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Sterilising and sorting municipal waste

Sterecycle has developed a system for sterilising and recycling unsorted domestic waste so that 90% of the waste stream can be diverted from landfill without separated kerbside collection.

The process is two-stage, involving steam conditioning and sterilisation at 140°C, then mechanical separation of the cleaned products.

The Sterecycle steam conditioning autoclaves are pressure vessels similar to those used in hospitals to sterilise surgical instruments, but much larger at 13.7m long. Unopened black-bag domestic waste is loaded into the vessels and steam and pressure is applied at over 140°C for one hour. The vessels are rotated, and the material is sterilised and broken down with the aid of helices.

The steam conditioning has two principal effects on the waste material: sterilisation to produce clean recyclables that can be easily separated and reduction in volume of the material by 66%.

The process is energy efficient - steam is created within the autoclaves via a heat exchanger using the moisture in the waste and heat. The steam is recycled between pairs of autoclaves.

The sterilised material is then separated into its various constituents: 60% organic fibre and 40% inorganics (glass, aluminium cans, steel cans, plastics, textiles, wood and miscellaneous items).

Sorting is done by processing equipment similar to that found in a standard mechanical recycling facility.

The glass, metal cans, plastics and textiles are clean with labels and foodstuffs removed and can be resold into the secondary materials market.

After stages one and two, the organic fibre can be used as a compost. It is a clean soil enhancer that is water absorbent and aerates soils to encourage growth.

Alternatively, the fibre can be further processed in several alternative ways to produce valuable by-products.

Passing the fibre through a washing plant removes the long fibres that can be sold to the paper industry as paper pulp.

The fibre can also be passed through anaerobic digestion to produce clean biogas for energy generation. It is an ideal energy feedstock for anaerobic digestion or gasification as it is a homogenous material - unlike untreated municipal solid waste.

The fibre is very clean and can be used to produce energy and/or heat with extremely low emissions - well below EU regulation requirements.

R&D has been carried out over the past 10 years in California resulting in a commercial sized demonstration plant.

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