# UPPER SOUTH ISLAND RELIABILITY MCP STAGE 1

## Attachment F- Meeting the Requirements of the Transpower Capital Expenditure Input Methodology June 2012

*Keeping the energy flowing*


Transpower New Zealand Limited The National Grid

# 1| Executive Summary

## 1.1 Proposal

Transpower New Zealand Limited (**Transpower**) is submitting the Upper South Island Reliability Stage 1 Proposal (the **Proposed Investment**) to the Commerce Commission for approval. The Proposed Investment is for:

- installation of a bus coupler at Islington
- the undertaking of remedial work to improve the resilience of our Islington substation to potential high impact but low probability large scale events
- installation of equipment to allow for improved analysis of system performance
- preliminary funding for a new transmission facility at Orari, near Geraldine.

The Proposed Investment is a "major capex proposal" as defined in Part 1 of the Transpower Capital Expenditure Input Methodology Determination, dated 31 January 2012 (the **Capex IM**). Transpower is applying to the Commission for approval of the Proposed Investment, so that Transpower can recover the costs relating to the project under the Individual Price-Quality Path Determination applicable to Transpower.[1]

## 1.2 Capex IM requirements

The Capex IM was issued by the Commerce Commission on 31 January 2012. The Capex IM contains a number of requirements Transpower must comply with in preparing a major capex proposal, and requirements the Commission must follow in determining whether to approve the major capex proposal.

In particular, the Commission may only decide to approve the proposed investment after:[2]

- it has consulted as required by the Capex IM; and
- has evaluated the proposal in accordance with Part 6 of the Capex IM, in particular:
    - whether what is proposed is consistent with the Capex IM, and the Commerce Act (Transpower Input Methodologies) Determination 2010;
    - the extent to which the proposal will promote the purpose of Part 4 of the Commerce Act 1986;[3]
    - whether the data, analysis, and assumptions underpinning what is proposed are fit for the purpose of the Commission exercising its powers under Part 4 of the Act, including consideration as to the accuracy and reliability of data and the reasonableness of assumptions and other matters of judgment;[4]
    - whether the proposed investment satisfies the Investment Test;[5]
    - having regard to the evaluation criteria in respect of specified approval components of the proposed investment, including major capex allowance, approval expiry date and major capex project outputs.

[1] Clause 1.1.5(2) of Part 1 of the Capex IM (definition of 'proposed investment') and clause 3.3.2(1) of the Capex IM.
[2] Clause 3.3.3(3) of the Capex IM.
[3] Clause 6.1.1(2)(b) of the Capex IM.
[4] Clause C1(2)(a) and (b) of Schedule C of the Capex IM.
[5] Clause C1(2)(c) of Schedule C of the Capex IM.

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The Commission is required to publish its decision on whether it will approve or reject the proposal as soon as is reasonably practicable after making it.[6]

The purpose of this document is to satisfy the Commission that it can approve the proposal because:

- the agreed consultation process has been followed, including the agreed approach to ensure appropriate consideration of non-transmission solutions to meet the investment need;
- the proposed investment promotes the purpose of Part 4 of the Commerce Act 1986 and is consistent with the input methodologies;
- the data, analysis and assumptions underpinning the proposed investment are fit for the purpose of the Commission exercising its powers under Part 4 of the Commerce Act;
- the proposed investment satisfies the investment test; and
- the other evaluation criteria listed in Schedule C are satisfied.

[6] Clause 3.3.3(6) of the Capex IM.

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# 2| Introduction

The Stage 1 Proposal (the **Proposed Investment**) comprises a range of investments, mostly within our Islington substation. The Proposed Investment is a "major capex project" as defined in part 1 of the Capex IM.

Clause 3.3.3(3) of the Capex IM provides that the Commission may only decide to approve the Proposed Investment after:

- consulting in any manner specified in clause 8.1.1 of the Capex IM
- evaluating the major capex proposal (and any further information that the Commission has requested) in accordance with Part 6 of the IM.

## 2.1 Proposal submitted as a major capex proposal

A "major capex proposal" is defined as a document identifying a "proposed investment" for which Commission approval is sought.[7] A "proposed investment" means a "major capex project" that Transpower seeks to have approved in terms of subclause 3.3.2(1) of the Capex IM.[8] A "major capex project" is defined as follows:[9]

***"major capex project"*** *means a particular* ***project*** *of* ***major capex****-*

*(a) undertaken to address a specific* ***investment need****;*

*(b) that is either or both of the following things:*

*(i) a* ***transmission investment****, including a variant on another* ***transmission investment*** *by virtue of a non-negligible change in the* ***commissioning date assumption****; or*

*(ii) a* ***non-transmission solution****, including a variant on another* ***non-transmission solution*** *by virtue of a non-negligible change in the* ***completion date assumption****;*

Major capex is defined as follows: [10]

***"major capex"*** *means* ***capital expenditure*** *that-*

*(a) is incurred to:*

*(i) meet the* ***grid reliability standards****; or*

*(ii) provide a* ***net electricity market benefit****;*

*(b) is not incurred in relation to any of the following things:*

*(i)* ***asset replacement****;*

*(ii)* ***asset refurbishment****;*

*(iii)* ***business support****; and*

*(iv)* ***information system and technology assets****; and*

*(c) is forecast to be-*

*(i) included in a* ***project*** *whose aggregate forecast* ***capital expenditure*** *exceeds the* ***base capex project threshold****;*

*(ii) included in a* ***programme*** *whose aggregate forecast* ***capital expenditure*** *exceeds the* ***base capex programme threshold****; or*

*(iii) a* ***non-transmission solution****;*

[7] Clause 1.1.5(2) of Part 1 of the Capex IM.
[8] Clause 1.1.5(2) of Part 1 of the Capex IM.
[9] Clause 1.1.5(2) of Part 1 of the Capex IM.
[10] Clause 1.1.5(2) of Part 1 of the Capex IM.

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The upper South Island does not have enough generation to meet electricity demand and the shortfall is supplied via our transmission lines into Islington and then further north.

Our planning studies have identified a need for additional voltage support to maintain reliability of supply within our voltage recovery criteria following a contingent event on the upper South Island grid. Accordingly the Proposed Investment is capital expenditure to meet the Grid Reliability Standards. The Proposed Investment is a transmission solution and is not asset replacement, asset refurbishment, business support or information system and technology assets, and is forecast to be included in a project whose aggregate exceeds the base capex project threshold.

Accordingly, we consider the Proposed Investment is appropriately categorised as a major capex proposal.

## 2.2 Overview of Major Capex Allowance and Major Capex Outputs

We expect the project to cost $12.10 million once commissioned. However, we are seeking Commerce Commission approval to recover the full costs associated with the Proposed Investment, up to a total amount of $13.65 million. This amount includes an allowance for uncertainties in the project costs and is the proposed Maximum Capex Allowance for the Proposed Investment.

## 2.3 Timing of proposal and approval expiry

We propose starting this work in 2012 and completing it as shown below. The following are our commissioning date assumptions for the Proposed Investment:

- New 220kV bus coupler Q2 2014
- Islington substation resilience measures Q2 2015
- Install load monitoring equipment Q1 2014
- Orari SSR cost and preliminary processes Q1 2013

We consider the commissioning date assumptions are reasonable having regard to the nature and complexity of, and need for, the works comprising the Proposed Investment.

The bus coupler will be commissioned by winter 2014 to meet the technical need.

The substation resilience measures may be commissioned prior to Q2 2015, but we yet to finalise the planned outage requirements.

The load monitoring equipment will be installed by early 2014.

The Orari preliminary work will be complete by late Q1 2013 in order to feed into the Stage 2 Proposal.

In addition, we consider that an appropriate approval expiry date for this Stage 1 Proposal would be 2018.

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# 3| Capex IM requirements

As discussed in Section 2.1 of this document, the Proposed Investment is a major capex proposal that the Commission is required to consider and assess in accordance with the Capex IM.

This section describes the requirements under the Capex IM that Transpower must comply with when submitting a major capex proposal, and the evaluation process the Commission must follow in determining whether to approve the major capex proposal.

## 3.1 Commission's approval process

The Commission may only decide to approve the Proposed Investment after:[11]

- consulting in the manner specified in clause 8.1.1 of the Capex IM; and
- evaluating, in accordance with Part 6 of the Capex IM (including by reference to the Investment Test), the major capex proposal and any further information that was requested.

In addition:

- a major capex proposal must comply with the applicable information content requirements, including those set out in Schedule G of the Capex IM, and contain the certifications specified in clause 9.2.1 (being the Chief Executive Officer certification for major capex proposals); and
- the Commission may reject the major capex proposal where Transpower has not complied with clause 3.3.1 of the Capex IM (being the obligations relating to the consultation programme, the approach ensuring appropriate consideration of non-transmission solutions and approval time frames).[12]

## 3.2 Commission's Criteria for evaluating the Major Capex Proposal

The criteria for evaluating the major capex proposal are contained in Part 6 and Schedule C of the IM. In making its evaluation the Commission is entitled to take into account the views of any person it has consulted pursuant to clause 8.1.1 of the Capex IM and any other information that it considers relevant.[13] The Commission may also engage any appropriately qualified person to assist the Commission with its evaluation.[14] The criteria that the Commission will use in its evaluation are:[15]

- whether the proposal is consistent with the input methodology and, where relevant, the Commerce Act (Transpower Input Methodologies) Determination 2010;
- the extent to which the proposal will promote the purpose of Part 4 of the Act; and
- whether the data, analysis, and assumptions underpinning the proposal are fit for the purpose of the Commission exercising its powers under Part 4 of the Act, including

[11] Clause 3.3.3(3) of the Capex IM.
[12] Clause 3.3.3(4) of the Capex IM.
[13] Clause 6.1.1(1) of the Capex IM.
[14] Clause 6.1.1(1) of the Capex IM.
[15] Clause 6.1.1 and Schedule C of the Capex IM.

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consideration as to the accuracy and reliability of data and the reasonableness of assumptions and other matters of judgement.

In addition:

- the Commission may not approve the Proposed Investment where it is not satisfied with one or more of the following proposed investment components:[16]
  - **major capex allowance;**
  - **maximum recoverable costs;**
  - **recovery scheme;**
  - **approved major capex project outputs;**
  - **approval expiry date;**
  - **P50;**
  - **commissioning date assumption; and**
  - **completion date assumption.**
- the Commission may not approve the Proposed Investment where, having evaluated the above investment components, it is not satisfied:
  - with the Proposed Investment in whole or in part,[17]
  - that the Proposed Investment satisfies the Investment Test.[18]
- the Commission must have regard to at least one of the following factors when evaluating the major capex proposal:[19]
  - whether the **proposed investment** and **investment options** reflect **good electricity industry practice**, are technically feasible, are possible in terms of Resource Management Act 1991 and other regulatory or property access requirements, and can be integrated into system and market operations;
  - whether the estimated time for the various project stages is reasonable in light of the proposed commissioning or **completion date**;
  - whether the **key assumptions** around outage planning are reasonable;
  - the extent to which Transpower has had regard to the views of interested persons as part of its consultation programme for **non-transmission solutions**; and
  - the impact of the **sensitivity analysis** on **electricity market benefit** or **cost elements** of the **proposed investment** and **investment options**.

The Capex IM also lists a number of evaluation techniques that the Commission may employ when undertaking the evaluations described above, including analysis of powerflow and dynamics in the grid, critiques of conceptual designs to derive cost and time estimates, cost benefit analysis of the Proposed Investment and investment options, critique of market development scenarios, unit rate benchmarking and any other technique or approach the Commission considers appropriate in the circumstances.[20]

## 3.3 The Investment Test

The Investment Test is set out in Schedule D of the Capex IM, and is reproduced here for convenience. The definitions used in the Investment Test have been included in the Appendix to this Major Capex Proposal.

[16] C1(2)(a) of Schedule C of Capex IM; components found in C1(1) of Schedule C of Capex IM. Note that the more specific criteria that are applied to each of the proposal criteria are discussed under the headings of the individual proposal criteria below.
[17] C1(2)(b) of Schedule C of Capex IM.
[18] C1(2)(c) of Schedule C of Capex IM. See discussion of the Investment Test at Section 3.3 of this document.
[19] C2 of Schedule C, General evaluation of major capex proposal.
[20] C6 of Schedule C of the Capex IM.

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**D1 Major capex - investment test**

(1) The investment test is satisfied in respect of a **proposed investment** if the **proposed investment** is an **investment option** that-

(a) is sufficiently robust under **sensitivity analysis**;

(b) has a positive **expected net electricity market benefit** unless it is designed to meet an **investment need** the satisfaction of which is necessary to meet the deterministic limb of the **grid reliability standards**; and

(c) has-

(i) the highest **expected net electricity market benefit**, where only quantified **electricity market benefit or cost elements** are taken into account; or

(ii) the highest **expected net electricity market benefit** including a qualitative assessment to take into account the contribution of associated unquantified **electricity market benefit or cost elements**, if the **proposed investment** has a similar **expected net electricity market benefit** to the **investment option** with the highest **expected net electricity market benefit** where only quantified **electricity market benefit or cost elements** are taken into account.

(2) For the purpose of subclause (1)(c)(ii)-

(a) a similar **expected net electricity market benefit** is one where the difference in quantum, subject to subclause (3), is 10% or less of the aggregate **project costs** of the **investment option** to which the **proposed investment** is compared; and

(b) an **electricity market benefit or cost element** may be treated as unquantified where-

(i) the cost of calculating its quantum in accordance with clause D7(4) is likely to be disproportionately large relative to the quantum; or

(ii) its expected value cannot be calculated in accordance with clause D7(4) with an appropriate level of certainty due to the extent of uncertainties in underlying assumptions or calculation approaches.

(3) For the purpose of subclause (2)(a), the **Commission** may, at its discretion, adopt such an alternative percentage to 10% as proposed by **Transpower** in respect of a **proposed investment**.

Section 5 of this document describes how the Proposed Investment satisfies the Investment Test.

## 3.4 Proposed Investment Components

Section 6 of this document sets out the evaluation of each of the relevant approval components of the Proposed Investment.

## 3.5 Other Part 6 evaluation criteria

The Commission must consider certain other evaluation criteria under Schedule C of the Capex IM. We comment briefly on these criteria below.

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### 3.5.1 Consistency with the input methodology

In our view, this major capex proposal is consistent with the Capex IM and the Commerce Act (Transpower Input Methodologies) Determination 2010.[21]

### 3.5.2 Promoting the purpose of Part 4 of the Commerce Act

In our view, the Proposed Investment promotes the purpose of Part 4 of the Commerce Act in being an investment consistent the Capex IM and the Commerce Act (Transpower Input Methodologies) Determination 2010. We are not aware of any specific reason why the Proposed Investment would not promote the purpose of Part 4 of the Commerce Act.

### 3.5.3 The suitability of the data, analysis and assumptions underpinning the proposal

In our view, the data, analysis, and assumptions underpinning this major capex proposal are fit for the purpose of the Commission exercising its powers under Part 4 of the Act. In particular, we have:

- applied evaluation techniques and cost/benefit calculation methodologies that are well established and understood by ourselves, the Commission and stakeholders with which we have consulted on the Upper South Island Reliability Stage 1 Proposal;

- consulted with interested stakeholders on investment need, investment options, assessment of electricity market benefit or cost elements and project costs, and the assumptions underpinning the major capex proposal as part of following the agreed consultation process.

## 3.6 Requirements applying to Transpower

### 3.6.1 Consultation requirements

Set out in Section 4 of this document is a discussion of how we have complied with clause 3.3.1 of the Capex IM (being the obligations relating to the consultation programme, the approach ensuring appropriate consideration of non-transmission solutions and approval time frames).

### 3.6.2 Information requirements applying to Transpower

The information requirements relating to major capex proposals are set out in clause 7.4.1 of the Capex IM and are as follows:

- major capex proposals must comply with Schedule G of the Capex IM and contain the chief executive officer certificates specified in clause 9.2.1 of the Capex IM[22];
- the number of investment options contained in a major capex proposal must be appropriate given the magnitude of the estimated capital expenditure and the complexity of the investment need associated with the proposed investment;[23]
- with respect to each investment option described in a major capex proposal, the-
    - specificity of information; and
    - rigour and comprehensiveness of the analysis,

  must be commensurate with the estimated capital expenditure and complexity of that option.[24]

[21] Clause 6.1.1(2)(a) of the Capex IM.
[22] See 4.2.7 Certification requirements which sets out the requirements contained in clause 9.2.1 of the Capex IM. Note that clause 7.4.1(4) of the Capex IM provides that one physical document may contain more than one of the certifications specified in clause 9.2.1 of the Capex IM.
[23] Clause 7.4.1(2) of the Capex IM.

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Section 7 of this document comprises a table setting out the specific information requirements of Schedule G of the Capex IM and cross references to where the required information can be found in this document. We believe that the level of analysis and specificity of information provided in this proposal is commensurate with the estimate capital expenditure and complexity of the proposed option.

### 3.6.3 Certification requirements

Clause 9.2.1 of the Capex IM specifies the matters that the Chief Executive Officer must certify. Section 8 of this document sets out the required certifications.

[24] Clause 7.4.1(3) of the Capex IM.

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# 4| Consultation and approach to consideration of non-transmission solutions

## 4.1 Notification

In accordance with clause 3.3.1 of the Capex IM, we notified the Commission in April 2011 of our intention to plan a major capex project that we considered may become a proposed investment.

## 4.2 Agreed consultation programme, approach to consideration of non-transmission solutions and approval timeframes

After the notification, we agreed with the Commission:[25]

- a consultation programme for a transmission investment or non-transmission solution, which provided in accordance with clause 8.1.3(1)(a) of the Capex IM for consultation by Transpower on such matters specified in Schedule I of the Capex IM as are applicable;
- an approach to ensure appropriate consideration of non-transmission solutions to meet the investment need, which provided in accordance with clause 8.1.3(1)(b) of the Capex IM for our consultation on such matters specified in Schedule I Division 2 of the Capex IM as are applicable; and
- approval timeframes.

The Commission published the items relevant to them on 19 April 2012 and we have been publishing the items relevant to them since 2011.[26] These items have also been regularly reviewed as to whether they remain appropriate and reasonable.[27][28]

## 4.3 Consultation

We have consulted interested persons in accordance with the consultation programme.[29]

An investigation into reliability in the upper South Island, completed in 2008, determined that new investment would not be required until around 2014, assuming the two Islington synchronous condensers were refurbished. We committed to revisit and monitor the situation at timely intervals. This proposal has arisen out of that obligation and studies confirming that it was not practicable to refurbish the condensers.

We announced in 2010 that we were investigating the need for transmission investment in the upper South Island to maintain a reliable supply of electricity.

We have engaged with industry stakeholders during this investigation.

We sought input in June 2011 to verify the key assumptions to be used in our investigation and used these key assumptions to define the need. We also released a Request for

[25] Clause 3.3.1(2) of the Capex IM.
[26] Clause 3.3.1(5) of the Capex IM.
[27] http://www.comcom.govt.nz/upper-south-island-grid-upgrade/
[28] http://www.gridnewzealand.co.nz/publications-and-resources
[29] Clause 3.3.1(7) of the Capex IM.

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Information (RFI) for this project in June 2011 and held a teleconference at the end of June 2011. From this RFI, five submissions were received by the closing date:

- Orion New Zealand Limited
- Mighty River Power Limited
- Energy Response Pty Limited
- Trustpower Limited
- Metering Technology Limited

Some submissions offered specific answers to the 13 questions included in the RFI document while others were focussed on a range of non-transmission solutions including potential generation within the upper South Island and demand-side management.

Since that consultation, we have:

- considered and incorporated the feedback where appropriate
- further developed the short list options (as set out in this document)
- developed the economic approach (as set out in this report)
- applied the Investment Test
- analysed the results
- published a draft investment proposal for consultation
-

As part of this consultation process, we also consulted on the market development scenarios (MDS), and modified these scenarios to incorporate feedback from generation companies. Having completed this consultation process and subsequent analysis, we are now submitting a Major Capex Proposal to the Commerce Commission.

See table 4-1 for a summary of communications to date.

## 4.4 Consideration of non-transmission solutions

We have followed the approach agreed with the Commission for consideration of non-transmission solutions.[30]

The consultation process undertaken enabled the appropriate consideration of non-transmission solutions to meet the investment need, and took into account the size and nature of the investment need and the likelihood that non-transmission solutions could reasonably meet the investment need. Information was provided during the various phases of the consultation process to enable the reasonable information needs of interested persons, including potential proponents of non-transmission solutions to be met.

We invited interested persons to provide views or information on or relevant to possible non-transmission solutions to meet the investment need. The five written submissions we received in June 2011 focussed their discussion on a range of options to meet the investment need, including potential generation within the upper South Island and demand-side management (both non-transmission solutions).

[30] Clause 3.3.1(7) of the Capex IM.

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In developing the long list of options we took the views and information relating to non-transmission solutions into account. The short list of options that was then developed included diesel generation as a non-transmission option. When consulting on our draft proposal we received feedback from interested persons on the potential for demand-side management in the upper South Island and potential new generation. We considered that feedback and have modified our proposal accordingly.

**Table 4-1- Project Communications to date**

| Date | Activity |
|---|---|
| September 2009 | Upper South Island Lines Company and CEO Forum held, reopening the upper South Island investigation grid upgrade in line with the commitment we made to monitor the situation. |
| March 2010 | Upper South Island workshop held, reopening the upper South Island investigation grid upgrade in line with the commitment we made to monitor the situation. |
| November 2010 | Upper South Island Lines Company technical meeting held to obtain input to verify the assumptions of our investigation. |
| June 2011 | Publication of the initial RFI document. E-mail to recipients inviting to a teleconference on 30th June 2011. |
| July 2011 | Submissions closed and summary published. |
| August 2011 | Summary of submissions published. |
| May 2012 | Publication of draft investment proposal for consultation. |
| May 2012 | Submissions closed. |
| June 2012 | MCP submitted to Commerce Commission. |
| June 2012 | Summary of submissions published with MCP. |

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# 5| Satisfying the Investment Test

## 5.1 Application of the Investment Test

Schedule D of the Capex IM sets out the criteria that the Proposed Investment must meet in order to satisfy the investment test (IT). For the purposes of this Proposed Investment, the Investment Test is satisfied if the Proposed Investment is an investment option that[31] (clauses relevant to this case in bold):

> ***(a) is sufficiently robust under sensitivity analysis;***
>
> ***(b)*** *has a positive expected net electricity market benefit unless it* ***is designed to meet an investment need the satisfaction of which is necessary to meet the deterministic limb of the grid reliability standards; and***
>
> ***(c) has***
>
> *(i) the highest expected net electricity market benefit, where only quantified electricity market benefit or cost elements are taken into account; or*
>
> ***(ii) the highest expected net electricity market benefit including a qualitative assessment to take into account the contribution of associated unquantified electricity market benefit or cost elements, if the proposed investment has a similar expected net electricity market benefit to the investment option with the highest expected net electricity market benefit where only quantified electricity market benefit or cost elements are taken into account.***

We consider that this document demonstrates that the Proposed Investment satisfies the indicated criteria and therefore meets the Investment Test.

## 5.2 Investment need

At present, the upper South Island does not have enough generation to meet electricity demand and the shortfall is supplied via our transmission lines into Islington and then further north. The upper South Island region includes several grid exit points north of the Waitaki Valley that are core grid links as listed in Schedule 12.3 of the Electricity Industry Participation Code. Accordingly, when assessing whether the grid satisfies the grid reliability standards, we must consider whether the grid will also satisfy the deterministic limb of the grid reliability standards (being, in short, an N-1 security standard).[32]

Our analysis has determined that the deterministic limb of the grid reliability standards is not satisfied at various grid exit points within the upper South Island region. As the Proposed Investment is an investment option that is designed to meet an investment need in the upper South Island region the satisfaction of which is necessary to meet the deterministic limb of the

[31] Schedule D, Clause D1 (1) of the Capex IM.
[32] Electricity Industry Participation Code 2010, Schedule 12.2, clause 2(2)(b).

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grid reliability standards, the Proposed Investment is not required to have a positive net electricity market benefit in order to satisfy the Investment Test.

## 5.3 Calculation period

Applying the Investment Test involves assessing the electricity market benefit of various investment options, being the cost and benefits received or incurred by consumers in respect of the investment option during the calculation period, which is defined as the:[33]

> "20 year period commencing on the **commissioning date** of the last asset to be delivered by the **proposed investment**, save that where significant **electricity market benefit or cost elements** and **project costs** are expected to-
>
> (a) cease to arise or be incurred during that period; or
>
> (b) arise or be incurred thereafter,
>
> it means the period commencing on the **commissioning date** of the last asset delivered by the **proposed investment** and terminating on the last date that significant **electricity market benefit or cost elements** and **project costs** are expected to arise or be incurred;"

In this case, our proposal includes a new 220kV bus coupler at our Islington substation, which will have a life exceeding 20 years.

The options we have compared are sets of development plans, listing investment required on the grid to maintain voltage stability between now and when a new line is built from the south into Islington. Once a new line is built, we do not expect to have to invest to maintain reliability for the upper South Island for many years.

The date the new line is required varies between the development plans and between the MDS. The latest it is required is 2050, hence we have evaluated all options out to 2050.

## 5.4 Demand and generation scenarios

A demand and generation scenario is defined in clause D4 of Schedule D of the Capex IM as follows:

(1) Demand and generation scenario means-

(a) until a document described in paragraph (b) of this clause is published,-

(i) scenario specified as 'market development scenario' in the statement of opportunities published by the Electricity Commission in 2010; or

(ii) reasonable variation on a scenario referred to in sub-paragraph (i), that reasonably has regard to the views of interested persons;

(b) description of a hypothetical future situation relating to forecast electricity demand and generation published by the Ministry of Economic Development (or other agency which subsequently assumes the responsibility) for the purpose of the preparation or evaluation of major capex proposals; or

(c) reasonable variation on a description referred to in paragraph (b) that reasonably has regard to the views of interested persons.

[33] Clause 1.1.5(2) of the Capex IM

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To date there has been no document described in paragraph (b) published so we are required to use the demand and generation scenarios published as the MDS in the Electricity Commission 2010 Statement of Opportunities[34], or reasonable variations of them.

As described in the Proposal and in Attachment C, we have modified the 2010 MDS, to incorporate the most recent advice from generation companies on their future plans for new generation in the upper South Island.

The MDS were first modified following our long list consultation in June 2011 and then again following our short list consultation in May 2012.

We believe our modified MDS are a reasonable variation on the original 2010 MDS and reasonably have regard to the views of interested persons.

## 5.5 Value of unserved energy

The Capex IM defines "value of expected unserved energy as follows":

> **value of expected unserved energy** means-
>
> (a) the appropriate cost per megawatt hour specified in or under clause 4 of Schedule 12.2 to the **code**; or
>
> (b) another appropriate cost per megawatt hour, of expected unserved energy (as 'expected unserved energy' is defined in the **code)**;

The value of expected unserved energy is used in quantifying the cost of involuntary demand curtailment.[35]

We have used the value of expected unserved energy as specified in clause 4 of Schedule 12.2 of the code, inflated from $2004 to $2011, as discussed in our June 2011 consultation.

## 5.6 Discount rate

In order to quantify the costs and benefits of the proposal, the electricity market benefit or cost element needs to be adjusted using the discount rate.

The discount rate is either:[36]

> (a) a standard rate of 7%; or
>
> (b) a non-standard rate other than 7% which is appropriate in the circumstances and subject to consultation under clause I3.

Our Investment Test analysis has been undertaken using the standard rate of 7%.

## 5.7 Analysis of Investment options

In order to assess whether the Proposed Investment satisfies the IT, the proposal must be measured against other investment options, so that it can be determined that the Proposed Investment has the highest expected net electricity market benefit.

Investment option is defined in Clause D2 of Schedule D of the Capex IM, as follows:

**Investment option** means a **major capex project-**

[34] http://www.ea.govt.nz/industry/ec-archive/soo/2010-soo/
[35] Clause D7(5) of Schedule D of the Capex IM.
[36] Clause D7(3) Schedule D of the Capex IM.

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(a) other than one proposed to be fully funded under a **new investment contract**;

(b) designed to meet a particular **investment need**;

(c) that is technically feasible; and

(d) that is different to another **major capex project** designed to meet the same **investment need** at least in respect of its proposed **commissioning date** or **completion date** or date for proposed delivery of **major capex project outputs**, as the case may be, which difference must be material.

The following section describes the short-list options we considered in our Investment Test analysis and the derivation of those options from the long list of options.

## 5.8 The Options

A long list of possible options was developed and consulted on in June 2011[37]. The draft long list of options included:

- Adding a sixth bus coupler at Islington
- Double breakering at Islington
- Double teeing circuits at Bromley
- New switching station
- Bus circuits at Orari, near Geraldine
- Refurbishment or replacement of synchronous condensers
- Static compensator (STATCOM) connected to a 220 kV bus in the upper South Island region
- Static var compensators (SVC) connected to the 220 kV bus in the upper South Island region
- STATCOM at Islington on T6 and T7 tertiary
- Multiple small STATCOMs
- Shunt capacitor banks
- Series compensation
- Non-transmission solutions such as new generation and demand-side options

Submissions to the consultation included:

- Orion offering the development of Belfast and Bromley sites as a diesel generation alternative to transmission
- Energy Response Pty Limited offering their services as an aggregator for demand-side participants
- Metering Technology Ltd detailing their load management system and advocating this to be rolled out nationally.

This feedback was incorporated into the long list prior to producing a short list of options. We have included our assessment of the long list to short list process in Attachment A, Long list to short list options report, and have summarised the key points below.

The short-list options were generated by ruling out long-list options that are not feasible for this project or clearly not cost-effective – see Table 6-1.

[37] http://www.gridnewzealand.co.nz/publications-and-resources

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## Table 5-1 Short Listing Summary

| | Option | Short-Listed? | Reason |
|---|---|---|---|
| | **Non-Transmission Solutions** | | |
| a) | New generation | ✗ | None significant committed |
| b) | Existing generation grid support contract | ✗ | Already accounted for in power system analysis |
| c) | Diesel generation | ✓ | Belfast and Bromley consented |
| d) | Upper SI load controller | ✗ | Already accounted for |
| e) | Special Protection Scheme (SPS) | ✗ | Too slow, no proponents for load shedding |
| f) | Pre-contingency load shedding | ✓ | Uneconomic |
| g) | Fuel switching | ✗ | Not viable on scale required |
| h) | Energy Efficiency | ✗ | Not viable on scale required |
| | **Transmission – Existing Assets** | | |
| a) | Tee 220kV circuit near Bromley | ✗ | Only minor improvement |
| b) | Reconductor existing transmission circuits | ✗ | Too expensive for marginal improvement in voltage stability |
| | **Transmission – New Assets** | | |
| a) | Sixth bus coupler at Islington | ✓ | Avoids pairing of north and south circuit during bus fault, <$2M |
| b) | Double breakering at Islington | ✗ | Similar effect to bus coupler, but much more expensive |
| c) | Islington 220 kV bus tie circuit | ✗ | Only helps during bus maintenance, $10M |
| d) | Pound Rd switching station | ✗ | Only minor improvement in voltage stability, many $10Ms |
| e) | +/- 80 Mvar STATCOM at Islington (or Bromley) | ✓ | Increases voltage stability limit, high-level economics ok |
| f) | +/- 40 Mvar STATCOM on Islington T6 and T7 | ✓ | Smaller STATCOM on 11 kV tertiary may be cost effective |
| g) | SVC at Ashburton | ✗ | Reconfiguration of 220 kV bus required or 66 kV solution less useful |
| h) | SVC at Islington (or Bromley) | ✓ | Increases voltage stability limit, high-level economics ok |
| i) | New synchronous condensers | ✓ | Provide inertia and modern ones have fast controllers |
| j) | STATCOMs on the West Coast | ✗ | Worst contingency is at Islington |
| k) | SVCs/STATCOMs north of Christchurch | ✗ | Not as effective as Islington or Bromley |
| l) | Shunt capacitors | ✓ | Additional static reactive support required |
| m) | Orari bussing | ✓ | Reduces the impact of a single line outage |
| n) | Series Capacitors | ✗ | Too expensive at $80M |
| o) | New AC Transmission line from the Waitaki Valley to Christchurch | ✗ | Too expensive at $500M until reactive limit increased and thermal limit is binding |
| p) | North Canterbury HVDC Tap-off | ✗ | Too expensive at $100Ms |

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The short listing process identified a range of options which could be used for this purpose. Each option on its own addresses the voltage support need for a different number of years and more than one investment will be required over time – until a new line is built into Islington from the south. Therefore, we built up a number of development plans, using different combinations of the short listed voltage support options.

Each development plan continued to the point where the new line is required. The technical analysis identified a year at which a new line would be required from the south into Islington. The year varies by MDS. Clearly, that prospective line is many years away, and generation or demand scenarios (or technology options) may develop which remove any need for it. However, until that line is built, or the other scenarios develop, we will face the need for increasing voltage support.

We evaluated many plans and found that it was always cheapest to start with the installation of a new 220kV bus coupler at Islington in 2014. With an expected cost at commissioning of $1.9 million and increase in system limit of 95MW, this low cost transmission solution is always the logical first step ahead of the investment in other short-listed options with a higher capital cost. It will defer the need for further investment in the upper South Island until at least 2016.

Our assessment is that diesel generation to defer the need for investment to 2016 would cost a minimum $2.9 million and that demand-side response would cost a minimum $3.3 million.

The six cheapest of these development plans, along with three which include diesel generation as an alternative to installing the bus coupler, form our short listed development plans.

The nine short-listed development plan options are shown in Table 6-2:

### Table 5-2 Short listed development plan options

| | Investments required in each development plan option | | | |
|---|---|---|---|---|
| **Option** | **2014** | **2016** | **2018 (if required)** | **post 2018** |
| 1 | Bus Coupler 6 | Refurbish SVC3 | Orari bussing | New line[38] |
| 2 | Bus Coupler 6 | Orari bussing | | New line |
| 3 | Bus Coupler 6 | Refurbish SVC3 | New SVC | New SVC, new line |
| 4 | Bus Coupler 6 | New SVC | | New SVC, new line |
| 5 | Bus Coupler 6 | Refurbish SVC3 | New sync conds | New SVC, new line |
| 6 | Bus Coupler 6 | Refurbish SVC3 | New STATCOM | New STATCOM, new line |
| 7 | Diesel generation | Orari bussing | | New SVC, new line |
| 8 | Diesel generation | Refurbish SVC3, new SVC | | New SVC, new line |
| 9 | Diesel generation | Refurbish SVC3, new STATCOM | | New STATCOM, new line |

[38] Note we are showing a new line being built at this point. Another option would be an HVDC tap north of Christchurch. The best option has not been investigated in any detail, but it would not affect the economic analysis if the new line was substituted by an HVDC tap.

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Table 6-2 shows a succession of need dates. After the 6th Bus Coupler or diesel generation in 2014, further investment is needed in 2016 and then again, in some development plans, by 2018. The right hand column of Table 6-2 shows the investments required after 2018. The timing for the new line varies between 2028 and 2050.

Our economic analysis determines the electricity market benefit or cost elements of each development plan out to 2050, using the capital costs for each element in the plan, the resultant operating and maintenance costs, the reactive loss benefits, the transmission loss costs and the unserved energy benefits. Detail on these costs and benefits are provided in Attachment C.

The electricity market benefit or cost elements are then discounted to a present value using the discount rate provided for in the Capex IM.

We believe our short list of options is appropriate and meet the requirements to be the investment options required to be evaluated in the Investment Test.

## 5.9 Assessment of expected net electricity market benefit

The analysis of expected net electricity market benefit where only quantified electricity market benefit or cost elements are taken into account, by MDS, are shown in Table 5-3.

**Table 5-3 – Expected net electricity market benefit (present value 2012 $m) relative to Option 6 by MDS**

| Option | Description | Expected Net Market Benefit relative to Option 6 (Present Value 2012 $m) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | No gen | MDS1 | MDS2 | MDS3 | MDS4 | MDS5 | Avg |
| 1 | BC6, refurb SVC3, Orari bussing | 1.0 | -1.2 | 7.8 | 9.5 | 3.0 | 6.3 | 5.1 |
| 2 | BC6, decomm SVC3, Orari bussing | -7.1 | 12.6 | -0.5 | 1.0 | -5.0 | -1.9 | 1.3 |
| 3 | BC6, refurb SVC3, new SVCs | 8.6 | -5.4 | 9.9 | 4.0 | 8.2 | 10.5 | 5.4 |
| 4 | BC6, decomm SVC3, new SVCs | 1.0 | 2.8 | 1.4 | 0.5 | 0.3 | 6.1 | 2.2 |
| 5 | BC6, refurb SVC3, new sync cons, new SVCs | 31.3 | 17.4 | 27.4 | 28.0 | 31.2 | 27.2 | 26.2 |
| 6 | BC6, refurb SVC3, new STATCOMs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | Diesel, decomm SVC3, Orari , new SVCs | 17.7 | 16.6 | 19.1 | 18.3 | 17.6 | 23.3 | 19.0 |
| 8 | Diesel gen, refurb SVC3, new SVCs | 27.8 | 20.2 | 19.3 | 17.9 | 26.2 | 30.1 | 22.7 |
| 9 | Diesel gen, refurbish SVC3, new STATCOMs | 35.6 | 31.3 | 34.5 | 27.3 | 34.4 | 39.4 | 33.4 |

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## 5.10 Assessment of unquantified electricity market benefit or cost elements

The expected net market benefit of development plan Options 2, 4 and 6 are within $2.2 million of each other on a present value basis.

We have determined that the difference in quantum between the quantified expected net electricity market benefit of our reference case[39] , option 6 (being the option with the highest expected electricity market benefit where only quantified electricity market benefit or cost elements are taken into account), and the expected net electricity market benefit of Options 2 and 4 is 10% or less of the aggregate project costs of Option 6.

The analysis supporting this conclusion is set out in the Proposal and in Attachment C.

Accordingly, we have undertaken a qualitative assessment taking into account the contribution to the expected net market electricity benefits of associated unquantified electricity market benefit or cost elements.

We consider:

- the cost of calculating the quantum (being the probability weighted average of the possible values) of the associated unquantified electricity market benefit or cost elements that have been assessed is likely to be disproportionately large relative to the quantum;

- the expected value of these associated unquantified electricity market benefit or cost elements cannot be calculated with an appropriate level of certainty due to the uncertainties in underlying assumptions or calculation approaches.

Details of our qualitative assessment of associated unquantified electricity market benefit or cost elements are summarised in Table 5-4 below and set out in full in the Proposal and in Attachment C.

### Table 5-4 Qualitative assessment non-quantified benefits (NQB) and overall preferred option

| Item | Option 2 | Option 4 | Option 6 |
|---|---|---|---|
| Expected Net Market Benefit | -1.3 | -2.2 | 0 |
| Other differences: | | | |
| • Option differences | ✓✓✓ | ✓✓✓ | ✓✓✓ |
| • Robust to no new generation | ✓✓✓ | ✓✓ | ✓✓ |
| • Consumer benefits through enhanced competition | ✓ | ✓ | ✓ |

[39] There is no requirement to define a reference case under the Capex IM. We have only done so for ease of presentation of the Investment Test results. The reference case is the lowest cost overall development plan, but this does not imply it is the most economic, or preferred option in any way.

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| Item | Option 2 | Option 4 | Option 6 |
|---|---|---|---|
| • Minimises disruption | ✓ | ✓✓✓ | ✓✓✓ |
| • Diversity benefits | ✓ | ✓✓ | ✓✓ |
| • Operational benefits | ✓✓✓ | ✓ | ✓ |
| • Aligns long term grid development | ✓✓✓ | ✓✓ | ✓✓ |
| **Overall ranking ENMB + NQB** | 1 | 3 | 2 |

## 5.1 Investment test results

Table 5-4 shows the overall ranking of Options 2, 4 and 6 based on both the expected net electricity market benefits and a qualitative assessment of the unquantified electricity market benefit or cost elements.

In conclusion, having considered both quantified electricity market benefit or cost elements and unquantified benefits we consider that Option 2 (being the Proposed Investment) satisfies the Investment Test.

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# 6| Approval Components for the Proposed Investment

The Commission may not approve the Proposed Investment where it is not satisfied with any one or more of the following proposed investment components:[40]

- **major capex allowance;**
- **maximum recoverable costs;**
- **recovery scheme;**
- **approved major capex project outputs;**
- **approval expiry date;**
- **P50;**
- **commissioning date assumption; and**
- **completion date assumption.**

This section evaluates each component in turn, setting out the specific factors that the Capex IM requires the Commission to have regard to in relation to that factor.

## 6.1 Major capex allowance

When evaluating the major capex allowance and maximum recoverable costs for proposed investments and investment options, the Commission must have regard to at least one of the following factors:[41]

- how major capex project outputs, key drivers, key assumptions, and cost modelling were used to determine the P50 and major capex allowance or maximum recoverable costs;
- what key assumptions were made regarding cost uncertainty in moving from a P50 forecast to the proposed major capex allowance or maximum recoverable costs;
- the capital costing methodology and formulation, including unit rate sources, the method used to test the efficiency of unit rates and the level of contingencies included;
- the impact of forecast costs on other costs, including the relationship with operating expenditure;
- mechanisms for controlling actual capital expenditure with respect to the major capex allowance or maximum recoverable costs; and
- the efficiency of the proposed approach to procurement of goods and services.

The expected cost (P50) of the Proposed Investment is estimated to be $12.10 million, once commissioned and the Major Capex Allowance is estimated to be $13.65 million. The difference between the two relates to the uncertainties around the project costs.

The uncertainties considered for this project are:

- scope allowance, to allow for scope differences in the project. The scope allowance diminishes as the project progresses from a conceptual design to detailed design.

[40] C1(2)(a) of Schedule C of Capex IM; components found in C1(1) of Schedule C of Capex IM. Note that the more specific criteria that are applied to each of the proposal criteria are discussed under the headings of the individual proposal criteria below.
[41] C3 of Schedule C of the Capex IM.

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Scope allowance is assumed to be a triangular distribution and we estimate both P50 and P90 allowances from that distribution.

- price uncertainty, to allow for possible market movements in the cost of components related to this proposal. Price uncertainty is assumed to be a triangular distribution and we estimate both P50 and P90 uncertainties from that distribution.
- construction uncertainty allows for unforeseen circumstances which may arise during construction. These may be related to extra costs incurred for bad weather, for instance. Construction uncertainty is assumed to be a triangular distribution and we estimate both P50 and P90 uncertainties from that distribution.
- commissioning uncertainty allows for construction periods which differ from our commissioning date assumption. The commissioning uncertainty diminishes as the project progresses from a conceptual design to detailed design. Commissioning uncertainty is assumed to be a triangular distribution and we estimate both P50 and P90 allowances from that distribution.

The P90 estimates of the uncertainties are used for the purposes of the Major Capex Allowance.

The difference between the Expected Cost and the Major Capex Allowance is therefore the sum of the difference between the cost estimate using P50 values of the uncertainties and P90 values of the uncertainties.

As we recover the costs once the project is commissioned (completed), the Major Capex Allowance to be approved by the Commerce Commission is expressed in commissioning year dollars. This is shown in Table 6-1.

The relationship between the expected cost of the project and our Major Capex Allowance is shown in Table 6-1.

**Table 6-1 Calculation of Major Capex Allowance**

| Project | Expected Cost (P50) (2012 $m) | Inflation | Financing costs | Expected Cost (P50) (2014-15 $m) | Major Capex Allowance (2014-15 $m) |
|---|---|---|---|---|---|
| 6th Bus coupler | 1.72 | 0.06 | 0.07 | 1.85 | 2.09 |
| HILP measures | 6.76 | 0.28 | 0.55 | 7.59 | 8.66 |
| Load monitoring | 0.65 | 0.02 | 0.03 | 0.70 | 0.76 |
| Orari facility | 1.86 | 0.04 | 0.06 | 1.96 | 2.14 |
| TOTAL | 10.99 | 0.40 | 0.71 | 12.10 | 13.65 |

## 6.2 Maximum recoverable costs

The Capex IM defines "maximum recoverable costs" as the "maximum amount of major capex which is not included in a closing RAB value and is approved in respect of a non-transmission solution by the Commission, over the duration of the project, as recoverable costs.".

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This proposal does not include the use of non-transmission solutions and does not include any maximum recoverable costs (as they are not applicable to this proposal).

## 6.3 Recovery scheme

The Capex IM defines "recovery scheme" as the "specification for the systematic attribution of maximum recoverable costs to one or more disclosure years, including by way of formulae".

This proposal does not include the use of non-transmission solutions, does not include any maximum recoverable costs and hence does not include a recovery scheme.

## 6.4 Approved major capex project outputs

The Commission must have regard to at least one of the following factors when evaluating proposed major capex project outputs:[42]

- the extent to which the major capex project outputs reflect the nature, quantum and functional capability of the transmission investment assets to be commissioned;
- the extent to which the major capex project outputs reflect the change in the functional capability of the grid as a result of undertaking the proposed investment;
- the extent to which the major capex project outputs are consistent with key assumptions used in determining the major capex allowance or maximum recoverable costs;
- the nature of the electricity market benefit or cost elements directly related to the supply of electricity transmission services taken into account in applying the investment test; and
- in the case of a non-transmission solution,-
    - the extent to which the major capex project outputs reflect the nature and quantum of any product or service provided to Transpower; and
    - the extent to which the major capex project outputs reflect the change in the functional capability of the grid resulting from the product or service provided to Transpower.

Our Stage 1 Proposal comprises the following Major Capex project outputs:

- Installing a new 220kV bus coupler at our Islington substation
- Improving the resilience of our Islington substation to HILP events by:
    - Upgrading the LVAC system at Islington;
    - Reducing exposure to damage from fire; and
    - Strengthening Islington control building and crane hall to Building Act 2004 earthquake compliance

- Installing 10 load monitoring units each at a different substation in the upper South Island
- Refining the design for a new facility at Orari by way of a more detailed Solution Study Report (SSR)
- Undertaking preliminary processes to obtain consents and easements necessary for Orari.

[42] C5 of Schedule C of the Capex IM.

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## 6.5 Commissioning date assumption

The Capex IM defines "commissioning date assumption" as "the assumption made as to the commissioning date of the last asset to be delivered by a major capex project" and "commissioning date" means date the asset is first commissioned.[43]

We will be starting work on these proposals in 2012 and will complete them as shown below. The following are our commissioning date assumptions for our Stage 1 Proposal:

- New 220kV bus coupler Q2 2014
- Islington substation resilience measures Q2 2015
- Install load monitoring equipment Q1 2014
- Motor load economic parameters Q4 2013
- Orari SSR cost and preliminary processes Q1 2013

## 6.6 Approval expiry date

The Commission must have regard to at least one of the following factors when evaluating a proposed approval expiry date:[44]

- the effect of the proposed approval expiry date on the quantified and unquantified costs and benefits under the investment test;
- the effect of the changes to the commissioning date assumption or completion date assumption on the expected net electricity market benefit under the investment test;
- the effect of the proposed approval expiry date and the commissioning date assumption or completion date assumption in the major capex proposal;
- the sensitivity of the proposed approval expiry date to the key assumptions used in the major capex proposal;
- demand and generation scenarios; and
- sensitivity analysis.

We have concluded that an appropriate approval expiry date for this Stage 1 Proposal would be 2018.

An approval expiry date should not be close enough to the commissioning date assumption that it is triggered by reasonable commissioning delays. In this case, 2018 is quite close to the commissioning dates of 2014/15, but given the relative simplicity (from a build perspective) of the proposal, it is unlikely to be triggered by commissioning delays.

On the other hand, an approval expiry date should be a point at which it is clear that if a project has not been commissioned, something has changed and it will not be commissioned.

In this case, new generation could emerge as early as 2018 in the upper South Island. It may be wind generation, which may or may not contribute significantly from a voltage support point of view, but if this Stage 1 Proposal is not commissioned by then it would be reasonable to at least reassess whether it is still appropriate or not.

[43] Clause 1.1.5(2) of the Capex IM.
[44] C4 of Schedule C of the Capex IM.

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## 6.7 Completion date assumption

The Capex IM defines "completion date assumption" as the "date that a non-transmission solution achieves completion" and "completion" means the provision of all services forecast to be delivered by the non-transmission solution." [45]

This proposal does not include the use of non-transmission solutions, hence we have not determined any completion date assumptions.

[45] Clause 1.1.5(2) of the Capex IM.

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# 7| Information Requirements for Major Capex Proposal

A major capex proposal must include the information listed or described in Schedule G of the Capex IM.

Set out in the table below is a list of the items of information required by Schedule G and where this information is located in the documentation for this major capex proposal.

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| ***Clause reference*** | ***Disclosure requirement*** | ***Cross reference to location in documents*** |
|---|---|---|
| G2(a) **Information on the investment need** | Explanation of the need for investment, including-<br><br>Information on its nature, extent, location and timing; | Attachment B – section 4 |
| G2 (b) | Commentary as to how the **investment need** is consistent with the most recent **integrated transmission plan**; | Proposal is consistent with section 6.6.1 of the Annual Planning Report 2012 |
| G2(c) | A summary of consultation participants' views on the **investment need** and how **Transpower** had regard to those views and if not, why not; | Attachment D – section 4 |
| G3(1) **Information on relevant demand and generation scenarios** | Detailed description of each **relevant demand and generation scenario** that is a **market development scenario variation** or **MED scenario variation**, as the case may be; | Attachment C – sections 2.1 and 2.2 |
| G3(2) | In respect of-<br><br>(a) each market development scenario variation or MED scenario variation, as the case may be, a description of it;<br>(b) each market development scenario variation,-<br>(i) explanation of the major variations between it and the **market development scenarios**; and<br>(ii) the rationale for the variations; and<br>(c) each **MED scenario variation**,-<br>(i) explanation of the major variations between it and the current **MED scenarios**; and<br>(ii) the rationale for the variations; | Attachment C – sections 2.1 and 2.2 |

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| Clause reference | Disclosure requirement | Cross reference to location in documents |
|---|---|---|
| G3(3) | In respect of each **relevant demand and generation scenario**,-<br><br>(a) the relative weighting of each scenario; and<br>(b) where that weighting was determined by **Transpower**, the methodology used to determine it; and | Attachment C – sections 2.1 and 2.2 |
| G3(4) | In respect of each **market development scenario variation** or **MED scenario variation**, as the case may be, summary of consultation participants' views on them. | Attachment D – section 4 |
| G4(1) **Information relating to each investment option** | In relation to each **investment option** contained in the **major capex proposal**-<br><br>(1) description of the **investment option**; | Attachment A –section 4.1 |
| G4(2) | (2) **net electricity market benefit** of each **investment option** under each **demand and generation scenario**; | Attachment C – section 3 |
| G4(3) | (3) in respect of each **investment option**, quantum of-<br><br>(a) each electricity market benefit or cost element;<br>(b) each **project cost**;<br>(c) aggregate **electricity market benefit or cost element**; and<br>(d) aggregated **project costs** on a **P50** basis, used to calculate each **net electricity market benefit**; | (a) Attachment C – section 3<br>(b) Attachment A – section 3<br>(c) Attachment C – section 3<br>(d) Attachment A – section 3 |
| G4(4) | (4) methodology used to determine the quantum of all information provided pursuant to subclause (3), including details commensurate with the estimated **capital expenditure** and complexity of the **investment option** of | (a) Estimate of costs from Transpower's Cost estimating tool.<br>(b) A detailed procurement plan will be developed upon approval of this proposal |

| *Clause reference* | *Disclosure requirement* | *Cross reference to location in documents* |
|---|---|---|
| | any-<br><br>(a) internal and external benchmarking and how the results were applied;<br>(b) relevant existing or proposed supply or procurement processes;<br>(c) modelling tools or techniques; and<br>(d) key publications and data sources; | once we have commenced detailed design.<br>(c) Attachment C – sections 2, 3 and 4<br>(d) Annual Planning Report http://www.gridnewzealand.co.nz/n4689.html, consultation documents http://www.gridnewzealand.co.nz/n283.html |
| G4(5) | (5) **key assumptions** used to determine the **net electricity market benefit** of each **investment option**, including-<br><br>(a) discount rate;<br>(b) calculation period;<br>(c) cost per megawatt hour used to determine the value of expected unserved energy; | Attachment C – section 2<br>(a) 2.5,<br>(b) 2.6<br>(c) 2.4 |
| G4(6) | (6) **expected net market benefit** of each **investment option**; | Attachment C – section 3.8 |
| G5(1) **Information relating to proposed investment only** | (1) identification of the **investment option** that is the **proposed investment**; | Proposal – section 7, table 7-4<br>Attachment C - section 3.4, Table 3-11 |
| G5(2) | (2) detailed description of the components of the **proposed investment**, including at least-<br><br>(a) identification of the extent to which the **proposed investment** is a **transmission investment** or a **non-transmission solution**;<br>(b) a summary of requirements for completion, such as property or property right acquisition, resource management approvals, asset | (a) Proposal, executive summary p2<br>(b) Proposal – section 3.1<br>(c) Proposal – section 3<br>(d) Assumption: Proposal, section 3.2, rationale: Proposal section 4.6, Attachment A<br>(e) N/A. This Attachment – section 6.2<br>(f) N/A |

| Clause reference | Disclosure requirement | Cross reference to location in documents |
|---|---|---|
| | purchases, asset construction and site remediation;<br>(c) any proposed **major capex allowance**;<br>(d) where a **major capex allowance** is applicable, the **commissioning date assumption** and rationale for it;<br>(e) any proposed **maximum recoverable costs**;<br>(f) where **maximum recoverable costs** are applicable, the **completion date assumption** and rationale for it;<br>(g) the estimated **P50;**<br>(h) all relevant supporting technical information and costing information;<br>(i) where the project is a **non-transmission solution**-<br>(i) the proposed **recovery scheme**; and<br>(ii) an explanation of the relationship between any proposed **major capex allowance** and any proposed **maximum recoverable costs** for that **non-transmission solution**; and<br>(j) proposed **approval expiry date** and rationale for it; | (g) Proposal – section 9<br>(h) Proposal, Attachments A, B, E, USI MCP Data File - MCA, USI MCP Data File - Technical<br>(i) N/A<br>(j) Proposal, section 3.4 |
| G5(3) | (3) detailed description of the rationale for seeking approval of the **proposed investment**; | Proposal, section 7, Attachment C, section 3 |
| G5(4) | (4) summary of the key evidence that supports that rationale such as contracts, reports, memos, financial or other data, results of modelling exercises, customer documentation and letters, and statements from directors; | USI MCP Data File - Technical<br>USI MCP Data File - Investment Test Consultation:<br>http://www.gridnewzealand.co.nz/n283.html<br>CEO Certificate: This attachment – section 8 |
| G5(5) | (5) detailed commentary as to how the **proposed investment** is consistent with the most recent **integrated transmission plan**, and if not, why not; | First integrated transmission plan is yet to be published, however, proposal is consistent with |

| Clause reference | Disclosure requirement | Cross reference to location in documents |
|---|---|---|
| | | section 6.6.1 of the Annual Planning Report 2012 |
| G5(6) | (6) identification of anything associated with the **proposed investment** falling under any of clauses D5(1)(a) to D5(1)(g) that did not meet the definition of expected market benefit or cost element only by virtue of its being unlikely to affect the **net electricity market benefit** to an appreciable degree; | Variable costs of unserved energy for n-2 events: Attachment C section 3 and Attachment C Appendix B. |
| G5(7) | (7) description of considerations, assumptions and calculations used to determine that something falling under any of clauses D5(1)(a) to D5(1)(g) did not meet the definition of expected market benefit or cost element by virtue of its being unlikely to affect the **net electricity market benefit** to an appreciable degree; | Variable costs of unserved energy for n-2 events: Attachment C section 3 and Attachment C Appendix B. |
| G5(8) | (8) outcome of sensitivity analysis; | Attachment C – section 3.5 |
| G5(9) | (9) description of the methodology applied in undertaking **sensitivity analysis**; | Attachment C – section 3.5 |
| G5(10) | (10) explanation as to how robust the **proposed investment** is to **sensitivity analysis**; | Attachment C – section 3.5 |
| G5(11) | (11) reasons for any selection of a-<br><br>(a) discount rate other than 7%; and<br>(b) calculation period other than 20 years;<br>(c) cost per megawatt hour determined using paragraph (b) of the | (a) N/A<br>(b) Attachment C, section 2.6<br>(c) Attachment C, section 2.4 |

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| Clause reference | Disclosure requirement | Cross reference to location in documents |
|---|---|---|
| | definition of value of expected unserved energy; | |
| G5(12) | (12) a description as to how the **proposed investment** reflects **good electricity industry practice**; | Proposal, section 7.7 |
| G5(13) | (13) rationale for determining that the **proposed investment** may satisfy the **investment test**, by reference to each subclause and paragraph of that test; and | This attachment – section 5. Proposal, section 7. Attachment C – section 3 |
| G5(14) | (14) a plan for monitoring costs, project milestones and deliverables that reflects the best information available to **Transpower** | A detailed plan will be developed once we obtain approval and commence detailed design. |
| G6(1) **Grid outputs** | In relation to each **investment option** contained in the **major capex proposal**-<br><br>(1) specification of **approved major capex project outputs** that are proposed; | Proposal, section 3.1. |
| G6(2) | (2) quantum of each **approved major capex project output** that is proposed; | Proposal, section 3.1.<br>USI MCP Data File - MCA |
| G6(3) | (3) rationale for those **approved major capex project outputs** that are proposed including-<br><br>(a) description of key factors and key assumptions relevant to their determination including the uncertainty associated with each such factor or assumption; and<br>(b) explanation of the extent to which the quantum of each proposed | Attachment C – section 3. |

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| Clause reference | Disclosure requirement | Cross reference to location in documents |
|---|---|---|
| | major capex project output reflects:<br>(i) the assets to be commissioned;<br>(ii) the forecast changes to the functional capability of the grid;<br>(iii) the quantum of forecast electricity market benefit or cost elements directly related to the supply of electricity **transmission services**; and<br>(iv) in respect of a **non-transmission solution**, any service provided by a third party; | |
| G6(4) | (4) explanation of the relationship between the proposed **P50** and the quantum of each **approved major capex project output** that is proposed including the sensitivity of the quantum of each **approved major capex project output** that is proposed to changes in the **P50**, including commentary in terms of increases or decrease in the scope of the **project**; | This document, section 6.1.<br>USI MCP Data File - MCA |
| G6(5) | (5) description of factors that may affect **Transpower's** ability to achieve each **approved major capex project output** that is proposed, including identification of each factor, with reasons, as within or outside **Transpower's** control; and | A detailed plan, including associated risks will be developed once we obtain approval and commence detailed design. |
| G6(6) | (6) in the case of a **non-transmission solution** description of the **transmission investment** it avoids in terms of both assets and expected costs avoided. | N/A |
| **G7(a) Information on consultation** | In respect of consultation, the specified information is a description as to how the consultation programme referred to in clause 3.3.1(2)(a)(i) was | Attachment D – section 1.2 |

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| Clause reference | Disclosure requirement | Cross reference to location in documents |
|---|---|---|
| | followed, including-<br><br>(a) a list of the relevant consultation steps and confirmation by Transpower that each occurred; | |
| G7(b) | (b) a list of respondents to the consultation; | Attachment D – section 1.2 |
| G7(c) | (c) a description of all issues raised by interested persons in response to **Transpower's** intended **major capex proposal**; | Attachment D – section 5.1 |
| G7(d) | (d) a summary of the arguments raised in respect of each issue to which paragraph (c) applies; and | Attachment D – section 5.1 |
| G7(e) | (e) in respect of the issues to which paragraph (c) applies, an explanation as to whether the **major capex proposal** accommodates the arguments referred to in paragraph (d); and<br>(i) if so, how; and<br>(ii) if not, why not; | Attachment C – section 2 |
| G8 (a) **Information on non-transmission solutions** | In respect of **non-transmission solutions**, a description as to how the requirements of Schedule I Division 2 were met, including-<br><br>(a) summary of the process followed to identify and assess **non-transmission solutions**; | Attachment A – section 5.2, Attachment C – section 3.1. |
| G8(b) | (b) description of **non-transmission solutions** suitable to meet the relevant **investment need** identified either by **Transpower** or by consultation participants; | Attachment A section 5.2 |
| G8(c) | (c) explanation as to how the **non-transmission solutions** to which paragraph (b) applies were taken into account when determining the **investment options** and applying the **investment test**; and | Attachment A section 5.2 |
| G8(d) | (d) description and justification of how any assets that would be **commissioned** by **Transpower** form part of the **non-transmission solution**. | N/A |

| *Clause reference* | *Disclosure requirement* | *Cross reference to location in documents* |
|---|---|---|
| G9 **Additional information** | any additional supporting material **Transpower** reasonably considers is relevant to the decision of the **Commission** under clause 3.3.3; | N/A |

# 8| Chief Executive Certification

**CHIEF EXECUTIVE OFFICER'S CERTIFICATION AS TO MAJOR CAPEX PROPOSAL (UPPER SOUTH ISLAND RELIABILTY STAGE 1)**

*(Transpower Capital Expenditure Input Methodology Determination 2012 Part 9 Clause 9.2.1) (the **Capex IM**)*

I, Patrick Clifford Strange, Chief Executive Officer of Transpower New Zealand Limited (**Transpower**) hereby certify, in relation to all information provided in accordance with Schedule G to the Capex IM with respect to the Upper South Island Reliability Stage 1 Major Capex Proposal, that having made all reasonable enquiries, it is my belief that:

(a) the information was derived from and accurately represents, in all material respects, the operations of Transpower; and

(b) the proposed investment to which the information relates was approved in accordance with the applicable requirements of Transpower's director and management approval policies; and

(c) the major capex proposal complies, in all material respects, with the requirements of clause 7.4.1 of the Capex IM.

**DATED:** 28.6.2012

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**PATRICK CLIFFORD STRANGE**

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