Revolutionising Concrete

Carbon Nanotube Enriched Concrete

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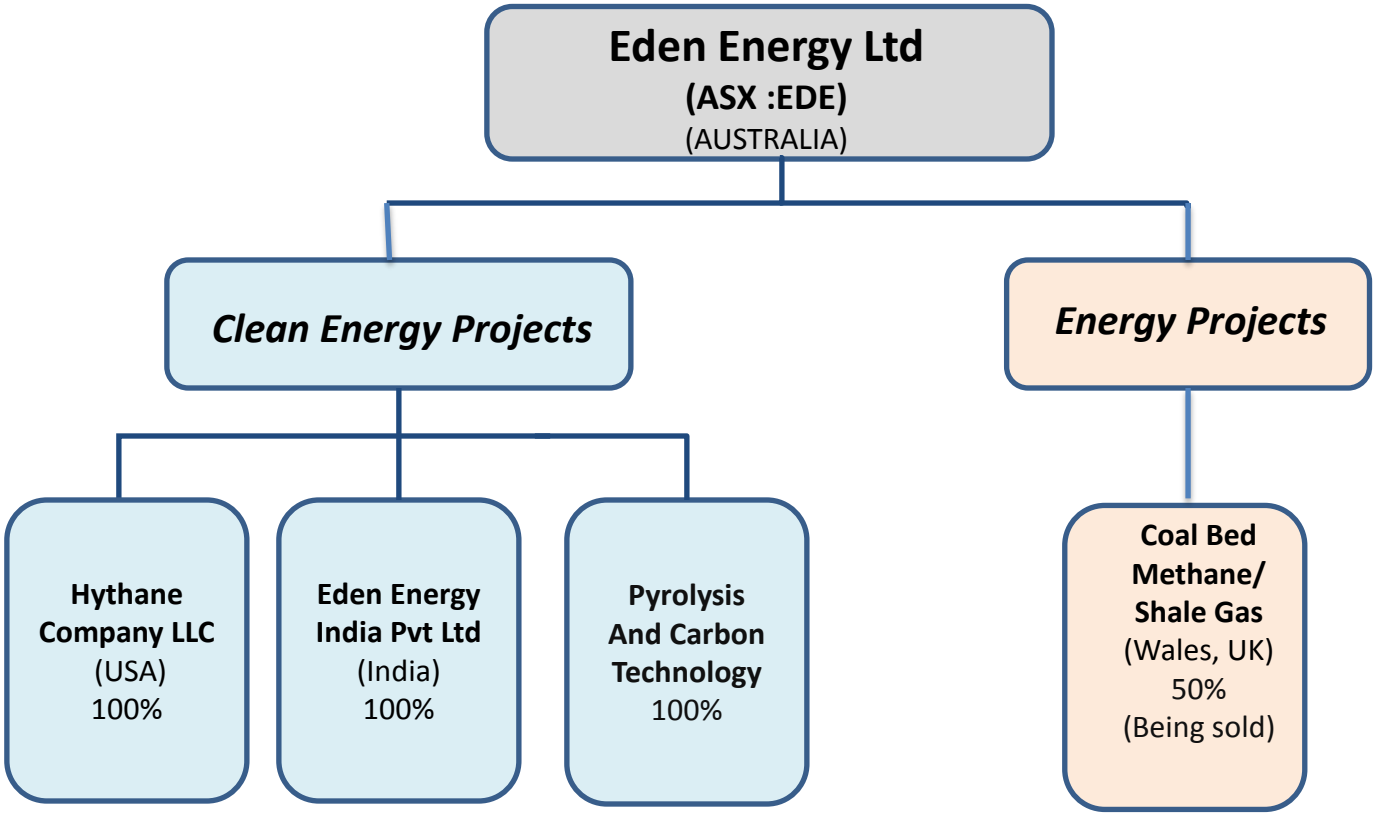
Chairman
11 November 2014

Corporate Structure

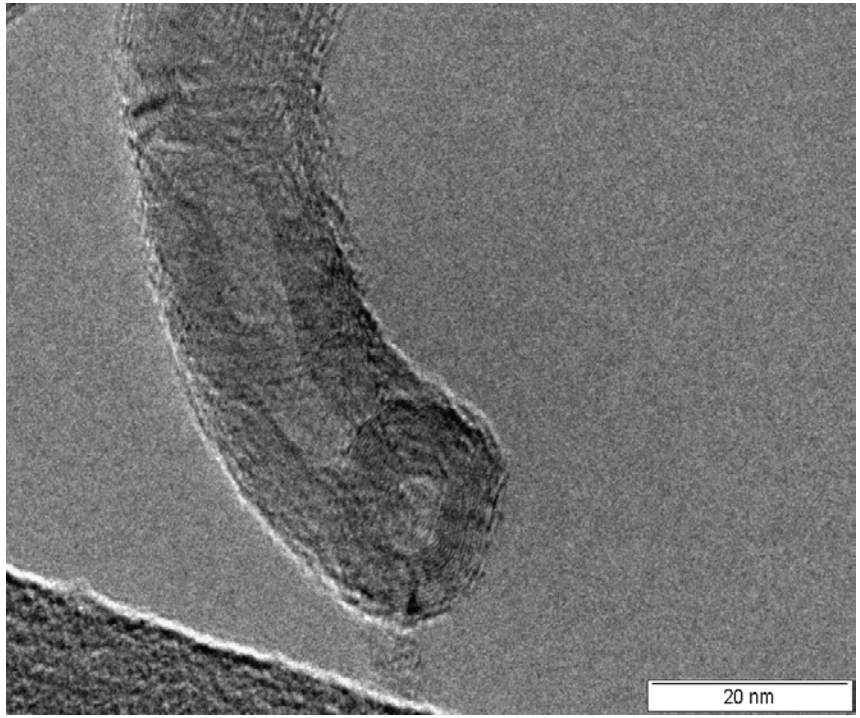


Carbon Nanotube Project

UQ/ Eden Developed Pyrolysis Process-CNT/CNF from Natural Gas (Eden 100%)

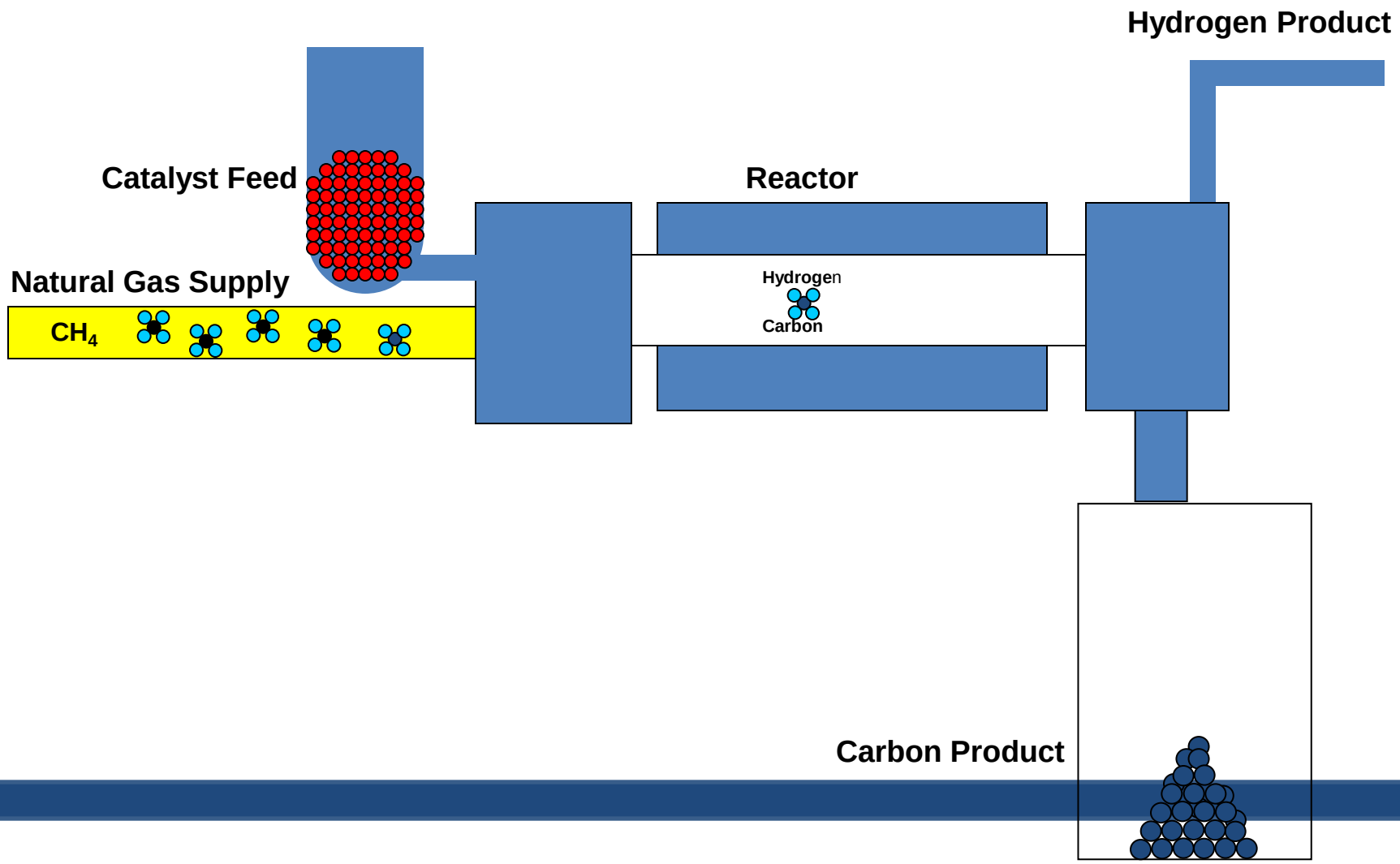
CH_4 + Catalyst + Heat = C + $2H_2$

- **Produces only CNT + H_2 - no CO_2**
- **Multi-walled carbon nanotubes:**
  - Tensile strength - 200-300x steel
  - Approx. 17% the weight of steel
  - High electrical/thermal conductivity
  - Bulk uses – concrete/plastics/polymers
- **Patents in 8 countries**



TEM image of Eden's MWCNT

Eden Energy CNT/ CNF Production



Eden's CNT/CNF Production Capacity

- **Eden's Commercial Scale Reactors in Denver, USA**
- **Scalable, modular reactors**
- **Capable of producing <40 tonnes of CNT/ year**
- **Low cost catalyst production**
- **High quality/low cost CNT/CNF**

CNT in Concrete

- **Significant global research conducted over past 5-8 years**

- **Monash University (Melbourne) - Collaboration**
  - Ongoing collaboration since 2011

- **US Consultant (Denver, Colorado)**
  - Assisting Hythane Co in testing and developing US market
  - Is arranging initial US trial for late 2014

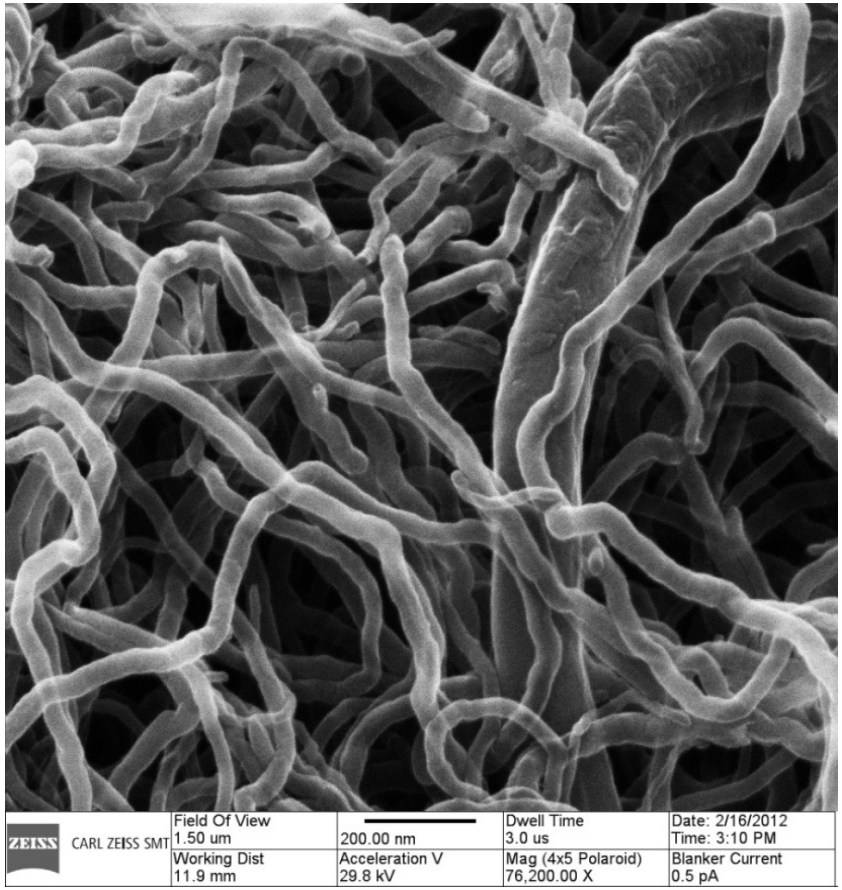
- **Major International Concrete Company**
  - On-going discussions with Eden and plans initial Australian trials in early 2015 for suitable applications

CNT in Concrete – Results to Date

- **CNT Concrete - 0.5 % CNT : 99.5% cement**
  - < 30% increase in compressive strength of cement
  - < 14% increase in tensile strength of cement
  - CNT act as nucleation points for cement hydration resulting in denser, tougher, less permeable cement

- **Product - CNT enriched liquid admixture**
  - mixed during batching

CNT in Fresh Cement Paste

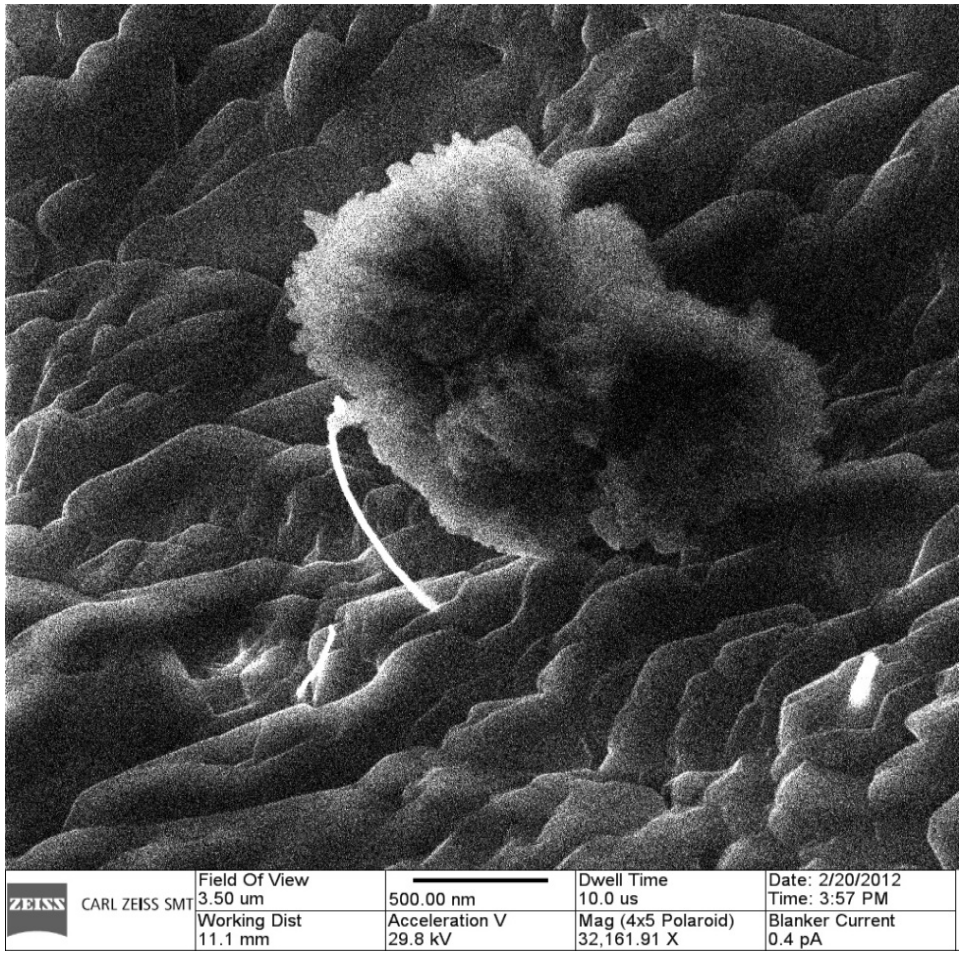


Monash University Helium Ion Microscope Image

Build-up of dense, hydrated cement on surface of CNT (top right)

- **CNT provide:**
  - nucleation points for cement hydration
  - nano-scale fibre re-enforcement.
- **CNT facilitate denser, stronger cement** and potentially more durable concrete**.**
- **Other larger-scale fibres provide** only nano-scale fibre reinforcement.

CNT in Fractured Hardened Cement Paste



Monash University Helium Ion Microscope Image

CNT bonded in hardened cement paste after fracturing

Note: ends of CNTs are well-bonded within cement gel and provide anchorage

CNT in Concrete - Benefits

- **Benefits – denser, stronger, tougher cement**
  - Mixed into liquid surfactant and added during batching process
  - Less concrete needed
  - Less steel re-enforcing (or perhaps none)
  - Greater abrasion resistance- lower maintenance costs
  - Denser, less permeable cement
  - Reduced building costs/ greater design flexibility

CNT in Concrete- Applications

- **Global Applications**
  - **Increased Abrasion Resistance**
    - road and bridge surfaces/ airport runways
    - pavements , warehouse/factory floors
  - **Increased Compressive and Tensile Strength**
    - high rise buildings, bridges
  - **Lower Permeability**
    - dams, spillways
    - sewer /water pipelines
    - coastal and marine applications

Global Concrete Market

- **Global concrete/ cement market- US$450 billion/year**
  - **Approx. 1 tonne of concrete** produced annually for every person
  - **Cement production creates 5% of annual global GHG emissions**
  - **CNT concrete could reduce cement** requirements by >15-30%

- **USA - initial target market**
  - **700 million tonnes/year** of concrete
  - **89,000kms of concrete** paved roads and bridges
  - **US$40 billion annual** infrastructure maintenance cost

Future Large Scale CNT Production

- **1,000 tonnes p.a. CNT capacity reactor**
  - **sufficient for > 1.7 million tonnes concrete** -7% of Australian market
- **10,000 tonnes p.a. CNT capacity reactor**

  - Natural Gas Fired Power Stations

  - Fertiliser Plants
  - **500 MW station** uses >100,000 tpa of natural gas (NG)
  - **10,000 tonnes CNT**: needs 5% of total NG; enough for 70% of Aust. concrete
  - **H_2 - 3,333 tonnes-** used in power production/ ammonia for fertiliser
  - **CO_2 reduction < 36,000 tpa** in both cases

Challenges and Marketing Plans

Challenges

- **Extension of shelf life of admixture** development underway
- **OH&S concerns resolved**
  - CNT in low concentrations (< O.5%) in liquid admixture
  - CNT used in low concentrations and is firmly bonded with cement

Marketing Plans

- **Global manufacturers planned for CNT admixture** production /marketing
- **Global concrete company interest-** initial Australian trials planned Q1 2015
- **US Trials to commence Q4 2014** –likely initial target roads/ bridges
- **Planned US commercial rollout in 2016**
- **Eden awarded Civil Contractors Federation Environment Award** -Oct 2014

Disclaimer – Forward-looking Statements and Projections

Whilst reasonable care has been taken in compiling the forward projections, timetables and costs estimates in this presentation, they necessarily are based on many assumptions and factors that are beyond the control of the company and accordingly there is no representation or warranty given that these projections will be achieved. There are many uncertain market and exploration risk factors on all the projects, particularly related to new markets and products such as carbon nanotubes and fibres and the risks are varied, including risk that patent applications will not be granted, or another party may claim priority or that other methods of producing better and cheaper alternative products will be developed and that projected prices will not be achievable. In the Indian market, there are many risks which are beyond the control of the company and which could significantly impact on both the prices that are achieved , the sales turnover and the production and operating costs. These risks include delays in the availability of the Natural, increases in the price of Natural Gas, market competition, shortages and cost increases in raw materials and labour, political or economic instability, problems with reliability of equipment produced and sold, warranty claims, currency fluctuations, restrictions on foreign investment, disputes with potential joint venturers, market resistance to the products or services offered, lack of available capital or finance, restrictions on international travel and similar factors beyond the control of the company. For these reasons, all potential investors and others must satisfy themselves on the reliability of these forward looking projections before acting upon any information provided to them in relation to forward looking projections, and neither the company nor any of its officers make any representations, warranties or commitments that these or any other forward projections will necessarily be achieved.

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