

# TecEco Cements



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As featured in New Scientist Magazine, (July 13, 2002) Discovery Channel etc.

TecEco cements comprise a range of binders within a system whereby reactive magnesia is blended with Portland cement and usually a pozzolan to remove lime (Portlandite).



Hydrated Portland cement paste (after Soroos, 1999)

## ➤ TecEco modified Portland cements.

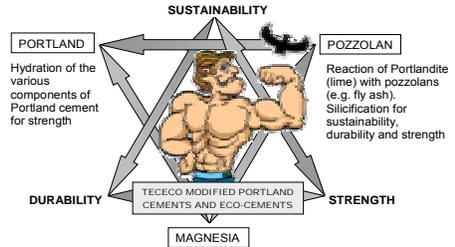
- Contain more Portland cement than reactive magnesia. Reactive magnesia hydrates in the same rate order as Portland cement forming brucite which densifies, maintains pH and protects due to its low solubility. Other benefits include lower water cement ratio, improvements in rheology, less shrinkage and carbonation.

## ➤ TecEco eco-cements

- Contain more reactive magnesia than Portland cement.

## ➤ Ramifications include:

- Greater Durability.  
TecEco cement concretes are not attacked by salts and do not carbonate as readily.
- A Lower More Stable pH for much Longer? – Less Corrosion  
As Portlandite is removed the pH becomes governed by the solubility of brucite and is much lower at around 10.5 -11 reducing problems such as AAR and etching, but still high enough to keep Fe and Fe<sub>3</sub>O<sub>4</sub> stable.
- Increased Density  
Brucite also densifies the matrix by filling in pore spaces taking up mix and bleed water as it hydrates reducing shrinkage. (Bleed water is taken up by brucite which is 69 mass% water!)
- Improved Rheology  
Reactive magnesia being much finer acts as a lubricant for Portland cement:  
Improving the rheology, reducing the water/cement ratio, improving strength and reducing shrinkage.
- Greater Sustainability  
TecEco modified Portland cements are more durable, last longer and there use less resources requiring less energy over time, whereas TecEco eco-cements can re-absorb considerable carbon dioxide making them suitable for large scale abatement.



**Modified Portland Cements**  
Hydration of magnesia → brucite for plasticity, durability and sustainability.

**Eco-Cements**  
Carbonation of brucite → hydromagnesite and magnesite for strength and abatement.

## TecEco Research Activities

Current research activities include a scoping study at the BRE in the UK, a study into hydration at UTS in Australia (pending) and major research initiatives on sustainable brownfield remediation, regeneration, waste minimisation and re-use at Cambridge University (UK).

The new TecEco cements have many advantageous properties for many applications opening up considerable avenues for research. They can utilise and bind a wide range of wastes considered toxic or hazardous as brucite can accommodate many substances because of its layered structure. TecEco cements are also likely to have additional desirable advantages as binders in combination with zeolites and carbonaceous materials.

**Eco-cements** are revolutionary new materials that use the built environment itself to create “structures that soak up carbon dioxide - the main greenhouse gas behind global warming.”

Many people believe that the recent extreme weather patterns are a foreboding warning of the future. Scientists therefore have a responsibility of finding ways of maintaining earth eco-systems.



With capture of CO<sub>2</sub> during the manufacture of eco-cements the potential for abatement is in the order of two billion tonnes or more and therefore should be considered very seriously.

TecEco are looking for research partners as well as funding to continue research in to what could be a major breakthrough in our efforts to find suitable systems to manage our impact on earth.

Should you have a research project in mind we will do our best to assist. Research partners will be in a position to negotiate licenses at a discounted rate. If you wish to find out more we suggest you visit our web site at [www.tececo.com](http://www.tececo.com), go to the technical documentation page and download some of our technical documents. A password is required for which you will need to contact the company at the email address shown below

**These properties make TecEco cements ideal for many uses including waste fixation, masonry products, pavement and ultimately readymix**

and on the web site.

**SCIENCE PAPERS AND BUSINESS DOCUMENTS ARE DOWNLOADABLE FROM THE WEB SITE AT [www.tececo.com](http://www.tececo.com) IF REQUIRED ASK FOR A PASSWORD.**

### MAJOR RESEARCH (As at 15/08/03)

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UTS (Sydney, Aust.)

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