EVIDENCE IN CHIEF OF FRANCIS CHANEL GEOGHEGAN - INDEX

BOARD OF INQUIRY

HAUĀURU MĀ RAKI WIND FARM PROPOSAL

In the matter	of the Resource Management Act 1991
And	
In the matter	of resource consent applications by Contact Wind Limited in respect of the Hauāuru mā raki Wind Farm Proposal
And	
In the matter	of notices of requirement and a resource consent application by Contact Energy Limited for transmission infrastructure related to the Hauāuru mā raki Wind Farm Proposal

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BRIEF OF EVIDENCE IN CHIEF OF FRANCIS CHANEL GEOGHEGAN

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Introduction

1. My name is **Francis (Frank) Chanel Geoghegan**. I am employed by Contact Energy Limited ("Contact") as Project Director – Generation and I have the authority of the company to give this evidence on its behalf.

2. I am an engineer by training (BE Canterbury). I also have a Diploma and Masters of Business Administration from Deakin University in Melbourne.

3. Since graduating from Canterbury University, I have spent almost all of my professional career in the electricity industry, initially with the New Zealand Electricity Department ("NZED"), then the electricity division of the Ministry of Energy before joining Electricity Corporation of New Zealand Limited ("ECNZ") on its formation in 1987.

4. I had a brief period as a self employed contract project manager in the early 1990s, during which time I managed the design and construction of New Zealand's first commercial wind turbine generator on Hawkins Hill, above Brooklyn in Wellington.

5. I returned to ECNZ in 1993 and since then I have held a variety of generation development and management roles, initially with ECNZ and then, on the formation and commencement of operation of Contact in early 1996, with the latter. During that time, my principal focus has been on development and management of thermal generation and I have been involved in or responsible for development of around 990MW of thermal generation capacity in New Zealand and Australia.

6. I took up my current role in 2007. I manage a team of 10 staff developing a portfolio of investment ready generation projects based on gas and wind fuel sources. I also have responsibility for Contact's investigation of emerging technologies, including electric vehicle deployment and tidal/wave power.

Scope of Evidence

7. My evidence will cover the following matters:

   (a) I will present a broad description of Contact and its role in the electricity industry. As part of that description, I will outline the role of Contact's wholly owned subsidiary, Contact Wind Limited ("Contact Wind");

(b) I will describe in general terms the challenges facing the New Zealand electricity generation industry and key elements of Contact's strategic plan to address those challenges;

(c) I will discuss the characteristics of wind farm developments that contribute to their commercial viability;

(d) I will describe the key parameters of the Hauāuru mā raki ("HMR") wind farm from a commercial investment perspective and explain how the project fits into Contact's strategic plan; and

(e) I will outline the objectives of the transmission aspects of the project that are the subject of notices of requirement and why the designation sought is reasonably necessary to achieve those objectives. My colleague Mr Wayne Mills discusses related issues including Contact's responsibility for the designation if approved by the Board of Inquiry.

Introducing Contact

8. Contact was established by the New Zealand Government as a state-owned enterprise in November 1995 to introduce competition in to the electricity generation sector. Contact commenced operations on 1 February 1996 when it acquired a portfolio of electricity generation and gas assets from ECNZ.

9. In 1998, Contact entered the retail energy market. Contact now supplies energy to around 650,000 New Zealand businesses and homes with a mix of electricity, natural gas, and LPG (via its wholly owned subsidiary Rockgas).

10. In October 1998, the Government decided to proceed with a 60% public share float of Contact, combined with a share sale of 40% to a cornerstone shareholder. The successor cornerstone shareholder, Origin Energy (through its subsidiary companies) now holds 51% of the issued share capital in Contact.

11. Contact was listed on the New Zealand and Australian Stock Exchanges in May 1999. Contact has since delisted from the Australian Stock Exchange but it is still listed on the New Zealand Stock Exchange. In its last Annual Report (as at 30 June 2008), the Company reported to 84,000 shareholders.

12. Contact is currently one of the top two companies by market capitalisation on the New Zealand Stock Exchange.

13. Contact owns and operates approximately 1860 megawatts of New Zealand's installed generation capacity – this equates to 22% of the generation in New Zealand. Contact's current generation portfolio is a blend of hydro, thermal and geothermal generation.

14. The HMR wind farm represents an important part of the expansion of Contact's generation portfolio to include wind.

15. Contact Wind is a wholly owned subsidiary of Contact's. It was incorporated in December 2006 as a special purpose company to undertake the HMR wind farm. The early stages of the project including initial approaches to landowners, erecting and monitoring wind measuring towers, and achieving a critical mass of participating landowners, were undertaken by Wind Farm Group Limited. Wind Farm Group has a participation agreement with Contact Wind so that it has a commercial interest in the project should it proceed. Mr Al Yates, Managing Director of Wind Farm Group Limited, is a director of Contact Wind.

Electricity Industry Issues

16. Mr David Hunt will provide an independent review in his evidence of some of the characteristics of the electricity industry, future demand for electricity and the options for increased generation output to meet that demand.

17. I will therefore only seek to summarise the key issues as I see them, in order to provide context for my discussion of Contact's strategic development plan and the role of the HMR wind farm within that plan.

18. The New Zealand electricity system remains dominated by hydro generation, principally located in the South Island and with relatively limited storage capacity.

19. Hydro generation also plays an important role adjusting output to meet fluctuations in electricity demand. Electricity cannot be stored and so the ability of the system to meet such fluctuations in demand is dependent on the availability of generation plants to adapt to increasing and reducing output as required, minute to minute, hour to hour and day to day.

20. As is well known, electricity demand has increased slowly and steadily over a number of years and that process is expected to continue for the foreseeable future. Mr Hunt quotes an annual average increase of 2.7% over the 25 years to 2005 in the report attached to his evidence, along with a variety of predictions of future electricity demand.

21. In the last 10 years, New Zealand's electricity demand has increased by some 7,300 gigawatt hours (GWh). In the same period new generation output totalling 6,610 GWh has been added to the system. The end result has been a progressive erosion in the ability of the electricity system to meet peak demand generation and a greater exposure to dry year events, particularly in the key South Island hydro catchments, where there is reduced hydro output. The winters of 2001, 2003 and 2008 have all been marked by such conditions.

22. One of the functions of the electricity market is to signal through the wholesale electricity price the need for new generation investment and to incentivise development of new generation in the most economically efficient order i.e. in order of marginal cost, so that the cheapest available generation option is the next one brought to market.

23. Wholesale prices have generally risen over the last 10 years but New Zealanders have been accustomed until recently to relatively low retail electricity prices.

24. The dynamics of the electricity market also mean that investments in new generation capacity are dependent on the extent to which investors can have confidence that the future wholesale electricity price path will deliver an acceptable rate of return on the capital invested in any new generation project.

25. Inevitably, unless some technological breakthrough or a significant discovery of low cost fuel occurs (e.g. readily exploitable natural gas), wholesale electricity prices will have to rise significantly if future electricity demand over the next 10-20 years is to be met from existing resources such as hydro, geothermal, wind and coal.

26. It is well recognised in the electricity industry that the increasing level of retail prices currently is a sensitive issue. From my perspective, that means it is important that the electricity market works as intended and new generation is bought on-stream in a timely way and in a rough order of cost.

In other words, the cheapest plants, factoring in all relevant costs, should be built first.

27. It is also generally recognised that there has been chronic underinvestment in the national grid for a number of years. As a result, transmission constraints are now more of a factor in planning for new investment, particularly of renewable energy projects which have to be built where the energy resource is located. That may not be close to the points of demand and thus the capacity of the transmission system to transmit electricity to where it is required is a significant issue for New Zealand.

28. Transpower is currently embarking on a major investment in the grid, to address the key pinch-points. The speed with which that occurs and the allocation of the costs of that investment is a key issue in determining the economic viability of projects. Primarily, but not solely, this issue arises in relation to the proposed upgrade of the HVDC link across Cook Strait. This has an estimated project cost of several hundred million dollars and the Electricity Commission's current policy is that that cost should be borne by South Island generators. This creates a disincentive to generators from investing in new South Island generation[1].

Contact's Strategic Plan

29. As I have already noted, Contact currently operates hydro, gas and geothermal powered generation plants.

30. Contact's strategic plan is to establish a portfolio of development options so it is in a position to respond to the price signals the electricity market will produce. One of my colleagues has responsibility for developing options in the hydro and geothermal field and my focus is on thermal and wind options, while keeping an eye on alternative technologies: solar, tide, wave and the like that are not yet commercially viable and are currently seen only in niche or prototype applications. Contact's objective is to have a diversified fuel base in order to reduce its exposure to climatic and economic cycles. Another objective is to be geographically diversified, to reduce the Company's exposure to the constraints of the electricity transmission system. While that is the ideal, the reality is that the

[1] Thus TrustPower was quoted in the New Zealand Herald in mid September 2008 as saying that it may have to shelve its large-scale South Island hydro and wind projects as a result of the high costs of the HVDC upgrade.

Company's objectives necessarily have to be focussed around available resources and potential sites for development.

31. On the information available to me, large-scale geothermal developments are the most efficient way of producing additional electricity available at present with an estimated cost in the range 5-7cents per kWh (or $50-70 per MWh). That is why both Contact and Mighty River Power Limited are currently progressing significant geothermal developments in the Central North Island.

32. To provide a frame of reference, I note that average wholesale electricity prices in 2007[2] were approximately $52 per MWh in the North Island, and slightly lower in the South Island.

33. Average wholesale electricity prices were much higher than that in 2008 (well over $100 per MWh), but the price was significantly affected by the combination of extremely dry conditions through the winter and reduced capacity on the HVDC link connecting the South Island Grid to that of the North Island.

34. Transmission issues mean that there is likely to be greater volatility in wholesale electricity prices in the next few years and the potential for pricing to be affected again by extreme weather events is also inherently uncertain. I have produced as **Exhibit FCG 1** a graph of pricing (as at 21 January 2009) of standardised derivative contracts (hedges) over the next three years that as I understand it, represents the market's expectation as to the wholesale electricity price path over the next few years. Information about the market on which these contracts are traded is available on the market website[3].

35. While geothermal development appeals as the most attractive option currently available, the reality is that large-scale geothermal development is necessarily limited to a relatively small number of geothermal systems on the Taupo volcanic zone, many of which are effectively excluded from development because of their tourist and conservation value. In the report attached to Mr Hunt's evidence, he cites a 2006 Ministry of Economic Development Report in relation to the potential for future geothermal generation. The same report notes medium to high confidence that 435

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[2] Note that the figures quoted in this and the following paragraph are wholesale prices. Retail prices reflect the contractual arrangements the consumer has with their supplier and include, among other things, local distribution costs.

[3] http://www.energyhedge.co.nz/ePublic/mtrade

MW of geothermal generation might be able to be developed by 2015. Even if this confidence is borne out in practice (among other things transmission upgrades are required to facilitate any significant further geothermal development), that level of new generation would only meet 3-4 years additional demand.

36. Contact is therefore looking for the next feasible type of electricity development after geothermal.

37. For the last 15 years or more, the availability of large amounts of relatively cheap natural gas has meant that natural gas-fired thermal stations were the cheapest and most efficient way in which electricity demand could be met. As is well known, Maui gas is rapidly running down and while new gas fields have come on line, they are much smaller than Maui and the gas from them is significantly more expensive.

38. During the same period, wind generation as an option has become progressively more attractive as turbine sizes have increased and the technology has improved.

39. The value of wind to each generation company varies, depending on the make-up of their existing portfolio (both type and location) and the new generation options open to them. Thus while wind has been a marginal economic investment to date, some companies have proceeded with it earlier than others, aided by the ability to choose the most favourable wind generation sites. There is no doubt, however, that we are fast approaching the point where wind is the next cheapest development option after geothermal at an approximate cost of 8.5 to 11 cents per kWh ($85-$110 per MWh) depending on the site characteristics of the project in question.

40. By contrast, new baseload gas generation has potentially the same order of cost as new wind at between 8.5 cents and 14 cents per kWh ($85-$140 per MWh) but has some major issues and risks. The major risk is that there is no certainty that sufficient domestically sourced gas would be available to fuel a new combined-cycle gas turbine. Genesis Energy proceeded with construction of its recently commissioned e3p combined cycle gas turbine because Government was prepared to financially underwrite a potential shortfall in its gas supply.

41. Contact has relatively recently (May 2008) tested the market by inviting offers to supply gas over a long time frame. No supplier was prepared to

guarantee supply. Even if that issue could be overcome, because of the uncertainties about the availability of domestic gas, if a supplier were prepared to quote, inevitably the quote would be priced to the predicted path of imported gas.

42. Importing gas is an option for the future and I am currently managing Contact's involvement in a joint venture with Genesis Energy investigating the potential to establish a liquefied natural gas terminal in New Zealand. The key risks with this option are the lack of certainty on the price path for imported gas over the lifetime of a new baseload gas plant and the significant stranding risk of the facility in the event a significant domestic gas field is found and developed. The international market for gas tends to track the international oil price which has been subject to huge fluctuations over the last twelve months. There is no certainty of the international oil price in 12 months time, much less the 20 year timeframe that an investor in a new gas turbine plant would want.

43. Overlaid on these uncertainties are the doubts about what allowance should be factored in for the future price of carbon emissions. Even the wide cost variation I have quoted above for a new gas fired plant could prove insufficient given the combination of these uncertainties.

44. In summary, the combination of issues surrounding new baseload gas-fired thermal generation means, in my view, that at this time renewable generation is more viable.

45. Coal-fired thermal generation is an alternative to running on gas. The same 2006 Ministry of Economic Development paper noted above describes New Zealand as being well endowed with coal resources. However, power stations running on coal emit significantly more carbon dioxide than combined cycle plants running on gas, so the same uncertainties over future carbon emission charges are relevant as well as issues of the relative cost of plant. In addition, coal brings with it other environmental issues and potential liabilities arising from ash disposal, and emissions of particulates, nitrogen oxides and sulphur dioxides. Improving technology is likely to address some of these issues though not necessarily entirely resolve them, but Contact has no experience in the technology involved and is not actively pursuing coal as a potential future option.

46. While the outlook for new baseload thermal may change (e.g. if there is a significant new domestic gas discovery) steps need to be taken now to

have new generation available to come on stream once the available geothermal options are exhausted. In practice, large-scale new wind developments are the most likely option available to meet increasing New Zealand electricity demand in the medium term. That is why wind generation, including in particular the HMR wind farm, forms an important part of Contact's strategic plan for developing new generation.

47. As a variable and largely uncontrollable generation source, there is, however, a limit to how much wind generation can be introduced into the New Zealand electricity system. Essentially, the issue is that as output from wind farms increases or decreases with the wind, other generation sources must alter their output up or down to compensate and iron out the movements or volatility in wind generation output. The system already has to handle this with large thermal generation stations "dropping off" in fault conditions but greater amounts of wind introduce greater complication for management of the system. We have already seen some instances of greater volatility in generation output over the last year or two with a relatively small percentage of wind connected to the grid. With increasing wind generation, that volatility will increase.

48. Variability of wind generation output can to some extent be mitigated by diversifying the geographical location of wind farms so they are not all subject to the same weather systems. The HMR wind farm is located a significant distance from the Tararua wind farms and (obviously) even further from Project West Wind (in Wellington) and the consented wind farms in the South Island. As discussed in greater detail by Mr Hunt, this means that fluctuations in output from the HMR wind farm will have a low correlation with those of other wind farms in other areas, thereby contributing positively to security of supply. Even so, there is an effective cap on the percentage of electricity that can be generated from wind. Opinions differ as to what that percentage might be. My understanding is that it is expected to be around 20%, perhaps a little higher. The significant point is that we are nowhere near reaching that percentage point at present, but when the percentage of wind does increase to the point when its integration into the system becomes problematic, I would expect additional thermal peaking plant and hydro options (particularly any with significant storage capacity) to be viewed with increased interest.

49. There are some significant hydro developments being pursued through the consenting process in the South Island, but I am not aware whether any are economic at present.

50. I should also note that Contact is currently constructing a single cycle 200 MW gas turbine peaking plant at Stratford. This plant is intended to provide fast start peaking capacity which can ramp up and down in response to changes in output from wind generation plant, as well as being available to supplement hydro in dry years, rather than providing baseload generation.

51. In summary, there are a number of different future generation options, particularly given the uncertainties that exist in the sector currently. A critical strategy for a company like Contact that provides significant generation capacity to meet New Zealand's current and future demand is to maintain as much flexibility as possible. We need to secure resource consents across a range of renewable and non-renewable energy projects that enable us to maintain a diversified portfolio of opportunities. Any one or more of these can then be implemented at short notice to align with market conditions.

52. As I have tried to explain, the investment drivers that determine when a project should or should not proceed are complex. The availability of resource consents that enable us to push ahead with any given option at the right time is an important component in making these investment decisions more efficient and timely for the country.

Characteristics of Successful Wind Developments

53. Wind turbines operate within a broad band of available wind. Typically, they will cut in (commence generation) at between three to four metres per second, they will reach full power output at around 14 metres per second and will cut out (cease generating) at around 25 metres per second. In other words, between full output being reached and cut out, the extra wind makes no difference to output. Once wind gets above the cut off speed, however, the turbines are automatically stowed in their safety positions to protect the generating plant.

54. The other key point to note is that the power available in the wind is proportional to the cube of the wind speed. Thus, a doubling of wind speed from four metres per second to eight metres per second gives rise to an eight-fold increase in available power.

55. It follows that quite small increases in average wind speed below the point when rated capacity is reached make a big difference to generation output and therefore to the cost of generation per unit of electricity.

56. New Zealand has one of the best wind resources in the world because there are a number of areas where average wind speeds are high in relation to the rated capacity of modern wind turbines. The Wellington area has a number of sites where average wind speeds are 10 metres per second or higher and the Brooklyn wind turbine has been one of the most productive turbines of its size in the world over its 15 year life. The area of the Tararua ranges where wind is funnelled through the Manawatu Gorge also has wind speeds around 10-12 metres per second which is outstanding by international standards.

57. Outside the Wellington and Tararua areas, a number of sites have been identified throughout New Zealand with wind resources in the 8-10 metres per second range.

58. Wind speed is partly a function of location with reference to prevailing winds, but also of topography (wind speed accelerates at the top of hills and ridgelines and decelerates in front of and behind hills and ridge lines) and elevation (wind speed varies with elevation above sea level so while there are exceptions, generally the more elevated the site the higher the average wind speed).

59. Having said that wind speed is a critical component in determining power output, it is clearly not the only issue to be considered. The ideal wind resource is one which consistently blows in a band around the average. That reduces the amount of time wind speeds are below the cut in speed and or above the cut out speed. Fewer extreme wind events also reduces fatigue loading and consequential wear and tear on the wind turbines, that translates into more frequent outages and higher operating and maintenance costs.

60. Another key consideration when identifying suitable areas for wind development is the terrain, which has a direct impact on wind turbulence and on the costs of construction. The sites providing the best wind resource tend to be located in inaccessible and rugged country.

61. Another important consideration is the ease, or otherwise, of connection to the grid and the distance from the point of connection to market. All

electricity being transmitted down a line incurs losses – typically around 4% overall and more on the Cook Strait cable at high load levels (up to 15%) or when the line is approaching its thermal capacity. The electricity market recognises those losses when it fixes wholesale prices at each connection node. Electricity generated in locations where there is already a surplus of electricity compared to demand is therefore worth less on the wholesale market than electricity where there is a shortage of electricity compared to demand. Typically that means for instance that a megawatt - hour of electricity in the southern half of the South Island is worth less on the wholesale market than a megawatt hour of electricity at Otahuhu in South Auckland. This is not an invariable rule. In the winter of 2008, because of the transmission constraints on the Cook Strait cable, precisely the opposite situation occurred, but that was a function of the extremely low hydro inflows in the South Island combined with the inability of the transmission system to transport electricity from where it was available in the North Island.

62. A related issue of distance to market is transmission risk. If the transmission system is unable to accept all of the electricity generated then that will mean a new plant will not operate at its potential capacity, potentially undermining its economic viability.

63. As already discussed, the existence of constraints in the transmission system, the delays in eliminating those constraints and the costs of transmission upgrades in circumstances where they are not borne by the market as a whole may be important issues in determining whether a particular wind farm site will be economic to develop.

Characteristics of the HMR wind farm

64. The HMR wind farm is a key element in Contact's plan to have wind electricity generation projects available and capable of delivering new generation at the cheapest cost after viable geothermal options are implemented. Contact proposes to invest in excess of a billion dollars in the HMR wind farm.

65. The quantity of the wind resource on the HMR wind farm's footprint has been monitored by a series of wind masts by Wind Farm Group and latterly Contact Wind for several years. Mr Manins addresses the quantity of the HMR wind farm's wind resource in his evidence. From my perspective, the

key consideration is that the modelled average wind speed of about eight metres per second puts it behind the Tararua and some South Island wind farm sites in terms of the quantity of the available energy resource. In addition, the HMR wind farm has a substantial overhead component by reason of the need to construct a 220kV transmission line to access the grid at Orton. As discussed in Ms Yorke's evidence, that transmission line has an estimated initial capital cost of $33 million.

66. As against that overhead cost, the HMR wind farm has the advantage that once connected to the grid, there are no capacity issues on the transmission line[4] and the HMR wind farm is close to the Auckland metropolitan area. It does not, therefore, have any exposure to the transmission risks and costs that I noted earlier. In particular, line losses will be low and there is little risk that electricity supplied from it will not be able to be transmitted to Auckland. Those same characteristics mean that the HMR wind farm provides an obvious benefit in enhancing security of electricity supply to the Auckland area.

67. In terms of constructability, construction of the HMR wind farm is of moderate difficulty, compared to other wind farm development sites. There are some development sites of less difficulty than the HMR wind farm, and some of greater difficulty.

68. The combination of these considerations means that if the HMR wind farm is successful in being consented, I would not expect its first stage to be commissioned before 2012-2013. That means it would come on-stream after geothermal developments already underway, and after any more favourably situated wind farm projects. As I have noted, however, this is how the electricity market should work: with projects that are cheaper in terms of dollars per unit of electricity cost being built first. It is nevertheless very important that projects like the HMR wind farm are consented and are therefore able to be built when market conditions are favourable. The long lead time for consenting and construction of a new generation plant of any type means that it is not practicable to wait until there is a clear demand for a new plant before initiating the process.

69. The request in the applications for a lapse period of 10 years reflects the economic reality that Contact is unlikely to proceed with the HMR wind farm immediately after consents are granted (assuming of course that they are

[4] Ms Yorke addresses this point in her evidence.

granted) and that depending on a wide range of considerations, it may be some time before the market conditions are favourable for the development to proceed. That is why it is important that consents are granted in order that the project can be executed quickly when conditions support it.

70. The consent applications Contact Wind has made specify maximum dimensions of wind turbines with maximum hub height of up to 100 metres and blade length of 50 metres. With 180 3MW turbines, the wind farm would have a maximum output of 540 MW and an estimated annual generation of up to around 1600 GWh. Contact Wind would look carefully at the option of installing smaller turbines which would have a lower output (e.g. 80 metre hub height and 41 or 46 metre blade length Siemens 2.3 MW turbines which would give a maximum output of 414 MW at an estimated annual energy output of around 1386GWh). The smaller sized turbines have a lower capital cost but the choice between them would turn principally on the assessment of which size turbine is better suited to the rugged West Waikato Coast and produces the lowest overall life cycle cost for the investment.

71. The consent applications have been pitched effectively on a worst case scenario, based on the largest turbines under consideration.

Reduction in Project Size

72. In any modular development, such as a wind farm, there is a question as to whether the project would be viable if the number of turbines consented were reduced from the 180 for which consent has been sought.

73. As discussed by Mr Yates in his evidence, the proposal to construct 180 turbines already represents a significant paring back of the number of turbines forming the project, for a variety of environmental and other reasons.

74. Clearly, any further reduction in the number of turbines will increase the effective dollar cost per megawatt hour produced from the HMR wind farm principally because the substantial transmission overheads (and other fixed costs) are spread across a smaller number of generation units. At a certain point, the project would not be viable at any currently foreseeable future electricity price. I do not know at this stage what that point would be and, in part, it would depend on the track the wholesale price of electricity takes over the next 10 years. I note also that the decision to proceed is not only

dependent upon electricity wholesale prices, but a number of other input costs and their relationship to those wholesale prices including, for example, the exchange rate, and international steel prices.

75. Although the inter-relationship of these factors is complex, I consider that any reduced scale project would be likely to push back the point in time when the HMR wind farm would proceed until a reasonable rate of return on capital investment is achieved.

76. For the same reason, any significant increase in the cost of the transmission will impact on the point at which the project might be economically viable. In the evidence of Mr Mills, he discusses the study Contact commissioned of the potential to underground the transmission line connection to Orton. The advice we received, as discussed in the evidence of Mr Kent, is that undergrounding the entire line would add several hundred million dollars to the project cost. Even undergrounding a relatively short section of line at the eastern end would add several tens of millions to the project cost. For a project that is finely balanced economically, these are significant additional costs which are likely to put back the project several years until wholesale electricity prices (and their inter-relationship to other input cost variables such as those mentioned above) made such an investment viable.

77. In practice, I do not think it likely that wholesale electricity prices would ever reach a point where it would be economically viable to proceed with the HMR wind farm if a significant length of its transmission connection were required to be undergrounded, certainly not for the foreseeable future.

78. If the HMR wind farm and projects like it do not proceed, for whatever reason, then given the long-standing opposition to nuclear power, New Zealand as a whole will be left with little option but to meet its increasing electricity demand largely with new thermal capacity. Unless there are significant new gas discoveries in New Zealand, that increased thermal capacity will either have to be powered with imported gas or coal. Either option would have significant implications for the level of carbon emissions from the electricity sector. Depending on the site and the technology available, a commitment to new large-scale coal-fired generation may have significant environmental implications. A need to proceed with an imported gas option would also have significant economic implications. As already noted, I have been closely involved in investigations being undertaken by

Contact and Genesis Energy into a LNG terminal at which such imported gas might be landed. Such a terminal would be a major infrastructure investment having a cost of its own in the order of several hundred million dollars. In addition, once a commitment had been made to import large amounts of gas for use for domestic electricity production, New Zealand would effectively be committed to meeting future electricity demand through thermal generation rather than renewable sources.

Transmission Objectives

79. Contact, as the Requiring Authority with financial responsibility for the work, has filed various Notices of Requirement with the Waikato and Franklin District Councils. These Notices of Requirement all relate to the transmission infrastructure linking the HMR wind farm to the national grid.

80. Contact's general objective, which applies to every Notice of Requirement, is:

> "*to create a safe, practical and efficient means by which electricity from the Hauāuru mā raki wind farm is able to be transmitted by the operator of the national Grid to wholesale and retail customers throughout New Zealand for their use*."

81. It reflects the inherent character of the electricity system that a safe and reliable transmission system is a critical element because without it electricity can not be delivered to its ultimate users. Practicality and efficiency are important because if the transmission system is too inefficient or impractical, either the generation plants funding the costs of transmission will be uneconomic or the consumer will be unable to afford the electricity transmitted to it.

82. Specific objectives apply to the individual Notices of Requirement. These reflect the role of each individual component of the transmission plant proposed in an integrated transmission system, as discussed in the evidence of Ms Yorke.

83. For the same reasons, the works the subject of Contact's requirements are reasonably necessary to ensure that a significant amount of renewable energy can be connected to the national grid. I have already discussed why it is important that new renewable generation is available to be brought on line when required.

84. Mr Mills discusses why Contact believed it was important that it have Requiring Authority status in this case and why it is reasonably necessary that Contact proceed by way of designation.

Consultation Issues

85. I have not been closely involved in the process of consultation with third parties regarding the HMR wind farm. The evidence of Mr Yates and Mr Mills covers that in some detail.

86. The one party that I have been involved in discussions with are the owners of the Sunset Views property. Sunset Views is a large property located immediately to the south of Port Waikato Township and immediately to the north of the HMR wind farm footprint.

87. The Sunset Views property was for a long period identified as a potential component of the HMR wind farm. Initially the discussions with the owners of the property as to whether they might participate in the HMR wind farm and if so on what basis were handled by Mr Yates. More recently (from early 2007 to date) I have led the discussions with the owners.

88. Notwithstanding the effort put into the discussions, we were unable to reach agreement on commercial terms with the owners of Sunset Views. As a result, we determined to proceed without Sunset Views forming part of the HMR wind farm and while their future participation has not been ruled out, that would necessarily have to be as a second stage, consented separately and after the HMR wind farm as it now stands.

89. I was therefore surprised to read the statement in the submission of Sunset Views Limited and Rimanui Farms Limited that:

> *"The submitters after careful consideration declined to be involved because once the full implications of the project became clear the Company was concerned about the huge adverse and invasive impact the proposal would have on their farming operations, the character of the District and on the environment of their workers."*

90. None of these issues have ever been put to me by any representative of Sunset Views Limited as a reason for their non-participation in the project and so far as I am concerned matters have been left on the basis that the

company’s owners would consider further offers Contact Wind might make to enable their participation with an open mind.

FC Geoghegan

Exhibit FCG 1