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## Response to the 2010 Draft New Zealand Energy Strategy and Energy Efficiency & Conservation Strategy from the Royal Society of New Zealand

Thank you for the opportunity to comment on the draft New Zealand Energy Strategy and the draft Energy Efficiency & Conservation Strategy. In this response, the Society highlights our previous statements in this area, which remain the position of the Society.

In 2008, the Society made a formal statement on climate change. This included the statements that:

“Reducing the future impact of climate change will require substantial reductions of net emissions of greenhouse gases. Major international policy changes would be required to deliver these reductions but various technologies exist to provide them:

More efficient use of energy, e.g. better designed and insulated houses, more efficient appliances and industrial processes

Renewable energy sources, e.g. hydropower, geothermal, wind, marine, and solar

Lower-carbon fossil fuels such as natural gas and the capture and storage of emissions from power plants

More efficient transport and urban systems and the use of appropriate biofuels and other renewable energy sources to power transport

Reforestation, reduced deforestation, and lower emission forms of agriculture”<sup>1</sup>

As a response to the previous New Zealand Energy Strategy in 2006, the Society produced a substantial report “*2020: Energy Opportunities*”. This report covered the prospects for renewable energy, biofuels, energy efficiency, and energy innovation in New Zealand. The recommendations from that report remain vital:

“**I.** That Government set aggressive but achievable targets for renewable transport fuels, phase out the use of fossil fuels unless carbon emissions can be securely sequestered and put in place the regulatory and investment policies to ensure reduced carbon emission fossil fuel free targets are met by 2020.

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<sup>1</sup> The climate change statement from the Royal Society of New Zealand:

<http://www.royalsociety.org.nz/organisation/panels/climate/climate-change-statement/>

- II. That biofuels be introduced as soon as possible, to provide greater security of transport fuels, with an emphasis on developing local industries for their production.
- III. That the transport fleet composition be modified over time to enable the more widespread uptake of renewable fuel use and that transport systems be modified to become sustainable.
- IV. That our electricity sector should make the transition to renewable supply by 2020. Further fossil fuel development must incorporate a commitment to zero carbon emissions. Electricity markets and systems must deliver a balance between supply and demand investments.
- V. That New Zealand continues to adhere to carbon emission agreements involving the wider international community. A shift to lower carbon emission systems will enable New Zealand to become an exporter of carbon emission reduction credits.
- VI. That New Zealand must undertake a sustained effort to drive indigenous innovation to address systemic energy and environmental issues. Substantial collaborative research and development is required and must involve the spectrum of industry, community, government and research.”<sup>2</sup>

In the four years since the Society’s report, it has become increasingly clear that there is continued and growing demand worldwide and in New Zealand for both low-carbon energy and low-carbon energy technologies. These two demands represent a vast opportunity for New Zealand to build upon our strengths in agriculture and forestry, our copious renewable energy resources for electricity, heat and transport, and the innovative minds of New Zealanders.

The impacts of climate change are becoming ever clearer. In Copenhagen, December 2009, at the UNFCCC 15<sup>th</sup> Conference of Parties no one questioned the climate change science and a target of stabilising atmospheric greenhouse gas concentrations by reducing annual emissions in order to ensure the global mean annual temperature increases by no more than 2<sup>o</sup>C, was agreed by all nations present. This made all nations face up to the challenge of delivering economic growth within tightening constraints on greenhouse gas emissions. The policy response to this will be ever higher carbon prices (or potentially strong international pressure for unilateral polices to deliver reduced emissions). In this context, renewable energy and related technologies are currently continuing to experience rapid growth globally. In contrast, investment into fossil fuels looks to become ever less competitive and future growth will partly depend upon the cost-effective deployment of carbon capture and storage technologies for coal- and gas-fired power stations. These technologies remain far from proven.

Our economic growth will need to be underpinned by energy supply security, but this is not enough. As pointed out clearly in the New Zealand Institute’s recent report “*A goal is not a strategy*”, improvements in New Zealand’s economic growth will be driven by exports of high tech niche goods from high productivity industries in growth markets.<sup>3</sup> In the energy context, the main strengths that we have in place are in specific energy efficient technologies, bioenergy for heat and power, and hydro, geothermal

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<sup>2</sup> The “2020: Energy Opportunities” report can be downloaded from:  
<http://www.royalsociety.org.nz/publications/policy/2006/2020-energy-opportunities/>

<sup>3</sup> Rick Boven, “A goal is not a strategy: Focusing efforts to improve New Zealand’s prosperity” New Zealand Institute 2010:  
[http://www.nzinstitute.org/index.php/nzeconomy/paper/a\\_goal\\_is\\_not\\_a\\_strategy\\_focusing\\_efforts\\_to\\_improve\\_nzs\\_prosperity/](http://www.nzinstitute.org/index.php/nzeconomy/paper/a_goal_is_not_a_strategy_focusing_efforts_to_improve_nzs_prosperity/)

and wind renewable electricity. We have future opportunities developing particularly in small-scale distributed energy systems (heat and power), ocean energy, and biofuels. In addition the potential for innovative energy management technologies and methodologies will be realised by the countries that aggressively pursue them first.

### **Using New Zealand's marginal farmland for bioenergy**

New Zealand's key competitive advantage is in agriculture and forestry – biologically converting the sun's energy into food and fibre. Our research capability is focused on that goal and the Society welcomes the substantial investment the Government has made in the Global Research Alliance on Agricultural Greenhouse Gases to reduce the emissions from our food production. To that advantage we could add the biological conversion of the sun's energy into fuels. New Zealand has a tremendous opportunity in developing bioenergy projects and supply chain technologies. Of particular note is the production of liquid transport fuels from fibre crops such as radiata pine, salix (such as willow), miscanthus, and others. Such production developments would mostly take place on marginal land, greatly increasing the income from the several million hectares of land that currently have relatively poor returns.<sup>2</sup>

Developing a domestic second-generation biofuel industry would have effects beyond aiding transport security in a world of increasing risk to future cheap liquid fuel supplies. Such an industry would form a base from which New Zealand innovators can create internationalisable goods and services, just as the New Zealand dairy industry is exporting advanced dairy production systems. The Society sees this as a major opportunity that should be given much more emphasis in the draft Energy Strategy.

### **An entirely renewable electricity system is within our reach**

New Zealand is one of the few nations in the world with a clear path to an entirely renewable electricity system. The natural resources available for renewable power exceed the existing and future power demands without being hindered by greenhouse gas emission constraints. Our geothermal and hydroelectric expertise is world-renowned and we have developing capability and companies for wind and marine power, and distributed generation. These companies provide examples of high-tech services and niche manufacturing in areas where there are increasing overseas markets. Expanding renewable energy is a major opportunity that the Draft Energy Strategy recognises. To deliver on that opportunity will take an actual target for renewable generation and a strategy with a clear pathway to achieve that target, such as ensuring a flexible grid that can assist the growth of renewable generation. The aspirational target and weak policies in the Strategy do not match this opportunity.

## **A focus on managing energy demand**

New Zealand will have to make a major energy transition in the next few decades. However, this adjustment will more on the use of energy than on its supply. Much of the future reduction in greenhouse gas emissions will have to come from changes on the demand side. These changes will involve both consumer technology shifts and changes in the way that individuals use energy.

The changes in both consumer behaviour and corporate approaches to sustainability will create numerous new business opportunities on the demand side. Unlike energy supply, these business opportunities will not be constrained by natural resource concerns and many will be New Zealand-specific. They have the potential to deliver reductions in emissions at cost-effective prices. These energy management enterprises are essentially the prospecting and development arm for realising efficiency and end use optimisation to fit with renewable supply. A significant investment in applied energy management research and professional level education is being called for by the industry. Investment in Energy Engineering and Energy Management education and research has a much greater potential to realise the improved energy efficiency and greater renewable penetration than new, high risk technologies like wave or current generators.

## **The heating & cooling sector**

Heating is neglected in the draft energy strategies, yet has a high energy demand in comparison to the transport and electricity (excluding for end-use heat) sectors. There is good potential for gas and coal to be substituted by biomass, geothermal heat and solar thermal systems. In addition improved energy efficiency can significantly reduce the energy demand for both heating and cooling. Greater emphasis on the heat sector is recommended.

## **Preserving options for future fossil fuel developments**

Carbon dioxide capture and storage (CCS) technologies are critical, enabling factors for the continued use of our fossil fuel reserves, if they can be successfully developed and widely deployed at cost-effective prices. However, capturing carbon on a sufficiently large scale and at a sufficiently low price has yet to be demonstrated and remains technologically challenging. The development track record so far has not been promising with several demonstration or pilot projects being delayed or halted. For example, the US FutureGen project set out, in 2003, to deliver a pilot plant in 2012 and has failed to do so. For fundamental thermodynamic reasons, the costs of CCS may remain high.<sup>4</sup> If this occurs, then carbon pricing will make fossil fuel use increasingly uncompetitive.

Given this uncertainty about the prospects for CCS, then the exploitation of fossil fuels should be delayed until this risk is more clearly understood. In particular, coal-to-liquid or gas-to-liquid fuels should be avoided as their production without carbon capture and storage results in a marked increase in carbon emissions from transport.

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<sup>4</sup> Shannon Page, *et al* "Carbon capture and storage: Fundamental thermodynamics and current technology" Energy Policy 37:3314-3324, 2009

## **In summary**

The Society's previous statements make clear the importance of addressing climate change by reducing greenhouse gas emissions. The draft strategies do not place enough emphasis on this goal.

- No pathway to achieve 90% renewable electricity by 2020 is presented.
- The limited target for improvements in transport efficiency in the face of a continuing increase in travel demand implies an acceptance that total emissions from transport fuels will increase. The lack of effective policy tools for reducing transport emissions and reducing personal travel demand are substantial concerns.
- Energy efficiency approaches need to consist of more than just 'educate and inform'. Stronger policies can deliver cost-effective reductions in both greenhouse gas emissions and reduced demand needs.
- Energy efficiency and coal and gas substitution in the heat market has been neglected.
- The opportunities for New Zealanders to develop, integrate, and export innovative renewable electricity (and other sustainable energy) technologies have been under-estimated and under-supported. For instance, the Marine Energy Deployment Fund directly assists the commercialisation of marine energy in New Zealand. It currently finishes in 2012; it should continue.

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