

Recycled minerals developer, Switzerland-based CalciTech Ltd, has developed two new applications for its patented processing technology, which extracts pure calcium carbonate from industrial waste. Given the increasing demand for making industrial processes more sustainable, this technology offers an attractive solution with the additional benefit of transforming the original mineral into a purer and more valuable form.

Synthetic calcium carbonate (SCC), a purer version of the widely used filler mineral GCC, relies on the preferential solution of calcium hydroxide entering the reactor vessel as a filtered, clear liquid, to react with waste carbon dioxide.

Two examples presented here, from Europe and China, could be applied globally. Both use CalciTech's patented process which separates the mineral from insoluble impurities (*IM March '09, p.65: CaCO₃; Synthetic but effective*).

China: reprocessing carbide waste

In China, around 7m. tpa of carbide lime is produced from the PVC process. At present, this waste is used for building materials or dumped in landfill. In Europe and the USA carbide lime is classed as hazardous material and can no longer be disposed of without processing. The Chinese Environmental Protection Administration has required new plants to recycle or treat the waste.

CalciTech has processed samples of this material and found that it is similar to the waste carbide lime found near its plant in Germany from which pure SCC has been manufactured.

Europe: mineral usage in paper

Total paper and board production in Europe is about 100m. tpa, manufactured from: virgin pulp fibre (48m. tonnes), an increasing proportion of recovered paper fibre (35m.

SCC's paper performance

CalciTech outlines paper sludge's role as a new source of synthetic calcium carbonate for the paper market

tonnes) and a growing volume of mineral filler and pigments (17m. tonnes), according to CEPI statistics.

These minerals are not recycled and have to be quarried, ground, treated and transported to mills across Europe. A significant portion has to be transported from remote sources to the centres of production and consumption. For example, high quality ground calcium carbonate (GCC) for paper coating is mined and ground in Norway and the Mediterranean and shipped to north and central Europe. Special coating clays are imported from the USA and Brazil to provide properties that European clays cannot offer.

At present, when paper is recycled, these minerals are treated as a waste stream and disposed of as landfill or low value applications in agriculture. The EU Waste Directive 2008/98/EC classifies the mineral sludge as waste and unsuitable for agricultural use.

Many recycled paper mills incinerate this sludge to make paper sludge ash (PSA), which can be used in low-value agricultural and construction applications. However, mineral sludge continues to be a material of negative value that is costly to dispose of. Indeed, landfill taxes are forecast to rise dramatically in the next 5 years.

Recycling paper sludge

PSA can be economically converted to a high

performance functional filler, synthetic calcium carbonate, using CalciTech's patented processes. SCC is an additional source of raw material that CalciTech can use in its planned plant expansion.

By separating calcium oxide from PSA, CalciTech can create another relatively pure material called *metakaolin*; a synthetic, value-added mineral that finds applications in high strength cement (*see p.80*).

The volume of paper sludge sourced from recovered graphic papers is estimated to total about 12m. tpa. The mineral content of this sludge varies according to whether the source material is magazines, office paper, newspaper or packaging. Using CEPI statistics on the volume of the various grades of recovered paper, CalciTech estimates the calcium carbonate content of the paper sludge to be 4.5m. tpa.

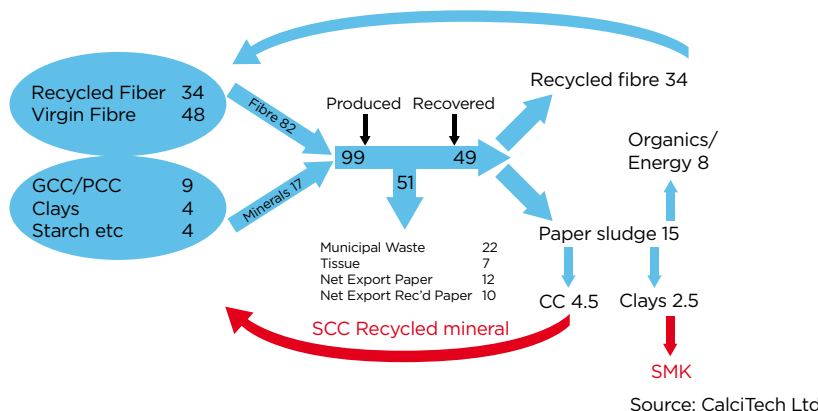
Using data from known recycled paper mills, the company estimates an addressable annual potential of 1m. tpa of SCC. At around 10 sites CalciTech envisages dedicated SCC plants with capacities between 30-70,000 tpa that only use PSA as a raw material source. Larger plants could be built where waste carbide lime or conventional burnt lime would also be used.

Environmental benefits

Recycling PSA brings significant benefits for a paper mill, the foremost of these being that disposal costs for waste minerals are eliminated; a big saving, considering costs will increase from €30/tonne to € 140/tonne when the EU's Waste and Landfill Directives are enforced in December 2010.

Additionally, there is no need to mine raw materials from remote locations – thus lowering a paper mill's carbon footprint. Also, carbon dioxide produced during the incineration of paper sludge is recaptured in the manufacture of SCC. CalciTech claims that SCC performs better than the original paper mineral with its higher brightness, opacity and printability.

European paper cycle (million tonnes, 2008)



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