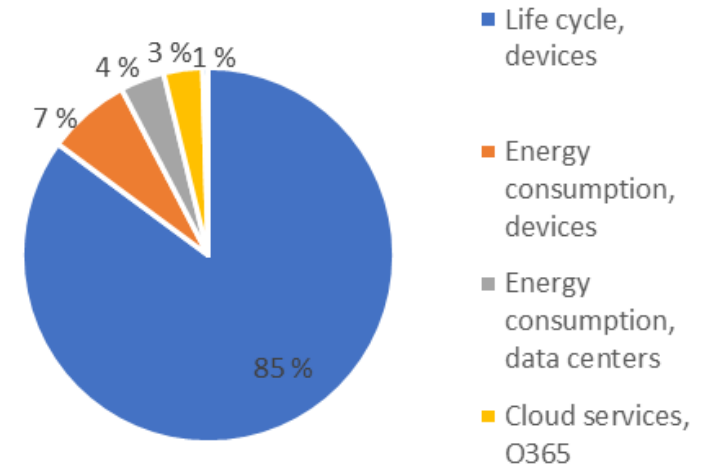
ICT

- Devices make up **over 80% of the emissions**. The biggest emissions categories include screens, TVs, laptops and desktops
- Reuse and recycling of devices is actively encouraged
- Utilization rates of data centers managed by Aalto are high.
- Heat recovery is in use in Otakaari data center.
- Energy consumption is measured and optimized
- Emissions of cloud services are monitored
- Tools to optimize web site traffic in use
- Methodologies and tools to calculate ICT emissions have been developed in Aalto

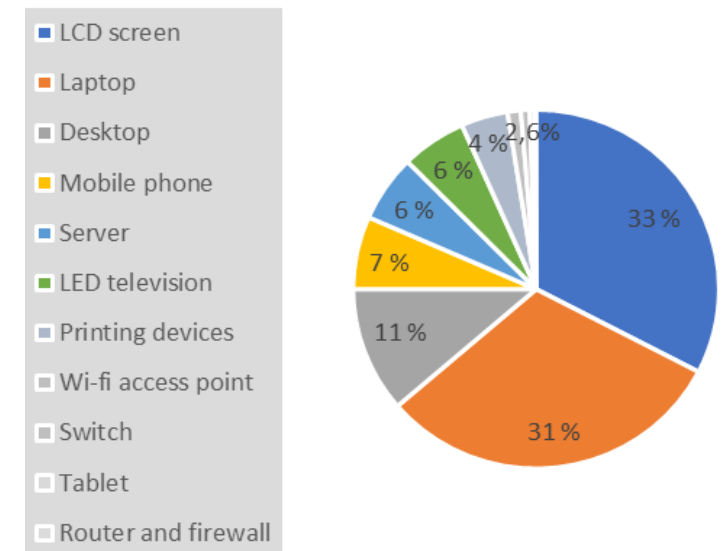
- ❖ Reductions can be achieved by switching to green electricity in data centers, heat uptake in all data centers, optimization of stock, green coding practices and optimization of heavy processing and storage
- ❖ 2030 emissions reduction potential vs. 2023: **-15%**

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tCO₂e



Lifecycle emissions

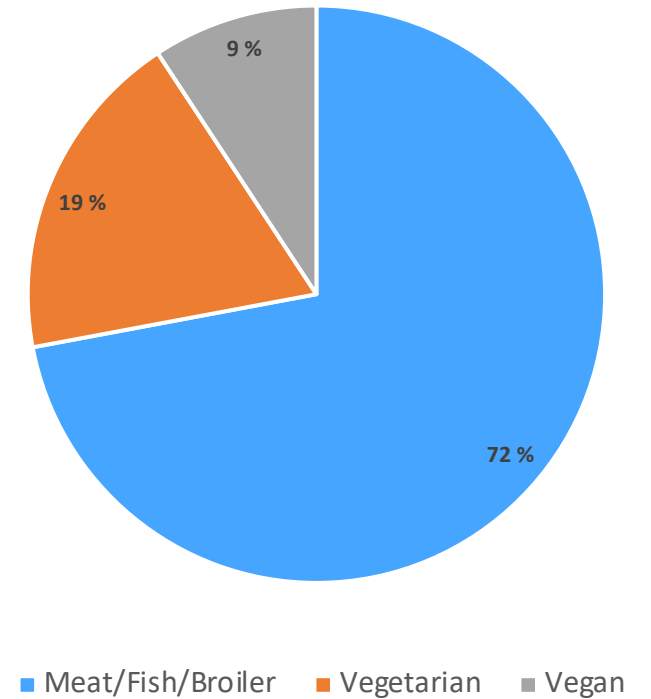


Food

- The cornerstones of campus restaurants are sustainability, variety of meals and wellbeing. Student restaurants emphasize **high sustainability standards** and certificates in their operations and supply chains and have set ambitious carbon reduction goals. Operations are guided by the providers' own sustainability programs and the Policy principles of student restaurants on campus | Aalto University.
- Sustainability awareness is promoted through campaigns and restaurant users are guided towards sustainable meal choices. **Climate friendly options** are marked clearly and information on the carbon footprint of meal options is available.
- **Sustainably produced, local and vegetarian ingredients are extensively used.** The use of energy and water and the amount of food waste is tracked. Possibility to buy leftover food is available in some restaurants.
- Sustainability is promoted in catering services and guided by the Aalto event planning guideline.

- ❖ Emissions can further be reduced by increasing user awareness, greening dietary choices, operations and supply chains.
- ❖ 2030 emissions reduction potential vs. 2023: **-30%**

Meals in student restaurants

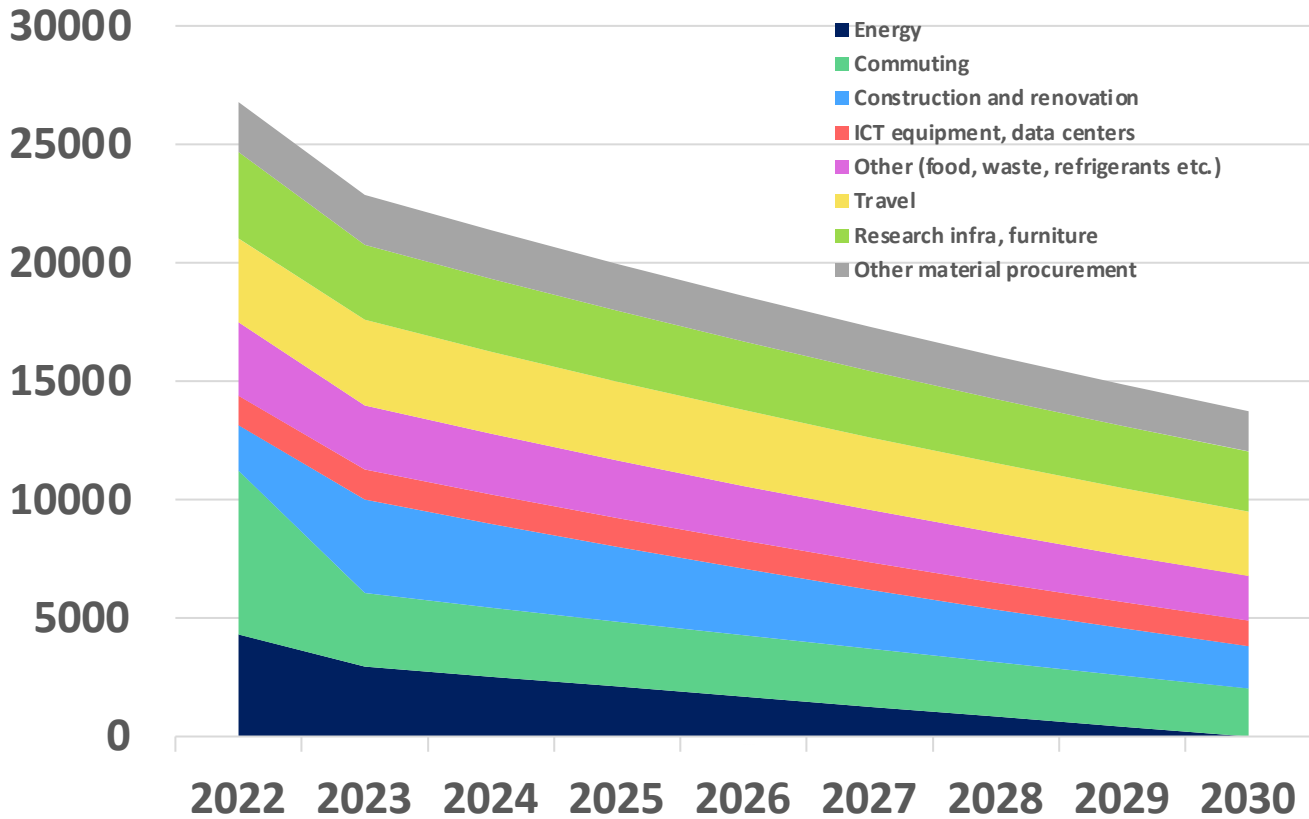


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Emissions reduction potential

2030 emissions reduction potential

Category	Change vs. 2023
Energy	-100 %
Construction and renovation	-55 %
Commuting	-35 %
Other (food, waste, refrigerants)	-30 %
Travel	-25 %
Other material procurement	-20 %
Research infra, furniture	-20 %
ICT equipment, data centers	-15 %



*other material procurement not currently included in published 2023 CO2e numbers

Main scenario assumptions

- Current, planned and recommended reduction actions in use
- Move **towards fossil free energy**. Emissions from energy consumption reduced to 0
- Mobility plan in effect, overall **further greening of transportation**, staff incentives encouraging the use of sustainable means of transportation.
- **Little or no new construction** and emissions from construction and renovation significantly reduced (-25% new construction, -15% renovation) compared to BAU.
- **Sustainable travel policies** and reduction of travel. **Hybrid ways of working broadly used**.
- **Reduction of procurement**. Procurement guidelines emphasizing scrutiny and consolidation. Life cycle thinking and sustainability requirements in procurement requirements broadly used.
- **Greening of operations**, production and supply chains (food, waste, water, cars, refrigerants etc.)
- Increasingly **sustainable restaurant services** and adoption of **sustainable diets**
- **Green ICT practices** in use, resource efficient device, network and data management.

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