



CONSORT
Bruny Island Battery Trial

Technical Specification and
subsidy design

Authorisations

Action	Name and title	Organisation	Date
Version 1.0 (for installer engagement)			
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Table of contents

Authorisations.....	1
Appendix A Definitions	12
Appendix B Sample single line diagrams	14
B.1 Typical install	14
B.2 AC Coupled installation.....	15
B.3 Battery backup system single line diagram.....	16
Appendix C Example quote.....	17
Appendix D Supported batteries and inverters	24

1. Purpose

The purpose of this document is to:

- Present the subsidy details and eligibility criteria for the Bruny Island distributed energy storage trial; and
- Describe the minimum standards that any installed energy storage system must meet.

It is aimed at installers who are participating in the Bruny Island distributed energy storage trial.

Terms in italics in this document have specific meanings, defined in Appendix A.

This document is divided into several sections:

- Section 2 describes the project and what it requires;
- Section 3 describes the subsidy, how it is calculated, and the process used to claim it; and
- Section 4 describes the minimum requirements for any system which can claim the subsidy.

1.1 Related Documents

This document is to be read with the documents listed below (links will be inserted once uploaded to website)

- Subsidy process and checklist
- Quote template
- Subsidy application form
- Social Sciences consent form
- Installer authority to act form
- Homeowner consent form
- Commissioning checklist
- Participation agreement
- GridCredits agreement
- Subsidy assignment form

2. Background

As part of an ARENA¹ supported research project we are subsidising batteries and solar generation to be installed in customer properties on Bruny Island. These batteries will be used for several purposes during the trial:

- They will be used to reduce load on the cable supplying Bruny Island during peak times;
- They will be used as part of a research project investigating innovative new ways of using them to benefit both the customer and the network; and
- They may be used by the customer to manage the customer's own energy use.

Approximately 40 battery systems will be installed as part of this trial. This will vary depending on what sort of system each customer installs. The subsidy is designed to procure approximately 150 kW of battery capacity.

It is critical that customers have a positive outcome from this project. Substandard equipment or installation practices will set a bad precedent for future applications of this technology. The critical success factors for this project are:

- The customers are satisfied with the trial and the process used;
- The installed systems can operate to relieve the network constraint;
- The installed systems are suitable for the research; and
- The trial provides information to TasNetworks and the industry in general that may be used for future applications of this technology.

This trial will as closely as possible match the process that would be used by TasNetworks on future similar projects. This has helped set the guiding principles for this trial as:

- The system design is left to a discussion between the installer and the customer;
- Beyond paying the initial subsidy we have no responsibility for the ongoing operation or maintenance of the system; and
- We will pay customers to use their battery during times of peak load on Bruny Island.

For this trial, the systems installed are heavily subsidised. A base level system is expected to cost each customer \$3,000 - \$5,000, with the remaining amount subsidised by us. There is no intent to extend this subsidy beyond this trial.

A compliant system must be installed by an *approved installer*. This ensures the workmanship is of a high standard.

Installers have a major role to play in this trial. They will:

- Work with the customer to optimise their solar/battery system;
- Procure the equipment to be installed;
- Perform installation work to a high quality; and
- Provide warranty support and maintenance of the installed systems.

¹ Australian Renewable Energy Agency

3. Subsidy

The subsidy will be paid by TasNetworks. It will be paid to the customer or the installer on the customer's behalf. We expect most customers will appoint the installer to act on their behalf.

3.1 Subsidy design

The subsidy is designed to be easy to calculate and not depend on the customer installing a particular type of technology (apart from the Reposit requirements). The installed battery capacity defines the value of the subsidy.

Battery capacity for the purposes of this trial is measured in *kilowatts* and defined as:

Battery capacity is measured in *kilowatts* and is the lesser of:

- The total warranted energy capacity of the battery minus any capacity the customer wishes to keep in reserve (in kilowatt-hours); and
- The sustained power output of the battery (measured in kilowatts) over one hour.

The above ratings must be available for at least 2,000 cycles.

The list of supported batteries is in Appendix D. This list also includes the subsidy which would apply for each configuration.

3.2 Subsidy terms

TasNetworks will pay a subsidy based on a quote provided to TasNetworks by the installer or customer. The quote must come from both a customer who has been pre-approved by TasNetworks and a TasNetworks *approved installer*.

TasNetworks will pay the lesser of:

- The total quote cost minus \$2,000;
- \$3,200 per *kilowatt* of *battery capacity*; and
- \$17,200.

Provided that:

- The energy storage system has 2 kilowatts of *battery capacity* or more;
- The quote contains all the information required under 3.3;
- The quote only contains the following items:
 - The *energy storage system* including:
 - *Reposit Ready* Batteries
 - *Reposit Ready* Battery inverter (possibly including solar inverter);
 - *Reposit optimising controller*;
 - Optionally solar generation; and
 - Energy monitoring equipment;
 - Optionally a separate *solar system (AC Coupled System)* where the separate inverter is capable of communicating with the *Reposit optimising controller*;
 - Labour directly required to install the *energy storage system* and *AC Coupled System*;
 - Ancillary parts directly required to install the *energy storage system* and *AC Coupled System* including if required a 3G modem that plugs directly into the USB port on the Reposit controller; and

- Parts and labour directly required to control any *switched loads*. This does not include the switched load itself.
- The quote must not include work required to rectify an existing substandard installation. This work must be completed prior to commencing installation of the energy storage system.
- The quote must not include work not directly related to items listed above. A customer can have other work performed at the same time but it must not be included in the quote provided to TasNetworks.

The total system must include some solar generation. This generation may be pre-existing in a premises that already has solar installed.

3.3 Information that must be included in the quote

Generally the quote must comply with the details specified in Clean Energy Council (CEC) [solar retailer's code of conduct](#) section 2.1.6. These requirements are included below for clarity. In addition TasNetworks requires details on the proposed battery installation.

- Itemised and costed list of major parts to be used, including:
 - Battery (manufacturer, make, rating kW/kWh);
 - Inverter (manufacturer, model. N/A if included in battery);
 - Separate Solar inverter in an *AC Coupled system* (Make, model);
 - Solar panels (make, model, total rating, connection point, number of panels);
 - Reposit Optimising controller; and
 - Monitoring equipment.
- Total remaining parts cost and description of parts;
- Labour cost;
- the total value of any discounts, STCs, Goods and Services Tax (GST) and rebates as applicable;
- A site-specific full system design including:
 - The proposed roof plan (sketch or diagram is acceptable);
 - Orientation and tilt of the solar panels;
 - Expected efficiency losses due to shading; and
 - The system's site-specific estimated energy yield, i.e. average daily performance estimate in kilowatt hours (kWh) for each month of solar generation. The performance estimate must be based on data obtained from the CEC System Design Guidelines for Accredited Designers or other reputable source.
- A site specific full battery system design including:
 - Proposed battery location (sketch or diagram is acceptable),
 - Expected usage of the battery (kWh/day) for purposes other than network support,
 - Expected battery lifetime based on warranty and expected cycle life (network support cycles can be assumed to be a maximum of 50 days per annum of 2 cycles per day. This would generally replace a cycle used by the customer).
- Number and description of proposed controlled loads;
- Single line diagram of completed installation;
- Expected bill change for the customer post installation;
- The factors required to calculate the kilowatt rating of the system for the subsidy:
 - Energy capacity of the battery and manufacturers warranted depth of discharge after 2000 cycles;

- Any energy capacity the customer wishes to hold in reserve (for backup purposes); and
- Maximum sustained power output of the battery over 1 hour.
- Evidence the customer has approved the quote;
- Any site conditions and special circumstances beyond the control of the Signatory which may result in extra chargeable work not covered by the quote. This includes any additional costs that may arise at or after installation and that will not be borne by the Signatory. For example, fees for meter exchange/reconfiguration, damage on meter panels, and changing dedicated off peak control devices if required;
- Business terms, including the payment method, deposits and timetable, and how long the quote will be valid for;
- Details about any after-sales services, guarantees and express warranties. The warranty must:
 - Include a statement that the consumer's rights under the warranty sit alongside the consumer guarantees which are required under ACL and cannot be excluded.
 - Under ACL, consumers cannot sign away their consumer guarantee rights. Signatories must not put terms into their contracts to avoid their consumer guarantee obligations.
 - The consumer's cooling-off and termination rights.
- An estimated timetable for supplying and installing the system. Where timeframes are out of control of the retailer, this can be noted with relevant disclaimers; and
- If the proposed battery/inverter combination is not listed in Appendix D, confirmation from Reposit Power the system will be supported.

The customer must be provided with a copy of the quote.

A sample quote is included in Appendix C.

3.4 Customer requirements

TasNetworks will assess customer eligibility using a formal application process. Only eligible customers will receive the list of *approved installers*. These eligible customers will have an approval letter with an approval number. It is likely that some installers will be contacted by customers who are not yet eligible. Installers should not submit quotes from ineligible customers to us.

During the trial customers will be required to:

- Maintain the energy storage system;
- Maintain an internet connection;
- Maintain a connection to the electrical network; and
- Participate in the research as required.

During the trial TasNetworks will be the main customer contact for issues that don't relate to customer hardware. Installers will be the customer's primary contact for issues with the installed equipment.

4. Minimum install and equipment standard

4.1 General requirements

Each completed installation must:

- Include an *energy storage system*;
- Include some amount of solar generation (part or all of which may be already existing);
- Be compatible (in its entirety) with the Reposit Power platform; and
- Be able to respond to a *network support event* using the *Reposit optimising controller*.

Example single line diagrams are shown in Appendix B.

The customer installation may also include several other elements:

- A separate solar inverter in an *AC coupled system*;
- One or more *switched loads*;
- A *backup power system*; or
- Other components are requested by the customer.

Beyond the energy storage system and some solar generation, TasNetworks is not prescriptive over what the customer will install. The subsidy is purely based on the battery kilowatt capacity (see 3.1). TasNetworks requires all installed equipment to meet all relevant standards.

Although already a requirement of the CEC battery accreditation we require all installations meet the [Clean Energy Council guidelines](#). The installer should also note other best practice documentation such as the [Energy Storage Council Australian Battery Guide](#).

We will check all installations at two points during the install process:

- When you send us the application form with the proposed installation details; and
- When we inspect the installation after the install.

At the application phase we will:

- Check the content and price of the quote against our expectations;
- Check the proposed location of equipment;
- Check the proposed equipment will work together as a system;
- Check the information provided to the customer appears accurate; and
- We may confirm some elements with the customer.

We will contact both you and the customer if we request changes.

Once the system is installed and you have submitted the installation checklist to us we will inspect the installation. This is the last step before we pay the subsidy. At this point we will be checking for:

- Whether the battery is placed according to the application; and
- Whether the wiring and installation meets the standard.

We will contact you and the customer if there are any issues. These must be rectified before we pay the subsidy.

4.2 Energy monitoring

Generally energy monitoring must be sufficient for:

- The operation of the *Reposit optimising controller*;
- Measuring demand response of the customer; and
- Performing the research.

This requires several energy monitors to be installed. The locations for these monitors are shown in Figure 1.

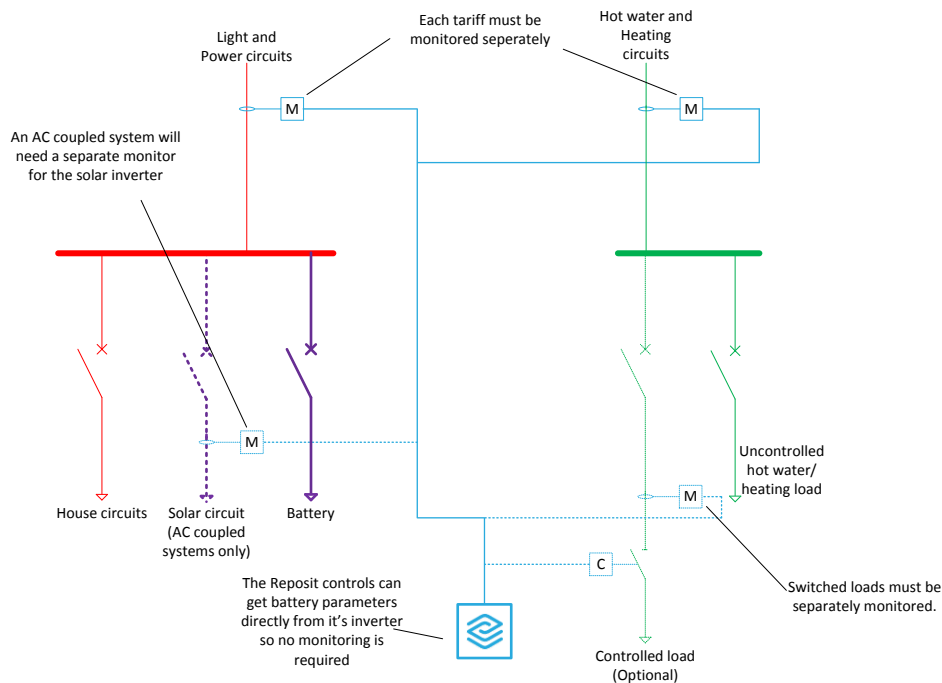


Figure 1 Monitoring locations

The minimum requirements for monitoring are:

- Each tariff connected to an installation must be individually monitored. The Reposit controls will only optimise against the tariff to which the solar/battery system is connected. Other tariffs will be used for indication and bill estimation;
- If connected with a different inverter (*AC coupled system*) the solar shall be monitored individually;
- Any *switched loads* must be monitored and switched separately;

All energy monitors must be capable of connecting to the *Reposit optimising controller*. Three phase connections must monitor all three phases.

The data created by this system will be:

- Stored on Reposit Power's servers;
- Shared with TasNetworks; and
- Shared with the other research partners.

All organisations participating in this trial have privacy policies which prevent sharing the data outside the organisations or using the data in an inappropriate way.

Details of the Reposit Power installation requirements and meters are in Appendix D.

Social research is being conducted according to strict ethics guidelines as monitored by the Human Research Ethics Committee of Tasmania.

4.3 Communications

Customers must have a home internet connection to participate in this trial. The internet connection will be used by the *Reposit optimising controller* to:

- Receive data necessary to perform optimisation calculations;
- Send present status information back to Reposit servers;
- Receive demand response requests from Reposit Power servers; and
- Receive occasional software updates from Reposit Power servers.

This internet connection is the customer's responsibility. They must maintain it for the length of the trial.

All communication with the *energy storage system* will be from Reposit's servers and through the *Reposit optimising controller*.

The *Reposit optimising controller* will consume around 1 gigabyte per month of data. It is the customer's responsibility to ensure that this usage will not cause any overuse charges for them.

The internet connection must always be active (excepting normal network outages). This includes when a customer is not home.

The *Reposit optimising controller* can be connected to:

- A wireless network;
- A wired (Ethernet) network; or
- A 3G (Mobile data) network.

These connections are selected by plugging the appropriate device into the USB port on the side of the *Reposit Optimising Controller*.

We have an internet datasheet available [here](#).

4.4 Energy Storage System

The *energy storage system* is the most important part of the installation. During the trial it will be used to support the network. When it is not required for network support the customer will use it to store excess solar energy or manage their tariff.

The requirements of the battery are:

- Must be *Reposit Ready*;
- Must have battery capacity of at least 2 *kilowatts*;
- Must be warranted for at least 2000 cycles from fully charged to the manufacturers recommended depth of discharge in 3 years;
- Must be installed by a CEC accredited grid connect battery installer;
- Must be designed by a CEC accredited grid connect battery designer; and

- Must be installed as per CEC guidelines for grid-connected energy systems with battery storage.

A list of supported systems is included in Appendix D. Other systems may be accepted with conformation from Reposit Power that the system is supported.

The installation must comply with the Clean Energy Council [battery storage install guidelines](#). We will be checking the proposed battery install against these standards and will not provide a subsidy for proposals which do not meet this standard.

4.5 Solar generation

The total installed system must include some solar generation (either as part of the *energy storage system* or separate as part of an *AC coupled system*). This project does not specify how much solar generation is to be installed as this will depend on the specifics of the customer demand.

4.6 Inverters

All inverter connected plant must comply with [TasNetworks Guideline for the Connection of Micro Embedded Generators to the TasNetworks Distribution Network](#). This means that the inverter must be AS4777 compliant and implement the settings specified in the guideline. Any inverter to which solar generation is connected must be a [CEC approved inverter](#).

The battery inverter must be *Reposit Ready*.

5. Relevant standards

Standard	Description
AS3000	Wiring rules
AS4777	Grid connect inverter standard
AS5033	Installation of solar arrays
NG R PD 09	TasNetworks Guideline for the Connection of Micro Embedded Generators to the TasNetworks Distribution Network
IEC62109	Safety of Power Converters for Use in Photovoltaic Power Systems CEC install guidelines for grid connected energy systems with battery storage
ESC 5000.2016	Energy Storage Council <i>'The Australian Battery Guide'</i>

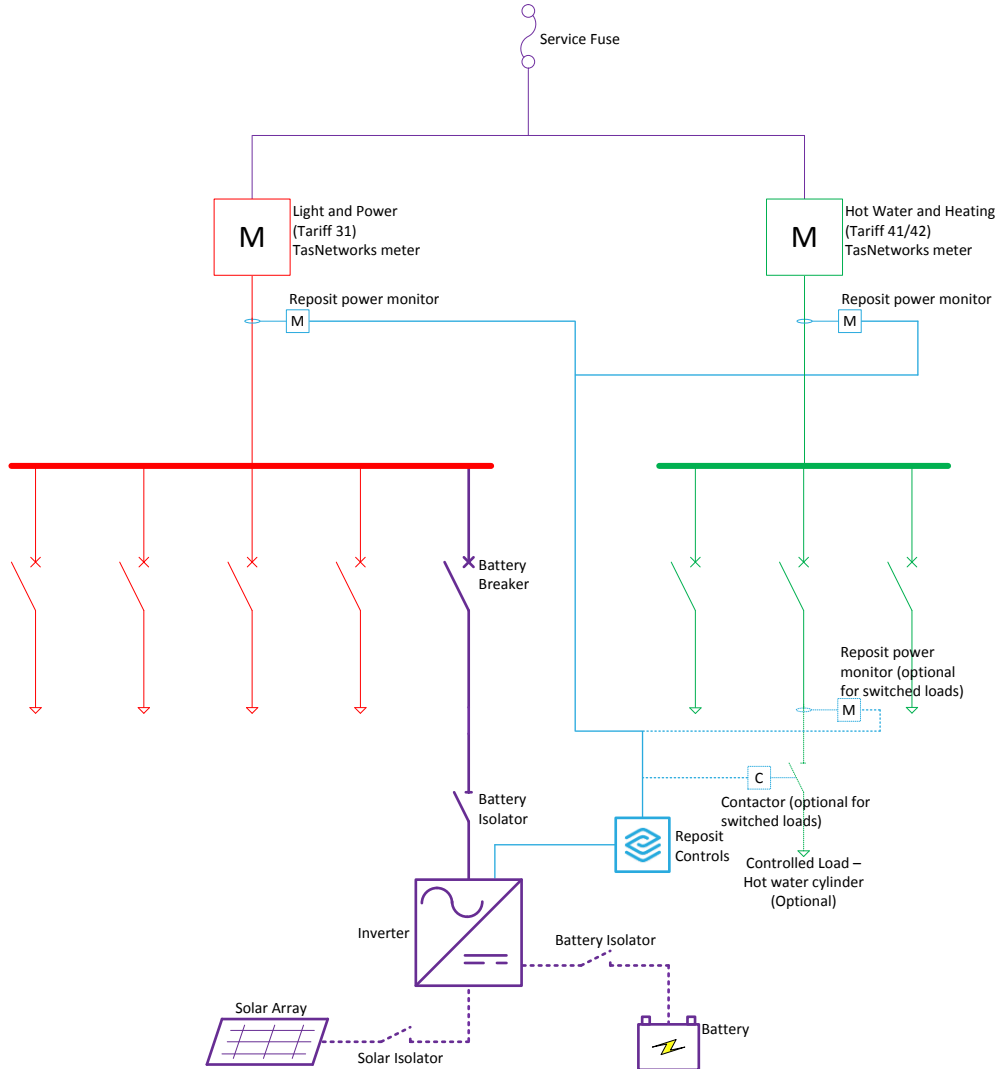
Appendix A Definitions

Term	Definition
AC coupled system	A system where the battery and <i>solar system</i> is connected with separate physical inverters
Approved Installer	An installer which is approved by TasNetworks for claiming the subsidy under this project.
Backup Load	A load which can be supplied from a <i>backup power system</i> when grid connection is lost
Backup power system	A system where some or all house loads may be supplied from the battery or PV system when grid power is lost. This specification is additional to any standards imposed by other standards pertaining to isolated systems.
Battery Capacity	The battery capacity (measured in kilowatts) as defined in 3.1.
Customer contribution	An amount of the install price which must be paid by the customer after all subsidies have been paid.
Customer switchboard	The switchboard immediately downstream of the customer's revenue meter to which the <i>energy storage system</i> is connected.
Energy storage system	The system which contains: <ul style="list-style-type: none"> • <i>Reposit Ready</i> Batteries; • <i>Reposit Ready</i> Battery inverter; • <i>Reposit optimising controller</i>; • Energy monitoring; and • Solar generation in a non <i>AC coupled system</i>.
Network Support event	A period of time which TasNetworks will request the response of an <i>energy storage system</i> and any <i>switched loads</i> to a network issue. This may include: <ul style="list-style-type: none"> • Charging or discharging a battery; • Switching switched loads off; or • Reactive power.

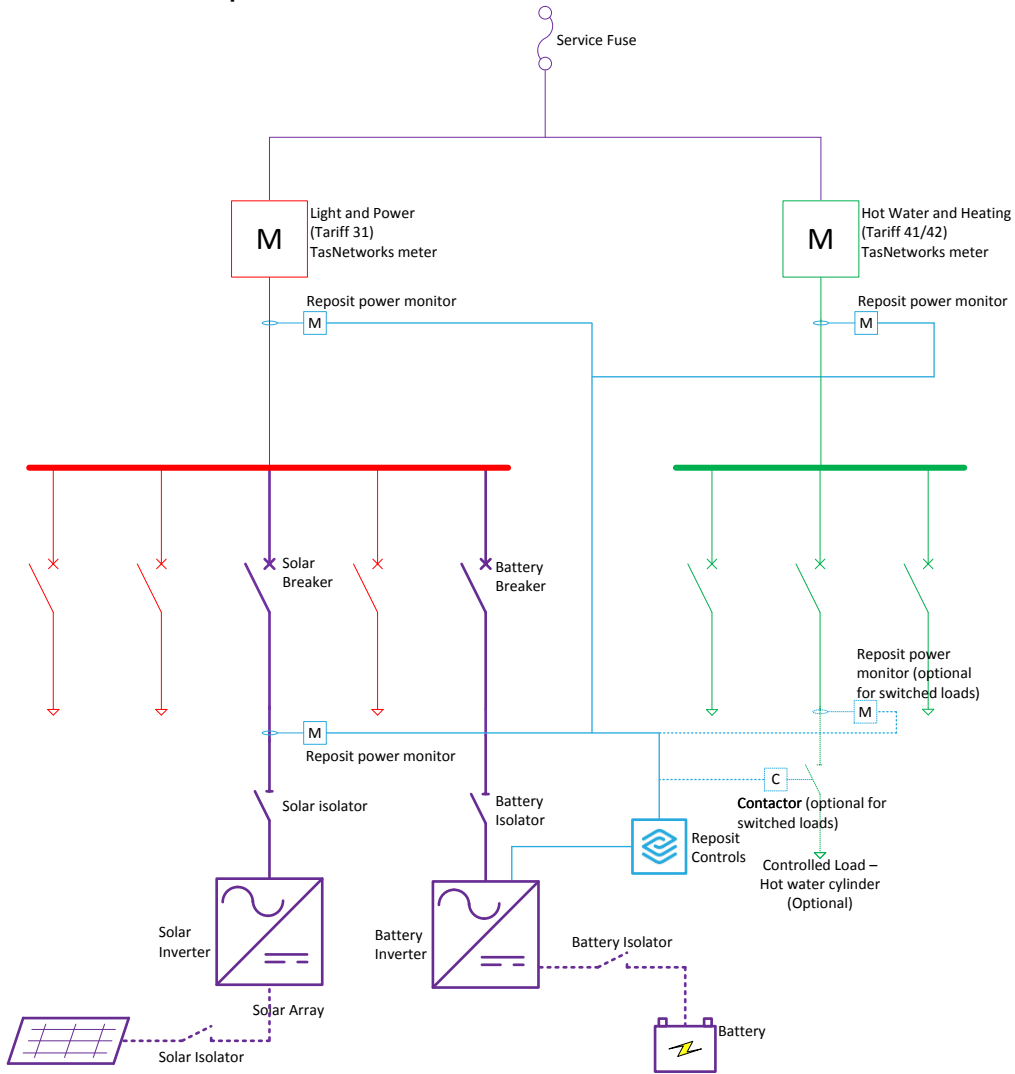
Term	Definition
Reposit optimising controller	The controller which: <ul style="list-style-type: none">• Logs energy data from installed sensors;• Sends commands to the <i>Energy Storage System</i> inverter; and• Receives requests from the Reposit Power servers.
Reposit Ready	Battery and inverter hardware that are fully integrated and tested with the Reposit optimising controller.
Solar system	In an AC coupled system the system which contains: <ul style="list-style-type: none">• Solar panels; and• Inverter.
Switched loads	Additional loads that a customer may switch to optimise their solar output and provide additional network support. Examples would be: <ul style="list-style-type: none">• Electric storage hot water cylinders;• Pool pumps; and• Some space heaters.

Appendix B Sample single line diagrams

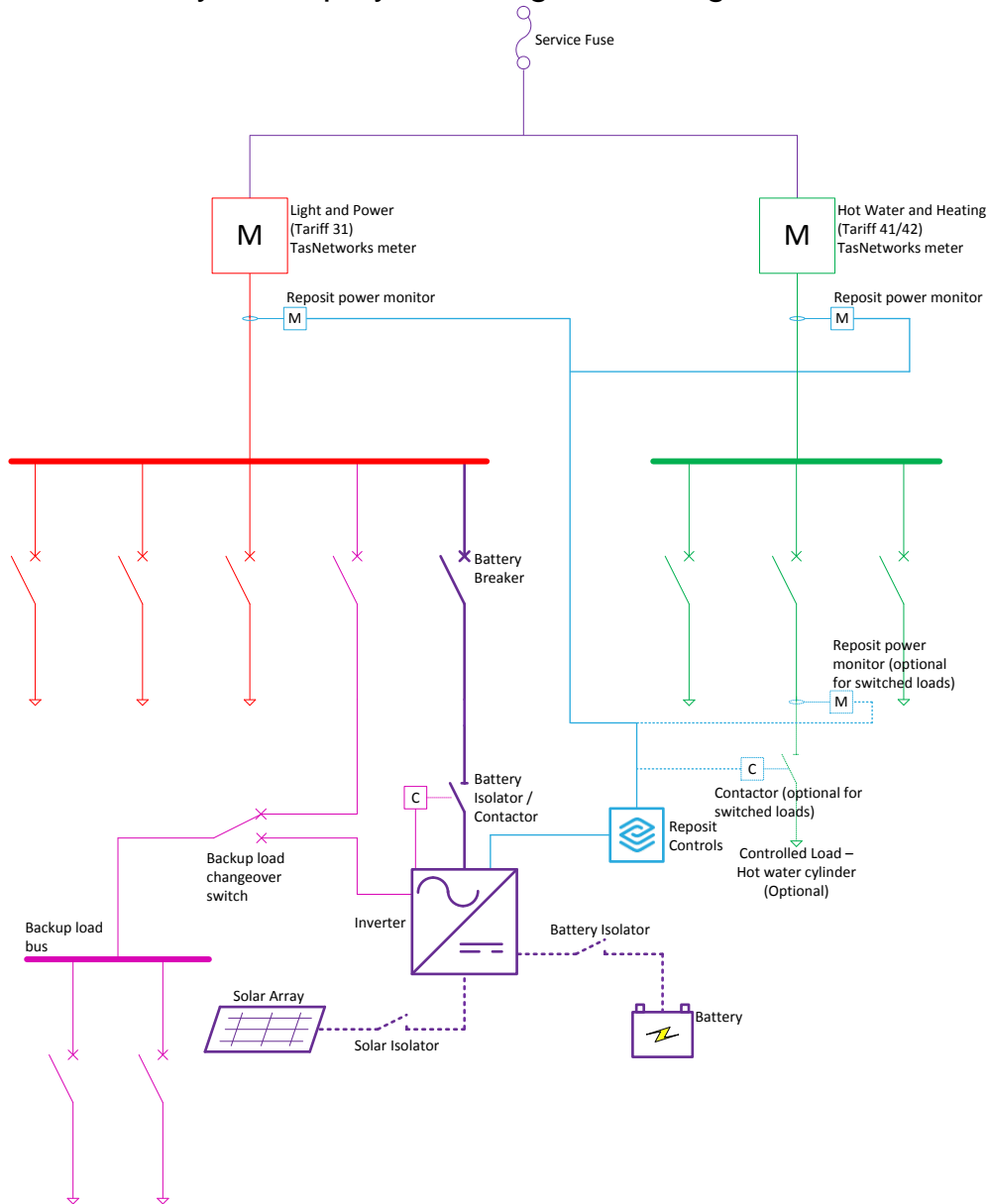
B.1 Typical install



B.2 AC Coupled installation



B.3 Battery backup system single line diagram



Appendix C Example quote

Installer Logo to go here

Installation details

Name J Citizen

Address Bruny Island

NMI 8XXXXXXXXXX

Installer details

Company name [Insert name]

Contact details [details go here]

Installation summary

Battery Make / Model LG RESU 6.4kWh/3.6kW

Solar Panel make /
model / number / total
output (kW) 15 X 260W Trina Honey TSM-260 (3.9kW)

Inverter make / model Sungrow SH5k

Switched loads Hot water cylinder (3.6kW element)

Total quote cost \$XX

Expected subsidy \$YY

Customer contribution \$ZZ

Expected yearly bill
impact \$AA

Expected install date 17/10/2016

List of major parts

Item	Make/Model	Quantity	Total cost (inc. GST)
Battery	LG RESU 6.4kWh/3.2kW battery system	1	\$
Battery Inverter	Sungrow SH5K Hybrid inverter (5kVA)	1	\$
Solar Inverter	N/A	N/A	\$
Solar panels	260W Trina Honey TSM-260 (3.9kW total)	15	\$
Reposit Controller	Reposit	1	\$
Reposit meters	Reposit RP110	3	\$
Switched load contactors	XX	1	\$
Other hardware		1	\$
Labour		1	\$
Sub total			\$
STC credit	X RECs at \$y		\$
Expected subsidy	3.6kW @ \$3,200/kW		\$11,520
Customer contribution			\$

Description of work performed

- Supply and install 1 X LG RESU 6.4kWh/3.6kW battery unit
- Supply and install 1 X Sungrow SH5k Inverter
- Supply and install 15 X 260W Trina Honey TSM-260 solar panels and associated mounting hardware
- Supply and install Reposit optimising controller and 3 X energy monitors (light and power, hot water, hot water cylinder controlled load) and associated mounting hardware
- Supply and install ethernet cable between Reposit optimising controller and existing ADSL modem
- Supply and install contactor for control of hot water cylinder controlled load
- Supply and install associated wiring and isolators
- Commission all installed equipment.
- Expected installation 17/10/2016
- Warranty documentation attached

Solar system design

Location/design

Orientation and tilt of panels	See drawing Approximately north west, approximately 10 degree tilt
Efficiency loss due to shading	None

Roof plan



Expected output

Month	Expected yield (kWh)
January	585
February	477
March	376
April	277
May	171
June	134
July	166
August	244
September	326
October	461
November	506
December	588
Total	4,311

Battery system design

Location/design

Battery location	Under front porch
Expected battery usage / day	4.3kWh for solar arbitrage and tariff arbitrage
Battery chemistry	Lithium Ion
Warranted cycles @ expected usage	4,000
Expected battery lifetime	10 years

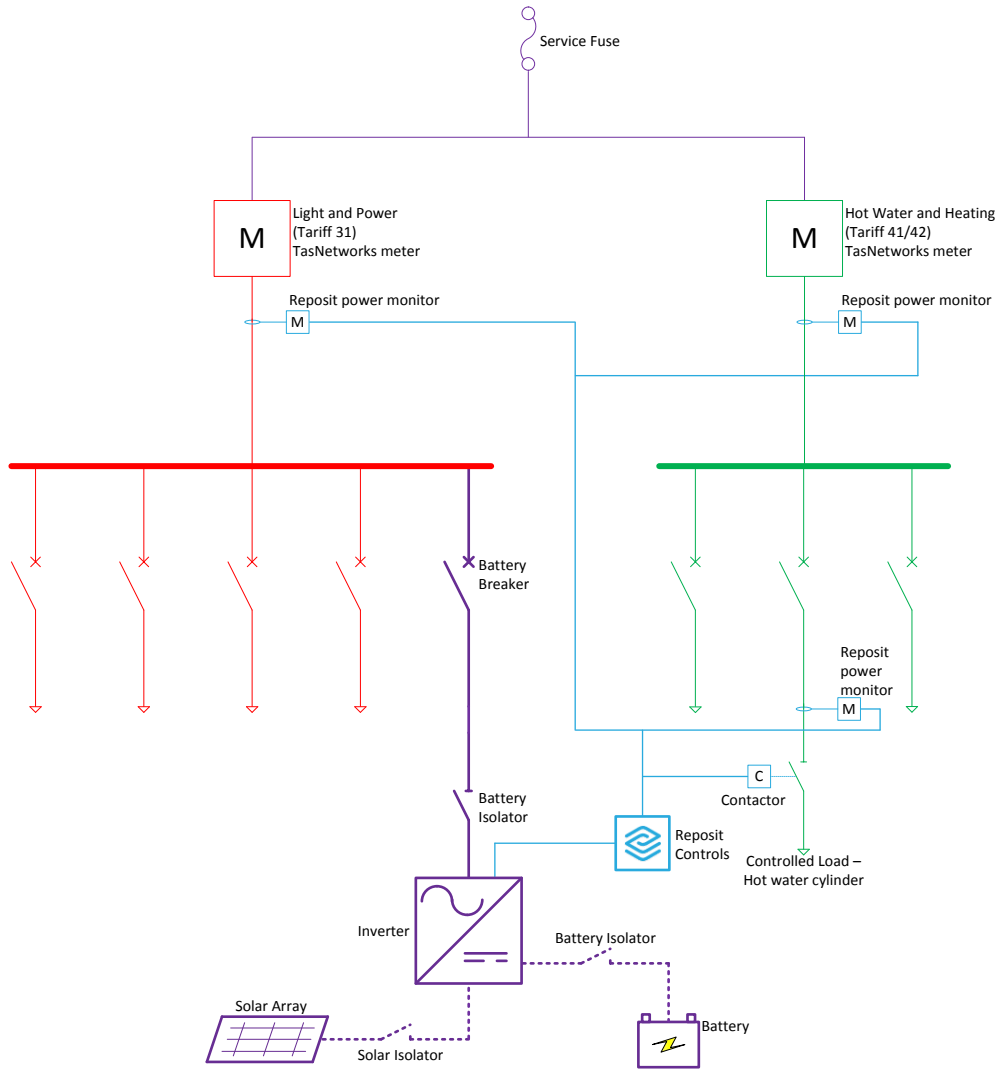
Location plan

Picture above

Controlled loads

Number of loads	1
1 Description	Hot water cylinder
Rated capacity (kW)	3.6kW

Single line diagram



Customer bill impacts

Current average bill \$2,000 pa (25 kWh consumption per day average)

Current tariff Tariff 31 and Tariff 41

Proposed tariff Tariff 93

Expected average bill \$1,200 pa

Assumptions used Customer consumes 60% of their energy during peak charge windows currently

Customer hot water controlled OFF during peak times

Battery can shift 5kWh/day out of peak demand times

Solar output in line with assumptions

Assumptions and risks

Panels can be installed as per diagram

Payment terms

Subsidy assigned to installer

Customer contribution paid on install

Exclusions

TasNetworks meter change

Warranty information

Length

5 years

Appendix D Supported batteries and inverters

For this trial any platform (battery/inverter combination) that is supported by Reposit Power will be accepted. Table 1 shows the batteries that are currently supported; Table 2 shows the inverters that are currently supported. Batteries or inverters that are not on this list will be accepted provided that:

- Reposit Power confirms the platform is supported (this should be attached to the quote); and
- A datasheet or specification is supplied which allows us to work out what the subsidy amount is.

We understand that the new LG RESU batteries (recently released) are supported by Reposit but you should check this with Reposit if you intend on installing one.

An installation may have multiple batteries installed provided the system as a whole is compatible with the Reposit Power platform. The maximum subsidy applies to the aggregate of all batteries that we can control at an installation.

Table 1 Supported batteries

Battery	Subsidy amount
LG RESU 3.6kW power 6.4kWh energy 5.12kWh warranted energy (2000 cycles) <i>Battery capacity: 3.6kW</i>	\$11,520
Tesla PowerWall 3.3kW power 6.4kWh energy 3.84kWh warranted energy (2000 cycles) <i>Battery capacity: 3.3kW</i>	\$10,560
Samsung Scalable All in One 7.2 4kW power 7.2kWh energy 6.36kWh warranted energy (2000 cycles) <i>Battery capacity: 4kW</i>	\$12,800
Samsung Scalable All in One 10.8 5kW power 10.8kWh energy 9.54kWh warranted energy (2000 cycles) <i>Battery capacity: 5kW</i>	\$16,000
Magellan RES1 (6.5 – 13kWh) 5kW power 6.5-13kWh energy 5.85 – 10.4kWh warranted energy (2000 cycles) <i>Battery capacity: 5kW</i>	\$16,000

Table 2 Supported inverters

Inverter make	Inverter model
Sungrow	SH5K hybrid
SolaX	SolaX X-Hybrid SK-SU3000 - SK-SU5000
SMA	Sunny Boy Storage 2.5
SolarEdge	StorEdge
Samsung	Inbuilt inverter to Scalable All in one
Magellan	Inbuilt inverter to HESS