Robin Smart

18/6/06

Mr Roy Hemmingway

Electricity Commissioner

Electricity Commission

Wellington

Dear Mr Hemmingway,

I wish to comment on the Commission's Draft Decision on Transpower's 400kV grid investment proposal.

I, with Professor Robert McQueen and Professor Laura Bennett, am a member of the Health Committee of New Era Energy. I have previously sent the Commission a number of submissions concerning health aspects of overhead high voltage AC transmission lines including my paper "Health Effects of High Voltage Transmission Lines: A Review of the Medical Literature December 2004" Further information on this aspect was contained in a copy of a letter to the Prime Minister, Rt. Hon. Helen Clark, of 14th May 2005.

It is noted that the draft decision declines approval for Transpower's 400kV proposal because it fails the Commission's Grid Investment Test, particularly because there are other transmission alternatives which are cheaper for the anticipated demand in the short to medium term. It is further noted that the Commission has now finalised this decision, and that a modified proposal from Transpower to defer costs by partially building the 400kV line, initially running it at 200kV, and subsequently completing the line to run at the planned 400kV at some future time, is now being considered. Transpower claim that this modification would reduce the cost from $650M to $450M in the short to medium term. Given that the Commission has found the cost of the 400kV proposal to be $750M it is possible that the Commission's finding on the costs of this alternative may be significantly different from Transpower's.

Easement Costs Underestimated:

My submission is that the Commission has significantly underestimated the likely true costs of the required land easements for the proposed line because these are based on Transpower's plan to build the line on a 65 meter wide strip. In determining this width Transpower has stated that it considered noise due to the line. It has concluded that 25 meters is sufficient distance to reduce any noise from the line to "background" noise levels. While it is certain that Transpower's conclusions regarding noise can, and will be if required, challenged, that is not the focus of my argument.

Concerning Electro-magnetic field (EMF) health effects on people residing close to the line Transpower asserts the expected level of alternating low frequency magnetic field at the edge of the easement strip, 25 meters from the line, would be less than the limit suggested by the National Radiation Laboratory (NRL) of the Department of Health. The NRL in turn refers to the International Committee on Non Ionizing Radiation Protection (ICNIRP) which suggested acceptable levels in April1998. These levels allow for 100 micro-tesla continuous residential exposure.

The expected level of magnetic field strength at the edge of the easement strip, 25 meters from the outermost line, according to Transpower is 0.6 micro-tesla (Transpower Spokesman Chris Roberts on National Radio Nine to Noon). This was stated during a discussion on research linking miscarriage with magnetic field strength of 1.6 micro-tesla or more. But our information is that such a low level would only be achieved at that distance from a 400kV line if the current load was so minute as to be ridiculous. At expected current loads of 1000 to 2500 A magnetic field strengths of 3 to 8 micro- tesla would be expected.

Actual measurements of magnetic field strength near Auckland's existing 220kV lines show that at 25 meters this is one to two micro-tesla. Therefore if Transpower was to build the line initially at 200kV, this level would likely be experienced at the edge of the easement strip where residence would be permitted. If the line was subsequently upgraded to 400kV, the level would be expected to rise at the edge of the easement strip to between 3 and 8 micro-tesla, depending on current load.

These levels are clearly well within the NRL/ICNIRP guideline. But this guideline is set so high as to be meaningless, and I shall show that there is widespread acceptance of this view.

Currently No Effective Regulation on AC Low Frequency Magnetic Field Levels for New Zealand Residences:

The ICNIRP when they set the guideline in April 1998 stated: “Induction of Cancer from long term EMF exposure was not considered to be established, and so these guidelines are based on short term immediate health effects such as stimulation of peripheral nerves and muscles, shocks and burns caused by touching objects, and elevated tissue temperatures---during exposure to EMF”. But they did in 1998 request caution in this field regarding exposure, acknowledging growing evidence. The ICNIRP stated its recommendations are “not intended to be a complete system to protect the public.” (www.icnirp.de/pubEMF.htm)

On studying the ICNIRP report it is apparent that this recommendation for continuous residential exposure limit at 100 micro-tesla was set merely by arbitrarily dividing the recommendation for occupational exposure, 500 micro-tesla, by five. There was no supporting evidence from studies of populations of people, nor any other creature, who had been studied over a long period to determine safety. That is not surprising if one considers the nature of a place where there is continuously 100 micro-tesla: it would be within a meter of a 400kV line; even a micro-wave oven only has a level of 30 micro-tesla. It follows that to assert that people, including children and pregnant women, can safely live at 100 micro-tesla would be foolish in the extreme. Small wonder that the ICNIRP added the caveat “that its recommendations are “not intended to be a complete system to protect the public”. Indeed they are only intended to prevent acute tissue effects such as shocks and burns, as stated. It follows that the New Zealand NRL is equally unsubstantiated in its recommendation of 100 micro-tesla. In reality there is no meaningful recommendation on a safe level for continuous exposure for New Zealand residences. This situation will not continue for more than a short period of time given current interest. There is certainty that the level of 100 micro-tesla will be considered too high. What is an appropriate level to set based on evidence, and best international practice?

The Commission Should Consider Likely Future Regulations Because Cost Is Affected:

I suggest that it is relevant for the Commission to consider this question in reaching it’s conclusions regarding Transpower’s proposals because it directly impacts on the cost, particularly the cost of required easements. I respectively suggest that it is not prudent for the Commission to merely accept, as it appears to have done, Transpower’s determination of 65 meters, as being appropriate for the life of this line in New Zealand. The matter may finally be settled by legal determination under the Resource Management Act; or it may be settled by political activity followed by regulation. It is appreciated that the Commission has to make its decisions based on the present status of regulations. But when it is so clear there is effectively no regulation in this area, and that there is certain to be one soon, well within the life of this line, I submit that it would be prudent of the Commission to inform itself of this issue, and take into account this factor as much as it reasonably can at this time. To do otherwise would be to risk future criticism. Ignoring this issue at this time would also risk substantial extra cost liability in future.

Best Practice Would Be 0.1 Micro-tesla for “Sensitive Areas”:

What is likely to be the regulated permitted EMF strength for residences in future New Zealand? I appreciate the Commission is very capable of researching and answering this question for itself. The Health Committee of New Era Energy of which I am a member as detailed above has concluded, after reviewing the available evidence, that for residences with children or women of childbearing age, schools, nurseries, hospitals or workplaces where children or women of childbearing age may be present for long periods, the level should be set at 0.1 micro-tesla. For a 400kV line this corresponds to an easement strip of 400 to 600 meters. For 200kV the easement strip to achieve this standard would be approximately 300 meters.

While setting the level at 0.1 micro-tesla would be best practice it is acknowledged that, considering the difficulties, there would be strong arguments put for the level to be set higher. If these arguments were to succeed it is considered, based on the available evidence, that it is very unlikely a level more than 0.4 micro-tesla would be determined. This would correspond to an easement strip width of 250 meters for 400kV, and 120 meters for 200kV.

The British “SAGE” Report:

An illustration of the difficulties if this issue is ignored has been shown by the British Stakeholder Advisory Group on Extremely Low Frequency Electromagnetic Fields (SAGE) in its recently publicised interim report. This committee, set up by the British Department of Health and containing members of the National Grid, Health Protection Agency, Deputy Prime Minister’s Office, Council of Mortgage Lenders, Universities and lobby groups, concluded that houses should not be built within 230 feet (70 meters) of “high voltage power lines” (400kV) and 115 feet (35 meters) of “low voltage power lines” (275kV). Britain, like New Zealand, has effectively ignored the issue in the past, assuring residents of house beneath or close to lines that there was no risk to health, and continuing to allow houses to be built under and close to lines, as in New Zealand. The SAGE committee was set up following publication of a paper by Dr Gerald Draper of the Oxford Childhood Cancer Research Group which studied 9700 children with leukaemia and the distance from their birth address to the nearest high voltage power line, and which concluded that those within 650 feet (200 meters) were 69% more likely to develop childhood leukaemia. Those from 650 feet to 1950 feet (200 to 600 meters) were 23% more likely to develop this cancer. Given these facts the conclusions of the Group concerning recommended distances seem rather limited, perhaps reflecting its multiparty makeup with varying agendas. But the consequences of even this limited recommendation are profound in the British environment: the committee considered buying and demolishing 75,000 affected homes; a quarter or more of the value of affected homes would be lost, totalling at least seven billion pounds. Informed real estate opinion is that many homes would become unsellable as a result of the recommendations. The anxiety and concern of affected people can only be imagined. Their anger at those in authority who ignored earlier warnings and continued to permit close proximity of new lines and houses can be appreciated. Considering the losses involved it seems inevitable that lawsuits will follow. If the costs of achieving this effective late widening of the easement strip around high voltage lines falls to the National Grid, the owner operator of the lines, it will be interesting to see what it does: will it buy and demolish the houses, or demolish the lines, putting them somewhere else or underground?

New Zealand and Britain are prominent (or notorious) internationally for the attitude of taking the ICNIRP recommendations at face value, and permitting residences under, or very close to, lines. Many other OECD countries have responded to concerns by their populations in recommending precautionary avoidance. In some cases regulations have been promulgated.

Sweden:

For example in Sweden the Swedish National Board for Industrial and Technical Development has to “act on the assumption that there is a connection between exposure to power frequency magnetic fields and cancer, particularly childhood cancer.” They have set a standard regarding radiation from computer monitors of 0.25 micro-tesla at 50 cm. Power utilities are advised to avoid magnetic radiation of the public.

Italy:

In Italy there is a regulated limit for “sensitive areas”, homes, schools, nurseries, hospitals etc., of 10 micro-tesla with an aim to achieve 3 micro-tesla for new structures. Three regions of Italy have a regulated limit of 0.2 micro-tesla for “sensitive areas” (Venetto, Emilia-Romogna, Toscana.). It is likely that many other regions in Italy would have followed this lead but they were prevented from doing so by a decree of the National Government. Precautionary avoidance is advocated.

Switzerland:

Switzerland has regulated for a limit of 1 micro-tesla for “sensitive areas”. Holland is considering similar regulation at 0.4 micro-tesla. These countries, like Europe and North America generally, encourage precautionary avoidance.

California:

In California the California Health Department issued information to schools recommending that measures be taken to reduce levels to less than 0.1 micro-tesla in schools following release of the influential California Health Department Report which concluded that magnetic fields were possibly involved in Childhood Leukaemia, Adult Leukaemia, Adult Brain Cancer, Miscarriage, Amyotrophic Lateral Sclerosis.

Australia:

In Australia, where generally the principle of precautionary avoidance has been followed much more assiduously than in New Zealand, a dispute between the residents of Logan City and the utility Energex Co. results in an out of court settlement limiting exposure to 0.4 micro-tesla. This is taken as an indication of what an Australian Court might determine on this issue. Regulators in Australia are currently researching the issue with a view to appropriate regulation.

United States:

In the United States the Environmental Protection Agency (EPA) of the National Council for Radiation Protection (NCRP), the official U.S. Government agency has in a draft report made a recommendation to control magnetic radiation to 0.2 micro-tesla in some “sensitive” circumstances www.safelevel.com . The EPA is currently revising its classification system and it is considered likely that low frequency AC magnetic radiation will be classified as “Likely Carcinogen”, the second category in a four step system. That will have substantial legal and regulatory weight and perhaps similar flow on effects to the British SAGE report.

The National Institute of Environmental Health Sciences (NIEHS) of the U.S. National institute of Health in July 1998 classified low frequency AC magnetic fields as a class 2B carcinogen on the basis of evidence concerning Childhood Leukaemia.

Britain:

In Britain, in addition to the interim SAGE report, the Royal Commission on Environmental Pollution (RCEP) stated “The evidence is sufficiently strong to allow liability suits to reach the Courts---in the U.S.A. and Europe. In many cases the precautionary principle is being applied and proximity between housing and power lines avoided.” (www.rcep.org.uk).

World Health Organization:

In 2002 the International Committee for Research into Cancer (IARC) of WHO accepted evidence that 0.3 micro-tesla magnetic radiation results in an increase in the incidence of Childhood Leukaemia by 1.7 times, and 0.4 micro-tesla by two times. This followed publications of two large studies from Britain and Europe in the British Journal of Cancer and the journal Epidemiology. IARC classified low frequency magnetic field as a carcinogen class 2B (Vol. 80, IARC, 2002.). The WHO International EMF Project has endorsed “Prudent Avoidance” as the appropriate strategy. (www.who.int/mediacentre; www.safelevel.com).

Effects on Easement Costs for the Proposal:

It is noted that in the Table 7.3 on page 71 of the Draft Report “Comparison of Base Costs” property costs are estimated at $133M by Transpower and $145M by PB Associates.

The Transpower estimate is considerably higher (47%) than the original statement in 2004 by Transpower that easements would cost $90M, indicating the uncertainty in this area.

250 meter wide easement:

If 0.4 micro-tesla was set by Regulation or Court ruling as the maximum level for residences this would mean an easement strip width of 250 meters as argued above. This would not be different under Transpower's modified proposal as the long term plan is for the line to operate at 400kV.

It is clearly impossible to accurately estimate the cost of a 250 meter strip compared to 65 meters. But it is obviously considerably more. It almost four times the land area. More properties would be affected. It is not likely that the cost would be four times greater as the major impact of the line on a properties value, and hence compensation, is the existence of the line on the property and this is not altered by the strip width. It seems likely the effect would be to increase the cost by two or three times. This would see the cost of Property go from $133M to $260M--$400M, using Transpower's estimates as base. Using PB Associates it would go from $145M to $290--$435M.

Therefore the Cost of the proposal is increased by between $133M to $300M under these assumptions if an easement of 250 meters is compelled instead of 65 meters as allowed for by the Commission.

600 Meter Wide Easement:

If a level of 0.1 micro-tesla was regulated or ruled then an easement strip of 600 meters would be required for the proposed 400kV line as argued above.

This is more than nine times the land area, and estimates of the change in cost of property are more difficult. But it is likely that many more properties would have to be purchased outright by Transpower, and more would be affected. There are 230 properties directly affected under the 65 easement width proposal. Assuming an average value of $2M, not unreasonable as many are valuable farms or expensive lifestyle blocks, the estimated total value is $860M of the directly affected properties. Perhaps Transpower would have to pay $500M to $600M to obtain property, easements, for such a line. The cost of the proposal would be increased by at least $400M to $500M.

Market Value Estimates:

The above examples use either PB Associates or Transpower's estimates as a starting point. The true figure will only be known at the conclusion of bargaining between the parties or legal action, under the Public Works Act if necessary. Many would consider that Transpower has seriously underestimated the true cost of land for this overhead line, even for a strip of 65 meters. By the time required legal action is over it is possible the land cost could be in excess of $1 Billion.

Conclusions:

It is clear that the cost of land required for Transpower's proposal has the potential to be greatly influenced by any future regulation or ruling concerning maximum permitted low frequency magnetic field levels for New Zealand residences. It is likely that such regulation or ruling will occur in the near future, given international moves including in Britain, and interest in New Zealand and Australia. When it does occur it seems likely it will be in the band 0.1 micro-tesla to 0.4 micro-tesla.

In this environment it is respectfully submitted that the Commission has been unwise to accept Transpower's thesis that an easement strip of 65 meters will be sufficient in future. Considering this factor, of the alternatives promoted by the Commission in its "Short-short List" Table 6.2, only the third, involving completing low cost intermediate alternatives initially then HVDC Whakamaru- Otahuhu in 2017 would appear competitive. This is because there are no recognised adverse health effects from HVDC and the same arguments for wide easement strips do not apply. In addition these lines are far less visually obtrusive for the same current load. These are amongst the reasons such lines are favoured internationally.

It follows that a plan to build an HVDC line to supply Auckland would not involve anything like the same easement costs compared to the proposal for overhead AC. Because of the absence of arguments for adverse health effects, and a lower visual profile, there would be much greater certainty in cost predictions as well as a far easier ride politically and legally for HVDC compared to the highly unpopular overhead AC proposal.

These are further arguments in favour of HVDC lines from generation sources in the South Island across Cook Strait to Auckland, with the conversion to AC occurring there, as mentioned by the Commission. HVDC is cheaper and more practical to place underground close to Auckland, a major consideration given the future growth of Auckland.

These are also arguments in favour of the Commission’s decision to reject the proposal in favour of intermediate upgrades initially followed by careful consideration over a period of years of the appropriate major upgrades to suit conditions in New Zealand when they are required.

Yours sincerely

Robin Smart