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Low emissions power and heat
- a chemical engineer's view

EFNZ workshop
6 December 2007

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Going global

Chemeng degrees are seeing a revival around the world – just as UK figures jump to their highest level in over a decade. **Rob Crossley** investigates



New Zealand's ambitious energy plans

THE government of New Zealand has set itself far-reaching targets in its new energy strategy, announced earlier this week.

Announcing the country's national energy strategy, prime minister Helen Clark said that New Zealand "is uniquely positioned to achieve greater sustainability in the energy sector." Exploiting this could give the country a huge strategic advantage, she added.

The strategy foresees a widespread switch to biofuels, hybrid vehicles and electric-powered cars, giving renewables a 25% share of the transport fuels market by 2020, which is set to rise to 85% by 2050. Four out of five cars on

the road will have to be able to use 10% biofuel blends by 2015. Electric-powered cars are expected to make up 5% of the cars on the road by 2020, and 60% by 2050, Clark added.

The country's energy minister David Parker is targeting a bit expansion of wind and geothermal power to help the country achieve its renewable electricity goals. New Zealand already generates 65% of its power from renewable resources, mostly from hydroelectric dams. The need for more fossil fuel power generation should be very limited, and Parker said that no further fossil fuel plants should be needed for at least the next ten years.

We're attracted to innovative ideas.

We're attracted to lowering carbon emissions.

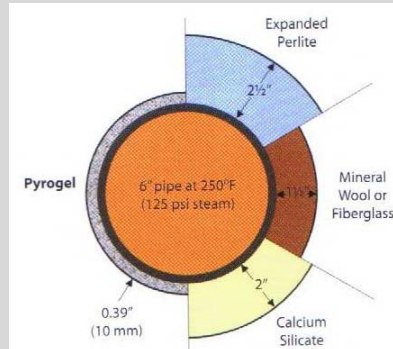
We're offering up to £250,000 of funding.

Attracted?



Hazelwood retrofit awarded

Process Group wins contract for demonstration project



Midlands Consortium wins energy institute

Birmingham, Loughborough and Nottingham net \$1b project



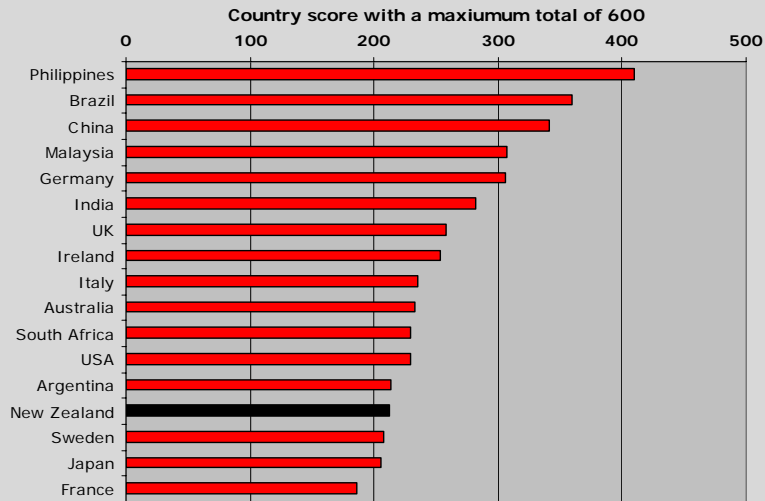
NZES under-values industrial energy efficiency

- If we are serious about reducing carbon emissions:
 - to improve our international competitiveness
 - to grow GDP
 - to reduce the carbon footprint of our export products
 - to invest in energy efficient plant

- We should be focusing on industrial energy efficiency

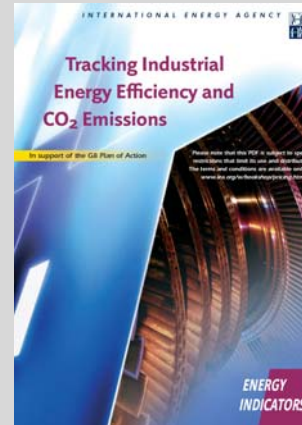
- Industrial energy efficiency should underpin the economy especially with emissions trading on the horizon

Industrial energy efficiency bench-marking



Source: Grant Thornton International Business Report (2007)

Newly industrialising countries appear to have done more to manage their energy costs than the service-oriented economies



The energy intensive industries

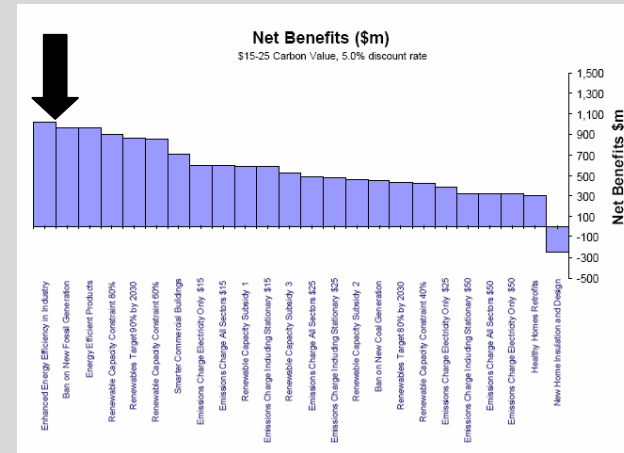
Source: OECD/IEA (2007)

- Efficiency has improved substantially
- All sectors can be made more efficient (around 20%)
- Asian countries are leading
- Three biggest sectors are chemical & petrochemicals, iron & steel and cement.
- Three biggest life cycle improvements: motors and steam systems and cogeneration
- New Zealand gets little mention

Our challenge in reducing carbon emissions

Both of these options will deliver 0.5 MtCO₂/year savings

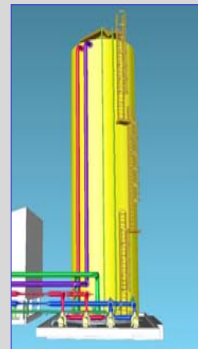
	Targets	Cost
Industrial energy efficiency	-8PJ/y (200 projects)	\$230M
Wind	+250MW (2 projects)	\$670M



Source: MED Benefit-cost analysis (2007)

NZEECS targets -2.4PJ/y in 2012

Two major heat recovery projects saving - 0.5PJ/y in 2005



Fonterra - Whareroa



CHH Kinleith

Constraints and gaps

- Technical leadership
- Skilled resources at all levels
- New thinking in two areas:
 - *Systems optimisation*
 - *Life cycle optimisation*
- More technology transfer projects in unit operations:
 - *Drying*
 - *Refrigeration*

Low emissions power and heat

As a country we need to recognise the value from industrial energy efficiency and that it will take time to build the technical resources we will need to implement NZES and emissions trading.