



Investment NZ commissioned study on NZ cleantech capability and activity in December 2007 – resulting from an influx of enquiries into our offshore offices;

“You Kiwis are clean and green, you have great resources, you guys are smart – you must have some great cleantech investment opportunities” [came to us because of Brand NZ]

We do, but companies and clean technologies suffer from perennial NZ problems around commercialisation - could see no coordinated approach to exploiting this capability and opportunity.

Developed concept in early 2008 - the **Clean Economy** – to get people joined up around this opportunity [as it impacts on all parts of the economy and could benefit the entire New Zealand economy]

Believe this is the single greatest opportunity for us to transform our economy – and the world wants to engage with what we have;

A brand to die for, an abundance of resources for renewable energy and biomass, and some smart thinking

Clean and Green, 100% pure [Koreans want it, Californians want it, Chinese and Indians want it]

The Clean Economy is our opportunity to transform our economy and drive productivity – Why simply emulate Australia when we can leverage our natural advantages in resource endowment and human capital.

Clean Economy 2025

The clean economy is an economic vision for New Zealand that recognises the global reality of a world that is resource constrained and carbon restraining.

The clean economy is one of wealth creation based on five foundations ***clean energy, clean transport, clean industry, clean agriculture*** and ***clean environment*** and values that are important to New Zealanders namely quality of life, quality of environment and social equity.

An economic vision? – Why do we need one?

[If going nowhere in particular, then end up nowhere in particular]

International investors believe a key issue for NZ is that we are **hindered by a lack of a clear consistent message, an expressed vision.**

And a measurable goal? And a plan? [If you fail to plan, plan to fail]

New Zealand is slow boiling frog – by any metric [crisis is we don't recognise we are in crisis] in times of crisis need to work together....

Smart countries 1) design their economies, 2) put politics aside and 3) develop a common long term agenda

Why could the Clean Economy work? [Labour – Aspiration, Greens – Core position, Maori – stewardship and taonga, National – can provide the business plan] plus fits with Kiwi values [Growth and Innovation Framework – clear message from research in 2004]

Think of it as Clean Economy = Knowledge Economy [values x resources] + NZ making a difference

Opportunity side of climate change [NZ lucked in – likely lower impact c.f. other countries plus have abundant resources and brand to capitalise on this]

Clean Economy 2025

A \$150billion high value low carbon export economy by 2025

Development, commercialisation and deployment of clean technologies* and smart thinking to transform existing sectors and create dynamic new ones

*Clean technologies or cleantech are products and services that improve performance, productivity or efficiency while reducing costs, raw materials, energy consumption and waste streams

Lloyd Morrison's call for a measurable goal in 2008

One metric suggested - weighted average increase in exports – to \$150B exports by 2025

Opportunity to decommoditise and decarbonise our economy and products at the same time

[They are interconnected]

Ben McNeil – “**Clean Industrial Revolution**” – central tenet is that those countries that decarbonise their economies the quickest and develop the technologies to do so will rule the 21st Century

McNeil believes that carbon intensity will be a de facto trade barrier in the future [Example - Tesco – will they buy coal fired wine [from Australia] or hydro powered wine? [from NZ]

Question – why do we not have “made with minimum 70% renewable energy” on the labels of all our products?

“NZ lacks global **clean & green** branding to optimise products and exports”

In tourism yes, but rest of economy no. Therefore significant opportunity exists to create higher returns from high value low carbon exports.

Strategic Imperatives

- Energy Security and Independence
- Continued market access and competitiveness
- Maintenance and Strengthening NZ Inc brand
- Exploiting cleantech window of opportunity
[\$7 trillion global investment in clean energy by 2030]
- New Industry development
- Proactive response to climate change

A range of imperatives for NZ as for other countries

Trouble comes in 3s – climate, financial and an energy crisis around the corner

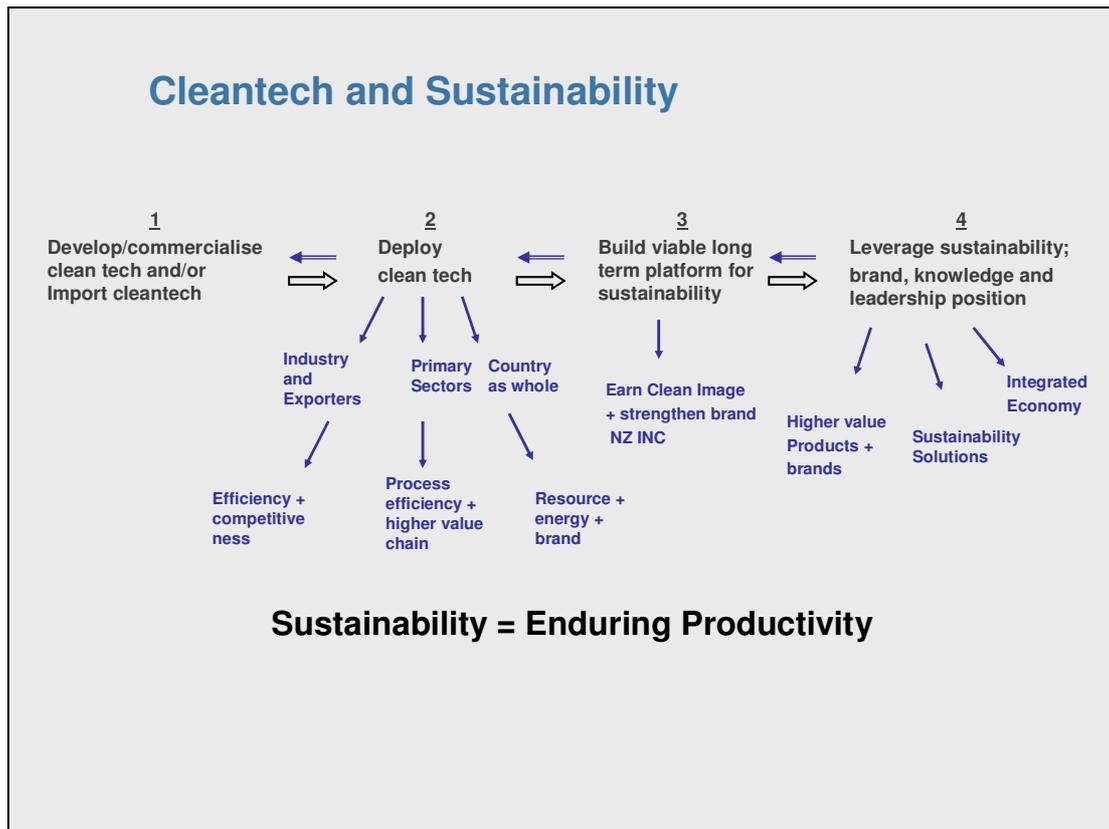
\$7Trillion figure – Cambridge Energy Research Associates - 2008

Need to focus on the opportunity side of climate change – however there is a window of opportunity for New Zealand – need to find what fits and where to focus efforts

Need Authenticity in our NZ Inc brand – [does not hold up to scrutiny at present]

Then need to embed that brand in value added [low carbon] products, technology and solutions

It is time for boldness.



Sustainability – persona non grata – productivity is now the word [but sustainability is just **enduring** productivity]

Diagram above relates to how sustainability and Cleantech are related

Harvard Business Review – **“Why Sustainability Is Now the Key Driver of Innovation”** Prahalad

“There’s no alternative to sustainable development. Even so, many companies are convinced that the more environment-friendly they become, the more the effort will erode their competitiveness. They believe it will add to costs and will not deliver immediate financial benefits. Talk to CEOs particularly in the US or Europe, and their concerns pour out: “Making our operations sustainable and developing green products places us at a disadvantage vis-à-vis rivals in developing countries that don’t face the same pressures”. [Later on]

“Our **research shows that sustainability is a mother lode of organizational and technological innovations** that yield both bottom-line and top-line returns. Becoming environment-friendly lowers costs because companies end up reducing the inputs they use. In addition, the process generates additional revenues from better products or enables companies to create new businesses. In fact, because those are the goals of corporate innovation, we find that **smart companies now treat sustainability as innovation’s new frontier**”

Kiwis like to think that we are frontier people so why are we not engaging?

Aspiration



100% Pure Ambition

Inspiration under our noses

Aspiration embedded in 100% Pure New Zealand

We are leaders not followers

Why build an economic agenda around simply trying to catch up with Australia?

Need ambition but tempered with realism

Including making hard decisions and approach what we need to do with honesty

Conscious of a comment in recently commissioned research report by Investment New Zealand

“Our [NZ] society has a slightly toxic mixture of smugness and myopia that leads us to over-inflate our advantages” ...

So at the risk of being accused of this very thing.....

Example: The greenest transport fuel on Earth

Conversion of forestry [and in the future algal] biomass to renewable transport fuels and chemicals

Leveraging biomass production and existing industrial infrastructure and breakthrough thermochemical processing technology



\$25 - 30 Billion industry by 2025

100% pure biomass

Active Investment New Zealand projects

Modular thermo chemical processes rather than biotechnology the near term key – a number in Australasia offer fast, low cost processes

NZ could through a unique set of circumstances lead the world in the development of sustainable renewable fuels

Leader is Ignite Energy Resources – major breakthrough – high quality, stable bio-oil with low oxygen content

NZ has abundant biomass [residues] and hydrogen capacity [for hydro-processing to renewable diesel and in future jet and petrol]

Leverage existing industrial assets, companies with strong balance sheets and brownfield sites [no or little consenting issues]

Industries that are challenged already [pulp & paper – now looking to biofuels]

Project de-risks these businesses and opens up new revenue opportunities

Scaled up over time, this could be significant export earner plus address our long term energy security issues.

Could be 70% Renewable in transport fuels [c.f. stationery energy] by 2025. Based on \$120/barrel this new industry could be worth \$22 Billion by 2025

Comment - Our heavy industry is world class and already very clean by global standards. Why are we not telling people? Industry feels alienated, particularly on issues relating to ETS and climate change. Better to work with them on Climate change solutions – Many NZ companies already working on these [e.g. Solray and Lanzatech]

Example: The cleanest energy on Earth

Abundance of renewable energy resources [wind, hydro, geothermal, solar, biomass and marine.

– Internationalise our capability [e.g. MRP/Meridian]

– Stake our claim – smaller scale distributed energy

Marine Energy Project – Cook Strait ~ 7 – 12 GW

Attract High Value Industries



\$15 - 20 Billion new industry by 2025

100% clean energy

NZ is spoilt for choice

Excellent capability within our Energy Generators – need to give them the bandwidth to grow their assets globally to take advantage of growth in clean energy.

Meridian – Southern Hydro – optimised these assets, improved performance, sold for a \$1b profit – aim to be global clean energy Reference Company.

Mighty River Power – are extending their reach internationally through their capability in geothermal [NZ has \$2b geothermal projects under development]

We may not compete with big wind and big solar – but island and remote communities need smart low cost distributed energy solutions – **the pacific is our near market** – we should be pioneering new energy solutions as we help islands wean off diesel generation. [Active NZTE project]

Marine Energy – Cook Strait potential 7 – 12 GW [tidal energy not wave energy] Fast-tracking the development [have marine technology capability, composites etc – NZ should be a global leader]

Could be quicker to get to cost comparable with wind

Once deployed and proven simply add another array [200 ~ 500 MW] for next project or demand cycle

Like Iceland we could be attracting new high value clean carbon neutral industries [aluminium smelters through to cloud computing, server banks etc]

Industry earning potential based on clean energy and downstream industry opportunities both in New Zealand and internationally.

Example: The healthiest food for Earth

Fast-track pastoral transformation to biological farming and phenotypic crops
[Healthy soil → Healthy forage → Healthy animals
→ Healthy population]

Capture value through supply chain innovation – from carbon credits to product differentiation – Food cap International



\$15 - 20 Billion additional value by 2025 100% healthy

Agriculture is in a sorry state [look at the industrial food chain in the US [10kgs of oil per kg of protein]. We have our own problems with a chemically dependent and over exploited pastoral farming model.

But there is a quiet revolution on farm [biological farming]

Unfortunately many are listening to the luddites and defending old science [vested interests]

Simple as Healthy Soil [biologically dynamic] → Healthy Forage [high energy density] → Healthy Animals [delivering high food value and lower GHG emissions] → Healthy Population [asset to NZ]

Starts with the soil – biology [also lock in vast amounts of carbon]

Food Cap – arguably most important innovation in the meat industry since refrigerated shipping – capture the value chain right to international markets
Secure supply chain [new IP/knowledge re science of meat aging [maintaining integrity, colour, texture and overall quality from the time of initial processing to the consumer] same integrity is guaranteed through their plants via transportation of product in novel RFP tagged and temperature controlled food capsules - No difference whether processed and packaged in their specially designed plants next door or 10,000 km away

Opportunity for NZ exporters – capture value of biological farming; differentiate products by virtue of quality and integrity, capture enhanced food values [omegas, antioxidants, flavanoids and minerals] brand positioning by differentiating from “ordinary” meat [take it out of commodity volume based supply chain and increase profits inside farm gate.

Example: The smartest cleantech on Earth

250 companies and organisations developing and commercialising cleantech products and services

Low cost, pragmatic solutions that are energy and resource efficient [smart materials and products]
Leveraging our problem solving DNA



\$5 - 15 Billion new industry by 2025

100% smart

Evidence of New Zealand companies that are developing some truly smart [and low cost] cleantech solutions

Kiwi DNA – problem solving [“doing what international experts say can’t be done”]. Some examples;

Duke Engine – Maehle world leaders in engine management were blown away by Duke Engine. 40% less weight & volume, 50% less moving parts, unique 3D motion – conventional 2D ICEs reached end of road. Duke the way forward for fuel efficiency and emissions – ideal for multi-fuels and hybridization

Designline – proving that we can manufacture and export clean transport solutions anywhere in the world – lead the world in the development of hybrid and electric buses and exporting to world

Intergrated Systems – elegant fully automated biogas system [payback 3 – 4 years]. One of these on every NZ dairy farm would make these self sufficient in energy and defer **700MW of generation**. System could be shipped all over the world [this and other packaged solutions is what we should be filling our containers with.

PWC report on Clean Economy quantified opportunity [Low carbon and environmental goods and services] – could add \$12 – 27 billion to economy by 2025. Need to find the market spaces that fit best with our capabilities and international partners to help us commercialise our capability.

Example: The best connectivity on Earth

Greatest Strategic weakness – disconnected [more so than distance to market]
High speed broadband but as importantly connectivity tools]
Leveraging our creative DNA,
Attract migrant skills and talent to NZ



\$? Billion new business by 2025

100% connected

The ultimate cleantech is digital and weightless economic activity [if you think in terms of greenhouse gases [energy and resource use] vs. economic output

Lack of Connectivity our biggest strategic weakness – we are not connected to the world.

Secure, world class high speed broadband – an absolute priority

Singapore – water is their greatest strategic weakness [95% imported from Malaysia], therefore deliberately set out to turn this weakness into strength – and become a global leader in water technologies

We should do likewise [with connectivity]

This is of national importance.

NZ has creativity and technology know-how to do this [as per companies]
Then can truly attract talent [and capital] if we can crack this

What is it worth? What is direct and indirect benefit to our economy?

What productivity gains would we enjoy if better connected to world for business and investment?

Example: The cleanest environment on Earth

Trouble in Paradise – brand under threat
Need to deal to contemporary and legacy issues
Investment in our brand – air, water and soil quality
Develop bioremediation and environmental capability
Solutions for China [Environmental Cooperation Agreement]



\$? Billion new business by 2025

100% authentic

Investment in our brand is critical.

Could drive a bus through clean and green and 100% Pure

[see Rod Oram exposé – “Trouble in Paradise”]

Only a matter of time before we are exposed.

What is the value of our 100% Pure brand – has anyone quantified it??

Need to make investment in our environment – urban air, water, soil

Need to address a range of legacy and contemporary issues. An example;

Contaminated sites [now becoming major public issue]

Had [May still have] fantastic capability in bioremediation [within NZ research organisations]

Legacy of environmental science capability

Need to reactivate capability, deploy in NZ then export.

China – Environmental Cooperation Agreement [ECA] could provide return on investment. Develop long term plan with China – help solve their 95% contaminated groundwater and widespread soil contamination. They provide the labour, we provide the smarts and know-how.

What is the value created from investing in our brand by cleaning up our environment and exporting this capability?

What can government do?

- Set an ambitious economic agenda [aspirational but realisable]
- Provide leadership [nationally and internationally]
- Be bold
- Engagement [political and industry]
- International partnerships
- Investment [particularly around projects of national importance]
- Structural changes to innovation system
- Policy and other instruments that support this vision

Need more ambition [and need to get people engaged and motivated]

Need leadership – within NZ but also in the position we take to Copenhagen [we are naturally inclined to lead, in fact would argue notwithstanding our size, people expect it. NZ losing our way at this stage is not good look.

[Not just about 2020 targets but action – accept that process is flawed and fraught – we can just get on and do it – and drive our economy with this]

People have been beating a path to New Zealand's door – let's engage effectively and make things happen.

It is a time to be Bold - Virgo AD 25 "Fortune favours the bold"
Government Investment? [Think bold not big]

A salient point – whatever you think of "Think Big" \$7B then NPV ~ \$40B. This was in response to energy crisis and economic decline – both situations more extreme now]

There are different ways that government can support and/or make investments in the Clean Economy. Set a clear direction.

[Economic stimulus package? – Clean infrastructure PPPs and funding/loan guarantees etc for technology demonstration – **NZ should be a global cleantech demo site – attract people and customers here**
Innovation system not working – what ROI are we getting from \$600M per year? Need structural changes/



In conclusion we have a choice in how we drive our economy and increase productivity

Population growth [get as many people here as possible and build more houses], dig holes and drive our natural capital harder [to the detriment of our quality of life and the environment], which is what we are doing now or;

Fully capitalise on our intellect [finally] and use our resources sustainably and more profitably [and the people we invite into the country need to have the skills to help us do that – delivering commercial skills, technology, knowledge, capital and market connectivity to complement our skills]

Countries to emulate – look at examples such as Denmark not just Australia.

Simply trying to catch up to Australia is the wrong thinking and can only increase the drain of talent.

Need to decommo-ditise our thinking [stop letting others mine our best and brightest]

New Zealand has the resources and intelligence to set its own path.

Clean Economy - **This is our cake and eat it moment!**