

Editorial: Industrial networks for resource efficiency

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Wasted materials represent valuable resources that we can no longer afford to discard. The concept of 'zero waste' is a challenge to old ways of thinking, calling for waste to be viewed as a potential resource with value to be realised, rather than as a problem to be dealt with, usually by burial in landfill sites or incineration without energy recovery. Examples of industrial symbiosis – the theoretical rationale and methods for sharing information and resources across different industries – are starting to be found worldwide. In this second themed issue of *Waste and Resource Management*, the results of an FP7 Collaborative Project, 'Towards zero waste in industrial networks' (Zerowin), which has demonstrated for the first time successful implementation of ten European Industrial Network case studies, are presented. In this themed issue, we focus on the construction and demolition and automotive sectors. A short overview of the themes which are discussed in detail in the individual papers is given here below. The key concepts of the Zerowin vision (outlined in the first themed issue) formed the foundation of the demonstration case studies presented in this issue.

Three construction case studies are presented. They are targeted at implementing zero-waste strategies in new construction projects (in the UK, Portugal and Germany) as well as in demolition (in Portugal) and refurbishment (in Germany) projects. These case studies are located in three distinct parts of Europe, representing regions with different environmental performance, different construction styles, infrastructure and culture, showing both commonalities and differences on their way to sustainable construction.

The construction case study in the UK (Williams *et al.*, 2014) was carried out on three construction sites operated by Wilding Butler (phases 1, 2 and 3, respectively), with input from Zerowin partners: Remade and University of Southampton. A full analysis of a baseline site was made, following which improvements in resource efficiency over two improvement phases, through implementing an industrial network, were

measured. In the phase 3 site, as a 'design and build' project (as opposed to build-only, whereby construction materials and methods, transport, energy and water supply are all specified and unchangeable), increased sustainable procurement of goods and services was possible to reduce resource use.

The Portuguese case study concept (Duraõ *et al.*, 2014) was developed for the Environmental Education Center in Torres Vedras, a new-build project, which is expected to be certified by the Portuguese sustainable construction scheme 'Leading by Environment for Sustainable Construction' (LIDERA). Alternative construction materials and practices were investigated with the aim of substituting some of the identified poorly performing materials, preferentially by reusable and recycled materials or by materials with lower environmental impacts. It was possible to define some substitutions for recycled, local or more sustainable materials. Networking between the actors involved on the construction works was stimulated. Several barriers were identified in the Portuguese case study that influenced the obtained results, most of them require a strategic or political intervention to be duly addressed.

In Portugal, three demolition sites were also studied. It was found that allowing sufficient time for the project to be completed is among one of the key issues for a rational resource management at a demolition site. The case study advocates the pre-demolition audit, resulting in a reuse and recycling plan as an approach to improve the practice.

As opposed to the British and Portuguese case studies, which are targeted at influencing the selection of materials and components supplied to new construction sites, the construction case study in Germany has been solely focused on improving the logistics around the construction sites (Tischer *et al.*, 2014). This case study has shown that an optimised logistical supply chain of delivery and disposal as well as waste separation at the source on site are the two key factors determining the success of reuse and recycling strategies in the

construction sector. The Zerowin partner Bauserve acted as a coordinator for the logistics of delivery as well as the logistics of disposal, in order to accomplish an industrial network among all the involved players. The German case study focused on two large construction projects: refurbishment of the Deutsche Bank Head Office in Frankfurt and the new construction Schwabinger Tor, both located in large business and industry centers. In both projects the concept of efficient construction logistics on the upstream as well as downstream site was implemented.

In the automotive industry case study (Regendfelder *et al.*, 2014), both the prototype and the serial production of a control housing with a substantial share of a recycle material were demonstrated. The automotive industry is one of the major consumers of plastics. Thus, the use of recycled plastics in automotive components offers potentially significant environmental improvements. The main goal of this case study was to demonstrate that recycled plastic can even be used for a highly sensitive element: the safety-to-life control housing of the braking system. The technical proof of feasibility has been provided by the leading industrial partner – Continental Tyres – and has already been taken up by a huge multi-national car manufacturer.

The final Zerowin case study (Peagram *et al.*, 2014) was developed to describe the current situation of used business-to-business (B2B) electrical and electronic equipment (EEE) collection and treatment in EU member states and propose improvements, including policy recommendations. The case study engaged with the actors currently collecting and treating used B2B EEE in the UK, Germany, Austria, Romania and Spain to see if the quantity and quality of recycling and reuse throughput can be improved. The findings of this case study are highly relevant to ongoing discussions on producer responsibility, waste entrepreneurship and the management of used EEE.

The Zerowin case studies provide insight into the challenges and obstacles existing in the studied industry sectors. They should be seen as good lessons learned from the merger of academic theory and vision with industrial practice, and should provide both objective evidence and inspiration for the future development of a resource-efficient Europe.

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