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Editorial

The Editor makes no apology in coming back to the theme of Remediation, Recycling and Reuse of waste materials, and waste management. The significance and implications of this major social problem will be clear when we realise that in the UK, for example, we produce some 8 t of waste per person per year, of which some 8–10% is made of household solid waste—and the mountain of waste continues to increase by some 2–3% every year. In London alone, the capital's total waste output is expected to increase by about 20% from about 3.4 to about 4.0 Mt by 2020. The current level of recycling household waste in London is about 9%, and this is targeted to be increased to about 35% by 2020. But all indications are that even if our projected targets of waste disposal are achieved, the mountain of unrecycled waste and the total output of waste will continue to increase.

All waste is characteristically heterogeneous—they contain objects of different sizes and shapes, and they are invariably composed of different materials. Non-hazardous household solid waste generally contains a complex mixture of paper, textiles, glass, metals, cartons, plastics and foodscraps. Commercial waste may additionally comprise wood, tyres, used oils and used furniture. In practice, a variety of waste treatment processes and systems are available today to deal with these wastes. The conventional methods include recycling of different materials such as glass, plastics and metals, landfill, incineration and composting. Recycling has important implications on the management of renewable and non-renewable resources. Reusing waste in a beneficial way ensures the process of utilising raw waste as a source of raw material, and the methods of collection and separation of the various types of wastes to be recycled play a significant part in the economic success of the recycling process.

The landfill method of dumping disposal has important implications on air, soil, as well as both surface and ground water. In many cities and countries landfill space is close to exhaustion—and the EU recommendations mean that waste going into landfill sites will have to be cut by 70–80%. For example, half of the rubbish that went into landfill in 1995, should be treated by alternative processes by 2009. Incineration still remains the most practical treatment technology, particularly for hazardous waste, but can create serious air pollution problems if not designed and operated properly. Incomplete combustion may produce unwanted pollutants, and there is also the problem of dealing with the ash residue.

Recycling construction and demolition waste still remains a top priority for the construction industry. More recently, new technologies have been developed to recycle plastics, and such recycled plastic products have been used in marine exposure conditions, to replace wooden piers for example, to counteract the work of marine borers that burrow into submerged wood. Perhaps the most exciting application of recycled plastics—termed fibre reinforced plastic "lumber", FRPL—has been in bridge construction. It is reported that a one-lane span across a stream in New Baltimore in New York, completed in 2000, was the first to use FRPL for the primary load—carrying structure. The "lumber" used in this bridge consisted of about 80% high density polyethylene (HDPE) and 20% fibreglass. The structure consists of a pair of parallel bowstring trusses with transverse floor beams. FRPL is a viscoelastic material, and properties of the recycled plastic are thus likely to remain highly variable and time dependent, which demands a better and clearer understanding of their material characteristics and structural capabilities. Currently the US produces some 6.5 billion kg of HDPE annually—and only about 5% is being recycled. The implications of recycling and reusing construction materials are thus highly challenging and environmentally unignorable.

The reuse and recycling of discarded materials has always been a great fascination to humans in general, and to engineers and architects in particular. The pioneering work of architect Samuel Mockbee in Hale County in Alabama in America's deep south is a shining example of the use of recycled materials and sustainable construction. In his architecture philosophy, discarded industrial wastes such as tyres, plastics, corrugated cardboard, car windows and the like have been transformed into weather tight components of architectural

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shelters for people who never had them. Remediation, Reuse and Recycling thus remains a technical challenge—at both material and structural levels to all engineers, architects and material scientists. Can the construction industry rise up to this vision and challenge?