

Schedule F5 Transmission Pricing Methodology

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1. Introduction

- 1.1 The transmission pricing methodology is used to recover the full economic costs of Transpower’s services, with the exception of investment contracts entered into pursuant to rule 8 of Section III of Part F of the **Rules**, existing new investment contracts and other contracts of the kind referred to in rule 9.1 of section IV of Part F of the **Rules**. The full economic costs of Transpower’s services include costs relating to investments which are not subject to the **Grid Investment Test**.
- 1.2 The **transmission pricing methodology**
- 1.2.1 replaces the methodology given legal effect by the Electricity (Transpower’s Pricing Methodology) Regulations 2004; and
 - 1.2.2 must take legal effect from 1 April 2008.

2. Overview of the Pricing Methodology

- 2.1 Transpower's principal objective as a State Owned Enterprise is to operate as a successful business. To this end Transpower's pricing must, subject to Part 4A of the Commerce Act 1986, recover the costs of providing its transmission services, which include capital, maintenance, operating and overhead costs. Prior to the start of each **pricing year**, Transpower's Board approves forecasts of:
 - 2.1.1 the revenue required to recover the costs of providing AC transmission services during the **pricing year**. This forecast is referred to as the **AC revenue** for that **pricing year**; and
 - 2.1.2 the revenue required to recover the costs of providing the **HVDC assets** during the **pricing year**. This forecast is referred to as the **HVDC revenue** for that **pricing year**.
- 2.2 The **transmission pricing methodology** comprises:
 - 2.2.1 connection charges, which recover part of Transpower's **AC revenue** by reference to the cost of providing **connection assets**. Section 4 describes how connection charges are calculated;
 - 2.2.2 interconnection charges, which recover the remainder of Transpower's **AC revenue**. Section 5 describes how interconnection charges are calculated; and
 - 2.2.3 HVDC charges, which recover Transpower's **HVDC revenue**. Section 6 describes how HVDC charges are calculated.
- 2.3 An overview of how Transpower's **AC revenue** and **HVDC revenue** are recovered through these charges is shown in diagrammatic form in Appendix A.
- 2.4 The **transmission pricing methodology** also describes:
 - 2.4.1 how the costs of **transmission alternative services** are charged and recovered, if and when **transmission alternatives services** are provided and/or funded by Transpower (Section 8); and
 - 2.4.2 practical ways to facilitate greater transparency in relation to Transpower's prudent discount policy, which helps to ensure that the **transmission pricing methodology** does not provide incentives for inefficient by-pass of the existing grid (Section 9).

3. Definitions and Interpretation

Definitions

Unless the context otherwise requires:

- 3.1 "**AC asset**" means a **grid asset** other than an **HVDC asset**;
- 3.2 "**AC revenue**" has the meaning set out in section 2.1;
- 3.3 "**AC switch**" means a switch that is an **AC asset**;
- 3.4 "**alternative project**" means an investment proposed by a **customer**, which if implemented, would bypass existing **grid assets**, but does not include proposed new generation;
- 3.5 "**annual charges**" means any or all of the **annual connection charge**, **annual interconnection charge** and **annual HVDC charge** for a **customer** at a **connection location** for a **pricing year**;
- 3.6 "**annual connection charge**" has the meaning set out in paragraph 4.2;
- 3.7 "**annual HVDC charge**" has the meaning set out in paragraph 6.1;
- 3.8 "**annual interconnection charge**" has the meaning set out in paragraph 5.1;
- 3.9 "**anytime maximum demand**" or "**AMD**" for a **customer** at a **connection location** means the average of the 12 highest **offtake** quantities for that **customer** at that **connection location** during the **capacity measurement period** for the relevant **pricing year**. This definition is subject to section 7 of this **transmission pricing methodology** and any prudent discount agreement;
- 3.10 "**anytime maximum injection**" or "**AMI**" for a **customer** at a **connection location** means the average of the 12 highest **injection** quantities for that **customer** at that **connection location** during the **capacity measurement period** for the relevant **pricing year**. This definition is subject to section 7 of this **transmission pricing methodology** and any prudent discount agreement;
- 3.11 "**capacity measurement period**" means, for any **pricing year**, the 12-month period starting 1 September and ending 31 August inclusive, immediately prior to the commencement of the **pricing year**;
- 3.12 "**connection asset**" has the meaning set out in paragraph 3.59;
- 3.13 "**connection link**" has the meaning set out in paragraph 3.58.3;
- 3.14 "**connection location**" means the **substation** or other location at which a **customer's assets** are directly connected to the **grid**;

- 3.15 **"connection node"** has the meaning set out in paragraph 3.58.2;
- 3.16 **"customer"** means a person who has or controls **assets** directly connected to the **grid** and, in relation to a **connection location**, means a person who has or controls **assets** directly connected to the **grid** at that **connection location**. A **customer** may be both an **offtake customer** and an **injection customer** at the same **connection location**;
- 3.17 **"customer allocation"** has the meaning set out in paragraph 4.22;
- 3.18 **"financial year"** means the financial year adopted by **Transpower** from time to time, being a 12 month period or such other period as **Transpower** determines. **Transpower's** current financial year is a 12 month period from 1 July to 30 June;
- 3.19 **"grid assets"** means assets and other works (including **land and buildings**) owned or operated by **Transpower**, which form part of the **grid** or are required to support the **grid**;
- 3.20 **"historical anytime maximum injection"** or **"HAMI"** for a **customer** at a **South Island generation connection location** means either the average of the 12 highest injections at that **South Island generation connection location** during the **capacity measurement period** for the relevant **pricing year**; or the average of the 12 highest **injections** at that **South Island generation connection location** during any of the four immediately preceding **pricing years**, whichever is highest. This definition is subject to section 7 of this **transmission pricing methodology** and any prudent discount agreement;
- 3.21 **"HVDC assets"** means the **HVDC link** and all **land and buildings** associated with the **HVDC link**;
- 3.22 **"HVDC customer"** means a **customer** who is, from time to time, the owner or operator of:
- 3.22.1 **South Island generation** which is directly connected to the **grid assets**; or
- 3.22.2 a **local network** to which **South Island generation** is connected, either directly or indirectly;
- 3.23 **"HVDC revenue"** has the meaning set out in section 2.1;
- 3.24 **"independent expert"** means an independent person who is a recognised technical expert in the matter that has been referred to him or her. In appointing an **independent expert** the party referring the matter to the **independent expert** shall nominate three persons and the other party may agree that any one of them be appointed. Failing agreement between the parties, the **independent expert** will be appointed by the **Board**;
- 3.25 **"injection"** means the net quantity of **electricity** flow into the **grid** at a **connection location** from a **customer's assets** during a **half hour** determined from **metering information**. This definition is subject to section 7 of this **transmission pricing methodology** and any prudent discount agreement;
- 3.26 **"injection customer"** means, subject to section 7, in relation to a **connection location**, a **customer** who has or controls assets from which electricity flowed into the **grid** at that **connection location** in any **half hour** during the **capacity measurement period** for the relevant **pricing year** or, if the **connection location** is a **South Island generation connection location**, an **HVDC customer** who has or controls assets from which electricity flowed into the **grid** at the **South Island generation connection location** in any **half hour** during the **capacity**

- measurement period** for the relevant **pricing year** or a **capacity measurement period** for any of the four immediately preceding **capacity measurement periods**;
- 3.27 **"interconnection asset"** has the meaning set out in paragraph 3.60;
- 3.28 **"interconnection link"** has the meaning set out in paragraph 3.58.4;
- 3.29 **"interconnection node"** has the meaning set out in paragraph 3.58.1;
- 3.30 **"land and buildings"** means any and all land or interest in land (including easements) acquired by **Transpower** for the purposes of establishing a **connection location** or **substation**, or for supporting **grid assets**, together with all buildings, oil containment facilities and the capitalised cost of establishing a **connection location** or **substation** or other **grid asset** (as the case may be);
- 3.31 **"link"** has the meaning set out in paragraph 3.56;
- 3.32 **"monthly charges"** means any or all of the **monthly connection charge**, **monthly interconnection charge** and **monthly HVDC charge** for a **customer** at a **connection location**;
- 3.33 **"monthly connection charge"** has the meaning set out in paragraph 4.2;
- 3.34 **"monthly HVDC charge"** has the meaning set out in paragraph 6.1;
- 3.35 **"monthly interconnection charge"** has the meaning set out in paragraph 5.1;
- 3.36 **"new investment contract"** means a contract entered into at any time between **Transpower** and a **customer** of **Transpower**, under which **Transpower** agrees to provide any new or upgraded **grid assets** and the **customer** agrees to pay charges based on **Transpower's** cost of providing the new or upgraded **grid assets**. It includes, but is not limited to a **"new investment agreement contract"** as defined in Part A of the **Rules**;
- 3.37 **"node"** has the meaning set out in paragraph 3.54;
- 3.38 **"offtake"** means the net quantity of **electricity** flow out of the **grid** at a **connection location** into **customer assets** during a **half hour** determined from **metering information**. This definition is subject to section 7 of this transmission pricing methodology and any prudent discount agreement;
- 3.39 **"offtake customer"** means, subject to section 7, in relation to a **connection location**, a **customer** who has or controls assets into which electricity flowed from the **grid** at that **connection location** in any **half hour** during the **capacity measurement period** for the relevant **pricing year**;
- 3.40 **"optimised replacement cost"** means, for any assets or group of assets, the optimised replacement cost of that asset or group of assets recorded in a **Transpower** asset register as at the **transition date**;
- 3.41 **"point of injection"** means a **connection location** at which an **injection customer** has assets connected to the **grid**;
- 3.42 **"pricing year"** means the period from April 1 to March 31, in respect of which **Transpower** calculates its prices;
- 3.43 **"region"** means a group of **connection locations**, being one of the groups identified in Appendix B as:

- 3.43.1 Upper North Island;
 - 3.43.2 Lower North Island;
 - 3.43.3 Upper South Island; and
 - 3.43.4 Lower South Island;
- 3.44 **"regional demand"** means, in any **half hour**, the sum over all **customers** at all **connection locations** in a **region** of all **offtake** quantities at those **connection locations**;
- 3.45 **"regional peak demand period"** means:
- 3.45.1 in relation to the Upper North Island and the Upper South Island **regions**, a **half hour** in which any of the 12 highest **regional demands** occurs during the **capacity measurement period** for the relevant **pricing year**; and
 - 3.45.2 in relation to the Lower North Island and the Lower South Island **regions**, a **half hour** in which any of the 100 highest **regional demands** occur during a **capacity measurement period** for the relevant **pricing year**.
- This definition is subject to section 7 of this **transmission pricing methodology** and any prudent discount agreement;
- 3.46 **"regional coincident peak demand"** or **"RCPD"** for a **customer** at a **connection location** means the **customer's offtake** at that **connection location** during a **regional peak demand period**. This definition is subject to section 7 of this **transmission pricing methodology** and any prudent discount agreement;
- 3.47 **"replacement cost"** means:
- 3.47.1 for a **connection asset** commissioned prior to the **transition date**, the cost of replacing that asset (either separately or as part of a group of assets) with a modern equivalent asset with the same service potential, multiplied by the **replacement cost adjustment factor**; and
 - 3.47.2 for any other **grid asset**, the cost of replacing that asset (either separately or as part of a group of assets) with a modern equivalent asset with the same service potential,
- as determined by **Transpower** and (unless stated otherwise) recorded in a **Transpower** asset register;
- 3.48 **"replacement cost adjustment factor"** means for any asset (or group of assets) the percentage which is the **optimised replacement cost** divided by the cost, as at (or about) the **transition date**, of replacing that asset (or group of assets) with the then modern equivalent asset with the same service potential;
- 3.49 **"South Island generation"** means, subject to section 7, any **generating unit** or **generating station** located in the South Island, which:

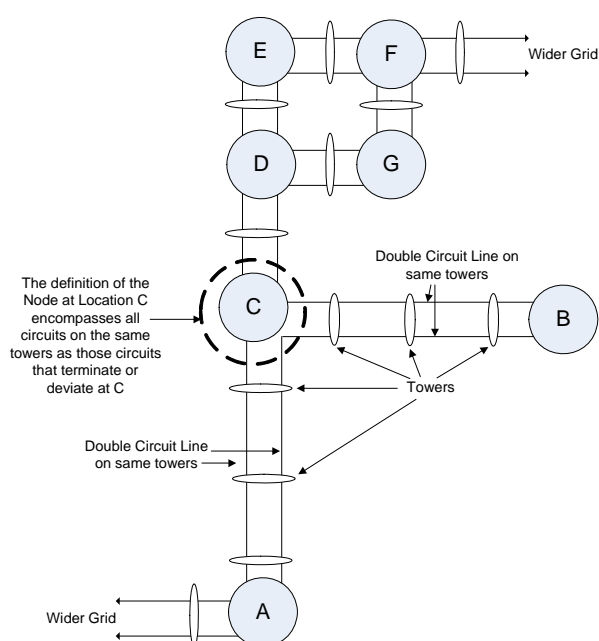
- 3.49.1 is directly connected to the **grid** or is connected to a **local network** which is connected (directly or indirectly) to the **grid**; and
- 3.49.2 has (directly or indirectly) injected electricity into the **grid** at any time during any **capacity measurement period** for the previous five **pricing years**;
- 3.50 "**South Island generation connection location**" means any **connection location** at which **South Island generation** is connected to the **grid** either directly, or indirectly via connection of a **local network**, to which **South Island generation** is in turn either directly or indirectly connected;
- 3.51 "**substation**" means a substation, including all **land and buildings**, switches, transformers, revenue meters and all other assets comprising or located at that substation;
- 3.52 "**transition date**" means the date of the last ODV report published on **Transpower's** website prior to the date on which this **transmission pricing methodology** takes effect; and
- 3.53 "**weighted average cost of capital**" means, for any **pricing year**, the pre-tax nominal weighted average cost of capital used by **Transpower** to determine **AC revenue** or **HVDC revenue** (as the case may be) for that **pricing year**.

Connection Asset Definition

Definition of Nodes and Links

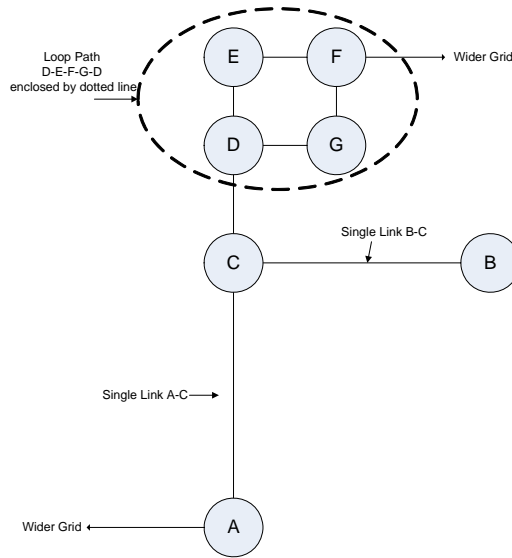
- 3.54 A **node** is any of the following:
- 3.54.1 a **connection location**;
 - 3.54.2 a location where a circuit, which is connected to two or more other **nodes**, diverges or terminates (such as a “tee” point or a deviation);
 - 3.54.3 any **substation** or switching station.
- 3.55 Any **node** which connects with one or more multiple circuits on the same towers or poles where at least one of those circuits deviates or terminates at that **node** is treated as a single **node** encompassing all of those circuits at that location.

Figure 1: Illustration of definition of a node



- 3.56 A **link** is either a single circuit or multiple parallel circuits (of the same voltage) connecting two **nodes** (and includes any **grid assets**, such as circuit breakers, that are required to connect the **link** at either **node**).
- 3.57 Figures 1 and 2 illustrate how **nodes** and **links** are identified. In Figure 1, A, B, C, D, E, F and G are all **nodes**. C is a single **node**, because one of the circuits of the **link** AC terminates at C. AC, CD (and DE, EF, FG and GD) and BC are separate **links**, although AB may be recorded as a single line in a Transpower asset register. Figure 2 shows the same configuration as Figure 1 but describes the circuits by way of **links**.

Figure 2 – Illustration of links and loop path



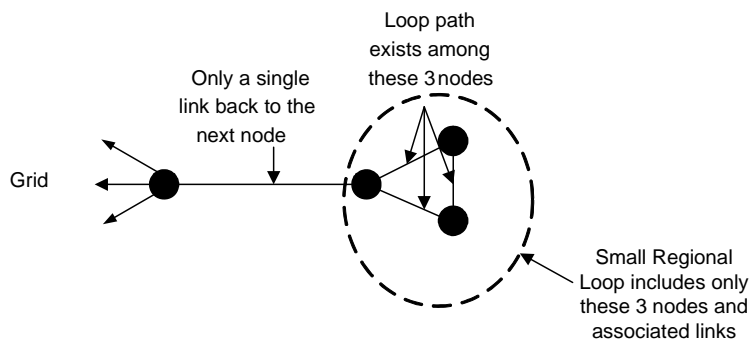
Identification of Nodes and Links as Connection or Interconnection

3.58 **Nodes** and **links** are identified as **connection nodes** or **connection links** or **interconnection nodes** or **interconnection links** according to the following rules:

3.58.1 An **interconnection node** is any **node** connected to two or more **nodes** in a “loop”, other than a “small regional loop”. A loop is a continuous path of **nodes** and **links** with the same start and end **node**. A “small regional loop” is where a loop path exists between any group of **nodes** (excluding the **nodes** at Benmore and Haywards) with only a single **link** from the loop back to the next **node** that is outside the loop (see Figure 3 below).

3.58.2 A **connection node** is any **node** that is not an **interconnection node**.

Figure 3 – Example of a small regional loop



- 3.58.3 A **connection link** is a **link** with a **connection node** at one or more of its ends.
- 3.58.4 An **interconnection link** is a **link** that connects two **interconnection nodes**.
- 3.58.5 **Links** and **nodes** that comprise a “small regional loop” are **connection links** and **connection nodes**.

Definition of Connection Assets and Interconnection Assets

- 3.59 A **connection asset** is:
- 3.59.1 any **grid asset** at a **connection node** other than **voltage support** equipment that is for **grid voltage support** purposes and has not been installed at a **customer's** request;
- 3.59.2 at an **interconnection node** that is a **connection location**:
- (a) any **grid asset** that is specifically required to connect a **customer**, including a supply transformer, feeder bay or supply transformer high voltage or low voltage breaker. Low voltage breakers, low voltage bus section breakers, voltage transformers, revenue meters and other equipment where they are on the same bus as the feeders are also **connection assets**;
 - (b) any **grid asset** that is used both to connect a **customer** (whether injection or offtake) and for **grid** operation generally; and
 - (c) a proportion of the **land and buildings** at that **connection location**. The proportion of **land and buildings** defined as a **connection asset** is that proportion which the **replacement cost** of the **connection assets** identified in paragraph 3.59.2(a) but excluding **land and buildings**, bears to the **replacement cost** of all **grid assets** (excluding **land and buildings**) at the **connection location**; and
- 3.59.3 any **grid asset** that is a **connection link**. A single line, recorded as such in a Transpower asset register, may form part of more than one **link**, so that a portion of a line may be identified as a **connection asset** with the remaining portion identified as an **interconnection asset**. For example, in Figure 1, if a line AB were recorded in a Transpower asset register, it would form part of a **connection link** BC and an **interconnection link** AC. Where part of a line is, or forms part of, a **connection link**, the value and costs ascribed to the **connection link** for the purposes of calculating connection charges is the same proportion that the ratio of the length of the **connection link** bears to the total length of the line.
- 3.60 An **interconnection asset** is any **grid asset** that is not a **connection asset**, or an **HVDC asset**.
- 3.61 A **connection asset** which connects a **customer's assets** at a **connection location** to the **interconnection assets** is referred to as a **connection asset** "for" or "which connects" (or other grammatical form of that phrase) that **connection location** or **customer's assets** (as the case may be).

Interpretation

Unless the context otherwise requires:

- 3.62 all defined terms are shown in bold text;
- 3.63 terms defined in Part A of the **Rules** have that defined meaning;
- 3.64 terms defined below and elsewhere in the text of this **transmission pricing methodology** take that defined meaning, and any other grammatical form of that term has a corresponding meaning;
- 3.65 where there is any inconsistency between the text description of a calculation for which there is formula and the particular formula, the formula takes precedence;
- 3.66 diagrams are for information only and do not form a binding part of this **transmission pricing methodology**;
- 3.67 a reference:
 - 3.67.1 to the singular includes the plural and conversely; and
 - 3.67.2 to a person includes an individual, company, other body corporate, association, partnership, firm, joint venture, trust or Government agency;
- 3.68 the word "including" is to be read as "including, but not limited to", and the word "includes" is to be read as "includes, without limitation";
- 3.69 where any matter is to be determined by **Transpower** or the **Transpower** Board, it is to be determined in **Transpower's** or the **Transpower** Board's (as the case may be) sole discretion while acting at all times reasonably;
- 3.70 a reference to a preceding **financial year** is a reference to the first complete **financial year** that precedes the start of the **pricing year** in respect of which the relevant calculation is undertaken; and
- 3.71 a reference to a prudent discount agreement includes any agreement entered into pursuant to the prudent discount policy in section 9 and any agreement which has the same or similar purpose as the prudent discount policy (including a **notional embedding contract**) entered into between Transpower and a **customer** whether prior to or after commencement of this **transmission pricing methodology**.

4. Connection Charges

Calculation of the Connection Charges

- 4.1 A connection charge for each **connection asset** for a **connection location** is calculated for each **pricing year** for each **customer** at that **connection location** by multiplying the sum of the asset, maintenance, operating and (for **injection customers**) overhead cost components for a **connection asset** by the relevant **customer allocation**, as follows:

$$\text{connection charge} = (A_{\text{conn}} + M_{\text{conn}} + O_{\text{conn}} + IO_{\text{conn}}) \times CA_{\text{conn}}$$

where:

- A_{conn} is the asset component for the **connection asset** calculated in accordance with paragraphs 4.6 to 4.8;
- M_{conn} is the maintenance component for the **connection asset** calculated in accordance with paragraphs 4.9 to 4.14 and is **$M_{\text{conn}} \text{ subs}$** Or **$M_{\text{conn}} \text{ line type}$** depending on the nature of the **connection asset**;
- O_{conn} is the operating component for the **connection asset** calculated in accordance with paragraphs 4.15 to 4.17;
- IO_{conn} is the injection overhead component for the **connection asset** calculated in accordance with paragraphs 4.18 to 4.21; and
- CA_{conn} is the customer allocation for the **connection asset** for the **connection location** in respect of which the connection charge is being calculated, calculated in accordance with paragraphs 4.22 to 4.23.

- 4.2 The sum of all connection charges calculated for a **customer** for all **connection assets** for a **connection location** in accordance with paragraph 4.1 is the **annual connection charge** for that **customer** at that **connection location** in that **pricing year**. The **customer's monthly connection charge** at that **connection location** for that **pricing year** is (subject to section 7 of this **transmission pricing methodology**) calculated as one twelfth of the **annual connection charge**. The example connection charge report at paragraph 4.24 illustrates how a **customer's annual connection charge** for a **connection location** is calculated.
- 4.3 Where a **customer** is both an **offtake customer** and an **injection customer** at a **connection location**, connection charges for that **connection location** are calculated separately for that **customer** as an **offtake customer** and an **injection customer**.

Calculation of Connection Charge Components

- 4.4 Each of the asset, maintenance, operating and overhead cost components of the connection charge is calculated by reference to a rate set for that component which is then applied to the particular **connection asset**. Different rates may be set for different types of **connection assets**; for example, different rates are used to calculate the **maintenance component** depending on whether the **connection asset** is located at a **substation** or is a line. Different types of lines have different rates. This section describes how the rates are set and applied to determine each component of the connection charge.
- 4.5 The rates for each component of the connection charge are recalculated for each **pricing year**.

Asset Component

- 4.6 The asset component of the connection charge allocates a portion of the cost of funding all **connection assets** plus their depreciation to the **connection asset** for which the connection charge is being calculated.

Asset Return Rate

- 4.7 The asset return rate used to calculate the asset component is referred to as **ARR_{conn}** and is expressed as a proportion. **ARR_{conn}** is calculated by dividing the product of the **weighted average cost of capital** and the regulatory asset value of all **connection assets** plus the annual depreciation of those assets by the **replacement cost** of all **connection assets** as follows:

$$ARR_{conn} = \frac{WACC \times RAV_{conn} + D_{conn}}{\sum_{conn} RC_{conn}}$$

where:

WACC is the **weighted average cost of capital** (expressed as a percentage);

RAV_{conn} is the regulatory asset value of all **connection assets**, as determined by **Transpower** and recorded in a **Transpower** asset register (expressed in dollars);

D_{conn} is total annual depreciation of all **connection assets** in the preceding **financial year** as determined by **Transpower** and recorded in a **Transpower** asset register (expressed in dollars); and

$\sum_{conn} RC_{conn}$ is the total **replacement cost** of all **connection assets**.

Calculation of Asset Component

- 4.8 The **asset component** of a connection charge is calculated by multiplying **ARR_{conn}** by the **replacement cost** of the **connection asset** for which the connection charge is being calculated as follows:

$$A_{conn} = ARR_{conn} \times RC_{conn}$$

where:

RC_{conn} is the **replacement cost** of the **connection asset** for which the connection charge is being calculated (expressed in dollars).

Maintenance component

4.9 The maintenance component of the connection charge allocates a portion of **Transpower's** total maintenance costs for all **connection assets** to the **connection asset** for which the connection charge is being calculated.

4.10 Maintenance recovery rates are set separately for **connection assets** located at **substations** and for the different types of lines. The different line types (all AC) used are:

4.10.1 220kV or higher voltage tower lines;

4.10.2 other tower lines; and

4.10.3 pole lines.

Substation Maintenance Recovery Rate

4.11 The maintenance recovery rate used to calculate the maintenance component of the connection charge for **connection assets** located at **substations** is referred to as $MRR_{conn\ subs}$ and is expressed as a proportion. $MRR_{conn\ subs}$ is calculated as the average of the annual maintenance costs incurred by **Transpower** for all **connection assets** located at all **substations** in each of the four immediately preceding **financial years** divided by the sum of the **replacement costs** of all **connection assets** located at all **substations** as follows:

$$MRR_{conn\ subs} = \frac{MC_{conn\ subs}}{\sum_{subs\ conn} RC_{conn\ subs}}$$

where:

$MC_{conn\ subs}$ is the average of the annual maintenance costs incurred by **Transpower** for all **connection assets** located at all **substations** in each of the four immediately preceding **financial years**, as determined by **Transpower** and recorded in **Transpower's** Maintenance Management System accounts for each of those **financial years** (expressed in dollars); and

$\sum_{subs\ conn} RC_{conn\ subs}$ is the sum of the **replacement costs** of all **connection assets** located at all **substations**.

Calculation of Maintenance Component for a Connection Asset Located at a Substation

4.12 The maintenance component of the connection charge for a **connection asset** located at a **substation** is calculated by multiplying $MRR_{conn\ subs}$ by the **replacement cost** of the **connection asset** for which the connection charge is being calculated as follows:

$$M_{conn\ subs} = MRR_{conn\ subs} \times RC_{conn\ subs}$$

where:

$RC_{\text{conn subs}}$ is the **replacement cost** of the **connection asset** for which the connection charge is being calculated (expressed in dollars).

Line Maintenance Recovery Rate

4.13 The maintenance recovery rate used to calculate the maintenance component of the connection charge for **connection assets** which are lines is referred to as $MRR_{\text{conn line type}}$ and is expressed as a dollar cost per length (expressed in km) of line for each line type. $MRR_{\text{conn line type}}$ is calculated for each of the three types of line referred to in paragraph 4.10 and is the average of annual maintenance costs incurred by **Transpower** for all lines of the type for which $MRR_{\text{conn line type}}$ is being calculated in each of the preceding four **financial years** divided by the total line length of line of that type as follows:

$$MRR_{\text{conn line type}} = \frac{MC_{\text{conn line type}}}{TL_{\text{conn line type}}}$$

where:

$MC_{\text{conn line type}}$ is the average of the annual maintenance costs incurred by **Transpower** for all lines of the type for which the maintenance recovery rate is being calculated in each of the four immediately preceding **financial years**, as determined by **Transpower** and recorded in **Transpower's** Maintenance Management System accounts for each of those **financial years** (expressed in dollars); and

$TL_{\text{conn line type}}$ is the total length of line of the type for which the maintenance recovery rate is being calculated forming part of the **grid assets** (other than **HVDC assets**), as determined by **Transpower** and recorded in a **Transpower** asset register at the end of the immediately preceding **financial year** (expressed in km).

Calculation of the Maintenance Component for Line Connection Assets

4.14 The maintenance component of the connection charge for a **connection asset** which is a line is calculated by multiplying $MRR_{\text{conn line type}}$ by the length of the line which is the **connection asset** for which the connection charge is being calculated as follows:

$$M_{\text{conn line type}} = MRR_{\text{conn line type}} \times L_{\text{conn line}}$$

where:

$L_{\text{conn line}}$ is the length of the line which is the **connection asset** for which the connection charge is being calculated, as determined by **Transpower** and recorded in a **Transpower** asset register (expressed in km).

Operating Component

- 4.15 The operating component of the connection charge allocates a portion of **Transpower's** total operating cost for all **AC assets** to the **connection asset** for which the connection charge is being calculated.

Operating Recovery Rate

- 4.16 The operating recovery rate used to calculate the operating component of the connection charge is referred to as **ORR** and is expressed as a dollar cost per switch. **ORR** is calculated by dividing the cost of operating all **AC switches** incurred by **Transpower** in the preceding **financial year** by the total number of **AC switches** less the product of 0.1 multiplied by the total number of **AC switches** operated by **customers** as follows:

$$\text{ORR} = \frac{\text{OC}}{\text{TS}}$$

where:

OC is the cost associated with operating all **AC switches** incurred by **Transpower** in the immediately preceding **financial year**, as determined by **Transpower** and recorded in its Maintenance Management System accounts for that **financial year** (expressed in dollars); and

TS is the total number of **AC switches**, based on the number of switching devices in a **substation** or switching station, (as determined by **Transpower** and recorded in a **Transpower** asset register as at the end of the immediately preceding **financial year**) less the product of 0.1 multiplied by the total number of **AC switches** operated by **customers**.

Calculation of the Operating Component of the Connection Charge for a Connection Asset

- 4.17 The operating component of the connection charge for a **connection asset** is calculated by multiplying **ORR** by the number of **AC switches** that form part of the **connection asset** for which the connection charge is being calculated less the product of 0.1 multiplied by the number of **AC switches** within the **connection asset** that are operated by **customers** as follows:

$$O_{\text{conn}} = \text{ORR} \times S_{\text{conn}}$$

where:

S_{conn} is the number of switches that form part of the **connection asset** for which the connection charge is being calculated, (as determined by **Transpower** and recorded in a **Transpower** asset register) less the product of 0.1 multiplied by the number of **AC switches** within the **connection asset** that are operated by **customers**.

Injection Overhead Component

- 4.18 **Offtake customers** pay a portion of **AC revenue** overhead costs through the interconnection charge. **Injection customers** are not charged an interconnection charge, so a share of **AC revenue** overhead cost is allocated through their

connection charges. The injection overhead component of the connection charge is calculated only for **connection assets** that connect a **customer's assets** at a **point of injection** to the **interconnection assets** and therefore applies only to **injection customers**.

Injection Overhead Revenue

4.19 The portion of AC overhead cost to be recovered from **injection customers** is referred to as **OHC_{inj}**. **OHC_{inj}** is calculated by reference to the proportion that the sum of the maintenance components for all **connection assets** for all **points of injection** bears to total maintenance costs of **AC assets** as follows:

$$OHC_{inj} = OHC_{AC} \times \frac{MC_{inj}}{MC_{AC}}$$

where:

OHC_{AC} is the overhead cost component of **Transpower's AC revenue** for the relevant **pricing year**, as determined by Transpower when setting the **AC revenue**;

MC_{inj} is the sum of the maintenance cost of the **connection assets** for all **points of injection** in the preceding **financial year**, as determined by **Transpower** and recorded in **Transpower's** Maintenance Management System accounts for that **financial year**; and

MC_{AC} is the sum of the maintenance cost of the **AC assets** in the preceding **financial year**, as determined by **Transpower** and recorded in **Transpower's** Maintenance Management System accounts for that **financial year**.

Injection Overhead Rate

4.20 The injection overhead rate used to calculate the injection overhead component of the connection charge is referred to as **IOR**. **IOR** is calculated by dividing **OHC_{inj}** by the sum of the proportion of the **replacement cost** of each **connection asset** connecting **injection customer** assets at all **points of injection** to the **interconnection assets** as follows:

$$IOR = \frac{OHC_{inj}}{\sum_{conn\ inj} RC_{conn\ inj} \times CA_{conn\ inj}}$$

where:

RC_{conn inj} is the **replacement cost** of a **connection asset** connecting **injection customer assets** at a point of injection to the **interconnection assets**.

CA_{conn inj} is the **customer allocation** of the relevant **connection asset** for the relevant **injection customer** at the relevant **connection location**; and

$\sum_{conn\ inj} RC_{conn\ inj} \times CA_{conn\ inj}$ is the sum of all amounts calculated as **RC_{conn inj} x CA_{conn inj}** for all **injection customers' connection assets** for all **points of injection**.

Injection Overhead Component

- 4.21 The injection overhead component of the connection charge is calculated for a **connection asset** for a **point of injection** by multiplying the **IOR** by the **replacement cost** of that **connection asset** for which the connection charge is being calculated as follows:

$$\mathbf{IO_{conn} = IOR \times RC_{conn\ i}}$$

Customer Allocation

- 4.22 Each **customer** at a **connection location** is allocated a proportion (expressed as a percentage) of each **connection asset** for that **connection location**. This percentage is referred to as the **customer allocation** for that **connection asset** at that **connection location**. The **customer allocation** is calculated in accordance with paragraph 4.23. If a **customer** is both an **offtake customer** and an **injection customer** at a **connection location**, a **customer allocation** for each **connection asset** for that **connection location** will be calculated for that **customer** as both an **offtake customer** and as an **injection customer**.
- 4.23 The **customer allocation** is calculated as follows:
- 4.23.1 for a **connection asset** which connects only one **connection location** to **interconnection assets**, except for a **connection asset** of the kind referred to in paragraph 3.59.2(b), the **customer allocation** is the proportion that the **customer's anytime maximum demand** or **anytime maximum injection** (as the case may be) at that **connection location** bears to the sum of all **customers' anytime maximum demands** and **anytime maximum injections** at that **connection location**;
- 4.23.2 for a **connection asset** which connects more than one **connection location** to **interconnection assets**, except for a **connection asset** of the kind referred to in paragraph 3.59.2(b), the **customer allocation** is the proportion that the **customer's anytime maximum demand** or **anytime maximum injection** (as the case may be) at that **connection location** bears to the sum of all **customers' anytime maximum demands** and **anytime maximum injections** at all **connection locations** for that **connection asset**; and
- 4.23.3 for a **connection asset** of the kind referred in paragraph 3.59.2(b), the **customer allocation** is the proportion that the **customer's anytime maximum demand** or **anytime maximum injection** (as the case may be) at the **connection location** bears to the total capacity of that **connection asset**, as specified in a **Transpower** asset register.
- 4.24 The following table illustrates the calculation of an **offtake customer's annual connection charge** at a particular **connection location**. It lists all **connection assets** for that **connection location** and the proportion of the connection charge for each of those **connection assets** (including the amount of each of the asset, maintenance, and operating components of the connection charge) included in the **annual connection charge** together with the **customer allocation** for the relevant **connection asset**. The column headed "Recovery" is provided for information only and indicates whether the asset, maintenance and operating components (respectively) are recovered under this **transmission pricing methodology** (TPM) or under a **new investment contract** (NIC).

Connection charge report										
2007 - Connection Charge Components										
Customer		Southern Electric								
Substation:		Johnston		Load Type:		OF				
Asset	Asset Id	Physical Location	Recovery		Asset Value	Asset Component	Maintenance Component	Operating Component	Customer Allocation	Connection Charge
			A	M	\$	\$	\$	\$	%	\$
LIN	JTN-PVL		TPM	-	4,513,794	393,151	187,603	0	4.27	24,798
LAND/BLDG	JTN	JTN	TPM	-	1,343,443	117,014	14,106	0	100.00	131,120
TRA	T1	JTN	NIC	-	694,012	0	7,287	0	100.00	7,287
SWIT	1	JTN	TPM	-TPM-	113,644	9,898	1,193	1,104	100.00	12,195
SWIT	2	JTN	TPM	-TPM-	113,664	9,898	1,193	1,104	100.00	12,195
SWIT	3	JTN	NIC	-TPM-	113,664	0	1,193	1,104	100.00	2,297
SWIT	92	PV	TPM	-TPM-	344,087	29,970	3,613	2,208	100.00	35,791
						Annual	Connection			225,683

Example figures only

Exceptions to the Application of the Connection Charge

- 4.25 Where a **connection asset** is provided by **Transpower** under a **new investment contract**, in which the capital costs of that **connection asset** are recovered, calculation of the connection charge for that **connection asset** for the **customer** who is a party to that **new investment contract** (irrespective of when that agreement was entered into) is as follows:
- 4.25.1 for the purposes of calculating the connection charge for that **connection asset** under paragraph 4.1, the asset component A_{conn} is \$0. Recovery of the amount which would otherwise be recovered as the asset component for that **connection asset** is determined by, and recovered under, the **new investment contract**, in accordance with the provisions of the **new investment contract**;
 - 4.25.2 the maintenance component and operating component of the connection charge are calculated as per paragraphs 4.12, 4.14 and 4.17; and
 - 4.25.3 where the **connection asset** connects more than one **connection location** or it connects a **connection location** at which there is more than one **customer**, the **customer allocation** is determined in accordance with the relevant **new investment contract**, rather than in accordance with paragraph 4.23 of this **transmission pricing methodology**.
- 4.26 If **Transpower** has entered into a prudent discount agreement in which it is agreed that notional **connection assets** that form part of the **alternative project** specified in the prudent discount agreement substitute for **connection assets** at a **connection location**, then for the purposes of paragraph 4.1 the **customer's customer allocation** for the **connection assets** so substituted is deemed to be 0.
- 4.27 Where a **customer** is connected at a **connection location** subject to an **input connection contract**, the following will apply:
- 4.27.1 those assets that the **customer** uses to connect at that **connection location** will not be included in the calculation of the total connection charge for that **connection location**; and
 - 4.27.2 the **customer** will be charged in accordance with the terms of the applicable **input connection contract**.

5. Interconnection Charge

- 5.1 The purpose of the interconnection charge is to recover the remainder of Transpower's **AC revenue** that is not recovered via connection charges. **Monthly interconnection charges** are paid by **offtake customers** in respect of each **connection location** at which they have **assets** connected to the **grid**. An **annual interconnection charge** is calculated for each **customer** at a **connection location** in accordance with this section 5. A **customer's monthly interconnection charge** at that **connection location** is one twelfth of the **annual interconnection charge**, subject to section 7 of this **transmission pricing methodology**.

Interconnection Revenue

- 5.2 The portion of **AC revenue** to be recovered by interconnection charges is calculated as the difference between Transpower's **AC revenue** and the amounts recovered by the connection charges for that **pricing year** as follows:

$$R_{IC} = \text{AC revenue} - \sum \text{connection charges}$$

where:

AC revenue is Transpower's **AC revenue** for the relevant **pricing year**; and

\sum connection charges is the sum of all connection charges calculated for the relevant **pricing year**.

Interconnection Rate

- 5.3 The interconnection rate used to determine the **annual interconnection charge** is referred to as **IR** and is the same for all **offtake customers** at all **connection locations** in all **regions**. The **IR** is calculated by dividing the interconnection revenue by the sum of the average of the **RCPDs** for each **customer** at a **connection location** for all **customers** at all **connection locations** for all **regions** as follow:

$$IR = \frac{R_{IC}}{\sum_{\text{regions}} \sum_{\text{cust}} \sum_{\text{loc}} \frac{1}{N_{\text{reg}}} \sum_{i=1}^{N_{\text{reg}}} RCPD_i}$$

where:

R_{IC} is the interconnection revenue calculated in accordance with paragraph 5.2; and

$\sum_{\text{regions}} \sum_{\text{cust}} \sum_{\text{loc}} \frac{1}{N_{\text{reg}}} \sum_{i=1}^{N_{\text{reg}}} RCPD_i$ is the sum of the average **RCPDs** for each **customer** at a **connection location** for all **customers** at all **connection locations** for all **regions**.

Calculating the Interconnection Charge

- 5.4 An **annual interconnection charge** is calculated for each **offtake customer** at a **connection location** by multiplying the interconnection rate by the sum of the **customer's RCPD** at a **connection location** as follows:

$$\text{interconnection charge} = IR \times \frac{1}{N_{\text{reg}}} \sum_{i=1}^{N_{\text{reg}}} RCPD_i$$

where:

IR is **IR**; and

$$\frac{1}{N_{\text{reg}}} \sum_{i=1}^{N_{\text{reg}}} \text{RCPD}_i$$

the average **RCPD** for the **offtake customer** in respect of whom the interconnection charge is being calculated at the relevant **connection locations**.

6. HVDC Charge

- 6.1 The purpose of the HVDC charge is to recover Transpower's **HVDC revenue**. HVDC charges are paid by all **HVDC customers**. An **annual HVDC charge** is calculated for each **HVDC customer** at each **South Island generation connection location**. The **monthly HVDC charge** is one twelfth of the **annual HVDC charge** subject to section 7 of this **transmission pricing methodology**.

HVDC Rate

- 6.2 The HVDC rate used to calculate HVDC charges is referred to as **DCR** and expressed as \$/kW. **DCR** is calculated for each **pricing year** by dividing the **HVDC revenue** by the sum of the **HAMI** for the relevant **pricing year** for all **HVDC customers** at all **points of injection** where **South Island generation** connects (directly or indirectly) to the **grid assets** as follows:

$$DCR = \frac{R_{HVDC}}{\sum_{HVDC} HAMI_{HVDC}}$$

where:

R_{HVDC} is **HVDC revenue** (expressed in dollars); and
 $\sum_{HVDC} HAMI_{HVDC}$ is the sum of **HAMI** (expressed in kW) of all **HVDC customers** at all **points of injection** where **South Island generation** connects (directly or indirectly) to the **grid assets**.

Calculating the HVDC Charge

- 6.3 The **annual HVDC charge** is calculated for each **HVDC customer** at each **South Island generation connection location** by multiplying **DCR** by the **HAMI** for the **HVDC customer** in respect of whom the **annual HVDC charge** is being calculated at each **South Island generation connection location** as follows:

$$HVDC \text{ charge} = DCR \times HAMI$$

where:

DCR is **DCR**; and
HAMI is the **HAMI** for the **HVDC customer** in respect of whom the **annual HVDC charge** is being calculated at that **South Island generation connection location**.

7. Adjustments to AMD, AMI, HAMI and RCPD and calculation of customer charges

7.1 Prior to the start of a **pricing year**, and otherwise during a **pricing year** as provided in this section 7, **Transpower** will calculate:

7.1.1 **AMD AMI, HAMI and RCPD** quantities (for each **regional peak demand period**);

7.1.2 **annual charges**; and

7.1.3 **monthly charges**,

in each case for every **customer** at every **connection location** for that **pricing year**. When a **monthly charge** is recalculated for part of a **pricing year**, all inputs used in the calculation will be the same as those used to calculate that **monthly charge** prior to the start of the **pricing year** except for the adjustments specifically provided in this section 7.

7.2 If, when calculating **AMD, AMI, HAMI and RCPD** quantities prior to the start of a **pricing year**, **Transpower**, in its sole discretion, considers that exceptional operating circumstances during the relevant **capacity measurement period(s)** have resulted in:

7.2.1 abnormal **regional demand** resulting in an exceptional **regional peak demand period** for that **pricing year**; and/or

7.2.2 distortions to a **customer's AMD, AMI, HAMI** and/or any **RCPD** quantity at a **connection location** for that **pricing year**,

Transpower may, but is under no obligation to:

7.2.3 determine that the exceptional **regional peak demand period** is to be ignored when assessing the **regional peak demand periods** for that **pricing year**; and/or

7.2.4 adjust the **customer's AMD, AMI, HAMI** and/or any **RCPD** for the quantity at the relevant **connection location** to minimise the impact of such distortion, as assessed by **Transpower** acting reasonably but otherwise in its sole discretion, as applicable. Such adjusted **AMD, AMI, HAMI and RCPD** quantities, as the case may be, shall be used to calculate **monthly charges** for that **customer** for that **connection location** for that **pricing year**.

7.3 If **Transpower**:

7.3.1 is notified that **South Island generation** at a **connection location** has been permanently de-rated (including decommissioning) to a specified aggregate rate capacity ("maximum de-rated capacity"); and

7.3.2 is satisfied that such **South Island generation** has been so permanently de-rated,

then, for the purposes of calculating a **customer's HAMI** at the relevant **connection location** for any **pricing year** that commences not less than 6 months after the date on which **Transpower** is satisfied under paragraph 7.3.2, any **injection** at that

connection location in any **half-hour** period up to the date on which **Transpower** is satisfied under paragraph 7.3.2 which:

7.3.3 is used to determine the **customer's HAMI**; and

7.3.4 exceeds the maximum de-rated capacity,
will be deemed to be equal to the maximum de-rated capacity.

7.4 If not less than 6 months prior to the start of a **pricing year**, **Transpower**:

7.4.1 is notified that the **offtake** and/or **injection** capacity of a **customer's assets** at a **connection location** has been permanently de-rated (including decommissioning); and

7.4.2 is satisfied that the **offtake** and/or **injection** capacity of such **assets** has been so permanently de-rated,

then, for the purpose of calculating the **customer's AMD, AMI** and/or **RCPD** quantities at that **connection location** for any **pricing year** that commences not less than 6 months after the date on which **Transpower** is satisfied under paragraph 7.4.2,

7.4.3 **Transpower** will estimate (acting reasonably but otherwise in its sole discretion) the **customer's** likely future **offtake** or **injection** (as the case may be) at that **connection location**, having regard to the change in the **customer's offtake** and/or **injection**; and

7.4.4 **injection** or **offtake** quantities for any **half-hour** period up to the date on which **Transpower** is satisfied under paragraph 7.4.2 which:

(a) are used to determine the **customer's AMD, AMI** or **RCPD** quantities; and

(b) exceed **Transpower's** estimate under paragraph 7.4.3,

will be deemed to be no more than the amounts estimated by **Transpower** under paragraph 7.4.3.

7.5 If:

7.5.1 **Transpower** decommissions a **connection location**; or

7.5.2 a **customer** causes all of its **assets** connected to the grid at a **connection location** to be, and **Transpower** is satisfied that the **customer's assets** have been, permanently disconnected from the **grid** at that **connection location**,

then:

7.5.3 the **customer's monthly charges** for the month in which the **connection location** is decommissioned, will be pro-rated for the number of days that the **connection location** was decommissioned or **assets** were disconnected and the **monthly charges** will be reduced accordingly; and

7.5.4 from the month following the month in which such decommissioning or disconnection occurred, the **customer's AMD, AMI, HAMI** and all **RCPD** quantities at that **connection location** and the **customer's monthly charges** at that **connection location** will be deemed to be zero.

- 7.6 If a **customer** connects **assets** to the **grid** at a **connection location** where that **customer** does not already have **assets** connected to the **grid** (including a **new connection location**), the following applies:
- 7.6.1 **Transpower** will agree with the **customer** whether the **customer** is to be an **offtake customer** or an **injection customer** at the relevant **connection location** and the **customer** will, until such time as the **assets** have been connected for a full **capacity measurement period**, be deemed to be an **offtake customer** and/or an **injection customer** accordingly.
 - 7.6.2 If the **asset** is a **generating unit** or **generating station** located in the South Island, the **generating unit** or **generation station** will be deemed to be **South Island generation**.
 - 7.6.3 **Transpower** will assign the **new connection location** to a **region** (unless it is an existing **connection location**).
 - 7.6.4 From the time of connection of the **assets** until such time as the **assets** have been connected to the **grid** for the whole of the **capacity measurement period** for a **pricing year**, or, in the case of assets which are deemed to be **South Island generation** under paragraph 7.6.2, have been connected to the grid for five consecutive **capacity measurement periods**, the **customer's AMD, AMI, HAMI** and **RCPD** quantities at the **connection location** will be determined using **Transpower's** estimates of the customer's likely offtake and/or injection at the **connection location** for that period.
 - 7.6.5 The **customer** will pay **monthly charges** at the **connection location** from the date the **customer's assets** are connected to the **grid**. If the **customer's assets** are connected part way through a month, the **monthly charges** for that month will be reduced by an amount, being a pro-rata proportion of the **monthly charges** for the number of days in the month that the **customer's assets** were not connected.
- 7.7 If:
- 7.7.1 a **customer's** connection of new **assets** at a **connection location** to which paragraph 7.5 applies, (the "first connection location") is a direct consequence of that **customer's** de-rating of **assets** at another **connection location**, (the "second connection location") without the **customer** terminating the second **connection location** as a **point of connection** under any relevant **transmission agreement**; and
 - 7.7.2 the **connection assets** for the second **connection location** are shared with any other **customer**,
- then:
- 7.7.3 **Transpower** will estimate (acting reasonably but otherwise in its sole discretion) the **customer's** likely **offtake** or **injection** at the second connection location from the date on which the new **assets** are connected at the first connection location ("load transfer date") until those assets have been connected to the **grid** for the whole of a **capacity measurement period** for a **pricing year**.
 - 7.7.4 The **customer's monthly connection charges** at the second connection will be recalculated from the load transfer date. When recalculating the **customer's monthly connection charges** from the load transfer date, any **injection** and/or **offtake** prior to the load transfer date used to calculate the **customer's AMD** and/or **AMI** at the second connection location will be capped at **Transpower's** estimates in accordance with paragraph 7.6.1.

- 7.7.5 If the load transfer date occurs part way through a month, the **customer's monthly connection charges** at the second connection location for that month will be the sum of:
- (a) a pro-rata proportion of the **customer's monthly connection charges** at the second connection location immediately prior to the load transfer date, based on the number of days in the month prior to the load transfer date; and
 - (b) a pro-rata proportion of the **customer's** monthly connection charges at the second **connection location** recalculated in accordance with paragraph 7.6.2, based on the number of days in the month including and subsequent to the load transfer date.
- 7.8 If **Transpower** enhances or upgrades **connection assets** for a **connection location** pursuant to a **new investment contract** with a **customer** (a "NIC customer"), excluding NIC customers to whom paragraph 7.5 applies:
- 7.8.1 If the enhancement or upgrade is commissioned part way through a **pricing year**, **monthly connection charges** at that **connection location** for the NIC customer will be recalculated from the date the enhanced or upgraded **connection assets** are commissioned to take into account those enhanced or upgraded **connection assets**.
- 7.8.2 If the **connection asset** enhancement or upgrade is commissioned part way through a month, the NIC **customer's monthly connection charge** for that month will be the recalculated **monthly connection charge** reduced by an amount, being a pro-rata proportion of the recalculated **monthly connection charge** for the number of days in the month prior to commissioning of the enhancement or upgrade.
- 7.9 Where, pursuant to this section 7, **Transpower** estimates a **customer's** likely **offtake** or **injection** over any period, **Transpower** may, but has no obligation to, review its estimate from time to time, but not more frequently than at three-monthly intervals. If **Transpower** revises its estimate, the **customer's**:
- 7.9.1 **AMD, AMI, HAMI** and **RCPD** quantities; and
- 7.9.2 **monthly charges**
- will be recalculated accordingly and such recalculated **monthly charges** will be payable upon **Transpower** giving such notice as required in the relevant **transmission agreement** with the **customer**.
- 7.10 If paragraphs 7.6, 7.7 or 7.8 apply, or **Transpower** revises any estimate and **monthly grid charges** under paragraph 7.9, there will be a wash-up and reconciliation at the end of the relevant **pricing year** of:
- 7.10.1 **monthly connection charges** paid by:
- (a) all **customers** at the **connection location**; and
 - (b) all other **customers** at **connection locations** which share the same **connection assets**; and
- 7.10.2 **monthly HVDC charges** paid by all **HVDC customers**, in each case, in that **pricing year** as follows:
- 7.10.3 In the case of **monthly connection charges**, the wash-up and reconciliation is to be undertaken in respect of all charges calculated in accordance with paragraph 4.1 for each shared **connection asset**:

- (a) using **AMD** or **AMI** for each **customer** as at the last day of the **pricing year** (including any **Transpower** estimate); and
- (b) so that the sum of the percentage proportions allocated to **customers** in accordance with paragraph 4.22 does not exceed 100% for any **connection asset** and so that **Transpower**, in turn, does not recover, in aggregate, more than 100% of the sum of the asset, maintenance, operating and overhead cost components calculated in accordance with section 4 for any **connection asset**.

7.10.4 In the case of **monthly HVDC charges**, the wash-up and reconciliation is to be undertaken:

- (a) using **HAMI** for each **HVDC customer** as at the last day of the **pricing year**; and
- (b) so that the sum of all **monthly HVDC charges** paid by the **HVDC customer** for that **pricing year** does not exceed the **HVDC revenue** for that **pricing year**.

7.10.5 **Transpower** will issue a credit note for any overpayment by a **customer** consequent upon the wash-up.

7.11 If a prudent discount agreement commences part way through a **pricing year**, **Transpower** will recalculate the **customer's monthly charges** at the relevant **connection location(s)** consistently with the prudent discount agreement from the date the prudent discount agreement takes effect until it terminates or otherwise ceases to apply. If the prudent discount agreement commences part way through a month, the customer's **monthly charges** for that month will be the sum of:

- (a) a pro-rata proportion of the **monthly charges** calculated in accordance with this **transmission pricing methodology** being the proportionate number of days in the month prior to commencement of the prudent discount agreement; and
- (b) a pro-rata proportion of the **monthly charges** calculated in accordance with the prudent discount agreement being the proportionate number of days in the month on and from commencement of the prudent discount agreement.

8. Transmission Alternatives

8.1 Charges for **transmission alternative** services will apply when **transmission alternative** services are provided and/or funded by **Transpower**. **Transmission alternative** services are services which substitute for the services provided by **connection assets** or **interconnection assets** or both.

8.2 Where a **transmission alternative** service substitutes for a service which would otherwise be provided by **connection assets**, a charge recovering **Transpower's** costs of funding that **transmission alternative** service is added to the connection charge(s) of the **customer(s)** for the relevant **connection location(s)**. The costs of the **transmission alternative** service are allocated between all **customers** at the relevant **connection locations(s)** in the same proportion that each **customer's** total connection charges for the relevant **connection location(s)** bears to the sum of all **customers'** connection charges for those **connection location(s)**.

- 8.3 Where a **transmission alternative** service substitutes for services which would otherwise be provided by **interconnection assets** a charge recovering the cost of the **transmission alternative service** is allocated between **offtake customers** in the same proportion that each **offtake customer's** interconnection charges bears to the sum of all **offtake customers'** interconnection charges.
- 8.4 If a **transmission alternative** service substitutes for both **connection assets** and **interconnection assets**, the allocation of the costs of the **transmission alternative service** as between **connection assets** and **interconnection assets** is made according to the rules set out in paragraph 4.23 for shared **connection assets** at an **interconnection node**.
- 8.5 The costs of funding **transmission alternative** services will be charged to, and payable by, **customers** in the month following the month in which **Transpower** is invoiced for those costs.

9. Prudent Discount Policy

Purpose of the Prudent Discount Policy

- 9.1 The purpose of the prudent discount policy is to help ensure that the **transmission pricing methodology** does not provide incentives for the uneconomic bypass of existing **grid assets**. The prudent discount policy aims to deter investment in **alternative projects** which would allow a **customer** to reduce its own transmission charges while increasing the total economic costs to the nation as a whole.
- 9.2 In order for a **customer** to obtain a prudent discount a **customer's alternative project** must be:
- 9.2.1 technically, operationally and commercially viable and have a reasonable prospect of being able to be successfully implemented; and
 - 9.2.2 uneconomic to implement given **Transpower's** economic costs of providing existing **grid assets** and the economic costs that would be incurred by the customer if it proceeded with the **alternative project**,
- determined in accordance with this prudent discount policy.

Information Required in a Prudent Discount Application

- 9.3 In order for an **alternative project** to be accepted by **Transpower** as a prudent discount application it must be developed to a level of detail equivalent to the detail that a prudent company Board would reasonably expect when considering an investment proposal.
- 9.4 Where a **customer** wishes to apply for a prudent discount, that **customer** must (at its own expense) submit to **Transpower** a written proposal describing the **alternative project** and the likely impact of that **alternative project** on that **customer's** transmission charges.
- 9.5 The proposal must, to the extent relevant, contain all of the information described in Appendix C, together with any other information which is likely to be relevant to **Transpower's** consideration of the **alternative project**.
- 9.6 Without limiting paragraph 9.5, **Transpower** may require the **customer** to provide any additional information which **Transpower** considers is reasonably necessary to enable it to conduct its assessment of the **alternative project** in accordance with clauses 9.7 to 9.15.

Assessment of Technical, Operational and Commercial Viability of Alternative Project

- 9.7 **Transpower** will, within a reasonable time of receiving the proposal, assess the **alternative project** to determine whether or not:
- 9.7.1 it is technically feasible;
 - 9.7.2 it is operationally feasible and compliant with the Asset Owner Performance Obligations and Technical Codes, and any other relevant requirements as set out in Part C of the **Rules**; and

- 9.7.3 the **alternative project** could reasonably be expected to provide the **customer** with transmission charges that would result in a lower overall commercial cost having regard to the capital, operating, maintenance and all other costs likely to be incurred by the **customer** as a result of undertaking the **alternative project** to the **customer** than the current **Transpower** charges, for the same or a similar level of service.
- 9.8 In undertaking its assessment of the **alternative project**, **Transpower** may adjust any of the information provided by the **customer** to reflect **Transpower's** reasonable assessment of current market prices, good engineering practice and any consequential impacts of the **alternative project** on the **grid assets** and the **customer's** assets.

Assessment that the Alternative Project is Uneconomic

- 9.9 Where **Transpower** considers that the **alternative project** does not satisfy one or more of the criteria specified in paragraph 9.7, no prudent discount will be provided.
- 9.10 Where **Transpower** considers that the **alternative project** satisfies all of the criteria specified in paragraph 9.7, **Transpower** will, within a reasonable time thereafter, assess the **alternative project** to determine whether or not it is uneconomic in accordance with paragraphs 9.11 to 9.15.
- 9.11 **Transpower** will calculate the present value of the estimated total costs of the **alternative project** including capital costs and operating and maintenance costs. **Transpower** may use the cost estimates provided by the **customer** or may reasonably adjust those costs to reflect current market prices, good engineering practice and consequential impacts of the **alternative project** on **grid assets** and the **customer's** assets.
- 9.12 The discount rate used to undertake the calculations required by clauses 9.11 to 9.15 will be the discount rate used in the **grid investment test**. The calculations required by clauses 9.11 to 9.15. will be carried out using a period of 15 years or the remaining life of the **grid assets** which the **alternative project** would bypass, whichever is the lesser.
- 9.13 **Transpower** will then calculate the present values of:
- 9.13.1 **Transpower's** costs of continuing to provide transmission services to the **customer** if the **alternative project** does not proceed, including operating and maintenance costs and planned future capital expenditure needed to maintain required service levels; and
- 9.13.2 **Transpower's** costs of continuing to provide transmission services to the **customer** if the **alternative project** does proceed, including operating and maintenance costs and planned future capital expenditure needed to maintain required service levels.
- 9.14 If the amount calculated pursuant to clause 9.13.1 minus the amount calculated pursuant to clause 9.13.2 is greater than the amount calculated pursuant to clause 9.11, the **alternative project** will be determined to be economic and no discount will be provided.
- 9.15 If the amount calculated pursuant to clause 9.13.1 minus the amount calculated pursuant to clause 9.13.2 is less than the amount calculated pursuant to clause 9.11, the **alternative project** will be determined to be uneconomic.

Independent Review

- 9.16 The **customer** may, within 60 days of being notified of **Transpower's** decision to offer a prudent discount agreement or that no discount will be provided, request a review by an **independent expert** of any or all of the assessments undertaken by **Transpower** for the purposes of that decision.
- 9.17 Within a reasonable time of being appointed, the **independent expert** is to report his or her findings to **Transpower** and the **customer**. The findings of the **independent expert** will be binding on **Transpower** and the **customer**. If the **independent expert** finds that the **customer's alternative project** is uneconomic and satisfies all the requirements of clause 9.7, the provisions of clauses 9.19 will apply.
- 9.18 The costs of the **independent expert** are to be met by the party requesting the review if the information or assessments reviewed are confirmed as reasonable; otherwise the costs will be met by the other party.

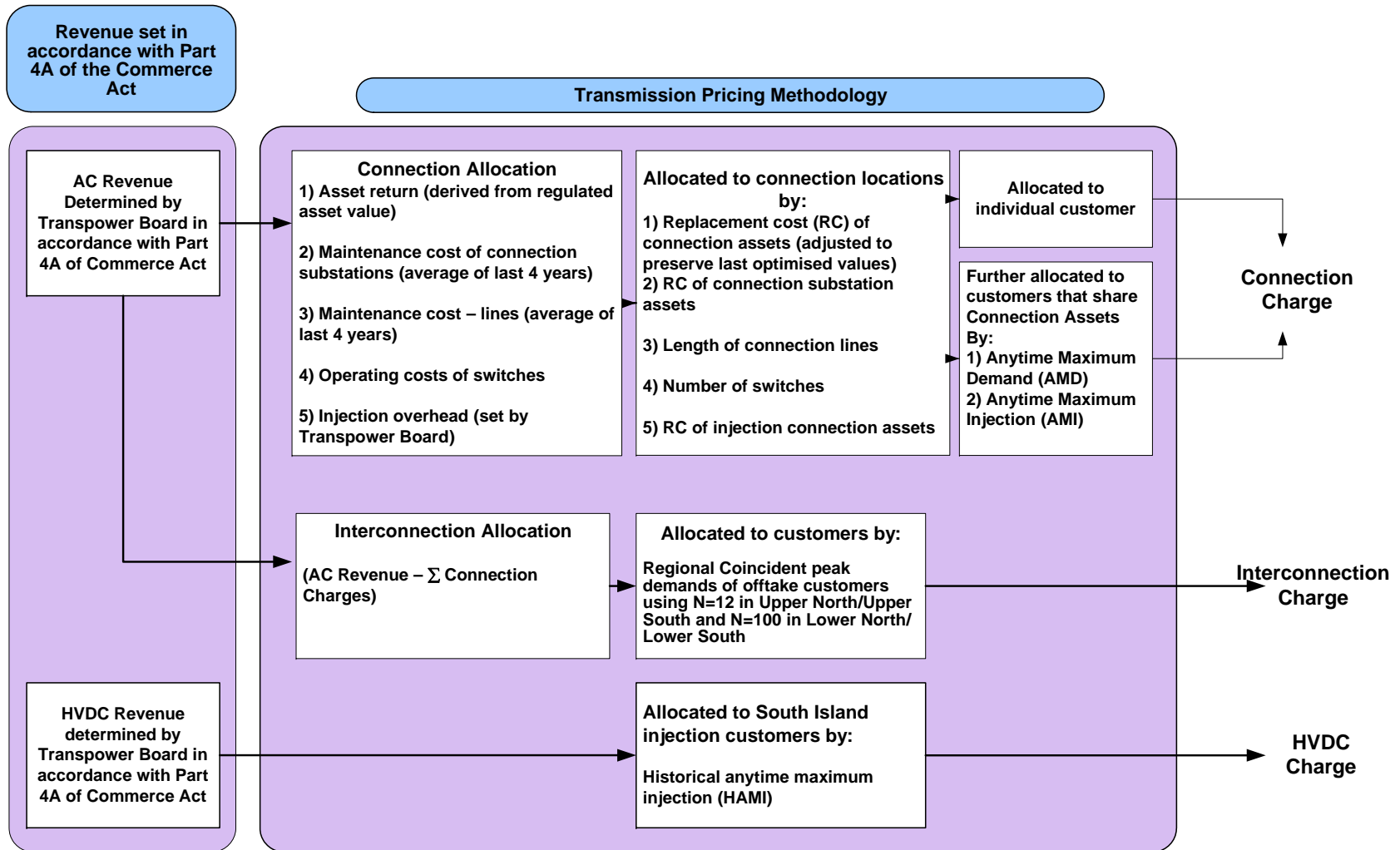
Prudent Discount Agreement

- 9.19 If the **customer's alternative project** is considered by **Transpower** to be uneconomic and to satisfy all the requirements of clause 9.7, **Transpower** will offer a prudent discount agreement to all **customers** that are directly affected by the proposal. The prudent discount agreement will provide for:
- 9.19.1 the **customer** to pay to **Transpower** an annuity (the amount of which is to be specified in the prudent discount agreement) determined by reference to the **customer's** cost of funding, maintaining and operating the **alternative project** over the duration of the prudent discount agreement, applying a commercial discount rate; and
- 9.19.2 **Transpower** to calculate the **customer's** transmission charges in accordance with this **transmission pricing methodology** as if the **alternative project** had been implemented.
- 9.20 The commencement date of a prudent discount agreement will take full account of the time that would reasonably be required for the **customer** to implement the **alternative project**.
- 9.21 The duration of a prudent discount agreement will be the lesser of the remaining economic life of the **grid assets** that are affected by the agreement, or 15 years.

Prudent Discount Details to be Published

- 9.22 As soon as reasonably practicable after concluding a prudent discount agreement with a **customer**, **Transpower** must publish on its website the decision made, the analysis supporting that decision and the following information:
- 9.22.1 the cost estimate used by **Transpower** in assessing the **alternative project** and the calculations undertaken by **Transpower** using those cost estimates;
- 9.22.2 any report prepared by an **independent expert**;
- 9.22.3 the annual amount payable by the **customer** pursuant to clause 9.19.1; and
- 9.22.4 details of how the **customer's** transmission charges will be calculated pursuant to clause 9.19.2.

Appendix A – Allocation of Tranpower’s AC Revenue and HVDC Revenue to its charges



Appendix B

Regions

North Island

The Upper North Island (UNI) is described in the Annual Planning Report (APR) as “the geographical area north of Huntly, including Glenbrook, Takanini, Auckland and the Northern Isthmus”.

The **connection locations** in the UNI region are:

Code	Name
ALB	Albany
BOB	Bombay
BRB	Bream Bay
DAR	Dargaville
GLN	Glenbrook
HEN	Henderson
HEP	Hepburn Rd
HLY	Huntly
KEN	Kensington
KOE	Kaikohe
KTA	Kaitaia
MDN	Marsden
MER	Meremere
MNG	Mangere
MPE	Maungatapere
MTO	Maungaturoto
OTA	Otahuhu
PAK	Pakuranga
PEN	Penrose
ROS	Mt Roskill
SVL	Silverdale
SWN	Southdown
TAK	Takanini
TWH	Te Kowhai
WEL	Wellsford
WES	Western Rd
WIR	Wiri

The remainder of the **connection locations** in the North Island are in the LNI region.

South Island

The USI is defined in terms of all GXPs supplied from the major concentration of generation in the Waitaki Valley and south of the Waitaki Valley. These GXPs are supplied by the 220kV system from Tekapo B, Twizel and Livingstone (refer Fig 5-19 in the APR).

The **connection locations** in the USI region are:

Code	Name
ABY	Albury
ADD	Addington
APS	Arthurs Pass
ARG	Argyle
ASB	Ashburton
ASY	Ashley
BLN	Blenheim
BRY	Bromley
CLH	Castle Hill
COB	Cobb
COL	Coleridge
CUL	Culverden
DOB	Dobson
GYM	Greymouth
HKK	Hokitika
HOR	Hororata
ISL	Islington
KAI	Kaiapoi
KIK	Kikiwa
KKA	Kaikoura
KUM	Kumara
MCH	Murchison
MOT	Motueka
MPI	Motupipi
ORO	Orowaiti
OTI	Otira
PAP	Papanui
RFT	Reefton
SBK	Southbrook
SPN	Springston
STK	Stoke
UTK	Upper Takaka
TIM	Timaru
TKA	Tekapo A
TMK	Temuka
WPR	Waipara
WPT	Westport

The remainder of the **connection locations** in the South Island are in the LSI region.

Appendix C

Information Required to Support a Prudent Discount Application

General information

1. Location of the **alternative project**.
2. A brief description of the **alternative project**.
3. A sketch or schematic of the **alternative project**.

Part A: Information required to enable a technical evaluation of the proposal

- (1) A report on the technical viability of the **alternative project**, provided by either the **customer**, or an external consultant on behalf of the **customer**. The report must include details of voltage quality, especially where there are switched capacitors and/or switched loads, such as motor starting, and information on the size of load, the size of any capacitors, the frequency of switching and the size of voltage steps.
- (2) A circuit diagram.
- (3) For a **customer** that operates a distribution network, a diagram of the **customer's** distribution network that is sufficiently detailed to run load-flow models. The network diagram should contain load distribution data, circuit parameters and the parameters of any embedded generation.
- (4) A description of how the requirement for any additional physical space will be met. (When attaching to existing equipment, or to an existing facility, there may be a need for physical space for new equipment, e.g. a new circuit breaker bay or a connection point to a generator bus.)
- (5) The following information, except where it is not applicable to the **alternative project**:
 - Voltage (kV)
 - Demand (peak MW/low MW)
 - Conductor rating and type
 - Circuit length (km) and type (single or double)
 - Voltage support type and rating (VARs)
 - Estimated losses (MW/km)
 - Transformers: size (VA) and impedance (Ω)

Part B: Cost of the alternative project

The following information is required to enable independent validation of the **customer's** cost estimates. This information must be provided, except where it does not apply to the **alternative project**.

Capital cost (line)

- (1) Conductor type, capital cost per metre, distance in metres and total estimated cost.
- (2) Type of structures (poles or lattice towers), number of structures, capital cost per structure and total estimated cost.
- (3) Type and number of insulators, capital cost per insulator and total estimated cost.
- (4) The capital cost of line fittings.
- (5) Any other capital costs of lines.

Capital cost (substation)

- (1) The type and number of transformers, the capital cost per unit and the total estimated cost.
- (2) The type and number of circuit breakers, the capital cost per unit and the total estimated cost.
- (3) The type and number of disconnectors, the capital cost per unit and the total estimated cost.
- (4) The type of protection and metering, the capital cost per unit and the total estimated cost.
- (5) The type and capital cost of buswork.
- (6) The type and capital cost of other infrastructure.
- (7) Any other miscellaneous substation costs.

Labour cost

- (1) Estimated labour costs.
- (2) Estimated design and project management costs.

Cost of system losses

The estimated cost of the electrical line losses that would result if the alternative were implemented, specifically:

- Estimated additional losses in MW/km.
- Estimated additional losses per annum in MWh.
- The estimated average price of energy in \$/MWh.
- Total estimated value of additional electrical losses per annum in dollars.

The cost of easements and consents

- (1) A topographical map of the line route in sufficient detail to verify estimates of the costs of easements and consents, or to verify that easements and consents are not required.
- (2) An estimate of consent costs.
- (3) An estimate of easements costs.
- (4) Estimate of property right costs.

Part C: Commercial evaluation

An analysis by the **customer** which provides a prima facie demonstration that the proposed **alternative project** would provide the **customer** with **Transpower** charges that would result in a lower overall commercial cost to the **customer** than the current **Transpower** charges, for the same or a similar level of service.

Part D: Legal matters

The implementation of some **alternative project** proposals will require the **customer** to enter into contractual agreements with third parties and to satisfy statutory requirements. Where this is the case, the **customer** must provide reasonable evidence that the **alternative project** would be able to be successfully implemented, including but not limited to:

- (1) a report from appropriately qualified planning, legal and property consultants that demonstrates that all consents required to implement the **alternative project** are either held, or are reasonably likely to be obtained; and
- (2) evidence of access, easement and other property rights required to implement the alternative project.