TEC Methololology

The application of the Total Efficient Cost (TEC) Model in the tariff setting process

2017-18 to 2018-19

As submitted to the Australian Energy Regulator

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1 Introduction

In accordance with the provisions of clause 6.18.2(a)[1] of the National Electricity Rules (**Rules**), TasNetworks is required to prepare an Annual Pricing Proposal for submission to and approval of the Australian Energy Regulator (**AER**).

Clause 6.18.5(a) of the Rules states that the network pricing objective is that the tariffs levied by a Distribution Network Service Provider in respect of its provision of direct control services to a retail customer should reflect the Distribution Network Service Provider's efficient costs of providing those services to retail customers.

TasNetworks' Total Efficient Cost (**TEC**) Model forms an important step in our tariff setting process for standard control services and this document provides an overview of the processes and methodologies used within our TEC Model.

[1] All references to the National Electricity Rules in this document relate to version 90 of the Rules.

2 Background

Our TEC Model uses the Annual Revenue Requirement (**ARR**) as an input and allocates revenue to asset groupings (by geographic region) and then to customer groups. The output of the TEC Model is a 'target revenue' for each customer group, which is to be recovered via our network tariffs.

The TEC Model process includes:

- geographic definition and asset data extraction;
- customer group definition;
- revenue allocation to asset classes and customer groups;
- an output of revenue by customer group and geographic region; and
- an output of revenue allocation by tariff group.

3 Geographic region definition

Our TEC Model has been constructed to reflect geographic differences in the cost of the distribution services that we provide. The geographic zones have been spatially defined (in our geo-spatial environment) allowing repeatable and consistent data extraction. Whilst it is a Rules requirement that uniform tariffs must be developed, an understanding of geographic costs assists in analysing the merits of pricing zones and communication of differential profitability and cross-subsidies.

We have divided Tasmania into 20 regions for operational performance measurement. The areas are defined to represent regions of homogenous operating conditions (similar assets, environment and customer characteristics). The regions are as follows:

- Burnie Urban
- Devonport Urban
- East Coast North
- East Coast South
- George Town Industrial
- Highlands
- Hobart CBD
- Hobart Urban
- Launceston CBD
- Launceston Urban
- Midlands North
- Midlands South
- North Central
- North Coast
- North East
- North West
- Sorell-Peninsula
- South
- Tamar West
- West Coast

Our TEC Model utilises six geographic regions, based on the amalgamation of the regions defined for operational performance management. The geographic areas used in the TEC Model are outlined in Table 1.

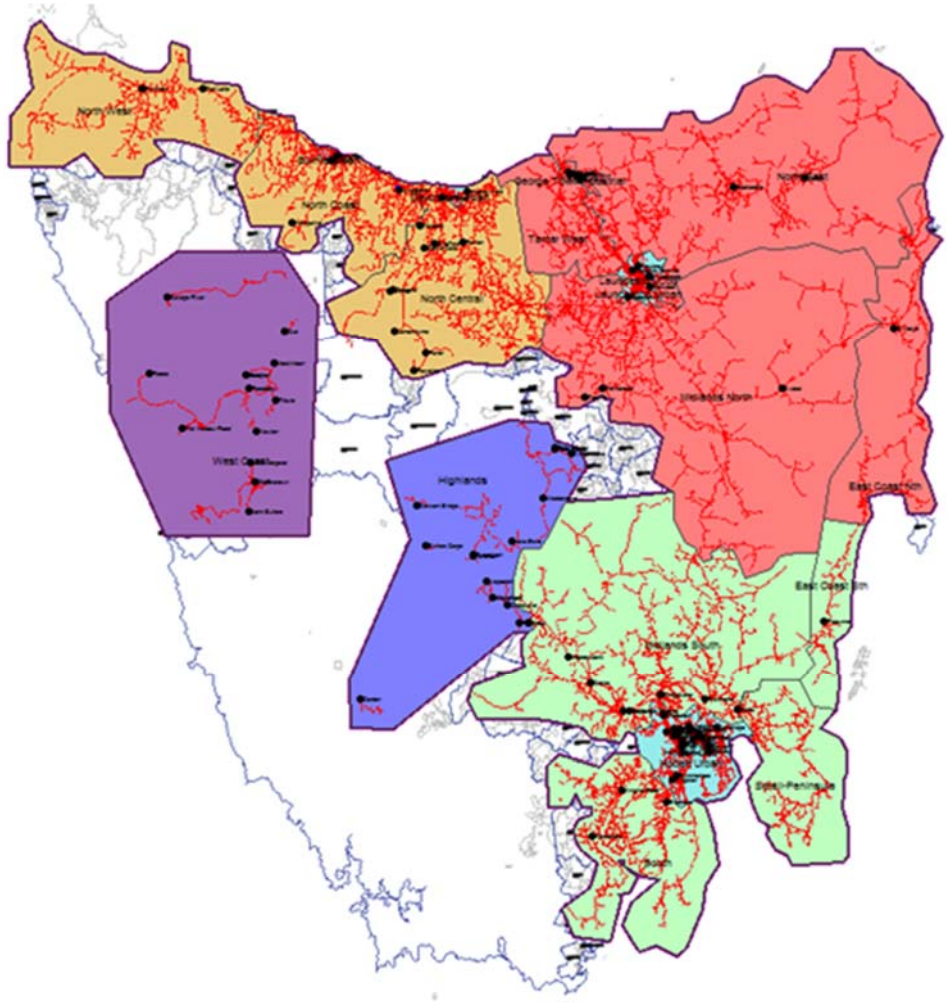
Table 1: TEC Model regions

TEC region	Distribution performance management region
Urban/CBD	Burnie Urban, Devonport Urban, Hobart CBD, Hobart Urban, Launceston CBD and Launceston Urban
North West	North Central, North Coast and North West
North	East Coast North, George Town Industrial, Midlands North, North East and Tamar West
Highlands	Highlands
South	East Coast South, Midlands South, Sorell-Peninsula and South
West Coast	West Coast

The use of the outlined TEC regions allows for a one-to-one correlation with operational areas which makes asset data capture both manageable and repeatable.

The map below depicts the TEC Model geographic regions.

Figure 1: TEC Model regions



4 Asset group definition

The following asset groups have been used within our TEC Model:

- transmission;
- subtransmission;
- zone substation;
- high voltage;
- distribution transformer;
- low voltage;
- common service; and
- connection.

These asset groups have been chosen as they represent the individual components within the distribution network where the driver for expenditure varies and the connection characteristics of the customer also vary. These asset groups are expanded below:

- **transmission** – all customers are a beneficiary of the transmission network and should receive a share of the costs associated with the provision of the transmission network;
- **subtransmission** and **zone substation** – all customers are a beneficiary of the subtransmission network and the associated zone substations. They should receive a share of the costs associated with the provision of subtransmission network and zone substations in their geographic region;
- **high voltage** – all customers are a beneficiary of the high voltage (**HV**) network and should receive a share of the costs associated with the provision of the HV network. Customers in rural areas should however receive a larger allocation of these costs as there is limited use of low voltage networks in these regions;
- **low voltage** – only low voltage (**LV**) customers are a beneficiary of LV assets. All large LV customers are likely to have dedicated (or largely dedicated) transformers, whereas small LV customers and all residential customers will use a large proportion of the shared LV network and therefore indirectly the transformers associated with that network;
- **common service** – all customers are a beneficiary of the common services (buildings, fleet, etc) that we provide; and
- **connection** – all customers have connection assets that are associated with their use of the distribution network.

5 Customer group definition

The following customer groups have been used within our TEC Model:

- unmetered;
- street lighting;
- uncontrolled energy;
- controlled energy;
- residential (light and power);
- LV < 25 kVA;
- LV 25 to 70 kVA;
- LV 70 to 300 kVA;
- LV > 300 kVA;
- HV < 2 MVA; and
- HV > 2 MVA.

The rationale for adopting these LV customer groups includes:

- LV single phase less than 25 kVA customers was chosen because 100 amps reflects the minimum service fuse size, which typically reflects non-process loads;
- LV customers with maximum demand between 25 kVA and 70 kVA will most likely fall within the manufacturing/commercial sector and be involved in some form of process usage. The upper boundary of the proposed range was selected because the maximum size for whole current meters is 100 amps. For more than 100 amp multi-phase, customers are likely to be supplied via an underground cable which represents a difference in costs associated with supply;
- LV customers with maximum demand between 70 kVA and 300 kVA are multi-phase customers likely to be connected to the shared LV system; and
- LV customers with maximum demand in excess of 300 kVA are likely to have dedicated (or largely dedicated) transformers and use a small proportion of the shared LV system.

Embedded generation has been excluded as a customer group in this iteration of the TEC Model as we currently have no generation customers that necessitate revenue apportionment. The Rules require that generation customers are not charged for the utilisation of the shared distribution network. Our existing embedded generation customers currently have no dedicated connection assets that have not been fully funded by the customer as a component of their connection.

The inclusion of an embedded generation customer group will be considered in the future (where dedicated connection assets are not fully funded) as this would aid in the correct apportionment of associated connection assets which comprise part of our regulated asset base (**RAB**).

The use of the outlined customer groups does not pose a restriction in terms of network tariff definition and development. A single TEC customer group may have multiple network tariffs associated with it or, alternatively, multiple TEC customer groups may be covered by a single network tariff.

6 Revenue entitlement grouping definition and allocation process

Our Revenue Cap has been determined by the AER and is based on a building block approach, which includes each of the regulated cost components, namely:

- a return on capital (including the indexation of the RAB);
- a return of capital (regulatory depreciation);
- an estimate of the amount of corporate income tax payable;
- any revenue increments or decrements arising from the application of the efficiency benefit sharing scheme, capital expenditure sharing scheme, service target performance incentive scheme and demand management incentive scheme;
- any revenue increments or decrements arising from the application of a control mechanism in the previous regulatory control period;
- any revenue increments or decrements arising from an under/over-recovery and/or pass through events; and
- forecast operating expenditure.

The revenue estimate for our network tariffs also includes an estimation of the charge that will be levied for the use of the transmission network.

6.1 Allocation to asset classes

The first step of the TEC process is to allocate or assign the network costs to asset classes in the most efficient and cost reflective way. That is, the TEC methodology ensures costs are allocated on a causal basis.

6.1.1 Return on capital

The return on capital component of the revenue cap (which represents the return on our RAB) can be separated into three distinct cost groups on the basis of the asset type. These cost groups are:

- **network –** the return on capital for those system assets employed in the provision of distribution services to customers.
- **common service –** the return on capital for those assets associated with the provision of common services. For example, fleet, IT and buildings.
- **connection services –** the return on capital for connection assets.

Return on capital costs are allocated to each geographic region on the basis in proportion to the depreciated value of the assets or depreciated optimised replacement cost (**DORC**).

In addition, the return on capital component allocated to the network cost pool is further allocated to the following distribution asset classes:

- subtransmission;
- zone substations;
- high voltage network;
- distribution transformers; and
- low voltage network.

Return on capital costs are allocated to each asset class in proportion to the DORC valuation.

6.1.2 Regulatory depreciation

The regulatory depreciation allowance is separated into the same three cost groups as the return on capital allowance. These cost groups are:

- **network –** the regulatory depreciation of those assets employed for the provision of distribution services to customers.
- **common services –** the regulatory depreciation for those assets associated with the provision of common services. For example, fleet, IT and buildings.
- **connection services –** the regulatory depreciation for connection assets.

Regulatory depreciation costs are allocated to each geographic region on the basis in proportion of to the installed value of the assets or optimised replacement cost (**ORC**).

Further, the regulatory depreciation component allocated to the network cost pool is further allocated to the following distribution asset classes:

- subtransmission;
- zone substations;
- high voltage network;
- distribution transformers; and
- low voltage network.

Regulatory depreciation costs are allocated to each asset class in proportion to the ORC valuation.

6.1.3 Operating expenditure

The AER has determined an overall efficient operating expenditure target for us as part of the regulatory review process. The operating expenditure costs are separated into two distinct cost groups based on the proportion of operating expenditure. These cost groups are:

- **network costs –** those costs directly associated with the operation and maintenance of asset classes that are attributable to particular customer classes.
- **common service –** include overheads and other operating costs which represent the summation of the non-system based costs which include corporate and divisional overheads.

The TEC Model is used to allocate these network costs to the users of the respective asset class. Costs are allocated to asset classes on the basis of the remaining life of the asset, following which costs are allocated to customer classes. An allocation on the basis of remaining asset life ensures that the oldest assets receive the largest proportion of maintenance costs as maintenance activities increase with asset age.

6.1.4 Tax allowance

The benchmark tax liability, as calculated within the AER's Post Tax Revenue Model (**PTRM**), is allocated to each of the three building block components of operating expenditure, return on capital and regulatory depreciation. The allocation is based on the ratio of their respective allocated revenue amounts. As outlined above, within each of these regulatory cost components there are a number of cost groups. The allocated tax allowance is therefore allocated to each cost group on the basis of their respected share of the total revenue.

6.1.5 Under/over recoveries and pass through events

Any calculated under or over-recoveries or costs associated with a pass through event is allocated to each of the three building block components of operating expenditure, return on capital and

regulatory depreciation. The allocation is based on the ratio of their respective allocated revenue amounts. As outlined above, within each of these regulatory cost components there are a number of cost groups. The allocated under or over recoveries or a cost associated with a pass through event is therefore allocated to each cost group on the basis of their respected share of the total revenue.

6.1.6 Transmission charges

Transmission charges are fully allocated to an asset class of transmission. Estimated transmission charges are allocated to geographic regions using an extension of our transmission locational pricing methodology.

6.2 Allocation to customer classes

The second step of the TEC process is to allocate or assign the network costs, already allocated to asset classes, to customer classes in the most efficient and cost reflective way. That is, the TEC methodology ensures costs are allocated on a causal basis.

There are a range of cost allocators that are used within our TEC Model. The selection of the appropriate allocator is based on the ability of the allocator to reflect the fundamental cost driver. We have adopted the allocators outlined below in the TEC Model for the following reasons:

- **number of customers –** this allocator is deemed appropriate for those costs that are dependent upon or driven by the number of connected customers.
- **anytime maximum demand** (**ATMD**) **–** this has been used to reflect the long run marginal cost associated with changes in demand.

The uncontrolled and controlled heating group is allocated an estimate of incremental costs as they are only available in conjunction with another type of network tariff. All other customer groups are allocated average costs.

Network costs are related both to the number of customer connections and customers' maximum demands. In general the closer the cost can be attributed to the customer, the more "per customer" the cost allocation. Consider the transmission network costs, the cost of adding a new residential subdivision is only related to the diversified maximum demand. However, the cost of the 400 V extension required is almost perfectly correlated with the number of new residential customers.

6.2.1 Transmission assets

All customer groups use the transmission network. Costs are typically driven by the demand requirements of the network and are therefore allocated to customer groups on the basis of group ATMD.

6.2.2 Subtransmission assets

All customer groups use the subtransmission network. Costs are typically driven by the demand requirements of the network and are therefore allocated to customer groups on the basis of group ATMD.

6.2.3 Zone substation assets

All customer groups use zone substations. Costs are typically driven by the demand requirements of the network and are therefore allocated to customer groups on the basis of group ATMD.

6.2.4 High voltage assets

All customer groups use the HV network. Costs are driven by the demand requirements of the network and the number of customers and are therefore allocated to customer groups on the basis of group ATMD and customer numbers.

As there is little use of LV networks in rural areas, the driver for the HV assets in these regions is weighted toward the number of customers as each connecting customer will tend to increase the size of the HV network.

HV network costs are allocated to urban customer groups 60 per cent on ATMD, 40 per cent on customer numbers. Rural customer groups are allocated 20 per cent on ATMD and 80 per cent on customer numbers.

6.2.5 Distribution transformer assets

No costs are allocated to HV connected customers because these customers do not use TasNetworks-owned distribution transformers.

No costs are allocated to the LV > 300kVA customer group as these customers generally have a dedicated distribution transformer and these costs are therefore included as connection assets.

Distribution transformer costs are allocated to remaining customer groups 60 per cent on ATMD, 40 per cent on customer numbers.

6.2.6 Low voltage assets

No costs are allocated to HV connected customers because these customers do not use the LV network.

No costs are allocated to LV > 300kVA group as these customers are connected to the LV terminals of a distribution transformer or all the LV cabling is included as connection assets.

LV network costs are allocated to remaining customer groups 25 per cent on ATMD, 75 per cent on customer numbers.

6.2.7 Common service assets

All customer groups use common service assets. Costs for these assets are allocated to customer groups 50 per cent on ATMD, 50 per cent on customer numbers.

6.2.8 Connection assets

Connection assets are allocated to customer groups on the basis of typical connection configurations.

7 Tariff group definition

The output of the TEC Model is a 'target revenue' for each tariff group. This tariff group target revenue is to be recovered via final network tariffs.

Our TEC Model has been constructed to reflect the customer, connection and pricing differences in the network tariffs that we prepare.

The following tariff groups have been used:

- unmetered;
- street lighting;
- uncontrolled energy;
- controlled energy;
- residential light and power (single rate);
- residential (time of use);
- commercial light and power (single rate);
- commercial (time of use);
- nursing homes;
- low voltage metered demand;
- irrigation;
- high voltage metered demand;
- high voltage negotiated; and
- embedded generation.

The rationale for adopting these tariff groups includes:

- the need to group customers on an economically efficient basis that adequately reflects customer characteristics;
- the impact that customers will have on the distribution network;
- recovering the costs of the distribution network on a basis which reflects the characteristics of the connected customer; and
- it groups like customers based upon their connection characteristics and their resulting metering requirements.

The use of the outlined tariff groups does not pose a restriction in terms of network tariff definition and development. A single tariff group may have multiple network tariffs or, alternatively, a tariff group may be covered by a single network tariff.

8 Allocation to tariff groups

The aim of the 'TEC to tariff group' process is to allocate or assign the network costs already allocated to customer groups to tariff groups in the most efficient way.

There are a range of allocators that are used and the selection of the appropriate allocator is based on the ability of the allocator to reflect the fundamental tariff outcome. We have adopted the allocators outlined below for the following reasons:

- **number of customers** – this allocator is deemed appropriate for those costs that are dependent upon or driven by the number of connected customers.
- **annual consumption or anytime maximum demand** – this allocator has been used to reflect the variable charge component included in our final network tariffs.

8.1.1 Unmetered

We have a single unmetered supply network tariff. Costs are therefore allocated 100 per cent to the unmetered tariff group.

8.1.2 Street lighting

We have a single street lighting network tariff. Costs are therefore allocated 100 per cent to the street lighting tariff group.

8.1.3 Uncontrolled energy

Our uncontrolled energy tariffs are available to both residential and commercial customers as a tariff in their own right or alternatively as a component of a time of use tariff.

The uncontrolled energy customer group is allocated to the residential (time of use), commercial (time of use) and uncontrolled energy tariff groups based upon the weighted average of historic consumption and customer numbers within this customer group.

The consumption within the residential (time of use) and commercial (time of use) is split between light and power, uncontrolled energy and controlled energy based upon the typical consumption of our residential and commercial customers.

8.1.4 Controlled energy

Our controlled energy tariffs are available to both residential and commercial customers as a tariff in their own right or alternatively as a component of a time of use tariff.

The controlled energy customer group is allocated to the residential (time of use), commercial (time of use) and controlled energy tariff groups based upon the weighted average of historic consumption and customer numbers within this customer group.

The consumption within the residential (time of use) and commercial (time of use) is split between light and power, uncontrolled energy and controlled energy based upon the typical consumption of our residential and commercial customers.

8.1.5 Residential (light and power)

Our residential tariffs are only available to residential customers as a residential light and power tariff or alternatively as a component of a time of use tariff.

The residential (light and power) customer group is allocated to the residential light and power (single rate) and residential (time of use) tariff groups based upon the weighted average of historic consumption and customer numbers within this customer group.

The consumption within the residential (time of use) is split between light and power, uncontrolled energy and controlled energy based upon the typical consumption of our residential and commercial customers.

8.1.6 Low voltage < 25 kVA

We have five tariff groups that fall within the LV < 25 kVA customer group, namely:

- commercial light and power (single rate);
- commercial (time of use);
- nursing homes;
- LV metered demand; and
- irrigation.

The LV < 25 kVA customer group is allocated to these tariff groups based upon the weighted average of historic consumption and customer numbers within this customer group.

8.1.7 Low voltage 25 to 70 kVA

We have five tariff groups that fall within the LV 25 to 70 kVA customer group, namely:

- commercial light and power (single rate);
- commercial (time of use);
- nursing homes;
- LV metered demand; and
- irrigation.

The LV 25 to 70 kVA customer group is allocated to these tariff groups based upon the weighted average of historic consumption and customer numbers within this customer group.

8.1.8 Low voltage 70 to 300 kVA

We have five tariff groups that fall within the LV 70 to 300 kVA customer group, namely:

- commercial light and power (single rate);
- commercial (time of use);
- nursing homes;
- LV metered demand; and
- irrigation.

The LV 70 to 300 kVA customer group is allocated to these tariff groups based upon the weighted average of historic consumption and customer numbers within this customer group.

8.1.9 Low voltage > 300 kVA

We have five tariff groups that fall within the LV > 300 kVA customer group, namely:

- commercial light and power (single rate);
- commercial (time of use);
- nursing homes;
- low voltage metered demand; and
- irrigation.

The LV > 300 kVA customer group is allocated to these tariff groups based upon the weighted average of historic consumption and customer numbers within this customer group.

8.1.10 High voltage < 2 MVA

The HV < 2 MVA customer group is allocated 100 per cent to the HV metered demand tariff group.

8.1.11 High voltage > 2 MVA

The HV > 2 MVA customer group is allocated 100 per cent to the HV negotiated tariff group.

8.1.12 Embedded generation

The embedded generation customer group is allocated 100 per cent to the embedded generation tariff group.

8.2 Cost allocation summary

Table 2 provides a summary of the tariff group allocation adopted in accordance with our established principles.

Table 2: Allocation of costs to tariff groups

	TEC Customer Group											
Tariff Group	**Unmetered**	**Streetlights**	**Uncontrolled energy**	**Controlled energy**	**Residential light & power**	**Commercial LV < 25 kVA**	**Commercial LV 25 to 70 kVA**	**Commercial LV 70 to 300 kVA**	**Commercial LV > 300 kVA**	**Commercial HV < 2 MVA**	**Commercial HV > 2 MVA**	**Embedded generators**
Street lights		100%										
Residential light & power single rate					84%							
Residential TOU					16%							
Commercial light & power single rate						80%	9%	3%	1%			
Commercial TOU			2%	15%		13%	41%	38%	9%			
Nursing homes						0%	0%	2%	3%			
Controlled energy				85%								
Uncontrolled energy			98%									
LV metered demand tariff						1%	7%	43%	78%			
Irrigation						6%	43%	14%	9%			
HV metered demand tariff										100%		
HV negotiated tariff											100%	
Unmetered	100%											
Embedded generation												100%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**