

Before the Board of Inquiry
at Wellington

under: the Resource Management Act 1991

in the matter of: a submission to the Board of Inquiry concerning the
Proposed National Policy Statement for Renewable
Electricity Generation

between: **Meridian Energy Limited**
(Submitter number 88)
Submitter

Supplementary statement of evidence of James Thomas Truesdale

Dated: 30 July 2009

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SUPPLEMENTARY STATEMENT OF EVIDENCE OF JAMES THOMAS TRUESDALE

INTRODUCTION

- 1 My full name is James Thomas Truesdale and I have the qualifications and experience described in my statement of evidence dated 27 May 2009.

FURTHER INFORMATION SOUGHT BY THE BOARD

- 2 At the resumed hearing in respect of the Proposed National Policy Statement for Renewable Electricity Generation on Thursday 2 July 2009, the Board of Inquiry requested some further information from Meridian Energy Limited (*Meridian*) on the issue of the potential contribution of wind generation in reaching the 90% renewable energy target, with reference to comments on behalf of the New Zealand Wind Energy Association (*NZWEA*).
- 3 I understand, that the Board asked for further information to be given by me in the form of a written submission in relation to the following comments by the Board recorded in the transcript of 2 July 2009:

3.1 *"We have been getting some conflicting evidence, which you would expect, on the issue of whether there is a need for further large hydro if the wind potential were to occur, this is by 2025, where there would be sufficient hydro within the current system to deal with thermal, nuclear, whatever providing there was major development of wind."*¹

3.2 *"That ratio is what we'd be particularly interested in."*²

- 4 In this supplementary statement of evidence I seek to provide the further information in response to the Board's request.

RESPONSE TO THE BOARD

- 5 It is impractical, and inappropriate, to form a view on the ratio required between wind and hydro generation in order to reach the 90% renewable energy target. I discuss this further at paragraph 8 and also in my earlier evidence in my comments on the competitive nature of the market.³ Rather, what can be said is that further wind

¹ Transcript, Board of Inquiry hearing, Proposed National Policy Statement for Renewable Electricity Generation, page 1964.

² Transcript, Board of Inquiry hearing, Proposed National Policy Statement for Renewable Electricity Generation, page 1965.

³ Statement of evidence of James Thomas Truesdale, dated 27 May 2009, paragraphs 21, 76 and 80.

generation on the system will likely require incremental additional flexibility in order to provide for the intermittent and uncontrollable nature of wind generation over different timeframes.

- 6 Flexibility can take different forms. For example, controllable hydro (i.e. with storage), demand response and fast-start thermal plant are all sources of short term system flexibility. In this regard, New Zealand is endowed with hydro that has offered, and will continue to offer, system flexibility. I highlighted the role of hydro generation as a controllable and flexible resource in my original statement (see paragraph 30).
- 7 Additional flexibility has an associated cost to the system. Hence economic considerations will determine how the proportion of wind generation on the system changes over time. Any additional system flexibility should come from the least-cost source available which, depending on relative economics, could include further large hydro developments. Also, see my earlier statement regarding the short term flexibility provided by the existing hydro generation base.⁴
- 8 If the overall cost of meeting electricity supply requirements is to be minimised, it is important that the costs associated with providing additional system flexibility are faced by those creating them. In other words, it is important that potential generation investments compete on even terms taking into account any system costs they impose. To the extent that policy ensures this occurs, the market will ultimately arrive at the optimal generation mix given the choices available to developers (including hydro and wind generation). The role of the market in meeting flexibility requirements and encouraging the appropriate plant mix to develop over time is a point that was made in my original statement (see paragraph 76).
- 9 Any attempt to prescribe a target proportion for a particular generation source, for example wind, will effectively limit the pool of possible investment options and will likely raise the overall cost of meeting electricity supply.
- 10 It should be noted that there is also an important role for other renewable sources of energy to play in meeting the 90% target. For example, the proportion of supply from geothermal generation has increased in recent years and accounted for approximately 10% of total generation in 2008. Over the longer term, subject again to economics, including any costs they impose on the electricity system, or benefits they might provide, other renewable technologies are likely to become more attractive. This further highlights the difficulties, and indeed risks, of trying to estimate future limits (or ratios) of different supply technologies.

⁴ Statement of evidence of James Thomas Truesdale, dated 27 May 2009, paragraph 37.2.

- 11 I note that in a number of respects, as summarised below, the New Zealand Wind Energy Association appears to hold similar views regarding potential wind generation limits.

NZWEA SUBMISSIONS

- 12 In the following table I set out my comments in relation to various points made in NZWEA's submissions.

Extracts from NZWEA submissions	Truesdale comment
<p>"In terms of the potential contribution of wind to the 90% target, while we don't expect wind to provide all of the increase in new generation, it certainly is becoming viable and has significant potential to increase from the 2 ½% to 3% that it provides today. – Fraser Clark p. 1623 (transcript).</p>	<p>Agreed.</p>
<p>"One factor that is sometimes discussed is are there limits to the amount of wind that we can accommodate on our power system, given wind's variable output? We discussed earlier, the Commission's wind generation investigation project looked at one scenario with over 2,000 megawatts, identified some changes that would be required in the market, and has incorporated some of those potential changes into its ongoing work program, but did not identify any overall limits to wind generation uptake. So there's a vast number of reports there, quite significant to go into.</p> <p>"Transpower as the owner/operator of the electricity system, has a similar position, and also has not identified any limits, just acknowledging that some changes may be required to the way they operate the system. But the system will benefit from having both resource and location diversity." – Fraser Clark p. 1623 (transcript).</p>	<p>If NZWEA means that system limits will be determined by economic considerations I agree.</p>
<p>"I think there's acknowledgement that as the amount of variable generation on your system increases, you need to have flexibility</p>	<p>While hydro supply has good short term flexibility, and can help to compensate for short term wind</p>

<p>to respond to that. That might be, in our case, we've got all this hydro sitting there. In other countries it might be Far-start (ph) [fast start] gas plants or it might be demand response: plants disconnecting or consumers disconnecting or changing their load profile, electric vehicles or whatever it might be. But in our case we've got some fairly flexible hydro resource and that was just identifying - that's low cost, sort of looks at 8.5, talks about this cost \$2.06 or \$2.76 of additional system costs related to ensuring supply. That was on the basis that there is very little amount of new, flexible reserve plant needed, because of what is sitting there today. There did reach potentially a point where the amount of new flexible plant becomes the proportion relative to new variable generation starts to become more significant. But up to around that point, a couple of 1,000 megawatts, it looked like you should be able to deal with that variability largely with what's there. As you go beyond that, maybe the proportion of flexible plant to variable or renewable plant becomes more significant. It doesn't have to be hydro necessarily, it might be Far-start thermal for instance, that's using the Henderson Cognac (ph) argument. So that's the way to sort of think about, when we talk about security of supply we actually have all of these different time intervals of interest - from the very split second, something falls off the system and you need to respond to it, to this five minute variation around supply and demand." - Fraser Clark p. 1656 (transcript).</p>	<p>intermittency, seasonal wind energy patterns are as yet unclear (and although dangerous to extrapolate from just one year, wind energy supply was also low during the 2008 hydro drought). Hydro storage is already utilized to smooth out hydro inflow variability and better match hydro supply to demand. If it turns out that wind energy is lower in winter and higher in spring/summer then more seasonal energy storage than we currently have may be needed to compensate for seasonal wind energy variations.</p>
<p>"One factor that is often identified as potentially limiting the penetration of wind into our power system is the impact of wind's variable generation output on the requirements for reserve generation and other ancillary services." - Fraser Clark paragraph 8.2 (Statement of Evidence).</p>	<p>Under its framework for integrating wind generation into the system, the Electricity Commission has indicated that costs imposed on the electricity system by intermittent generation will be borne by investors (as for other forms of generation⁵).</p>
<p>"Talking from what the operator says, for</p>	<p>See above. It is impractical</p>

⁵ For example, larger generating units pay a greater share of instantaneous reserves costs because they impose a greater risk on the system.

<p>example, Transpower said you can run a system on 100% wind if you want to. There is just a cost associated with that, and the cost becomes too high. From a practical perspective, I don't envisage that it will just be wind. We've clearly got geothermal resource, there's potential for hydro and other factors there. You could probably do it with wind, but you will have to install some other things along the way. But again, I don't think it's actually realistic that scenario." – Fraser Clark p. 1657 (transcript).</p>	<p>to say what the economic limit will be.</p>
<p>"NZES identifies that increased use of renewable sources of electricity generation contributes to security of supply by reducing reliance on fossil fuels (which also provides insulation against rising fuel costs) and by increasing the diversity of sources and location of supply in the electricity system (and reducing our dependence on hydro generation, thus lowering dry year supply risks)." – NZWEA paragraph 1.12 (submission).</p>	<p>As noted above, it is unclear to what extent seasonal wind energy patterns might increase or reduce the demands on hydro storage.</p>

James Thomas Truesdale
30 July 2009