COST ALLOCATION POLICY FOR VICTORIAN TERMINAL STATIONS—NEGOTIATED TRANSMISSION SERVICES

PREPARED BY: Network Development

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## Version Release History

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1 Purpose

The purpose of this policy document is to explain how AEMO will allocate costs between successive connection applicants to arrive at fair and reasonable pricing arrangements for negotiated transmission services that entail connection to multi connection terminal stations on the Victorian declared shared network (DSN).

Specifically, the objective of this policy is to encourage multiple connections to common terminal stations, in preference to multiple terminal stations servicing individual connections in close proximity to one another.

AEMO has developed this policy in response to receiving a significant number of connection applications within close physical proximity to one another in recent years. These connection applications have been to major 500 kV and 220 kV transmission lines which are critical to the secure operation of the DSN. Establishment of multi connection terminal stations rather than a separate terminal station for each individual connection provides the following advantages:

- Fewer “cut-ins” to the connecting transmission lines, with an associated improvement in security;
- Lower overall connection costs and better utilisation of terminal station assets, which is expected, ultimately, to reduce costs to connection applicants and consumers;
- Shorter lead times for applicants connecting to an existing terminal station as compared to building a new separate terminal station; and
- Increased likelihood of multi connection terminal stations being connected to additional transmission lines in the future, reducing constraints on individual connections.

In developing this policy, AEMO is seeking to address any possible disincentives faced by the first applicant connecting to a multi connection terminal station, including the following:

- First applicant must bear all costs of establishing the terminal station until a subsequent connection application is received. AEMO is proposing to require subsequent applicants to contribute retrospectively to station establishment costs, in addition to contributing to prospective charges;
- A high level of uncertainty may exist regarding the likelihood and timing of subsequent connection applications. AEMO will make applicants seeking to connect in the vicinity aware of the terminal station and encourage them to connect to the existing terminal station where it is technically and economically efficient.

A further general aim of the policy is to provide a framework for sharing of negotiated transmission service costs, and avoid protracted negotiations.

2 Application

In its Guidelines for Establishing Terminal Stations, AEMO outlines its approach in establishing a terminal station for voltages of 220 kV or above. Those Guidelines explain that terminal stations may be configured to allow for multiple connections of generating plant. This policy explains how negotiated transmission service charges will be allocated between multiple parties connecting generating plant to the same terminal station.

This policy covers three different situations where the costs of establishing and augmenting a terminal station will be allocated to the provision of negotiated transmission services. These situations are as follows:

- An Initial Connection.
- An Incremental Connection.
- An Expansion Connection.
This policy applies to connections involving contestable and non-contestable transmission network augmentations.

3 Legal and Regulatory Framework

AEMO has declared network functions under the National Electricity Law, including:

- to plan and direct augmentation of the DSN;
- to provide shared transmission services by means of, or in connection with the DSN; and
- to provide information about the planning processes for augmentation of the DSN and to facilitate decisions for investment and the use of resources in the Victorian electricity industry.

AEMO is the provider of shared transmission services in Victoria and the party applicants are required to approach when seeking connection to the DSN. Connection to the DSN is governed by Chapter 5 of the National Electricity Rules (NER), while Chapter 6A governs the pricing of shared transmission services.

In determining this policy, AEMO has also been guided by the national electricity objective, which seeks to promote the efficient operation and investment in the market for the long-term benefit of consumers, taking account of price, quality, reliability, security and safety.

4 Related Policies and Procedures

This policy should be read with the following:

- Guidelines for Establishing Terminal Stations.
- Guidelines for Shared Transmission Connections.
- Policy on the Active Management of Victorian Connection Applications.
- Connecting Victoria: Transmission Project Development Protocol

5 General Concepts

The costs associated with the establishment of a terminal station and its subsequent use, are calculated by reference to the capital cost of establishing the relevant infrastructure plus the ongoing cost of operating and maintaining it. When a terminal station is augmented, there will be costs associated with the augmentation that are similarly calculated. When an applicant seeks a connection to the transmission network requiring the development of a terminal station, the costs associated with establishing, operating and maintaining the terminal station are charged to the applicant as negotiated transmission services.

With the exception of outage charges, which are borne upfront, these costs are converted to monthly charges for the provision of shared transmission services over a lengthy period of time (typically 30 years) and are charged in accordance with Use of System Agreements that applicants are required to enter into with AEMO. When new applicants seek connection to an existing terminal station (where the cost of the terminal station is being recouped from the initial applicant at whose request it was established) there will be a need to:

- Adjust the monthly charges paid by the initial applicant.
- Allocate a portion of the monthly charges relating to the establishment of the terminal station to the new applicant.

Subsequent applicants will share the monthly charges for establishment of the terminal station and pre-existing assets from when they connect. The operation and maintenance components of the
monthly charge will be apportioned between applicants to reflect the allocation of charges associated with terminal station establishment and pre-existing assets. Subsequent applicants will also contribute to the initial applicant’s negotiated transmission service costs, including outage charges. The methodology for determining contributions to these historical costs shall be developed in consultation with stakeholders (refer Section 9.2).

In this policy, the applicant seeking connection to the DSN through the establishment of a new terminal station will be referred to as “Applicant A”. Any subsequent applicants will be referred to as “Applicant B”, “Applicant C”, and so on, depending on the sequence, in time, of their application to connect.

6 Principles

AEMO has developed this policy to promote the following:

- Equitable allocation of negotiated transmission service costs between applicants connecting to the same terminal station.
- Economic efficiency in transmission network connections.
- Transparency and certainty in charging arrangements for connection applicants.

Application of these principles results in the following outcomes:

- Applicants requiring construction of a new terminal station will pay the full cost of their connection;
- Future applicants connecting to the same terminal station will pay their actual cost of connection to the terminal station and a share of the cost associated with the provision of negotiated transmission services paid by existing applicants. Generally, these costs will be shared based on generation capacity or the number of bays utilised by each applicant’s generating plant.
- Existing applicants will not be subject to an increase in costs associated with connection of new applicants.

This will mean that applicants will be able to share their investment costs with subsequent applicants, thereby reducing their own costs.

7 Policy

7.1 Cost allocation summary

Figure 1 summarises how costs will be allocated between applicants for specified components of a terminal station.

A number of different bases of allocating costs are adopted as follows:

- **Relative Capacity** – the cost will be shared between applicants based on the relative capacity of their respective generating plant.
- **Relative Number Of Bays** – the cost will be shared between applicants based on the relative number of connection bays occupied by each.
- **Respective Bays** – the cost of a connection bay and the associated supporting works will be allocated to the applicant connecting to that bay.

Further detail supporting AEMO’s proposed allocation of costs is provided in the remainder of Section 7.
7.2 **Initial Connection**

New terminal stations will be designed in accordance with AEMO’s Guidelines for Establishing Terminal Stations, with the Initial Connection being in accordance with AEMO’s Guidelines for Shared Transmission Connections.

The design of a new terminal station to accommodate new generation will be proposed by an applicant and specified by AEMO. If the applicant proposes a terminal station design, AEMO will consider whether and to what extent the design of the terminal station should be modified to be consistent with AEMO’s guidelines.

The applicant will be able to select the location of a new terminal station for its connection, subject to AEMO’s agreement on fair and reasonable terms. AEMO may nominate an alternative location, in which case AEMO will provide information to the applicant that will enable it to compare the connection costs, opportunity for cost sharing and ongoing costs of a connection at AEMO’s nominated location against a connection at the applicant’s nominated location.

The cost of the interface and terminal station works for an Initial Connection will be allocated to the applicant (Applicant A) and any other applicant seeking to connect at the same time, as described below.

**Interface Works** will be allocated to Applicant A unless more than one applicant seeks to connect at the same time, in which case the costs will be allocated on the basis of the relative megawatt (MW) capacity of each applicant’s generating plant.

**Transmission Line Diversion** (Terminal Station to Existing Network) costs will be allocated to Applicant A unless more than one applicant seeks to connect at the same time, in which case the costs will be allocated on the basis of the relative MW capacity of each applicant’s generating plant.

**Line Cut-in Bays** will be allocated to Applicant A unless more than one applicant seeks to connect at the same time, in which case the costs will be allocated on the basis of the relative number of bays occupied by each applicant’s generating plant.

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial Connection</th>
<th>Incremental</th>
<th>Expansion Connection (second line)</th>
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<tr>
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<td>Transmission Line</td>
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<td>Relative Capacity</td>
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<td>Outage Costs</td>
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<td>applicant</td>
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*Figure 1: Cost allocation summary*
Connection Bays and Connection Bay Supporting Works will be allocated wholly to the applicant connecting to that bay as these costs are directly linked to the connection of each generating plant. Where two applicants connect to a single bay then the costs of that connection bay will be divided equally between the two applicants irrespective of the capacity of the applicants’ generating plant.

Common facilities will be allocated to Applicant A unless more than one applicant seeks to connect at the same time, in which case the costs will be allocated between applicants on the basis of the relative number of bays occupied by each because the majority of these expenses, including the cost of control equipment, are driven by the number of bays at the terminal station.

Outage Costs incurred during the initial construction of the terminal station will be borne upfront by Applicant A. If more than one applicant seeks to connect at the same time, the costs will be allocated on the basis of the relative MW capacity of each applicant’s generating plant.

7.3 Incremental Connection

An Incremental Connection occurs where one or more applicants intend to connect generating plant at an existing terminal station without triggering the need for a major expansion. In other words, the initial connection arrangement for the terminal station is expandable and can accommodate additional connections.

To the extent these assets are providing a negotiated transmission service, the establishment costs for connection to the terminal station will be allocated from the date of the new connection as follows:

Interface works – The cost of connecting new generation to the terminal station will be allocated on the basis of the relative MW capacity of each (existing and new) generating plant.

Transmission Line Diversion (Terminal Station to Existing Network) – The costs of the transmission line assets will be allocated on the basis of the relative MW capacity of each (existing and new) generating plant.

Line Cut-in Bays – The costs of these works will be allocated on the basis of the relative number of bays occupied by each (existing and new) generating plant.

Connection bays and connection bay supporting works – The cost of connection bays and supporting works will be allocated to the applicants connecting to the respective bays irrespective of the capacity of the applicants’ generating plant as these costs are directly linked to the connection of each generating plant.

Common facilities – The costs of these facilities will be allocated on the basis of the relative number of bays occupied by each (existing and new) generating plant.

Outage Costs – The costs required for subsequent connections will be borne upfront by each subsequent applicant based on the relative MW capacity of their generating plant. If more than one subsequent applicant seeks to connect at a time, then outage costs shall be divided between those subsequent applicants based on the relative MW capacity of their generating plant.

Operation and maintenance charges will be apportioned between applicants to reflect the allocation of costs associated with terminal station establishment and pre-existing assets.

Subsequent applicants will also contribute to the costs (including outage costs) incurred during the initial construction of the terminal station. The methodology for determining contributions to these historical costs shall be developed in consultation with stakeholders (refer Section 9.2).

7.4 Expansion Connections

An Expansion Connection occurs where subsequent generation connections can only be accommodated if there is a major expansion of the terminal station involving a substantial investment. Examples of a major expansion include:
Conversion from a tee connection to double-switching or breaker-and-a-half switching of connecting transmission lines.

Connection of the terminal station to the network via an additional transmission line.

A key feature of most Expansion Connections is that the expansion benefits all connected parties, including those who were connected before the expansion, including greater reliability through additional redundancy in the case of network outages or other contingencies.

In order to ensure that existing connected parties are not subject to any increase in costs, the expansion applicant (Applicant B) shall bear all expansion costs. Consequently, an expansion applicant is not expected to contribute as significantly (compared with previous incremental connections) to historical costs associated with the initial development of the terminal station.

Subsequent applicants will pay their actual cost of connection to the terminal station and a share of the cost of the expansion works (negotiated transmission services) paid by the expansion applicant. Subsequent applicants are not expected to contribute as significantly (compared with pre-expansion incremental connections) to historical costs associated with initial establishment of the terminal station.

The methodology for determining contributions from expansion applicants and subsequent applicants to costs incurred during the initial construction of the terminal station shall be developed in consultation with stakeholders (refer Section 9.2).

Allocation of negotiated transmission service costs between connecting parties is described in the following sections under two typical expansion scenarios.

7.4.1 Conversion from a tee connection to a double- or breaker-and-a-half switching arrangement

There is a limit to the total generation that can be connected at a terminal station via tee connections. Where this limit would otherwise be exceeded, AEMO will require new generating plant to connect via a double-breaker switching arrangement, breaker-and-a-half switching arrangement, or a second line. The type of arrangement required will vary according to the location of the connection on the network and is subject to change as the transmission system is augmented. The maximum limit, at the most favourable locations on the Victorian system, is presently around 600 MW.

To the extent that assets are providing a negotiated transmission service, where an expansion connection involves conversion from a tee connection (currently servicing Applicant A) and does not include the need to connect to an additional line to connect Applicant B, costs will be allocated upon conversion as follows:

1. **Interface Works** – The cost of interface works associated with the conversion will be allocated to Applicant B unless additional applicants seek to connect at the same time, in which case the cost will be allocated between Applicant B and those other applicants on the basis of the relative MW capacity of each of their generating plant. If Applicant C seeks to connect after the conversion has occurred, the cost of these works will be recovered from Applicant B and Applicant C also on the basis of the relative MW capacity of each of their generating plant from the time they connect.

2. **Line Cut-in Bays** – The cost of the works associated with the conversion will be allocated to Applicant B unless additional applicants seek to connect at the same time, in which case the cost will be allocated between them on the basis of the relative number of bays occupied by each of their generating plant. If Applicant C seeks to connect after the conversion has occurred, the cost of these works will be recovered from Applicant B and Applicant C also on the basis of the relative number of bays occupied by each of their generating plant.

3. **Connection Bays and Supporting Works** – The cost of connection bays and supporting works will be allocated to the applicants connecting to the respective bays irrespective of
the capacity of the applicants’ generating plant as these costs are directly linked to the connection of each generating plant.

4. **Outage Costs** – The costs incurred for each connecting generating plant are to be borne upfront by the relevant applicant. Where a single outage or series of outages is required for the simultaneous connection of two or more new generating plant, these costs will be allocated between the relevant applicants on the basis of the relative MW capacity of each of their generating plant.

7.4.2 **Connection to an additional line**

Where the expansion connection involves the need to connect the terminal station to an additional transmission line and does not include conversion from a tee connection, costs will be allocated upon connection as follows:

1. **Interface Works** – The cost of interface works associated with the additional line connection will be allocated to Applicant B unless additional applicants seek to connect at the same time, in which case the costs will be allocated between them on the basis of the relative MW capacity of each of their generating plant. If Applicant C seeks to connect after the additional line has been connected, the costs of these works will be recovered from the Applicant B and Applicant C also on the basis of the relative MW capacity of each of their generating plant from the time they connect.

2. **Transmission Line Diversion (Terminal Station to Existing Network)** – The costs of the works associated with the additional line connection will be allocated to Applicant B unless additional applicants seek to connect at the same time, in which case the costs will be allocated between them on the basis of the relative MW capacity of each of their generating plant. If Applicant C seeks to connect after the additional line has been connected, the costs of these works will be recovered from Applicant B and Applicant C also on the basis of the relative MW capacity of each of their generating plant from the time they connect.

3. **Line Cut-in Bays** – The costs of the works associated with the additional line connection will be allocated to Applicant B unless additional applicants seek to connect at the same time, in which case the costs will be allocated between them on the basis of the relative number of bays occupied by each of their generating plant. If Applicant C seeks to connect after the additional line has been connected, the costs of these works will be recovered from Applicant B and Applicant C also on the basis of the relative number of bays occupied by each of their generating plant.

4. **Connection Bays and Supporting Works** – The cost of connection bays and supporting works will be allocated to the applicants connecting to the respective bays irrespective of the capacity of the applicants’ generating plant as these costs are directly linked to the connection of each generating plant.

5. **Outage Costs** – The cost of outages required for each connecting generating plant are to be borne upfront by the relevant applicant. Where a single outage or series of outages is required for the simultaneous connection of two or more applicants, the costs will be allocated between them on the basis of the relative MW capacity of each of their generating plant.

7.5 **Application of Policy - Examples**

Appendix A includes examples of the application of this policy based on the standard breaker-and-a-half configuration outlined in AEMO’s Guidelines for Shared Transmission Connections. A non-standard tee arrangement is also included to reflect possible future development of some existing terminal stations that were established prior to the implementation of this policy.
8 Connection to Existing Prescribed Service Terminal Stations

Where sufficient provision for expansion exists, an applicant may connect to an existing terminal station that is allocated to prescribed transmission services, for example, a terminal station established to supply load. Such connections will generally be made on a stand-alone basis and funded entirely by the applicant as negotiated transmission services.

9 Further Development

This policy is subject to further development in the following areas.

9.1 Load Connections

This policy does not cover cost allocation for load connections. AEMO is currently considering how costs will be allocated between applicants connecting generation and load at the same terminal station. Any approach for load connections will be developed in consultation with Victorian Distribution Network Service Providers and take into account any applicable NER requirements.

9.2 Historical Costs

Subsequent applicants will make an additional contribution to historical costs where required to preserve connection timing indifference among existing and potential applicants. The amount will be based on a number of factors, including whether any historical costs have been borne upfront (e.g. outage costs) and the gradient of any monthly charges. The basis and arrangements for contribution to historical costs will be the subject of further consultation with stakeholders.

9.3 Shared Network Transformers

A terminal station may include one or more large shared network transformers connecting two switchyards at voltages of 220 kV and above (e.g. 500/220 kV). Where providing a negotiated transmission service, the cost of a shared network transformer is to be allocated between applicants on the basis of the relative MW capacity of each applicant’s generating plant. Cost allocation examples including shared network transformers are to be included in a future revision of this policy.

9.4 Transmission Frameworks Review

Elements of this policy may be affected by the outcomes of the AEMC’s Transmission Frameworks Review (TFR). AEMO will monitor the outcomes of the TFR and modify any policies or procedures if required for consistency with any Rule changes arising from the TFR.
APPENDIX A: Example applications of cost allocation policy

For the purpose of cost allocation based on the number of bays occupied:

- A single-switched generation or transmission line connection is considered to occupy one half bay.
- A double-switched generation or transmission line connection is considered to occupy a full bay.
- Two connections within one bay (generating plant or transmission line or both), with or without a centre circuit breaker are considered to occupy one half bay each.

Transmission line diversion works are included in the examples on the basis that the new terminal station is a significant distance from the existing line easement.

**Example 1 – Initial stage for a breaker-and-a-half arrangement**

Figure 1 represents an existing breaker-and-a-half arrangement with one generation connection.

*Figure 1: Illustration of example 1*

In this arrangement, one bay is occupied by the line cut-in (which is shared transmission network infrastructure) and a second bay is occupied by a single generation connection. Additional bays may be constructed to accommodate future generation connections or line cut-ins.

If all costs reflect the provision of negotiated transmission services, the applicant (Applicant A) must pay all costs associated with this terminal station.
Example 1a – Connection of additional generating plant to an existing breaker-and-a-half arrangement

Figure 2 represents an existing breaker-and-a-half arrangement with one existing and one future generation connection.

**Figure 2: Illustration of example 1a**

In this example, Applicant B connects its generating plant to one bus in a new bay, where the connection does not require connection to a second transmission line.

Applicant B would pay for the following:

- Establishment of one additional half bay to enable the connection of its generating plant.
- Installation of one circuit breaker in the existing bay connecting the existing generating plant.
- A portion of the costs of the transmission line diversion and interface works based on the relative MW capacity of its generating plant.
- One third of the transmission line cut-in bay.
- One third of the payment stream for the land costs of the terminal station and remaining station assets (common facilities) excluding switchyard bays and connection assets.

Applicant A’s payments for existing station assets and land would be reduced by an amount equal to the contributions from Applicant B as listed above.
Example 1b – Expansion of breaker-and-a-half arrangement to a double-line connection

In this example, a third generating plant is connecting to the terminal station, requiring the terminal station to be switched to a second connecting line. The expanded arrangement is shown in Figure 3.

Applicant C would pay for the following:

- Second transmission line diversion costs.
- Interface works to connect the second transmission line.
- Bay housing the connection for the second transmission line.
- Establishment of one additional half bay to enable the connection of its generating plant.
- Extension of one bus across an existing bay to enable connection to the additional bay, including the installation of an additional circuit breaker in the bay connecting Applicant A.

The methodology for determining contributions from Applicant C and subsequent applicants to negotiated service costs incurred prior to the connection of the third generating plant shall be developed in consultation with stakeholders (refer Section 9.2).
Example 2 – Development of a tee connected station

Figure 4 represents a tee connection with two generation connections. This non-standard tee arrangement is representative of some existing terminal stations. Applicant A’s generating plant, Gen A, occupies two bays, while Applicant B’s generating plant, Gen B, is to occupy one bay.

Assuming that this terminal station:

- Is designed to accommodate up to nine bays. Two bays are initially occupied by line cut-ins (shared transmission network infrastructure) and the remaining seven bays can be used to accommodate generation connections or future line cut-ins.
- Was wholly funded by Applicant A.

On connection of Gen B, Applicant B would pay for:

- Establishment of one additional half bay (Bay 5) to enable the connection of Gen B.
- 21% of the costs of the transmission line diversion and interface works [50 MW / (50 MW + 192 MW)].
- One third of the transmission line cut-in bay.
- One third of the payment stream for the land cost of the terminal station and cost of the Common Facilities, excluding switchyard bays and connection assets.

Applicant A’s payments for existing station assets would be reduced by an amount equal to the contributions from Applicant B as listed above.
Example 2a – Expansion stage for a tee connection to double switching arrangement

Figure 5 represents a typical double switched arrangement with two existing generation connections (192 MW and 50 MW) plus one future additional generating plant connected to the terminal station.

In this example, connection of Gen C by Applicant C requires establishment of a second bus and four shared network transmission line circuit breakers.

Applicant C would pay for the following:

- Modification to line interface works to accommodate a double switching arrangement.
- Establishment of the second (No 2) 220 kV bus running through Bays 1, 2, 3 and 4.
- Modification to two bays (Bay 1 and Bay 4) housing the two transmission line connections, including installation of four new CBs and all associated connecting plant.
- Establishment of one additional half bay (Bay 6) to enable the connection of Gen C.

The methodology for determining contributions from Applicant C and subsequent applicants to negotiated service costs incurred prior to the connection of Gen C shall be developed in consultation with stakeholders (refer Section 9.2).
Example 2b – Incremental stage for connection of additional generating plant

Figure 6 represents a typical double switched arrangement with three existing generation connections (Gen A, Gen B and Gen C) plus one future additional generating plant connected to the terminal station.

Figure 6: Illustration of example 2b

In this example, Applicant D connects Gen D to the No 2 bus in a new Bay 7 adjacent to Bay 6, where the connection requires only the construction of that new bay.

Applicant D would pay for the following:

- Establishment of one additional half bay (Bay 7) to enable the connection of Gen D.
- A portion of the costs of the transmission line diversion and interface works associated with the previous expansion to accommodate Gen C based on the MW capacity of Gen D relative to the MW capacity of Gen C.
- Half the payment stream for the remaining costs paid by Applicant C:
  - Establishment of the second (No 2) 220 kV bus running through Bays 1, 2, 3 and 4.
  - Two bays (Bay 1 and Bay 4) housing the two transmission line connections, including four new CBs and all associated connecting plant.

Applicant C’s payments for existing station assets would be reduced by an amount equal to the contributions from Applicant D as listed above.

The methodology for determining contributions from Applicant D and subsequent applicants to negotiated service costs incurred prior to the connection of Gen D shall be developed in consultation with stakeholders (refer Section 9.2).
Example 2c – Expansion stage for connecting a double switching arrangement to a second line

Figure 7 represents a typical double switched arrangement with three existing generation connections (Gen A, Gen B and Gen C) plus one future additional generating plant connecting to the terminal station.

Figure 7: Illustration of example 2c

In this example, connection of Gen D by Applicant D requires connection of the station to a second line. This will involve extensions to both busbars and insertion of up to four shared transmission network line breakers.

Applicant D would pay for the following:

- Second transmission line diversion costs.
- Interface works to connect the second transmission line.
- Establishment of one single switched (half) bay to enable the connection of Gen D.
- Two bays, each with a connection to the second transmission line in a double CB switched arrangement.

The methodology for determining contributions from Applicant D and subsequent applicants to negotiated service costs incurred prior to the connection of Gen D shall be developed in consultation with stakeholders in (refer Section 9.2).