



**banah CEM**

*High Performance Geopolymer Cement*

*High Performance Geopolymer Cement*

Andrew McIntosh  
8<sup>th</sup> July 2015  
Saint-Quentin



# Agenda

- Introduction to banah UK Ltd
- The banahCEM System
- Current Projects
- Standards



# Introduction to banah

- Formed 2008
- Geopolymer cement manufacturer
- Obtained significant investment 2014
- Construction of production plant – 150,000 tpa
- Expansion of R&D Facilities
  - XRD
  - STA
  - PSD
  - Compression / Tensile Test
- Customer Collaboration
- Standardisation



# The banahCEM System



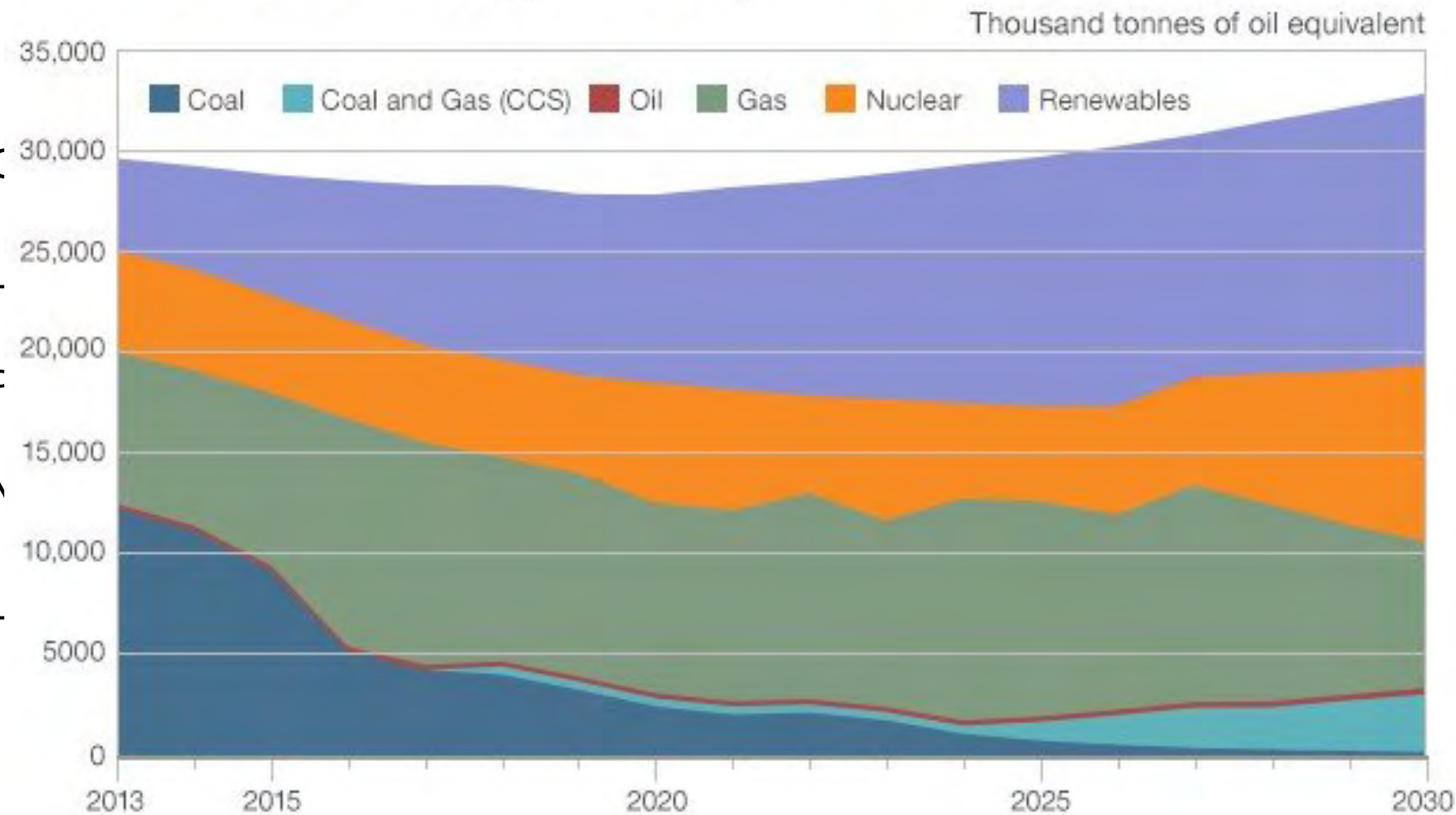
Powder Component  
banahCEM (a)



Liquid Component  
banahCEM (b)

# The banahCEM system

Future sources of electricity (2013 – 2030)



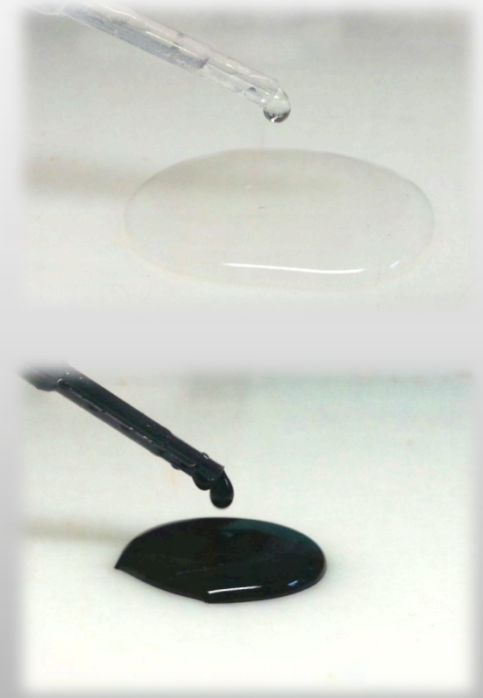
Source: DECC



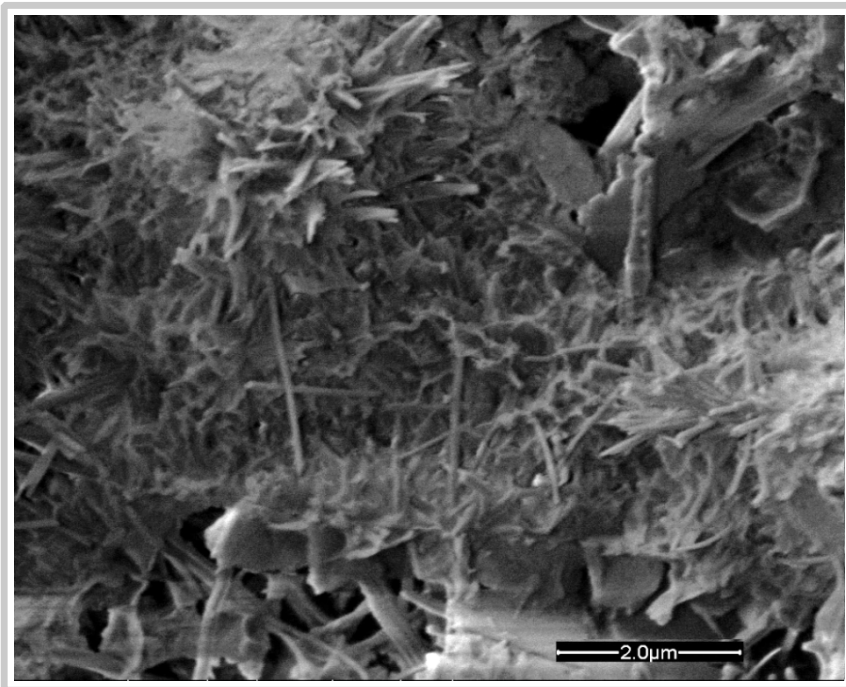
linitic

## Liquid Component - Production

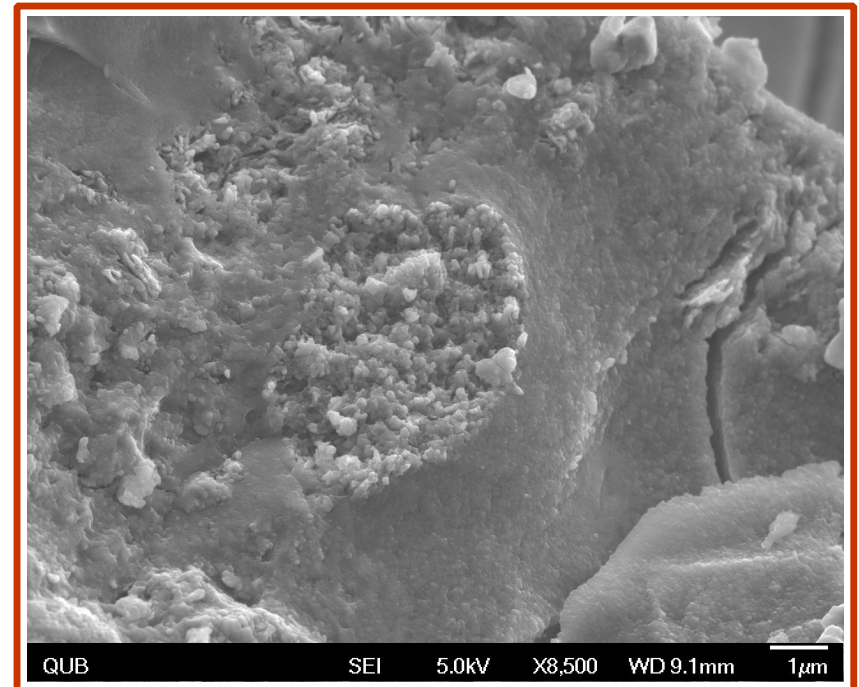
- Two Options Available
  - Modified Commercially-available Silicate Solutions
  - Alternative Amorphous Silica-based Production of Alkali Silicate Solution
- Alternative Option Enables use of By-products Containing Amorphous Silica Source.
- Option Chosen Depends on End-Use
- Alternative Option has Lower Carbon Footprint



## Scanning Electron Micrographs (1 $\mu$ m = 0.001 mm)



Portland Cement



banahCEM

## Fire Resistance

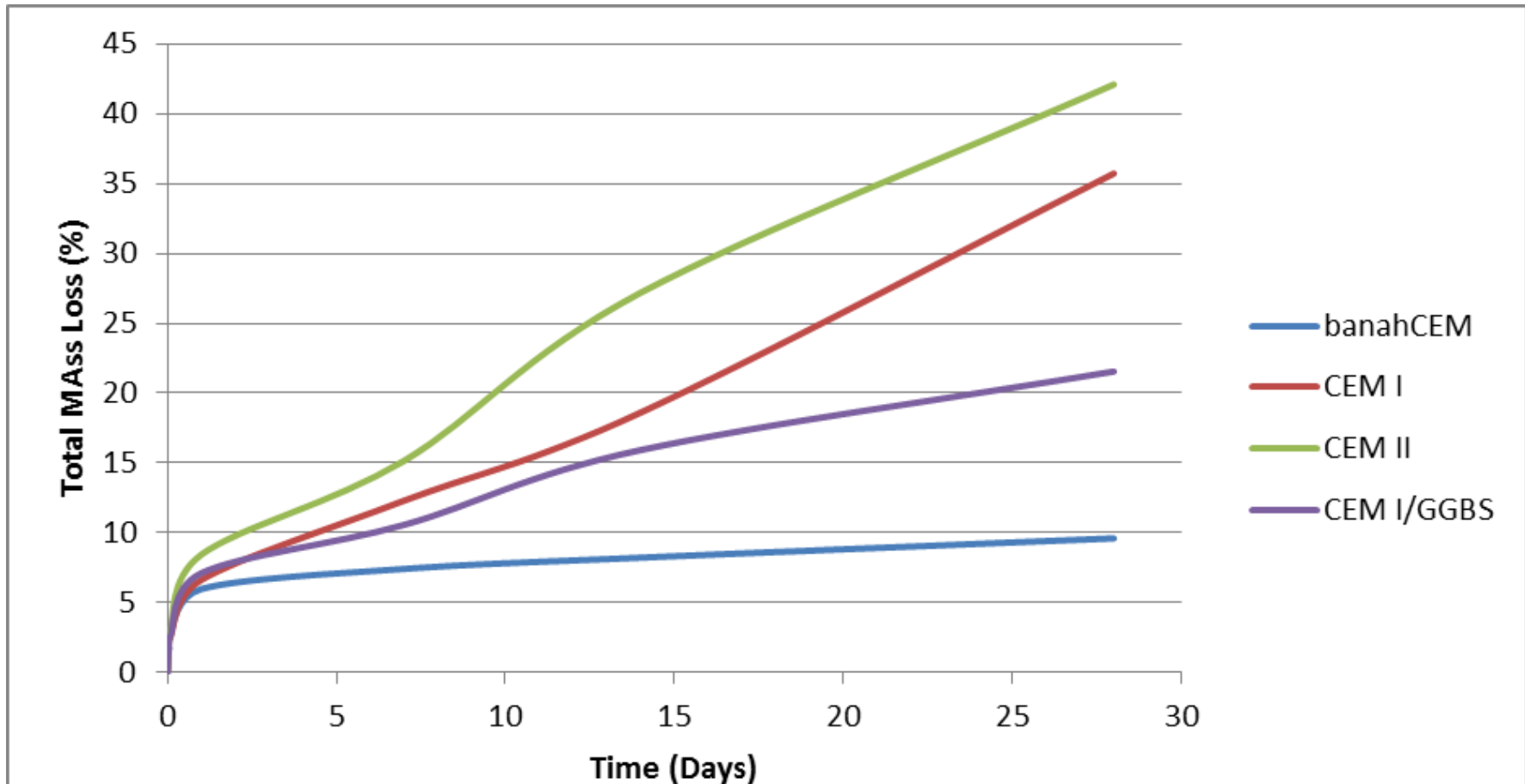
- Typical Portland cement concretes will spall at 350°C
- Typical house fire burns at 660°C
- banahCEM Stable to 800°C and Retains Integrity to +1000°C
- Research in this area continuing with University of Ulster (FireSERT)



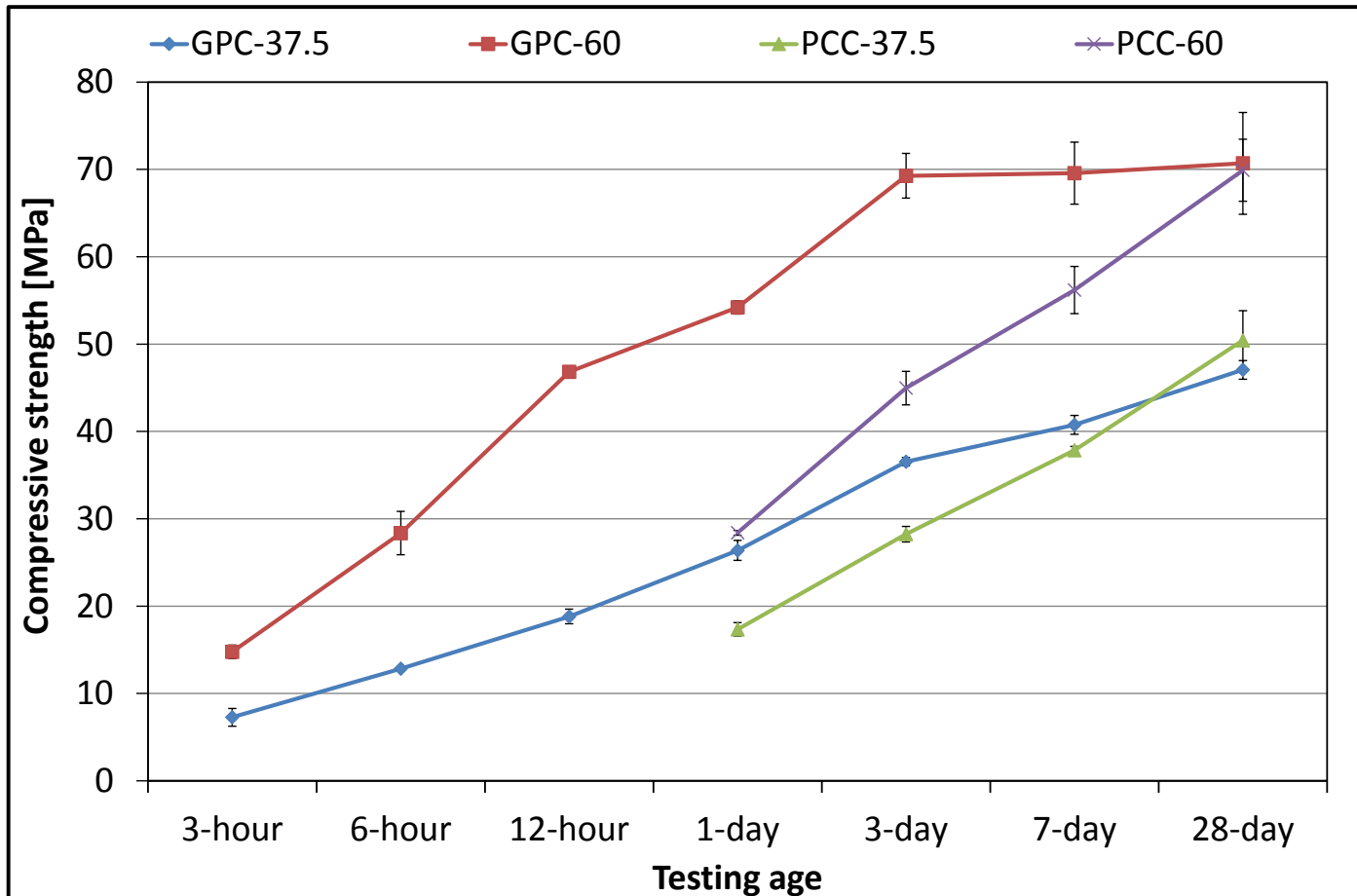
Before and After  
Heating to 1000°C



## Acid Resistance



## Rapid Strength Gain





CO<sub>2</sub> / tonne cement - 0.8 tonnes

**banahCEM**

Global cement production per year - 3 billion tonnes

**reduces this by**

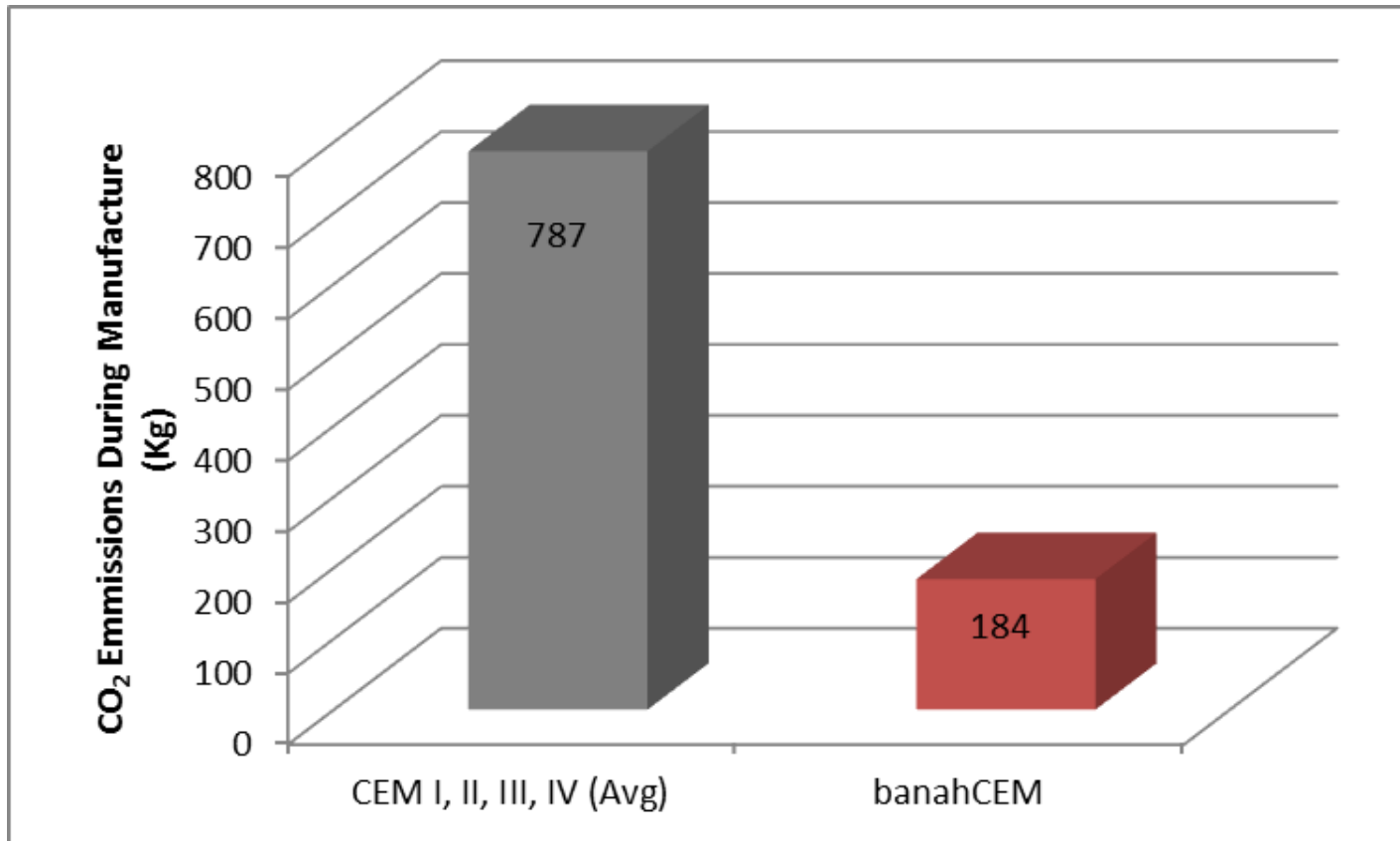
**80%**

Contribution to annual man-made CO<sub>2</sub> - 2.4 billion tonnes

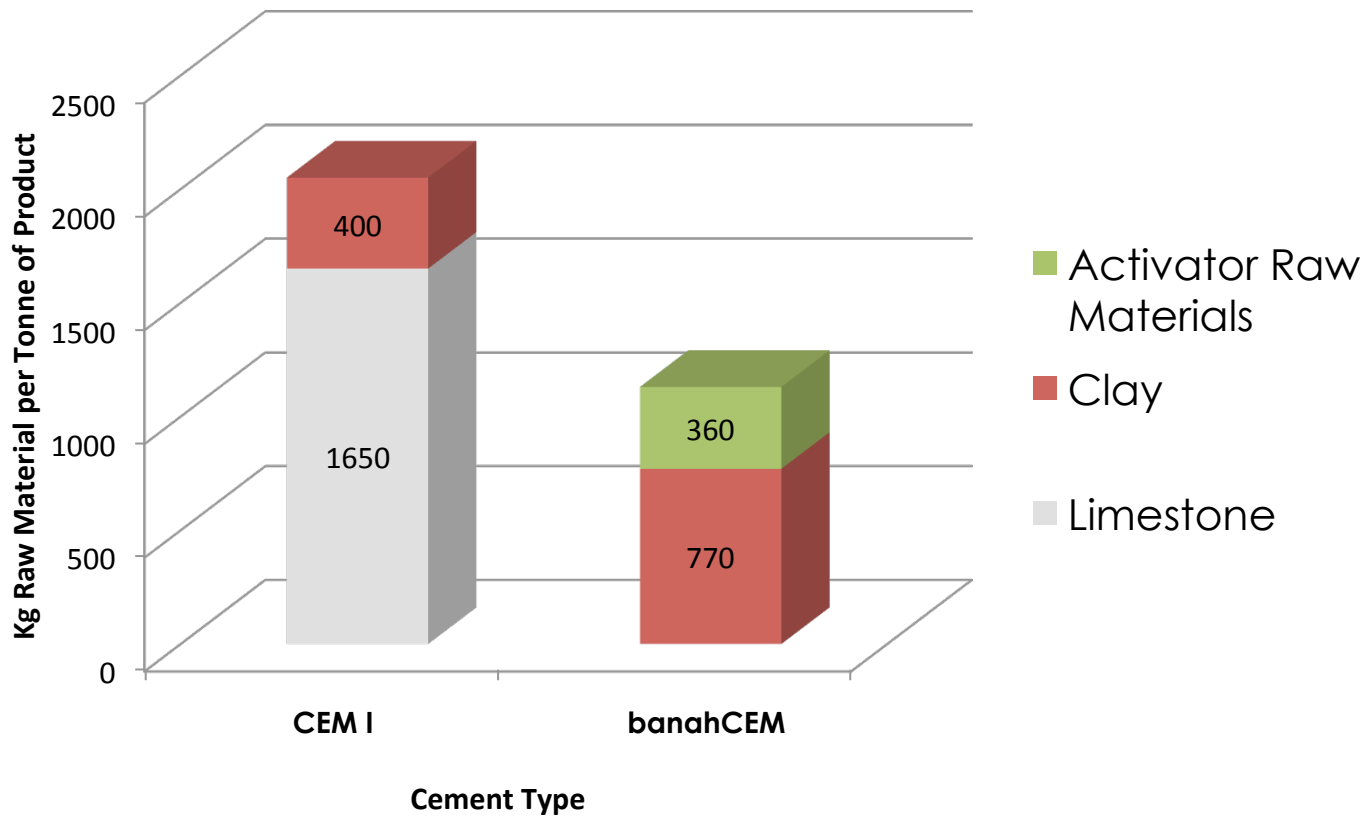
CO<sub>2</sub> Emissions

**or 6% of Global CO<sub>2</sub> based on 2014 figures**

## CO<sub>2</sub> Emissions



## Hole in Ground Factor



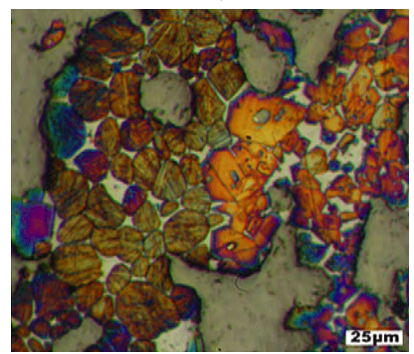
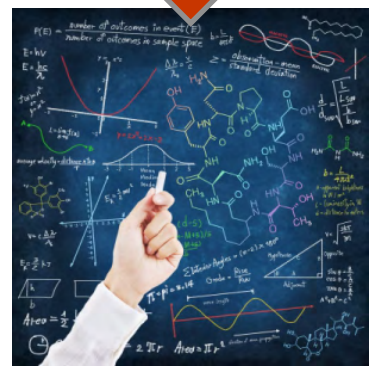


# banahCEM Production





# University Collaboration



## Current Applications

- Sub-sea Installations – anchoring
- Wastewater Infrastructure - pipes
- Tunnel Linings and Fire Refuges
- High Quality Moulding - GRC
- Acid Resistance – Industrial
- Foamed Products - panels
- Sustainable Concrete – Green Building





- PAS
  - PAS 8820 : 2016
  - Nomenclature issues - AACM
- EAD/ETA
- Test Method Development
- REACH Compliance



Website:  
[www.banahuk.co.uk](http://www.banahuk.co.uk)

E mail:  
[andrew@banahuk.co.uk](mailto:andrew@banahuk.co.uk)