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Pricing Methodology

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1 Introduction

This document sets out TransGrid's proposed transmission pricing methodology. It will be submitted to the Australian Energy Regulator (AER) by 31 May 2014 for approval and will apply from 1 July 2015.

TransGrid is the "Co-ordinating Network Service Provider" for the New South Wales market region. This means that TransGrid applies its pricing methodology to determine the transmission prices that are to be charged in the New South Wales market region to recover the regulated transmission revenues of Ausgrid, Directlink, ActewAGL, and TransGrid.

TransGrid's pricing methodology has been developed in consultation with customers and other stakeholders. An explanation of the rationale for the pricing methodology is set out in the accompanying paper, *Transmission Pricing Methodology – Better Outcomes for Customers*. The pricing methodology complies with the relevant provisions of the National Electricity Rules (the Rules) and the AER's pricing methodology guidelines.

While the pricing methodology is complex, this document is drafted in 'plain English' to assist stakeholders in understanding the methodology.

2 Duration

A pricing methodology typically applies for the duration of a 5 year regulatory period. A recent Rule change[1] will require this proposed pricing methodology to be updated by 27 February 2015 in order to introduce inter-regional transmission pricing. The updated pricing methodology will reflect guidelines on inter-regional transmission pricing that are currently being developed by the AER.

TransGrid considers that the pricing methodology should be more flexible than it has been in the past, by allowing changes to be made during a regulatory period if the pricing provisions in the Rules are amended. As explained in *Transmission Pricing Methodology – Better Outcomes for Customers*, TransGrid will work with customers and other stakeholders to consider whether a Rule change proposal for submission to the AEMC should be developed.

[1] Australian Energy Market Commission, *National Electricity Amendment (Inter-regional transmission charging) Rule 2013*, 28 February 2013.

3 Which services are subject to this pricing methodology?

TransGrid's pricing methodology applies to transmission services that are subject to revenue cap regulation. The four service categories are:

- Shared transmission services or "TUOS services", which are provided to large customers and distribution companies;
- Connection services or "exit services", which are also provided to large customers and distributors;
- Connection services or "entry services", which are provided to generators; and
- Common services, which are services that provide the same benefit to all transmission customers irrespective of their location.

Full definitions of the transmission service categories are set out in the Rules.

In addition to these regulated or "prescribed" transmission services, TransGrid also provides negotiated transmission services. Some connection services are negotiated services, for example as provided for in clause 11.6.11 of the Rules.

Negotiated transmission services are not priced in accordance with this pricing methodology. For further information on negotiated transmission services, please refer to our negotiating framework.

4 Overview of the pricing methodology

The pricing methodology is concerned with:

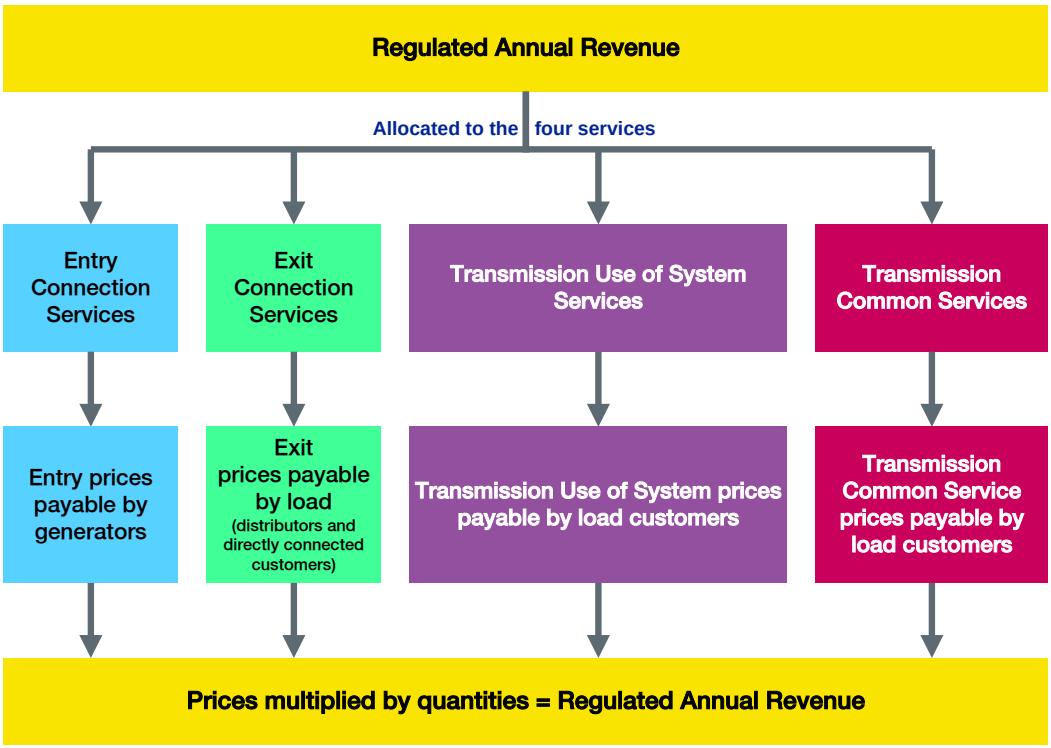
(1) recovering the regulated transmission revenue from customers and generators;

(2) allocating the appropriate amount of revenue to be recovered to each of the four transmission service categories;

(3) determining the amount of revenue to each of the TNSP's connection points; and

(4) setting prices at each of those connection points to recover the required revenue. Depending on the category of service, prices may be set on the basis of MWh, MVA or MW, or levied as a fixed charge per day.

This is illustrated in the diagram below.



A more detailed presentation of the pricing methodology is provided in Appendix A.

5 Aggregate Annual Revenue Requirement

The Rules define the revenue to be recovered from transmission prices as the "Aggregate Annual Revenue Requirement" or AARR. This is different to the maximum allowed revenue (MAR) set by the AER because it may include a number of adjustments, such as:

- reopening or revocation of the revenue determination;
- network support pass through;
- cost pass through;
- payments or penalties under the service target performance incentive scheme; and
- contingent projects.

In addition to these adjustments, the Rules require the operating costs expected to be incurred in the provision of common services to be allocated directly to common services, and recovered through common service prices. The operating expenditure that we attribute to common services is derived from budget projections and includes:

- network switching and operations;
- administration and management of the business;
- network planning and development; and
- general overheads.

6 Revenue recovery from transmission service categories

6.1 Overview

The first step in calculating transmission prices is to determine how much revenue should be recovered from each of the four transmission service categories.

We begin this task by allocating transmission assets to each service category. The revenue requirement (net of the operating costs allocated directly to common services) is then allocated to each service category to reflect the percentage of the total asset costs that is attributed to that service.

Clause 2.4 of the AER's pricing methodology guidelines explains how assets should be attributed to the different service categories. For example, the AER's guidelines state that the types of transmission system assets that are directly attributable to entry services are limited to:

A. substation buildings, substation land and associated infrastructure (such as fences, earthing equipment etc);

B. switchgear and plant associated with generators' generating systems connection and generator transformers;

C. secondary systems associated with primary systems providing prescribed entry services;

D. transmission lines owned by TNSPs connecting generators' generating systems to the TNSP's transmission network; and

E. meters associated with prescribed entry services and owned by the TNSP.

The AER provides similar guidance in relation to exit services, TUOS services and common services. TransGrid's pricing methodology adopts an allocation approach which is consistent with the AER's guidelines.

In cases where assets could be attributable to more than one category of transmission service, the Rules provide a mechanism for determining the appropriate allocation. Further information on this priority ordering process is provided in Appendix C.

6.2 Worked example

The following table provides an illustrative example of how the revenue requirements are allocated to particular service categories. The asset values are expressed in terms of optimised replacement cost (ORC), derived from the regulatory accounts.

Table 1
Asset allocations to service categories

Category	Asset Value ($)	Cost Share
Exit service	6,972,222	16.2%
Entry service	1,761,111	4.1%
TUOS service	33,566,667	78.0%
Common service	750,000	1.7%
Total	**43,050,000**	**100.0%**

Table 2 below shows the derivation of the revenue to be allocated amongst the four different services. It assumes that the maximum allowed revenue is $2,604,434.

Table 2
Derivation of AARR to be allocated to the four services

Derivation	Amount ($)
Maximum allowed revenue	2,604,434
Total adjustments for: • network support pass through; • cost pass through; • payments or penalties under the service target performance incentive scheme; and • contingent projects.	-45,000
Deduct common service operating expenditure (which is allocated directly to common service)	-55,000
AARR to be allocated	**2,504,434**

The cost share percentages shown in Table 1 are used to allocate the revenue to be recovered from each service category. In accordance with the adjustments set out in Table 2, Table 3 shows that the revenue to be allocated (the AARR) is $2,504,434.

Table 3
Revenue allocations to service categories

Category	Cost Share	Revenue (AARR) to be recovered from each service ($)
Exit service	16.2%	405,609
Entry service	4.1%	102,453
TUOS service	78.0%	1,952,741
Common service	1.7%	43,631
Total	100.0%	2,504,434

7 Revenue to be recovered from each connection point

7.1 Overview

The second step is to determine the revenue to be recovered from each connection point.

For connection points that only provide entry services, the allocation is relatively straightforward. The revenue to be recovered from entry services is allocated to each connection point in proportion to the value of the entry assets employed at that connection point. As in the previous example, the allocation process is based on the ORC.

For connection points that provide exit services, the calculation is more complex because an allocation needs to be provided that reflects exit services, TUOS services and common services. The approach to allocation of revenue to these three services is as follows:

- For exit services, the approach is the same as the approach adopted for entry services. In particular, the revenue to be recovered from exit services is allocated to each connection point in proportion to the value (expressed in ORC terms) of the exit assets employed at that connection point.
- Common services are also straightforward. The common service revenue must be recovered from all connection points on a postage stamp basis, which means that the prices do not vary by location. Following consultation with our customers, TransGrid has concluded that the common services should be recovered from connection points on the basis of the maximum demand at each connection point. We examine the issue of pricing structures in section 8.
- TUOS services are more complex. Following stakeholder consultation, TransGrid has decided to maintain the existing allocation approach:
  - 50% of the revenue to be recovered from TUOS services is to be postage stamped – so that each connection point is allocated a share that does not vary by location. As noted above in relation to common services, TransGrid will allocate these costs according to the maximum demand at each connection point.
  - 50% is allocated to connection points according to the Cost Reflective Pricing Methodology (CRNP).

We discuss TUOS in further detail in section 7.3. However, we first provide some numerical examples for the allocation of entry, exit and common service costs to each connection point.

7.2 Worked examples for entry, exit and common services

The following examples show how the allocation of revenue is applied to entry and exit services.

For entry services, this illustrative example assumes that there are two generators, Gen 1 and Gen 2. The asset values at each connection point and the corresponding percentage of the total is shown in the table below.

Table 4
Asset values employed at each entry point

Entry Connection Point	Asset Value ($)	Percentage of Total
Gen 1	1,033,333	58.7%
Gen 2	727,778	41.3%
Total	**1,761,111**	**100.0%**

As shown in Table 3 in section 6.2, the total revenue to be recovered from entry services is $102,453. Table 5 below shows that the revenue amount to be recovered from each generator is proportional to the asset values employed at each connection point.

Table 5
Entry service revenue to be recovered at each entry point

Entry Connection Point	Cost Share	Revenue Allocation ($)
Gen 1	58.7%	60,114
Gen 2	41.3%	42,338
Total	**100.0%**	**102,453**

Table 6 below shows a similar allocation process in relation to exit services. From Table 3, the revenue to be recovered in relation to exit services is $405,609. The revenue allocation to each connection point reflects the proportionate value of the exit assets employed at each connection point.

Table 6
Revenue allocation to each exit point

Exit Connection Point	Asset Value ($)	Percentage of Total	Revenue Allocation ($)
Load 1	2,083,333	29.9%	121,198
Load 2	1,405,556	20.2%	81,768
Load 3	2,633,333	37.8%	153,194
Load 4	850,000	12.2%	49,449
Total	6,972,222	100.0%	405,609

Table 3 in section 6.2 shows that $43,631 of the AARR is to be allocated to common services. Table 2 shows that a further $55,000 (being the operating expenditure attributable to common services) is to be allocated directly to common services, so the total revenue to be recovered is $98,631. As shown in Table 7 below, this is attributed to each connection point according to the maximum demand at that connection point.

Table 7
Common service revenue allocation to each exit point

Exit Connection Point	Maximum Demand (MW)	Percentage of Total Maximum Demand	Revenue Allocation ($)
Load 1	160	16.7%	16,439
Load 2	300	31.3%	30,822
Load 3	100	10.4%	10,274
Load 4	400	41.7%	41,096
Total	960	100.0%	98,631

7.3 Transmission Use of System (TUOS) services

7.3.1 Adjustments to the TUOS revenue to be recovered

The revenue attributed to TUOS services is divided equally between:

- A locational component, which is allocated to connection points using CRNP; and
- A non-locational component, which is recovered on a postage stamp basis.

The following adjustments are made to the revenue to be recovered from the locational and non-locational components of TUOS:

- The TUOS revenue to be recovered on a locational basis is adjusted by:
  - subtracting estimated inter-regional settlements residue proceeds. The estimated proceeds are converted to an equivalent asset replacement cost, which is offset against the asset replacement cost of the relevant interconnector network assets. The reduced network costs are used as an input to the CRNP methodology;
  - including an estimate of network support costs. These costs are converted to an equivalent asset replacement cost, which is added to the asset replacement cost of the transmission assets these services support.
- The TUOS revenue to be recovered on a non-locational component is adjusted:
  - by subtracting settlements residue due to intra-regional loss factors;
  - for any over-recovery amount or under-recovery amount from previous years;
  - for any shortfall or over-recovery that arises from limiting the change in locational prices at a connection point; and
  - for any amount arising as a result of the application of prudent discounts.

7.3.2 Application of the CRNP methodology

The CRNP methodology allocates a proportion (the locational component) of shared network costs to individual customer connection points. TransGrid applies the CRNP methodology using the T-PRICE cost reflective network pricing software used by most TNSPs in the NEM.

The CRNP methodology requires three sets of input data:

- An electrical (load flow) model of the network;
- A cost model of the network; and
- An appropriate set of load/ generation patterns.

Appendix B describes the CRNP methodology in more detail.

As noted in Appendix B the choice of operating conditions is important in developing prices using the CRNP methodology. The use made of the network by particular loads and generators will vary considerably depending on the load and generation conditions on the network. For this reason a number of operating scenarios are examined with different load and generation patterns.

The Rules provide TransGrid with flexibility in the choice of operating conditions. The key requirements are that:

- the allocation of dispatched generation to loads be over a range of actual operating conditions from the previous financial year; and
- the range of operating scenarios be chosen so as to include the conditions that result in most stress on the transmission network and for which network investment may be contemplated.

TransGrid's primary objective is to ensure that the application of the CRNP methodology provides stable prices that reflect, to the extent possible, the long run marginal costs of serving load. With this objective in mind, TransGrid will apply the CRNP methodology for the 20 days with the highest peak half hourly demand during the most recent financial year. For the avoidance of doubt, the T-PRICE software would apply for all periods in each peak day, rather than only for the peak half-hour.

Where actual operating conditions from the previous complete financial year are unavailable for a connection point, as would be the case for a new connection point, or where there are material changes in customer requirements at a connection point, an estimate of demand will be used instead. TransGrid will engage with the relevant network customer to determine the estimated demand.

7.3.3 Flexibility to apply modified CRNP methodology

The Rules allow a TNSP to apply modified CRNP. The benefit of applying modified CRNP is that it allows prices to take the level of network utilisation into account. In the absence of this adjustment, locational prices may fall as the network becomes more heavily loaded, and prices will tend to be higher for more lightly utilised assets. In effect, the price signal may be inappropriate.

TransGrid has not applied modified CRNP thus far. Implementing the methodology requires additional inputs to the T-PRICE software to incorporate information on network utilisation. In the absence of completing this further work, it would be premature to commit to the adoption of modified CRNP.

However, TransGrid will adopt the modified CRNP approach during the regulatory period if it is expected to provide more cost reflective price signals. Prior to adopting a modified CRNP approach, TransGrid will:

- advise customers, prior to the publication of its prices, that it intends to apply the modified CRNP approach;
- publish an updated "Better Outcomes for Customers" paper to explain TransGrid's decision to adopt the modified CRNP approach; and
- update this pricing methodology to reflect TransGrid's amended approach.

8 Transmission pricing structures

The third and final step in setting transmission prices is to determine the pricing structure, which is the basis on which prices are calculated and applied for each service category. In a number of cases, the Rules provide no choice regarding the pricing structure. The remainder of this section addresses each service in turn.

8.1 Entry and exit services prices

The revenue to be recovered for entry and exit services at each connection point is recovered on the basis of a fixed $/day price.

It is possible that entry and exit services are shared between generators or customers at a common connection point. In these cases, the costs are allocated as follows:

- If there are multiple generators connected at a single connection point, then the entry cost would be allocated between the generators on the basis of the peak generation into the system by each generator. TransGrid does not currently have any connection points where this occurs.
- If there are multiple customers connected at the one connection point, then the exit asset cost is allocated between the customers on the basis of the peak load measured for each customer in the most recent completed financial year. This arrangement currently applies at some points where two distributors share a connection point.

8.2 TUOS pricing – locational component

The application of the CRNP methodology establishes a revenue amount that should be allocated to each connection point. As discussed in section 7.3.2, this calculation is based on the application of CRNP over 20 peak days.

To determine the locational TUOS price to be applied in the forthcoming year at each connection point, TransGrid will maintain its current approach. The calculation requires that the $ amount of locational TUOS costs allocated to a connection point is divided by the average of the monthly maximum demands in each month at that connection point in the previous financial year (adjusted for forecast system load growth from the historical period to the period during which the prices will apply) and expressed as a $/kW/month price. This pricing structure is unchanged from the current approved methodology. TransGrid will adopt kVA charging no sooner than 1 July 2017.

For the avoidance of doubt:

- The CRNP methodology is applied using historic data, to allocate locational costs to each connection point.
- A locational price is calculated for each connection point by dividing the allocated costs by the connection point demand.
- The locational price for each connection point is applied to the monthly maximum demands in the year ahead.

Two specific complications are worth noting:

- Where there are both customer loads and generator auxiliary loads at a connection point, rates are set on the basis of the full load at the connection point, even though the generator does not pay usage charges.
- In some cases, there is a back up supply to a particular load (e.g. a town or large industrial customer) and simple application of the pricing calculation could give very different prices for the two connections. Where it is assessed that this may create incentives to the customer to switch supply points, and that this would not be consistent with efficient operation of the network, the variable rates at the two points may be set to the same level and a fixed charge used to obtain the balance of usage revenue allocated to the connection point.

The Rules require that the TUOS locational prices must not change by more than 2% per annum relative to the average increase, unless:

(1) the load at the connection point has materially changed;

(2) in connection with that change, the customer requested a renegotiation of its connection agreement with the TNSP; and

(3) the AER has approved the change of more than 2 per cent per annum.

TransGrid will apply these provisions. As already noted, the balance of any revenue shortfall or over-recovery that occurs as a result of applying the 2 per cent constraint is addressed by adjusting the non-locational TUOS prices.

8.3 TUOS pricing – non-locational component

TransGrid is required to recover the non-locational TUOS revenue on a postage stamp basis, which means that the price cannot vary by location. In response to feedback from stakeholders, TransGrid will recover the non-locational TUOS revenue on the basis of either contract agreed maximum demand or historical maximum demand. In both cases, the price is expressed as $/kW/month. TransGrid will adopt kVA charging no sooner than 1 July 2017.

The non-locational TUOS price is calculated by dividing the non-locational TUOS revenue by the sum of the historic average monthly demand or the contract demand for all connection points. Adjustments are made to account for historic metering data not being available or significant differences between historic and current metered demand. The adjustments must be consistent with the charging arrangements, described below, to ensure that the application of the prices yields the required non-locational TUOS revenue.

The AER's pricing methodology guidelines require that maximum demand based charges must be calculated by:

A. multiplying the maximum demand based price by the maximum demand at that connection point in the corresponding billing period two years earlier (i.e. historical metered maximum demand off-take); or

B. multiplying the maximum demand based price by the maximum demand at that connection point in the same billing period (current metered maximum demand off-take) if the historical maximum demand off-take is not available; or

C. multiplying the maximum demand based price by the current metered maximum demand off-take if the historical metered maximum demand off-take is significantly different to the current metered maximum demand off-take.

In accordance with the AER's guidelines, TransGrid will levy non-locational TUOS prices on the basis described above. If, however, a customer has agreed a nominated maximum demand with TransGrid, prices will be levied to that customer on the basis of that demand.

When applying the contract agreed maximum demand price, the TUOS non-locational component charge for a billing period will be calculated for each connection point by multiplying the contract agreed maximum demand price by the contract agreed maximum demand for the connection point (prevailing during the billing period concerned and expressed in $/kW/month) and multiplying this amount by the number of months in the billing period.

8.4 Prescribed common service prices and charges

Under the Rules, the revenue requirement attributed to common services must be recovered on a postage stamp basis. TransGrid will calculate common service prices, and recover common service costs on a maximum demand or nominated maximum demand basis, in the same manner as described in section 8.3 above.

8.5 Excess demand charge

For those customers who have chosen to have their general and common service charges set on the basis of contract agreed maximum demand, TransGrid needs to calculate an excess demand charge that will apply if the nominated demand is exceeded. The rate to be used in calculating the excess demand charge is set out in formal agreements with the customer, preferably in the relevant connection agreement, and therefore may be different for different customers.

To date, only two customers have taken up this option and the excess demand charge rate is identical. In principle, the excess demand charge may vary by location as the costs of exceeding the nominated demand will tend to be locational specific. TransGrid's excess demand charge should be set on a cost reflective basis in each case, but at a minimum, what the customer would have paid if the contract agreed maximum demand equalled the total demand including the exceedance.

Once the excess demand charge and escalation method has been agreed with the customer, the relevant customers will be advised by email or letter of the amended rate before 1 July each year.

8.6 Setting of TUOS locational prices between annual price publications

In the event that TransGrid is required to set a TUOS locational price at a new connection point or at a connection point where the load has changed significantly[2] after prescribed TUOS service locational prices have been determined and published, an interim price, not subject to the side constraints of clause 6A.23.4(f) of the Rules, will be determined. This will be calculated using the prevailing pricing models and soundly based demand forecasts. Suitable adjustments to reflect actual outcomes that differ from forecasts will be negotiated with the customer for inclusion in the relevant connection agreement.

A price subject to the side constraints of clause 6A.23.4(f) of the Rules will be determined and published at the next annual price determination.

9 Pricing certainty

TransGrid proposes that it should be able to negotiate a fixed price with its customers, for a period of up to 5 years. To avoid exposing customers to unacceptable risks of forecasting error, the fixed price period cannot extend beyond the period covered by the existing revenue determination. TransGrid will consult with customers and other stakeholders to develop a framework for negotiating fixed price contracts. The principles that will govern this framework are:

[2] For an existing connection point this would be subject to clause 6A.23.4(g) of the Rules.

- The negotiated price must reflect a reasonable forecast of the prices that would result from the annual application of this pricing methodology;
- Consideration should be given to the value obtained by the customer in securing price certainty;
- The negotiated price should not disadvantage other customers;
- The methodology for determining the fixed price should be transparent to all customers; and
- TransGrid should not obtain any benefit or incur any cost as a result of providing price certainty.

This framework would be available to all customers, including distribution network companies.

10 Billing arrangements

10.1 Billing for prescribed transmission services

TransGrid will calculate the transmission service charges payable by Transmission Network Users for each connection point in accordance with the published transmission service prices. Where relevant, charges will reflect metering data managed by AEMO.

TransGrid will issue bills to Transmission Network Users for prescribed transmission services which satisfy or exceed the minimum information requirements specified in clause 6A.27.2 of the Rules on a monthly basis or as specified in the relevant transmission connection agreement.

Consistent with clause 6A.27.3 of the Rules a Transmission Network User must pay charges for prescribed transmission services properly charged to it and billed in accordance with this pricing methodology by the date specified on the bill.

10.2 Payments between Transmission Network Service Providers

As the Co-ordinating Network Service Provider, TransGrid will pay to each relevant Transmission Network Service Provider the revenue which is estimated to be collected on their behalf during the following year. Such payments will be determined by TransGrid.

Financial transfers payable under clause 6A.27.4 of the Rules will be paid in equal monthly instalments or as documented in revenue collection agreements negotiated between the parties.

11 Prudential requirements

11.1 Prudential requirements for prescribed transmission services

Consistent with clause 6A.28.1 of the Rules, TransGrid may require a Transmission Network User to establish prudential requirements for either or both of connection services and transmission use of system services. These prudential requirements may take the form of, but need not be limited to, capital contributions, pre-payments or financial guarantees.

The prudential requirements will be negotiated between the parties and specified in the applicable transmission connection agreement.

11.2 Capital contribution or prepayment for a specific asset

Consistent with clause 6A.28.2 of the Rules, where TransGrid is required to construct or acquire specific assets to provide prescribed connection services or prescribed TUOS services to a Transmission Network User, TransGrid may require that user to make a capital contribution or prepayment for all or part of the cost of the new assets installed.

TransGrid notes that no capital contributions or prepayments have been made in respect of prescribed transmission services assets as at the date of this proposed pricing methodology.

In the event that a capital contribution is required, any contribution made will be taken into account in the determination of prescribed transmission service prices applicable to that user by way of a proportionate reduction in the ORC of the asset(s) used for the allocation of prescribed charges or as negotiated between the parties.

In the event that a prepayment is required any prepayment made will be taken into account in the determination of prescribed transmission service prices applicable to that user in a manner to be negotiated between the parties.

The treatment of such capital contributions or prepayments will be in accordance with the relevant provisions of the Rules and the revenue determination.

12 Prudent discounts

TransGrid has a very small number of customers who currently receive prudent discounts pursuant to clause 6A.26.1 of the Rules. All transmission charges paid by those customers are in accordance with the prudent discount arrangements approved by the AER.

TransGrid will address any future request for prudent discounts in accordance with the Rules requirements.

13 Monitoring and compliance

As a regulated business TransGrid is required to maintain extensive compliance monitoring and reporting systems to ensure compliance with its obligations under the State Owned Corporations Act, National Electricity Law, and the Rules, together with numerous other regulatory instruments.

In order to monitor and maintain records of its compliance with its approved pricing methodology, the pricing principles for prescribed transmission services, and part J of the Rules, TransGrid:

- incorporates the specific obligations arising from part J of the Rules into its compliance management system;
- maintains electronic records of the annual calculation of prescribed transmission service prices and supporting information; and
- periodically subjects its transmission pricing models and processes to functional audit by suitably qualified persons.

14 Description of pricing methodology differences

The primary differences between the pricing methodology set out in this paper and TransGrid's current pricing methodology are:

(1) Increased flexibility is provided to:

   a. enable amendment of the pricing methodology following a Rule change; and

   b. introduce the modified CRNP methodology where this approach is likely to result in prices that are more cost reflective.

(2) Locational pricing is to be more focused on peak demand by applying the CRNP methodology over the 20 peak days, rather than 12 months. Locational prices will continue to be applied to monthly maximum demand in the year ahead.

(3) All postage stamp prices will be set according to maximum demand, and therefore will no longer apply on an energy basis.

(4) As explained in section 15, the annual change in transmission costs for any TransGrid customer or large distribution customer will be capped at a maximum of CPI + 3%. The cap will compare the transmission charges in the most recent financial year with charges in the forthcoming year, assuming that the customer's demand is unchanged.

(5) Arrangements are proposed to enable TransGrid to provide pricing certainty for customers, including distribution networks.

(6) Excess demand charges will be set on a cost reflective basis.

In addition, TransGrid will adopt kVA charging no sooner than 1 July 2017.

These changes reflect the feedback provided by stakeholders during TransGrid's consultation process. TransGrid considers that the changes will promote the achievement of the National Electricity Objective and deliver improved outcomes for customers.

15 Transitional arrangements and other information

This section addresses a number of matters that arise from the pricing methodology guidelines which have not been covered elsewhere in this proposed pricing methodology.

In relation to transitional arrangements, TransGrid is conscious of the need to ensure that its new pricing methodology does not lead to price shocks for any customer, including distribution customers. To give effect to this objective, TransGrid will impose an overall cap on annual transmission costs of CPI + 3%. As noted in section 14 above, the cap is to be applied on the assumption that the customer's demand is unchanged from the previous year.

TransGrid is not responsible for network charges to distribution customers. However, TransGrid recognises that its transmission charges are passed through to a number of large distribution customers. TransGrid intends to liaise with each distributor to extend the application of the CPI + 3% cap to these distribution customers on an annual basis.

TransGrid should not be adversely affected by applying transitional arrangements such as the price constraint described here. If the application of the price constraint would result in a revenue shortfall, this shortfall may be recovered by adjusting upward the charges that

would otherwise apply in respect of non-locational TUOS services (in accordance with clause 6A.23.4(h)). To give effect to the price cap, the postage stamp charge will therefore be reduced at the relevant connection point(s) on a transitional basis, and a compensating increase will apply at the remaining connection points.

TransGrid also notes that, apart from provisions contained in Power Supply Agreements (as defined in Chapter 9 of the National Electricity Rules) Chapter 9 derogations do not impact on the arrangements in this proposed pricing methodology. In accordance with the Rules, the requirements of those Power Supply Agreements take precedence over the requirements of the Rules to the extent that they might address transmission pricing requirements.

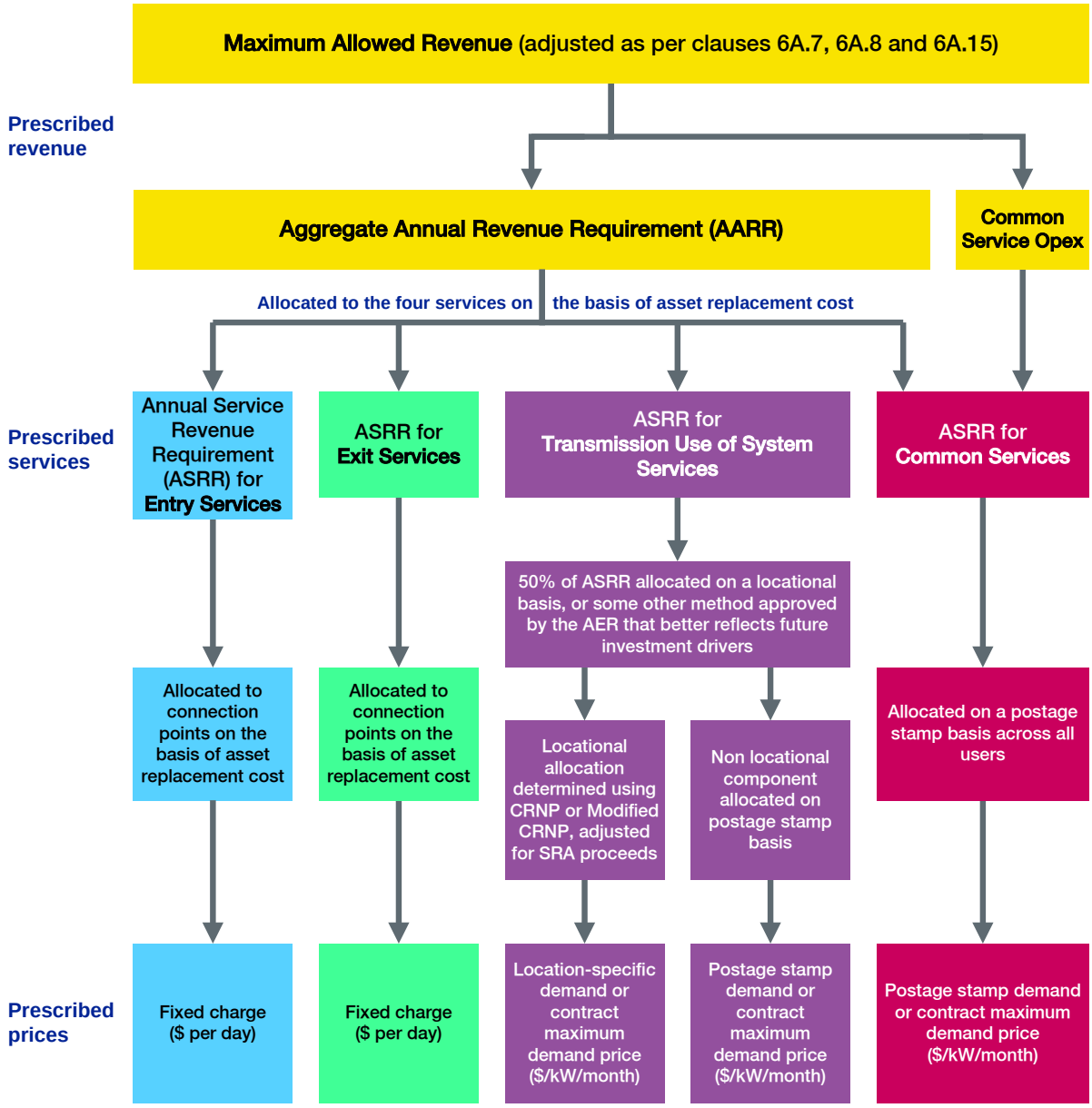
TransGrid has not provided a confidential version of this proposed pricing methodology to the AER in accordance with clause 2.5 of the pricing methodology guidelines and hence the provisions of clause 2.1(n) of the pricing methodology guidelines are not applicable.

16 Conclusion

TransGrid's proposed pricing methodology for the regulatory control period from 1 July 2015 has been submitted to the AER in accordance with the requirements of Chapter 6A of the Rules and the pricing methodology guidelines. TransGrid is confident that its proposed pricing methodology fully satisfies the requirements of the Rules and the pricing methodology guidelines.

If approved by the AER, TransGrid's pricing methodology will address a number of concerns raised by stakeholders during TransGrid's consultation process, and deliver outcomes to customers that promote the achievement of the National Electricity Objective.

Appendix A – Structure of Transmission Pricing under Part J of Rules



Appendix B – Cost Reflective Network Pricing Methodology

The cost reflective network pricing (CRNP) methodology generally involves the following steps:

(1) Determining the annual costs of the individual transmission network assets in the optimised transmission network;

(2) For modified CRNP, adjusting each asset's cost according to its expected utilisation;

(3) Determining the proportion of each individual network element utilised in providing a transmission service to each point in the network for specified operating conditions;

(4) Determining the maximum flow imposed on each transmission element by load at each connection point over a set of operating conditions;

(5) Allocating the costs attributed to the individual transmission elements to loads based on the proportionate use of the elements;

(6) Determining the total cost (lump sum) allocated to each point by adding the share of the costs of each individual network element attributed to each point in the network.

Allocation of generation to load

A major assumption in the use of the CRNP methodology is the definition of the generation source and the point where load is taken. The approach is to use the "electrical distance" to pair generation to load, in which a greater proportion of load at a particular location is supplied by generators that are electrically closer than those that are electrically remote. In electrical engineering terminology the "electrical distance" is the impedance between the two locations, and this can readily be determined through a standard engineering calculation called the "fault level calculation".

Once the assumption has been made as to the generators that are supplying each load for a particular load and generation condition (time of day) it is possible to trace the flow through the network that results from supplying each load (or generator). The use made of any element by a particular load is then simply the ratio of the flow on the element resulting from the supply to this load to the total use of the element made by all loads and generators in the system.

Operating conditions for cost allocation

The choice of operating conditions is important in developing prices using the CRNP methodology or modified CRNP methodology. TransGrid has flexibility in the choice of operating conditions but notes that the Rules that existed prior to 2006 set out the principles that should apply in determining the sample of operating conditions considered. Of particular note is the requirement that the operating conditions to be used are to include at least 10 days with high system demand, to ensure that loading conditions, which impose peak flows on all transmission elements, are captured.

Schedule 6A.3.2(3) is more prescriptive, requiring that the allocation of dispatched generation to loads be over a range of actual operating conditions from the previous financial year and that the range of operating scenarios is chosen so as to include the

conditions that result in most stress on the transmission network and for which network investment may be contemplated.

The use made of the network by particular loads and generators will vary considerably depending on the load and generation conditions on the network. For this reason a number of operating scenarios are examined with different load and generation patterns.

In selecting those operating scenarios it is important to recognise that the operating conditions that impose most stress on particular elements may occur at times other than for system peak demand.

Appendix C – Priority Ordering Methodology

Rules Requirement

Clause 6A.23.2(d) of the Rules requires that:

Where, as a result of the application of the *attributable cost share*, a portion of the AARR would be attributable to more than one category of *prescribed transmission services*, that *attributable cost share* is to be adjusted and applied such that any costs of a *transmission system* asset that would otherwise be attributed to the provision of more than one category of *prescribed transmission services*, is allocated as follows:

(1) to the provision of *prescribed TUOS services*, but only to the extent of the *stand-alone amount* for that *category of prescribed transmission services*;

(2) if any portion of the costs of a *transmission system* asset is not allocated to *prescribed TUOS services*, under subparagraph (1), that portion is to be allocated to *prescribed common transmission services*, but only to the extent of the *stand-alone amount* for that *category of prescribed transmission services*;

(3) if any portion of the costs of a *transmission system* asset is not attributed to *prescribed transmission services* under subparagraphs (1) and (2), that portion is to be attributed to *prescribed entry services* and *prescribed exit services*.

Stand-alone amount is defined as:

For a *category of prescribed transmission services*, the costs of a *transmission system* asset that would have been incurred had that *transmission system* asset been developed, exclusively to provide that *category of prescribed transmission services*.

It should be noted that TransGrid has obtained legal advice in relation to clause 11.6.11(c)(2), which deals with grandfathering of connection assets. The legal advice is that clause 11.6.11(c)(2) effectively adds a fourth step to the priority ordering. The remainder of this appendix, however, is focused on the first three steps as required by clause 6A.23.2(d).

In its rule determination the AEMC provided the following guidance on the application of the priority ordering approach for the allocation of costs which can be attributed to more than one type of service:[3]

> "The Commission has maintained a priority ordering approach for the allocation of expenses or costs which can be attributed to more than one type of service. The cascading principle adopted by the Commission is based on the premise that users are seen to be the 'cause' of transmission investment. Therefore, costs should be first allocated to prescribed transmission use of system services on a stand-alone basis and then to *prescribed common transmission services*. Where a service/cost cannot justifiably be attributed to TUOS or common services it should be allocated to entry and exist services."

In developing this methodology TransGrid has had regard for the following example in the rule determination:[4]

Consider a substation costing $30 million that was developed:

- partly in order to provide *prescribed TUOS services*;

[3] AEMC, *Rule Determination for National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, p5.
[4] Ibid p37.

- partly in order to provide *prescribed common transmission services*; and
- partly in order to provide *prescribed exit services*.

Then assume that had the substation been developed solely to provide *prescribed TUOS services*, it could have been much smaller and would have cost only $10 million. Had the substation been developed solely in order to provide *prescribed common transmission services*, it would have cost $5 million. Finally, had the substation been developed solely in order to provide *prescribed exit services*, it would have cost $20 million.

The application of the principle would then lead to the $30 million cost of the substation being attributed to Prescribed Transmission Service categories as follows:

- $10m to the *prescribed TUOS services ASRR*;
- $5m to the *prescribed common services ASRR*; and
- the remaining $15 million to the prescribed exit service *ASRR*.

Objective and General Approach

The proposed allocation methodology relies on the assumption that substation infrastructure and establishment costs are proportionate to the number of high voltage circuit breakers in the substation.

Based on this assumption the appropriate allocator for substation infrastructure and establishment costs for a stand-alone arrangement is the ratio of the number of high voltage circuit breakers[5] in the stand-alone arrangement to the number of high voltage circuit breakers in the whole substation.

Proposed Methodology

Step 1: Branch Identification

Identify the branches,[6] being the lines, transformers, major reactive devices and exits/entries in the substation which provide prescribed TUOS, *prescribed common transmission services* and exit or entry services, in the substation.

Step 2: Allocation of Circuit Breakers to Branches

For each high voltage circuit breaker in the substation identify the branches directly connected to it. Any circuit breaker that does not directly connect to a branch is excluded from allocation and all costs associated with it are added to the substation infrastructure and establishment cost.

Count the total number of circuit breakers directly connected to branches.

As a general rule, Distribution Network Service Providers (DNSPs) are classified as a prescribed exit service while Generators are classified as a prescribed entry service. Negotiated services are not part of the regulated asset base and fall outside the priority ordering process detailed in clause 6A.23.2(d) of the Rules.

Step 3.1: Stand-alone arrangements for Prescribed TUOS

With reference to the number of lines providing *prescribed TUOS services* determine the number of circuit breakers required to provide TUOS services of an equivalent standard on a

[5] Low voltage circuit breakers are not considered in the standalone arrangements.
[6] "Branches" are defined below.

stand-alone basis.[7] The stand-alone configuration is the simplest substation configuration (in the absence of development) had it been developed to provide a prescribed TUOS service. This may be done by way of a look up of typical stand-alone configurations.

Step 3.2: Stand-alone arrangements for Prescribed common transmission services

With reference to the number of lines providing *prescribed TUOS services* and the devices providing *prescribed common service* determine the number of circuit breakers required to provide *prescribed common transmission services* of an equivalent standard on a stand-alone basis. The stand-alone configuration is the simplest substation configuration (in the absence of development) had it been developed to provide a *prescribed common service*. This may be done by way of a look up of typical stand-alone configurations.

Step 4: Allocation of substation infrastructure and establishment costs

Step 4.1: Allocation of Prescribed TUOS

Allocate a portion of substation infrastructure and establishment costs to prescribed TUOS according to the ratio of the high voltage circuit breakers identified in step 3.1 to the total number of high voltage circuit breakers connected to branches in the substation identified in step 2.

Step 4.2: Calculate the Unallocated Substation Infrastructure Costs after TUOS Allocation

Calculate the Unallocated substation infrastructure cost by subtracting the amount calculated in step 4.1 from the total substation infrastructure amount.

Step 4.3 Allocation of Prescribed Common Service

Allocate a portion of the substation infrastructure and establishment costs to *prescribed common service* based on to the ratio of the high voltage circuit breakers providing *prescribed common transmission services* identified in step 3.2 to the total number of high voltage circuit breakers connected to branches in the substation. If the common service portion of substation infrastructure is greater than the Unallocated costs, then the Unallocated portion only is attributed to *prescribed common service*. In this instance, nothing will be attributed to *prescribed entry and prescribed exit services*.

Step 4.4: Calculate the Unallocated Substation Infrastructure Costs after Common Service Allocation

Calculate the Unallocated substation infrastructure cost by subtracting the amount calculated in step 4.3 from the amount calculated in step 4.2.

Step 4.5: Allocation of Prescribed Entry and Exit Service

Allocate the remaining substation infrastructure and establishment costs (calculated in step 4.4) to each branch providing prescribed exit or entry services based on the ratio of the high voltage circuit breakers providing the entry or exit service to the branch to the total number of high voltage circuit breakers providing entry or exit services or in accordance with the cost allocation process.

[7] Whilst an argument can be made that a substation would typically not exist to provide TUOS services alone it is believed that this is inconsistent with the intent of the rule. Accordingly standalone arrangements for prescribed TUOS are taken to require a level of switching consistent with the prevailing bus arrangements.

Notes

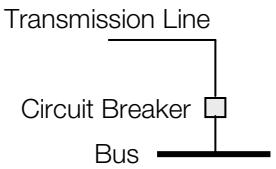
Costs are only allocated in step 4 until fully allocated.

- Consistent with clause 6A.23.2(d)(3) of the Rules it is possible that no costs will be attributed to entry and exit services.
- New and existing negotiated service assets are excluded from the analysis as any incremental establishment costs associated with them are taken to be included in the negotiated services charges on a causation basis.
- The assessment of standalone arrangements only needs to be conducted once per substation except where changes to the configuration of the substation occur.

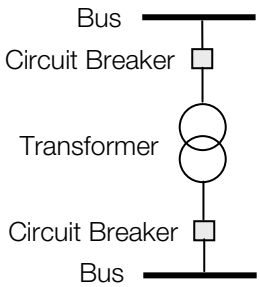
Definitions and examples are set out on the following pages.

Definition - Branches

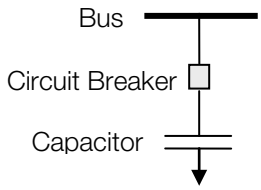
As illustrated by the diagrams below a "Branch" is a collection of assets (e.g. lines, circuit breakers, capacitors, buses and transformers) that provide a transmission service.



Branch with Transmission Line, Bus and Circuit Breaker



Branch with Transformer, Circuit Breaker and two Busses



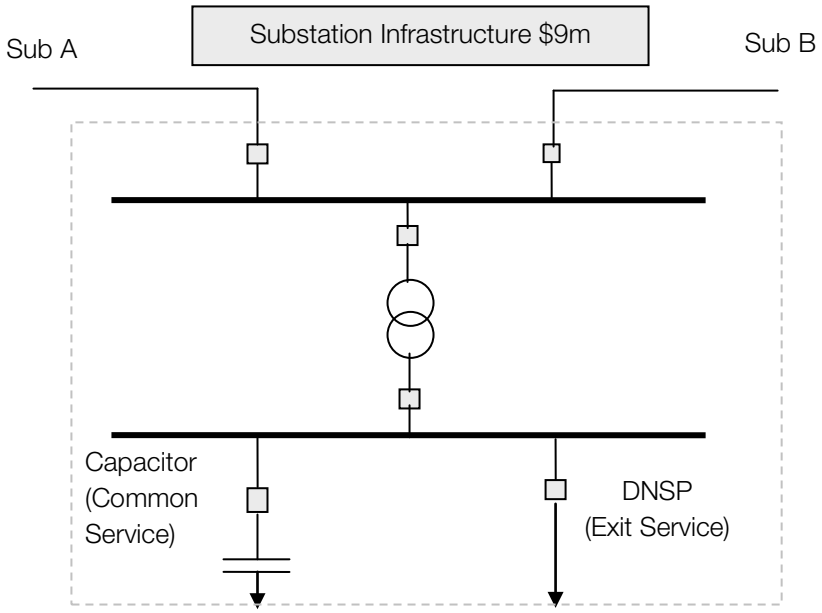
Branch with Capacitor, Circuit Breaker and Bus

Examples are set out on the following pages.

Examples

Example A

The substation configuration is shown in the diagram below.



Step 1: The branches are Sub A, Sub B, DNSP, Tie Transformer and PCS.

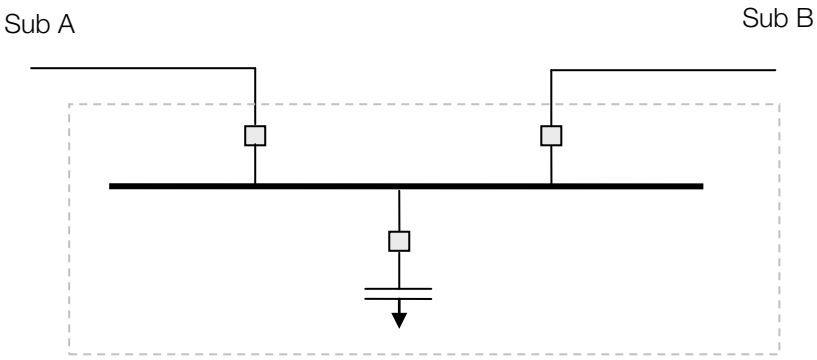
Step 2: The total number of circuit breakers directly connected to branches is 6.

Step 3.1: The stand-alone arrangement for the provision of *prescribed TUOS services* to an equivalent standard is shown below and consists of 2 circuit breakers.

Stand Alone Prescribed TUOS Service

Step 3.2: The stand-alone arrangement for the provision of *prescribed common transmission services* to an equivalent standard is shown below and consists of 3 circuit breakers.

Stand Alone Prescribed Common Service



Step 4:

Assume total Infrastructure cost is $9m.

Costs are allocated to prescribed TUOS in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost Allocated to TUOS = (2/6) x $9m = $3m

Unallocated = $9m - $3m = $6m

Costs are allocated to *prescribed common service* in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost allocated to Common Service = (3/6) x $9m = $4.5m

Unallocated = $6m - $4.5m = $1.5m

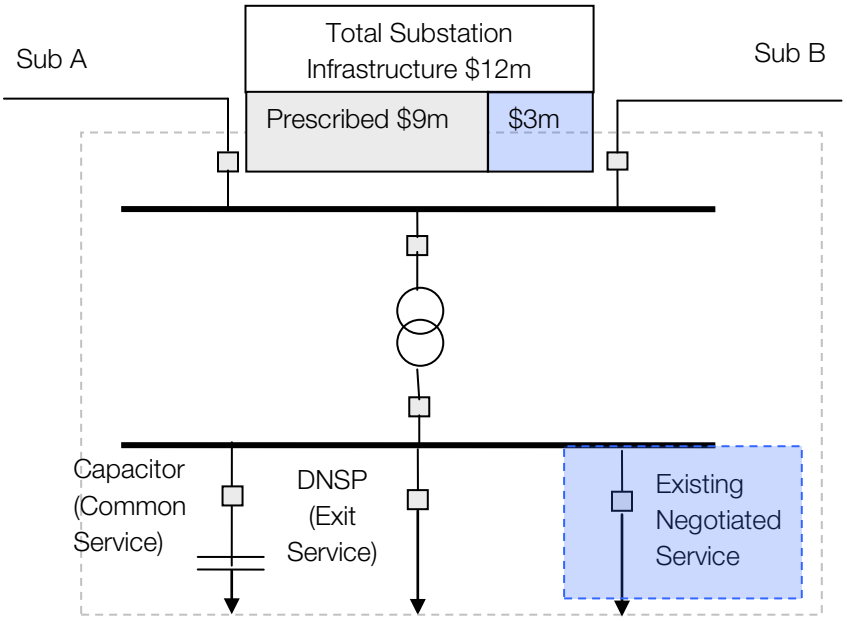
Remainder of Unallocated (calculated above) to be allocated to *prescribed entry and prescribed exit services*.

Infrastructure Cost allocated to Exit = $1.5m

Item	Number	Allocation	Unallocated
Substation infrastructure costs		9,000,000	9,000,000
Total breakers	6		
TUOS stand-alone breakers	2		
Share to TUOS	0.333	3,000,000	6,000,000
Common Service stand-alone breakers	3		
Share to Common Service	0.500	4,500,000	1,500,000
Share to Entry and Exit services		1,500,000	

Example B

The substation configuration is shown in the diagram below.



Step 1: The branches are Sub A, Sub B, DNSP, Tie Transformer, PCS and an existing negotiated service.

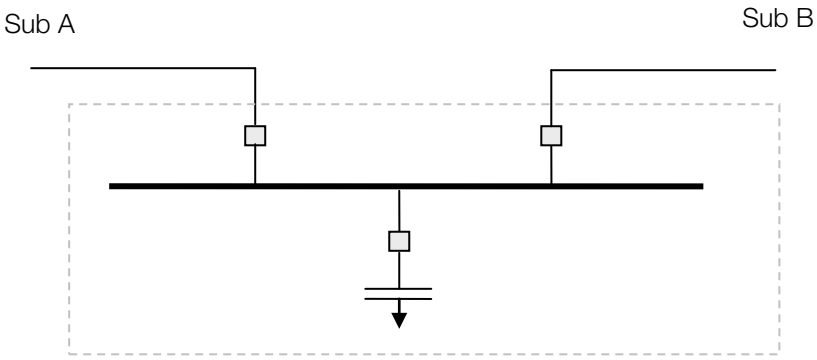
Step 2: The total number of circuit breakers directly connected to branches is 6 (no prescribed costs are allocated to the existing negotiated service).

Step 3.1: The stand-alone arrangement for the provision of *prescribed TUOS services* to an equivalent standard is shown below and consists of 2 circuit breakers.

Stand Alone Prescribed TUOS Service

Step 3.2: The stand-alone arrangement for the provision of *prescribed common transmission services* to an equivalent standard is shown below and consists of 3 circuit breakers.

Stand Alone *Prescribed Common Service*



Step 4:

Assume total Infrastructure cost is $12m, however $3m is for the existing negotiated service, which does not form part of the regulated asset base and is not governed by 6A.23.2(d).

Costs are allocated to prescribed TUOS in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost Allocated to TUOS = (2/6) x $9m = $3m

Unallocated = $9m - $3m = $6m

Costs are allocated to *prescribed common service* in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost allocated to Common Service = (3/6) x $9m = $4.5m

Unallocated = $6m - $4.5m = $1.5m

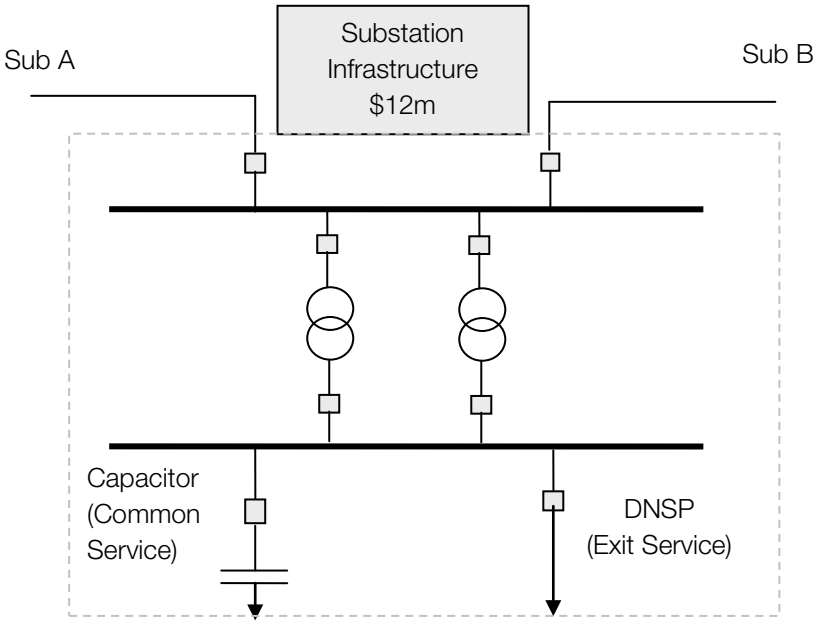
Remainder of Unallocated (calculated above) to be allocated to *prescribed entry and prescribed exit services*.

Infrastructure Cost allocated to Exit = $1.5m

Item	Number	Allocation	Unallocated
Substation infrastructure costs		9,000,000	9,000,000
Total breakers	6		
TUOS stand-alone breakers	2		
Share to TUOS	0.333	3,000,000	6,000,000
Common Service stand-alone breakers	3		
Share to Common Service	0.500	4,500,000	1,500,000
Share to Entry and Exit services		1,500,000	

Example C

The substation configuration is shown in the diagram below.



Step 1: The branches are Sub A, Sub B, DNSP, Tie Transformer 1, Tie Transformer 2 and PCS.

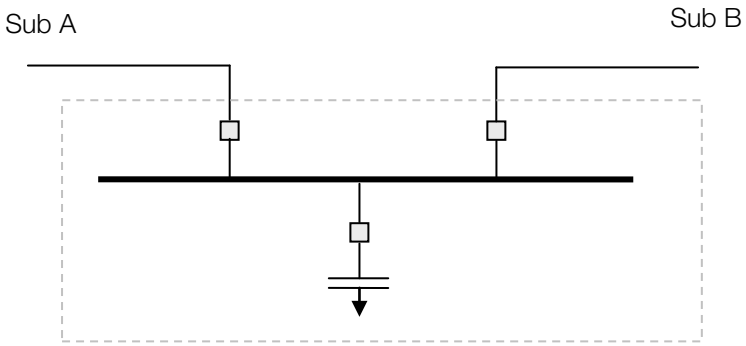
Step 2: The total number of circuit breakers directly connected to branches is 8.

Step 3.1: The stand-alone arrangement for the provision of *prescribed TUOS services* to an equivalent standard is shown below and consists of 2 circuit breakers.

Stand Alone Prescribed TUOS

Step 3.2: The stand-alone arrangement for the provision of *prescribed common transmission services* to an equivalent standard is shown below and consists of 3 circuit breakers.

Stand Alone *Prescribed Common Service*



Step 4:

Assume total Infrastructure cost is $12m.

Costs are allocated to prescribed TUOS in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost Allocated to TUOS = (2/8) x $12m = $3m

Unallocated = $12m - $3m = $9m

Costs are allocated to *prescribed common service* in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost allocated to Common Service = (3/8) x $12m = $4.5m

Unallocated = $9m - $4.5m = $4.5m

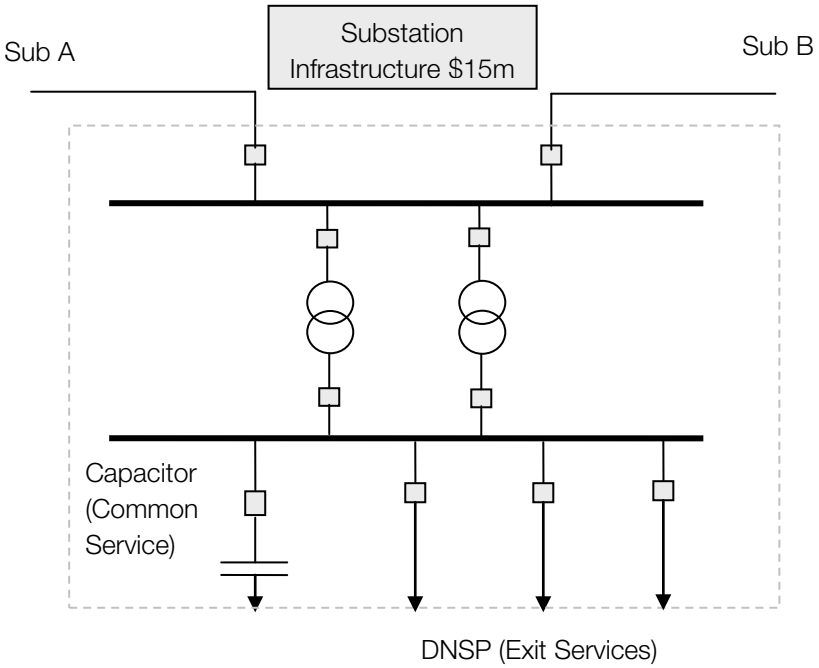
Remainder of Unallocated (calculated above) to be allocated to *prescribed entry and prescribed exit services*.

Infrastructure Cost allocated to Exit = $4.5m

Item	Number	Allocation	Unallocated
Substation infrastructure costs		12,000,000	12,000,000
Total breakers	8		
TUOS stand-alone breakers	2		
Share to TUOS	0.250	3,000,000	9,000,000
Common Service stand-alone breakers	3		
Share to Common Service	0.375	4,500,000	4,500,000
Exit service		4,500,000	

Example D

The substation configuration is shown in the diagram below.



Step 1: The branches are Sub A, Sub B, DNSP1, DNSP2, DNSP3, Tie Transformer 1, Tie Transformer 2 and PCS.

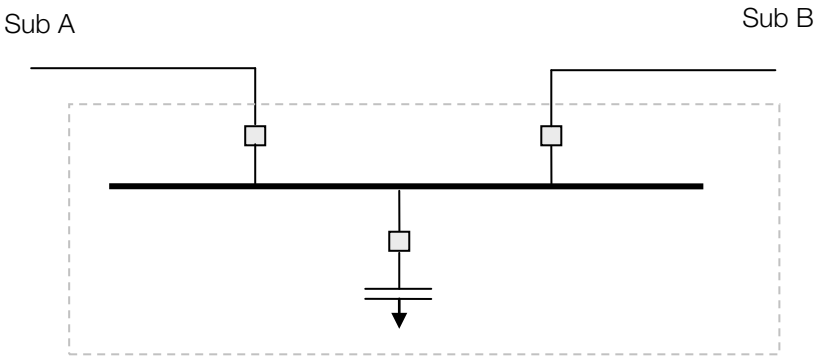
Step 2: The total number of circuit breakers directly connected to branches is 10.

Step 3.1: The stand-alone arrangement for the provision of *prescribed TUOS services* to an equivalent standard is shown below and consists of 2 circuit breakers.

Stand Alone Prescribed TUOS

Step 3.2: The stand-alone arrangement for the provision of *prescribed common transmission services* to an equivalent standard is shown below and consists of 3 circuit breakers.

Stand Alone *Prescribed Common Service*



Step 4:

Assume total Infrastructure cost is $15m.

Costs are allocated to prescribed TUOS in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost Allocated to TUOS = (2/10) x $15m = $3m

Unallocated = $15m - $3m = $12m

Costs are allocated to *prescribed common service* in the ratio of the circuit breakers in the stand-alone arrangement to the total circuit breakers.

Infrastructure Cost allocated to Common Service = (3/10) x $15m = $4.5m

Unallocated = $12m - $4.5m = $7.5m

Remainder of Unallocated (calculated above) to be allocated to *prescribed entry and prescribed exit services*.

Infrastructure Cost allocated to Exit = $7.5m

Item	Number	Allocation	Unallocated
Substation infrastructure costs		15,000,000	15,000,000
Total breakers	10		
TUOS stand-alone breakers	2		
Share to TUOS	0.200	3,000,000	12,000,000
Common Service stand-alone breakers	3		
Share to Common Service	0.300	4,500,000	7,500,000
Exit service		7,500,000	