

Novacem – carbon negative cement  
to transform the construction industry

**Innovation and Investment Opportunities in  
Carbon Capture and Storage**

*Energy Futures Lab, Imperial College*

*London • 15 October 2008*

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## The Novacem proposition

### **Novacem will transform the construction industry with a new carbon negative cement that will replace Portland cement**

- Portland cement is a pervasive and important material (US\$150Bn/year) but accounts for about 5% of man-made CO<sub>2</sub> emissions
- Novacem has invented a new type of cement that has the potential to achieve cost and performance parity with Portland cement
- Best of all, our cement uses less CO<sub>2</sub> in its manufacture and then absorbs CO<sub>2</sub> as it cures. Compared to Portland cement, we have an advantage of approx 1 tonne of CO<sub>2</sub> per tonne of cement
- Novacem is a spin-out from Imperial College, London
  - Five year pipeline agreement with 5\* Civil Engineering Department
  - Seed funding from Imperial Innovations (AIM: IVO.L)
  - Building world class team under Chairman Stuart Evans
  - Leads £1.5Mn Technology Strategy Board (TSB) project with partners Rio Tinto Materials, Laing O'Rourke, WSP and Imperial College
  - Labs and offices in the Imperial Incubator

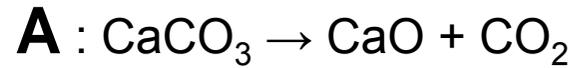
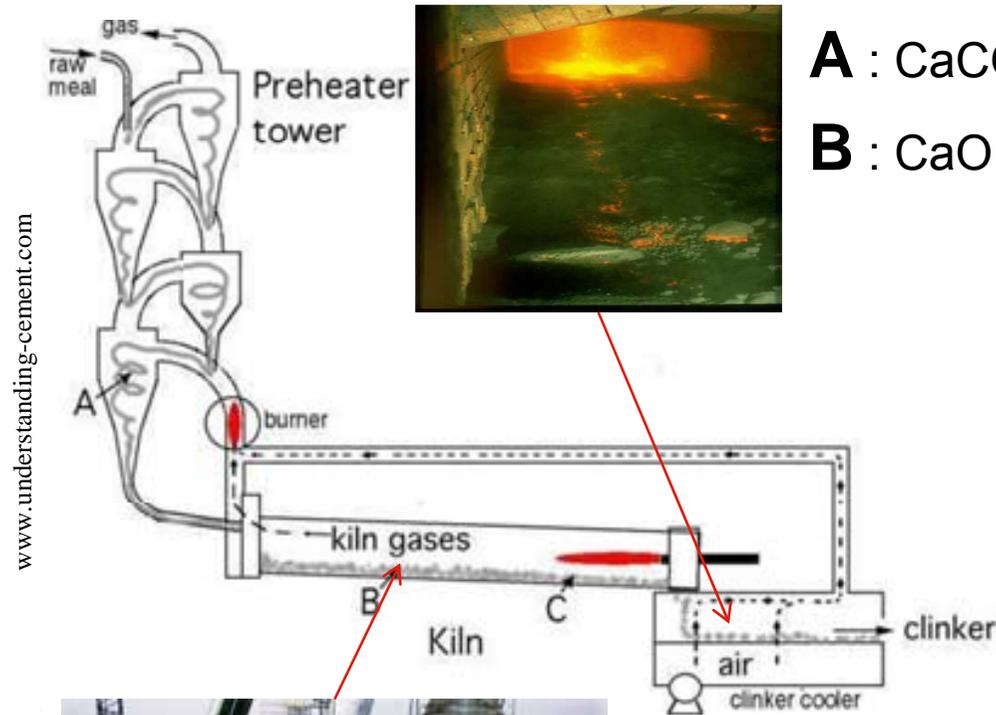
## Novacem and Imperial College

**In the world of innovative high tech firms, universities and young start-ups are often closely linked. But they have different (although complementary) objectives**

- **Imperial College:** a machine for turning Money into Knowledge
- **Novacem:** a machine for turning Knowledge into Money

**The Novacem Chairman has deep experience of taking great inventions from great universities and turning them into great companies.**

Portland cement is socially and economically essential but has a high carbon footprint

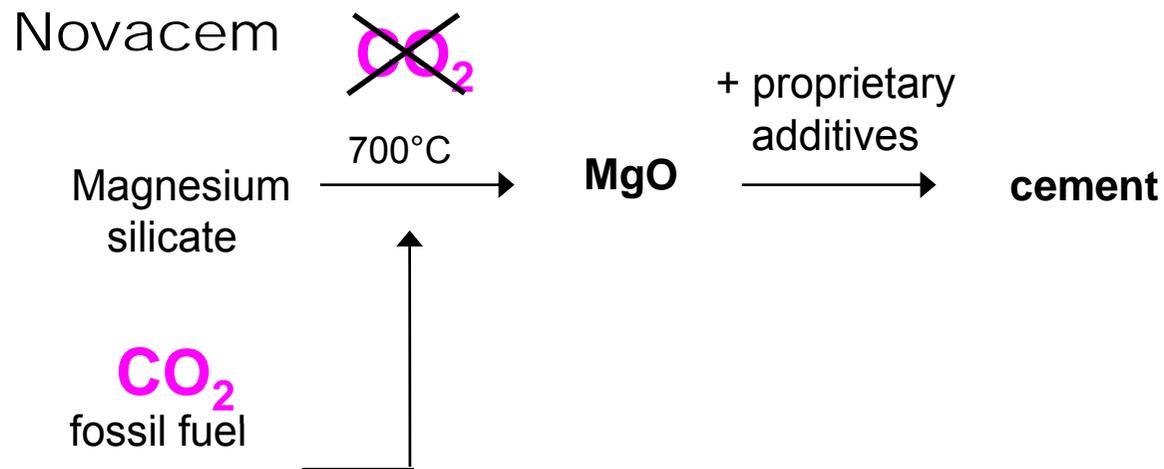
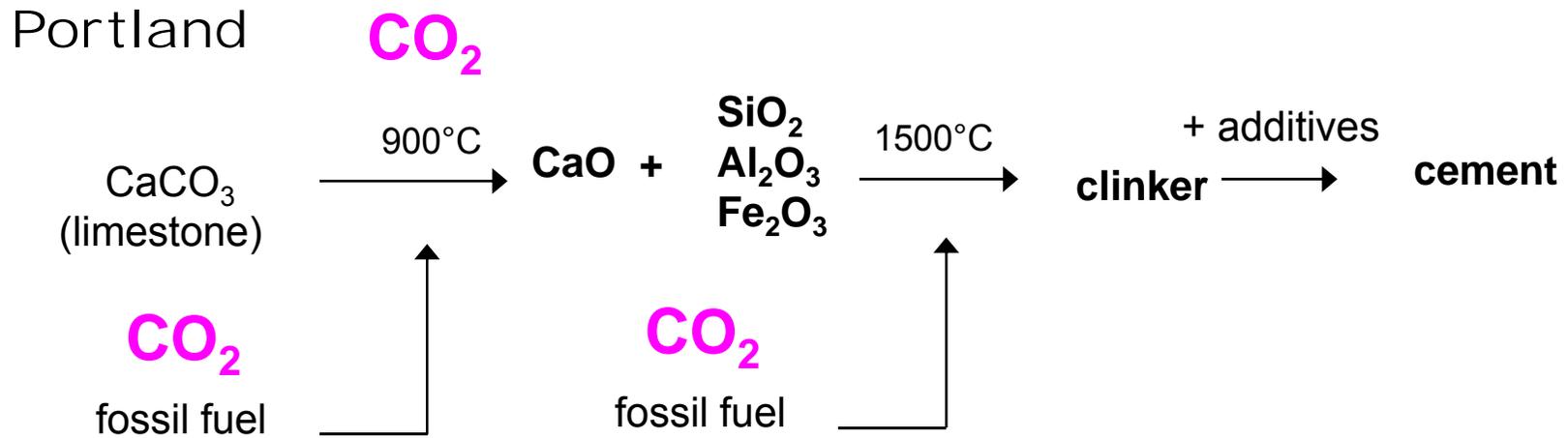


**clinker + calcium sulphate = cement**

**aggregates + cement (‘binder’) = concrete**



Novacem has invented a new carbon negative binder based on Magnesium Oxide (MgO)



Novacem will win in both production and use

|          | <b>Production</b> | <b>Use</b> | <b>Total</b> |
|----------|-------------------|------------|--------------|
| Portland | 0.8/1.1           | (0.2/0.5)  | 0.4          |
| Novacem  | 0.2/0.4           | (0.9/1.1)  | (0.6)        |
|          | Novacem Advantage |            | (1.0)        |

*tonnes of CO<sub>2</sub> generated/(absorbed) per tonne of cement*

*Source: Imperial College/Novacem research*

The big win is that if Novacem completely replaced Portland, cement would absorb about 5% of man-made CO<sub>2</sub> emissions rather than generate 5%

## A great start to building a world-class team



**Stuart Evans, Executive Chairman.** An entrepreneurial business leader since 1984, was founding CEO at Plastic Logic and Cotag International. Early career at IBM & McKinsey following Harvard MBA & Cambridge BA/MA. Full profile at [www.linkedin.com/in/stuartevans](http://www.linkedin.com/in/stuartevans)



**Dr Nikolaos Vlasopoulos, Chief Scientist.** PhD and MSc at Imperial College, following MEng at Democritus University of Thrace in Greece. Received Technology Venture Fellowship at Tanaka Business School in 2007.

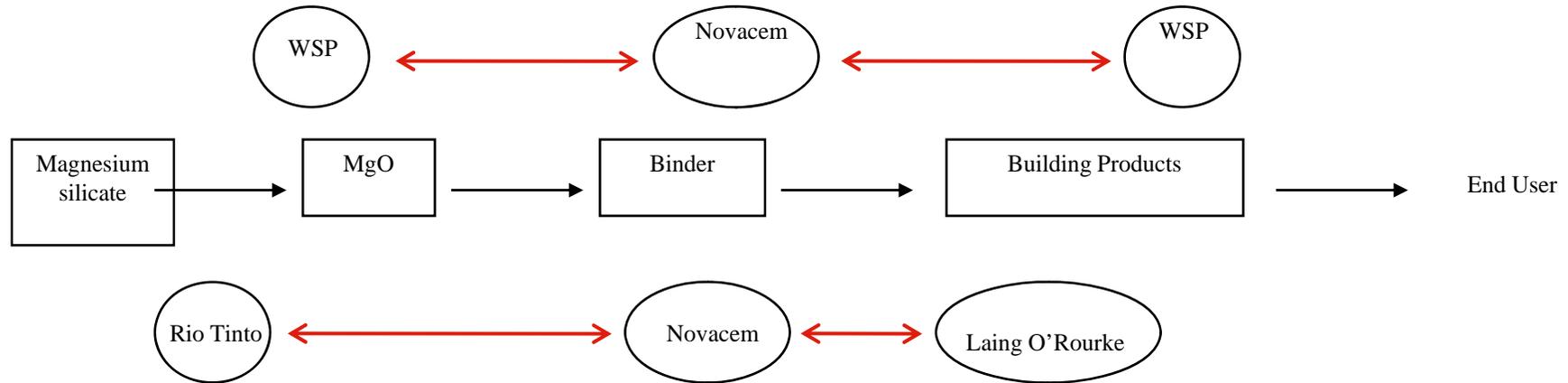


**Dr Chris Cheeseman, Senior Scientific Advisor.** Reader in Waste Management in Civil and Environmental Engineering at Imperial. Leads large research group in resource efficiency & reuse of materials. Over 100 scientific papers. Oxford DPhil.



**Daniel Ptacek, Business Development/Project Management.** Over 25 years' construction industry experience in Europe and USA including Laing, Tarmac, Amey and others. Worked on the Millennium Dome and GSK Labs at Stevenage.

Our leadership of £1.5Mn TSB project with key industrial partners is impressive early validity of our technology



Leading global mining & exploration company with £30Bn sales and 47,000 employees [www.riotinto.com](http://www.riotinto.com)



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World class science-based university focused on science/ engineering and application to industry. [www.imperial.ac.uk](http://www.imperial.ac.uk)



## Business model and investors for platform technologies

- Novacem needs to develop and prove our technology and will require a pilot plant prior to scalable volume production. We still have to determine size/location but this is an important goal for the TSB project.
- Cement industry is globally fragmented – the top 4 companies are only 14% of industry revenues. Its much more concentrated in the UK, but Novacem is playing a global game.
- This is a big job and we can't do it on our own. We aim to build a ecosystem of investors and partners that can make a real difference. And governments have an important contribution to make as well.
- We don't plan to have our own cement plants, but will make our technology available to others on competitive and compelling terms.
- Imperial Innovations is a great seed investor. From this foundation, we will build a high quality group of global financial and corporate investors.
- But remember, business models usually change in high tech start-ups developing platform technologies. As we develop our technology and get out into the market, we'll learn more about what it takes to win.

## Novacem milestones

| <b>Event</b>                                      | <b>Timing</b> |
|---|---------------|
| • Basic research at Imperial College              | 2005 onwards  |
| • Innovations starts seed funding in stealth mode | Oct 2007      |
| • Wins TSB project                                | April 2008    |
| • Moves into Incubator                            | Oct 2008      |
| • Bench scale process in the lab                  | Oct 2009      |
| • Testing and validation                          |               |
| – Building products (eg, blocks)                  | Aug 2010      |
| – Reinforced structural concrete                  | Aug 2010      |
| • Pilot plant operational                         | Aug 2010      |

In competitive terms, its still early days with everything to play for

- The traditional cement industry is under pressure<sup>1</sup> to tackle the carbon problem and is following a fourfold strategy:
  - Using pozzolans to blend with Portland cement
  - Including mineraliser additives to reduce process temperatures
  - Energy efficiency/using green fuels
  - CO<sub>2</sub> sequestration
- Other new entrants are emerging, including
  - Calera, California
  - TecEco, Australia
  - C-Fix, Holland
  - Calix, Australia

We have a healthy respect for these companies (whose existence reassures us we are onto a good thing), but know where we have advantages

*Note 1 - see, for example, Cement vs Carbon, Credit Agricole, Sept 2008*

## Conclusion

- There is an unprecedented and urgent imperative. As John Doerr<sup>1</sup> put on Monday: *“You can bail out the banks; you can’t bail out the environment”*
- Consumers and their governments are demanding the construction industry change its ways
- This is a great opportunity to move from invention & research to customers & products – the race is on!
- Many different elements in the emerging value chain need to work together to deliver the best solution for consumers
- We welcome the opportunity to discuss these ideas with you, and thank you for your attention!

*Note 1 – conversation with John Doerr, Partner at Kleiner Perkins at Harvard Business School – Monday 13 October after a week of unprecedented financial turmoil and government intervention*

## **Great companies need great people**

If you are a talented, hardworking and enthusiastic individual, interested in a career opportunity with Novacem, please submit your resume to:

**[careers@novacem.com](mailto:careers@novacem.com)**

# Thank you!

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