



**TAL
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TALTECH GREENHOUSE GAS MONITORING PROJECT

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ACADEMY OF ARCHITECTURE AND URBAN STUDIES 2023

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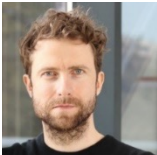
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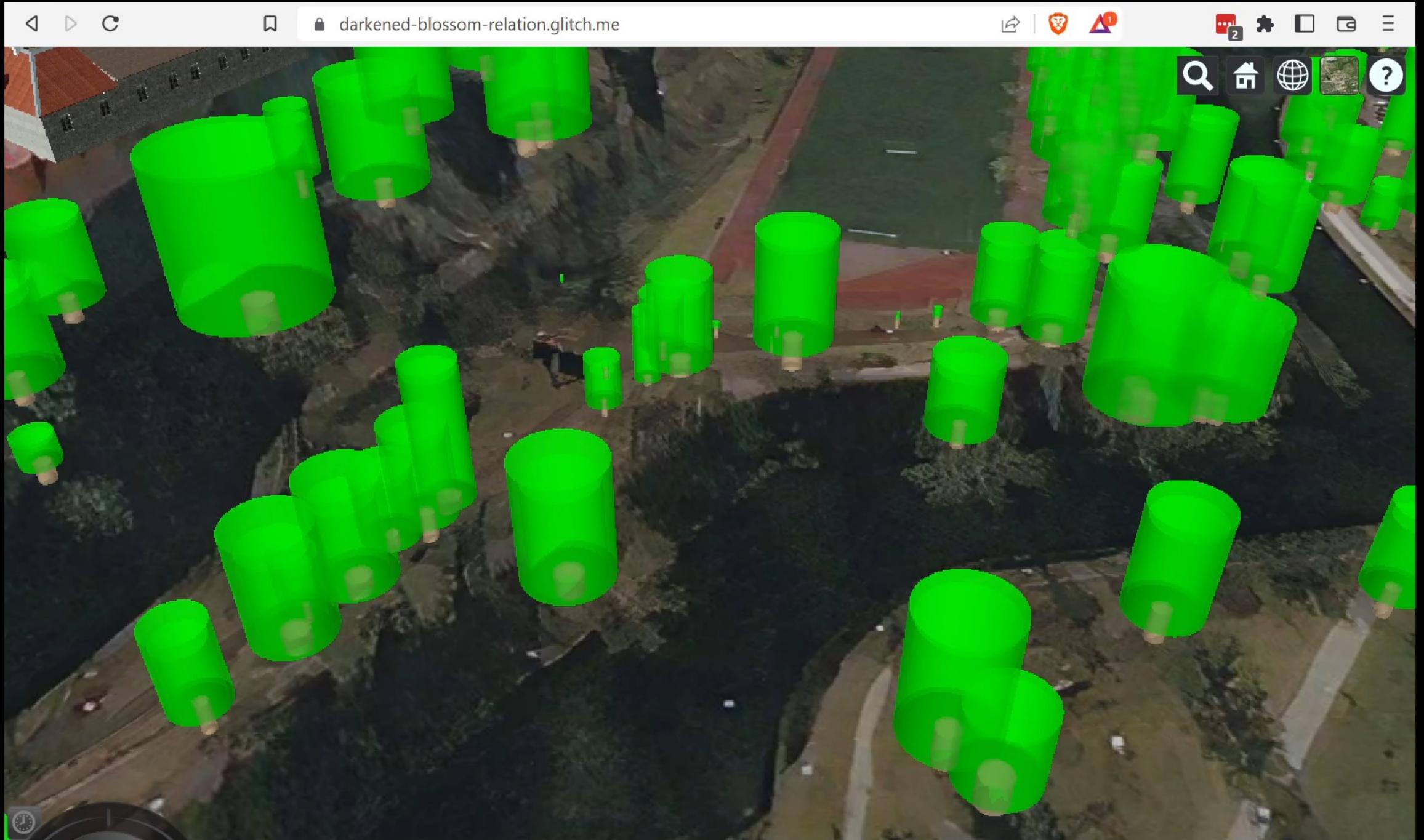
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GreenTwins project – algorithmic plant objects for digital twins, prototype / Antti Kauppi



ESG reporting

- Annual ESG reporting of (large) companies
 - **Environmental** for example climate change, pollution, water and marine resources, biodiversity, ecosystems, circular economy.
 - **Social** for example diversity and inclusion, human rights, working conditions, health and safety, employee relations, payment gaps, related rights, workers in the value chain, affected communities, consumers and end users.
 - **Governance** for example policies, risk management and internal controls, ownership and structural transparency, independence and oversight, responsible business practices, ethics, anti-corruption and executive pay fairness.

Corporate Sustainability Reporting Directive (CSRD)

- requires large companies to regularly report the environmental and social impact of their activities.
- helps investors, consumers, policy-makers and other stakeholders evaluate non-financial performance
- drives more responsible approaches to business.
- provides companies a common reporting framework for non-financial data
- applies to all companies meeting at least two of the following three criteria
 - 40m € net revenue
 - 20m € balance sheet
 - more than 250 employees
- approximately 50,000 companies in total will fall within the scope of the CSRD.
- companies meeting the criteria must submit their CSRD report on sustainability performance for the financial year 2023 on January 1, 2024



Carbon footprint assessment tool for universities: CO2UNV

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ABSTRACT

Universities, as organisations engaged in education, research and community services, play an important role in promoting sustainability and should be an example of a sustainable organisation. The Carbon Footprint (CF) is a very useful decision-making tool that allows organisations to measure and communicate the effect of their activities on the environment. To do so, it is necessary to have tools capable of calculating, tracking and reporting their greenhouse gas (GHG) emissions, as well as guiding the actions for reducing and offsetting them. The aim of this article is to present a tool specifically designed to calculate the carbon footprint of universities, called CO2UNV. This tool is able to quantify the CO₂e equivalent (CO₂e) emissions for scopes 1 (direct GHG emissions), 2 (electricity indirect GHG emissions) and 3 (other indirect GHG emissions), for a university as a whole and for the different buildings/units that it is made up of. It includes, by default, the typical emission sources of an education centre and their corresponding emission factors. However, it is totally adaptable to any other type of organisation thanks to the possibility of including new emission sources and of updating all the emission factors (by default and new). It is also capable of evaluating the evolution of the CF over time, and the CO₂e offsets achieved by contributing to offset projects. The results report includes input data and the graphical representation of results. Finally, CO2UNV is applied to calculate and offset the CF of the Universitat Jaume I (Spain), and the study concludes with its validation according to applicability and accuracy criteria.

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1. Introduction

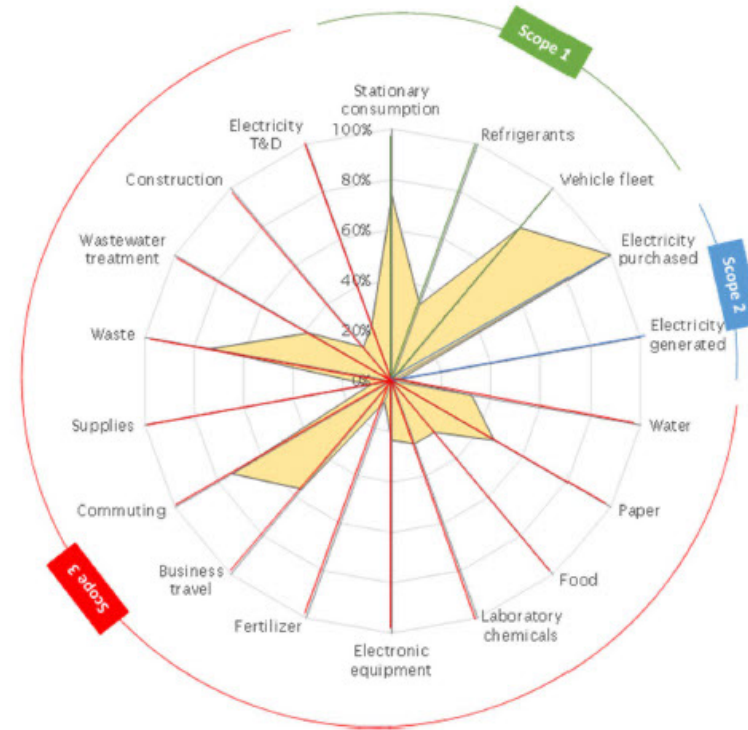
One of the biggest challenges in the world today is climate change because its impact has a great influence on humans and the environment. Towards the 1970s, governments around the world became fully aware of the need to address sustainable development. In 1983 the World Commission on Environment and Development (WCED) was appointed the mission of uniting countries to pursue sustainable development together and it popularised the term "Sustainable Development" with the publication of the Brundtland Report (WCED, 1987). From the Rio Declaration (United Nations, 1992a), Agenda 21 (United Nations, 1992b) and the United Nations Framework Convention on Climate Change (United Nations, 1992c), society's awareness of the environment and, in particular, greenhouse gas (GHG) emissions started to grow. Later, in 2015, the Agenda 2030 for Sustainable Development (United Nations, 2015) proposed a set of 17 Sustainable Development Goals (SDGs) to be achieved by 2030, one of which is SDG 13 (Climate Action - Take urgent action to combat climate change

and its impacts). Recently, in 2019, the European Commission (EC) presented the European Green Deal (COM, 640, 2019), a plan including fifty specific actions to combat climate change, with the aim of making Europe the first climate-neutral continent by 2050.

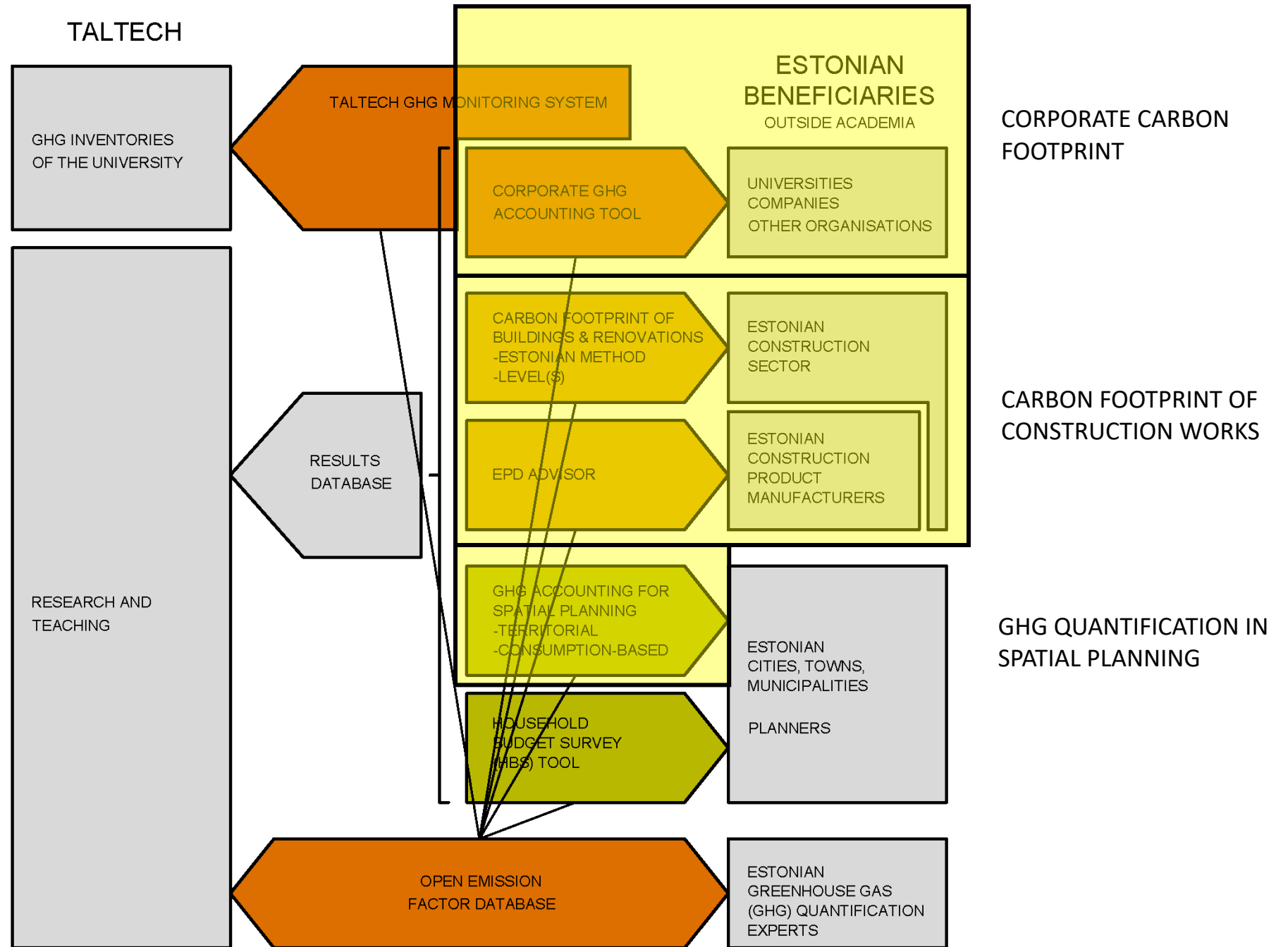
The main factor that contributes to climate change is global warming, which is measured by the concentration of GHG emissions released into the atmosphere. For organisations that aim to contribute to achieving the climate-neutral goal, the first step is to determine their current environmental performance in terms of their Carbon Footprint (CF). Afterwards, based on the analysis of the current situation, organisations can propose action plans to reduce or even offset their GHG emissions.

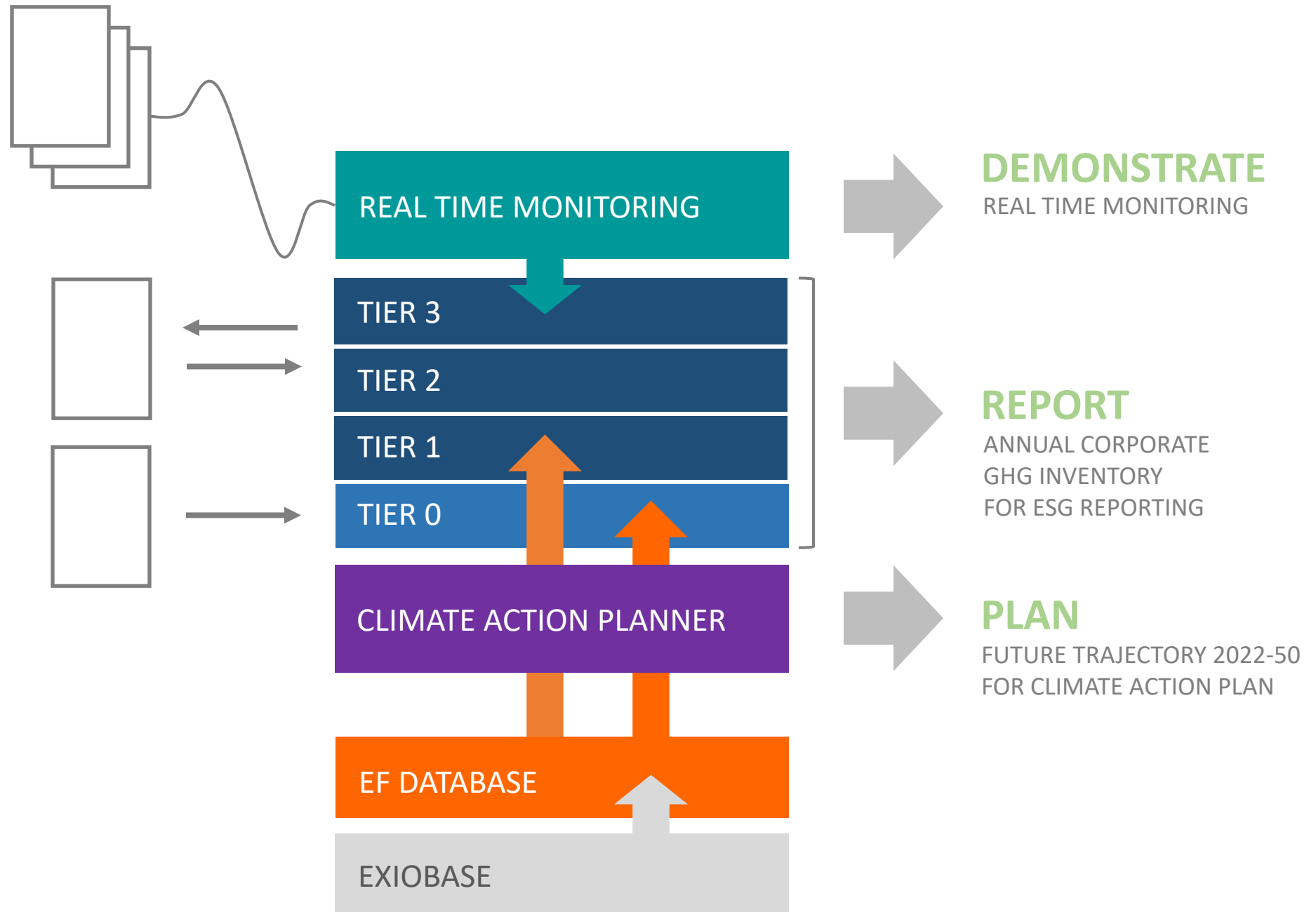
The most notable regulatory framework for accounting GHG emissions is the GHG Protocol (2004), which defines the CF as the total amount of GHG emissions generated directly or indirectly by the activities carried out by the organisation, usually expressed by the carbon dioxide equivalent (CO₂e). To help delineate emission sources, improve transparency and better manage the full spectrum of GHG risks and opportunities, three "scopes" (scope 1, scope 2 and scope 3) are defined for GHG accounting and reporting purposes. According to the GHG Protocol (2004), Scope 1 (direct GHG emissions) accounts for GHG emissions from sources

CARBON FOOTPRINT IN HIGHER EDUCATION INSTITUTIONS



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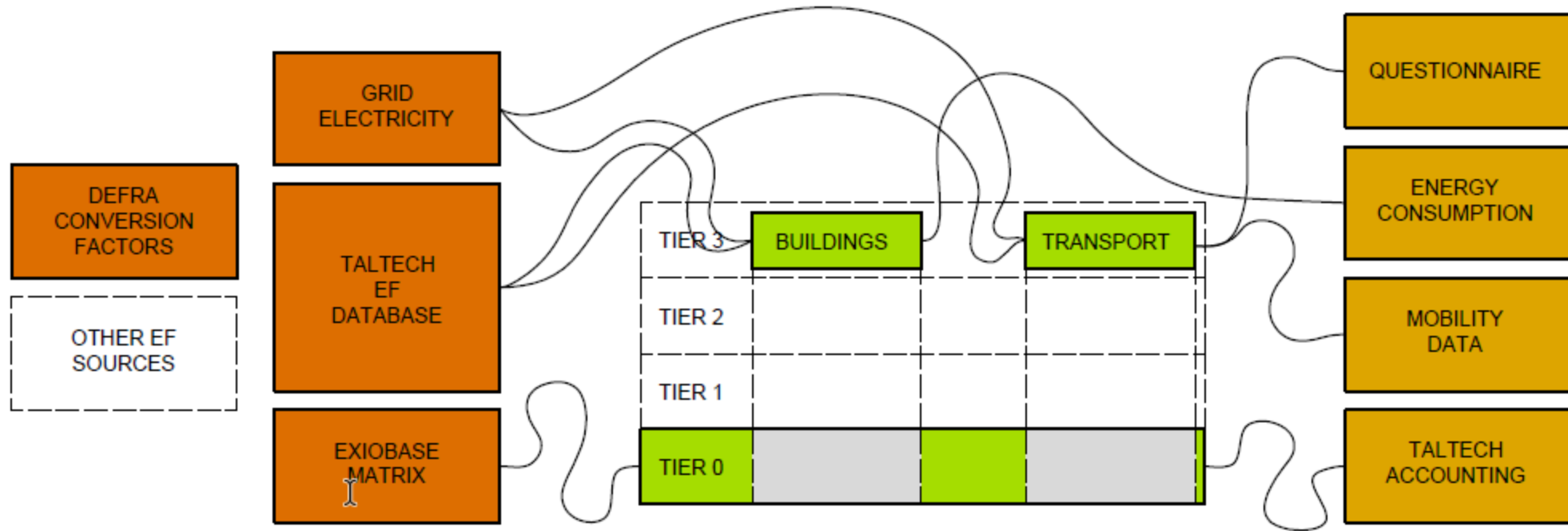




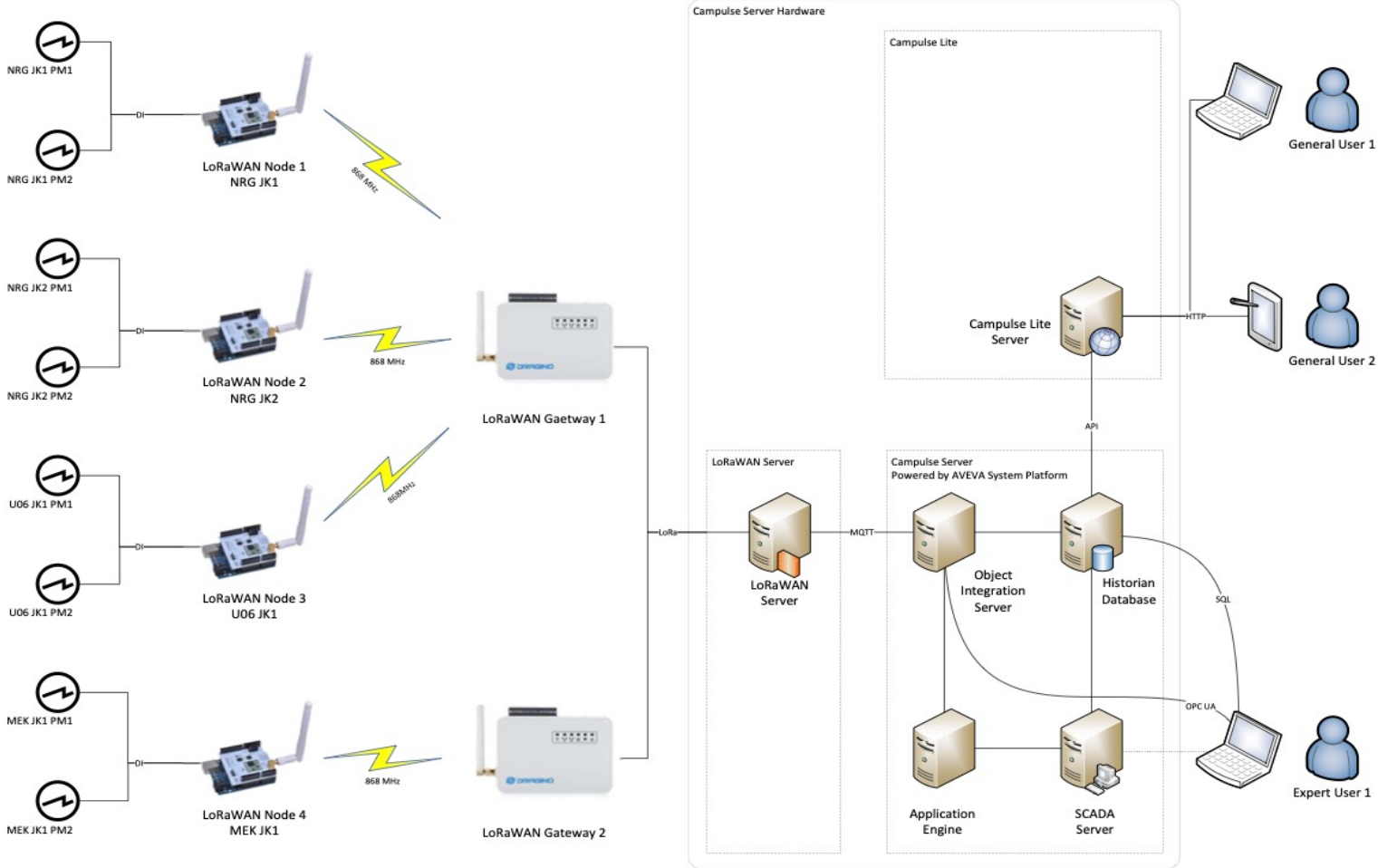
TALTECH GHG EMISSIONS MONITORING SYSTEM AND THE TIERED HYBRID LCA METHOD

EMISSION FACTORS

ACTIVITY DATA

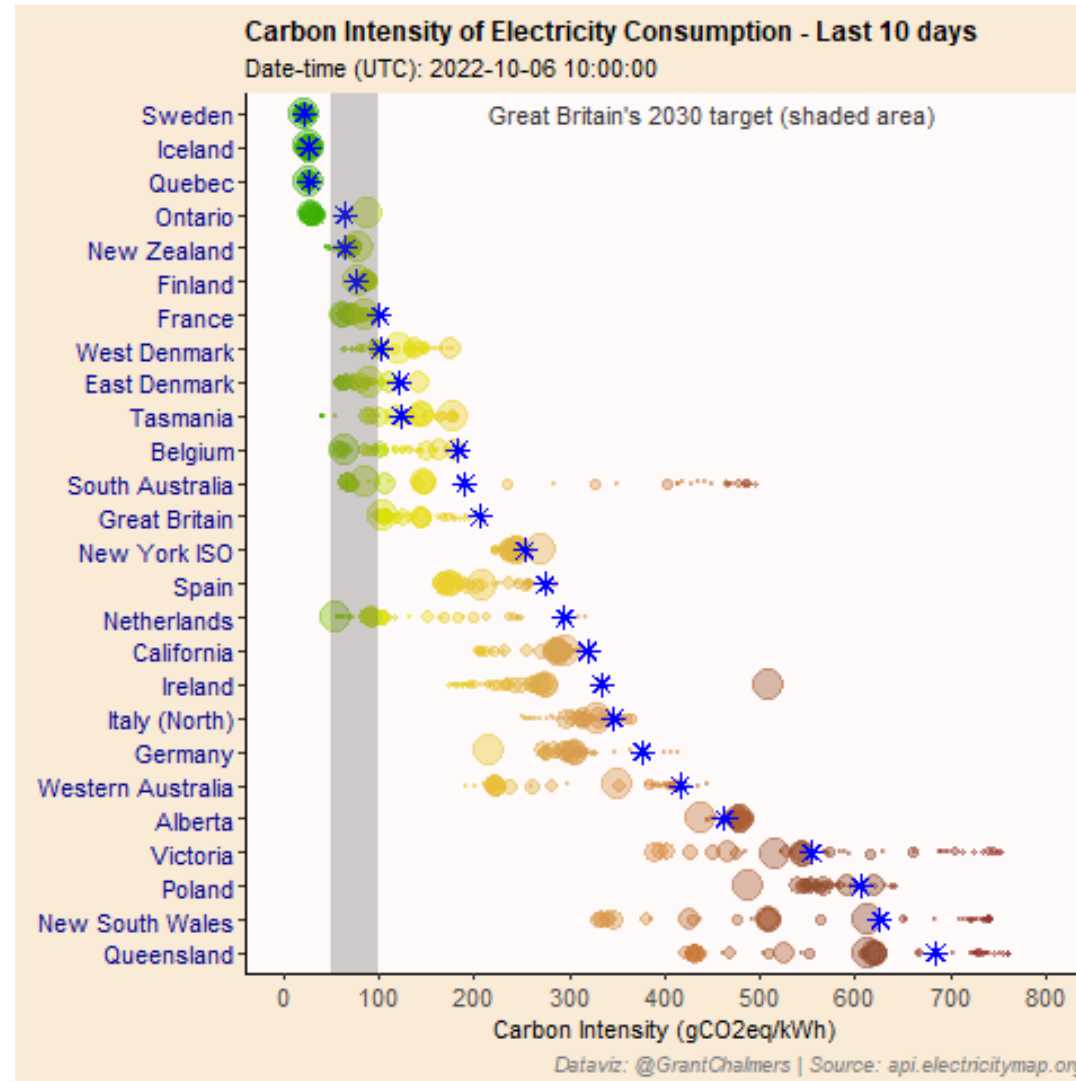


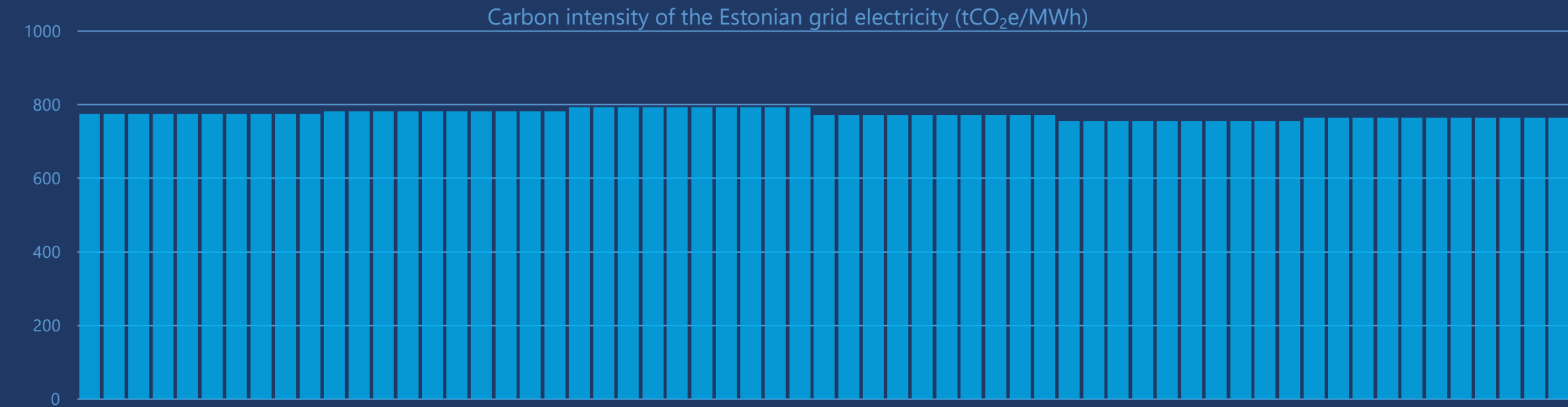
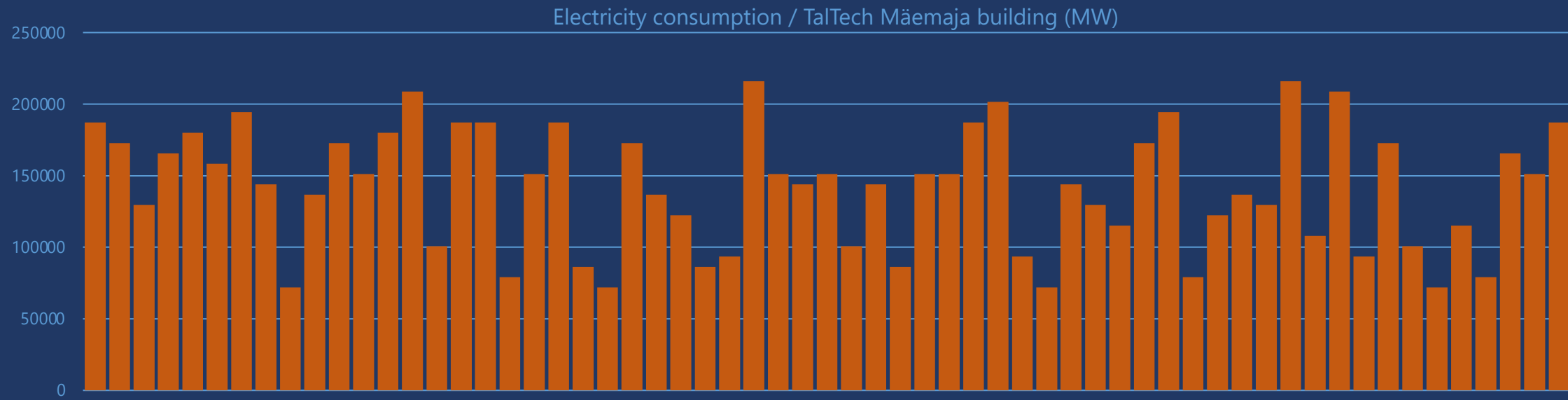
TALTECH DATA SOURCE CAMPULSE



REAL TIME MONITORING OF GRID ELECTRICITY EMISSION FACTOR

INFOGRAPH BY GRANT CHALMERS, UNIVERSITY OF QUEENSLAND, AUSTRALIA







Hourly-based greenhouse gas emissions of electricity – cases demonstrating possibilities for households and companies to decrease their emissions

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<https://doi.org/10.1016/j.jclepro.2015.11.027>

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Highlights

- There might be large variation in hourly based emission factors.
- This offers potential for decreasing emissions by real-time based demand management.
- We show how emissions may be decreased by changing timing of electricity use.

THANK YOU FOR YOUR ATTENTION

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