



SUSTAINABLE SYSTEMS

Fields of Expertise TU Graz

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Urs Leonhard Hirschberg,
Sustainable Systems

Source: Lunghammer – TU Graz

In my column in the last issue of this publication, I referred to an urgent public appeal by the Intergovernmental Panel for Climate Change (IPCC): the necessity to drastically reduce greenhouse gas emissions by 45% by 2030 and to zero by 2050, in order to limit global warming to 1.5 degrees Celsius. I pointed out that science and technology can make a long-term contribution to reaching this goal. In fact, the IPCC typically adds to its reports

that “research and development are making unexpectedly good progress”. But of course, it has not been nearly enough.

The notion that “Technology will save us?” (note the question mark) is the tag line for a lecture series currently under way, which is organised by sustainability4u, an initiative jointly sponsored by all four Graz universities. It aims to question the widespread faith in technological solutions and to look at the ethical questions that are linked to technological advances. Just like last year, when the focus was on the 17 Sustainable Development Goals (SDGs), this year’s series is proving a success. It is attracting many students from all the universities, and the talks are being followed by lively debates with the speakers.

If anything, the lectures are making it very clear that it is not enough to look to science and technology to sort things out for us. After all, the problems we have created

on this planet have been associated with technological advances. They have enabled us to claim the dubious honour of having impacted the planet we live on as no other species has ever done before us. We are now living in the Anthropocene epoch. Mankind has succeeded in raising CO₂ levels in the atmosphere to over 400ppm – an all-time high – and thereby profoundly changing the climate. But not only that, we have also polluted land and oceans in an unprecedented fashion, and caused the fastest rate of extinctions for millions of years. Insects are currently experiencing an apocalypse, as Thomas Schmickl declared when he gave the first lecture of the series. Meanwhile, as Gottfried Kirchengast pointed out in the third lecture, Austria is not doing nearly enough to curb greenhouse gas emissions. After a fall between 2005 and 2014, overall levels have been rising again in recent years. Austria’s traffic-related CO₂ emissions per capita are now 60% above the EU average.



So who will save us? It is clear that it will have to be a joint effort, but with science and technology very much playing their part. Informing the public and creating greater awareness, while keeping the discussions rational, is in some ways just as important as working on new technical solutions. The lecture series has set out to make a contribution to this. And it is not the only initiative of this kind. TU Graz Sustainability Week, which aims to raise awareness of the 17 SDGs, will take place from 3-9 June.

TU Graz is, of course, a technical university, and we are very proud of this. And no one here is naive enough to assume that technology is the simple cure-all. We still believe, however, that we can contribute to solving these urgent problems. The next seed funding for projects carried out by junior researchers in the Sustainable Systems Field of Expertise is currently underway. This is what we need: young, critical minds with new ideas, who understand the systemic nature of our problems, and who want to humbly contribute to solving them.

**Markus Göllles,
Martin Horn:**

Advanced Control for Sustainable Energy Systems

The growth in renewable energy technologies will render future energy systems more complex and volatile. So advanced control strategies are required to ensure their optimal operation. For this reason, the Bioenergy 2020+ competence centre established a working group focusing on automation and control in close cooperation with the Institute of Automation and Control at TU Graz.

Model-based control strategies for different renewable energy technologies, such as biomass combustion and solar thermal systems, as well as strategies for their optimal interaction will be developed in the course of the cooperation. A key part of the research focuses on developing control-oriented mathematical models for the respective processes. This means that the models reproduce the main dynamic characteristics of the processes sufficiently well but still serve as a suitable basis for controller design. >

**Figure 1: Biomass gasification
CHP plant in Senden, Germany.**

Source: Schneider-photography

