

CIRCUSTAIN

Advanced sustainability assessment of the circular economy applied to construction PVC, focusing on integrated labour effects



Inspiration

To achieve more sustainability and local prosperity, circular economy is proposed as a key strategy, in particular by European and the Luxembourgish governments. Besides the probable environmental (e.g. less greenhouse gas emissions due to the avoidance of incineration) and economic (e.g. more local profit) benefits, the potentially positive social implications of a circular economy are often overlooked and should also be regarded. Studies have shown that a circular economy will lead to the creation of more jobs and a shift to different types of jobs. Yet, the potential positive effects of circular economy initiatives, compared to business as usual, should not be taken for granted. Adequate assessment and informed guidance of these practices are needed, considering the often overlooked social (e.g. job creation) and integrated effects.

To this end, we will improve the respective methodology and apply it to PVC in the construction sector. The latter sector is one of the most prominent economic sectors of Luxembourg in which the circular economy plays a major role. Plastics used in construction are a considerable source of plastic waste and may be eligible for recycling. In particular, PVC is used in many construction products (e.g. piping & flooring) due to its durability and long lifetime, accounting for 2.4 million tonnes of post-consumer waste in the EU in 2020, of which 44% is generated by the building and construction sector (European Commission, 2022).

European Commission, 2022. The use of PVC (Poly Vinyl Chloride) in the context of a non-toxic environment. Luxembourg: Publications Office of the European Union.

Innovation

The main research question of CIRCUSTAIN is as follows: "What is the sustainability impact of selected circular economy initiatives, focusing on plastics (PVC) in the construction sector, when considering primarily crucial social labour-related impacts integrated with environmental and economic cause-effect chains?"

To answer this question, we will first apply the conventional methodology of Life Cycle Sustainability Assessment (LCSA), an approach that evaluates the impact of all processes of product systems at a global level on all three pillars per amount of reference product(s) provided, allowing circular systems and their linear counterparts in the construction & plastic sector to be compared. Hereto, inventories of finite recycling/reuse loops will be modelled over time using the approaches developed in the FNR-funded projects [FLOREC](#) and [IMMEC](#). However, these projects do not cover the social impact or sustainability as a whole. Our conventional LCSA framework will cover the three pillars separately with a particular in-depth estimation of worker hours for each foreground process and certain social labour-related impacts or risks (e.g. labour conditions).

Second, to better address integrated effects, we will model two impact pathways: (1) the effect of the reduced environmental impact on the health state of the labour force, influencing labour availability and costs; (2) rebound effects on the environment due to a higher expenditure associated with job creation.

Finally, we will include these impact pathway models in LCSA, resulting in a novel LCSA modelling framework, which will be re-applied to the cases. This work will mainly be conducted by LIST, with support from LISER (Michela Bia) for socioeconomic modelling and Utrecht University (Detlef Van Vuuren) for mentoring. To support this interdisciplinary research in the CIRCUSTAIN project, experts/stakeholders from the Luxembourgish government and industry will be involved.

Impact

The outcomes will provide new insights into the sustainability impact of the circular economy (also distinguishing local from global impacts), serve as a template for further research, and allow the pinpointing of certain measures that can be taken to improve the sustainability of circular economy initiatives (e.g. delimit transportation distances for waste collection).

Partners

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