

Editorial: Construction waste prevention and recycling for construction products

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The three articles appearing in this issue of *Waste and Resource Management* deal with important issues from opposite ends of the waste and resource management spectrum. The first tackles a significant problem of how to deal with the prevention and minimisation of waste in construction, while the other two articles look to returning waste products back into productive resources through their incorporation into construction products.

Soharu *et al.* (2023) have focused on the management aspects of construction projects by using action research to delve into factors that influence waste prevention and minimisation at construction sites. They looked at the interaction of many attributes and influences that might affect a positive outcome for waste prevention for the most important causal factors and included a broad spectrum of construction projects and managerial personnel within their research scope. They show that problems can arise at all stages of construction projects, but especially in the earlier stages, including: incorrect work planning, inappropriate working methodology, problems with material ordering and material damage. All staff and workers have their role to play and well-trained staff with clear responsibilities are vital in maximising waste prevention opportunities.

Paving blocks were the product that Yomphong *et al.* (2023) focused on in their research, examining how waste glass from bottles and containers could be utilised as a substitute for sand, at replacement proportions of up to 100%, for the manufacturing of paving slabs. The waste glass powder (WGP) had to be finely crushed in this experiment and carefully sieved in order to generate the type of WGP that would replicate the sand used for the manufacture of paving blocks. Perhaps it was unsurprising that the WGP performed as well as the river sand, given that container glass is manufactured from over 70% silica sand, albeit in most glass furnaces a high proportion of cullet is utilised.

Krishnan *et al.* (2023) used glass fines and polyethylene terephthalate (PET) plastic waste in the manufacture of bricks, but at lower temperatures than in a conventional brick kiln. The substitution of the two waste-based materials was tried at different proportions, but necessarily overall quite low proportions. Also, there had to be the addition of two chemicals as alkaline

activators – sodium hydroxide and sodium silicate – to ensure the mix would stabilise and chemically bond. The temperatures used for the initial moisture reduction and the higher temperature of the subsequent firing of the bricks was very low in comparison to conventional brick kilns, albeit for a longer time than a brick kiln, and also lower than for other previous waste material substitutions for brick manufacture. This was partly necessitated by the inclusion of the PET, which would have melted at a temperature of 240–270°C.

These two examples of construction product manufacture showed conclusively that these waste materials could be used as appropriate substitutes, although there was no economic analysis of the potential application to the real world manufacturing scenarios in either case. However, it is also necessary to question whether it is an appropriate use of these materials in the locations where manufacturing of those products might take place? In Thailand, there is a local market for cullet, but this is mainly for clear waste glass and potentially more cullet could be generated than consumed by local container glass manufacturing capacity.

In Victoria, Australia, there is more cullet than can be used in local glass manufacture. However, the PET could be utilised after processing in virtually any location as a recycled material for the manufacture of a wide range of other products, including: new beverage bottles, food containers and fibre for clothing products, for example. This processing and product manufacture could occur anywhere as there are no restrictions on the international movement of clean PET containers, unlike most other waste plastics. Therefore, a different choice of plastic or mixture of plastics might have been more appropriate for this experimental design to be more consistent with real world issues for plastics waste.

Overall, these articles act as good examples of the breadth of the spectrum of the waste and resource management research that is being undertaken in universities in all parts of the world. It is important that the construction sector acts on the results of the action research of our Indian colleagues, but whether either of the two products demonstrated on an

experimental basis can be brought to market is more doubtful. The results from the research by Soharu *et al.* (2023) demonstrate the need for all staff at every level to enhance their skills through continuing professional development.

REFERENCES

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