

URBAN WASTE AND CIRCULAR ECONOMY: socio-technical pathways towards a sustainable future

With the "URBAN WASTE AND CIRCULAR ECONOMY" initiative, we want to create an interdisciplinary setting, which will address sustainable chemistry and circular economy from a promising socio-technical perspective on 2 emerging upcoming chemical areas. Besides the inter- and transdisciplinary research, there will be also a focus on education innovation to train the 'chemist or engineer of the future' by the implementation of socio-technical imaginaries, multiperspectivism and sustainability politics.

Leading scientists:

Faculty of Engineering and Architecture: prof. Kevin Van Geem, prof. Guy Marin

Faculty of Bioscience Engineering: prof. Korneel Rabaey, prof. Wim Soetaert, prof. Chris Stevens, prof. Jo Dewulf

Faculty of Economics and Business Administration: prof. Brent Bleys

Faculty of Political and Social Sciences: prof. Thomas Block

Faculty of Sciences: prof. Filip Du Prez, prof. Pascal Vandervoort

new professorships: 3

Project description

In this initiative we want to create an interdisciplinary setting that will look at sustainable chemistry and circular economy with a new mindset. In particular this initiative will develop a new vision on circular economy, implementing a socio-technical perspective on 2 upcoming chemical research areas where UGent has little to no track-record, namely 1) urban waste conversion and valorization and 2) photochemical reactions and process intensification using solar light. Using insights from the academic fields 'Science and Technology Studies' (STS) and 'Transition Studies' this initiative will address these chemical challenges in various research settings. Next to innovative inter- and transdisciplinary research, we will also focus on education to train the 'chemist or engineer of the future' by introducing sociotechnical system thinking, multiperspectivism and the politics of sustainability. This initiative will put Ghent University in pole position to become one of the leading institutes in sustainability research and education on circular economy and urban waste.

Circular economy is recently emerging as a key concept in the transition towards a more sustainable future. It aims to oppose the current 'take, make, dispose' economy by reducing waste and related pollution, and by making optimal use of all available resources. A new paradigm is crucial in the elaboration of these developments. But what the circular economy should look like is unclear and still open, and therefore, it is prominently a very appropriate theme for an interfaculty initiative. Different socio-technical imaginaries emerge in several academic fields, in policies and politics, in industry and business, etc. As such, different transition pathways are possible. Although a strong belief in sole technological solutions is dominant in technical research, the academic team behind this initiative acknowledges that the technology is shaped by a variety of social and political negotiations that simultaneously define an objects form, its meaning and the societal problems to which it is a solution. Different social groups (scientists, engineers, designers, policy-makers, users, etc.) have different needs and values and it is through a process of interaction between groups that a particular form and meaning stabilizes.

The interrelatedness between technological innovations, economic drivers, societal expectations and government policies will shape the dominant circular economy model. Therefore, the aim within this interfaculty initiative is to contribute to the transition towards a circular economy and a sustainable future by linking the societal and governance challenges that this transition entails with the drivers for scientific and technical innovation. Ghent University would be one of the first universities to combine these different aspects. This is the missing link towards a necessary socio-technical system change or sustainability transition of the urban waste system, according to the faculty members supporting this proposal.

This initiative is jointly proposed by the recently founded Centre for Sustainable Chemistry (www.csc.ugent.be) and the Centre for Sustainable Development (www.cdo.ugent.be) and aims to establish fruitful interactions between research, education and services to society. Research and education on circular economy are of strategic importance for Ghent University, and fit within the ambitions of the sustainability vision of Ghent University and the strategy of the think-tank 'Transition UGent: towards a sustainable university'. To become one of the leading knowledge-institutions with a focus on innovation and sustainability, this proposal aims to support cross-fertilization between these disciplines and to create – complementary to specialized, monodisciplinary research and education we need on that issue – a working environment where the boundaries between research, development and education on circular economy and urban waste fade away.

Proposed impact

In a world with growing pressures on resources and the environment, we need a transition to a resource-efficient and ultimately regenerative circular economy. Such a sustainability transition can be characterised as a transformative change of the socio-technical waste and resource regime at the systems level, including major changes in technology, production, consumption and distribution of wealth and well-being.

As illustrated in the introduction, the transition towards a circular economy wherein optimal use is made of all available resources is of utmost importance for our society. With the depletion of fossil resources, the production of functional materials and fuels faces great challenges. Many researchers believe that the primary source of energy will shift slowly towards photovoltaic and other electrical sources. With the focus on a sustainable production of chemicals and functional materials, the shift towards solar light as our primary energy source can be expanded to its use in organic synthesis via photochemistry. Photochemical processes not only offer potential for the expansion of the synthetic chemical arsenal but also possess some basic aspects that make them easily applicable in a sustainable chemistry setting.

Researchers also emphasized the importance to shift to renewable resources as the primary source of functional materials in which urban waste can be seen as a key target. Urban waste, and more specifically how to deal with it, has become a major global challenge. A large amount of all the urban waste is currently landfilled, incinerated or ends up in the environment via another way, resulting in a negative ecological impact. In the circular economy concept, urban waste is a resource for the production of new materials via recycling and re-use of these products. This approach is beneficial for both the environment and the economy, resulting in energy savings, reduction of greenhouse gas emissions, economic gains for companies and the creation of new jobs. In the context of Europe's transition towards a circular economy, waste management is considered as a key topic, illustrated by the implementation of the Circular Economy Package in 2015 by the European Commission. This overview illustrates the high impact that the valorization of light and urban waste can have on the environment and the economy.