

# LANDFILL MINING – POTENTIAL SOURCE FOR MAINTENANCE-FREE CONSTRUCTION MATERIALS?

*Aarne Saareväli*  
*Rexest Grupp Ltd, Estonia*

## ABSTRACT

As the use of plastic products is very widespread, reuse of the plastic waste represents a huge challenge. Plastic packaging (e.g. thin plastic bags, foil, foodwrappings) and other plastic waste (pallets, garden furniture, buckets, sport and hobby equipment, car bumpers, canisters, pipes, bobbins, computer and TV cases, plastic refrigerator details, etc.) form the most problematic and continuously growing type of waste, that according to common solutions can be mainly landfilled, or incinerated.

Initial sorting of waste and subsequent recycling of single-type plastics into uniform mass, granules or new products are the generally preferred solutions for recycling plastic. Recycling is normally performed based on one specific type of plastic, e.g. LDPE, HDPE, PS, PP or PET, in the course of which the sorted plastic waste is washed, shredded, dried and granulated. The biggest problem with mixed plastics is posed by the fact that polymers of different types are immiscible because of their different molecular weights and long polymer chains. Heating the polymers is not sufficient for decomposing polymer molecules; therefore, the polymers to be recovered must typically have identical compositions to achieve effective mixing. When plastics of different types are simultaneously melted together, they usually do not mix – like oil and water – and will form layers. Low-grade mixed dirty plastic is typically rejected from recycling. Rexest Grupp Ltd, however, has developed a technology for recycling mixed plastic waste.

In this study it has been discovered that mixed plastic waste that was landfilled for over a decade did not differentiate from the fresh mixed plastic, neither had the landfilled plastic lost its polymeric properties. Landfilled plastic needs only to be separated from other materials (eg textile, paper) and soil. After mechanical separation, recycling technologies that are able to use of mixed plastic waste, were as also able to handle mixed landfill plastic.

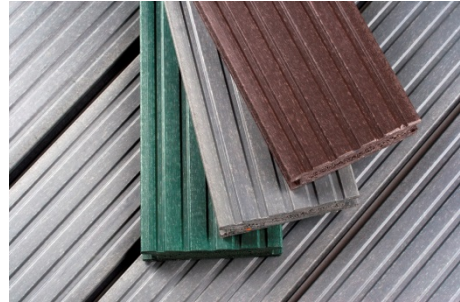
Experiments demonstrate that construction materials and products like decking boards, noise barriers, garden furniture etc. could therefore be produced also from landfilled plastic waste, turning this waste into the maintenance free products that are also recyclable after decades of use. Taking into account vast number of landfills that contain plastic waste it raises question whether turning these materials into recyclable construction materials could form a new challenge and possibility to support the environment, and lower the need for the usage of new resources.

**SUSTAINABLE RE-USE OF LOW-GRADE MIXED PLASTIC**  
Collected from sorting systems or collected from closed landfills

**Input - mixed plastic waste**  
Collected from sorting system



**Output – maintenance free construction materials**  
100% recycled, 100% recyclable



**Input - mixed plastic waste**  
extracted from landfill



**Output – maintenance free construction materials**  
100% recycled, 100% recyclable



**KEYWORDS**

Mixed plastic recycling; landfilled plastic waste; incineration, waste plastic-to-product.