Grand Technion Energy Program

TECHNION Israel Institute of Technology

"ZERO EMISSION – CAN WE REACH IT? THE EXAMPLE OF UNIVERSITY CARBON FOOTPRINTING"

Prof. Dr. Eckard Helmers

University of Applied Sciences Trier, Germany.
Umwelt-Campus Birkenfeld, Dep. for Environmental Planning and Technology.

Tuesday, 23/11/21 14:30 Wolfson Dept. of Chemical Eng. Auditorium 1

Eckard Helmers studied Biology and Chemistry at German universities, completed his studies in Chemistry with a MS-equivalent degree at Georg-August-University of Göttingen. He conducted Ph.D. research on trace metals in seawater at the Alfred-Wegener-Institute for Polar and Marine Research in Bremerhaven (Germany), which allowed him to participate in expeditions with the research vessel Polarstern throughout the Atlantic Ocean. Since 1998 he is Professor at Trier University of Applied Sciences, Germany.

He has been researching about automobile emissions since 30 years. Particularly, he is investigating the environmental impact of the European diesel car boom. Several research projects originate from a cooperation with the EU commission's Joint Research Center. He initiated and headed projects in which combustion engine cars were converted to electric cars, accompanied by detailed life cycle assessment focussing on the comparison of combustion engine and electric cars under real-world conditions.

Recently he focussed on University sustainability analysis presenting the first objective international university carbon footprint comparison, as also the first quantitative measurement of sustainability subjects in university teaching.

He has been a visiting professor and guest scientist at universities in Singapore, USA, Abu Dhabi, Sri Lanka, Ireland, Luxembourg and Croatia.

Abstract

Targeting zero carbon emissions is believed to be essential in order to keep the worldwide warming within tolerable limits. However the understanding of the term "zero carbon emissions" turns out to be very different.

Universities, as innovation drivers in science and technology worldwide, and as the institutions educating all kind of experts should reach out in becoming carbon–neutral institutions and such lead this transformation. Many have picked up the challenge and quantified their carbon footprints, however up to date this is limited to use phase emissions. Also, there is limited consistency between the reported carbon footprints (CFs) because of different analysis methods and impact measures, respectively.

For the first time, CF data from 20 universities worldwide have been evaluated, partly corrected, and augmented by missing contributions, to improve the consistency and comparability. The CF performance of each university in the respective year is thus homogenized, and measured by means of two metrics, which were already established so far: CO_2e emissions per capita and per $m^2 \bullet y$ of constructed area. Both metrics vary by one order of magnitude across the different universities. A new metric expressing the economic efficiency in terms of the CF per $ expenditures and year is suggested.

As it has often been reported by Life Cycle Assessment, the use phase impact alone can deliver a wrong understanding of the environmental impacts of a product or an institution. This project quantified for the first time the embodied impacts of two university campuses, which are the Umwelt-Campus Birkenfeld (UCB, Germany) and the Nanyang Technological University (NTU) Singapore. As well this project quantified the effects of switching to full renewable energy supply on the carbon footprint of a university campus using the example of UCB. It turned out that in case of a renewable energy supply embodied infrastructure impacts can be dominating, which is why they need to be essentially quantified. Concluding, minimizing university carbon footprints needs a holistic approach considering all impacts caused on and by a campus including upstream effects.