SCION
forests·products·innovation

TECHNICAL SHEET: SLUDGE DEWATERING

Sludge Dewatering is an intermediate process that mechanically reduces the moisture content of sludge for subsequent processing.

Dewatering lowers the volume and weight of solid wastes, reducing costs (such as transport and landfill) and increasing its suitability for subsequent utilisation. Stabilises waste – reduced leachates and provides a more uniform product. Performance from mechanical dewatering is critical to downstream energy recovery from combustion. While polymer use can enhance dewatering it is expensive and can be problematic downstream.

Mechanical dewatering options (i.e. screw press, belt press, centrifuge, filter bands or presses) dewater sludge to 30% - 50% solids content depending on composition and water retention properties of the sludge or sludge mix in question. However with pulp and paper sludge, solids contents of 20-30% are more commonly achieved.

Primary solids are primarily composed of fibres, fines, and fillers, and are easy to mechanically dewater. Secondary sludge, from biological and chemical treatments, is difficult to dewater mechanically (without the addition of additives), and is often combined with primary sludge to improve its dewatering properties.

Chemical additives (i.e. CaO, $FeCl_3$, acids, surfactants, inorganic conditioning compounds) are used to improve flocculation characteristics and hence, dewaterability Thermal conditioning of biological sludge by heating (175°C) is reported to improve dewaterability to 30% -40% solids as opposed to up to 20% solids for chemical conditioning.

Materials Accepted	• Primary sludge • Secondary sludge • Scrubber sludge • Slurries
Examples in Current Use	*NZ* *Wastewater treatment (municipal and industrial)* *Pulp mills (primary and secondary sludge) - mechanical dewatering with chemical addition or settling ponds.* *Overseas* Multiple

Infrastructure and Space Requirements	Mechanical dewatering systems are compact and readily integrated into a sludge processing line. Most operate continuously however; filter presses operate in batch mode and require two units in parallel for continuous operation. Underflow from dewatering is redirected to the WWTP. Prior to dewatering, thickening may be required to provide initial volume reduction. Dewatering in settling ponds requires large land area.
Capital Cost	Moderate costs for mechanical equipment.
Operating Cost	Mechanical dewatering costs include the polymer use for thickening and energy costs for equipment operation. Equipment wear and tear high due to high pressure operation.
End Product	Mechanical dewatering produces a semi-dry product with multiple beneficial use options: Land application • Landscaping products – Golf courses. • Soil Conditioner after vermicomposting or composting or via direct land spreading or ploughing. • Fertiliser delivery - add active ingredients such as Nitrogen. Slow controlled application of nutrients/fertilisers. Manufacturers must prove that there is no risk of contamination. Combustion • Suitable solids for combustion - Low water content (<65%) solids can economically generate energy for the mill. Construction • Building industry products - Sludge (or ash) additives can improve the quality of building products. Long storage times may alter the product).
Operating capacity e.g. viable at low vs. high tonnage	Viable at nearly any tonnage
Potential consenting issues	• Biological sludge dewatering in open lagoons are susceptible to generate odour • Dewatered sludge alternative use is subjected consenting due to potential pathogens • Land application of product need analysis and prior approvals
Technology Risk	A qualitative assessment of the likelihood of failure of the option or scenario due to issues related to the technology e.g. equipment failure, unable to achieve output standards 3 = low risk, technology well proven commercially in New Zealand for conventional dewatering. Novel methods for improving dewatering are relatively unproven.
Commercial Risk	No of suppliers Range of input materials A qualitative assessment of the likelihood of failure of the option or scenario due to issues related to the commercial arrangements e.g. supplier unable to maintain operations, increase in cost of process, transport or ongoing site management exceed those able to be reasonable recovered or those for comparable options. 3 = low risk, supplier well proven commercially in New Zealand
Market Risk	A qualitative assessment of the likelihood of failure of the option or scenario due to issues related to the 'market' for the product e.g. a use for the product cannot be found due to concerns about trace contaminants. For land application after vermicomposting or composting: 1 = high risk, potential for product to have no market if contamination concerns are raised. 2=med risk, if municipal biosolids are not included in the blend as organic certification for vermicomposted pulp mill solids has been gained in NZ. For combustion: 2 = med risk, reliant on single, but secure, market

This Pulp & Paper Solid Waste Technology Assessment was supported by the Ministry for the Environment's Waste Minimisation Fund.

CONTACT
Kim McGrouther
07 343 5772
kim.mcgrouther@scionresearch.com

www.scionresearch.com