

# Renewable energy

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## Introduction - Four drivers of change

Good morning. While developing the proposed renewable energy target for New Zealand has been the focus of much of my time in the past few months, today I don't want to spend much time revisiting old ground – rather I want us to look forward to the challenge of implementation.

Let me begin by observing that the energy scene is potentially on the cusp of profound changes. Four key drivers of change can be readily identified:

1. The end of the Maui era. For more than 2 decades New Zealand has soaked up an effective glut of gas. The predictable, and imminent rundown of the field does not present a supply crisis but does signal the need for permanent adjustment - away from \$2/GJ gas and away from the supply flexibility provided by the Maui field and associated infrastructure.
2. Coincidentally, the dawning of the Kyoto era. Government has announced its intention to ratify the Kyoto Protocol before the end of the year. Kyoto is driving a number of purposeful government policies to reduce CO2 emissions. It is also fostering an international market for trading carbon credits.
3. Technological and market transformation in sustainable energy technologies. What I mean here is the rapid development of environmentally friendly energy supply and use technologies – from pre-commercial to competitive market-ready technologies. This transformation has been underway now for more than a decade. For example in 1988 wind power cost some 12-15c/kWh. Now, at the country's best sites costs are about 7c/kWh, and are still falling with new technology developments and scale economies. Similarly, electricity from PV systems was about 60c/kWh in 1988 – today costs are down to 30-40c/kWh, and are expected to decline much further over the next two decades. This is the result of the “experience curve” effect outlined yesterday by Dr Schock.
4. Concern over oil supply security. This is a focus in the EU and US in particular, and in turn is driving a substantive effort to find alternative energy technologies for transport. New Zealand, largely being a taker of international automotive

technologies, will indirectly benefit from new technologies that improve the efficiency of energy use and provide alternative forms of motive power.

### **Building blocks for a sustainable energy future**

In part, or in full each of these drivers of change reinforce actions that we can characterise as building blocks for a sustainable energy future.

First, they reinforce ongoing energy efficiency improvements. They provide incentives on both the supply-side and the demand-side to extract greater energy services from each unit of energy used. Increased energy efficiency improves economic performance and benefits environmental outcomes.

Second, they reinforce a transitioning away from fossil fuels, and in particular a transitioning from high carbon fossil fuels. The transition may have a very short term focus - for example, when the Maui field runs out within the next 5-7 years. Or, it may be a transition spread out over many decades as new technologies that enable a smooth take over from current fossil fuel dependency are developed and commercialised.

Third, and the focus of this address, is that they reinforce renewable energy technologies and systems. Not only are renewable energy systems largely climate benign, but a diversified portfolio of renewable energy supply is fundamental to address long term energy security concerns.

### **Renewable energy in New Zealand**

Renewable energy...what can you say about the renewable energy resource in New Zealand? In a word it is fantastic. New Zealand has an enormous, high quality renewable energy resource, which could provide for the expanded energy needs of this country many, many times over.

Whereas most developed nations are looking at raising their renewable energy contribution from typically 5-10% at present to 10-15% or so in the next decade, New Zealand currently has 29% of its consumer energy provided by renewables and is looking at moving this into the 30's by 2012. In other words we already have a huge head-start through having tapped some of the more concentrated renewable energy available such as elevated water (through hydro), geothermal steam and biomass.

In 2000 the Government embedded the desired outcome of a "progressive transition" to renewable energy into New Zealand's energy policy. The proposed target in the NEECS (National Energy Efficiency and Conservation Strategy) of 30 PJ renewable energy annually by 2012 provides an initial, tangible expression of that policy.

There are many reasons why we would want to greatly expand the contribution from renewable energy:

- Increasingly, renewable energy technologies appear to be the most cost-effective form of new electricity supply, with the cost of many renewables expected to decline further in the future,
- Renewables have effectively zero net CO<sub>2</sub> emissions (with one or two small geothermal exceptions),
- Rapid deployment and flexibility - technologies to capture renewable energy increasingly come in discrete, modular packages that can be deployed flexibly and quickly. This enables renewable energy deployment to incrementally match growth in energy demand, thus avoiding the historical undersupply/oversupply cycles typical of the New Zealand electricity system where demand growth has generally been met by building large power stations with long construction lead times,
- Renewable energy is not constrained by our conventional energy supply networks - the renewable energy resource is distributed throughout the entire country which means that access to some form of energy, wherever you are, can be guaranteed through using up-to-date capture technologies,
- Renewables provide the country with long-term energy supply security.

Adding up the imperative for renewables, and the opportunities presented in New Zealand, the case for a big renewables push is overwhelming.

## Deployment

I want to turn now to deployment because the policy development phase, which has commanded attention over the last two years, is drawing to a close. By and large the policy framework is now set. Yesterday the Minister referred to the Government now having its “ducks in a row” regarding the broad policy environment which includes climate change, energy efficiency and renewable energy. That is not to say that there is still not the need for ongoing policy tweaks and further detailed design around proposed policy instruments. But it does mean that by and large the focus is shifting to delivery.

We can think of the deployment opportunities in 3 ways:

1. Immediate - cost-effective right now
2. Imminent - almost cost effective but still needs an additional incentive to be commercially viable
3. Horizon - we can see them coming but there is still some way to go.

Note that this is a way of thinking about **opportunities** and **markets**, not technologies. Technologies will span all three categories. Even photo-voltaic (PV) systems, which are often considered to be on the horizon because the cost of power is many times higher than mainstream electricity costs, are the most cost-effective forms of electricity supply in some situations, with further market opportunities available to be exploited right now.

The categories of “immediate” and “imminent” opportunities are dominated by electricity and process heat. Yesterday Mike Lear outlined how approximately 11,000GWh of low-moderate cost renewables appear to be some of the most promising electricity supply options for this country over the next two decades. This includes a diversity of renewable energy technologies – small and large scale hydro, wind and geothermal, as well as small scale landfill gas options.

Large amounts of renewables, primarily biomass-based fuel, and geothermal steam, are already used in the forest processing industry. There is scope to greatly increase use of renewables with expanded forest processing. There is also the potential for biomass energy products to displace fossil fuels in some applications.

Easteel Ltd recently won the EnergyWise renewable energy award with a process heat plant fired using green sawdust – the result of some clever engineering brought about by years of learning and improving. Not only is it technically impressive, but with a supply of sawdust on hand the economic case was simply overwhelming. Why would you not choose renewable energy?

Beyond the forest industry the main barrier is that the source of renewable material (waste wood) is often not available where it is needed without incurring significant transport costs. A key challenge therefore in getting a wider use of renewables for process heat is a systems approach – better matching supply and demand, and improving technology and logistical processes.

To date transport has been a virtual non-player in the renewables game. Less than 1% of transport energy is provided by renewables. In the short term bio-fuels offer some potential for renewables substitution, although overall cost-effectiveness is unclear at this stage.

Perhaps the more strategic, long term opportunity is the use of hydrogen. Initially, hydrogen supplies might come from fossil fuel sources (in particular natural gas), but in the long term sustainable hydrogen production would need to come from renewable sources. New Zealand’s natural renewable energy heritage makes the possibilities for sustainable hydrogen production very exciting. It is good to see some significant FRST funding now going towards hydrogen research, but I suggest that more emphasis needs to be given to developing a strategic approach for New Zealand, including the scope for utilising distributed, renewable energy supplies.

### **Five ways of maximizing renewable energy implementation**

I want to offer five observations, which are suggestions for gaining traction to maximise renewable energy implementation.

**ONE – RECOGNISE AND HARNESS THE SKILLS OF IMPLEMENTERS**

We need to harness the knowledge and expertise of “implementers” - those who are able to grasp the opportunities brought about by the changing environment and new drivers for change. People who can provide leadership by example and who are natural entrepreneurs. People who can turn good ideas into quality, cost-effective production systems. People who can think tactically about markets and opportunities, and who can turn market opportunities into profitable businesses. And, people who are tenacious.

Sometimes New Zealand has lost opportunities by not being able to turn good ideas into sustainable businesses. We need to ensure that there is a conducive environment for the *implementers* to succeed.

**TWO – SEEK ENVIRONMENTAL WIN-WINS**

We must seek environmental win-wins from renewable energy. Renewable energy promises permanent solutions to the issue of energy sector CO<sub>2</sub> emissions, but many renewables have localised environmental impacts which must be recognised, and dealt with. The way in which localised environmental effects are being dealt with through the practice of the Resource Management Act has drawn considerable comment and criticism from potential renewable energy developers. The situation is somewhat paradoxical because while we may regard renewable energy as the foundation for a sustainable energy future, the Resource Management Act (RMA) - which is the country’s leading legislative framework designed to achieve sustainable management of resources - is seen by many to be preventing more renewables being developed.

Work is currently underway looking at whether renewable energy can be better recognised and dealt with under RMA processes. Improvements to the RMA might be necessary but the point is this - it doesn’t diminish the need for renewable energy developments to be sensitive to local environmental concerns, to the point that some resources may be “off-limits” to renewable energy development because of their conservation values (or other values).

Renewables provide one environmental “win” already with low or no-CO<sub>2</sub> emissions. We should be striving to ensure that renewable developments provide a “win’ for local values as well.

**THREE – SECURE INSTITUTIONAL COMMITMENTS TO RENEWABLE ENERGY**

There is much untapped potential for renewable energy development through the process of gaining institutional commitments and through consumer choice. Negotiated Greenhouse Agreements are a key aspect of policy outlined in the Government’s preferred climate change policy package. We currently have central government commitments to improve energy efficiency. Increasingly we are seeing businesses

committed to triple bottom line accounting and instituting changes as a result of that increased awareness.

To date the commitments that have been made tend to be focused on energy efficiency. But that is changing. A very good example is that of the Christchurch City Council, winner of the recent 2002 Energy-Wise Supreme Award. By providing fledgling manufacturer Windflow Technologies with a 10 year purchase agreement for wind power, not only will the Council source a greater proportion of their energy from sustainable sources but they have enabled a windpower development based on local design and manufacturing to get underway. A true potential win-win situation.

I suggest the scope for other institutions (be they public or private) to make similar commitments to renewable energy, with flow-on benefits for local business development, is enormous.

#### **FOUR – SUSTAINABLE ENERGY OUTCOMES REQUIRE INTEGRATING ENERGY EFFICIENCY AND RENEWABLES**

We need to make sure our framework of thinking is “sustainable energy”, not just renewable energy. A sustainable energy framework means we think about the energy system as a whole – the demand side and the need for higher levels of energy efficiency, and the supply side with transition strategies into renewable energy, and transition strategies away from fossil fuels. We need to avoid seeing renewables alone as the answer, and see them as part of an integrated package of measures.

Let me give you an example. The forecast 2% growth in electricity demand that was discussed yesterday, and is regarded virtually as a “given”, doesn’t fully factor in the increased efficiency that is targeted by the NEECS. Currently the ongoing rate of energy efficiency improvement is about 1% per annum. To achieve the NEECS target that rate will need to be lifted to 2%pa. While we know that this rate of improvement is not going to occur overnight, nevertheless it is not unrealistic to be aiming to bend the growth line down by half a percent per year in the short term given a concerted effort on the demand side. This would see the annual increment in electricity required drop from a predicted 7-800GWh per year to perhaps 500GWh.

Deployment of smaller scale and rapidly constructed renewable energy projects to incrementally meet this load growth is eminently feasible in my view. Combinations of wind, geothermal, biomass-based co-generation, landfill gas, hydro and hydro upgrades – opportunities that are cost effective or near to it now could meet this sort of demand growth. For example, one 70MW wind farm would provide about 250GWh, or half the reduced annual requirement suggested above.

High end-use efficiency is the natural partner of renewable energy. They work together. Let’s harness the opportunities.

## FIVE – DEVELOP A “CULTURE” AROUND A SUSTAINABLE ENERGY FUTURE

To a large extent this is a summation of the four previous points, we need to develop a culture, built on a much greater conscious understanding at all levels, around the idea of a sustainable energy future. To be honest the concept of a “culture” can be a bit nebulous. But, I take it as meaning that over time, through feedback, reinforcement and positive promotion sustainable energy choices start to come naturally – they are seen as the natural way of thinking and acting. We have a number of mechanisms that are beginning to reinforce that culture for energy efficiency, such as appliance ratings, an upcoming home energy ratings scheme, and so on. The Energy-Wise Awards, attended by 400 people 10 days ago is a further expression of a developing culture. We need to make sure that feedback mechanisms are inclusive around the concept of “sustainable energy”, including renewable energy.

### Conclusion

New Zealand is on the cusp of a new energy era with the drivers for change aligning in ways that haven’t happened in the past.

In recent years one of the key issues around New Zealand’s response to climate change was a concern that we shouldn’t be exposing ourselves to risks and potentially large costs by being “ahead of the pack”. This is a valid concern.

However, with the vast opportunities emerging in the new renewable energy marketplace, with New Zealand’s high quality renewable energy resource, combined with the resourcefulness and ingenuity of New Zealanders, I can’t see any reason why New Zealand should not want to retain its current position at the head of the pack for renewable energy implementation. The benefits that could flow – an increasingly sustainable energy system offering a host of potential spin-off business initiatives, is an opportunity waiting to be realised.

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### Discussion

**Kerry Wood:** Ian, you mentioned the advantage of renewables being able to come in quickly because there was a wide range of methods available, but there's also the problem that if an industry is very small, even 30% growth doesn't produce a very big industry quickly. How do you see this one as being resolved?

**Ian McChesney:** In a measured sort of way, Kerry. I think the target that has actually been set is not so "out there" that it becomes impossible to achieve. So I think the target has been set with the idea that a ramping up of capacity within the renewable energy

industry and a ramping up of knowledge within consumers as a whole is going to be consistent with that target. I can perhaps look at the progress that Geoff Henderson is making with his wind turbine development. He's starting with one. It is with the relationship with the Christchurch City Council, that is the building block for further development. It's not something that's going to happen just within one year, but over a five year period, I think that we can expect a reasonably rapid build-up over that sort of time frame.

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