

Transpower
Witness
Mr David Boyle
(Day 5)

BOARD OF INQUIRY
Upper North Island
Grid Upgrade Proposal

2 April 2008

Audio Transcript

To be read in conjunction with the
tabled evidence / statement.

9.35 am start

9:37am Page 12 Paragraph 42 Interjection

Chairperson "Can I make a suggestion that in the previous sentence which you were in the middle of reading, just look at it and see whether omitting the word "and" would enable you to convey the meaning clearly"

Boyle "Sorry..."

Chairperson "So, for a particular, line three."

Boyle "Oh for a particular conductor material, the resistance is inversely proportional to the cross section area..."

Chairperson "No, Mr. Boyle we are dealing with the previous sentence, second sentence, so for a particular current, so I'm suggesting and be omitted, the fourth line, is that right?"

Boyle "Oh, yes sorry."

Chairperson "So, read that sentence again please."

Boyle "So, for a particular current flowing through a conductor, the lower the resistance, the lower the losses per kilometre."

Reading

9:50 Page 17 Paragraph 57 Interpolation

Chairperson "Am I looking at the right chart?"

Boyle "Ah, yes, I think so...Yes, yep, 4 to 8, yep."

Chairperson: "They're not numbered in our book, so..."

Boyle "Oh, sorry, ok"

Chairperson "So, there's one that starts...that's headed today, and then there's another that's headed 2008, then there's 2009, and 2010."

Boyle "And 2011?"

- Chairperson "2011."
- Boyle "Pages 4. There's five of them."
- Chairperson "Thank you."
- Reading
- 9:55am Page 17 Paragraph 58 Interpolation
- Chairperson "I might just ask a question there, to help me to relate your words with the chart, or diagram that says today."
- Boyle "Yes."
- Chairperson "Does that diagram show the two 110kv circuits from Bombay to Auckland?"
- Boyle "No, no, it doesn't have those ones in there."
- Chairperson "Right. And, the Arapuni to Pakuranga, is that a separate diagram in the top right quadrant of that drawing?"
- Boyle "It's on...yeah, it's on...this one here, its shown off to one side is 110km system, with the Bombay one, it was starting...it was going to get quite tight on the diagram, this was a really important one to show, because it showed this one was coming out for future, and the reason we used today is it is at today...with 2008, I know we are in 2008 now but, by mid 2008 we will have made changes, so that's...if that makes sense, before winter, that's the winter 2008..."
- Chairperson "By the winter you would have completed Ohinewai. Is that it?"
- Boyle "Yes."
- Chairperson "Thank you."
- Kos "They're all shown Sir, the topographical map, everything is on that one."
- Chairperson "Thank you."
- Boyle Reading Paragraph 59
- 10:20 Page 26 Paragraph 59 Interjection
- Boyle: "Both the large hydro and renewable scenarios have none."
- Chairperson "Just to be clear about that...I'm talking about scenario D..."
- Boyle "Yes."
- Chairperson "Presumably that means no new base load station in Auckland or Northland."

Boyle "Yes, that's correct Sir."

Chairperson "Thank you."

Reading

10:34am Page 31 Paragraph 109 Interjection

Chairperson "Just looking at figure 5, we can infer what it stands for, but the two graphs shown on that figure are not actually labelled are they?"

Boyle "Um, yeah, sorry, must apologise for that, when it was cutting it, I think we lost something. Um...the step...the step line..."

Rutherford "In blue?"

Boyle "Sorry?"

Rutherford "In blue?"

Boyle "Um yes, ??, it's in blue, the step line is the capability of the transmission system."

Chairperson "Ok, capability."

Boyle "Ah, yes, and as the title of it, the winter transfer limits into the Upper North Island, after interim investments are commissioned, each one of those steps is as the result of one of our interim investments, so, each time we make an investment it increases the transmission limit, and the line trending up from, you know, about 2300 right up to 3200, that is the demand forecast for the Upper North Island."

10:35am Reading

11:00 Page 43 Paragraph 146

TEA BREAK

11:28am RESUMED

Chairperson "Mr. Kos, I think that it's expected of the Board to tell you, in the event that it turns out that there is a piece of evidence that you've adduced that the Board isn't clear that it can accept and it's the purpose of my interrupting the process at the moment, because at the first opportunity we should give you that information, so that you can have the opportunity to consider how to deal with the matter. And, it turns out, that Mr. Rutherford has been able to share with the members of the Board that there's an aspect of the evidence given by Mr. George that it isn't clear at the moment that we can accept as being a complete statement, and I'll ask Mr. Rutherford to outline to you what that aspect is, so you can, in due course, pursue the matter as you think right."

Kos "So, I'll just make sure...I wonder if I could ask Mr. Taylor to join me please, just to take notes."

Chairperson "Yes. Now, Mr. Rutherford."

Rutherford "Thank you. There was some of Mr. George's evidence and in cross-examination to a feature called n-1, in relation to reliability or security. The discussion also included the terminology n-g-1, and we heard some explanations about what that meant and how it was derived. I put a question to Mr. George in relation to the operation of the system as it occurs on a day-by-day...and I think he later on explained that this was minute by minute, as opposed to his long term planning. I asked him whether the current operation used n-1 or n-g-1. My understanding was, that his reply...was that the system used n-g-1, and he then went on to answer some questions from the Chair as to further explanation of what those terms meant. I am having some difficulty accepting that the system is run on a n-g-1 basis, on a minute-by-minute, as of now, because of the way that those...My understanding of the way that those components, the n is defined as the system operates, as opposed to Mr. George's original area of interest, you might say, when he's looking at planning terms, and what he understands by the terms. So, I'm seeking clarification, first off, that the answer was n-g-1 to the question, I think that's important to understand that I heard Mr. George's answer correctly, and then if Mr. George confirms that that is his answer and that answer stands, then perhaps we might need a further explanation from, either Mr. George or someone who is able to answer that question, as to just how that would work in practice on a minute-by-minute, second by second basis."

Kos "I suspect I know the answer myself to the question, and I think there is a difference between how one operates a system and the extent to which one builds a system, and I think that's where confusion may have entered into Mr. George's answer to your question yesterday. I understand the system's built to n-g-1, I don't think it operates to n-g-1, but I'm not the witness fortunately, the ideal witness to answer that is, in fact, Mr. Boyle, and I wonder if we could deal with the matter, your Honour, in this way, and that is, I will ask Mr. Boyle to deal with that question at the end of his evidence, and we will proceed with his evidence in the usual way at the moment and come back to that, and I think he'll be able to answer your questions Mr Rutherford, very clearly."

Chairperson "Thank you, Mr. Kos."

Kos "Thank you, Sir"

Chairperson "Thank you, Mr. Taylor, and Mr. Boyle, we're at Paragraph 147."

11: 35am Reading

11:44am Page 47, Paragraph 161 Interpolation

Boyle "However, these failure rates related, not only to the overhead lines but, also, to the other...Sorry, there's a word missing, it should be lower voltage equipment... Such as underground cable sections, bus-bars...Sorry...can I just stop that sentence, I've...sorry can you remove the word 'lower' completely? Sorry, about that."

Chairperson "And, remove 'voltage'?"

Boyle "Um...no... Ah, yes, sorry, yes??"

Reading

11:59 Page 52 Paragraph 188 Interpolation

Boyle "...but two single circuit lines are required to provide the same capacity as a one...as one double circuit line...sorry there's an extra 'a' in there after as."

Reading

12:00 noon Page 52 Paragraph 189 Interjection

Boyle "The Triplex Sulphur bundle configuration consists of three 33.8mm diameter All Aluminium Alloy Conductors (AAAC) in a rectangular arrangement, with..."

Chairperson "Just...Just would you look at that again please?"

Boyle "All Aluminium, in a triangular arrangement..."

Chairperson "Triangular, yes."

Boyle "Oh, sorry, what..."

Chairperson "You said rectangular."

Boyle "Oh, sorry."

Reading

12:15 pm Page 57, Paragraph 206 Interjection

Boyle "Losses of 80-85 MW are roughly equivalent to the output of a small power station."

Rutherford "Sorry, if I could just interrupt, your graph shows option 1, 2, 3 and 4."

Boyle "Yes."

Rutherford "Have you omitted the brackets...Option 4 and after talking about the high conductor Option, is that option 4?"

Boyle "Sorry, yes, that's correct. After the high...Option 4 is the high temperature conductor option, sorry about that."

Rutherford "So, Option 4 should be in brackets, after... Fourth line from the bottom?"

Boyle "Sorry?"

Rutherford "Fourth line from the bottom."

Boyle "Yes."

Rutherford "Thank you."

Boyle "Sorry about that."

12:30 pm

Chairperson LUNCH BREAK

1.47 pm RESUMED

Kos "Mr Boyle, would you continue with your Statement of Evidence?"

Boyle Reading Page 64 Paragraph 235

1.55 pm Page 67 Paragraph 244 Interpolation

"That should be 'in' service redundancy."

Reading

1.59 pm Page 69 Paragraph 249 (d) Interpolation

"From earlier change in the evidence...no base load' stations in the area."

Chairperson "Thank you."

2.21 pm END

Kos "Thank you very much Mr Boyle. Would you take now please your rebuttal statement and would you read that please from Paragraph number 1."

Chairperson "Thank you Mr Boyle."

Boyle Reading rebuttal evidence.

2.47 pm END

Chairperson "Mr Kos."

Kos "Thank you Mr Boyle. I'm going to ask you a few questions about the issue raised by the Board and Mr Rutherford before the morning tea adjournment. That issue related to the difference between the transmission system planning criteria in the grid reliability standards and the system operators...operational requirements."

Boyle "Alright."

Kos "For a start, can you please explain to the Board how the n-g-1 criteria is assessed for the upper North Island."

Boyle "Yes, I can...it might be easier if I draw this on the board because...is that...it's actually...to try and explain that in words is actually quite difficult."

Chairperson "That's true of understand it as well, I think."

(Mr Boyle draws on whiteboard) VIDEO RECORDED

Boyle "Yeah...it will...??...there's our Hautapu bus, I won't put those 110 lines in....to show on other drawings to make it a bit simpler...that is the...CTGC ?...our gas turbine generator and that's approximately 375mW and that's the transmission North. From the South into Otahuhu there's a line that goes out to Glen...through to Glenbrook. I'm going to run out of board. This is Huntly, this...14.14mW of generation. I've just shown it as a single generator...it's a bit simpler. This is Glenbrook and this is the same line. I've shown it as a double circuit by putting...that's simply to show its length and that carries on down to...through to...Taranaki.... That's Hamilton and this is the...Huntly, Otahuhu A line. This line going down and this is the Glenbrook deviation. That's roughly our 220kV transmission system...running through to Auckland, at the moment, we've got Whakamaru down to here, Otahuhu here with the combined cycle plant there...?...life generation down here. These circuits are all...they all have different ratings, so starting over here these...these are...ratings...mVa, 200...I'll just have to note this....every single one, sorry...these ones here are 403.....210...457mva. This part here is 670 from this point upwards, 670...this one here is 694, 762. As you can see, we do have a lot of circuits running up here, they're all different...they're all different capacities starting at 220 here running up to 762 here and the power doesn't share evenly between them, it's based on the impedance of the line and that determines, so you could have...two conductors that could be double the rating of each other, but they could actually have more or less the same current flowing through them, because the impedance, the reactors...which impedes the currents flowing through are the same. So, to look at the n-g-1, in Auckland...we looked at the system and said...this is a single shaft combined cycle generator, so...it's a very long machine with a big gas turbine like an aircraft and it has a heat recovery turbine and generator on the end. If you get a failure of any one of those parts on the turbine, the plant's out of service until it's fixed. So, we looked at...we looked at the system and said well, the normal...n-1 with all equipment reasonably and I think, that's the key word, expected to be in service."

That led us to...to look at what was reasonably...expected to be in service and at that point, we decided it wasn't reasonable to expect at peak load periods the generators would always be in service. So, the reasonable bit moved up from an n-1 to an n-g-1. The reason I'm writing this quite wide is so I can put the plant items underneath it. What it is...and this is the Otahuhu Combined Cycle Plant, so the g is...should we say that should come out of service before we start. So, we calculate the limits then...and...then in this one here, 1 is the largest component, now that could be a generator or it could be a transmission line, depending on what the next largest component is, and this is the critical bit about the operational...how the operational one that Mr Rutherford asked about. So, for our planning criteria we run n-g-1 and in this case the largest part at the moment is this one here,...that...is called the Otahuhu -Whakamaru three circuit, because that's the longest one there so it's -1 here Otahuhu - Whakamaru circuit. When we...put a new line in because the line capacity is about 1450mVa even at 220 that will change so this is now at 2011 the n-g-1 will still be that Otahuhu CCGT, but that will become the...Whakamaru...Brownhill circuit. Is that reasonably...ask any questions you like."

Chairperson "Well, I think we won't thank you, but we do want to hear your evidence now, but want you to answer any questions that Mr Kos might have for you now."

Boyle "Yes."

Chairperson "We won't ask any questions at this stage, because there will be cross-examination on this, which will go first."

Kos "Thank you, Sir. So, if we then look at your...the...diagram could we just look at what n is please. What's n?"

Boyle "n is the system at peak load so, we should be able to supply...peak load...peak system load, without any interruption with the loss of those plant items."

Kos "So, is that...is n an assumed level of demand?"

Boyle "You could refer...in this case you could refer to it as an assumed level of demand and meet that demand."

Kos "Right, now, having set out the planning side could we then look please at the system operators...operational requirements, what are they?"

Boyle "These..."

Kos "Before you answer that, tell us about the function of Transpower as system operator, because it's both grid owner and system operator isn't it?"

2.58 pm

- Boyle "Yes, Transpower has two parts to the business... we are all one company, but we also...Transpower has a system operator contract with the Electricity Commission, so the system operator function is... their job is to manage the real time despatch of generation and make sure there is enough transmission around to match the generation with the load that they can supply, and that's in real time when they do that."
- Kos "And, is that done by the same people or a different group of people within the company?"
- Boyle "That's done by Systems Operations Division, which is different to the Grid Investment or National Grid Divisions."
- Kos "Back to my question then. How does the systems operational requirements relate to that planning diagram?"
- Boyle "The system operator... they are trying to maintain... they only maintain it to n-1, so the planning criteria in this area is n-g-1, because it's expected to be with all reasonable equipment in service. But, the system operator runs purely to n-1 so, in this particular case, the n-1 is always the Otahuhu Combined cycle, that's now."
- Kos "And, is that because 1 can always be either a transmission item out or a generation item out?"
- Boyle "That's correct Mr Kos, they...look at the plant that's available to them at the time, so, they'll be looking at the schedules of what generations going to be available, what transmissions lines are available, and they'll try and make sure they've still got n-1 at any particular time. So, for example, if that generator is out of service for maintenance they'll then be looking at the system saying, 'well, what's going to happen next'. So, they'll just be looking at n-1. So, with a generator out, then they would be looking at the dependency of this circuit, but normally with the generator in they would be at the loss of that."
- Kos "Right. If we were to assume that no further investment occurs and we reach the year 2013, could you consider these assumptions please, firstly that actual demand is equal to n, secondly the g has occurred the Otahuhu Combined Cycle is out, and thirdly that 1 has occurred so, you've lost your key transmission line, assume all of these three events occur, what would be the situation then?"
- Boyle "2013, demand would have to be shed and in those situations unless the operator has some automatic method of doing it they would actually shed load, what were refer to as pre-contingencies, so they'll identify that this problem is there the generator was out. If this line trips, they're gonna overload the circuits, they would, unless there's some automatic way of removing it...the load... they would ask for demand curtailment before the next event happened. So, in peak time in winter, if this generator was out, then this would be the next contingency, they would go to the Power Boards and say...they would go we need to reduce the load below 2500

megawatts. Before this event happens, so they would manage that down pre event so there would actually be demand...it would be controlled...demand curtailment. prior to the event.”

3.02 pm

Kos “Could you answer any questions then that my friends have?”

Chairperson “Thank you Mr Kos. Mr Allan.”

Allan “Chairman, afternoon Mr Boyle. reference is made in my friend’s opening submissions and also in your rebuttal evidence at...Paragraph 34, says there’s a possibility of a second 400kV line after 2042 coming into Brownhill, you’re familiar with that proposal obviously? That’s never been open into full public consultation has it, as a proposal?”

Boyle “Absolutely, not they are all modelled projects the same as the second 220 kV line so we...we...listed a number of projects if we went in this direction what was the number of modelled projects we would have to do, and the same with the second 220kV one it is modelled, they are all modelled projects.”

Allan “So, presumably, if this became a prospect of having to put in a second 400kV line, you’d then have to look at further upgrades to Brownhills, you’d have to look at re-configuring the Brownhill substation.”

Boyle “Not necessarily, we haven’t established where the entry point to Auckland would be yet. And, there’s a possibility we might go to another location, at that point, if we went with a second 400, we may go there we may not depends on at the time really.”

Allan “Thank you. Environmental considerations were not the key driver for assessment of the proposal prior to applying to the Electricity Commission for funding were they?”

Boyle “Were they...”

Allan “So, prior to applying to the Electricity Commission for funding, environmental considerations they weren’t the key driver for assessment of the proposal were they?”

Boyle “They were one of the drivers for assessing the proposal, yes.”

Allan “But, not a key driver? Not a key driver?”

Boyle “I...think they are a key driver, as Mr Taylor will discuss later, they were actually a driver from quite early on in the process.”

Allan “The proposal was prepared for assessment against the Grid Investment Test wasn’t it?”

Boyle “For that part of it, yes, that’s the actual 400kV line from Point A to Point B.”

- Allan "And, you'd accept that's an economic test isn't it?"
- Boyle "For establishment of a transmission solution from...point...Whakamaru to South Auckland, yes as far as the Electricity Commission are concerned, the proposal to them was one of economic test.'
- Allan "And...environmental...and cultural considerations were taken into account, only to the extent that they added a specific cost to the proposal at that stage, at that time, weren't they?"
- Boyle "Mr Taylor, honestly, is the expert in this area...my knowledge of it is, that the process went through...we were looking for a long time and all of these things were considered as part of the proposal?"
- Allan "You would defer to Mr Taylor on that point?"
- Boyle "Absolutely."
- Allan "I just want to pick up on something you said in Paragraph 225 then. You say the proposal was designed to optimise the trade off between costs and benefits and environmental impacts."
- Boyle "Sorry was that..."
- Allan "225"
- Boyle "225, thanks."
- Allan "You see there the paragraph designed to optimise costs, benefits and environmental effects, so are you saying there that leading in to the Electricity Commission process, environmental impacts were a consideration for Transpower?"
- Boyle "We did consider the impacts, yes.'
- Allan "And, if I understand your evidence correctly, appreciate what you're saying about deferring to Mr Taylor, You're saying though that the primary environmental consideration is, as far as you are concerned, is that referred to in Paragraph 208, and i.e. the smaller number of new lines and smaller number of overall lines, as far as you're concerned, that's the environmental consideration."
- Boyle "No, I'm saying that's a benefit of 400 versus 220 was the smaller number of lines."
- Allan "Key environmental advantage sorry, yes"
- Boyle "Yes."
- Allan "Turning to your rebuttal evidence at Paragraph 22, you challenge Mr Freke's assertion there that only internal costs were considered, in terms of external environmental costs the only cost Transpower considered was the cost of obtaining easements wasn't it?"

Boyle "No, I don't think so, there was an amount in the breakdown of the costs for the Grid Investment Test, was environmental mitigation. That cost was in there as well."

Allan "I think you refer to that in the next paragraph as well, actually at Paragraph 23 you refer to environmental mitigation being built into the project and environmental mitigation costs being taken into account, through the GIT, what environmental mitigations being built into the project so, apart from easement costs?"

Boyle "Sorry, on the environment costs, I will have to defer to Mr Taylor."

Allan "Your evidence is purely focussed in these technical matters and you'll defer to him again in that regard?"

Boyle "That's correct."

Allan "Thank you, I have no further questions Sir."

Chairperson "Thank you Mr Allan. Ms Brennan, thank you."

3.08 pm

Brennan "Your honour, Mr Boyle."

Brennan "Mr Boyle do you accept the environmental damage that this line will cause will be done from when it's constructed, from construction?"

Boyle "Sorry, the environmental damage."

Brennan "The environmental damage will be done when it's constructed?"

Boyle "Are you talking about the physical damage to the land when it's constructed..."

Brennan "The environmental damage, the visual impact if you like."

Boyle "My impression of this is, that Transpower is following what it considers to be the correct legal process on this, and... Mitigations should be referred to Mr Taylor, and about property Mr Miles."

Brennan "So, is there any question that when the lines go up that is when the visual impact, when it comes in to play, isn't it, it's not down the line when its run at 400kV?"

Boyle "Absolutely when it's constructed it's constructed as a 400kV line."

Brennan "And, under the RMA you are aware you are required to consider alternatives?"

Boyle "Yes, I am aware of that but it's not my area of expertise."

- Brennan "Consideration of alternatives?"
- Boyle "No, they are...issues...with the RMA we did consider alternatives."
- Brennan "What environmental alternatives were considered when choosing the 400kV line?"
- Boyle "Sorry, when choosing the what, 400kV line, what impacts were considered?"
- Brennan "What environmental impacts were considered?"
- Boyle "Ms Brennan, my evidence really is about system planning, I'm really not trying to duck the question here, but my involvement with this was about actually about coming up with a number of options that could be used, and then...Mr Taylor and others were...went and had a look at the environmental effects that...of the options and how they might be...and the mitigations as well."
- Brennan "Did those...that work done by Mr Taylor and his group feed back some financial information into the proposal?"
- Boyle "Yes, it did."
- Brennan "Can you tell us what that was?"
- Boyle "I think it was about 11 million dollars mitigation costs were in the 400 proposal and 8 in the 220, that's from memory."
- Brennan "11 million dollars."
- Boyle "In mitigation costs yes."
- Brennan "Does that seem like a lot of money to you in the scale of the proposal?"
- Boyle "...If you are just talking about straight environmental costs, I think, my impression of the process it's gone through, is that they actually looked at the lowest impact route, and they priced that as well, I don't think you can say it's a single figure."
- Brennan "In terms of mitigation, environmental impacts, visual impacts, to for example local landowners, do you think 11 million dollars sounds like a lot of money, to hide 400 pylons?"
- Boyle "I really can't comment on that."
- Brennan "Ok, do you agree that building this very large line will lock out environmental and technological impacts over the next few years? New technology comes along, new mitigations measures come along, ...dark...? steel towers for example, once this lines up, we can't take any advantage of any of those things, is that correct?"

- Boyle "Regarding, your question...was two parts, one of them was about technology, are you referring to technology of transmission lines, or...?"
- Brennan "Yes."
- Boyle "I think this is a modern technology line we are putting up, I don't feel, i don't see it as a standard transmission line...I'm not sure what...what some people say we are using outdated conductors, we are not, we're using a triple AC conductor, we...the transmission line is reasonably standard other than that."
- Brennan "There are developments overseas with cross arms, pylons, which have lines at the top, which can be shortened later, to mitigate the visual effects, etc."
- Boyle "Yes, I Know...I'm not actually aware of those pylons you are talking about, but if you look at the pylons that are there you are governed by a number of physical constraints that we...where can you put your wires, you can't put them any lower, because of our requirements for energised maintenance we have a certain distance we have the conductors apart in both horizontal and vertical...planes...so."
- Brennan "Compact Monopoles Akimbo Rigid Insulators, which can save many, many metres off the height of a pylon, not in your area of expertise?"
- Boyle "No, we were, when Mr Noble was around talking about particular types of insulators on towers, you could probably discuss that with him. We do, you particularly quoted Akimbo arms, as you are probably aware we have used Akimbo arms in places in new Zealand and most notably where you go into Onehunga from the Airport there is a couple of towers there that have Akimbo arms on them, and they do have their uses in places.'
- Brennan "And, they do not have any uses..."
- Boyle "You'll have to talk to Mr Noble about the specific design, my understanding is you can use Akimbo arms in some places and you can't use them in others."
- Brennan "I think, so far, we have found it a little frustrating that there is no holistic view of this, we have to go to different people, they should all be back into the system planning, your department.'
- Boyle "Honestly Ms Brennan, none of us can be an expert in every single subject, and this is...we have our area of expertise, and we bring them, all together. We don't work in isolation, we look at what the system planning need is, we then ask engineering if that is a viable one, we will change the design a bit, we will talk to the environmental people, property people about what we can do, so we do...do it as a group, so, if you're asking very specific things about designs of towers, we have experts that can do that, and it becomes...we all become a bit of an expert, but we can lead you astray with the answers by doing that."

Brennan "So, I can get from Mr Taylor, what is fed back into the system on environmental matters and Mr Noble on design matters?"

Boyle "That is correct."

Brennan "When Transpower put its original proposal to the Electricity Commission it was for a 400kV line with a capacity of 2400mVa as stated in your evidence. Transpower assured the EC that it would meet the need for at least 20 years is that right?"

Boyle "I'm not sure about that quotation you've got there as the Development Plan clearly showed that...for the large hybrid generation in Auckland, that another line would be required about 2020. That's part of the information about the Grid Upgrade Plan."

3.15 pm

Brennan "Your Honour, I think Mr Rice has got some information here, there is a Transpower document, this document is a Transpower document..."

Chairperson "I think if you would allow me to make a suggestion, that instead of you telling us what the document is, which would not be evidence, you might ask the witness if he recognises it, and if he does then you might ask him to tell us what the document is, and that would be evidence."

Brennan "Thank you your Honour."

Chairperson "That's what you are aiming for isn't it?"

Brennan "Thank you. Mr Boyle do you recognise this document?"

Boyle "I have seen it before."

Brennan "And, can you tell us what the document is?"

Boyle "Do you want me to read out the executive summary?"

Brennan "Please."

Boyle Read out, introduction and the first part of the Executive Summary Page 6.

Brennan "Thank you, 'the next 20 years at this point I'm assuming will take us up to 2026'...?"

Boyle "Sorry, there is a bit of a misunderstanding. These things are usually based from when the project is started. So, 20 years is talking from at the time this one was 2009 to 2029 based on the medium load forecast of the prudent load forecast which was used on the later proposals."

Brennan "So, do you, as an expert in this, agree or disagree that the 2400mVa would meet security of supply out to 2009...?"

- Boyle "2009...?"
- Brennan "Sorry, 2029."
- Boyle "1200mVa that would probably meet it around 2029, yes."
- Brennan "Has demand forecast fallen?"
- Boyle "It's not entirely factual, there was a 2005 Statement Of Opportunities, there was a draft 2007, there is now a draft 2008, the 2008 one."
- Brennan "Has that one been release yet?"
- Boyle "It's on the Electricity Commission web site."
- Brennan "Thank you very much, roughly how much...this piece of the grid, I don't know if its got a name."
- Boyle "You are referring to the grid to the south of Otahuhu."
- Brennan "Right ,thank you, that bit of the grid, that part of the world, how much generation is there in there at the moment?"
- Boyle "In here?"
- Brennan "Local generation."
- Boyle "There is 1400mW sitting at Huntly, a couple of Hydro plants that are connected into Hamilton, ones at Arapuni and ones Karapiro, and from memory that's about 300mW, there used to be a plant at Te Awamutu, Gas plant that was shut down this year, and the rest, most of the generation feeds in at Whakamaru."
- Brennan "And all that generation goes up to Auckland pretty much, Hamilton as well..."
- Boyle "If you look at the load here there's over...at peak there's over 2000mW now."
- Brennan "Can I ask how much generation has been consented, but not yet built?"
- Boyle "In Auckland?"
- Brennan "Yes."
- Boyle "There's a Combined Cycle Plant at Otahuhu by Contact Energy, they are building two new plants at Stratford instead. So, they are not building at Otahuhu but at Stratford."
- Brennan "Any, more consented in Auckland?"
- Boyle "Yes there is a small wind farm out from Glenbrook, Te...i think it's about 26mW, I think that's about it."

Brennan "Thank you."

3.22 pm

Brennan "I would like to get some numbers clear, we asked Mr Coad, he referred us to Mr George who referred us to you, could you please give them to us... What is the current demand of the Auckland half of the north island, currently."

boyle "Last Year...I have that just here, if I could just take these numbers."

Chairperson "Just take your time to get the right document Mr Boyle."

Boyle "Thank you."

Boyle "In 2007, the top piece 2050mW load data."

Brennan "Is that the actual of the forecast?"

Boyle "Metered amount, every half hour, instantaneous demand would be higher than that."

Brennan "Can you tell me what the forecast demand is for 2020?"

Boyle "From which demand?"

Brennan "Whichever one you have, the 2005 SOO, whichever."

Boyle "3406 prudent forecast,"

Brennan "And, was that just the Transpower figure not the SOO figure?"

Boyle "No, sorry that was the high, 3301 prudent figure 2005, the 2007 one was 3198 and the 2008 was 3163."

Chairperson "Perhaps you, and the witness, both now whether you are talking about the predicted demand from Auckland or from some other district but, I'm sorry, I don't think I'm clear about that, so could that be clarified please?"

Brennan "Sorry, we were talking about; I hope we were talking about the forecast demand for electricity in Auckland and the upper north island region."

Chairperson "Thank you I'm glad I asked. Now, Mr Boyle, is that what you were talking about?"

Boyle "Yes, I was referring to what is known as the prudent demand forecast in the upper north island."

Chairperson "Thank you."

Brennan "Just on that one figure you note that the 2008 SOOs had gone back up, that was the figure you gave me for 2008?"

- Boyle "That it is correct, at 2020, at 2040 the 2007 SOO was 4942mW."
- Brennan "Can I also ask you for the same figures for the forecast prudent demand for 2050."
- Boyle "4186 was the figure we used, the 2007 SOO was 3976 and the 2008 was 3995."
- Brennan "Thank you very much for that, so and just to clarify, these are prudent figures which are higher than the expected demand but, they are prudent because you have to plan for the extra security."
- Boyle "No, they are not higher than expected they are just, if we plan for that level we will be able to supply the demand at that period at 90% of the load draws, so there may be 10% of the time when we may exceed that."
- Brennan "The average of the demand draws is lower than this?"
- Boyle "Are you talking about the median one, yes we can't design a transmission system to cover a median, it's used for economic purposes."
- Brennan "No, it's when we look forward as to when other upgrades are likely, so thank you for those, forgetting for the moment n-1 and g-1 can we look at capacities in the system, so the capacity in that drawing on whiteboard, so what's the capacity of those lines at the moment?"
- Boyle "The thermal capacity?"
- Brennan "Yes, the thermal capacity."
- Boyle "The thermal is a little misleading it gives the capacities combined together to give you a delivered product at the other end."
- Brennan "Ok."
- Boyle "So, you are actually looking at a delivered product at the end which is very dependent on how much generation is here, how much is coming from Taranaki, how much load is at Hamilton, if there is a high load at Hamilton, that then loads up this circuit so we can't put more in here, so we are actually talking about what we can draw off for Auckland, adding them all up does not give you... If you add them up you don't get the answer."
- Brennan "How much can you draw off for Auckland?"
- Boyle "Right now we can supply n-1..."
- Brennan "Can we have it without n-1, we can talk about that in a minute."
- Boyle "I think it's around 2500."
- Brennan "Thank you, if a 220Kv line was built, what would that increase that capacity to, forgetting about n-g-1?"

Boyle "If we do without all the measures then we can increase the capacity by about, I did a very rough calculation before... if 220kv line it would have 1450mVA, in one circuit, but it also."

Brennan "That's doing the n-1 thing."

Boyle "Yes, that's correct."

Brennan "I was just looking for the raw capacity, I am going to get onto the other one."

Boyle "Ok, then you add 2900 on to what's there at the moment."

Chairperson "Is that a convenient time for us to take the break Ms Brennan?"

Brennan "Absolutely"

Chairperson "We will break for a quarter of an hour."

3.30 pm TEA BREAK

3.50 pm

Chairperson "Thank you Ms Brennan, would you like to continue please?"

Brennan "Thank you your Honour. Mr Boyle, we were looking at capacities, if you remember, I think we ascertained that the capacity of the grid...well, that the amount that you can supply at the moment up to the upper North Island is about 2500MVA I think you said?"

Boyle "The total amount that can be supplied at..."

Brennan "Absolutely...(unclear)"

Boyle "It's not really about the supply, you've got to be quite clear, that we've got requirements, and the system operator has to...supply under the n-1 conditions."

Brennan "I absolutely accept that, absolutely. The additional capacity that would be added in more...terms of the 220kV line, would be an additional...2900?"

Boyle "Two by 1450. Yes."

Brennan "And, the proposed line operating at 200kV...220kV? sorry."

Boyle "Two by 1450."

Brennan "The same. Thank you. And when the proposed line was converted to 400kV operation?"

Boyle "Two by 2700."

- Brennan "Excellent, thank you for that. Now, I'm going to do the n-g-1 or n-1...I think we've got it on the list somewhere, what is the value of 1 at the moment?"
- Boyle "Today, with the g out, it is...this circuit here, the Otahuhu-Whakamaru 3 circuit."
- Brennan "Okay, and what's the value of that?"
- Boyle "457 MVA."
- Brennan "Thank you. So, in my understanding then, the 1 in the n-g-1 represents the largest item in the grid. That's right, in this part of the grid?"
- Boyle "That is correct."
- Brennan "So, at the moment 1 is 457 MVA, after building the proposed line and energising it at 220kV, what would 1 be?"
- Boyle "The...it would be the loss of the 1450 MVA circuit."
- Brennan "Thank you. And, after upgrading to over 400 the...?"
- Boyle "The loss of the 2700 MVA circuit."
- Brennan "So, the larger the capacity of the circuits, the more redundancy has to be built into the system, is that right? Sorry, spare capacity."
- Boyle "No, the larger the capacity of an individual item, then you do lose...you've got to calculate it, with that out of service."
- Brennan "I accept that. So, at this moment, this grid has to have 457 MVA at spare capacity, to meet n-g-1?"
- Boyle "It has to... It's not quite as simple as just adding up the numbers, because what happens is, when the amount of capacity that we've transferred here, during a contingency, is dependent on, which one of these circuits gets to 100 percent. So, it's fully loaded. So, you may be in a situation, where, for example, at the moment, the lines that overload first, are these two smaller ones, so, when they get to a certain amount, that's all you can do, and there may well be spare capacity on other parts of the circuits, so it's not as simple as just adding numbers up, sorry."
- Brennan "Okay, but a moment ago you said that the value of 1 was 457 at the moment, that was the Otahuhu line?"
- Boyle "What you asked me was the value, sorry, I misunderstood what you were asking me. What's the loss...you said what's the...what we're talking about the 1 there, was the circuit that were tripped, and this has a thermal capacity of 457 MVA."
- Brennan "Okay, are you happy that will be picked up elsewhere in the grid?"

- Boyle "You have to be able to pick up whatever is required, now that may not be 457, the loss of this means, that when this is out, everything else gets loaded across the other circuits, so it depends on what you can supply through those at the time. It just depends on the load of Hamilton, the generation injection in Huntly, the generation injection here, and the generation in Hamilton."
- Brennan "Thank you. After conversion to 400kV, the 1 would be 2700 MVA?"
- Boyle "That's the circuit...contingency, is not talking about the 1, the contingency would be the loss of the 2700 MVA circuit is correct."
- Brennan "And you have to have capacity to cover that. The loss of that?"
- Boyle "Well, no, what would happen, is that the rest of the system without these two out here, the one circuit plus the rest of them, would load up and take the remaining load. So, the limit here is based on, what is going to flow through these circuits, after one of them is taken out, and with none of these exceeding 100 percent of their capability."
- Brennan "Mr George said yesterday under cross-examination, that when this line is energised to 400kV, there would only be 2700 MVA running at a time, as the other circuit would be needed in case of the contingency, the contingency of the other...that line went out. Is that not correct?"
- Boyle "No...that's what I'm saying. If one circuit would be out...2700 would be out, the other one would be in. It would be to only load them up as much as possible, and if you look in the amended proposal we have a development plan that actually puts pieces of equipment in there, it actually helps balance all those circuits out."
- Brennan "That 2700 MVA is more than the capacity of the entire grid at the moment, this part of the grid, or the demand that can be met by this grid, you said 2005?"
- Boyle "Yes, that's correct, yes."
- Brennan "And it's also more than the total demand of Auckland and the upper North Island, at this moment?"
- Boyle "So, that was..."
- Brennan "More than demand, yes."
- Boyle "It is more...the capacity of that circuit is greater, than the total demand of the upper North Island at the moment. That's correct."
- Brennan "It seems be...It seems to me that because of this n-g-1, and because of the capacity of the lines, that, we're actually building a large amount of redundancy into the line, do you not agree with that?"

- Boyle "No, I don't think we're building...I wouldn't say we're building redundancy into it. We're building a line, knowing that the capacity is calculated up with the loss of one of the circuits."
- Brennan "But, the fact that the loss of one circuit means 2700 MVA, as opposed to 1450 MVA, means that there has to be additional space in the grid to deal with that?"
- Boyle "I don't think that's particularly...that's not a really big issue, because that always happens when you change voltage or you change capacity."
- Brennan "Exactly. And that's one reason that it seems odd that Transpower are making this jump, to a new voltage. I mean, you are necessarily building in a lot of spare capacity, as much spare capacity as there is demand at the moment in Auckland and the upper North Island. And as an electricity consumer, I don't think that's reasonable, and as a land owner who will be impacted, by the scale of this proposal..."
- Kos "I think you need to put a ...sorry..."
- Brennan "Sorry."
- Kos "Sir, I think...Ms Brennan needs to put a question..."
- Chairperson "I was thinking that it might come to a question, at the end, such as the last question, which started off with a plot position, and then the witness was asked whether he agreed, or whether he accepted that, and I think that...I shouldn't preclude Ms Brennan from asking questions in that way, if she finds it convenient."
- Brennan "Thank you your Honour, I will try and stick to questions."
- Chairperson "Please."
- Brennan "So do you think that electricity consumers should be happy to pay for this excess capacity, in what is only a small part of the grid effectively?"
- Boyle "I think it's not actually an issue about excess capacity, in that we went through the Grid investment Test, and this was the lower cost option. And, that is what ultimately gets reflected back when you take...when it gets reflected back to the customers, because you're taking into account losses as well in there. So, the...what reflects back onto the customers, is the lower cost option? And this is the lower cost option."
- Brennan "Am I right in believing, that the Electricity Commission did not assess the conversion to 400kV? That was a modelled project, was it not?"
- Boyle "You're correct, that it is a modelled project, what...where you're slightly incorrect, is that they did assess the cost of that line, as part of the GIT. To do that they assessed all the modelled projects, lined them up, with times and costs, and did the calculations. So, yes, they did assess the cost of another 220kV line."

Brennan "Thank you. You are aware that...we'll not go there. On a related issue...or on the same issue really, if you get permission to convert the proposed line to 400kV, without building another line, how much extra capacity will you actually unlock in that line?"

Boyle "We'll be...we'll be...sorry, if we...When we go from 220 to 400, we unlock...we go from 1450 to 2700 MVA, so we unlock the difference there."

Brennan "But, you're limited by the n-..."

Boyle "No, remember when we go to 400, we've got two circuits at 2700 MVA, so, the contingency is lost with one of them. So, we've still gained the other 2700. We've moved from 1450, to 2700 at that point."

Brennan "Yes, So, you gain 1450?"

Chairperson "1250."

Boyle "1250."

Brennan "Whatever that number was. 1250. Thank you. To release more than that, you'd have to build another line for the capacity to carry at least 2700 MVA, is that correct?"

Boyle "If you...once you get past the point of which you've used up that, then there would have to be another transmission augmentation to apply, I guess."

Brennan "Right. If you built another 400kV capable line, what would the potential capacity of the grid be at that point, with two 400kV lines?"

Boyle "Well, when we do that, the contingency would still be the loss of one 2700 MVA circuit, so, it's 3 times 2700...8100 MVA additional capacity."

Brennan "So, the next step increase, we get...sorry, we get the...sorry, I'm doing my maths here, so we get 2900 initially, forgetting the n-1 at the moment, then you can unlock another 1250 MVA, and then we go up another step and we get to..."

Boyle "No, sorry...sorry Ms Brennan, you're actually mixing up numbers there, what you'd get, you'd get 1450 with either the 220 or the 400."

Brennan "Right."

Boyle "And, then...yes, I know, it's getting au fais? with those circuits and lines, I can understand that."

Brennan "So, we get the 1450, and then we get another 1250?"

Boyle "Correct."

Brennan "And, then we jump up, quite substantially, to 8100?"

- Boyle "Yes, yes we do."
- Brennan "Okay, Are you aware of the concerns raised by the Electricity Commission about converting the proposed line to 400kV?"
- Boyle "I presume, you're referring to some emails, confidential emails?"
- Brennan "Not entirely, but yes. I would like to bring to the Board's attention a...part of our...one of the appendices of our Statement of Evidence, which I think you have."
- Chairperson "Do you think that you might achieve your purpose better, without referring to these documents, by just putting to the witness the substance of your position in this regard?"
- Brennan "I can't do that your Honour, I do have a small problem, in that when we cross-examined Mr George, he denied all knowledge of this, so I brought all the documents today, just to make sure we could actually embrace this, but, I can see that Mr Boyle is going to acknowledge."
- Chairperson "Well, I want you to understand this, you see. That the fact that your proposition might depend on a document from somebody else who isn't a witness in the case, won't make your proposition any stronger than if you just put it direct in your own language to the witness for his comment. Now' you may do it whichever way you choose, but I thought you might like to see the options, and choose between them."
- Brennan "I don't know...okay, are you now aware of an email from Dr Ralph Craven to the Electricity Commission, regarding the security of supply issues?"
- Boyle "Yes, I am aware of it...aware of it, yes."
- Brennan "I going to read something from that, and I'd like to know if you're familiar..."
- Kos "Well, I think that's where, Sir, we've got to look at the document."
- Chairperson "Yes. You've made the choice to refer to documents, rather than just to put the substance of your position, is that right Ms Brennan?"
- Brennan "I think, I have to, yes, your Honour."
- Chairperson "So, will you tell us the details of the document that you wish the witness to look at, and tell us where we may find it please?"
- Brennan "Yes, your Honour. It is Appendix 6, of the Statement of Evidence, of G Copstick and Kate Brennan."
- Chairperson "Thank you. So, you're asking the witness to look at what you hope will be proved to be a copy of a email document, from a Dr Ralph Craven to a Peter Harris and a David Gascoigne. Is that right?"
- Brennan "That's right, your Honour."

- Chairperson "Dated the 14th of December 2006."
- Brennan "That's right, your Honour. For clarification I should mention, that Dr Ralph Craven was a chief executive of Transpower at that time. Peter Harris is the Deputy Chair of the Electricity Commission..."
- Chairperson "Just..."
- Brennan "You don't need to know that?"
- Chairperson "Well, it's not that, if you want me to know, then the best way for me to be told, is for you to ask questions of the witness, and then we will get it in evidence."
- Brennan "Hello, Mr Boyle. This email, was sent from whom to whom?"
- Boyle "It was sent from Dr Craven, signed as Dr Ralph Craven, Chief Executive, Transpower New Zealand Limited, To Peter Harris, Electricity Commission."
- Brennan "Thank you. Can you read Paragraph 7 of that email, please?"
- Boyle Reads Paragraph 7.
- Brennan "Thank you. Can you clarify what DCST means in this?"
- Boyle "Double Circuit Steel Tower."
- Brennan "Thank you, that's been worrying me for some time. I'm also at this point, going to introduce some more information. Mr Boyle, do you recognise the letter on the front of this document?"
- Boyle "It's a... Is this the date of 17th of January 2007?"
- Brennan "That's correct."
- Boyle "With response to EC questions raised from meeting held on the 20th December 2006?"
- Brennan "That's correct."
- Boyle "Yes I do."
- Brennan "Right, and who was that sent from and to, please?"
- Boyle "It was sent from Tim George, General Manager, Grid Investment, to Mervyn English, General Manager, Electricity Commission."
- Brennan "And it is entitled please?"
- Boyle "It is entitled Response to EC questions raised in the meeting 20 December 2006."
- Brennan "Thank you. And there is a report attached to that, with those responses?"

- Boyle "Yes, there is."
- Brennan "Can you turn to Page 39 of that please, and can you please read out Paragraph 163?"
- Boyle Reads Paragraph 163.
- Brennan "Thank you, is that still the view of Transpower?"
- Boyle "Sorry, I'd have to read the rest of it; this is...you've taken this in isolation from another 20 paragraphs."
- Brennan "Yes, okay."
- Boyle "I'm afraid I'm not sure what this view is of Transpower at all, you're actually asking me as a witness, is it my view, and in my view it's no. That we would convert...it's highly likely that we would convert to 400 before building a second line."
- Brennan "Can I put to you, that Transpower, when addressing the Electricity Commission, who with all due respect to this Board aren't the electricity experts, when in that instance, or those instances, they were asked about this issue of security of supply of the 400kV line on conversion, the responses to that Board, as we've seen here, was that another line may be modelled, is that correct?"
- Boyle "Are you talking about this particular one, or Dr Ralph Cravens one?"
- Brennan "Both."
- Boyle "Dr Cravens one doesn't say, it just says as an example, and talked about the optionality of ...It didn't actually say we were going to build a second line."
- Brennan "No it didn't, but nor did it insist that conversion to 400 was, which is what we've been hearing from evidence from Transpower here."
- Boyle "Sorry?"
- Brennan "I think evidence from Transpower witnesses we've heard, including your own evidence, has said very clearly, that the Transpower view is that conversion to 400 is a reasonable thing to do?"
- Boyle "That's correct."
- Brennan "I haven't seen that in response to any questions from the Electricity Commission to Transpower, on the same subject?"
- Boyle "I'd actually have to look through all these documents you've provided."
- Brennan "Okay. In the...does it seem to you that now that Transpower is in front of a Board that isn't dealing with environment matters, that the security of supply issue is assumed by Transpower to all be okay, converting to 400,

and that the decision is...the decision we're told is environmentally sound because it will reduce transmission corridors?"

Boyle "You've got a number of questions there, is...you're asking whether we still think that putting a single 400kV line is the correct option, and living to 400 before..."

Brennan "Another line is built?"

Boyle "Yes, we do."

Brennan "Do you think that Transpower is changing its opinion on this, depending on the Board in front of which it stands, at the time?"

Boyle "Absolutely not."

Brennan "Do you have any evidence of any papers, where Transpower have insisted to the Electricity Commission that this line can be and could meet the grid upgrade approvals, to be converted at 400kV?"

Boyle "I would have to actually go back on the vast quantities of documents that we have to actually find that...to find those particular documents."

Brennan "Do you believe that the documents exist?"

Boyle "Yes, I do."

Brennan "Thank you. Mr Boyle, how much of the Auckland upper North Island amount do you think it's prudent to carry on a single line?"

Boyle "Are you saying how much..."

Brennan "How much capacity on a single line?"

Boyle "How much is prudent? Well, we calculated out what the un-served energy would be, for both proposals, and we established that relative to energy calculation, the 400kV line was okay to use."

Brennan "Sorry, the question was, what percentage do you think is...?"

Boyle "Ms Brennan, you can't actually put a straight percentage on what...what is safe to do, you've got to look at the probabilities of the event actually happening in the first place, and then how much load, and what the effect of that load being lost is."

Brennan "Do you agree that the six of these pylons, proposed pylons, would mean they are more likely to be struck by planes, helicopters, hot air balloons?"

Boyle "I...you know, that's very hard for me to comment on, are you talking about the height? Because they're higher you're saying that they...you think they're more likely to... I can't honestly comment on that, there could be a school of thought, that because they're bigger they'll be easier to see, equally."

- Brennan "They certainly would from some places. You say in Paragraph 82 of your evidence that the 2007 Statement of Opportunity demand figures would delay by one year. The need date for the project?"
- Boyle "Approximately one year, for the initial project, yes."
- Brennan "I think you say here, that the costs associated with building too early, are considered to be a much lower risk than the risks and costs of building to late?"
- Boyle "That's correct."
- Brennan "The risks and costs to Transpower of building too early, may be less than the risks of building too late, the risks and impacts on the local communities that you're building through, I mean another year could be a substantial thing for some people, in regards to a visual amenity a year...I mean it has to be. Has that been taken into account?"
- Boyle "When we talk about the risks...the risks and benefits of doing that, we are talking about the risks and benefits that we can use in the GIT and other places, which includes business confidence, and other such things. The risk of actually not being able to supply load, at a particular time, is quite high."
- Brennan "Do you accept that there are environmental risks as well, with this project?"
- Boyle "I can't comment, I'm...Are you asking my personal opinion? I'd say that we will be constructing a year early, and I'm not sure of what that impact of constructing a year early is, to be honest."
- Brennan "Thank you. Paragraph 130 of your evidence in chief. You say that the key difference, in this proposal, is an environmental one, the key difference being that the proposal involves a construction of a single line, where as in your opinion, it would involve more lines, if it was 220kV."
- Boyle "That's correct."
- Brennan "How speculative is that, do you think?"
- Boyle "How speculative? I think it's actually built into...if you look at our modelled projects we have a new line needing to be constructed, at around about 2034 for 220kV."
- Brennan "We are working on prudent demand forecasts, we are working on no generation, not one additional bit of generation in the upper North Island for, how many years would that be?"
- Boyle "What we refer to as reliable generation."
- Brennan "Are you saying that there won't be any...your demand...the reason you say there will need to be another line, is based on prudent demand, and no new generation?"

- Boyle "That's based on the scenarios we ran through it, yes."
- Brennan "And for how many years out are we talking here, what was that next new date, the date for the next line?"
- Boyle "For the next line, round about 2034."
- Brennan "It's quite a long way in the future do you not think, to project, and lock people into environmental damage, on the basis that up between now and almost 30 years hence, there will be no new generation, and there will be a prudent demand. That's a long time in the future?"
- Boyle "Yes, it is a long time in the future, we are...we are a long term infrastructure company. We've got those lines...will be up there for 50, 70 plus years, so we have to think about what's going to happen in the future...a long way into the future."
- Brennan "But, from an environmental point of view, the damage is done on construction, as we see it, the staged approach with very big, large stages, adding big lumps of capacity, seems to be inconsistent with the whole RMA process. The whole idea of making a minimum amount of damage that you can do. What you're doing is making a huge amount of damage, and saying, this is what we'll do, is that not right?"
- Boyle "I think I did comment in my evidence, I'll just have to find the page that we are...we had a 220 and 400kV, we looked at two options, and we looked at the 400kV, which was around about 10 meters higher, than the higher capacity 220kV option."
- Brennan "Sorry, your Honour I can't think how I can put to question the fact that I know that's going to be argued quite...I don't think you'll find that that's agreed by many people, outside Transpower's 10 metre lower...I think, given the difference, you said the key difference is the limitation on corridors?"
- Boyle "That's correct."
- Brennan "That's true. Another difference you must agree, is the height of the pylons?"
- Boyle "Absolutely."
- Brennan "The larger, the further away you can see them, etcetera."
- Boyle "I'm not sure about visual effects, what I can say, is that they are approximately 10 metres higher than the higher capacity 220."
- Brennan "And by putting in a very large tower, in 2013, you would be locking out any benefits, the people who are losing the visual amenity, could possibly get from generation, and tidal of generation, Kaipara Harbour?"
- Boyle "Are you suggesting Kaipara Harbour as a reliable generation source?"

- Brennan "No, no, I'm just suggesting that...I'm just saying that from 30 years out, I think it's very difficult to go that far ahead, and say what will happen?"
- Boyle "It is, it is very difficult."
- Brennan "And this proposal locks out any opportunity in taking advantage of mitigation technologies, transmission technologies, new generation?"
- Boyle "Absolutely not. This proposal, enables a large quantity of renewables from the south as well, you're talking about a single point solution where, there's a lot of generation in the Auckland area, or something similar, even quoting tidal, which tidal is classed as intermittent energy, which is not...can't be guaranteed to be there when you need it. Tidal is only there when the tides coming in and out. So, yes we are...we've got to have something that will enable reliable supplies to Auckland."
- Brennan "I'm not denying that, but, do you not also agree, that the people whose environment is impacted on by this will not get any benefits, should other things come on line, in that time frame? That...lock the lines up?"
- Boyle "Sorry, it's purely speculative of what will and won't happen in the future."
- Brennan "Exactly. Paragraph 137 of your evidence in chief. You note that the result for the Grid Investment Test under the sensitivity analysis here, it passed in most cases. You are aware I see from further on in you evidence, that when Transpower...when the Electricity Commission used PBAs cost estimates, there was a sway, effectively, to a 220 alternative. So, that the difference in price, and cost between the proposal and the 220 alternative is 200,000 dollars?"
- Boyle "No, I'm not aware of that, I'm not aware of that from the reading of the Electricity Commission documents, either."
- Brennan "Okay, I apologise, I thought heard you talking about it earlier. Paragraph 166 of your evidence in chief. 'There have been two weather events in the past 20 years that have caused double circuit outages'. That's what you say there?"
- Boyle "That's correct."
- Brennan "That's correct. And in Paragraph 169, you say that 'Historically there have been only a few direct hits on the Transpower lines, one in the last 20 years'?"
- Boyle "That's correct."
- Brennan "So that's three events in the last 20 years, on reasonably low towers?"
- Boyle "No, that's those two plus that event, on the 220kV sample of towers we looked at, that's correct."
- Brennan "And you're quoting a meantime between failures of 137 years?"

- Boyle "That's correct."
- Brennan "Does that take into account, double circuit failures from aircraft, for example?"
- Boyle "Yes it does."
- Brennan "It does."
- Boyle "Yes."
- Brennan "Can I ask how you extrapolate data from a 220 line...a much smaller 220 line, being hit by a helicopter, to a very large one?"
- Boyle "We can do that pretty linearly actually, because the lines...how many hits that we've had on lines, we look at them at their varying sizes, we had some large 220 lines have been hit by helicopters, so we don't think there's an issue with extrapolating that inflation straight up."
- Brennan "How often are lines hit by helicopters?"
- Boyle "Well, I think I've actually stated that, that we've...what did I say...we've had one event in the last 20 years."
- Brennan "Earlier in that same paragraph, you say only a few direct hits, so I assume that...is that longer than 20 years ago, or...?"
- Boyle "Yes, over a long period of time, I can remember, I think I know of two of them. One of them that's caused a double circuit outage, and I know another one that has, other hits...we've had hits with aircraft, but we're specifically talking about ones that caused double circuit outages, so damaging the conductors on both sides."
- Brennan "You accept that a lot of this line goes through rural areas, where top dressing is much more prevalent than it has been?"
- Boyle "Yes, I...I assume that there is top dressing on that rural land there, yes."
- Brennan "Just bear with me one second. In Paragraph 208 in your Statement of Evidence, you state that 'the smaller number of new lines, and the smaller overall number of lines, is a key environmental advantage of the 400kV line'. Do you accept that if a second 400kV line needs to be built, then the proposal then should not be built?"
- Boyle "What did you say?"
- Brennan "If a second 400kV line would need to be built, for conversion of the line to 400, then this proposal should not be built, because it does not minimise the corridors?"
- Boyle "No, I don't necessarily agree with that, because if you look in the long term, even when you expand it out, if you for example, did build a second 400kV line earlier, and energise it, you still get the benefit of that extra

8100, which takes you out, my guess is around 2060. Where, with the 220kV option, you'd be putting 1 in 2034, 1 in 2049, another one around about 2060 as well, so, you've still ended up with a lot more 220kV lines than 400kV lines."

Brennan "I think as you said earlier, you can't tell what's going to happen that far out into the future, you can plan for it, but you can't say that is definitely going to be the case, can you?"

Boyle "No, you can't."

Brennan "Thank you. Paragraph 6 of your rebuttal evidence please, Mr Boyle."

Boyle "Page 6?"

Brennan "Paragraph 6. This is in reference to Statement of Evidence by Mr Copstick and myself, where you say that the high capacity double circuit 220kV line and cables from South Auckland to Pakuranga and Otahuhu, would require construction of a second line in the future. The requirement for the second line, is explicitly stated in the modelled projects?"

Boyle "Sorry, did you say Paragraph 6 in the rebuttal, or in the main evidence?"

Brennan "The rebuttal."

Boyle "Sorry what was your question?"

Brennan "I'm just waiting for you to find it. You state that, again, that there's a second 220kV, is explicitly modelled...stated in the list of modelled projects?"

Boyle "That's correct, it is."

Brennan "And I am again saying that there is...you do not know that that will necessarily happen. That is your impression, and your planning impression of the grid at the moment, is that that will be required?"

Boyle "That is...when we do the Grid Investment Test, we have to build the modelled projects out into the future, and make an assessment between a number of projects."

Brennan "That doesn't give any certainty to what's going to happen in the next 30 years, does it?"

Boyle "No, you're also asking...you're saying that it definitely won't happen, you're trying...I, we're...we're saying it is a possibility that it will happen, and based on that scenario, then that's what the... what we'd have to do."

Brennan "Thank you. I have no further questions your Honour."

Chairperson "Thank you Ms Brennan. Mr Wilkinson, thank you."

- Wilkinson "Thank you your Honour, Mr Boyle. First of all, can I apologise for confusing you with Tim George from yesterday that I was speaking, we have met before. Can I first turn to Page 82 of your evidence in chief...sorry, to Paragraph 82, on your demand forecasts? Can you confirm, that over the period of the project for 400 capable line, that's over the period for which the amended proposal has applied for funding, that high capacity 220 line, will be technically, virtually indistinguishable from the 400 line?"
- Boyle "The period that we've made our analysis out to is 2042, the answer is...it will only be indistinguishable in around about 2000...to about 2033/34. And a second 220kV line will be required, and when we upgrade the voltage to 400."
- Wilkinson "The...was the amended proposal, or did that cover, an application for approval of expenditure out until 2042?"
- Boyle "No, It...The application did not, and if it had, I'm...I think Tim George mentioned yesterday, it's highly unlikely that it would have been approved by the Electricity Commission to date, for expenditure that far out."
- Wilkinson "So, my original question is that the period over which the proposal is operative, which is out until 2032, 2033, that the 220...this is the dual period, that the 400 capable line is operating as a 220 line?"
- Boyle "I think we've stated this, but the..."
- Wilkinson "But, there is no distinguishable difference between the two, in terms of their technical performance?"
- Boyle "That's correct."
- Wilkinson "That's just what I wanted to establish, that technically they are equivalent, the only difference really is that you have a big 400 line, or a somewhat smaller 220kV line, but otherwise they will be identical, for that period?"
- Boyle "Not identical, but they have the same current rating, yes, they're the same conductor size."
- Wilkinson "Yes, the same technical capability."
- Boyle "Yes."
- Wilkinson "Could I turn now to Paragraph 132, in which you state that the towers will have similar span lengths and same conductor type and conductor arrangement, and in your view will be about...you've designed them about 10 metres shorter than the proposed 400kV line. Is that correct?"
- Boyle "That is correct."
- Wilkinson "If I could turn to your illustration, which is Figure 6, this shows a visual comparison, I assume these are to scale, is that correct?"

- Boyle "They are to scale?"
- Wilkinson "Is that correct?"
- Boyle "Yes, I think they are. I didn't draw these so I'd have to get a ruler to check them sorry."
- Wilkinson "But you have presented them in your evidence for a visual comparison?"
- Boyle "Yes, the information that I was provided, these were..."
- Wilkinson "And to properly make a visual comparison, they would have to be to scale, is that correct?"
- Boyle "I'm assuming that they are to scale, yes."
- Wilkinson "On the left of that illustration, is a picture of an existing 220kV line, is that correct?"
- Boyle "That's correct."
- Wilkinson "And the alternative 220kV line, which is now being proposed, is in the centre?"
- Boyle "That's correct."
- Wilkinson "Would you say that that the alternative 220kV line in the centre presents a more bulky appearance, than the illustration of the conventional 220kV line?"
- Boyle "It is a larger constructed tower, yes."
- Wilkinson "Yes it is higher, but it is also wider."
- Boyle "That is correct."
- Wilkinson "Assuming that these drawings are to scale, would you...would you dispute that if the drawings are scaled up, the dimensions of the cross arms, on that modified...sorry the alternative 220kV tower, are about 50 percent longer than they are on the standard 220kV tower, as we use it, Sir, at the moment?"
- Boyle "Yes, they do look a bit bigger in the picture."
- Wilkinson "And also, you can just about see it in the drawings, I'll ask the question, would you agree that the insulator string lengths are longer?"
- Boyle "Not significantly, no."
- Wilkinson "Well, would you disagree with me if I said, that if you expand this diagram up onto the screen, and I'm assuming that the same scale diagram, is the same one that Mr Kos used, that if you explained these up...that the insulator string lengths are also longer by about 50 percent."

- Boyle "That's possible yes."
- Wilkinson "So, the Nett overall effect of this tower, is that it's taller, and it's wider, it's very much bulkier in fact, than a standard 220kV tower. Is that correct?"
- Boyle "It could also be, that the tower in question is actually shown too small. Because if you look closely, you make a comparison between a 220...the two 220's, if you look at the 400kV, that's probably at a scale to the large 220, the 220 and the 400 are probably reasonably in scale. So you're right, there could be a problem with one of the drawings, but, it could equally be that that Otahuhu-Whakamaru C line is actually shown slightly smaller than it should be."
- Wilkinson "Well I did ask you whether they were to scale, and you did say, that you thought they were?"
- Boyle "Yes, I did say that, that is correct."
- Wilkinson "So, the Nett effect, from going from a standard 220kV line, to the new proposed design, is that it is massively bigger in construction, than the standard 220kV line?"
- Boyle "I don't know if the word massively...using the word massive as though it's a...these towers are going to be a lot higher than the Otahuhu-Whakamaru C line, because there is very large spans between them."
- Wilkinson "If as I claim from carrying out measurements on screen, the alternative 220kV tower, does have longer insulator string lengths, why would that be?"
- Boyle "I'm completely unsure about this. What I can do though, is this particular drawing, I can...one of the later witnesses, I can get him to actually go through this drawing with you, with the distances in there."
- Wilkinson "Are you referring me to Mr Khot?"
- Boyle "Mr?"
- Wilkinson "Khot."
- Boyle "No, it would be either Mr Noble, or Mr Lake."
- Wilkinson "I see. Is it correct that the person principally concerned with designing insulator string lengths is Mr Khot?"
- Boyle "That's correct."
- Wilkinson "Is it not correct, that by and large, the height of a tower and the width of a tower is governed by the selection of the insulation string lengths?"
- Boyle "That's not my area of expertise, however, the answer...the width of the one , not necessarily, the height between the arms, if it's a longer

- insulator...and longer insulators, then yes it can be, it can make it wider between the arms, at a vertical direction."
- Wilkinson "So, would you say that a shorter insulator string length, would in general produce a shorter tower?"
- Boyle "I think, what I can do, is I can get someone to actually make sure that they have actually dimensioned...that they have these things dimensioned for you, when you're actually on to ask that question. I'm not an expert on these things; I got the drawing provided to me."
- Wilkinson "Are you suggesting...you are...are you suggesting that, really I should be addressing my questions to somebody else?"
- Boyle "I am suggesting, that...to the line designers and I can make sure that they do have the dimensions available for you."
- Wilkinson "Thank you, can I now pass to Paragraph 165, where I believe that you state that the towers are being designed, as to the requirement that the line be largely immune to lightning strikes?"
- Boyle "That is correct."
- Wilkinson "When you say largely immune, what does that largely actually mean?"
- Boyle "It means...I think we use the word 'highly resistant to lightning strikes' in there...this is 165?"
- Wilkinson "This is 165, yes."
- Boyle "What it means, is that we wanted a minimal number of outages caused by lightning strikes, on this line."
- Wilkinson "A minimal number?"
- Boyle "Correct."
- Wilkinson "What was the target set for, for meantime between failures, for lightning strikes on that line?"
- Boyle "Are you talking about originally, or this?"
- Wilkinson "This...it is part of this proposal?"
- Boyle "From memory, it was trying to minimise...have at least no more than one...originally it was one single circuit strike every 20 to 40 years, and a double circuit one higher than that."
- Wilkinson "Is it permissible to circulate a page from another one of Transpower's witnesses, who is not here to table his evidence, but it is available? That is Mr Khot's evidence. "

- Chairperson "You can show the witness a document, and if he is able to recognise it, so that he can follow it, then you can ask him questions about it. Then we'll see where you go."
- Wilkinson "So could I...I'll take it over myself. Do you need copies?"
- Chairperson "Well it sounds as if would be helpful, would Mr Kos have a copy?"
- Kos "Can we find out what it is, Sir? Then we may have a copy ourselves?"
- Chairperson "Why don't we see whether the witness is open to answering inquiries?"
- Wilkinson "Are you familiar with Mr Khot's report, on design of the towers and insulators?"
- Boyle "No, I am not."
- Wilkinson "You are not?"
- Boyle "No."
- Wilkinson "Are you familiar with...sorry, I'll ask another question. What was the required acceptable rate of failure...?"
- Kos "I'm sorry Sir, before we go much further, can I be told which page...I have Mr Khot's evidence, I don't know which page we're talking about."
- Wilkinson "It is Page 21, and we're referring to Paragraph 76."
- Kos "Thank you."
- Wilkinson "And...Can I ask Mr Boyle to actually read out that Paragraph, your Honour?"
- Chairperson "If you'd like to."
- Wilkinson "Mr Boyle, would you like to read that out?"
- Boyle Reading Paragraph 76
- Wilkinson "Correct. So Mr Khot is saying, that he was asked to design the line, which would have a meantime between failures, for double circuit outages, of one in 20 years?"
- Boyle "No, that's incorrect. To read this correctly...these failures may only be transient faults, and may not lead to total loss of supply."
- Wilkinson "Yes, I didn't ask about how long the failure might be, that's another question..."
- Boyle "We'll start again, the meantime between failures, would be no less than one in 20 years, for a transient fault."

- Wilkinson "That is not what he actually says, he says that, meantime between failures, for a double circuit outage, of 20 years, he then goes to qualify by saying, that these...well, is it true that they may not lead to loss of supply, and on the other hand, they may?"
- Boyle "I'd have to read the original...spec...that we actually gave to (unclear)? to see what the 'may' meant. The may...if we had...wrote may had, it probably should have been 'shall' not 'may'."
- Wilkinson "So, you do concede, that he has designed, on the basis of this paragraph, he was required to design the line, for a one in 20 years double circuit outage?"
- Boyle "From what he's written here, I can see that, yes."
- Wilkinson "I think that can be checked by reading Mr Khot's evidence further. If I may turn to, Paragraph 173, would you like to read out what Paragraph 173 says?"
- Boyle Reading Paragraph 173
- Wilkinson "So only pure random events, such as helicopter strikes, not therefore lightning, not earth movements, no other forms of catastrophe, only random events, such as helicopter strikes?"
- Boyle "We were looking at random events for that line, yes that's correct."
- Wilkinson "If I pass to 174, you say that the expected meantime between failures for the proposed 400 capable line, can only expected to be one in 137 years?"
- Boyle "That's correct."
- Wilkinson "How did you come to that remarkably precise figure, of 137 years?"
- Boyle "I don't actually have the figures in front of me, but you're working with very small probabilities multiplied by 190, to give yourself 137 years. So, it does...I think it may be 136.99 or something, or around there, I would actually have to get you the figures, to tell you exactly what the figures were."
- Wilkinson "In his cross-examining yesterday, Mr George, if this is permissible to quote this, stated that 'In order to calculate meantime between failures accurately, you need a large population on which to draw'. Is that your view as well?"
- Boyle "That's correct, we took it from the last 20 years of data...of Transpower data."
- Wilkinson "Would that in your view, then represent a large population of events from which to draw?"

Boyle "It represented a reasonably large number of lines, in line kilometre years. Yes."

Wilkinson "What sort of variation would you expect us to be...bearing in mind these are probabilities, what sort of variations would you expect...you say 137 years, not 137 years, 2 months, 3 days. Or is it...there is no variability; no variation expressed in that 137 years, so there's three significant figures. Would you not interpret that as meaning, that you felt that was accurate, to the last of those significant figures?"

Boyle "Absolutely not, it was just a pure calculation that came out at 137. A failure rate multiplied by a number of kilometres, and it worked out to be 137."

Wilkinson "What sort of variance would you expect to be on that, plus or minus, how many?"

Boyle "It's a big number. I think the...by putting the...The 137 was the number that came out if the calculation. What we were trying to do, was highlight to the Electricity Commission and others, that it was a very...it was a low probability of failure in these events. If we'd used the same numbers from Australia where they've had no faults over an extremely long period, what would the calculation of that be...infinity. But it's a silly number to use. It was just highlighting it was a reliable line, with a low probability of failure. And the 137 was just purely a calculated number."

Wilkinson "Thank you for that. Originally, you had I believe the figure of 20 years, which you supplied to the Electricity Commission, which you then increased to 40 years, and then, you then increased subsequently to 137 years, is that correct?"

Boyle "I think I explained earlier in my evidence, why those numbers, where the number changes in those numbers were, yes."

Wilkinson "But you are still not prepared to put any...sorry. Was not the significance of these meantime between failure figures relevant in that, there were certain cost penalties accrued to the 400kV, for shorter estimates of meantime between failures?"

Boyle "So, if the uncertain energy was greater?"

Wilkinson "Yes."

Boyle "I don't think the uncertain energy was calculated at 137, I'd have to check that anyway, I think it was calculated at a much lower number, by the Electricity Commission."

Wilkinson "Are you aware, that a figure of 100 years is the cut off point beyond which no penalties would be accrued, on the basis of the expected un-served energy, in the Electricity Commissions calculations?"

Boyle "No, I'm not aware of that, sorry."

- Wilkinson "If I can turn now, to Paragraph 183, you say..."
Reading Paragraph 183
- Boyle "That's correct."
- Wilkinson "And in 184 you say..."
Reading paragraph 184
- Boyle "That's correct."
- Wilkinson "Is not the purpose of trying to calculate, meantime between failures, to take account of random events, like helicopter strikes?"
- Boyle "That's correct, which we did do...took that into account."
- Wilkinson "And in that respect, is the experience in Australia relevant?"
- Boyle "I think it is relevant, when we're talking about failures...tower failures, and losses of lines. I think it is equally relevant."
- Wilkinson "And was the large increase in activity in aircrafts around the Ardmore Airport, taken into account in making those calculations?"
- Boyle "No, it wasn't."
- Wilkinson "So, those large increases in aircraft movements around Ardmore Airport, were not taken into account, and cannot...can you tell me how you then came to such a figure as 137 years for the meantime...expected meantime between failures?"
- Boyle "That's based on a larger population of lines, including a number of lines that run past airports, and all of other lines running into Auckland, that run on that same route."
- Wilkinson "And also taking into account, that the lines in fact will be higher?"
- Boyle "I really can't comment on that, that's actually dealt with in other peoples evidence."
- Wilkinson "Could you tell me whose evidence, that's dealt with?"
- Boyle "I think it might be...it will be about transmission lines and grids, I think it will be Mr Noble."
- Wilkinson "Thank you. Turning to Paragraph 226, this is just trying to get some clarification here. That in your last sentence, you say 'it is the option that will ensure the lowest numbers of new lines are constructed in the long term'. Does that mean the lowest number of extra lines? You say new lines?"
- Boyle "Yes. It does. I think I said earlier on, I talked about additional lines."

- Wilkinson "Additional lines?"
- Boyle "Yes, I said earlier on in my evidence..."
- Wilkinson "Is this not then, replacement lines?"
- Boyle "Sorry, I think we have...I did say earlier on in my evidence, we talked about, if you like, sacrificing a line, we said...we talked about Brownfield essentially and Greenfield routes, and this line goes on to an existing Brownfield site, the next one we would if you like sacrifice another...some existing low capacity lines, when the next big line goes up, whether it be 220 or the 400."
- Wilkinson "So, it could in fact be a replacement line, rather than an extra line?"
- Boyle "Absolutely. Absolutely, we've said that."
- Wilkinson "Thank you, it's just that...I just wish to clarify that when we read of new lines, or additional lines, it implies all the other existing lines are left standing, and these are additional to what's already standing?"
- Boyle "Sorry for the confusion, but what we were talking about, is in the total number of lines there at the moment, how many more will be added to that, if you like the total number of lines going into Auckland."
- Wilkinson "I turn to Paragraph 234, concerning the duplexing of the A and B lines. You say in the last sentence that the towers are weaker, generally weaker, and the steel used...generally because the steel is lower strength."
- Boyle "That's correct."
- Wilkinson "How much lower in strength is the steel?"
- Boyle "I can't tell you the exact number."
- Wilkinson "Would you disagree with me if I said, it was 4 percent?"
- Boyle "I don't know. I haven't got the figure, I cannot agree or disagree with you, I'm sorry."
- Wilkinson "But, if it were 4 percent, the steel itself was weaker...by 4 percent; this would not be a significant contributor to the design parameters?"
- Boyle "I'm sorry, I can't comment on it. I absolutely can't."
- Wilkinson "But you did comment, on the fact that the steel is at lower strength?"
- Boyle "That's correct."
- Kos "One of the difficulties we're dealing with here Sir, is there's no evidence in this matter to support the proposition that Mr Wilkinson is putting forward. Had it been put forward in Mr Wilkinson's evidence it would have

been addressed in the evidence in the witnesses of Transpower. So if Mr Wilkinson is referring to some evidence, I'm not aware of it. I think this is one of those occasions where he really needs to put what his case is going to be, where the evidence is, that supports this 4 percent margin. I'm certainly not aware of it."

Chairperson "I'm not sure that I accept your proposition, Mr Kos, thank you for raising it. But it seems to me, that in the case of a requiring authority, proposing a development, those who wish to oppose it, are entitled to test the case in support of it, by cross-examination. They are entitled to test it by contradictory evidence, if they have some, but of...they haven't, they're still entitled to test it by cross-examination. And at the end, what the Board will have to do, is to look at the totality of the evidence, on that particular topic on coming to its conclusions. So, at the moment I'm not inclined to deprive the association that Mr Wilkinson's representing of its opportunity to test by cross-examination, even if they haven't got evidence about the 4 percent. I hope that counsel will assist the Board in submissions, against the risk that the Board might misunderstand questions as being a source of evidence."

Kos "Well I'm grateful, I know the Board will be very careful of that particular point. I suppose I was making two points, Sir. One was, I attempted in a very gentle way to restrain my friend with the excellent motoring jumper I just noticed and I appreciate you've ruled against me on that particular point. The other point I'm making to the Board, and I'll make it of course again in submissions, that it's difficult for Transpower to deal with an issue like this, when it simply comes out of left field, and it otherwise have called evidence in rebuttal form, which would have dealt with a specific point, if there was evidence from a submitter. That's a submission point, and we'll deal with it later."

Chairperson " I haven't, I think, had to make any ruling, because I don't think it's been asked of the Board, about the possibility of a party, and in particular Transpower, calling further rebuttal evidence in rebuttal of matters which have arisen during the course of the inquiry hearing. Obviously there would be several issues one way or another in deciding an application of that kind, should it be made."

Kos "Ye, it certainly won't relate these set of evidences, given by way of question, as opposed to evidences given by way of evidence."

Chairperson "Yes."

Kos "Thank you."

Chairperson "Thank you. Now, Mr Wilkinson, we've reached the time of the day when we need to rise I think, so unless there's just one more question, I think we're going to need to ask you to return in the morning, and continue with your association cross-examination then."

Wilkinson "I do have several more questions, and therefore I'm, not a large number, you'll be glad to hear."

Chairperson "No, I'm not glad to hear, I'm glad if you ask all of the questions that the association wishes to ask, and I'm willing to be entirely patient about that, but, it might be better for the association as well as for the rest of us, if we in quite a warm afternoon by rising now. "

Wilkinson "I am prepared to leave it till tomorrow, it's been a long day for everybody."

Chairperson "Thank you very much. We'll continue the hearing tomorrow morning at half past nine."

5.02 pm ADJOURNED