Clean circular economy: recycling while eliminating legacy toxics

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Optimized reuse and recycling of materials are main requirements in order to reach a circular economy. The challenge is not only how to recycle as much material as possible, but also how to make sure these material streams are of sufficient quality to go through a new life cycle. The risk of contamination of material streams is seen by many as one of the key threats to a circular economy. Recycling substances we want to get rid of does not seem wise. Interest in this issue is "emerging" both in the media, the environmental science community, industry and policy. The substances involved are well known by the SETAC community: brominated flame retardants in recycled plastics, PAHs in recycled roofing material and mineral oil mixtures (MOSH/MOAH) in recycled paper. In the LCA community, modelling of recycling systems has been a research topic for decades as well. However, in the SETAC Europe meetings, no specific session has been devoted to the issue of toxic substances in recycling so far. Therefore, a session is organized to address toxic substances in recycling from a broad perspective, bringing together knowledge from analytical chemistry and toxicology, as well as life cycle assessment and policy. Specific topics to be addressed are: -what is the problem? Which toxic substances are involved and to which extent are they found in recycled materials? Some examples are flame retardants in insulation materials and plastics from electronics, and endocrine disrupting plasticizers and metals (e.g. cadmium) in packaging plastics. -challenges in analytical chemistry: the development of fast, selective and sensitive techniques for monitoring contaminants in waste streams, as well as smart sampling strategies. -how are policy makers dealing with the issue? Discussions on the Stockholm Convention are ongoing, and will have to lead to acceptable recycling protocols balancing material resource efficiency and consumer safety. -Life Cycle Assessment studies could play a prominent role in this discussion, by quantifying the environmental benefits of recycling, as well as the potential impact of toxic compounds being emitted. What developments are needed to allow LCA to also deal with the potential harm of toxics remaining in the materials, without direct release into the environment? -which solutions are available for removing contaminants from recycling streams?