

## **IRSDS 20<sup>th</sup> Annual Conference Trondheim, Norway: Summary of tracks 5d and 3d, Circular Economy working group Co-chairs: Pauline Deutz, Don Lyons**

There were two sessions relating to the Circular Economy working group. The authors and audience are thanks for good presentations and the lively discussion that followed.

A key idea to emerge is the importance of scale in resilience. In terms of both cost and environmental efficiencies a small scale can be disadvantageous. Larsen et al. found that the per capita carbon footprint of municipal service provision increased with decreasing population size for settlements in the county of Oppland. A contributory factor to high carbon footprints in some settlements was the presence of a significant number of second homes. The energy/water usage of these cabins was included in the footprint calculation, but their temporary occupants are excluded from the population total. In Ireland, Lyons and Buser found that whilst the organisation of waste electronics and electrical equipment (WEEE) was effective, the supply was too small for the establishment of a disassembly facility to be cost effective. WEEE is exported to the UK and other EU member states for disassembly and materials recovery. A second aspect to the question of scale was illuminated by Amorim de Souza, who was also examining the management of WEEE. Apparently successful implementation of EU WEEE recovery targets rests in part on the export of WEEE to developing countries. However, the potential benefits to recipients (e.g., access relatively low cost computers) are either not realised, or are out-weighed by the dis-benefits disposed without appropriate safeguards. Thus the impact of policies needs to be considered beyond the scale to which the policy explicitly applies.

A second theme to emerge from the sessions was the relationship between economic performance and environmental impact. Drawing on a material flow and dynamic stock analysis of global steel supplies, Pauliuk et al. devised scenarios of steel production-related greenhouse gas emissions from 2010-2050. They found whilst the potential to further reduce emissions by production efficiencies are limited, developed countries are reaching saturation point for steel consumption. Significant emissions reductions could therefore come from the transport of developed country steel scrap for use in developing countries. In a contrasting study, Font Vivanco et al. analysed the use of the rebound effect from environmental economics in industrial ecology. The rebound effect refers to the increase in total material/energy use that can accompany material and energy efficiencies. Industrial ecologists have applied LCA to the analysis of the rebound effect, but in the process broadening the term so that the clarity of meaning is lost and comparison between studies becomes difficult.

Interdisciplinary research comprises the third and final theme. The Font Vivanco et al. paper proposed a framework for the use of LCA to analyse the rebound in order to promote an interdisciplinary engagement between IE and environmental economics. Deutz et al., discussed the potential for interdisciplinary collaboration between the different methodologies comprising IE. The authors argued that although differences can signify radically contrasting assumptions e.g., regarding the relationship between researchers and their data, these differences substantially reflect differences in the types of questions asked. Co-operation across methodologies can be mutually beneficial, with IE providing the validation established disciplines confer work within their tradition of scholarship.

Amorim de Souza EI, 2014, Disposing Second Hand Electrical and Electronic Equipments (EEE) from the European Union (EU) Countries to Developing Countries, Are they Really Disposed? Paper presented to the 20<sup>th</sup> Annual ISDR Trondheim, Norway, 28-20 June.

Deutz P, Lyons D, Wang, Q and Baumgartner RJ, 2014, Exploring methodologies in industrial ecology. Paper presented to the 20<sup>th</sup> Annual ISDR Trondheim, Norway, 28-20 June.

Font Vivanco D, van der Voet, E, Kemp R, 2014, The rebound effect through industrial ecology's eyes: A review of LCA-based studies and proposal of a common framework. Paper presented to the 20<sup>th</sup> Annual ISDR Trondheim, Norway, 28-20 June.

Larsen, HN, Skaar, C, Ness C, 2014, The Carbon Footprint of Municipalities in Oppland. Paper presented to the 20<sup>th</sup> Annual ISDRC Trondheim, Norway, 28-20 June.

Lyons D, Buser A. 2014, Industrial Symbiosis and the small economy context. Paper presented to the 20<sup>th</sup> Annual ISDRC Trondheim, Norway, 28-20 June.

Pauliuk S, Müller DB and Hertwich EG, 2014, Managing Global Material Stocks Under Emissions Constraints – A Case Study for Steel. Paper presented to the 20<sup>th</sup> Annual ISDRC Trondheim, Norway, 28-20 June.