Policy and Regulatory Working Group (PRWG)

Consultation Paper 6

Date: August 2022

TasNetworks | Powering a Bright Future

Contents

Glossary

Term or Abbreviation	Meaning
ACS	Alternative control services
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
BEV[1]	Battery electric vehicle: Vehicles that are solely powered by electricity and do not have petrol, diesel or LPG engine, fuel tank or exhaust. They are also known as plug-in EVs as they use an external electrical charging outlet to charge the battery.
Cost reflective pricing	Pricing which is indicative of the true cost of supplying or providing a service
Customer group	A way of aggregating customers that share similar characteristics, such as usage and behaviour patterns.
DER	Distributed energy resources: This encompasses embedded generation, e.g. solar PVs, batteries, electric vehicles.
Default assignment	Refers to customers being automatically assigned to a specific tariff when either connecting to the network or when their characteristics change (please note: default assignment may occur at different times depending on the distribution network service provider's tariff strategy).
EV	Electric vehicle: A vehicle that derives all or part of their power from electricity supplied by the electric grid. They are powered by electricity rather than liquid fuels.
Embedded Network	Private networks which serve multiple premises and are located within, and connected to, our distribution network through a single connection point.
Embedded Network Customer	The end use customers within an embedded network. These customers are offered connection services and may purchase energy from within the embedded network.
Embedded Network Operator / Owner	The person or person(s) appointed to take care of procurement, billing, collection and customer service. The Embedded Network Operator is typically either the building owner or appointed by the building owner.
Flat rate tariff	A single fixed price for the use of the network, which does not vary with time of use.
HEV	Hybrid electric vehicle: Hybrid vehicles that do not plug-in are not considered an EV
HV	High voltage: High voltage means anything greater than low voltage, i.e. >= 1,000 volts. For the purpose of this document, high voltage commonly refers to electricity usage by large business customers.
ICE	Internal combustion engine:

[1] https://arena.gov.au/renewable-energy/electric-vehicles/

Term or Abbreviation	Meaning
	An engine that generates power by the burning of petrol, oil, or other fuel with air inside the engine.
LV	Low voltage: The National Electric Code considers voltages <1,000 volts to be low voltage. For the purpose of this document, low voltage commonly refers to electricity usage of small business or residential customers.
Mandatory assignment	Refers to a type of prescribed tariff assignment where customers must remain on the default network tariff the distributor assigns to them.
Minimum demand on the minimum demand day	The "minimum demand day" identified the day where there was the lowest amount of demand on the network over the financial year. The minimum demand is then the lowest amount of demand at a given point in time on that minimum demand day.
Network tariff	Network price components and conditions of supply for a tariff class
Obsolete	Obsolete network tariffs are no longer available to new installations or able to be applied to an existing installation not already assigned to the obsolete tariff.
Opt in	A type of tariff assignment that occurs when a customer notifies their retailer of their desire to opt into a particular network tariff.
Opt out	A type of tariff assignment that occurs when a customer notifies their retailer of their desire to opt out of a particular network tariff.
PHEV[2]	Plug-in hybrid electric vehicle: Plug-in hybrid electric vehicles are powered by a combination of liquid fuel and electricity. They can be charged with electricity using a plug but also contain an internal combustion engine that uses liquid fuel
Substation	Part of an electrical generation, transmission, and distribution system. Among other important functions, substations connect the high voltage transmission network and the low voltage distribution network – from which our residential customers and the majority of our business customers connect.
Tariff class	A class of retail customers with similar characteristics that are grouped together so that similar customers pay similar prices.
Tariff structure	Refers to the shape, form or design of a tariff, including its different components (or charges), as well as, in some cases, how they interact. Network tariff structures determine how a network operator calculates how much an individual customer is charged for using its network.
ToU	Time of use: A type of cost reflective tariff that applies different prices for electricity at different times of the day, week or year.

[2] https://arena.gov.au/renewable-energy/electric-vehicles/

1. Introduction

1.1. Purpose of this document

The purpose of this paper is to:

- explain the analysis which has informed setting of the demand threshold proposed for the residential network tariff for customers with distributed energy resources (**DER**);
- quantify the tiered capacity charges which are planned for the network tariffs for embedded network operators that were previously supported by the PRWG;
- explain proposed improvements in the way TasNetworks prices quoted services; and
- prepare the PRWG for a discussion about the topics of importance to customers in the coming regulatory control period, and the means by which TasNetworks might convey information to customers about those topics to inform their decision making.

1.2. Workshop objectives

It is intended that the August workshop of the PRWG will:

- validate the demand threshold proposed for the revised residential DER network tariff which is to be offered on an opt-in basis in the 2024-29 regulatory control period;
- bring to a conclusion the conversation about the new embedded network tariffs to be introduced in the 2024-29 regulatory period;
- test proposed improvements in the way TasNetworks prices quoted services (specifically, simplification of the labour rates used to recover the cost of TasNetworks personnel);
- seek PRWG input about the topics of importance to customers, plus when and how TasNetworks needs to reach customers during their decision making processes; and
- provide members of the PRWG with an understanding of a rule change proposal to enable the cost of the proposed Marinus Link undersea interconnector to be recovered from the beneficiaries.

1.3. PRWG objectives

The Policy and Regulatory Working Group (**PRWG**) supports the development and submission of TasNetworks' regulatory and revenue proposals by providing advice on regulatory framework issues, forecasts and pricing strategy development.

It is anticipated that there will be one further PRWG forum prior to TasNetworks submitting its regulatory and revenue proposal for the 2024-29 regulatory control period to the Australian Energy Regulator (**AER**) in January 2023. The final forum will be to receive feedback from the PRWG and other stakeholders on the proposed Tariff Structure Explanatory Statement (**TSES**) and Tariff Structure Statement (**TSS**).

2. Executive summary

As part of TasNetworks' ongoing transition to more cost reflective network pricing, the PRWG has been asked to consider a number of prospective network tariff reforms for TasNetworks' 2024-29 regulatory control period, including several new or revised network tariffs. Previously, the PRWG has been supportive of the introduction of a time of use, consumption-based network tariff aimed at residential customers who invest in DER, and endorsed the introduction of network tariffs for the operators of embedded networks.

In both cases, while the concepts, fundamental design parameters and assignment rules for the network tariffs were supported by the PRWG, further analysis was required by TasNetworks to quantify aspects of the new network tariffs. Specifically, the demand threshold that is to apply to the residential DER tariff was yet to be quantified, along with the tiered capacity allowances applying to the embedded network tariffs.

Since the PRWG accepted the need for an embedded network tariff and endorsed the idea of a tariff targeting customers with DER, analysis has been undertaken by TasNetworks of the present load characteristics of the residential and business customers that are likely to be assigned to these tariffs. Research has also been undertaken into the additional demands that those customers are likely to make of the distribution network in the future. That analysis has been used to quantify the unresolved tariff parameters and is presented in this paper, along with the demand threshold and capacity allowances which TasNetworks is intending to propose to the AER.

In both cases, the parameter values proposed by TasNetworks aim to strike a balance that enables customers assigned to the tariffs to realise the benefits of their investments, whether it be in DER or an embedded network, while ensuring they make cost reflective contributions towards the cost of the distribution network they share with other customers.

The other pricing reforms canvassed in this paper are intended to achieve greater consistency and equity in the pricing of quoted services.

During the course of TasNetworks' engagement with the PRWG, a consistent theme has emerged: the need to ensure customers are well informed when choosing the network tariffs to which they are assigned and when making decisions about their use of electricity. To that end, in one of the last PRWG workshops to be held before TasNetworks lodges its regulatory proposal for the 2024-29 regulatory period, the focus is on obtaining PRWG guidance about the topics of importance to customers, as well as how TasNetworks might best communicate with customers in order that they can make informed choices about their energy use. That feedback will play a critical role in informing TasNetworks' communication plans as it looks to power a bright future for our customers.

3. Pricing principles

At our June 2020 forum, members of the PRWG helped develop TasNetworks' pricing principles. These principles continue to guide our discussion regarding tariff reform and development.

Affordable

We offer an essential service and recognise that customers want affordability in the delivered cost of electricity. To support this we will ensure sustainable network investment and that particularly vulnerable customers will not be exposed to hardship as a result of our pricing or network tariff reforms.

Fair

We will provide transparent and cost reflective pricing signals so that all customers contribute to their portion of total network costs.

Simple

Our network pricing will be both cost reflective and easy for our customers, retailers and stakeholders to understand.

Consistent

We will avoid creating price shocks for customers and minimise upward pressure on the delivered cost of electricity.

Innovative

We will investigate innovative solutions that meet the changing needs of our customers and changes in technology.

Choice

We will not stand as a barrier for customers who invest in distributed energy resources, such as solar generation and battery storage. Our pricing will provide choice to our customers to best meet their energy needs, while not imposing on the needs of others or the network.

4. Standard Control Services

4.1. Residential DER network tariff

4.1.1. Our proposed amended DER network tariff

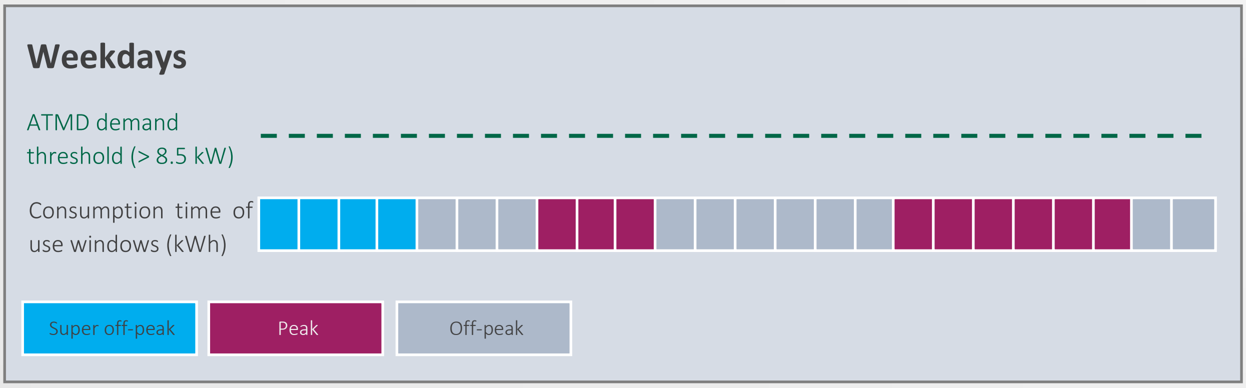
We are proposing an innovative additional choice of network tariff for residential customers, involving revisions to an existing network tariff which have been developed with the growing number of prosumers in mind. The proposed network tariff represents a cost reflective alternative to the default consumption based time of use network tariff (TAS93) to be made available through retailers, on an opt-in basis.

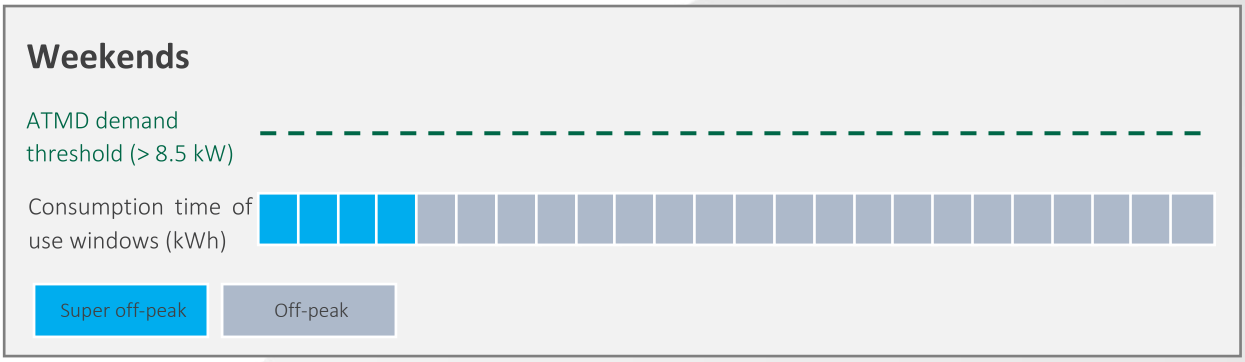
The network tariff is primarily a time of use consumption tariff, which from 1 July 2024 will include a new super off-peak period between midnight and 4:00 am, as well as a demand threshold that rewards customers who are able to keep their peak demand below an anytime maximum demand (**ATMD**) threshold. There are several key components to the proposed tariff:

- a super off peak period between midnight and 4:00 am on both weekends and weekdays, offering lower network charges than at other times of the day, including even off-peak periods
- a morning peak period between 7:00 am and 10:00 am, with an extended evening peak period between 4:00 pm and 10:00 pm on weekdays
- a demand threshold on any day (weekdays and weekends):
    - for any day on which the customer's daily ATMD remains below the demand threshold (i.e. ≤8.5 kW), no demand related charges would be applied.
    - for any day on which the customer's daily ATMD exceeds the demand threshold (i.e. >8.5 kW), an excess demand charge would be applied to the difference between the ATMD on that day and the demand threshold.

Figure 1 illustrates the time of use periods applying to the revised network tariff.

Figure 1 **Proposed structure of the residential time of use DER network tariff (TAS97)**

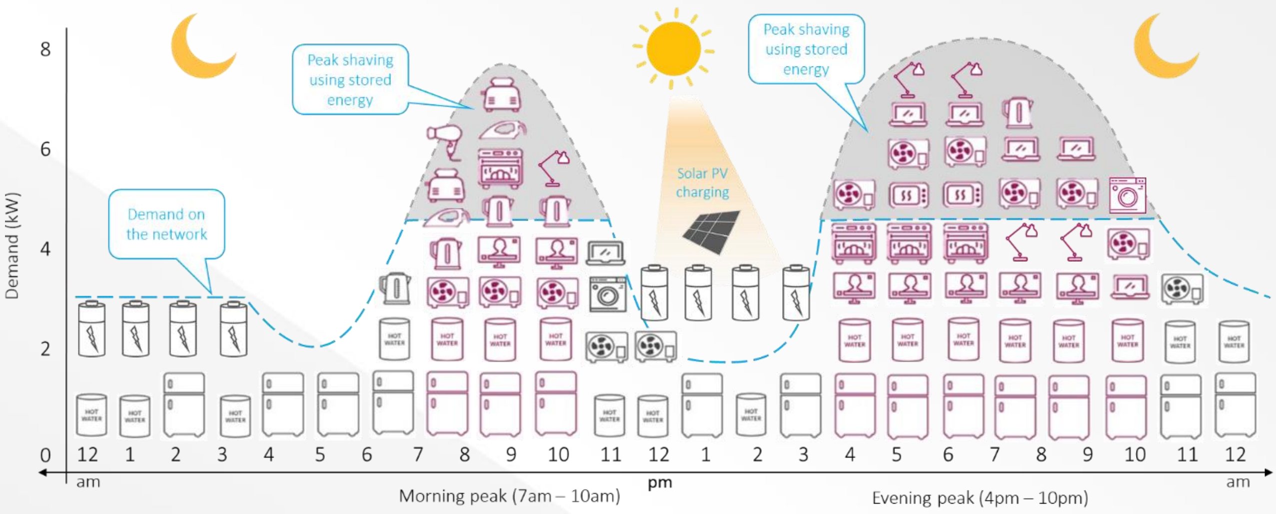




One of the purposes of the structure of the tariff is to encourage customers with EVs to charge their vehicles overnight and customers with household batteries to recharge their batteries overnight for use during peak periods – often referred to a 'peak shaving'. Customers who take advantage of the off-peak and super off-peak periods will potentially benefit from lower network charges. The reduction in peak demand on the network, or at least the lessening of growth in peak demand, made possible by the use of battery storage with the support of time of use network pricing, means that, in the longer term the distribution customer base on the whole will benefit from reduced augmentation of the network.

Figure 2 (below) illustrates the potential for customers with battery storage to use stored energy at peak times of the day when the delivered cost of energy on a time of use basis is at its highest, maximising the value of their batteries and the energy they generate themselves. The practice of peak shaving has the added benefit of potentially keeping customer's peak demand below the residential DER network tariff's demand threshold of 8.5 kW.

Figure 2 **Peak shaving using stored energy**



4.1.2. Use case: electric vehicles (EV)

Respondents to our DER Survey, both EV owners and non-EV owners, stated that they would predominantly charge electric vehicles at home – mostly overnight. This is consistent with the EV ownership experience which is emerging in other parts of Australia and overseas. However, it is noted that new EV owners tend to 'top-up' their battery more frequently than more experienced customers, possibly due to higher levels of range anxiety.

The rate at which an EV can be charged in a residential setting, and the level of demand that charging a vehicle will place on the network, is determined by a combination of factors, including the customer's connection characteristics (single or three phase), the plugs and chargers installed in their home, the size of the vehicle's battery and state of charge, as well as the maximum charge rates of the vehicle and the charger. Ambient temperatures also play a part in determining how much charge and, therefore, range, can be added to an EV over a given period. Table 1 (below) provides an indicative guide to the time it might take to add 60 kWh of energy to an EV's battery pack using a variety of the charging technologies which are available for use in residential settings, ranging from a 230 volt general power outlet to a 22 kW Level 2 charger.

Table 1 Types and levels of EV charging[3,4]

Type of EV chargers	**Level 1 "Regular electricity outlet"**		**Level 2 "Dedicated home EV charging point"**		
EV charging plugs (AC only)	230 volt AC up to 10A 2.3kW (single phase)	230 volt AC up to 15A 3.5kW (single phase)	230 volt AC up to 32A 7.2kW (single phase)	400 volt AC up to 16A 11kW (3 phase)	400 volt AC up to 32A 22kW (3 phase)
Time to charge 60 kW/h battery	26-34 hours	16 hours	8 hours	6 hours	3 hours

The distance an EV can travel on any given charge depends on a range of factors, including the weight of the vehicle, the efficiency of its electric drivetrain and the ambient temperature (EVs are more efficient and get slightly better range in summer conditions than in winter), driving style, tyre condition and pressure, road conditions and topography. As a result, the distance an EV might be able to travel using the charge illustrated in the above table might vary from approximately 230 km for an EV that uses 26 kWh per 100 km to 375 km for an EV that uses 16 kWh/100km.

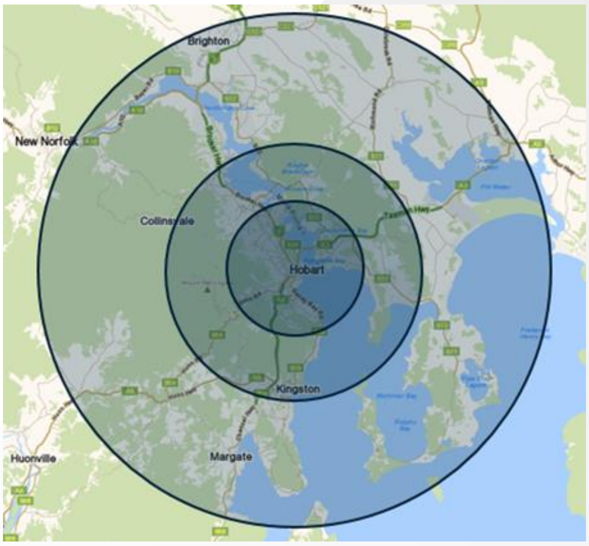
While much is made of range anxiety and the maximum range of different EV models, the reality for many people is that they infrequently travel distances approaching their vehicle's maximum range. Regular travel by private vehicle is likely to be limited to commuting and some incidental journeys in and around the population centre in which people live and work.

[3] https://www.egenelectrical.com.au/charging-guide

[4] https://electricvehiclecouncil.com.au/about-ev/charger-map/

Amongst Australian states and territories, Tasmania has a relatively disaggregated population and travel distances vary across the state. However, the majority of the population (approximately 70 per cent[5]) resides in urban areas. The following maps show examples of population centres around Tasmania, Launceston and Hobart, as well as the City of Burnie on Tasmania's North West Coast, and illustrate the sort of distances that commuters working in or near the centre of all three cities might travel in a day.

Hobart and surrounds

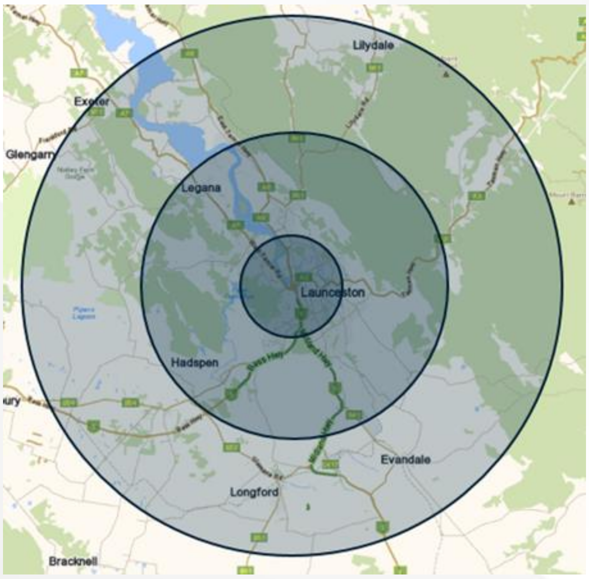


The inner suburbs of Hobart (represented by the inner circle) involve commutes of up to 10 km each way into central Hobart, and encompass places like Glenorchy, Mt. Nelson and Lindisfarne.

The outer suburbs involve commutes of up to 15 km, one-way, into central Hobart, a distance which takes in areas like Austins Ferry, Kingston, Cambridge and the Hobart Airport.

A number of 'dormitory' suburbs and towns in the greater Hobart area involve commutes of between 25-35 km, one-way, to reach central Hobart. This encompasses the towns of Sorell, New Norfolk and Brighton.

Launceston and surrounds

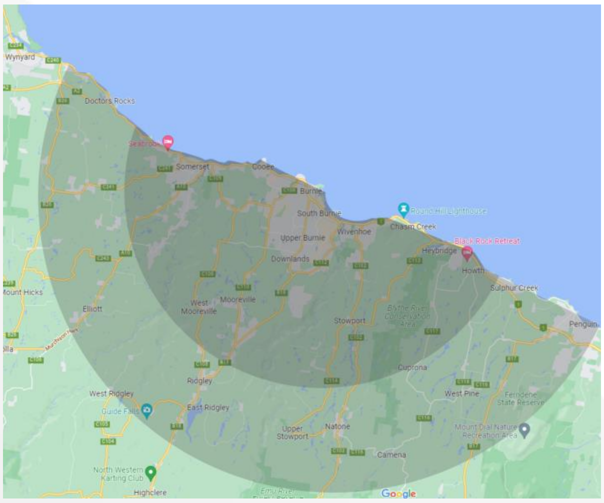


Launceston's inner suburbs (the inner circle) within 10-15 km of the city centre include the areas of Prospect Vale, Kings Meadows, Rocherlea and Riverside.

Launceston's surrounds, including the towns of Legana and Hadspen, are less than 25 km from the Launceston centre, with larger commutes of between 25 and 35 km including locations suchs as Evandale, Longford and Exeter.

[5] https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02016-17, Population estimates by SA2 and by significant urban areas (as at 2017)

Burnie and surrounds



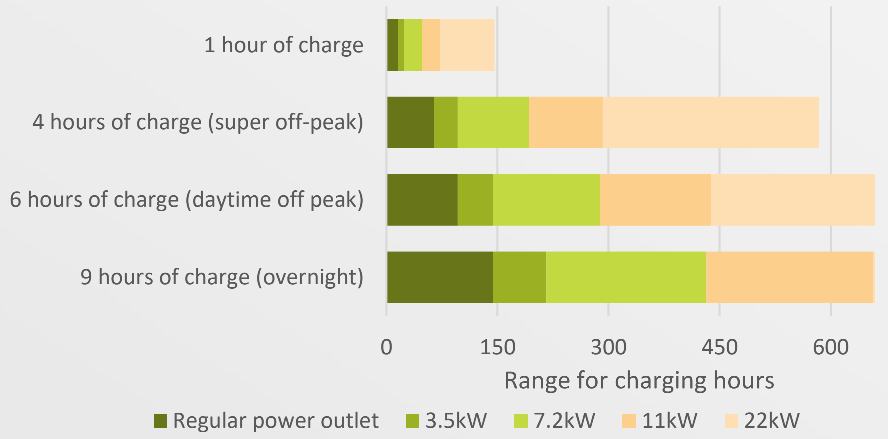
The City of Burnie occupies an area that can be described within a 10 km arc of the City's central business district, meaning that daily commuting within the City using an EV should be easily accommodated with overnight charging using a home charger during non-peak periods. As the crow flies, the towns of Cooee, Somerset, Stowport and Heybridge all fall within a 10 km radius of Burnie's centre.

Commutes of up to 15 km, one-way, would add the townships of Ridgley and Natone to the range that most EVs could travel daily with minimal overnight charging, with Penguin and Wynyard falling just outside a 15 km zone from Burnie's centre (noting that the illustration – which is only approximate – shows Penguin falling with 15 km of Burnie).

Devonport, the other City on the North West Coast is only 40 km from Burnie. For an EV which uses 18 kWh per 100 km, without making allowances for terrain etc., a round trip of 80 km between the two cities would consume in the order of 14-15 kWh, or about the amount of energy that a 7 kW Level 2 home charging station could add to an EV battery in about two hours.

It is acknowledged that some commuters will travel greater distances, in some instances over 100 km (return) a day[6]. Figure 3 shows that over four hours of charging at home using a 7 kW charger, a typical EV can add sufficient charge to its batteries to travel approximately 180 (or approximately 45 km of range per hour of charging). On this basis, the four hour super off-peak period which is to be a feature of the revised residential DER network tariff should afford the vast majority of EV owners with sufficient access to a lower delivered cost of energy to charge their vehicles enough to cater for everyday use and even, with some planning, journeys that require the battery to be fully charged.

Figure 3 **Estimated EV range for weekday off-peak or super off-peak charging[7]**



[6] Examples of commutes greater than 100km per day include Deloraine-Launceston, Bushy Park-Hobart

[7] https://thedriven.io/2021/07/29/how-much-will-it-cost-to-install-an-ev-charger-at-home/. Note: These times are estimates only and are not manufacturer endorsed. They assume a 15kWh/100km efficiency.

4.1.3. Use case: household batteries

Aside from encouraging customers with EVs to charge their vehicles overnight during the off-peak and super off-peak periods that, between them, offer lower network charges for nine hours on weekdays from 10 pm to 7 am, the residential DER network tariff has also been designed to maximise the financial benefits for prosumers who invest in battery storage as well as solar panels.

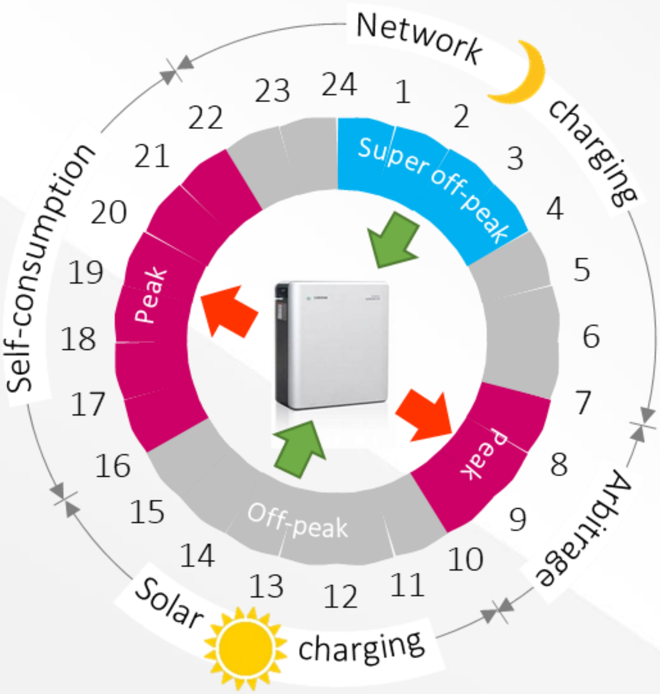
The time of use windows that apply to the residential DER network tariff help make it possible for prosumers to charge and discharge (or 'cycle') their batteries at least twice a day. If a prosumer with battery storage only does solar charging, their battery will cycle at most only once per day. Cycling a battery more than once a day by also drawing on the network for recharging can potentially reduce a customer's energy bills and shorten the payback period for their batteries, while at the same time reducing load on the network at peak times.

Prosumers assigned to the residential DER network tariff with appropriately sized solar panels and batteries will be able to:

- charge their battery overnight during the super off-peak period (and the off-peak periods on either side of the super off-peak period, if necessary),
- discharge energy from the battery during the morning peak period,
- recharge the battery using power generated by their solar panels during the day, and then
- discharge the battery again during the evening peak period, before repeating the same cycle the next day.

The following diagram (Figure 4) illustrates the interaction between the residential DER network tariff and the use of battery storage (and solar panels) to maximise the savings available to customers from time of use network pricing.

Figure 4 **Cycling battery storage using the residential time of use DER network tariff (TAS97)**



Using the battery, solar panels and network in this way potentially delivers value for the customer by:

- **Maximising the value of the energy generated during the day**

  The energy produced using a customer's solar panels during the day-time off peak period can be stored for self-consumption during the subsequent afternoon/evening peak, when electricity prices are at their highest – and significantly higher than the feed-in tariff that could be earned by the customer if they exported the energy they produce for use by others.

- **Minimising the cost of energy taken from the grid to charge the battery**

  By recharging the battery overnight, when the delivered cost of energy is at its lowest, the customer can effectively buy electricity at off-peak rates, store it in a battery and then consume that energy during the subsequent peak period, saving themselves the difference between the peak and off-peak retail electricity prices.

Taking advantage of the differences in electricity prices that occur at different times of the day in this manner is a form of 'arbitrage'. For a residential customer on a time of use retail tariff, assuming a differential between peak and off-peak periods of around 17.5 cents per kWh, if a customer with a 10 kWh battery were to fully charge their battery during the overnight off-peak period and discharge the battery completely during the subsequent morning peak period, without allowing for any efficiency losses, they would theoretically save $1.75 each day, or potentially around $635 a year.

If that same storage capacity were able to be recharged using solar panels during the course of the day, and the stored energy used during the subsequent evening peak, based on current peak retail pricing, the customer could conceivably save a further $3.33 each day, or just over $1,200 during the course of a year. Using the common rule of thumb that one kW of solar panels will produce around four kilowatt hours of electricity per day, in theory an array of only 3 kW in capacity might be sufficient to charge a 10 kWh battery. Solar yields in Tasmania are lower than on mainland Australia, however, and the amount of usable energy produced will also depend on a range of factors such as the orientation of the solar panels.

While in practice the actual results achieved may be something less than the above estimates, the use of the network to charge storage devices, rather than solely relying on solar panels, has the potential to unlock greater value from customers' investment in DER.

Energy can also potentially be discharged from the battery to keep a customer's demand below the 8.5 kW threshold applying to the residential DER network tariff, above which the customer would incur demand charges – or at least minimise any above-threshold demand if the customer is using an energy intensive appliance such as a level 2 home charger for an EV that draws more than 8.5 kW.

4.1.4. Anytime maximum demand threshold

The ATMD threshold for the residential DER tariff has been set at a level so as to not interfere with typical household load patterns. This gives consideration to the typical utilisation of household appliances, as well as heating and hot water requirements during winter.

Figure 5 (below) shows that around 94 per cent of households' current maximum demand during peak periods is less than or equal to the 8.5 kW demand threshold being proposed as part of the residential DER tariff. This means that for the vast majority of residential customers, if they were to opt-in to the residential DER network tariff, they would not need to modify their current use of electricity in any way to avoid incurring charges for exceeding the demand threshold. Of the small percentage (around 6 per cent) of residential customers that do exceed a maximum demand of 8.5 kW during peak periods, 70 per cent have a maximum demand of no more than 10.5 kW, meaning that that they would incur demand charges based on a difference of 2 kW or less between their metered demand and the residential DER tariff's demand threshold.

Figure 5 **Household maximum demand during peak periods**

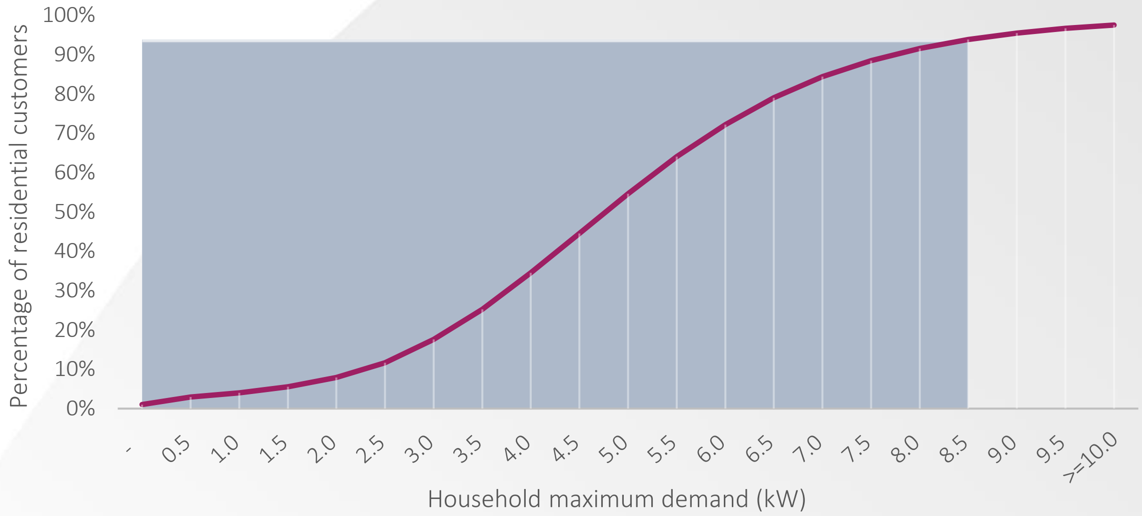
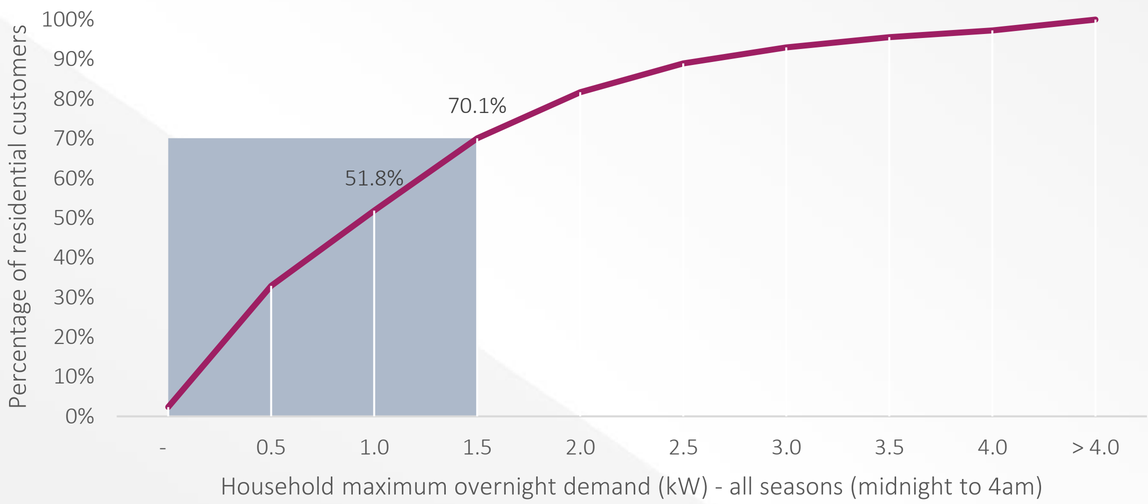


Figure 6 (below) illustrates maximum demand amongst residential customers from midnight to 4 am, which aligns with the proposed super off-peak period timeframe for the residential DER network tariff. The graph shows that just over 50 per cent of households have a maximum demand of 1.0 kW or less between the hours of midnight and 4:00 am, while approximately 70 per cent of households have a maximum demand of 1.5 kW or less during the same period. This suggests that the majority of residential customers could charge an EV using a 7.2 kW Level 2 charger during the proposed super off-peak period without exceeding the residential DER tariff's demand threshold or having to modify their use of electricity to keep demand under the threshold.

Figure 6 **Overnight maximum household demand (kW)**



The 8.5 kW ATMD threshold should provide sufficient 'headroom' overnight, when household energy use is usually at its lowest, to charge an EV during off-peak and super off-peak periods using a 7.0 - 7.5 kW charging station without exceeding the threshold. At that rate, four hours of charging during the super off-peak period alone should provide sufficient charge to cater for most customers' weekday commutes and journeys. Plus, a further five hours of off-peak period charging is available between

10:00 pm and 7:00 am the next day to add additional charge if greater range is going to be required in coming days, all without charging the EV during peak periods, when the delivered cost of electricity is higher.

It is important to note that if the ATMD threshold is exceeded, the demand charges that are applied to the difference between the customer's actual maximum demand and the threshold (the excess demand) are not intended to be punitive. As is the case with the higher network charges applied to energy consumed during peak periods on the network, the pricing applied to a customer's excess demand is merely intended to provide a cost reflective pricing signal to customers, that their usage of electricity is imposing greater demands and, therefore, additional costs on the network. In no way are customers on the residential DER network tariff being told through pricing signals that they shouldn't exceed the demand threshold – they just incur additional cost for doing so, which reflects the extra network capacity they are utilising.

Why not a time of use demand tariff?

TasNetworks introduced time of use demand tariffs on an opt-in basis for both residential and small business customers in 2017, but to date neither tariff has been incorporated by retailers into their retail tariffs. Those demand based network tariffs will continue to be available in the 2024-29 regulatory period. However, our expectation is that the primarily consumption-based DER tariff for residential customers being proposed for the 2024-29 regulatory control period will offer benefits for customers with DER that will make the tariff more appealing to retailers and customers alike than the earlier demand tariffs.

The economic case for introducing demand charges in residential network tariffs is well documented. Well-designed demand tariffs are considered by many economists and experts involved in the economic regulation of electricity networks to better reflect the demands that individual customers place on networks, and to allocate costs more equitably between customers than consumption tariffs. However, the concept of demand is arguably a more difficult concept for most residential customers to understand than consumption.

Time of use demand tariffs are a concept that many residential customers have difficulty understanding – even those that might be more engaged with managing their energy usage and generation. Concluding in mid-2019, our *emPOWERing You* trial tested residential customer's responsiveness to a time of use demand based network tariff and showed that participants found it easier to reduce consumption than to implement measures specifically aimed at reducing demand.

On an interval (time of use) basis there is also a direct link between consumption and demand, meaning that the pricing signals provided by a time of use consumption tariff are a good proxy for demand based time of use pricing. Amongst *emPOWERing You* participants there was a strong correlation between consumption and demand. For example, for the majority (73 per cent) of participants the direction of the change in their maximum demand recorded during winter aligned with changes in their consumption.

In practice, network tariffs are required to strike a balance between cost-reflectivity and a range of competing tensions, such as equity, simplicity and technological neutrality. This can mean some design elements that might increase cost reflectivity may not be practical or meet with customer support.

The correlation between changes in consumption and demand suggests that if customers are willing and have the capacity to respond to time of use pricing signals, rather than relying on demand based time of use tariff, changes in network peak demand could be achieved using a consumption based time of use tariff, which has the advantage of being better understood by customers.

Why not a controlled load tariff?

Many Tasmanians are familiar with the concept of a controlled load tariff – if not the terminology – through their exposure to the off-peak tariffs which have been available to Tasmanians for many decades. The defining characteristics of controlled load tariffs are that electricity is only supplied for a specific end-use (e.g. hot-water heating and (storage) space heating) and for a limited number of hours each day, usually at a lower price than electricity supplied at other times of the day. Controlling load typically requires dedicated circuits in the customer's premises that are separately metered.

Traditionally, electricity distributors have been responsible for electing which hours electricity is supplied under controlled load arrangements as a means of limiting peak demand on the network. In the past, time-clocks were used to control load on a set and forget basis, although other techniques exist and advanced meters now potentially make dynamic control of load possible.

In theory, a controlled load network tariff could be used to allow EV owners to connect a charging station in their home's garage to their meter box, via a dedicated circuit, giving access to a lower delivered cost of electricity for charging EVs at times that don't add to peak demand on the network. TasNetworks does not, however, consider that a controlled load tariff for EV charging represents a better solution than uncontrolled time of use network tariffs.

The use of controlled load arrangements and their reliance on separate circuits and metering may result in additional costs for the customer, including increased charger installation costs and additional supply charges and metering costs.

Controlled load tariffs also prevent customers from using energy at certain times of the day. This means customers may not be able to charge their EVs at times that suit them more than the charging periods offered under a controlled load arrangement, or charge their vehicle for unplanned or urgent trips.

Smart charging technology is increasingly putting load control into the hands of the customer, making it easier to respond to time of use pricing. Some EVs also feature on-board charging timers, which can be set to charge (or not) at various times, with those settings even able to be made location specific.

Lastly, because the time of use network tariff for residential customers with DER will apply to all the electricity a household consumes, rather than just the electricity supplied to a particular circuit and end use, customers will be able to take advantage of features such as the super off-peak period to do things other than charge an EV, like charge stationary batteries or power energy intensive appliances.

4.2. Embedded Networks

4.2.1. Review

Embedded networks are private networks that serve multiple premises located on the same property, which is typically connected to the distribution network through a single connection point. The electricity that flows through this point is purchased by the embedded network operator and on-sold to its customers. The customers of an embedded network are not customers of TasNetworks and neither their metering data nor any information relating to their metering identifiers is visible to TasNetworks.

Sites that might lend themselves to being set up as embedded networks include shopping centres, retirement villages, apartment complexes and caravan parks. In the case of a shopping centre set up as an embedded network, the shopping centre owner or managing agent might be the embedded network operator and the individual shops within the shopping centre the members of the embedded network.

Whilst embedded networks may be less common in Tasmania than interstate, in recent years TasNetworks has observed an increase in the level of interest from property owners and property developers in the use of embedded networks. Many of those enquiries have been from businesses in other states that specialise in embedded network management.

TasNetworks has previously identified the risk that, without a specifically designed network tariff, the operators of embedded networks (and, indirectly, the members of their embedded networks) may avoid making an equitable contribution towards the cost of the distribution network, resulting in these costs being borne by other customers.

For the 2024-29 regulatory control period, TasNetworks has proposed, and the PRWG has recognised, that dedicated embedded network tariffs could be used to ensure that equity outcomes are protected for *all* customers, while still offering embedded network owners and their customers the scope to reduce their network charges overall, by virtue of sharing a connection with the distribution network.

4.2.2. Proposal for new tariffs in 2024-29

Building on the guidance provided by the PRWG and other stakeholders, we now propose to introduce two purpose-designed embedded network tariffs in the 2024-29 regulatory control period. One network tariff will be applied to embedded networks connecting to the distribution network at low voltages while the other will apply to embedded networks connecting at high voltage.

Consideration was given to a third embedded network tariff that would have been assigned to embedded networks connecting on the low voltage network that have residential customers within their embedded network. However, detailed examination of load data for the sort of properties that might be eligible for such a tariff revealed maximum levels of demand that were very similar to the demand characteristics exhibited by existing and prospective embedded networks servicing commercial customers – even though the load profiles may have been different. Therefore, the capacity tiers proposed for the network tariff being developed for embedded networks connecting at low voltage lend themselves to existing and prospective embedded networks that service residential customers. For this reason it was decided use a single tariff to apply to all LV embedded network connections.

4.2.3. Structures for our proposed embedded network tariff

Given the diversity of existing and prospective embedded network sites, our stakeholders have indicated a preference for any network tariff designed specifically for embedded networks to incorporate a capacity based charge, rather than the fixed daily service charges that form part of the network tariffs applied to more homogenous customer groupings. The PRWG has previously identified that a single fixed connection charge would not be flexible enough to support the range of embedded networks that might exist.

Charging embedded network operators for the network capacity required to service the aggregate demand of their customers is a way of ensuring embedded networks make cost reflective contributions towards the cost of the network. A network tariff specific to embedded network operators is also a means of ensuring that embedded networks also benefit from the costs TasNetworks avoids by supplying an embedded network through a single connection point, rather than each customer within the embedded network having their own connection. This approach, and the need to ensure embedded networks make a contribution towards the cost of the network that reflects the characteristics of their load and their connection to the network, has been informed by our engagement with the PRWG.

To ensure the proposed tariffs recover the revenue allocated to the tariff in the most efficient way possible, it is proposed that the embedded network tariffs will have three components (see Figure 7):

- **Service charge** – a tiered daily charge based on the expected any-time maximum demand[8] of an embedded network at the embedded network's connection point with the distribution network;
- **Demand charge** – based on the maximum amount of energy used by an embedded network at a given moment during a particular period (calculated as an averaged maximum demand, to avoid customers' charges being based on momentary spikes in usage); and
- **Consumption charge** – a volumetric charge based on the energy consumed by an embedded network as a whole (and delivered to the embedded network via the distribution network).

Figure 7 **Embedded network tariff charging components**

The tiered service charge will recognise that embedded networks are a diverse group of customers, with significant differences in the connection capacity and network capability required to support each embedded network (with demand being the principal driver of that capacity), whereas relatively homogenous groups of customers, such as residential customers, lend themselves to the use of fixed service charge, which is applied to every customer on the same network tariff. The tiered arrangement is intended to provide more flexibility and greater cost-reflectivity than a fixed daily charge. Table 3

[8] TasNetworks will undertake a review of the demand for embedded networks each year to ensure customers are assigned to the correct service charge tier. This will ensure that the service charge reflects changes in the load or connection characteristics of an embedded network that might arise, for example, as a result of growth within the embedded network or changes in the embedded networks' reliance on the distribution network due to the deployment of DER within the embedded network.

(below) sets out the tiers associated with the service charges that will be applied to embedded networks connected at both low and high voltages. Customers assigned to the low voltage network tariff for embedded networks will be catered for by a range of four capacity tiers, whilst the network tariff for embedded networks connecting at high voltage will feature two capacity tiers.

Table 2 Proposed capacity tiers for connected embedded networks

Tier	Low Voltage (LV) Capacity	High Voltage (HV) Capacity[9]
Tier 1	0-100 kVA [0-140 Amps]	0-750 kVA [0-1,000 Amps]
Tier 2	100-300 kVA [140-400 Amps]	750+ kVA [1,000+ Amps]
Tier 3	300-750 kVA [400-1,000 Amps]	n/a
Tier 4	750+ kVA [1,000+ Amps]	n/a

4.2.4. Embedded network tariff assignment

The new embedded network tariffs will be assigned to all new embedded networks connecting to the distribution network on or after 1 July 2024.

TasNetworks' tariff assignment rules will not make it mandatory for existing embedded networks to move to the new embedded network tariff. Existing embedded networks will be permitted to remain on the network tariff they are assigned to as at 30 June 2024. However, if existing embedded network customers choose to change network tariffs after 30 June 2024, their only option will be to opt-in to the embedded network tariff which is most suited to their network connection, and once assigned to an embedded network tariff, an embedded network may not revert to a non-embedded network tariff.

While most embedded networks are served by a single connection to the distribution network, some larger sites, such as a large shopping centre, may potentially have multiple connections to the distribution network. Under these circumstances, each connection will need to be assigned to an embedded network tariff, meaning that the capacity charge, as well as the volumetric and demand based charges, will apply to each connection.

It would have been reasonable to consider creating a new stand-alone tariff class for embedded networks. However, we have deemed that it is appropriate to place embedded networks within existing tariff classes. The main reason for doing this are:

- The synthesised embedded networks' usage profiles used to simulate customer outcomes under an embedded network and the nature and extent of their usage or intended usage of distribution services are similar to customers currently within the existing tariff classes to which we propose to assign the new tariffs.

[9] The amps shown reflects the capacity of the low voltage connection of the transformer.

- The proposed tariff assignment rules will not make it mandatory for existing embedded networks to move to the new embedded network tariff. The new tariff will only apply to new embedded networks. As a result, there will be new embedded networks assigned to the new tariffs while some incumbent embedded networks might remain assigned to their current tariffs under existing tariff classes (unless the incumbent embedded network operators choose to change network tariffs). Incorporating embedded networks within existing tariff classes will ensure that customers with similar characteristics will continue to be grouped together in the future.

Embedded networks are sufficiently 'different' as customers of the distribution network that they require a new dedicated tariff class. Using the profiles of our synthesised embedded networks, we propose to place the new embedded network tariffs into the following tariff classes:

Table 3 Assignment of our proposed new embedded network tariffs to tariff classes

Embedded network tariff	Proposed tariff class
LV business embedded network	Low voltage large business
HV business embedded network	High voltage large business

5. Alternative Control Services

5.1. Quoted services

Quoted services are services provided by TasNetworks where the nature and scope of the job is specific to an individual customer's needs and can vary between customers. It is, therefore, not possible to set generic fixed fees in advance for these services. In the case of ancillary network services that are non-standard in nature and, therefore, provided on a quoted basis, the prices charged to customers are based on an AER approved methodology, which allows TasNetworks to recover the directly incurred costs for labour, contractors and material involved in providing the service.

Whilst we are not proposing to change the methodology for pricing quoted services during the 2024-29 regulatory control period we have, however, undertaken a review of quoted services labour categories.

TasNetworks has 42 internal labour categories, covering all employees from field apprentices to our CEO. Approximately 50% are used to directly deliver quoted services. For the current regulatory period, these were mapped to 16 labour categories for which we proposed and the AER approved hourly rates. We've found that due to similarities between some of these categories it can be difficult for customers to understand what tasks are completed by the different labour categories.

For the upcoming regulatory control period we are proposing to cluster internal categories used for quoted services based on performing like tasks. For example, the 'field worker' category includes all staff that perform electrical work. This has allowed us to reduce the number of proposed labour categories to eight, removing skill set duplication whilst still allowing for labour rate diversity.

By clustering labour categories by the type of work they complete there is less confusion around the category of worker required for each task, reducing complexity for customers and improving transparency of the labour costs of providing quoted services.

Table 4 Proposed quoted services labour categories

Proposed	Internal categories include
Labourer	Field Construction Officer and Locations Officer [Field Workers who do not perform electrical work]
Administration	Customer Service, Project Support Officer [Office based staff not otherwise covered]
Field Worker	Linesman, LV Cable Jointer, Electrical Technician, Dual-Trade Elec/Line worker, Live Linesman [Field Workers who perform electrical work]
Designer	Designer
Construction Coordinator	Site Manager, Scheduling, Field Coordinator, Team Leader, Project Manager Distribution
Distribution Operator	Switching Operations, Distribution Operations
Project Administration	Customer Experience, Land Access & Approvals [More specialised office based]
Engineer	Engineer and Protections and Control Technical Officer

5.2. Distribution Connection Policy

TasNetworks is licensed to provide distribution customer connection services in accordance with the provisions of various electricity laws. Customer connection services are customer initiated services, or works associated with the:

- establishment of a new connection to TasNetworks' distribution network;
- modification of an existing connection to TasNetworks' distribution network; and
- extension or augmentation of TasNetworks' distribution network in support of a new or modified connection.

TasNetworks' Distribution Connection Policy establishes the requirement for the provision of customer connection services, sets out the circumstances in which TasNetworks will require a connection applicant to pay a connection charge and establishes the basis for determining those charges.

We are reviewing our Distribution Connection Policy to ensure its continued suitability, along with its alignment with customer expectations and compliance obligations.

The following table outlines TasNetworks proposed Distribution Connection Policy amendments.

Table 5 Distribution Connection Policy proposed amendments

Policy position	Proposed amendment
Asset relocation services, the relocation of existing network assets.	Review of accumulated depreciation subsidy underway, further information below.
Incremental revenue rebate (**IRR**), a rebate recognising the additional future revenue from the connection.	Residential calculation updated to use the proposed default time of use (**ToU**) tariff, further information below.
Distributed Energy Resources and Export Limits, new AER guideline will address treatment of DER connections.	Guideline to be published in November 2022, requirements will need to be considered as part of Policy update
Augmentation threshold and rate methodology, the maximum demand threshold under which applicants are not required to pay augmentation costs.	No change to existing policy
Connection types, basic or negotiated connections.	No change to existing policy
Charging principles, the principles used to guide the policy	No change to existing policy
Developer mains scheme, a scheme to reimburse for customer funded work which will be used by another customer	No change to existing policy
Other connection related services i.e. public lighting, above standard services etc..	No change to existing policy.

Incremental Revenue Rebate

Each connecting customer that provides additional revenue in the form of ongoing network charges will receive a rebate or a reduction in their connection charges to reflect this future revenue stream. This is known as an incremental revenue rebate (**IRR**).

With flat rate network tariffs[10] being proposed as obsolete for the next regulatory control period, we have updated the IRR to utilise the proposed default residential time of use tariff. Our analysis indicates there is no material change to customer outcomes from the updated IRR calculation.

Table 6 IRR Proposal customer impact

Rebate based on flat rate tariff (2022-23 Residential general and hot water (TAS31/41))	**Rebate based on time of use tariff** (2022-23 Residential time of use (TAS93))
$529.12	$530.76

Asset Relocations

In some instances, providing a connection service requires the relocation of existing components of the distribution network (such as poles).

The provision of this relocation service is in addition to the connection service, and attracts an additional charge for the connection applicant. Asset relocation services are also commonly requested by parties other than a connection applicant, such as a road authority or local council.

The Distribution Connection Policy provides guidance on the treatment of costs when an applicant, including parties not requesting a connection service, require the relocation of distribution network assets.

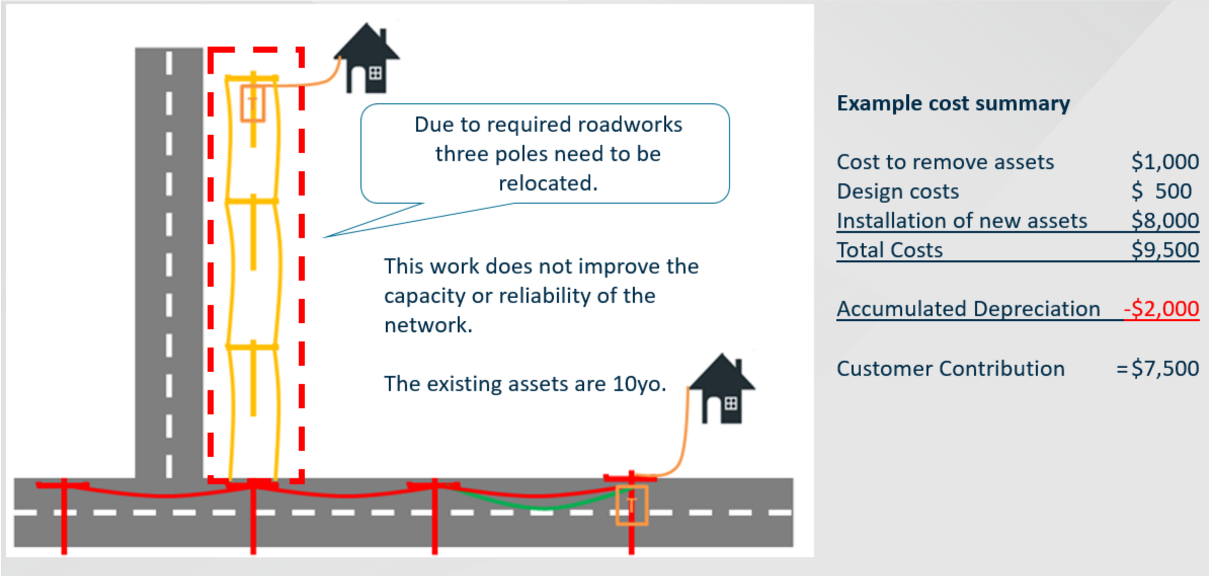
When calculating the customer contribution to a requested asset relocation, TasNetworks separates the work in to:

- what is dedicated for that particular customer as an alternative control (quoted) service; and
- work that is required on the shared network as a standard control service.

Under the current policy the customer contribution towards the cost of new distribution network assets is reduced by the value of the accumulated depreciation of the removed assets. As this is a standard control service this reduction is funded by the general distribution customer base.

[10] TAS31 residential general, TAS41 residential hot water and TAS22 business general

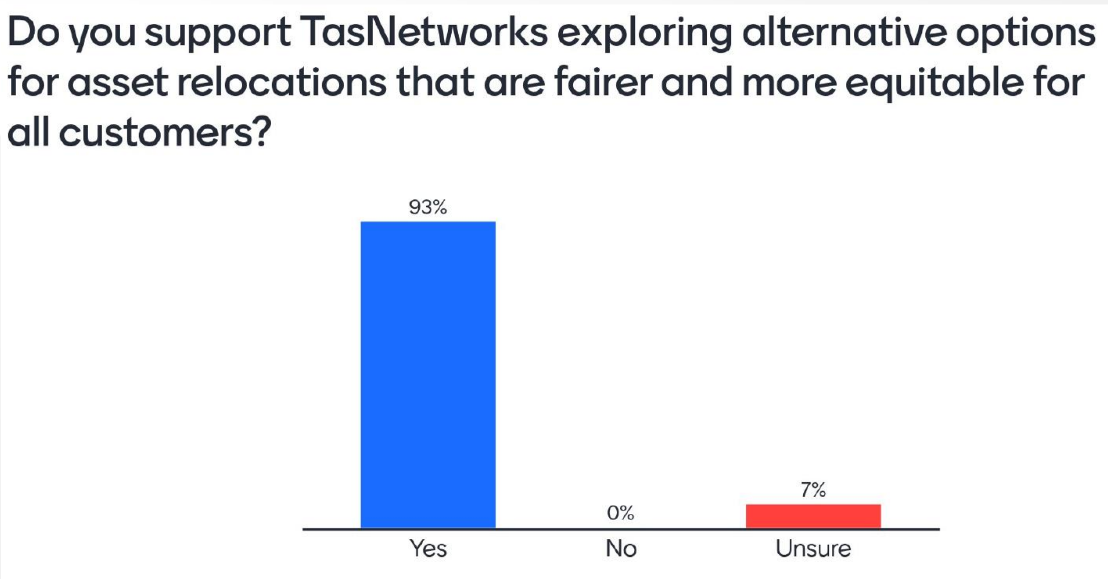
Figure 8 **Asset relocation example**



Engagement

TasNetworks recently engaged with the Local Government Association of Tasmania (**LGAT**) on the topic of asset relocations. We presented the above information and asked for feedback on if participants support TasNetworks exploring alternative options for asset relocations, the results of which are presented below.

Figure 9 **LGAT engagement response**



TasNetworks proposal

For the upcoming regulatory control period TasNetworks is proposing to remove the accumulated depreciation subsidy, as this subsidy is funded by the broader customer base and not aligned with the principle of cost reflectivity. The proposed change will also ensure that more efficient pricing signals are provided to the parties that request asset relocations in the future.

6. Engaging with our customers

6.1. Background

TasNetworks would like to help customers make more informed decisions about the network tariffs to which they are assigned and their use of electricity. Our stakeholders have told us that network tariff reform needs to be accompanied by a strong communication and education program for customers. They also consider that working with retailers is important.

To date, we have identified a number of complementary measures that we could take during the 2024-29 regulatory control period to better inform customers, including:

- providing updated information;
- making the information available from TasNetworks easier for customers to access; and
- partnering with third parties to leverage their relationships with our customers.

To help customers make informed decisions about their energy needs, we have already updated our website, including developing a new section about electric vehicles and EV charging. This provides an overview of key information for those customers interested in purchasing an electric vehicle.

This is just one example of the sort of complementary measures that we might employ during the 2024-29 regulatory control period to improve the information we provide to customers and make it easier to access.

6.1.1. The 'What'

As we've worked together with the PRWG on our plans for the 2024-29 regulatory control period, we've thought about a wide range of tariff and pricing related topics. We've considered:

- Pricing principles
- Customer equity
- Advanced meters
- Time of use tariffs and network utilisation
- Demand and demand based tariffs
- Default tariff assignment
- Distributed Energy Resources, including embedded generation, batteries and EVs
- DER tariffs
- Export pricing
- Embedded network tariffs
- Obsolete network tariffs
- Customer impacts
- New connections
- How TasNetworks' prices quoted services

The question is: Based on your understanding of these and other issues, as well as your own experience as customers or customer advocates, what are the topics that are going to be of greatest interest and importance to our customers in the coming regulatory period?

6.1.2. The 'Who'

There are over 298,000 households, businesses and institutions in Tasmania that take their supply of electricity from the network of poles, wires and underground cables which make up the electricity distribution network. Amongst those customers you will find varying degrees of interest, understanding and engagement in relation to the management of their use of electricity.

Our customers include sophisticated prosumers, innovators and early adopters, customers who actively manage their consumption of electricity, customers that prefer to 'set and forget' as well as vulnerable customers. And they exhibit varying degrees of engagement in the management of their electricity – which can vary over time for individual customers depending on their prevailing circumstances.

The question is: Who is it that TasNetworks needs to reach in relation to the topics identified as being important to our customers in the coming regulatory period? Is it our customers (and which ones) that we need to reach directly or is our audience not our customers directly, but the intermediaries and/or influencers that our customers look to for information and advice?

6.1.3. The 'How'

Customers and stakeholders have told us that they first seek information on their energy needs, particularly about DER technology, through parties other than TasNetworks. In relation to EVs, for example, after family and friends, respondents to our DER survey cited the internet as a major source of information on EVs, along with car retailers and the RACT. Some respondents mentioned specific websites such as the AEVA website and Tesla's site.

The results of our DER survey suggested that only a small proportion of residential and small business customers consider TasNetworks (6 per cent of respondents) and electricity retailers (3 per cent of respondents) as potential sources of information and advice in relation to their energy use.

On this basis, we consider that, in addition to TasNetworks' own communications, a successful communication plan in relation to network tariff reform and pricing will require cross-industry cooperation and is likely to involve third parties acting in partnership with TasNetworks or as our intermediaries.

During the 2019-24 regulatory control period we have been partnering with the Australian Energy Foundation to run a series of webinars related to managing household energy needs. This series has covered topics such as reducing hot water costs, understanding DER technology and efficient heating options. We have had a positive response to the webinars, which have been well attended and generated additional visits to our website.

In 2024-29, we are looking to continue partnering with the third parties that our customers rely on for information about their household or business' energy needs, including our partnership with the Australian Energy Foundation.

The question is: Who should TasNetworks partner with or seek to use as intermediaries, in order to provide accurate and useful information and advice to customers? And if TasNetworks is making information available directly to customers, what channels should we be using to reach them?

7. TasNetworks tariff strategy progress

	Status	Completed on
Pricing principles	Reviewed	PRWG meeting June 2020
Tariff assignment rules	Reviewed	PRWG meeting July 2021
Tariff trial principles	Co-designed	PRWG meeting July 2021
Tariff trial options	Identified	PRWG meeting July 2021
Time of use consumption periods review	Co-designed	PRWG meeting April 2022
Embedded network tariffs	Ongoing	
Review of residential DER tariff (TAS97)	Ongoing	
DER – tariff trial engagement	Informed	PRWG meeting April 2022

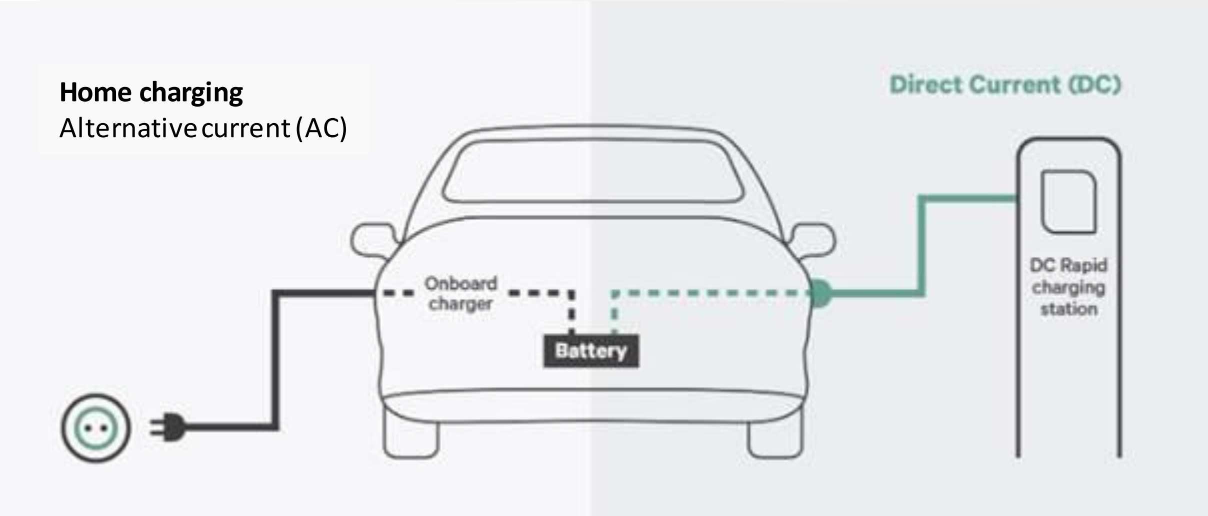
Appendix A. Home electric vehicle charging technology

There are two types of chargers used in EVs – one powered by alternative current (AC) and one by direct current (DC). The power that comes from the grid to your home is AC, however batteries, similar to the ones used in EVs store power as DC. Inverters are usually built into electronic devices to convert power from AC to DC – this happens for smart phones as well as EVs.

The inverter in your EV is referred to as the "on-board charger", converting the AC current from your home into a DC current for your EV battery. Unlike the large DC chargers found at rapid charging stations – which can feed electricity straight into your EV battery, bypassing the on-board inverter – EV home chargers delivery AC power between 3.6-22 kW to the on-board battery management system of the vehicle, through either a portable or hardwired EV charger.

Converting the charge from DC to AC slows the rate of charge, reducing the amount of heat generated through charging, helping maximise battery life.

Figure 10 **How home charging differs from public rapid charging stations**



There are two types of chargers available for home charging:

- **Level 1** chargers are small and portable and are commonly plugged into a home power point. Note that the plug that these chargers are plugged into should be protected with a safety switch to protect against shocks and faults.
- **Level 2** chargers are supplied by a dedicated home EV charging point that are hardwired into your home. These chargers deliver more power (amps and voltages) decreasing the charge time to your vehicle.

The type of charger used in your home will determine the speed at which your EV will charge and the amount of energy, or demand it will place on the network (Table 1, page 10).