



Western Power

**Bi-directional Reference
Service and Associated Tariff**

DRAFT

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This report contains 51 pages*

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1 Executive Summary

Network Advisory Services (NAS) has been engaged by Western Power to define a new reference service and reference tariff for distribution users with bi-directional energy flows due to small scale embedded generation, for inclusion in Western Power's Access Arrangement. This report:

- Sets out the background to, and analysis of, various options relating to the provision of a bi-directional service by Western Power; and
- Recommends a reference service for Western Power to consider in lodging its revised Access Arrangement, which takes into account operational factors specific to Western Power.

Western Power's South West Interconnected Network (SWIN) in the South West Interconnected System (SWIS) is regulated by the Economic Regulation Authority (ERA) in accordance with the *Electricity Networks Access Code 2004* (the Code). In accordance with the Code, Western Power lodged proposed revisions and a revised Access Arrangement Information for the SWIS with the ERA on 1 October 2008.

The ERA undertook public consultation in late 2008 in relation to Western Power's proposed revisions to the Access Arrangement. A submission from Synergy to the ERA, dated 17 December 2008, stated that there was a need for Western Power to "provide a reference service at a connection point where electricity is 'likely to be transferred' both into and out of the network". Synergy submitted that such a reference service was required for the use of small scale renewable energy systems and that in this regard Western Power's proposed revisions to the Access Arrangement did not meet the requirements of the Code.

The ERA released its Draft Decision on Western Power's proposed revisions to the Access Arrangement for the SWIS in July 2009. In its Draft Decision, the ERA recommended that the proposed Access Arrangement be amended such that one or more reference services provide for single connection points to function both as entry points and exit points, i.e. a bi-directional reference service.

In undertaking this task, NAS considered:

- The current arrangements in Western Australia for bi-directional supply;
- The requirements of the Code;
- Western Power's Technical Rules;
- The current reference services and feed-in-tariffs on offer in the SWIN (primarily the renewable energy buy-back scheme (REBS) currently offered by retailer Synergy);
- Western Power's proposed Access Arrangement;

- Synergy's submission to the ERA regarding Western Power's reference services;
- The requirements of the ERA's required draft decision amendment;
- The likely impact on the REBS; and
- Western Power's current bi-directional services.

Following discussions with Western Power, the following technical aspects of the reference service have been agreed to be that:

- The service will be titled "*Energy (Residential) - Bidirectional Service*";
- The description of the service will be "*A bidirectional service combined with a connection service and a standard meter service at a bidirectional point on the low voltage (415 volts or less) distribution system*"; and
- Customer's will be eligible to receive the service if:
 - The bi-directional point that the service was being sought at is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections;
 - The customer's inverter system complies with the requirements of AS 4777 and the Technical Rules;
 - The customer's facilities and equipment comply with the Technical Rules, the WA Electrical Requirements and AS3000; and
 - The metering equipment installed is capable, as determined by Western Power, of meeting the bi-directional service criteria.

Having agreed on the technical aspects of the reference service and following further discussions with Western Power, four Options were determined for the associated reference tariffs to apply at the customer's bi-directional point:

1. The status quo – being the assignment of existing network tariffs to new customers at bi-directional points on the same basis as is currently carried out by Western Power. Existing customers who install small scale embedded generators at bi-directional points would retain the same network tariff they were paying before they installed the embedded generator at that connection point. In almost all cases, given that customers of the REBS are residential customers, this would be either RT1 or RT3 as set out in Western Power's tariff schedule;
2. To design and apply a seasonal demand tariff to customers at bi-directional points;

3. To design and apply a variation to RT3, being a time of use tariff, to customers at bi-directional points; or
4. To design and apply a variation of RT1, being a usage based charge, to customers at bi-directional points where the difference between the new tariff and RT1 was that the new tariff would be at a higher rate to compensate for the reduced network electricity consumption.

These Options are discussed in detail in section 4.2 of this Report.

Western Power requested that NAS consider the network tariff options against the following criteria. Ensuring:

- That the tariff is cost reflective for both the transmission and distribution networks, as required by Chapter 7 of the Code;
- There are no cross subsidies between customers with and without embedded generation, as required by Chapter 7 of the Code;
- There is administrative simplicity;
- Reference service design does not set up any unreasonable barriers to entry such as high up-front cost; and
- Compatibility with the REBS.

The assessment criteria are discussed in detail in section 4.3 of the Report.

Following a review of the Options against the criteria – and having regard to the Code, the *Electricity Industry Metering Code 2005* and Western Power's pricing principles, existing tariff design process, existing reference tariffs, sustainability policy, and metering and tariff modelling capabilities – NAS formed a view that Option 3, the time of use network tariff, is the most suitable of the Options under consideration when examined against the assessment criteria. This is because:

- Depending on the design of the tariff, it is more reflective of the cost imposed on the network by the customer than both Option 1 and Option 4, although being consumption based it is still less cost reflective than the demand based tariff of Option 2. Further, the differentiation between on-peak rates and off-peak rates provides an incentive to the customer to alter consumption patterns to achieve cost savings;
- Depending on the design of the tariff, Option 3 may reduce or limit cross subsidisation;
- The tariff involves no change to the existing practices in the approval of the connection application and no changes to the metering and meter data collection processes. Although Option 3 is more administratively complex than

maintaining the status quo it is less complex than implementing the demand based tariff of Option 2;

- No additional barriers to entry or up-front costs are imposed on the customer by the implementation of the Option 3 tariff; and
- The Option 3 tariff is technically compatible with the REBS, although changes to the retail tariff offering may need to be made.

Further, the adoption of a variation to the time of use tariff that defines three tariff periods – on-peak, off-peak and shoulder – allows for greater cost reflectivity and additional scope for the customer to change consumption patterns to achieve further cost savings. Such a network tariff design would be similar to that employed by EnergyAustralia in New South Wales with its PowerSmart Home Rates, where the time periods are defined as follows:

- Off-peak is from 10pm to 7am everyday;
- Shoulder is from 7am to 2pm and 8pm to 10pm during working weekdays and from 7am to 10pm on weekends and public holidays; and
- On-peak is from 2pm to 8pm on working weekdays.

The form of the recommended reference service is therefore:

- Reference Service Name: Reference Service C1 – Time of Use (Residential) – Bidirectional Service;
- Reference Service Description: A *bidirectional service* combined with a *connection service* and a *standard meter service* at a *bidirectional point* on the low voltage (415 volts or less) *distribution system*;
- Technical Eligibility Criteria: *Users* are eligible to use this service if:
 - The bidirectional point is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections;
 - The consumer's inverter system must comply with the requirements of AS 4777 and the Technical Rules; and
 - The consumer's facilities and equipment comply with the Technical Rules, the WA Electrical Requirements and AS 3000;
- Metering Criteria: Installation at the bi-directional point of an interval meter approved by Western Power having capability for import and export channels and five register information collection;

- Applicable Reference Tariff: The applicable reference tariff is RT14 which is a new time of use tariff;
- Applicable Standard Access Contract: “Electricity Transfer Access Contract” published in Appendix 4 of the Access Arrangement; and
- Applicable Service Standard Benchmarks: As set out in Section 3.18 and 3.19 of the Access Arrangement.

Following consideration of this report by Western Power, we understand that:

- Western Power will invite feedback and comments from interested stakeholders on the draft recommendations through public consultation;
- This Report will be finalised taking into account stakeholder feedback on the reference services and associated reference tariffs; and
- Western Power will revise and submit its Access Arrangement to the ERA.

NAS gratefully acknowledges the cooperation and assistance of Western Power, its management and staff, in the preparation of this Report.

2 Introduction

2.1 Background

Western Power's South West Interconnected Network (SWIN) in the South West Interconnected System (SWIS) is regulated by the Economic Regulation Authority (ERA) in accordance with the *Electricity Networks Access Code 2004* (the Code). In accordance with the Code, Western Power lodged proposed revisions and a revised Access Arrangement Information for the SWIS with the ERA on 1 October 2008.

The ERA undertook public consultation in late 2008 in relation to Western Power's proposed revisions to the Access Arrangement. A submission from Synergy to the ERA, dated 17 December 2008, stated that there was a need for Western Power to "provide a reference service at a connection point where electricity is 'likely to be transferred' both into and out of the network".¹ Synergy submitted that such a reference service was required for the use of small scale renewable energy systems and that in this regard the proposed revisions to the Access Arrangement did not meet the requirements of the Code.²

The ERA released its Draft Decision on Western Power's proposed revisions to the Access Arrangement for the SWIS in July 2009. In its Draft Decision, the ERA recommended that the proposed Access Arrangement be amended such that one or more reference services provide for single connection points to function both as entry points and exit points, i.e. a bi-directional reference service.

2.2 Purpose and Structure of this Report

Western Power engaged Network Advisory Services (NAS) to define a reference service and associated reference tariff for distribution users with bi-directional energy flows due to small scale embedded generation, for inclusion in Western Power's Access Arrangement.³

This Report sets out draft recommendations with regard to the reference services and the associated reference tariffs. NAS understands that Western Power will make this Report public, and will seek the views of interested stakeholders in relation to the nature and form of the reference services set out in section 5. Following this consultation, and following the incorporation of relevant comments, the Report will be

¹ Synergy, 'Western Power's Proposed Revised Access Arrangement – Submissions on Reference Services', 17 December 2008.

² Synergy noted that it currently had 1800 customers with small scale renewable energy systems connected to the network and that this number was expected to increase significantly with the proposed introduction of the Western Australian Government's feed-in tariff scheme for small scale renewable energy.

³ Applies to small scale embedded generation connected via inverter systems rated up to 10 kVA for single phase connections and 30 kVA for three phase connections.

finalised and Western Power will revise and submit its Access Arrangement to the ERA.

The Purpose of this Report is therefore to:

- Set out the background to, and analysis of, various options relating to the provision of a bi-directional service by Western Power; and
- Recommend a reference service for Western Power to consider in lodging its revised Access Arrangement, which takes into account operational factors specific to Western Power.

The remainder of this report is structured as follows:

- Section 3 sets out existing Western Australian arrangements for bi-directional supply;
- Section 4 sets out the Options for designing remaining (tariff) aspects of the reference service;
- Section 5 evaluates the Options against criteria established by Western Power; and
- Section 6 sets out the conclusions and next steps.

2.3 Disclaimer

This Report has been prepared for Western Power to meet the Terms of Reference. The contents of this report pertain solely to the facts, circumstances and assumptions which were sourced by Network Advisory Services during the desktop review and discussions with Western Power. The conclusions drawn in this Report may not be valid if there is any change in the facts, circumstances or assumptions that have been made available to Network Advisory Services. Accordingly, while we believe that the statements made in this Report are accurate, no warranty of accuracy or reliability is given.

Neither Network Advisory Services nor any employee of Network Advisory Services takes responsibility arising in any way whatsoever to any person (other than Western Power) in respect of this advice, for any errors or omissions herein, arising through negligence or otherwise however caused. This document is not to be used for any purpose other than those specified herein.

3 Western Australian Arrangements for Bi-Directional Supply

3.1 Electricity Network Access Code

The Electricity Industry Act 2004 provides the legal framework for the Western Australian electricity industry, including the development of an Electricity Networks Access Code ('the Code').

The Code establishes a framework for third party access to electricity transmission and distribution networks in Western Australia. The objective, as stated in section 2.1 of the Code, is to promote the economically efficient:

- (a) investment in; and*
 - (b) operation of and use of,*
- networks and services of networks in Western Australia in order to promote competition in markets upstream and downstream of the networks.*

Section 5 of the Code defines the required content of an Access Arrangement. In particular, section 5.1 of the Code requires that an Access Arrangement must:

- (a) specify one or more reference services under section 5.2; and*
 - (b) include a standard access contract under sections 5.3 to 5.5 for each reference service; and*
- {Note: An access arrangement may contain a single standard access contract in which the majority of terms and conditions apply to all reference services and the other terms and conditions apply only to specified reference services.}*
- (c) include service standard benchmarks under section 5.6 for each reference service;*

A reference service is defined in the Code as "a covered service designated as a reference service in an access arrangement under section 5.1(a) for which there is a reference tariff, a standard access contract and service standard benchmarks." While a covered service is defined in the Code as "a service in relation to the transportation of electricity provided by means of a covered network, including:

- (a) a connection service; or*
- (b) an entry service or exit service; or*
- (c) a network use of system service; or*

- (d) *a common service; or*
- (e) *a service ancillary to a service listed in paragraphs (a) to (d) above, but does not include an excluded service.*

{Note: This Code uses the expression covered service to describe what is sometimes called a 'regulated service'. It can be distinguished from an excluded service.

Covered services subdivide into reference services and non-reference services.}"

Section 3.1 of the Code defines a "covered network" with regard to Western Power as:

The portions of the SWIS which are owned by Western Power Corporation are a covered network from the Code commencement date, unless coverage has subsequently been revoked under section 3.30.

Section 5.2 of the Code sets out the requirements of an Access Arrangement with respect to the provision of reference services, namely that an Access Arrangement must:

- (a) *specify at least one reference service; and*
- (b) *specify a reference service for each covered service that is likely to be sought by either or both of:*
 - (i) *a significant number of users and applicants; or*
 - (ii) *a substantial proportion of the market for services in the covered network; and*
- (c) *to the extent reasonably practicable, specify reference services in such a manner that a user or applicant is able to acquire by way of one or more reference services only those elements of a covered service that the user or applicant wishes to acquire; and*
- (d) *for the covered network that is covered under section 3.1 specify one or more reference services such that there is both:*
 - (i) *a reference service which enables a user or applicant to acquire an entry service at a connection point without a need to acquire a corresponding exit service at another connection point; and*

- (ii) *a reference service which enables a user or applicant to acquire an exit service at a connection point without a need to acquire a corresponding entry service at another connection point.*⁴

Section 5.3 of the Code requires that for each reference service a standard access contract must be:

- (a) *reasonable; and*
- (b) *sufficiently detailed and complete to:*
 - (i) *form the basis of a commercially workable access contract; and*
 - (ii) *enable a user or applicant to determine the value represented by the reference service at the reference tariff.*

Section 5.4 of the Code states that a standard access contract may:

- (a) *be based in whole or in part upon the model standard access contract, in which case, to the extent that it is based on the model standard access contract, any matter which in the model standard access contract is left to be completed in the access arrangement, must be completed in a manner consistent with:*
 - (i) *any instructions in relation to the matter contained in the model standard access contract; and*
 - (ii) *section 5.3;*
 - (iii) *the Code objective; and*
- (b) *be formulated without any reference to the model standard access contract and is not required to reproduce, in whole or in part, the model standard access contract.*

{Note: The intention of this section 5.4(b) is to ensure that the service provider is free to formulate its own standard access contract which

⁴ The Code defines an entry service as a “covered service provided by a service provider at an entry point under which the user may transfer electricity into the network at the entry point.” An entry point is defined in the Code as “a point on a covered network identified as such in an access contract at which, subject to the access contract, electricity is more likely to be transferred into the network than transferred out of the network.”

The Code defines an exit service as a “covered service provided by a service provider at an exit point under which the user may transfer electricity out of the network at the exit point.” An exit point is defined in the Code as “a point on a covered network identified as such in an access contract at which, subject to the access contract, electricity is more likely to be transferred out of the network than transferred into the network.”

complies with section 5.3 but is not based on the model standard access contract.}

Section 5.6 of the Code requires that a service standard benchmark for a reference service must be:

- (a) reasonable; and*
- (b) sufficiently detailed and complete to enable a user or applicant to determine the value represented by the reference service at the reference tariff.*

Additionally, Chapter 12 of the Code defines the authority of the Technical Rules that govern the construction and operation of Western Power's SWIN. Section 12.1 of the Code requires that the Technical Rules:

- (a) are reasonable; and*
- (b) do not impose appropriate barriers to entry to a market; and*
- (c) are consistent with good electricity industry practice; and*
- (d) are consistent with relevant written laws and statutory instruments.*

Section 12.4 of the Code states that “*subject to any exemptions granted under sections 12.34 and 12.41, the service provider and users of a network must comply with the technical rules*”.

Further, section 12.6 of the Code states that, subject to this Chapter 12, the following networks must have technical rules:

- (a) a covered network; and*
- (b) a non-covered network that is part of an interconnected system which contains one or more covered networks.*

The requirements of Western Power's Technical Rules are detailed in section 3.2 below.

3.2 Technical Rules

Chapter 12 of the Code requires Western Power to publish Technical Rules to govern the SWIN six months prior to the commencement of its next Access Arrangement.

In accordance with the Code, Western Power first submitted its proposed Technical Rules for the SWIN on the 24 August 2005, as part of its Access Arrangement and Access Arrangement Information for the 2007-09 period. The ERA then approved

and published Western Power's Technical Rules on 26 April 2007, to become effective from 1 July 2007.

On 1 October 2008, in accordance with the Code, Western Power submitted its revised Technical Rules to the ERA for assessment as part of the current Access Arrangement review.

The Technical Rules consist of the standards, procedures and planning criteria governing the construction and operation of an electricity network, and deal with all the matters to be addressed by the Technical Rules listed in Appendix 6 of the Code. This includes, amongst other things:

- Performance standards in respect of service standard parameters;
- The technical requirements that apply to the design and operation of facilities and equipment connected to the network;
- The standards which apply to the operation of the network, including in emergency situations;
- Obligations to test facilities and equipment in order to demonstrate compliance with the technical rules;
- Procedures that apply if the service provider believes that any part of facilities and equipment does not comply with the technical rules; and
- Procedures that apply to the inspection of facilities and equipment connected to the network;
- The standards which apply to control and protection settings for facilities and equipment connected to the network;
- Procedures that apply to the commissioning and testing of new facilities and equipment connected to the network; and
- Procedures that apply to the disconnection of facilities and equipment from the network; and
- The information that a user must provide to the service provider in relation to the operation of facilities and equipment connected to the network.

The Technical Rules apply to:

- (1) *The Network Service Provider in its role as the owner and operator of the transmission and distribution systems;*
- (2) *System Management in its role as operator of the power system;*

- (3) *Users of the transmission or distribution system who, for the purposes of these Rules include:*
- (a) *every person who seeks access to spare capacity or new capacity on the transmission or distribution system or makes an access application under the Access Code in order to establish a connection point or modify an existing connection;*
 - (b) *every person to whom access to transmission and distribution capacity is made available (including every person with whom the Network Service Provider has entered into an access contract or connection agreement).*

Section 3 of the Technical Rules sets out the technical requirements which users must satisfy as a condition of connection of any equipment to the transmission and distribution systems (including embedded generating units), except where granted an exemption by the Network Service Provider in accordance with the Code.

Clause 3.7 of the Technical Rules details the requirements for the connection of energy systems to the low voltage (LV) distribution system via inverters. The scope of this clause is stated in clause 3.7.1, namely:

- (a) *This clause 3.7 addresses the particular requirements for the connection of energy systems to the Network Service Provider's low voltage distribution system via inverters. It covers installations rated up to 10 kVA single phase and 30 kVA three phase. For similarly rated non-inverter connected energy systems, the requirements of clause 0 apply.*
- (b) *The scope of this clause 3.7 is limited to technical conditions of connection. The Network Service Provider is not able to enter an energy buyback agreement directly. A User wishing to enter into such an agreement must apply to a participating retailer. It should also be noted that whereas this clause 3.7 covers connection issues for generators up to 30 kVA, the maximum generator capacity for which a retailer may be prepared to enter into an energy buyback agreement may be less than this amount.*

Clause 3.7.2 of the Technical Rules states that the nominal network voltages and maximum energy system capacities for which these requirements apply are:

- 240 V single phase 10 kVA; and
- 415 V three phase 30 kVA.

It is assumed that the full rated capacity of the inverter is capable of being exported to the distribution system.

Clause 3.7.3 of the Technical Rules details the relevant technical standards that apply to the connection of energy systems to the LV distribution system via inverters, whereby:

- (a) *The installation of primary energy systems must comply with the relevant Australian Standards and international standards.*
- (b) *Inverter systems must satisfy the requirements of Australian Standard 4777 “Grid connection of energy systems via inverters” as published and revised. The following parts of this standard apply:*
 - (1) *AS 4777.1 – 2005 Part 1 Installation requirements.*
 - (2) *AS 4777.2 – 2005 Part 2 Inverter requirements.*
 - (3) *AS 4777.3 – 2005 Part 3 Grid protection requirements.*
- (c) *The term 'inverter energy system' in these Rules has the same meaning as in AS 4777.*
- (d) *A type-test report or type-test certificate from an independent and recognised certification body showing compliance of inverter plant with AS 4777.2 (2005) must be supplied to the Network Service Provider.*
- (e) *Should it be necessary to change any parameter of the equipment as installed and contracted, approval must be sought from Network Service Provider. Subsequently, the Network Service Provider will determine whether a revised application is required.*

Clause 3.7.4 of the Technical Rules states the requirements associated with installing the meter, namely that:

The User must make provision for both an import and export meter. Should an additional meter be required for the export power meter, the User may need to install an additional meter box or rearrange the existing meter box to accommodate a second meter.

Clause 3.7.5 of the Technical Rules details the safety requirements, whereby:

- *Installations must comply with the relevant Australian Standards and all statutory requirements including AS/NZS 3000, AS/NZS 5033 and the WA Electrical Requirements.*
- *All electrical installation, commissioning and maintenance work wherever required must be carried out by an electrical contractor licensed under the Electricity (Licensing) Regulations, 1991.*

The remainder of clause 3.7 of the Technical Rules, clauses 3.7.6 to 3.7.9, covers the technical requirements associated with:

- Circuit Arrangements;
- Protection;
- Commissioning and Testing; and
- Signage Guide.

3.3 Reference Services and Feed-In Tariffs in Western Australia

3.3.1 Background

There is currently no mandated Feed in Tariff (FiT) scheme in Western Australia. The only scheme is one which is operated by Synergy which offers a renewable energy buy-back scheme (REBS). The scheme applies to eligible customers, as defined under the *Electricity Industry (Licence Conditions) Regulations 2005*, with small renewable energy systems, namely:⁵

- Residential customers with energy consumption of less than 50 MWh per annum;⁶
- Schools, universities or other educational institutions; and
- Non-profit making organisations.

The Scheme is available to customers only after they have installed a renewable energy installation at their premises. Once they have done this, they may enter into one of two retail services and tariff options, the A1 Tariff or SmartPower rates for electricity purchases from Synergy.⁷ Customers are offered renewable energy

⁵ The *Electricity Industry (Licence Conditions) Regulations 2005* defines a small renewable energy system as: a system of photovoltaic arrays; a system of wind turbines; a hydro power system; or another system for the generation of electricity from a renewable energy source, that has a generating capacity exceeding 500 W but not exceeding 5 kW.

⁶ For multi-residential premises, each premise must be connected to the renewable energy system of a size equivalent to more than 500 watts up to 5 kilowatts to be eligible. Synergy may also require changes to metering arrangements in order to allow eligible customers at multi-residential premises to participate. The Scheme may not be available for shared systems (such as tenants in an apartment complex) due to metering constraints.

⁷ The SmartPower tariff is only available to residential customers. For other eligible customers only the buyback rate equivalent to the applicable tariff (less the GST component) is available. If the customer is registered for GST, Synergy will pay the applicable tariff rate without deducting the GST component.

buyback rates equal to the A1 Tariff or SmartPower electricity purchase rates, less the GST component.⁸

3.4 Western Power's Proposed Access Arrangement

Western Power lodged proposed revisions and a revised Access Arrangement Information for the SWIS with the ERA on 1 October 2008.

Section 3 of Western Power's proposed revisions to the Access Arrangement (the revisions) relate to the offered Reference Services, Non-Reference Services and Service Standard Benchmarks.

Western Power offers 11 reference services at network exit points:

1. Anytime Energy (Residential) Exit Service A1;
2. Anytime Energy (Business) Exit Service A2;
3. Time of Use Energy (Residential) Exit Service A3;
4. Time of Use Energy (Business) Exit Service A4;
5. High Voltage Metered Demand Exit Service A5;
6. Low Voltage Metered Demand Exit Service A6;
7. High Voltage Contract Maximum Demand Exit Service A7;
8. Low Voltage Contract Maximum Demand Exit Service A8;
9. Streetlighting Exit Service A9;
10. Un-Metered Supplies Exit Service A10; and
11. Transmission Exit Service A11.

Western Power offers two entry services as reference services:

1. Distribution Entry Service B1; and
2. Transmission Entry Service B2.

⁸ Customers who also take up Synergy's Natural Power or Earth Friendly energy options, which allows their electricity to be sourced from renewable energy options in the case of Natural Power, or through a carbon neutral mix of sources in the case of Earth Friendly, will continue to pay the additional rates for these policies over the A1 Tariff and SmartPower electricity purchase rates.

Appendix 7 of the proposed Access Arrangement provides details of each reference service, being:

- A “description” of the reference service, for example, the description of the Anytime Energy (Residential) Exit Service A1 is as follows:

An exit service combined with a connection service and a standard meter service at an exit point on the low voltage (415 volts or less) distribution system.

- The “eligibility criteria”, indicating:
 - The type of user that the reference services is applicable to;
 - The type of meter required; and
 - The regulations that apply to the connection;

The eligibility criterion for the Anytime Energy (Residential) Exit Service A1 is detailed as follows:

Users are eligible to use this service if:

- 1. The exit point is located at a residential premise or a premise occupied by a voluntary/charitable organisation;*
- 2. A single register accumulation meter is installed at the exit point; and*
- 3. The consumer’s facilities and equipment comply with the Technical Rules, the WA Electrical Requirements and AS 3000;*

- The “reference tariff” associated with the reference service is detailed with reference to Western Power’s price list, published in Appendix 5 of the proposed Access Arrangement, for example the reference tariff associated with the A1 exit service is “RT1”;
- The “standard access contract” – for all reference services it is the Electricity Transfer Access Contract (ETAC), published in Appendix 4 of the proposed Access Arrangement; and
- The “service standard benchmark” that applies, namely:
 - For reference services A1 to A10 and B1, the SAIDI and SAIFI service standard benchmarks (SWIN total, CBD, urban, rural short, rural long) detailed in sections 3.18 and 3.19 of the proposed Access Arrangement, respectively, apply;

- Additionally, for reference service A9 (“Streetlighting Exit Service”), where Western Power is responsible for the repair of faulty streetlights, a service standard benchmark applies in relation to repair times for reported faults, as detailed in section 3.23 of the proposed Access Arrangement;
- The service standard benchmarks for the reference services A11 and B2 available to users directly connected to the transmission network are detailed in section 3.22 of the proposed Access Arrangement and includes:
 - Circuit Availability (% of total time);
 - System Minutes Interrupted (meshed network); and
 - System Minutes Interrupted (radial network).

In accordance with section 3.4 of the proposed Access Arrangement, reference services are to be provided to users under the terms and conditions of the ETAC. The ETAC sets the common contractual provisions and the provisions for the transfer of electricity and technical compliance for a user connecting to Western Power’s SWIN.

Section 3.1 of the ETAC states the provision and use of services as:

- (a) *For each Connection Point, on and from the Start Date and up to and including the End Date, subject to and under this Contract:*
 - (i) *Western Power must provide the Services, up to the Contracted Capacity; and*
 - (ii) *the User must pay the Charges for, and may use, the Services.*
- (b) *The User must not:*
 - (i) *transfer electricity out of the Network at a Connection Point unless it has an Exit Service for that Connection Point; and*
 - (ii) *transfer electricity into the Network at a Connection Point unless it has an Entry Service for that Connection Point.*
- (c) *For each Service at each Connection Point, the User must endeavour, as a Reasonable and Prudent Person, to ensure that the rate at which electricity is transferred into or out of the Network by or on behalf of the User does not exceed the Contracted Capacity for that Service.*⁹

⁹ A Service is defined in the ETAC as an Entry Service or an Exit Service to be provided under this Contract in respect of a Connection Point as specified in Part 1 of Schedule 3.

3.5 Synergy's Submission

Synergy made a submission to the ERA on 17 December 2008 in relation to Western Power's reference services. In its submission, Synergy stated that:

- There is a need for Western Power to provide a dedicated reference service, in accordance with sections 5.2(d)(i) and (ii) of the Code, that enables a user or applicant to acquire an exit or entry service at a connection point without a need to acquire a corresponding entry or exit service at another connection point, i.e. a reference service at a connection point where electricity is "likely to be transferred" both into and out of the network;
- The reference services in the proposed Access Arrangement do not adequately provide a service for use of small renewable energy systems and consequently does not meet the requirements of section 5.2(b) of the Code;
- Synergy has over 1,800 customers who utilise small renewable energy systems which are connected to the network.¹⁰ Synergy anticipates that the rate of growth of these customers will increase significantly with the proposed introduction of a feed-in tariff for small renewable energy systems;
- The standard access contract and reference service (clause 3.1(b) of the ETAC) restricts the use of a connection point as both an entry point and exit point, despite the requirements of section 5.2(d)(i) and (ii) of the Code;
- The proposed Access Arrangement does not demonstrate how Western Power has determined that the proposed reference services to meet the requirements of 5.2(b) of the Code;
- It is important that the proposed Access Arrangement contain a mechanism, by which Western Power, within an access arrangement period, to consult with users of the Western Power's network on the scope and requirements of reference services. This mechanism should also include a requirement to advertise and request submissions from consumers supplied using this network;
- In order to support the significant portion of the market that has small renewable energy systems connected to the network, the proposed revisions to the Access Arrangement should:

In accordance with sections 5.2(d)(i) and (ii) of the [Code], contain an appropriate reference service that enable a user or applicant to acquire an

¹⁰ Synergy states that currently Western Power deems customers who utilise small renewable energy systems to be operating exclusively on an exit service, at an exit point. Synergy also notes that under the current framework any request for a service by a user or applicant of a small renewable energy system will be treated as a request for a non-reference service.

exit or entry service at a connection point without a need to acquire a corresponding entry or exit service at another connection point;

- *Contain a reference service that provides a basis and gives users the flexibility and choice to implement mechanisms for monitoring and settling the energy that is exported and imported to and from the network; and*
 - *Contain a reference service that is sufficiently detailed and complete to form that basis of a commercially workable access contract and enable a user or applicant to determine the value represented by the reference service, in accordance with section 5.3 of the [Code]. This also includes the requirement to define the metering eligibility criteria.*
- Western Power should be required to provide a reference service or a covered service for a bidirectional connection point, the application and queuing policy, the reference services, the Code and the pricing list should be amended to address the following:
 - *how an applicant applies for a bidirectional connection point and the associated capacity for transferring electricity into and out of the network;*
 - *the rules for determining, assigning and tracking these connection points on the network;*
 - *the rules for determining the charges associated with transferring electricity into and out of the network;*
 - *the duration or period that a bidirectional point can operate for;*
 - *how bidirectional connection points are managed under the [Electricity Transfer Access Contracts], including how the maximum extent of any liability will be determined; and*
 - *how a bidirectional connection point will be transferred between [Electricity Transfer Access Contracts] in accordance with the Customer Transfer Code.*

3.6 ERA's Draft Decision Amendment

The ERA's Draft Decision on Western Power's proposed revisions to the Access Arrangement for the SWIS was released in July 2009.

In the Draft Decision, the ERA accepted Synergy's submission that the range of reference services, under Western Power's proposed Access Arrangement revisions did not provide a service for a connection point that may variously function as either an entry or exit point. The ERA also considered that, under clause 5.2(b)(i) of the

Code, Western Power is required to specify a reference service for each covered service that is likely to be sought by a significant number of users and applicants and that this was likely to be the case with regard to the number of connection points for bi-directional services required by Synergy (and potentially others). Consequently, the ERA recommended the following required amendment (Required Amendment 1):

*The proposed access arrangement revisions should be amended such that one or more reference services provide for single connection points to function both as entry points and exit points. This revision will cater for the requirements for network services that arise where small-scale renewable energy systems connect to the network and where electricity consumers participate in the Renewable Energy Buyback Scheme.*¹¹

3.7 Western Power's Current Bi-Directional Service

Western Power does not currently provide an explicit bi-directional *reference service* to support the REBS. However, it does provide a service to customers of the REBS, which could form the basis of a reference service.

Western Power's current service has the following features.

Firstly, Western Power must approve a customer's application for the installation of a renewable energy installation and its connection to the network. This approval is facilitated in accordance with the Technical Rules, the various relevant Australian Standards and the consequential requirements of Western Power.

A customer may apply itself, or have its installer complete an "Application to Connect Small Scale Renewable Energy Systems to the Western Power Network"¹², which is then considered by Western Power against a list of pre-approved invertors. Once the application has been approved, the customer may then agree to enter the REBS.

Once a customer signs up to the REBS, Synergy requests that Western Power upgrade the meter at the customer's connection point. Western Power's standard meter is generally either a single channel five register manually read electronic meter, or an accumulation meter, neither of which allow for the import and export of electricity through the meter or the collection of interval data. The request by Synergy is therefore to install a two channel meter at the premises, which would provide an import and export channel with five registers (peak, off-peak, high shoulder, low shoulder and anytime).

¹¹ ERA, 'Draft Decision on Proposed Revisions to the Access Arrangement for the South West Interconnected Network', 16 July 2009, p.27.

¹² <http://www.westernpower.com.au/documents/forms/smallrenewableenergysystems.pdf>

When the meter data is collected by Western Power and provided to Synergy:

- The customer export channels provide the basis by which Synergy purchases energy from the customer; and
- The customer import channel provides the basis by which Synergy is charged network tariffs by Western Power for the customer's residual energy requirement.

3.8 Agreed Aspects of the Future Bi-Directional Reference Service

Western Power has advised NAS that its current service, while not currently defined as a Reference Service, is sufficiently developed to be a *bi-directional reference service* that can be specified in the Access Arrangement. The applicable Standard Access Contract would be the "*Electricity Transfer Access Contract*" published in Appendix 4 of the Access Arrangement.

Western Power has also advised that there will be no charge for entry services provided to customers at bi-directional points, i.e. customers will not be charged for feeding energy into the network.

The technical aspects of Western Power's current service as a reference service would be that:

- The service will be titled "*Energy (Residential) - Bidirectional Service*";
- The description of the service will be "*A bidirectional service combined with a connection service and a standard meter service at a bidirectional point on the low voltage (415 volts or less) distribution system*";
- Customer's will be eligible to receive the service if:
 - The bi-directional point that the service was being sought at is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections. This would allow the operation of the REBS and also allow for future possible expansion of the REBS at the discretion of Synergy or other retailers;
 - The customer's inverter system complies with the requirements of AS 4777 and the Technical Rules;
 - The customer's facilities and equipment comply with the Technical Rules, the WA Electrical Requirements and AS3000; and
 - The metering equipment installed is capable, as determined by Western Power, of meeting the bi-directional service criteria.

There is however, one further issue that remains unresolved in the design of the reference service, being the manner by which Western Power will charge customers for their usage of the bi-directional service.¹³ A discussion of the reference tariff options for customers at bi-directional points is detailed in section 4.

¹³ The current practice is for customers to be charged the same network tariff as those customers which are not at a bi-directional point.

4 Options for Designing Remaining Aspects of the Reference Service

4.1 Purpose of this Section

As noted in section 3.8, the technical aspects of Western Power's bi-directional reference service are already established. The remaining issue to be resolved is the manner by which Western Power will charge customers for electricity consumption at their bi-directional points.

Accordingly, this section sets out:

- The options for charging customers for the electricity that they import from Western Power's network;
- The criteria by which these options will be assessed; and
- The characteristics of the options in relation to the criteria (where required).

4.2 Options for Reference Tariffs

Four options have been developed for the network tariff to apply at the customer's bi-directional point, being:

1. The status quo – being the assignment of existing network tariffs to new customers at bi-directional points on the same basis as is currently carried out by Western Power¹⁴. Existing customers who install small scale embedded generators at bi-directional points would retain the same network tariff they were paying before they installed the embedded generator at that connection point. In almost all cases, given that customers of the REBS are residential customers, this would be either RT1 or RT3 as set out in Western Power's tariff schedule. This is the tariff which would be paid by the customer for all electricity that is imported from the network into the customer's connection point;
2. To design and apply a seasonal demand tariff to customers at bi-directional points, which would be paid by the customer for all electricity that is imported from the network into the customer's connection point;
3. To design and apply a variation to RT3, being a time of use tariff, to customers at bi-directional points, which would be paid by the customer for all electricity that is imported from the network into the customer's connection point; and

¹⁴ Assignment of customers to network tariffs is currently carried out on the basis of customer type, customer size, voltage requirements and metering capability.

4. To design and apply a variation of RT1, being a usage based charge, to customers at bi-directional points where the difference between the new tariff and RT1 was that the new tariff would be at a higher rate to compensate for the reduced network electricity consumption.

There are no options where Western Power would charge customers to export electricity from their connection point into the network.

These options are discussed in more detail below.

4.2.1 Option 1 – The Status Quo

As noted in section 3.7, Western Power currently considers and approves the connection of the embedded generator to its network, installs an upgraded two channel, five register interval meter at the connection point to facilitate import and export channels, and provides meter reading services.

The current practice is then for Western Power to invoice Synergy following the two monthly manual meter reading cycle for the total amount of electricity which has been exported from the network to the customer's connection point (or imported into the connection point from the network depending on the perspective taken).

Customers that already have an existing compatible single phase, or three phase meter (generally an EM1000 meter, or an EM3330 meter, respectively) need to have their meter reprogrammed for import/export measurement by Western Power at a cost of \$49.50.¹⁵ For other customers, Western Power's standard single and three-phase direct connect interval meter is installed at a cost of approximately \$115.50 or \$704, exclusive of travel costs, respectively.¹⁶ The metering installation costs are invoiced to Synergy and then passed on, through a gazetted charge, to customers.

Western Power does not currently reclassify a customer to a different network tariff once an embedded generator has been connected. As a result, the previous exit tariff continues to apply.

Where a new customer connects to the network – and therefore where no previous tariff arrangement was in place – Western Power assigns that new customer to a network tariff on the same basis as if there was no embedded generator installed.

¹⁵ Western Power's standard three phase interval meters are configured with two channels for import only measurement (kWh and kVAh), although they have the capability for four channels with import/export measurement.

¹⁶ Western Power, 'Metering Code Model Service Level Agreement', Approved by the ERA on 30 March 2006. All costs are exclusive of GST.

(http://www.wpcorp.com.au/documents/METERING_SERVICES_GENERIC_SLA_WITH_WA_RETAILERS.pdf)

4.2.2 Option 2 – Seasonal Demand Tariff for Bi-Directional Customers

Option 2 would involve assigning new customers and potentially re-assigning existing customers to a new network tariff once the connection point has been classified as a bi-directional point (i.e. once the embedded generator has been installed).

The new tariff would be demand based, such as \$/kVA, which would be charged to the customer based on its maximum demand over an appropriate time interval. For example, based on Western Power's existing low voltage metered demand tariff, RT6, the new network tariff design may consist of:

- A fixed metered demand charge which is payable each day;
- A variable metered demand charge calculated by multiplying the demand price (\$/kVA) by a rolling seasonal monthly maximum half hourly demand at the bi-directional connection point; and
- A fixed metering charge which is payable each day.

Western Power has advised that Option 2 would require either the installation of multi-channel interval meters with the capability of recording kVA data, or the installation of multi-channel interval meters, with the kVA demand mathematically derived from the kWh and kVArh channels.¹⁷

Currently, kVA demand can be derived from Western Power's standard EM-3330 (0350) three phase interval meter, but not from its standard single phase EM1000 (0200) interval meter, which is only capable of measuring kWh usage.¹⁸ Western Power does not have a single phase meter capable of measuring, or deriving kVA demand.

The simplest solution under Option 2 would be for Western Power to source and install a single phase interval meter with both kWh and kVArh measurement functionality to complement its existing standard three phase interval meter. The cost associated with the new single phase meter would likely be materially higher than the cost of the current EM1000 meter and closer in quantum to that of the three phase meter.¹⁹

The process for approving the installation of a new single phase interval meter with the additional functionality may involve, amongst other things:

¹⁷ Using the formula, $KVA = \text{SQRT}(kW^2 + kVAr^2)$.

¹⁸ It is not a requirement of the *Electricity Industry Metering Code 2005* (the Metering Code) for type 5 and type 6 meters to provide reactive power measurement, refer to Table 3 of Appendix 1 of the Metering Code.

¹⁹ An example of a single phase meter with kWh and kVArh functionality is the Echelon EM-1021 Single Phase IEC Residential Electricity Meter (Model 8332 or 83861), or alternatively a Smart Meter would have the necessary functionality.

- Testing and evaluation of the new meter by Western Power;
- Commercial justification of the new meter;
- Determining who would pay for the additional cost associated with the new meter;
- Discussing with Synergy on the impact on the existing REBS of installing the new meter; and
- Demonstrating the customer's willingness to pay.

Where a compatible three phase meter currently exists, namely the 0350 meter type, no additional cost would be incurred, otherwise a three phase meter installation cost of \$704, exclusive of travel costs, would apply.²⁰ Under this scenario, Western Power could continue to manually download the data using hand held units. The metering installation costs would be paid by the customer when the embedded generator was installed at the customer's premise.

4.2.3 Option 3 – Time of Use Tariff for Bi-Directional Customers

Option 3 involves assigning new customers, and potentially re-assigning existing customers, to a new network tariff once the connection point has been classified as a bi-directional point (i.e. once the embedded generator has been installed).

The new tariff would be the existing time of use tariff, RT3, or a new variation of RT3. The tariff would be designed with a higher price during the on-peak residential demand time period than the off-peak time period.²¹ Western Power's existing time of use network tariff, RT3, consists of:

- A fixed use of system charge which is payable each day;
- An on-peak use of system variable charge calculated by multiplying the on-peak energy price by the quantity of on-peak electricity consumed at the bi-directional connection point (expressed in kWh);
- An off-peak use of system variable charge calculated by multiplying the off-peak energy price by the quantity of off-peak electricity consumed at the bi-directional connection point (expressed in kWh);
- A fixed metering charge which is payable each day;

²⁰ Refer to footnote 16.

²¹ On-peak periods for the existing time of use tariffs, RT3 and RT4, are defined in Western Power's Price List as being between 8am and 10pm during weekdays (including public holidays), while off-peak periods are all other times (including weekends).

- An on-peak variable metering charge calculated by multiplying the on-peak variable price by the quantity of on-peak electricity consumed at the bi-directional connection point (expressed in kWh); and
- An off-peak variable metering charge calculated by multiplying the off-peak variable price by the quantity of off-peak electricity consumed at the bi-directional point (expressed in kWh).

An alternative to the existing RT3, on-peak and off-peak, network tariff is a time of use tariff broken down into three different time periods – on-peak, shoulder and off-peak. Such a network tariff design would be similar to that employed by EnergyAustralia in New South Wales with its PowerSmart Home Rates²² where the time periods are defined as follows:

- Off-peak is from 10pm to 7am everyday;
- Shoulder is from 7am to 2pm and 8pm to 10pm during working weekdays and from 7am to 10pm on weekends and public holidays; and
- On-peak is from 2pm to 8pm on working weekdays.

Designing the tariff in this manner would provide greater cost reflectivity by more narrowly defining the on-peak period to capture the likely peak residential demand and would provide a greater incentive to the customer to alter consumption patterns to reduce cost.²³

Option 3 would have the same metering requirements as the status quo, as the existing interval meters installed at bi-directional points record import and export channels, with the five registers on each channel recording usage at peak, off-peak, high shoulder, low shoulder and anytime periods. The cost of installing metering for the customer would be the same as under Option 1, which could continue to be invoiced to Synergy and then passed on, through a gazetted charge, to customers.

4.2.4 Option 4 – Higher Rate Usage Tariff for Bi-Directional Customers

Option 4 involves assigning new customers and potentially re-assigning existing customers to a new network tariff once the connection point has been classified as a bi-directional point (i.e. once the embedded generator has been installed).

The new tariff would be a variation of the existing tariff, for example RT1a instead of RT1, which would charge the customer at a higher rate. The design of the new network tariff would be as follows:

²² <http://www.energyaustralia.com.au/energy/ea.nsf/Content/NSW+TOU+Res+Home>

²³ For representative examples of summer and winter residential customer demand within Western Power's SWIN, refer to attachment A and attachment B of this report, respectively.

- A fixed use of system charge which is payable each day;
- A variable use of system charge calculated by multiplying the energy price by the quantity of electricity consumed at a bi-directional connection point (expressed in kWh);
- A fixed metering charge per revenue meter which is payable each day; and
- A variable metering charge calculated by multiplying the variable price by the quantity of electricity consumed at a bi-directional connection point (expressed in kWh).

Option 4 would have the same metering requirements and associated costs as the status quo, Option 1, as the basis of charging the customer would remain the same as if the customer did not have an embedded generator installed. The cost of installing meters could continue to be invoiced to Synergy and then passed on, through a gazetted charge, to customers.

4.3 Criteria for Assessment of Options

Western Power has requested that NAS assess the Options for the network tariff to apply at the customer's bi-directional point against the following criteria:

1. Ensuring that the tariff is cost reflective with respect to both the transmission and distribution networks, as required by Chapter 7 of the Code;
2. Ensuring there are no cross subsidies between customers with and without embedded generation, as required by Chapter 7 of the Code;
3. Administrative simplicity;
4. Ensuring reference service design does not set up any unreasonable barriers to entry such as high up-front cost; and
5. Compatibility with the REBS.

These criteria are discussed further below.

4.3.1 Criteria 1 – Ensuring that Tariffs Reflect Cost

Criteria 1 is important to consider because the Options imply different reference tariff designs and therefore different relationships between the cost of supply and the tariff revenue collected.

Cost reflectivity of tariffs has been considered at length by Western Power and by the ERA as part of previous Access Arrangement approval processes. This is because section 7.3 of the Code requires that Western Power's proposed pricing

methods must ensure that tariffs recover the forward looking efficient costs of providing the reference services.

For this reason, Western Power's Price List Information sets out a justification of how reference tariffs have been structured in order to reflect cost, and an interpretation of this relationship. Section 2.3 of the Price List Information provides that:

It is essential to separate the two processes of "determining cost of supply" and "setting reference tariffs" to recover those costs. In the ideal world the costs of supply can be clearly allocated to particular customer groups and the reference tariffs are set to exactly recover those costs. In addition, the costs are separated into fixed and variable components and the reference tariffs are similarly split so that fixed costs are recovered by fixed charges and variable costs by variable charges.

It is recognised that the determination of the cost of supply for users and respective reference tariffs is not a completely definitive process. A number of simplifying assumptions are required, for example, the categorising of users into a small number of customer groups or classes. These assumptions may introduce errors that are considered to not be significant and there is considerable historical precedence in deriving the network cost of supply that supports the approach.

Demand is the best measurement of capacity but as the vast majority of users have energy only metering that does not record demand; energy is used as a proxy for demand. The limitations on the metering information available will introduce minor non-deterministic errors that cannot be avoided or quantified.

Western Power currently ensures that tariffs reflect cost via a process of distributed cost allocation set out in the Price List Information, and approved by the ERA. Essentially, it involves two stages, being:

- Determination of the target revenue and the reference service revenue for Western Power; and
- Allocation of the revenue components to different cost pools for various customer groups, based on factors such as supply voltage, location and load characteristics.

Western Power sets reference tariffs from the cost of supply determination – therefore the reference tariffs do not directly relate to the customer groups. Section 2.3.3 of the Price List Information notes that this:

is because a number of the customer groups are based on derived user demands whereas the reference tariffs are based on the user and metering data that is actually available. The users within the customer groups are linked to reference tariffs so that cost of supply can then be derived for each

reference tariff. The cost of supply is in terms of fixed and variable costs and price settings are then simply established to recover the cost pools from the users.

In order to assess whether a particular option reflects costs, it is necessary to understand what is the cost of a customer on the network. In general, the cost associated with providing network services to a customer differs according to the shape of the customer's load profile, which is reflective of the nature of the customer (i.e. domestic or business), the voltage required and the total electricity use of the customer. The load shape affects the cost of service provision because the network is primarily built to meet peak load requirements rather than energy consumption. This has been confirmed by various distribution network service providers. For example:

- Integral Energy has stated that “*Growth in peak demand is a primary driver of network capital investment*”;²⁴
- Country Energy has stated that “*Peak demand, particularly summer peak demand, is a principal driver of growth related capital expenditure*”²⁵
- AGL Electricity (now known as Jemena Electricity Networks) has stated that “*Forecasts of network demand and customer connections drive much of the need for investment in the network*”;²⁶ and
- ActewAGL has stated that “*The zone substation demand forecasts are key drivers of the capital expenditure program*”.²⁷

Customers with peakier load profiles that correspond with the network peaks generally require greater network capacity, and therefore have higher costs to serve per unit of energy delivered compared to customers with a relatively flat load profile.

It should also be noted that there is a relationship between the number of new embedded generator connections and the costs of planning and building the network. If peak demand can be reduced by increasing numbers of embedded generation systems then reductions in capital expenditure may be achievable in some areas of the network. However, large numbers of these systems, located in areas where load is low, may lead to the amount of electricity being imported into the system exceeding that which is being used by the area – thus feeding electricity back up into the system and into transformers which may require substantial network redesign to accommodate.

²⁴ Integral Energy, ‘Regulatory Proposal to the Australian Energy Regulator 2009 to 2014’, 2 June 2008, p.27.

²⁵ Country Energy, ‘Electricity Network Regulatory Proposal 2009-2014’, 2 June 2008, p.84.

²⁶ AGL Electricity, ‘2006 Electricity Distribution Price Review – Submission by AGL Electricity Limited’, October 2004, p.29.

²⁷ ActewAGL, ‘ActewAGL Distribution Determination 2009-14 – Regulatory Proposal to the Australian Energy Regulator 2009 to 2014’, June 2008, p.92.

However, the relationship of renewable energy systems, such as solar PV systems, with network cost is complicated by the fact that the generation output may not be coincidental with peak demand and that there is a lack of certainty, or firmness, associated with the reliability of renewable generator systems. In Western Power's SWIN, the residential peak demand tends to occur between approximately 5:30pm and 8pm during summer and between 6:15pm and 8:30pm during winter,²⁸ whereas solar PV output tends to peak between 10am and 2pm, when the sun is strongest. The difference in peak solar PV output and residential peak demand needs to be taken into consideration in assessing the cost reflectivity of the Options and is addressed in section 5 of this Report.

On balance, there is sufficient evidence to suggest that the best way to reflect a customer's cost on the network is to allocate costs based on that customer's demand.

Each of the Options results in tariffs which reflect costs in different ways:

- Option 1 ensures that customers with embedded generation will pay less than those customers which, all other things being equal, do not have an embedded generator installed. This is because customers are being charged on a consumption basis and the embedded generator will cover a proportion of the customer's electricity consumption. To the extent that the embedded generator does not materially reduce the customer's peak demand, the network tariff will not be reflective of the real cost of that customer;
- Option 2, being a demand based tariff, is reflective of the costs imposed on the network by the customer. Under this option, all other things being equal, a customer with an embedded generator installed will only pay less in total network charges than a customer without an embedded generator installed, where the embedded generator reduces peak demand, or the customer changes their behaviour to lower their peak demand;
- Option 3 is a hybrid between a demand charge and a usage charge, which can be used to signal a need to alter usage to times where the customer's demand might have been at its peak. Thus, the customer is provided with a cost incentive to shift its peak through a usage based charge. Under this option, all other things being equal, a customer on the existing network tariff RT3 with an embedded generator installed will pay less in total network charges than a customer on the same tariff without an embedded generator installed due to the reduction in network electricity consumption that will occur. However, a new variation of network tariff RT3 could be designed for customers with embedded generators installed at bi-directional points where higher on-peak rates apply, therefore compensating for the reduction in network electricity consumption. In this case, a customer with an embedded generator installed will only pay less than a customer without an embedded generator installed

²⁸ For representative examples of summer and winter residential customer demand within Western Power's SWIN, refer to attachment A and attachment B of this report, respectively.

where the customer uses the embedded generator (or changes their behaviour) to further reduce their electricity consumption or shift their usage of electricity to off-peak times. Such a scheme could be refined further to reflect the costs of the customer on the network by defining a third tariff period, as detailed in section 4.2.3. This tariff is similar to Option 2 in intention, however the method of charging remains based on electricity consumption, not demand;

- Option 4 is the same tariff structure as Option 1 but at a higher level. The customer receives a blunt signal that if they connect an embedded generator, then the customer will pay the same amount to Western Power regardless of any decision they might make to shift or reduce their peak demand or their times of consumption. While it achieves the objective of cost recovery, it could be argued that such a tariff would not “reflect” costs of that customer.

The assessment of each of the Options under this criterion is set out in section 5.

4.3.2 Criteria 2 – Limiting Cross Subsidies

A cross subsidy is essentially a payment made by one class of customers to another class of customers, despite there being no economic basis for such a payment.

The extent of cross subsidisation present will be relative to the degree of cost reflectivity achieved in the tariff design. It is generally accepted that cross subsidies are minimised where the cost of providing a service exceeds the incremental cost, or marginal cost, of that service. This is also reflected in section 7.3(b)(i) of the Code where it is a requirement that the reference tariff applying to a user:

“at the lower bound, is equal to, or exceeds, the incremental cost of service provision”

Further, given the fact that the output from renewable embedded generation systems, such as solar PV systems, may not be coincidental with peak demand and that there is a lack of certainty, or firmness, associated with the reliability of renewable generator systems, as discussed in section 4.3.1, it could be assumed, all other things being equal, that the cost to the network of a customer with a small scale embedded generator installed will be approximately the same as a customer without an embedded generator installed.

Given the above assumption, the level of cross subsidisation can be illustrated by considering two separate hypothetical customers (Customer A and Customer B) with the same electricity consumption and an identical peak demand with both assigned to each of the tariff Options. For example, both Customer A and Customer B consume 8 MWh of electricity per annum and have a peak demand of 2 kW at 6pm. Customer A has an embedded generator which generates electricity between 10am and 5pm but nothing after 5pm (producing a total of 2 MWh per annum) and Customer B does not have an embedded generator installed. Both customers

therefore have the same peak demand but Customer A uses less energy as a consequence of the self-generation between 10am and 5pm.

Under Option 1, Customer A would pay for 6MWh at RT1 while Customer B would pay for 8MWh at RT1. If it is accepted that the appropriate means of determining cost is the 2KW of peak capacity “reserved” for both customers, then Customer B is bearing more of the cost of reserving that capacity than Customer A. Customer A is therefore being cross-subsidised by Customer B.

Under Option 2, both Customer A and Customer B would pay for 2kW of reserved capacity on the network. If it is accepted that the appropriate means of determining cost is the 2KW of peak capacity “reserved” for both customers, then both customers are paying a tariff which is reflective of their cost. There are therefore no cross-subsidies between Customer A and Customer B.

Under Option 3, the tariff would be designed so that a higher rate is charged in the on-peak period than the off-peak. The amount paid by Customer A depends on the way in which the time of use tariff was constructed. While ultimately Customer A is importing less energy from the network than Customer B (6 MWh instead of 8MWh per annum), an efficiently set time of use tariff would try to ensure that a customer with embedded generation installed would pay more for the energy used during the peak period than a customer without an embedded generator installed, on the basis that peak demand would remain unchanged, to compensate for the difference. A more refined time of use tariff that utilised three tariff periods would then allow Customer A to benefit from any reduction that may occur from a reduction in peak demand from the use of the embedded generator and provide greater incentive to change consumption patterns to achieve cost savings.

Under Option 3, therefore, the design of the tariff would be the most significant factor in determining whether a cross subsidy was achieved.

Under Option 4, Customer A would pay a price for its 6MWh which ensured that the total revenue collected from Customer A was equal to that collected from Customer B for 8MWh. While there would be no cross subsidy between Customers A and B, there would be few positive signals sent to either Customer under this Option and it is possible it could act as a negative incentive to pursue the connection of an embedded generator by Customer A.

4.3.3 Criteria 3 – Administrative simplicity to Western Power, Retailers and Customers

Western Power forecasts that it will have around 10,000 embedded generation systems in its network in the next 12 months. For this reason, it is necessary to design a reference service and a reference tariff that:

- Requires as little administrative amendments to Western Power’s current practices as possible;

- Requires as little up-front complexity to customers and retailers as possible; and
- Avoids, to the greatest extent possible, customers with embedded generation systems being on different tariffs.

Option 1 would involve no change to the current practice of installing a two channel meter once an embedded generator has been installed and no change to meter data collection processes. It would also involve no changes to the existing tariff arrangements paid by customers with embedded generation installed and all new customers would be on the same tariff as these customers. There would therefore be no need to transition existing customers to a new tariff.

Option 2 involves no change to existing practices in the approval of the connection application but does require the approval and sourcing of a new single phase interval meter with kWh and kVAh measurement functionality, the subsequent derivation of kVAh and the design and implementation of new tariff arrangements. The approval process may include, amongst other things: testing and evaluation of the new meter by Western Power; commercial justification for the new meter; determining who will pay for the additional costs involved (including customer willingness to pay); and discussing with Synergy any impact on the REBS. Western Power would need to make a decision on whether to retain customers currently registered on the REBS on the existing tariff arrangements or transition these customers to the new arrangements. If it elected to transition these customers – therefore declaring the status quo redundant – then there would be a cost impost for customers requiring single phase metering equivalent to the installation cost of the new meter, which would need to be paid by either Western Power or the customer at the point of transition. If it elected not to transition these customers, then there would be two classes of customers – those existing as at the date that the existing arrangement was declared obsolete, and new customers – receiving a bidirectional service.

Option 3 involves no change to existing practices in the approval of the connection application, and no changes to metering and meter data collection processes. This is because the two channel meters currently installed when a customer connects an embedded generator are capable of recording 5 channels of information suitable for time of use tariffs. Western Power would however need to make a decision on whether to retain customers currently registered on the REBS on the existing tariff arrangements or transition these customers to the new arrangements. If it elected to transition these customers – therefore declaring the status quo redundant – then there would be no cost impost on customers for metering. If it elected not to transition these customers, then there would be two classes of customers – those existing as at the date that the existing arrangement was declared obsolete, and new customers – receiving a bidirectional service.

Option 4 involves no change to existing practices in the approval of the connection application, and no changes to metering and meter data collection processes. This is because the basis of the tariff would be unchanged – only the rate would increase. As with the previous Options, Western Power would however need to

make a decision on whether to retain the current customers registered on the REBS on the existing tariff arrangements or transition these customers to the new arrangements.

4.3.4 Criteria 4 – Barriers to Entry

In assessing the reference service and associated tariff design there is a need to consider whether any additional and unreasonable barriers to entry will be imposed on prospective customers, these include any additional up-front costs and reduced financial incentives.

4.3.5 Criteria 5 – Compatibility with the REBS

Western Power recognises that any Option that it chooses must be compatible with the REBS. This is because the REBS is currently operating in the market, is understood by customers, and has led to the request for the reference service to be established.

Western Power does not consider that any of the Options would be incompatible with the REBS.

5 Evaluation of Options

5.1 Option 1 – The Status Quo

5.1.1 Background to Option

As noted in section 4.2.1, the status quo would involve no change to Western Power’s existing practices upon receiving an application from a customer seeking to install an embedded generator and to access the REBS offered by Synergy. The characteristics of the service would be as set out in the following table.

Characteristics	Option 1 Details
Reference Service Name:	Reference Service C1 – Anytime Energy (Residential) – Bidirectional Service
Reference Service Description:	A <i>bidirectional service</i> combined with a <i>connection service</i> and a standard meter service at a <i>bidirectional point</i> on the low voltage (415 volts or less) <i>distribution system</i>
Technical Eligibility Criteria:	<p>Users are eligible to use this <i>service</i> if:</p> <ul style="list-style-type: none"> • The <i>bidirectional point</i> is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections; • The consumer’s inverter system complies with the requirements of AS 4777 and the Technical Rules; and • The <i>consumer’s facilities and equipment</i> comply with the Technical Rules, the WA Electrical Requirements and AS 3000.
Metering Criteria:	Installation at the bi-directional point of an interval meter supplied or provided by Western Power having capability for import and export channels and five register information collection.
Applicable Reference Tariff:	The applicable reference tariff is that which would otherwise be assigned to the connection point if it were an exit point and not a bi-directional point.
Applicable Standard Access Contract:	“Electricity Transfer Access Contract” published in Appendix 4 of the Access Arrangement
Applicable Service Standard Benchmarks:	As set out in Section 3.18 and 3.19 of the Access Arrangement

5.1.2 Assessment of Option 1 against the Criteria

Our assessment of this option against the criteria appears below.

Criteria	Assessment of Option Against the Criteria
Criteria 1 – Ensuring that Tariffs Reflect Cost	Option 1 has a weaker relationship with cost – as determined by the customer's reserved capacity on the network – than the other Options. Under Option 1 the customer with an embedded generator installed will pay less than a customer without an embedded generator installed due to the fact that customers are being charged on a consumption basis and the embedded generator will cover a proportion of the customer's electricity consumption. To the extent that the embedded generator does not materially reduce the customer's peak demand, the network tariff will not be reflective of the real cost of that customer.
Criteria 2 – Limiting Cross Subsidies	Option 1 involves the greatest cross subsidisation of all of the Options. It would involve those customers with embedded generation installed being subsidised by customers which do not have embedded generation installed. This is because the tariffs are measured on a consumption basis and do not reflect demand usage of the network.
Criteria 3 – Administrative simplicity to Western Power, Retailers and Customers	Option 1 is the most administratively simple of the options in that it involves no change to the current practice of installing a two channel meter for small scale embedded generators and no change to meter data collection processes. It would also involve no changes to the existing tariff arrangements paid by customers with embedded generation installed and all new customers would be on the same tariff as these customers. There would therefore be no need to transition existing customers to a new tariff.
Criteria 4 – Barriers to Entry	Option 1 does not present any additional barriers to entry for customers wanting to install embedded generators at bi-directional points.
Criteria 5 – Compatibility with the REBS	Option 1 is compatible with the REBS.

5.2 Option 2 - Seasonal Demand Tariff for Bi-Directional Customers

5.2.1 Background to Option

As noted in section 4.2.2, Option 2 involves a new demand based tariff. The characteristics of the service would be as set out in the following table.

Characteristics	Option 2 Details
Reference Service Name:	Reference Service C1 – Seasonal Anytime Maximum Demand (Residential) – Bidirectional Service
Reference Service Description:	A <i>bidirectional service</i> combined with a <i>connection service</i> and a standard meter service at a <i>bidirectional point</i> on the low voltage (415 volts or less) <i>distribution system</i>
Technical Eligibility Criteria:	<i>Users are eligible to use this service if:</i>

	<ul style="list-style-type: none"> The <i>bidirectional point</i> is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections; The consumer's inverter system must comply with the requirements of AS 4777 and the Technical Rules; and The <i>consumer's facilities and equipment</i> comply with the Technical Rules, the WA Electrical Requirements and AS 3000.
Metering Criteria:	Installation at the bi-directional point of an interval meter supplied or provided by Western Power having capability for import and export channels and kWh and kVAh information collection.
Applicable Reference Tariff:	The applicable reference tariff would be RT14 (a new seasonable anytime maximum demand tariff).
Applicable Standard Access Contract:	"Electricity Transfer Access Contract" published in Appendix 4 of the Access Arrangement
Applicable Service Standard Benchmarks:	As set out in Section 3.18 and 3.19 of the Access Arrangement

5.2.2 Assessment of Option 2 against the Criteria

Our assessment of this option against the criteria is as follows:

Criteria	Assessment of Option Against the Criteria
Criteria 1 – Ensuring that Tariffs Reflect Cost	Option 2 has a stronger relationship with cost – as determined by the customer's reserved capacity on the network – than the other Options. This is because Option 2 is based on demand, not consumption, and therefore is reflective of the costs imposed on the network by the customer. Under this option, all other things being equal, a customer with an embedded generator installed will only pay less in total network charges than a customer without an embedded generator installed, where the embedded generator reduces peak demand, or the customer changes its behaviour to lower its peak demand;
Criteria 2 – Limiting Cross Subsidies	Option 2 involves the least cross subsidisation of all of the Options. This is because the tariff reflects the demand requirements placed on the network.
Criteria 3 – Administrative simplicity to Western Power, Retailers and Customers	<p>Option 2 is the most administratively complex of the options for Western Power as suitable new single phase interval meters with kVAh measurement functionality would need to be approved, sourced and installed with the kVA demand subsequently derived.</p> <p>The approval process may include, amongst other things: testing and evaluation of the new meter by Western Power; commercial justification for the new meter; determining who will pay for the additional costs involved (including customer willingness to pay); and discussing with Synergy any impact on the REBS.</p>

	The new distribution tariff would need to be designed and implemented and a decision would need to be made on whether to transition existing REBS customers to the new arrangements. If Western Power elected to transition these customers – therefore declaring the status quo redundant – then there would be a cost impost for customers requiring single phase metering equivalent to the installation cost of the new meter. This would need to be paid for by either Western Power or the customer at the point of transition. If Western Power elected not to transition these customers, then there would be two classes of customers – those existing as at the date that the existing arrangement was declared obsolete, and new customers – receiving a bidirectional service.
Criteria 4 – Barriers to Entry	Option 2 presents an increased cost to customers requiring new single phase meters, while the application of this tariff may remove some of the financial incentive for customers to install embedded generators compared with under the status quo.
Criteria 5 – Compatibility with the REBS	Option 2 involves the installation of a new single phase meter in addition to a new tariff structure. Adjustment to the REBS would need to be discussed with Synergy.

5.3 Option 3 – Time of Use Tariff for Bi-Directional Customers

5.3.1 Background to Option

As noted in section 4.2.3, Option 3 involves a new demand based tariff. The characteristics of the service would be as set out in the following table.

Characteristics	Option 3 Details
Reference Service Name:	Reference Service C1 – Time of Use (Residential) – Bidirectional Service
Reference Service Description:	A <i>bidirectional service</i> combined with a <i>connection service</i> and a standard meter service at a <i>bidirectional point</i> on the low voltage (415 volts or less) <i>distribution system</i>
Technical Eligibility Criteria:	<p>Users are eligible to use this <i>service</i> if:</p> <ul style="list-style-type: none"> • The <i>bidirectional point</i> is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections; • The consumer's inverter system must comply with the requirements of AS 4777 and the Technical Rules; and • The <i>consumer's facilities and equipment</i> comply with the Technical Rules, the WA Electrical Requirements and AS 3000.
Metering Criteria:	Installation at the bi-directional point of an interval meter supplied or provided by Western Power having capability for import and export channels and five register information collection.

Applicable Reference Tariff:	The applicable reference tariff is RT14 (a new time of use tariff).
Applicable Standard Access Contract:	"Electricity Transfer Access Contract" published in Appendix 4 of the Access Arrangement
Applicable Service Standard Benchmarks:	As set out in Section 3.18 and 3.19 of the Access Arrangement

5.3.2 Assessment of Option 3 against the Criteria

Our assessment of this option against the criteria is as follows:

Criteria	Assessment of Option Against the Criteria
Criteria 1 – Ensuring that Tariffs Reflect Cost	Option 3, depending on its design will have a stronger relationship with cost than the status quo, particularly so under the three period design variation, with the higher peak demand charge operating as an incentive to reduce or shift consumption patterns. Option 3 would not be as cost reflective as Option 2, due to the method of charging being based on electricity consumption rather than demand, but the tariff could be refined further to reflect the costs of the customer on the network by defining a third shoulder tariff period, as detailed in section 4.2.3.
Criteria 2 – Limiting Cross Subsidies	Option 3 may reduce or limit cross subsidisation depending on the way in which the time of use tariff was designed. Generally, a customer with an embedded generator would pay less than a customer without an embedded generator installed on the same tariff as the embedded generator would cover a proportion of the customer's electricity consumption. However, the tariff could be designed with a higher peak rate to compensate for any difference that would otherwise occur. A more refined time of use tariff that utilised three tariff periods would then allow the embedded generator customer to benefit from any reduction that may occur from a reduction in peak demand from the use of the embedded generator and provide greater incentive to change consumption patterns to achieve cost savings.
Criteria 3 – Administrative simplicity to Western Power, Retailers and Customers	Option 3 involves no change to existing practices in the approval of the connection application, and no changes to metering and meter data collection processes. This is because the two channel meters currently installed when a customer connects an embedded generator are capable of recording 5 channels of information suitable for time of use tariffs. The new distribution tariff would need to be designed and implemented and a decision would need to be made on whether to transition existing REBS customers to the new arrangements. If Western Power elected to transition these customers – therefore declaring the status quo redundant – then there would be no cost impost on customers for metering but the extent of tariff increases would need to be assessed in the context of allowable side constraints. If Western Power elected not to transition these customers, then there would be two classes of customers – those existing as at the date that the existing arrangement was declared obsolete, and new customers – receiving a bidirectional service.
Criteria 4 – Barriers to	The metering requirements and metering costs associated with Option 3 are the same as what currently exists and hence do not present any

Entry	additional barriers to entry for customers wanting to install embedded generators at bi-directional points. However, the associated tariff, depending on its design, may remove some of the existing financial incentive for customers to install embedded generators.
Criteria 5 – Compatibility with the REBS	Option 3 is technically compatible with the REBS, although an adjustment may need to be made to the current retail tariff offering.

5.4 Option 4 – Higher Rate Usage Tariff for Bi-Directional Customers

5.4.1 Background to Option

As noted in section 4.2.4, Option 4 involves a new demand based tariff. The characteristics of the service would be as set out in the following table.

Characteristics	Option 4 Details
Reference Service Name:	Reference Service C1 – Seasonal Anytime Maximum Demand (Residential) – Bidirectional Service
Reference Service Description:	A <i>bidirectional service</i> combined with a <i>connection service</i> and a standard meter service at a <i>bidirectional point</i> on the low voltage (415 volts or less) <i>distribution system</i>
Technical Eligibility Criteria:	<p><i>Users</i> are eligible to use this <i>service</i> if:</p> <ul style="list-style-type: none"> • The <i>bidirectional point</i> is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections; • The consumer's inverter system must comply with the requirements of AS 4777 and the Technical Rules; and • The <i>consumer's facilities and equipment</i> comply with the Technical Rules, the WA Electrical Requirements and AS 3000.
Metering Criteria:	Installation at the bi-directional point of an interval meter supplied or provided by Western Power having capability for import and export channels and five register information collection.
Applicable Reference Tariff:	The applicable reference tariff is RT14 (new anytime energy tariff).
Applicable Standard Access Contract:	"Electricity Transfer Access Contract" published in Appendix 4 of the Access Arrangement
Applicable Service Standard Benchmarks:	As set out in Section 3.18 and 3.19 of the Access Arrangement

5.4.2 Assessment of Option 4 against the Criteria

Our assessment of this option against the criteria is as follows:

Criteria	Assessment of Option Against the Criteria
Criteria 1 – Ensuring that Tariffs Reflect Cost	Option 4 maintains cost recovery parity on a per customer basis with customers without embedded generators installed who are on the RT1 tariff, but may not be reflective of the true costs of the customer, given the weaker relationship with demand. Under Option 4 the customer receives a blunt signal that if they connect an embedded generator, then the customer will pay the same amount to Western Power regardless of any decision they might make to shift or reduce their peak demand or their times of consumption.
Criteria 2 – Limiting Cross Subsidies	Option 4 minimises any cross subsidisation by maintaining cost recovery parity with customers without embedded generators installed who are on the RT1 tariff. However, while there would be no cross subsidies, there would be few positive signals sent to either Customer under this Option.
Criteria 3 – Administrative simplicity to Western Power, Retailers and Customers	Option 4 involves no change to existing practices in the approval of the connection application, and no changes to metering and meter data collection processes. This is because the basis of the tariff would be unchanged – only the rate would increase. However, the new distribution tariff would need to be designed and implemented and a decision would need to be made on whether to transition existing REBS customers to the new arrangements.
Criteria 4 – Barriers to Entry	The metering requirements and metering costs associated with Option 4 are the same as what currently exists and hence do not present any additional barriers to entry for customers wanting to install embedded generators at bi-directional points. However, the higher tariff rate will remove some of the existing financial incentive for customers to install embedded generators.
Criteria 5 – Compatibility with the REBS	Option 4 is compatible with the REBS, although an adjustment may need to be made to the current retail tariff offering.

5.5 Summary Assessment

A summary of the assessments is set out below.

Evaluation criteria	Options			
	Option 1 – Status Quo	Option 2 – Demand Tariff	Option 3 – Seasonal TOU	Option 4 – Higher Rate Energy Based Tariff
Criteria 1 – Ensuring that Tariffs Reflect Cost	Weakest relationship with cost.	Strongest relationship with cost imposed on network.	Depending on design, potentially a stronger cost relationship than Option 1 and Option 4.	Maintains cost recovery parity but may not be reflective of true costs.
Criteria 2 – Limiting Cross Subsidies	Greatest degree of cross subsidisation.	Least degree of cross subsidisation.	Depending on design - minimises cross subsidisation.	No additional cross subsidisation.
Criteria 3 – Administrative Simplicity by Western Power, Retailers and Customers	Most administratively simple of the Options.	Most administratively complex of the Options.	Second most administratively complex Option.	Second least administratively complex of the Options.
Criteria 4 – Barriers to Entry	No additional barriers to entry.	Highest up-front costs of the Options and potentially weaker financial incentive than status quo.	No additional up-front costs, although potentially weaker financial incentive than status quo.	No additional up-front costs, although weaker financial incentive than status quo.
Criteria 5 – Compatibility with the REBS	Compatible with the REBS.	Involves installation of new single phase meter and new tariff structure. Adjustment to REBS would need to be discussed with Synergy.	Technically compatible with the REBS, although may require retail tariff adjustment.	Compatible with the REBS, although may require retail tariff adjustment.
Summary	Not recommended	Not recommended at present – future investigation required	Recommended for further examination	Not recommended

6 Conclusions and Next Steps

NAS has examined the background to the ERA's required Draft Decision amendment to Western Power's proposed Access Arrangement revisions (Required Amendment 1), including the requirements of the Code, the Technical Rules, the current reference services and FiTs on offer in the SWIN, Western Power's proposed Access Arrangement and Synergy's submission to the ERA with regard to Western Power's reference services. NAS has also examined the ERA's required draft decision amendment, the impact on the REBS and has discussed with Western Power its current bi-directional services.

On this basis, NAS agreed the following technical aspects of the reference service with Western Power:

- The service will be titled "*Energy (Residential) - Bidirectional Service*";
- The description of the service will be "*A bidirectional service combined with a connection service and a standard meter service at a bidirectional point on the low voltage (415 volts or less) distribution system*"; and
- Customer's will be eligible to receive the service if:
 - The bi-directional point that the service was being sought at is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections;
 - The customer's inverter system complies with the requirements of AS 4777 and the Technical Rules;
 - The customer's facilities and equipment comply with the Technical Rules, the WA Electrical Requirements and AS3000; and
 - The metering equipment installed is capable, as determined by Western Power, of meeting the bi-directional service criteria.

Having agreed on the technical aspects of the reference service and following further discussions with Western Power, NAS has:

- Identified four reference tariff options: the status quo; a seasonal demand tariff; a time of use tariff; and a higher rate variation of existing tariff RT1;
- Assessed each option against five criteria: ensuring that tariffs reflect costs; limiting cross subsidies; providing administrative simplicity to Western Power, retailers and customers; minimising barriers to entry; and maintaining compatibility with the REBS; and
- Had regard to the requirements of the Code, the Metering Code and Western Power's pricing principles, existing tariff design process, existing reference tariffs, sustainability policy, and metering and tariff modelling capabilities.

NAS considers that Option 3, the time of use network tariff, is the most suitable of the Options, in that:

- Depending on the design of the tariff, it is more reflective of the cost imposed on the network by the customer than both Option 1 and Option 4, although being consumption based it is still less cost reflective than the demand based tariff of Option 2. Further, the differentiation between on-peak rates and off-peak rates provides an incentive to the customer to alter consumption patterns to achieve cost savings;
- Depending on the design of the tariff, Option 3 may reduce or limit cross subsidisation.
- The tariff involves no change to the existing practices in the approval of the connection application and no changes to the metering and meter data collection processes. Although Option 3 is more administratively complex than maintaining the status quo it is less complex than implementing the demand based tariff of Option 2;
- No additional barriers to entry or up-front costs are imposed on the customer by the implementation of the tariff; and
- The tariff is technically compatible with the REBS, although changes to the retail tariff offering may need to be made.

Further, NAS considers that the adoption of a variation to the time of use tariff that defines three tariff periods – on-peak, off-peak and shoulder – as detailed in section 4.2.3, allows greater cost reflectivity and additional scope for the customer to change consumption patterns to achieve further cost savings.

NAS recognises that the demand tariff of Option 2 provides the most cost reflective solution and involves the least degree of cross subsidisation. However, there are several matters that Western Power would need to resolve before this option could be implemented, being that:

- Western Power does not currently have an existing standard single phase meter with reactive power measurement functionality;
- There would be an increased cost associated with installing such a meter relative to the current standard meter; and
- The new meter would need to undergo a process of internal assessment and approval to ensure that it could be commercially and technically justified prior to installation.

If Western Power is able to address these matters then Option 2 might become the best long-term solution.

The form of the recommended reference service is therefore:

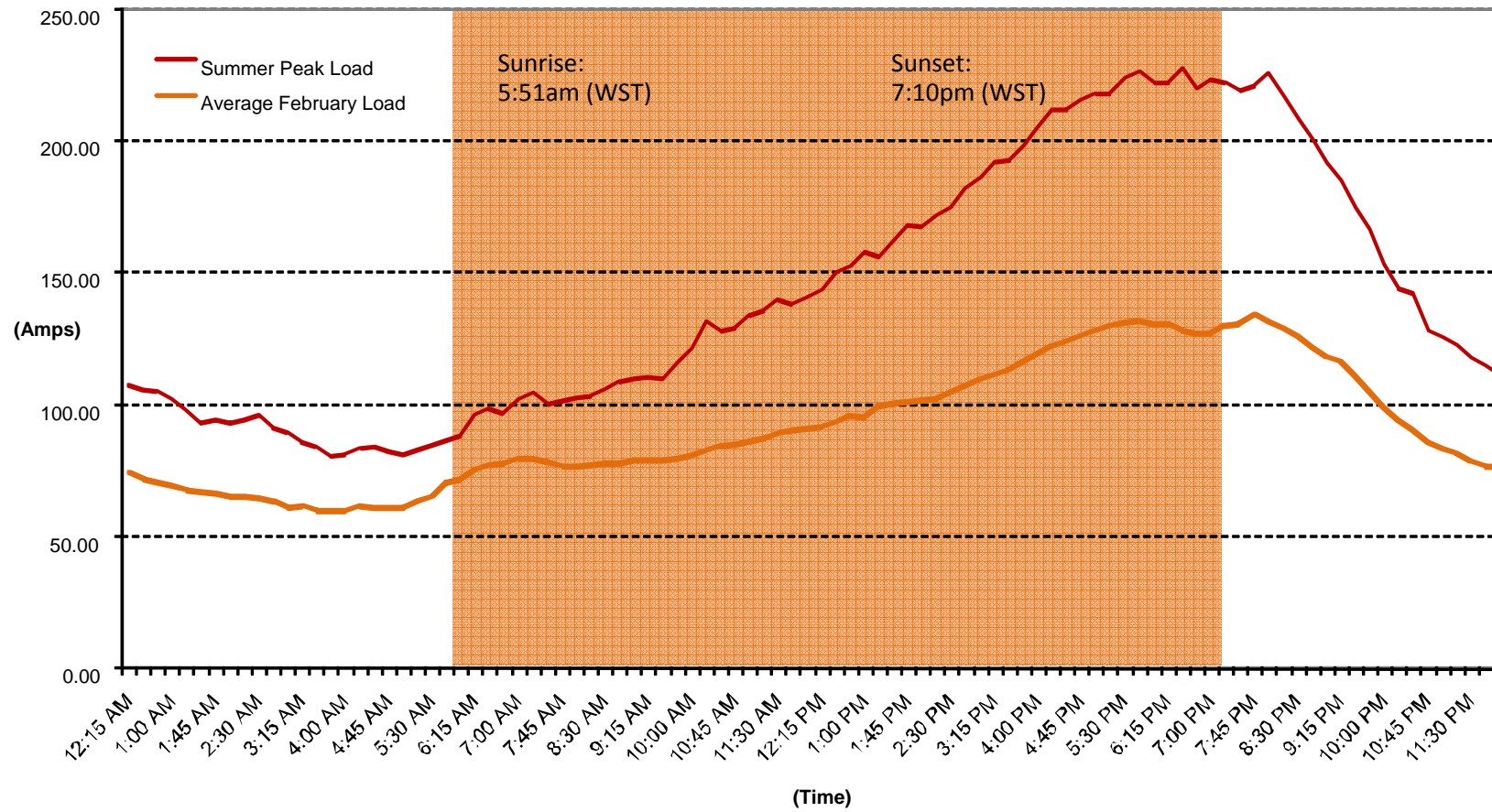
- Reference Service Name: Reference Service C1 – Time of Use (Residential) – Bidirectional Service;
- Reference Service Description: A *bidirectional service* combined with a *connection service* and a *standard meter service* at a *bidirectional point* on the low voltage (415 volts or less) *distribution system*;
- Technical Eligibility Criteria: *Users* are eligible to use this service if:
 - The bidirectional point is located at a residential premise with an inverter system rated up to 10 kVA for single phase connections and 30 kVA for three phase connections;
 - The consumer's inverter system must comply with the requirements of AS 4777 and the Technical Rules; and
 - The consumer's facilities and equipment comply with the Technical Rules, the WA Electrical Requirements and AS 3000;
- Metering Criteria: Installation at the bi-directional point of an interval meter approved by Western Power having capability for import and export channels and five register information collection;
- Applicable Reference Tariff: The applicable reference tariff is RT14 which is a new time of use tariff;
- Applicable Standard Access Contract: "Electricity Transfer Access Contract" published in Appendix 4 of the Access Arrangement; and
- Applicable Service Standard Benchmarks: As set out in Section 3.18 and 3.19 of the Access Arrangement.

Following its approval of this draft report, it is anticipated that:

- Western Power will invite feedback and comments from interested stakeholders on the draft recommendations through public consultation;
- NAS will finalise the report to Western Power, which will document the final recommendations (taking into account stakeholder feedback) on the reference services and associated reference tariffs; and
- Western Power will revise and submit its Access Arrangement to the ERA.

A. Summer Load Profile

Summer Load Profile on Residential Feeder WD 210 – 11/2/2009



B. Winter Load Profile

Winter Load Profile on Residential Feeder WD 210 – 20/7/2009

