Building Upgrade Finance
‘No worse off’
Methodology for estimating tenant cost savings

A guide to making a reasonable estimate of lessee savings resulting from a building upgrade under a building upgrade agreement

SOUTH AUSTRALIA
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A guide to making a reasonable estimate of lessee savings resulting from a building upgrade under a building upgrade agreement

Prepared for:

Department of Environment, Water and Natural Resources

Prepared by:

Common Capital Pty Ltd

Suite 10.12, 250 Pitt Street, Sydney NSW 2000, Australia

www.commoncapital.com.au

ABN 69 164 899 530

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About this document

This document is a guide to using the approved Methodology for calculating a reasonable estimate of cost savings to building lessees resulting from an upgrade under a building upgrade agreement (BUA).

Building Upgrade Finance (BUF) is a voluntary mechanism which assists building owners to access finance to improve the energy, water or environmental efficiency or sustainability of existing commercial buildings. Finance is tied to a property rather than a property owner, with repayments collected via a local government charge that is levied on the property (a building upgrade charge). Repayments are then passed on to the financier by the local council.

This document may be relevant to you if you are either:

- a lessee, where your lessor is requiring you to contribute to the repayment of a building upgrade charge using the ‘no worse off’ pathway (Clause 12(2)(b)(ii) of Schedule 1B of the *Local Government Act 1999*)
- a building owner interested in, planning or undertaking a building upgrade using BUF and are considering seeking lessee contributions to the building upgrade charge using the above-mentioned pathway, or
- a person helping either of the above parties to understand their obligations under BUF.

This document explains the purpose, eligibility and application of the proposed Methodology to determine what tenant contributions can be reasonably recovered under the ‘no worse off’ pathway.

Contents

1 Introduction to this guide

This guide is to assist both building lessors and lessees to understand and use the Methodology for calculating a reasonable estimate of cost savings to building lessees resulting from upgrades which are financed under a building upgrade agreement.

The Methodology can be obtained at www.environment.sa.gov.au/climatechange-buf, and is henceforth referred to as "the Methodology". This guide is intended to be read in conjunction with the Methodology.

The Methodology applies to building upgrade projects where the lessees of the building will receive direct financial savings from the upgrade project. Building owners can use the calculations set out in this guide to determine the value of these savings to building lessees, and require that they make a contribution towards the cost of the building upgrade.

The Methodology is intended to ensure that lessees that are required to make these contributions are no worse off than they would otherwise have been without the building upgrade. To ensure this, the Methodology establishes the direct and verifiable cost savings to the lessee from the upgrade. Under the *Local Government (Building Upgrade Agreements) Act 2015* this savings estimate sets an upper limit for contributions that a lessor can recover from lessees without their explicit consent.

Should the building owner wish to recover a lessee contribution without explicit consent, the Local Government (Building Upgrade Agreements) Regulations 2017 (the Regulations) require the building owner to report on annual savings made to those lessees[1].

The Methodology applies to both Predicted Savings calculations, for estimating future Lessee Savings arising from building upgrade works, and to Savings Made calculations, for reporting the annual savings made to the lessees in accordance with the Regulations.

This section summarises Building Upgrade Finance, and outlines the different pathways that a building owner may take to seek contributions from their lessees towards repaying the building finance. Note that the Methodology is a set of calculations for environmental upgrade projects. The detailed sections of the guide aim to assist readers to interpret and implement these calculations, and as such is aimed at suitably qualified individuals with relevant experience.

[1] Unless the lessor and lessee agree that this requirement does not apply, or applies with agreed modifications (in accordance with the Regulations).

The remainder of the document is structured as follows:

Section	Purpose
1	Introduction to BUF and lessee contribution pathways
2	Checks to establish whether a building owner may require a lessee to make contributions
Note: the following sections are relevant when the lessee will be required to make a contribution towards a building upgrade charge under the 'no worse off' pathway.	
3	Glossary of terms used in the guide
4	Outlining the calculation steps needed to make a reasonable estimate of cost savings to lessees
5	Defining the boundary of the building upgrade
6	Guide to calculating predicted savings and savings made
7	How to convert the calculated utility savings into financial savings
8	How to allocate the financial savings between lessees
9	Outlining the documentation to support the cost savings calculations

1.1 About Building Upgrade Finance

Building Upgrade Finance is designed to support upgrades of existing commercial buildings. Under the Building Upgrade Finance mechanism, finance for the building upgrade is underpinned by a tripartite agreement between a property owner, finance provider and a local council. The finance provider agrees to advance funds to the property owner for an upgrade to a building that will deliver improved performance. The finance is then recovered through a new charge on the land imposed by the local council.

The enabling legislation in South Australia allows building owners to require a contribution to a building upgrade charge from their lessees if they can ensure that their lessees are no worse off than they would have been without the upgrade. That is, they must prove that the upgrade results in bill savings to the lessee that meets or exceeds this pass-through.

For example, a building owner may enter into a building upgrade agreement to upgrade the lights in their building. In this building, the owner passes energy bills through to lessees as part of a net lease arrangement. The upgraded lights will result in lower energy bills for the building, which means a direct reduction in lessee bills. The building owner may pass on the finance repayment costs to the lessee (via a contribution to the building upgrade charge) either with the lessee's consent or if the building owner can demonstrate that the lessee will be no worse off – that is their contributions do not exceed the savings when calculated in accordance with the Methodology.

The Methodology is used by building owners to determine the bill savings for each lessee as part of the building upgrade.

1.2 Recovery of lessee contribution to a building upgrade charge

There are two pathways for a lessee to make a contribution towards a building upgrade charge. The lessee may consent to make a contribution, or they may be required to make a contribution by the building owner.

The Methodology applies to the second of these pathways – when lessees are required to make a contribution towards a building upgrade charge.

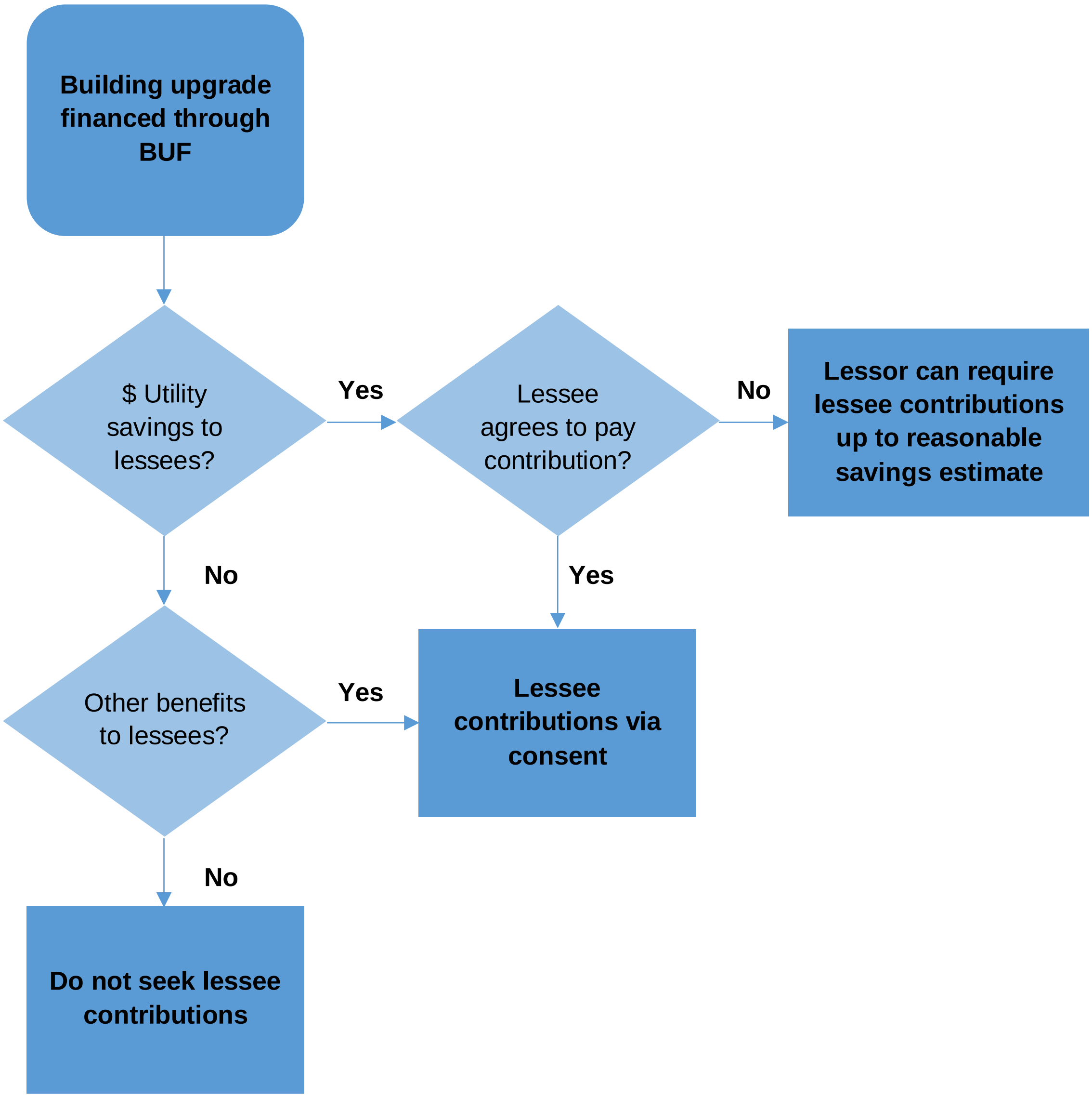

Figure 1 Determining the appropriate pathway for lessee contribution

1.2.1 Lessees may agree to make a contribution

A lessee may consent to make a contribution towards a building upgrade charge. This consent may take into account broader lessee benefits that do not result in direct bill savings, such as (but not limited to) improved building condition or indoor environment quality.

The Methodology outlined in this guide does not apply when lessees have explicitly agreed to make a payment towards the building upgrade charge.

1.2.2 Lessees may be required to make a contribution

Under the enabling legislation a lessee may be required to make a contribution towards the building upgrade charge when they receive a direct financial benefit from the upgrade works. The contribution is limited to ensure that the lessee is no worse off – that is, the contribution they make may not exceed the bill savings by the lessee.

The Methodology defines the “reasonable estimate” of savings to lessees arising from the building upgrade. The Methodology applies to estimates of predicted savings as well as estimating the annual savings made following the completion of the upgrade.

2 Checks to establish whether a building owner may require a lessee to make contributions

This section can be used to check whether a lessee can be required to pay a contribution without explicit consent.

Eligibility requirements to use the Methodology	
☐	Upgrade works have been financed under a building upgrade agreement.
☐	Upgrade works will deliver utility savings (i.e. electricity, gas or water bill savings).
☐	Lessees normally pay the bills that will be reduced either directly to a utility supplier, or indirectly as a pass through from the lessor (e.g. under a net lease).
☐	The lessor intends to require the lessee to make a contribution towards a building upgrade charge.
☐	Lessee has not consented to make a contribution towards the repayment of the building upgrade charge or the consent was not sought.
☐	Upgrade works fall into one of the following categories: ▪ Commercial building lighting upgrade ▪ Whole or partial building retrofit that will lead to a NABERS Energy or Water rating improvement ▪ Renewable energy equipment installation ▪ Any energy or water upgrade in which savings will be measured and verified using an energy model.

If a project does not meet these eligibility criteria, this Methodology considers that the lessee cost savings cannot be confidently estimated and the upgrade is deemed to have zero financial benefit to the tenant.

3 Glossary of terms used in this guide

This section outlines the terminology used in the Methodology and throughout this guide for easy reference.

Attribution Factor is the proportion of the Utility Savings that may be attributed to the lessee subject to this calculation.

Billing Unit is the physical unit that the Utility Supplier uses to measure and bill utility use, such as kilowatt-hours (kWh) or megalitres (ML).

Building Upgrade Charge is the charge on the land to be paid by the building owner for the purpose of repaying the money advanced by the financier for the upgrade works under the building upgrade agreement.

Confidence Factor is the proportion of Utility Savings that may be confidently attributed to the lessee, as defined by the Methodology.

Contribution is the amount to be recovered from a lessee towards the payment of the building upgrade charge.

Conversion Factor is the appropriate factor to convert Utility Savings into Billing Units.

Estimate Period is the time period for which this estimate is determined in years.

Lessee Savings is the reasonable estimate of cost savings to building lessees arising from upgrade works.

Method Boundary is the scope of the upgrade works for the purpose of undertaking the estimate. The Method Boundary may be a whole building (for example, a whole building retrofit) or a specific component within a building (for example, the lifts in a commercial building).

NABERS is the National Australian Built Environment Rating System, a national rating system that measures the energy efficiency, water usage, waste management and indoor environment quality of a building or tenancy and its impact on the environment. Note that only Energy and Water NABERS ratings may be used to calculate lessee savings for the upgrade works.

NABERS Accredited Assessor is a person authorised to conduct accredited NABERS ratings in accordance with the NABERS Rules.

NABERS Rules is the NABERS Rules for Collecting and Using Data, the quality standard for a NABERS rating. For a rating to be accredited by NABERS, the assessment on which it is based must be performed by a NABERS Accredited Assessor and comply with the NABERS Rules that set out principles and rules for gathering, interpreting and using data. The NABERS Rules are published on the NABERS website.

Predicted Savings is an estimate of Lessee Savings that forecasts the expected savings arising from the upgrade works over an Estimate Period.

Savings Made is an estimate of Lessee Savings that is made for annual reporting purposes in accordance with Regulations and is based on the measured data arising from the upgrade works over the previous 12 months.

The Methodology is the methodology approved under the Act to make a reasonable estimate of lessee cost savings arising from a building upgrade.

Total Savings is the total annual financial savings from the upgrade works for a Utility.

Utility is the service that is the subject of the upgrade works, i.e. electricity, gas or water, which is normally paid for by the lessee either directly to a Utility Supplier or indirectly through the lessor. Utilities that are billed separately to multiple parties in the building should be treated separately. For example, common area electricity and lessee electricity, if billed separately, are considered separate utilities.

Utility Savings is the total annual efficiency improvement arising from the upgrade works, expressed in appropriate units for that utility and calculated in accordance with the Methodology.

Utility Supplier is the entity that the lessor or lessee pays for the use of the utility, such as an energy retailer or water utility. In some cases the lessor may act as a Utility Supplier to the lessee.

Utility Tariff is the volume based cost of the utility to the lessee, expressed in dollars per Billing Unit.

Specific technical terms relevant to components of the Methodology are defined as needed throughout this guide.

4 Introduction to the reasonable estimate of cost savings Methodology

4.1 Using the Methodology to predict savings and measure savings made

Under BUF, if the lessor wishes to require lessee contributions towards a building upgrade charge without consent, they will need to both:

- estimate expected Lessee Savings arising from the upgrade using a Predicted Savings sub-method, prior to issuing a notice to the lessee for a contribution towards the building upgrade charge; and
- Estimate the Lessee Savings delivered by the upgrade using a Savings Made sub-method for an annual report to the lessee[2]. This estimate must be repeated annually throughout the contribution period and reported to the lessee unless otherwise agreed with the lessor.

The Methodology includes an overarching method that details the process for estimating the financial value of savings to the lessee from the building upgrade, and a range of sub-methods to quantify the utility (energy or water) savings that the upgrade delivered. These sub-methods allow for a range of approaches to estimate both the Predicted Savings and Savings Made for an upgrade project. Each Predicted Savings sub-method has a corresponding sub-method to estimate Savings Made for the upgrade. Section 6 details the various sub-methods and guidance on which sub-method may be best suited to the building upgrade.

The timeline in Figure 2 below outlines the use of the Methodology through the life of a building upgrade.

[2] Unless the lessor and lessee agree that this requirement does not apply, or applies with agreed modifications (in accordance with the Regulations).

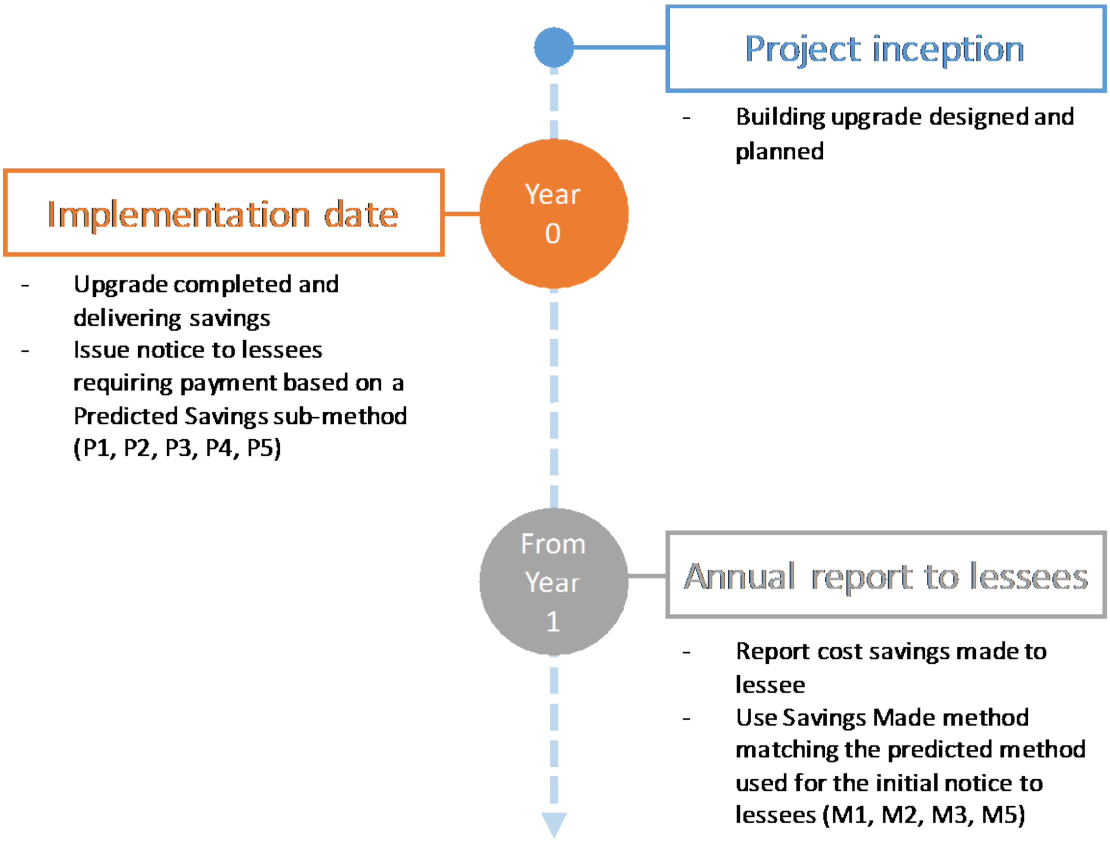

Figure 2 Timeline for estimating Lessee Savings in a building upgrade

4.2 The Methodology may be used for upgrades to building energy or water use

Building upgrades may deliver a range of benefits to building owners and lessees, including savings in various resources such as electricity, gas, water, sustainable transport or waste.

However, a lessee will only realise cost savings where[3]:

- there is a variable utility charge[4] related to that resource use, such as a retail tariff or rate charged for the use of electricity, gas or water
- the lessee is charged for that variable resource use
- the billing and attribution of those charges to the lessee is transparent

Most lessees are charged for electricity use, with at least some of those charges relating to building fixtures such as lighting. Some lessees will be charged variable rates for gas and water from base building and/or tenancy

[3] Potential savings from reduced maximum demand are not included into the methodology.

[4] Variable charges are applied by the Utility Supplier to the use of a resource, measured in cost per unit of resource use (e.g. $ / kWh).

resource use. It is rare that a lessee will be charged a variable rate for waste or any other resources.

Some utility bills may include both fixed and variable components. Fixed components are referred to by many names such as supply charge, or standing charge. These charges may be based on the value or size of the property and do not vary by use of the utility. These fixed charges are not included in the savings estimate.

In summary, lessees are most likely to realise utility bill savings for reduced electricity use from the building upgrade. In some cases they will also realise utility bill savings for gas and water use.

4.3 Explanation of Methodology components

This section explains the various components of the reasonable estimate calculation. The Methodology steps through each of these components to establish the reasonable estimate of cost savings to lessees, as shown in Figure 3 below. Note that the same process applies to both Predicted Savings and Savings Made estimates.

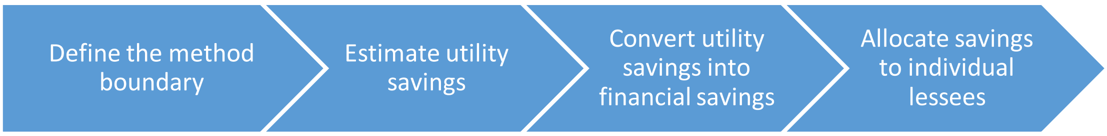

Figure 3 Reasonable estimate calculation components

The Methodology includes the following components:

1. Define the method boundary – set out the scope of the Methodology and how it applies to the upgrade works
2. Estimate utility savings – quantify the energy or water savings arising from the upgrade, using one of the Predicted Savings or Savings Made sub-methods
3. Convert utility savings into financial savings – determine the financial value of the energy or water savings delivered by the upgrade
4. Allocate savings to individual lessees – for buildings with multiple lessees, the financial savings are divided between them in the same proportion that they would normally pay for that utility.

The following sections of this guide describe how to complete each of these components to make a reasonable estimate of cost savings to lessees from a building upgrade.

5 Defining the method boundary

This section details the documentation required to establish the method boundary. Defining the boundary for the calculations will ensure that the reasonable estimate is applied appropriately to the lessees in the building.

Note that the calculation of Lessee Savings for a particular building upgrade may include a number of separate calculations for different upgrade components. For example, a building upgrade may involve a lighting retrofit and installation of renewable energy. In this case, the building owner may choose to separately calculate Lessee Savings for each component using appropriate sub-methods (e.g. sub-method P1 for the lighting retrofit, and sub-method P2 for the renewable energy installation). Lessee Savings could also be separately estimated for different stages of a building upgrade, to allow for staged lessee contributions as the upgrade is completed.

Care must be taken when making multiple Lessee Savings estimates on the same building to ensure that the estimates are fully exclusive and that no savings are double counted. The method boundary must include a summary of any other savings estimates on the building, and confirmation that there is no double counting.

The Method Boundary includes a range of information about the building, the upgrade works and the coverage of the Lessee Savings estimate that must be completed:

- Building upgrade details, including a summary of the upgrade works, utilities affected by the upgrade works, and confirmation that savings are not double counted when there are multiple Lessee Savings estimates in the same building
- Details of the affected lessees
- How lessees normally pay for the affected utilities
- The type of Lessee Savings estimate calculated (Predicted Savings or Savings Made)
- Estimate Period.

This information is detailed in the following sections. Section 5.6 contains a fictional example method boundary document, showing an appropriate level of detail.

5.1 Building upgrade details

The best source of this information will be documentation from the building upgrade agreement. This summary should be very brief and describe the upgrade works in broad terms, and the “utility” that is improved by the upgrade works (electricity, gas or water).

If an upgrade affects more than one utility, most of the calculations in the method will need to be repeated to determine the lessee savings for each utility. The total Lessee Savings from the upgrade will be the combined savings for each utility.

Note that in some cases the upgrade may increase the use of a particular utility in the building while reducing another – such as a project that shifts from electricity to gas use for heating. The total Lessee Savings estimate for the upgrade must include savings from all affected utilities, even if the Lessee Savings for a particular utility are negative.

When the building has a number of separate Lessee Savings estimates for individual elements of a large building upgrade, or for a staged upgrade, this section of the method boundary must detail the coverage of each of these separate estimates, and confirm that there is no overlap and double counting between the estimates.

Relevant information includes:

- Brief upgrade works summary – e.g. common area lighting upgrade
- Utilities affected by the upgrade works – e.g. electricity, gas and/or water
- Any other upgrades to the building for which this methodology will be applied, and confirmation that method boundaries do not overlap and that savings are mutually exclusive – e.g. where Lessee Savings are estimated separately for upgrades affecting multiple building elements or for staged upgrades.

5.2 Who benefits from the upgrade works

This information will be available from building leases. All the lessees who will be required to make a contribution towards the building upgrade charge should be identified. This will include all lessees that pay for the utility improved by the building upgrade.

The calculation method may apply to both single-leased and multi-leased buildings. Where buildings have multiple lessees, separate Lessee Savings will be established for each individual lessee based on their individual savings from the upgrade works. Note that the Methodology involves calculating the total savings arising from the upgrade for the whole building, and then dividing these savings between individual lessees, so minimal additional work is required to calculate Lessee Savings for buildings with multiple leases. Note also that any lessees that do not normally pay for the utility (for example, in a building with a mixture of net and gross leases) must be excluded from these calculations.

The application of the Methodology in different lessee scenarios is depicted in Table 1 below:

Table 1 Scenarios for applying the reasonable estimate of the Methodology

Scenario	Example	Methodology calculations required
Single lessee, Single utility	Lighting upgrade in single-leased building	Apply the reasonable estimate calculation (steps 5 and 6 in the Methodology) once.
Single lessee, multiple utilities	Full building retrofit of single-leased building	Apply the reasonable estimate calculation (steps 5 and 6 in the Methodology) for each utility. The total Lessee Savings is the sum of lessee savings for each utility.
Multiple lessees, single utility	Electrical air conditioning system upgrade in multi-leased building	Establish the Utility Savings for the upgrade works (step 5 in the Methodology). Apply step 6 of the Methodology to establish Lessee Savings for each lessee.
Multiple lessees, multiple utilities	Full building retrofit of a multi-leased building	Apply the reasonable estimate calculation (steps 5 and 6 in the Methodology) for each utility and for each lessee. The total Lessee Savings for each lessee is the sum of the lessee savings for each utility.

Relevant information includes:

- Affected lessees – name, location in building.

5.3 How do lessees normally pay for each utility

Only the utilities that are eligible for inclusion in this method should be documented – that is, utilities that will be affected by the upgrade works, and are normally paid for by lessees either directly to a utility supplier, or indirectly as a pass-through from the lessor.

This information will be available from utility bills and leases for the building. A range of different scenarios may apply for different utilities, depending on the financial arrangements in the building.

Relevant information includes:

- Summary of utility supply and lease details for each utility affected by the upgrade works, including billing arrangements showing how lessees normally pay for the utility.

5.4 The type of reasonable estimate

The Methodology for making a reasonable estimate of Lessee Savings applies to both the forecast of expected lessee savings over an estimate period for the purposes of issuing a contribution notice (Predicted Savings), and to annual reports of the savings made back to lessees (Savings Made).

Section 6 of this guide details the process for estimating Predicted Savings and Savings Made for a building upgrade.

Relevant information includes:

- The type of Lessee Savings estimate – either Predicted Savings or Savings Made.

5.5 The relevant period for this reasonable estimate

For Predicted Savings estimates, the Estimate Period must match the period for which the lessee is required to make a contribution towards the building upgrade charge. This information will be available from the notice sent to lessees requiring them to make the contribution.

For Savings Made estimates, the Estimate Period must match the annual reporting period for which the estimate applies.

Relevant information includes:

- Estimate Period – the start and end dates for the period to which the estimate of Lessee Savings applies.

5.6 Example method boundary documentation

This section is an example of method boundary documentation for a fictional building upgrade with multiple lessees and with multiple utility savings.

Method Boundary for 131 Example St, Adelaide 5000

Brief upgrade works summary

Whole building upgrade including HVAC system upgrade, LED lighting upgrade to tenancies and common areas, shared bathroom refurbishment.

Utilities affected by the upgrade works

Electricity – common areas, Electricity – tenancies, Gas, Water

Details of affected lessees

Lessee 1 – Anonymous Legal Firm, whole first floor

Lessee 2 – My Banking office, second and third floors

Summary of utility supply details for each utility affected by the upgrade works

Utility	Supplier	Pays bills	Lessee pays by
Electricity – common areas	Energy Australia	Lessor	Bills passed through to all lessees under lease conditions. Lessee 1: pays 25% of bill Lessee 2: 75%
Lessee 1 electricity	AGL	Lessee 1	Direct payment by Lessee 1
Lessee 2 electricity	Origin Australia	Lessee 2	Direct payment by Lessee 2
Water	SA Water	Lessor	Bills passed through to all lessees under lease conditions Lessee 1: pays 45% of bill Lessee 2: 55%
Gas	AGL	Lessor	Bills passed through to all lessees under lease conditions Lessee 1: pays 30% of bill Lessee 2: 70%

Type of reasonable estimate:

Predicted Savings

Estimate Period:

1 July 2017 – 30 June 2020 (3 years)

Figure 4 Example method boundary

6 Estimating utility savings

This section introduces and explains the various approved sub-methods that are used to calculate the utility savings for a building upgrade, and how each might apply to the upgrade works.

6.1 Choosing an appropriate sub-method

The Methodology includes a number of sub-methods that are applicable to different upgrade works, for both Predicted Savings and Savings Made, as depicted in Figure 5 below. Note that each Predicted Savings sub-method has a corresponding Savings Made sub-method. Once an appropriate sub-method has been selected to estimate Predicted Savings for a particular upgrade works, the corresponding sub-method must be used to estimate the Savings Made.

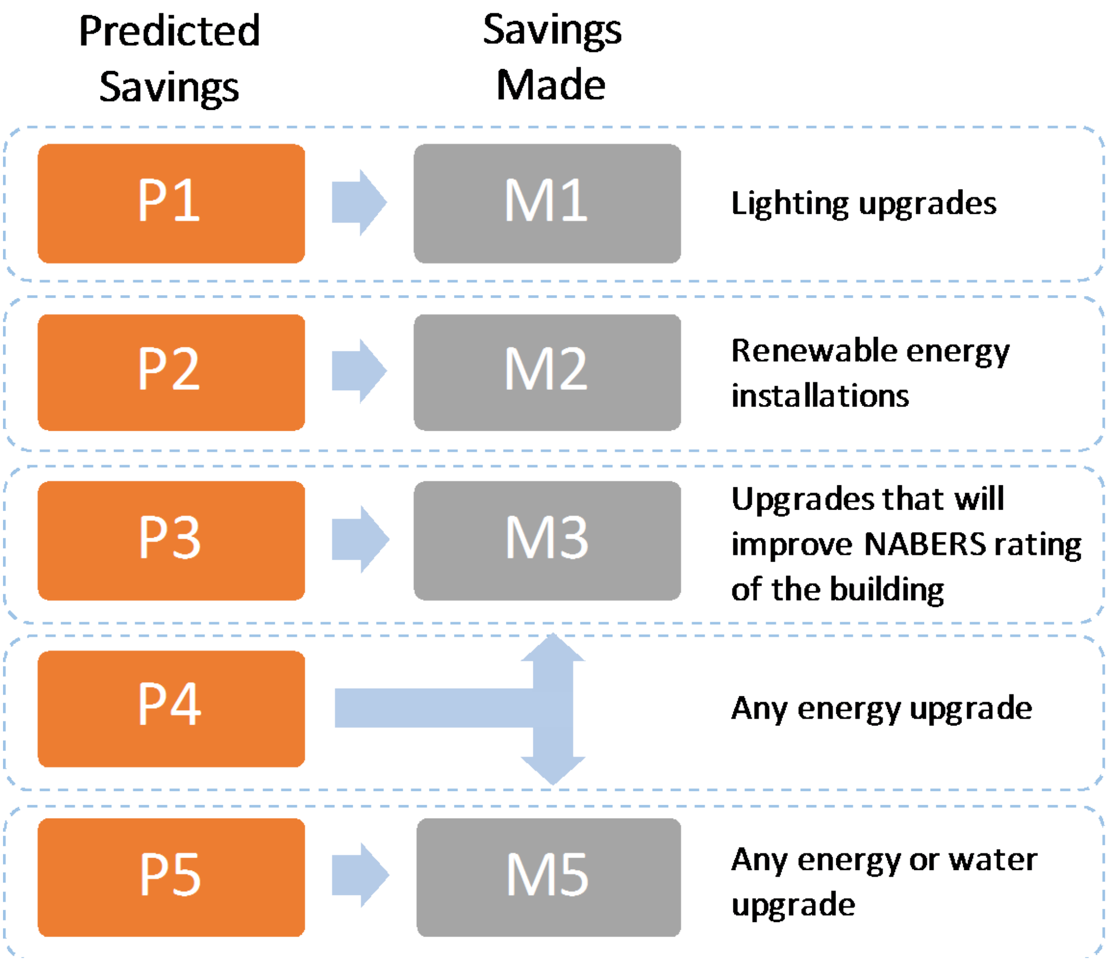

Figure 5 Calculation sub-method options for building upgrades

Upgrade works that use sub-method P4 to estimate Predicted Savings will use sub-method M3 or M5 to estimate Savings Made.

Table 2 below describes the different sub-methods in greater detail.

Table 2 Calculation sub-methods

Sub-method to estimate predicted savings	Matching sub-method to estimate savings made	Suited for upgrade projects	Issues to consider for sub-methods
P1 - Lighting Based on lights as first installed	**M1 – Lighting** Based on lights as operating during reporting period	Lighting upgrades	+ simple, low cost approach for lighting projects - not available for non-lighting projects
P2 - Renewable Energy Based on accredited installer estimates and/or Renewable Energy Certificates	**M2 - Renewable Energy** Based on metered energy generated / exported	Renewable energy installations that are eligible for the Renewable Energy Target	+ simple, low cost approach for renewable projects - not available for other projects
P3 – NABERS Based on difference between a past NABERS rating and predicted future NABERS rating using simulation or audit	**M3 – NABERS** Based on difference in actual NABERS ratings before and after the upgrade	Whole building or part-building energy and/or water upgrades that will improve the NABERS rating of the building	+ reasonably simple method using NABERS ratings that are likely to be available already - requires annual NABERS ratings - savings made calculations may vary slightly in extreme weather years
P4 - Energy audit Based on estimated savings in accordance with AS3598:2014 or a superseding standard	Upgrades that have used P4 to predict energy savings can use sub-method **M3** or **M5** to estimate savings made	Any energy upgrade	+ audit likely to have already been done for upgrade business case - energy only
P5 - Project Impact Assessment with Measurement and Verification	**M5 - Project Impact Assessment with Measurement and Verification**	Any energy or water upgrade	+ covers any upgrade - relatively complex - (P5 only) requires post upgrade data so estimate cannot be

Based on measured data before and after the upgrade to predict future savings	Based on measured data and a baseline model of utility use		completed prior to upgrade

The most common source of lessee bill savings for building upgrades is expected to be electricity savings, and the calculation sub-methods reflect this. The application of sub-methods to each type of resource is summarised in Table 3 below.

Table 3 Sub-methods and utility savings that can be calculated

Sub-method	Electricity	Gas	Water
P1 and M1 (lighting sub-methods)	Yes		
P2 and M2 (renewable energy sub-methods)	Yes		
P3 and M3 (NABERS sub-methods)	Yes	Yes	Yes
P4 (energy audit sub-method)	Yes	Yes	
P5 and M5 (Project Impact Assessment with Measurement and Verification sub-methods)	Yes	Yes	Yes

The calculation sub-methods are based on methods in other energy efficiency or renewable energy schemes. This allows engineers and practitioners to use familiar and well-tested methods when estimating utility savings. To a large extent, the sub-methods rely on the documentation, guides and tools provided by those other schemes.

The methods are suited to both efficiency upgrades (such as installing new energy efficiency equipment) and cost savings arising from shifting to more environmentally efficient supply. Cost savings from shifting to alternative thermal energy sources such as central chilled water or other thermal systems may be estimated using sub-methods P3, P4 and P5 (and the associated savings made methods M3 and M5). Sub-method P2 and M2 apply if the new energy source is renewable. Cost savings associated with shifting from grid supplied water to rainwater, greywater, or other recycled water sources may be estimated using sub-method P3 and M3.

Note that a particular building upgrade may choose to use a number of different calculation methodologies for different components of the upgrade. In this case, care must be taken to avoid double counting any of the utility savings.

For example, a building upgrade could involve lighting upgrades, HVAC upgrades and a solar PV installation. The Lessee Savings for this project could be calculated using a number of different sub-methods, or an overarching sub-method as outlined below. Note that this example shows the Predicted Savings methods used for the project – annual reports will be based upon the corresponding Savings Made sub-methods for the project components.

Table 4 Indicative example options when choosing a sub-method for the building upgrade

<table>
<tr><th>Example upgrade component</th><th>Calculation option A</th><th>Calculation option B</th><th>Calculation option C</th></tr>
<tr><td>Lighting upgrade</td><td>P1 (lighting)</td><td rowspan="3">P3 (NABERS)</td><td rowspan="2">P5 (PIAM&V)</td></tr>
<tr><td>HVAC upgrade</td><td>P4 (energy audit)</td></tr>
<tr><td>PV installation</td><td>P2 (renewable energy)</td><td>P2 (renewable energy)</td></tr>
</table>

Note that the example options listed above are indicative only.

For all sub-methods, the person completing the calculations should hold appropriate qualifications that demonstrate their competence. Table 5 outlines examples of acceptable qualifications for each sub-method.

Table 5 Appropriate qualifications for calculating savings using a sub-method

Sub-method	Acceptable qualifications
P1 and M1 (lighting sub-methods)	A Certified Energy Efficiency Specialist (CEES) or Certified Energy Efficiency Leader (CEEL) with the Energy Efficiency Council, or A Certified Energy Manager (CEM) or Certified Energy Auditor (CEA) with the Association of Energy Engineers, or A Registered Lighting Practitioner with the Illuminating Engineering Society of Australia and New Zealand, or An individual with proven experience in lighting efficiency projects
P2 and M2 (renewable energy sub-methods)	Clean Energy Council Accredited Designer (P2 only)
P3 and M3 (NABERS sub-methods)	NABERS Accredited Assessor, and For energy audits (P3 only): A Certified Energy Efficiency Specialist (CEES) or Certified Energy Efficiency Leader (CEEL) with the Energy Efficiency Council; a Certified Energy Manager (CEM) or Certified Energy Auditor (CEA) with the Association of Energy Engineers; or an individual with proven experience in delivering energy audits For energy simulations (P3 only), an individual with proven experience in undertaking energy simulations, particularly for buildings seeking to achieve high NABERS ratings For water audits (P3 only), an individual with proven experience in delivering water audits.
P4 (energy audit sub-method)	A Certified Energy Efficiency Specialist (CEES) or Certified Energy Efficiency Leader (CEEL) with the Energy Efficiency Council, or A Certified Energy Manager (CEM) or Certified Energy Auditor (CEA) with the Association of Energy Engineers, or An individual with proven experience in delivering energy audits.
P5 and M5 (Project Impact Assessment with Measurement and Verification sub-methods)	Certified Measurement and Verification Professional with the Efficiency Valuation Organization, or A person certified by the Energy Efficiency Council as a Certified Energy Efficiency Leader or Certified Energy Efficiency Specialist

The following sections provide a guide to the calculations for each of the calculation sub-methods.

6.2 Sub-method P1 – Lighting

This method can be used where lighting equipment in a building has been upgraded as part of the building upgrade. It uses the Commercial Lighting Energy Savings Formula (CLESF) Method in the NSW Energy Savings Scheme (ESS).[5] The South Australian Retailer Energy Efficiency Scheme (REES) CL1 Commercial Lighting Upgrade activity also uses the CLESF Method for savings calculations.[6] Note that additional minimum installation standards apply to comply with that scheme but are not required for the BUF. Certain technologies (such as T5 adaptor kits) are excluded from both the REES and BUF method.

People making calculations using this sub-method should have proven experience in lighting efficiency projects. This may include professionals such as lighting specialists, energy efficiency specialists, or energy and electrical engineers, e.g.:

- a Certified Energy Efficiency Specialist (CEES) or Certified Energy Efficiency Leader (CEEL) with the Energy Efficiency Council
- a Certified Energy Manager (CEM) or Certified Energy Auditor (CEA) with the Association of Energy Engineers
- a Registered Lighting Practitioner with the Illuminating Engineering Society of Australia and New Zealand.

Sub-method P1 is a Predicted Savings estimate. The estimate is based on the nominal rated power of the components of the lighting system (lamps and control gear) before and after the upgrade. It also estimates annual *operating hours* for the building or each area in the building, based on its classification or usage.

Only upgrades of existing, working lighting equipment, fixed to the building, are applicable for the use of this Methodology. Only certain lighting technologies are applicable, e.g. T5 adaptor kits are excluded. If new lighting is being installed as part of a larger new development or building refurbishment, then other sub-methods should be used to estimate Lessee Savings.

The savings are calculated using the ESS Commercial Lighting Calculation Tool, provided by the ESS Administrator. The annual electricity savings are

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[5] See Commercial Lighting on the ESS website, http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Commercial_Lighting.

[6] See the REES website, https://www.sa.gov.au/topics/water-energy-and-environment/energy/rebates-concessions-and-incentives/retailer-energy-efficiency-scheme-rees.

assumed to persist for ten years after the installation. The Total Energy Savings (MWh) for the lighting project as determined using the ESS calculator must be annualised for the Utility Savings estimate.

Figure 6 below shows an example extract report from the ESS calculator for an example lighting upgrade project. The inputs to the calculator, as shown below, include the number of lights installed, details of the original and upgraded lights, and the type of space that the lights are installed in. The calculator determines the "Total Energy Savings" for the upgrade. In the example below the savings are 1248 MWh, deemed over 10 years. Annual savings, and hence the Utility Savings, are therefore 12.48 MWh in this example.

Note also that the ESS calculator includes a number of inputs relating to the Energy Savings Scheme that are not relevant for the Methodology, including details of the certificate creator and registered project. These details do not need to be completed.

End Use Application:	BUILDING LIGHTING
Site Name:	ABCDEF Building
Site Address:	123 ABC Street,Adelaide,SA,5000

Original Energy Saver (Purchaser):

Site Contact	John Smith
Phone:	0444 444 444
E-mail:	john.smith@abcdef.com

Total Energy Savings (MWh)	1248
Total ESCs (Indicative)	1322

		Original Lighting Equipment							Upgraded Lighting Equipment								
No	Location Name	No. lamps	Lamp type	Nominal lamp power (W)	Ballast/ transformer type	Control system-1	Control system-2	Air conditioned space	No. lamps	Lamp type	Nominal lamp power (W)	Ballast/ transformer type	Control system-1	Control system-2	Air conditioned space	Date of Implemenation	Savings (MWh)
1	Space 1	1000	T8 or T12	32	C	none	none	Yes	1000	LED Lamp	10	None	none	none	Yes	1/7/2016	1248.00

Figure 6 Example report extract from ESS Commercial Lighting Calculation Tool

Relevant documentation includes:

- Copy of the completed ESS Commercial Lighting Calculation Tool for the upgrade
- Details of the original and upgraded lighting system, including number and type of lights.

6.3 Sub-method M1 – Lighting

This method is used to report on Savings Made for building upgrades that used sub-method P1 to predict Lessee Savings.

Sub-method M1 is a Savings Made estimate.

The estimate is based on the nominal rated power of the components of the lighting system (lamps and control gear) before and after the upgrade, as installed and in working order during the reporting period, and the estimated *operating hours* for the building during the reporting year for each area in the building, based on its classification or usage.

People making calculations using this sub-method should have proven experience in lighting efficiency projects. This may include professionals such as lighting specialists, energy efficiency specialists, or energy and electrical engineers (see sub-method P1).

The savings are calculated using the ESS Commercial Lighting Calculation Tool, provided by the ESS Administrator. The calculation should be similar to that done for Predicted Savings for the upgrade, with updated inputs based on the actual lights present in the building during the reporting year.

Relevant documentation includes:

- Copy of the completed ESS Commercial Lighting Calculation Tool for the upgrade.
- Details of the original and upgraded lighting system, including number and type of lights present during the reporting year.

6.4 Sub-method P2 – Renewable Energy

This method can be used where renewable energy equipment has been installed as part of the building upgrade. Equipment is only eligible if it is eligible to create certificates under the Renewable Energy Target (RET) scheme.[7]

Sub-method P2 is a Predicted Savings estimate.

Depending on the size of the system, a renewable energy system must be eligible to create certificates under either the Small-Scale Renewable Energy Scheme or the Large-Scale Renewable Energy Target. A small-scale system must be under 100 kW in generation capacity. As well as solar photovoltaic systems, small-scale systems include solar water heaters and heat pump water heaters, which *displace* electricity use rather than generating electricity themselves.

The predicted electricity savings for the renewable energy installation are based on either:

- the annualised number of renewable energy certificates that have been created for the system, or

[7] See the Renewable Energy Target website, http://www.cleanenergyregulator.gov.au/RET.

- An estimate of the annual energy that will be generated by the system.

For small-scale systems renewable energy certificates (RECs) can be created immediately after installation for up to 15 years of electricity savings. The number of certificates is based on the size and location of the system. When using RECs to predict Utility Savings using this sub-method, the total number of RECs for the system must be divided by the number of years that the RECs are created for (up to 15 years).

Alternatively, a renewable energy system designer may provide an accurate estimate of likely system generation that takes into account local site factors that are not considered when calculating RECs.

To estimate the predicted savings for solar photovoltaic generators, the amount of electricity that will be exported from the building each year must also be estimated. Note that many systems will be designed so most or all of the generated electricity is used in the building, as this will generally provide greater financial savings from the system. However some systems may export energy from the building, particularly very large installations. The system designer should provide information on the amount of energy that is expected to be exported from the building.

Estimates of generated and exported energy expected for the system should be made by a person that is qualified to make such an estimate, such as a Clean Energy Council Accredited Designer.

Relevant documentation includes:

- Records of the Renewable Energy Certificates for the system
- Records of exported electricity or estimate calculations.

6.5 Sub-method M2 – Renewable Energy

This method is used to report on savings made for building upgrades that used sub-method P2 to predict Lessee Savings.

Sub-method M2 is a Savings Made estimate.

The electricity savings made by the renewable energy installation are based on the measured energy that was generated by the system over the reporting period.

In addition, the savings must take into account any energy that was generated by the system and exported from the building.

The measured electricity savings are based on utility annual meter readings, including both electricity generated and electricity exported.

In some cases the lessor may have sold the electricity generated by the renewable energy installation to the lessee at some marginal rate. The Methodology takes this on-selling into account as this is a cost to lessee. The total Utility Savings in this case is based upon the difference between the cost of electricity purchased from the public electricity network and the cost charged for the renewable energy sold to the lessee.

Relevant documentation includes:

- Records of metered generated and exported electricity.

6.6 Sub-method P3 – NABERS

This method can be used where the building can be rated under the National Australian Building Environmental Rating Scheme (NABERS)[8] prior to the building upgrade. The building must be re-rated after the upgrade on an annual basis to calculate utility savings for reporting purposes.

Sub-method P3 is a Predicted Savings estimate.

The savings are based on a NABERS rating before the building upgrade and engineering estimates of the predicted savings from the building upgrade. It can calculate electricity, gas or water savings.

NABERS is a performance based rating system that determines how efficiently a building is using the rated utility (energy or water) against similar buildings. Building utility use is adjusted to take into account factors outside of a building operator's control that affect performance, such as building size, occupancy and local climate. This adjusted use is then placed on a rating scale to compare it to other buildings.

The NABERS sub-methods use this widely accepted process to calculate energy and/or water savings in a building, taking into account changes to the building such as size or occupancy over time.

Users of this sub-method will need to predict the future energy or water use of the building following the building upgrade, using an energy audit, energy simulation or water audit. They should also be familiar with the NABERS Rules and must be a NABERS Accredited Assessor.

This sub-method can be used to estimate savings for any upgrade to a building that can be NABERS rated. Currently, there are NABERS ratings tools for the following building types (refer to NABERS website for further information):

- offices
- shopping centres
- hotels
- data centres.

[8] See NABERS website, https://nabers.gov.au/.

The method can be applied to any of the different Energy and/or Water ratings available within each of these building types (e.g. tenancy, base building or whole building ratings for offices, and IT, infrastructure or whole facility ratings for data centres), depending on the nature of the upgrade.

For the purposes of the guide, calculations for a fictional building upgrade are shown in the steps below. The example building is a fictional NABERS rated office building located in the Adelaide CBD, with details as outlined in Figure 7 below.

Building address	131 Example St, Adelaide 5000
NABERS Rating type	Office, base building
Historical NABERS Baseline rating period	1 Feb 2015 – 31 Jan 2016
Historical NABERS Baseline rating	3 stars (Energy), 2 stars (Water)
Rated building area	9,500m^2
Rated building hours	47 hours/week
Upgrade works	Major building refurbishment including HVAC, lighting, façade and bathroom upgrades
Upgrade implementation date (upgrade works complete)	1 October 2016

Figure 7 Fictional NABERS rated building for example sub-method calculations

A key concept in this sub-method is that of the “Predicted NABERS Rating”. NABERS ratings are based upon twelve months of utility data. The Predicted NABERS Rating is the NABERS rating that the building is expected to achieve after the building upgrade is completed. Once the building is upgraded it is expected to achieve the Predicted NABERS Rating throughout the Estimate Period. This concept is outlined in the timeline shown in Figure 8 below.

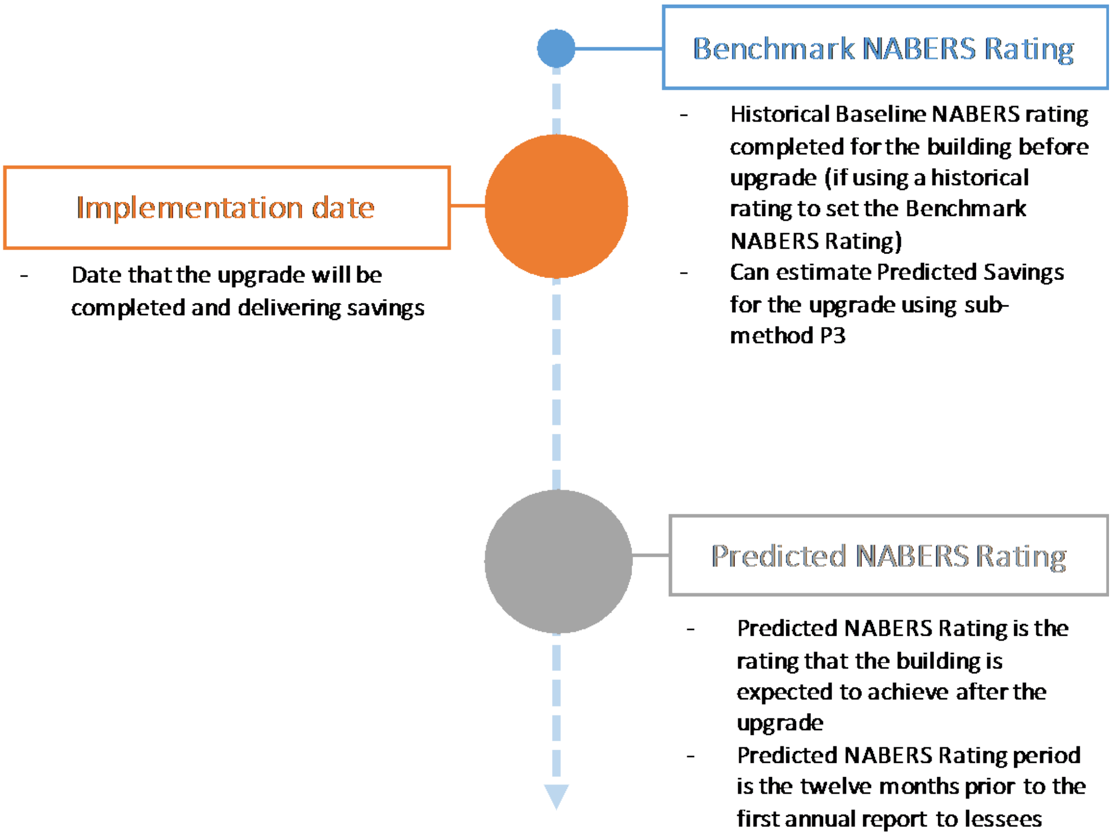

Figure 8 Time periods relevant for calculating Predicted NABERS Ratings in sub-method P3

The Predicted Rating details for the fictional example used in this section are shown in Figure 9 below.

For the fictional example building as outlined in Figure 7 above, the upgrade implementation date is 1 October 2016. At this date, the building upgrade is fully complete, and delivering savings to lessees through improved energy and water efficiency in the building.

The fictional example assumes that the first annual report is due on 1 January 2018. This means that:

- The Predicted NABERS Rating period is 1 November 2016 – 31 October 2017.
- The Predicted Rating Year is 2017 (the year of the last date in the Predicted Rating Period).

Figure 9 Example Predicted NABERS Rating details

When using this method, it is important to note that NABERS does not adjust for annual weather patterns. NABERS ratings are climate corrected – that is, the rating takes into account the historical average weather for the building location to allow comparison between buildings in different climates across Australia. However, the rating does not consider the actual weather at that location during the rating year. While this impact is not likely to affect the overall NABERS rating of the building, the energy used by the building may vary between particularly hot and cold years within star rating bands.

This means that the annual estimates of savings made by the building upgrade once the upgrade is completed may vary slightly from year to year based on prevailing weather conditions. If the energy use in the building is particularly weather sensitive the Project Impact Assessment with Measurement and Verification sub-methods (P5, M5) may be used to predict and measure savings.

6.6.1 Sub-method calculation steps

This section is a guide to the calculation steps used to estimate the Predicted Savings for the building upgrade using sub-method P3. For each utility, the Predicted Savings are calculated as follows:

Step 1 – Calculate Predicted Utility Consumption for the Predicted Rating Year

To complete this step in the sub-method, the predicted utility consumption must be estimated for the building after the upgrade is installed, based on either the results of an energy audit, an energy simulation, or a water audit. This estimate will likely be done as part of the business case for the building upgrade.

Note that any energy that would be excluded from future NABERS ratings of the building in accordance with the NABERS Rules[9] must also be excluded from the predicted utility consumption for the building. For example, if energy used in a building car-park will be excluded from the NABERS rating, it should also be excluded from the predicted utility consumption for the building. If in doubt, NABERS Accredited Assessors are trained in the application of NABERS Rules and can advise on appropriate coverage for the predicted utility consumption.

To calculate the Predicted Electricity Consumption for the upgrade, any "on-site unaccounted electricity" must be included. This is the electricity that is predicted to be consumed on-site and will not be accounted for in the NABERS rating. This may include, for example, electricity that that will be generated on-site by solar PV or biogas generation, and the fuel input will not be included in the rated energy consumption according to the NABERS Rules. This energy consumption must be estimated using an appropriate method, and added to the calculation. It must be converted to MWh.

For the purposes of the example, assume that a type 2 energy audit and a water audit were done for the building. The example building also has an

[9] See the NABERS website, www.nabers.gov.au for the rules applied to NABERS ratings for each building type.

existing 10 kW solar PV generator that generated 12,191 kWh of electricity in the twelve months prior to the building upgrade, which was consumed totally on-site. The system will not be changed during the upgrade so it is appropriate to use this historical data to predict the future energy generation for the system.

Based on these audits, the utility consumption for the example building after the upgrade was predicted to be:

Data sourced from the Type 2 Energy Audit:

- NABERS Electricity: 320 MWh
- NABERS Gas: 420,000 MJ

Data sourced from the water audit:

- NABERS Water: 2.6 ML

Data sourced from predicted on-site energy generation that will not be included in future NABERS ratings:

- On-site unaccounted electricity: 12,191 kWh = 12.191 MWh

Therefore the predicted utility consumption for the building is:

- Predicted Electricity Consumption = 320 + 12.191 = 332.191 MWh
- Predicted Gas Consumption = 420,000 MJ ÷ (1000 x 3.6) = 116.667 MWh
- Predicted Water Consumption = 2.6 ML
- Predicted rating.

Figure 10 Predicted consumption for example building after building upgrade

Step 2 – Calculate Benchmark NABERS Rating

The Benchmark NABERS Rating is the rating that the building would achieve if the upgrade was not installed. In most cases this rating will be based upon a historical NABERS rating for the building, but the estimate can also use a published market average benchmark to measure savings against business-as-usual in the Predicted Rating Year. These two calculation methods to calculate the benchmark NABERS rating index are outlined below:

1. Look up the benchmark NABERS rating index in Table A20[10] of the Energy Savings Scheme Rule for the minimum NABERS rating that can be used as a baseline where:
    a. no previous NABERS rating exists for the building, or

[10] Table A20 and A21 of the ESS Rule are on page 69 of http://www.ess.nsw.gov.au/How_the_scheme_works/Legal_Framework_and_Rules. .

b. this is the preferred method.

2. Use a Historical Baseline NABERS rating for the building, to one decimal point. The NABERS ratings for this method use a more precise decimal rating for the building, as detailed on the NABERS rating report.

The example building has previous NABERS ratings of 3 stars for Energy and 2 stars for Water (as outlined in Figure 7 above). For this building, the Benchmark NABERS Ratings are based on the Historical NABERS Baseline Ratings determined to one decimal point:

- The Benchmark NABERS Rating for electricity and gas calculations is 3.1 stars
- The Benchmark NABERS Rating for water calculations is 2.4 stars.

Figure 11 Example Benchmark NABERS Rating

Step 3 – Calculate Benchmark Utility Consumption (Electricity, Gas and Water)

This step is to determine how much energy the building would have used if it was not upgraded. It uses a NABERS Reverse Calculator[11] to determine how much energy or water the building would have used if the energy or water efficiency had not been improved, but the configuration of the building (area, hours and other building information) is as it will be after the upgrade. This step means that Utility Savings can be calculated for the building even if operating conditions change.

NABERS Reverse Calculators take a target NABERS rating and building configuration, and estimate what utility consumption would produce that rating. The Reverse Calculators have a number of inputs that need to be determined for the building:

- Target rating – the NABERS rating to be achieved. In this sub-method, the target rating will be the Benchmark NABERS Rating
- Building information – the inputs to a NABERS Rating that describe the building, such as Rated Hours, Rated Area and number of computers; these inputs vary between rating types, and are determined by applying the NABERS Rules to the building
- Percentage Breakdown of Energy Consumption (energy ratings only) – the proportion of electricity, gas and other energy sources used in the building.

[11] See the reverse calculators on the NABERS website, https://nabers.gov.au/public/webpages/ContentStandard.aspx?module=40&template=3&include=Reverse.htm&side=CommitmentAgrTertiary.htm. A separate calculator is published for each NABERS rating type.

The expected building information for the Predicted NABERS Rating must be identified for this sub-method – that is, the hours, area and other rating inputs for the Predicted NABERS Rating, and the energy breakdown for the building before the upgrade.

The building information will normally be determined from the rating report of a Historical Baseline NABERS rating, adjusted if necessary to account for expected changes to the building after the upgrade. This will require an understanding of the NABERS Rules. If a Historical Baseline NABERS rating is not available for the building, the relevant building information will need to be established in accordance with the NABERS Rules.

It may be appropriate for a NABERS Accredited Assessor to advise on the appropriate inputs for the building[12].

Along with the building information, for NABERS energy ratings the Reverse Calculator also requires the percentage breakdown of energy consumption in the building to estimate how much electricity and gas is used. For this sub-method, the energy use breakdown for the Historical Baseline NABERS Rating is used.

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[12] See NABERS website for a list of Accredited Assessors https://nabers.gov.au/public/webpages/ContentStandard.aspx?module=30&template=3&id=320&side=Testing.htm

Rating type

The example building is an office with a NABERS Energy base building rating and a NABERS Water rating.

Target rating

Use the Benchmark NABERS Rating as the target rating, as described in Figure 11**.**

Building information

The building information for the example building prior to the building upgrade were determined for the Historical Baseline NABERS Rating as detailed in Figure 7 above:

- Rated Area: 9,500m^2
- Rated Hours: 47 hours/week.

For the example building, the building will change slightly after the upgrade, with additional office space opening on the ground floor. A NABERS Accredited Assessor has advised that the additional office space will add 450m^2 to the Rated Area of the building, and that the overall operating hours are not expected to change.

Percentage breakdown of energy consumption

The energy use breakdown for the building can be established from the Historical Baseline NABERS Rating report:

- Electricity use: 1085 MWh, Gas use: 564,000 MJ ÷ (1000 x 3.6) = 157 MWh.

From the information above, the inputs to be used in the NABERS Reverse Calculator to determine the Benchmark utility consumption are:

For energy savings:

- Rating Type: NABERS Energy for offices, base building
- Target rating: 3.1 stars
- Building Information: Rated Area: 9,950m^2, Rated Hours: 47 hours/week
- Percentage breakdown of energy usage: Electricity 87.4%, Gas 12.6%

For water savings:

- Rating Type: NABERS Water for offices
- Building Information: as per energy savings
- Target rating: 2.4 stars

Figure 12 Determining the information required to calculate Benchmark utility consumption

Once the building configuration is established, use the relevant NABERS Reverse Calculator to estimate the benchmark utility consumption for the building given the benchmark NABERS rating and the expected building configuration after the upgrade. A screenshot from the NABERS Energy for offices reverse calculator is shown in Figure 13 below.

1. ENTER THE STAR RATING

Enter the baseline rating for calculating the baseline emissions, or the baseline rating + 1 star for calculating the minimum abatement.

NABERS ENERGY **3.1** **STARS**

Note: Decimal ratings between 0.5 star increments are only acceptable in this worksheet and not the full version of the corresponding reverse calculator.

2. ENTER THE BASE BUILDING INFORMATION

Building Postcode	**5000**
Hours each week with occupancy levels of 20% or more (hrs/week)	**47**
Net Lettable Area of the building (m2)	**9500**

Percentage Breakdown of Energy Consumption:		
	Electricity	**87%**
	Gas	**13%**
	Coal	**0%**
	Diesel	**0%**

3. RESULTS

NABERS ENERGY

Results - Energy Consumption

Electricity	**1,078,710**	kWh per annum
Gas	**559,843**	MJ per annum
Coal	**-**	kg per annum
Diesel	**-**	L per annum

Figure 13 Example completed NABERS Reverse Calculator

Step 4 – Calculate Utility Savings

The Utility Savings are the difference between the benchmark consumption and the predicted consumption after the building upgrade.

For the example building upgrade, the utility savings are:

Electricity:

- Benchmark Electricity Consumption: 1078.71 MWh (from the NABERS Reverse Calculator in step 3)
- Predicted Electricity Consumption: 332.191 MWh (from step 1)

Utility Savings (electricity) = Benchmark Electricity Consumption - Predicted Electricity Consumption

- Utility Savings (electricity) = 1078.71 – 332.191 = 746.519 MWh

Gas:

Utility Savings (gas) = Benchmark Gas Consumption – Predicted Gas Consumption

- Benchmark Gas Consumption: 155.512 MWh (from step 3)
- Predicted Gas Consumption: 116.667 MWh (from step 1)
- Utility Savings (gas) = 155.512 – 116.667 = 38.845 MWh

Water:

Utility Savings (water) = Benchmark Water Consumption – Predicted Water Consumption

- Benchmark Water Consumption: 8.0 ML (from step 3)
- Predicted Water Consumption: 2.6 ML (from step 1)
- Utility Savings (water) = 8.0 – 2.6 = 5.4 ML

Figure 14 Calculation of Utility Savings for example building

Relevant documentation includes:

- The output report from the NABERS reverse calculator
- Copies of the relevant NABERS Rating Certificates.

6.7 Sub-method M3 – NABERS

This method can be used where the building can be rated under the National Australian Building Environmental Rating Scheme (NABERS)[13]. The building must be rated for the reporting period to calculate the savings made by the upgrade, and in most cases will have been rated prior to the upgrade to establish a Historical Baseline NABERS rating for the building.

These calculations must be made by a NABERS Accredited Assessor.

[13] See NABERS website, https://nabers.gov.au/.

Sub-method M3 is a Savings Made estimate.

The savings are based on the Benchmark NABERS Rating, and a NABERS rating after the building upgrade, referred to as the Current NABERS Rating. It can calculate electricity, gas or water savings.

As in sub-method P3, this sub-method can be used to estimate savings for any energy or water upgrade to a building that can be NABERS rated.

This sub-method M3 uses the NABERS process to calculate the actual energy and/or water savings in a building, taking into account changes to the building such as size or occupancy over time. It does this by comparing:

- The utility use in the building measured using a current NABERS Rating
- The utility use in the building before the upgrade, based on an adjusted historic “benchmark” NABERS rating to work out how much energy and/or water the building would have used before the upgrade if it had the same area and hours of use as the current rating).

This process is depicted in Figure 15 below.

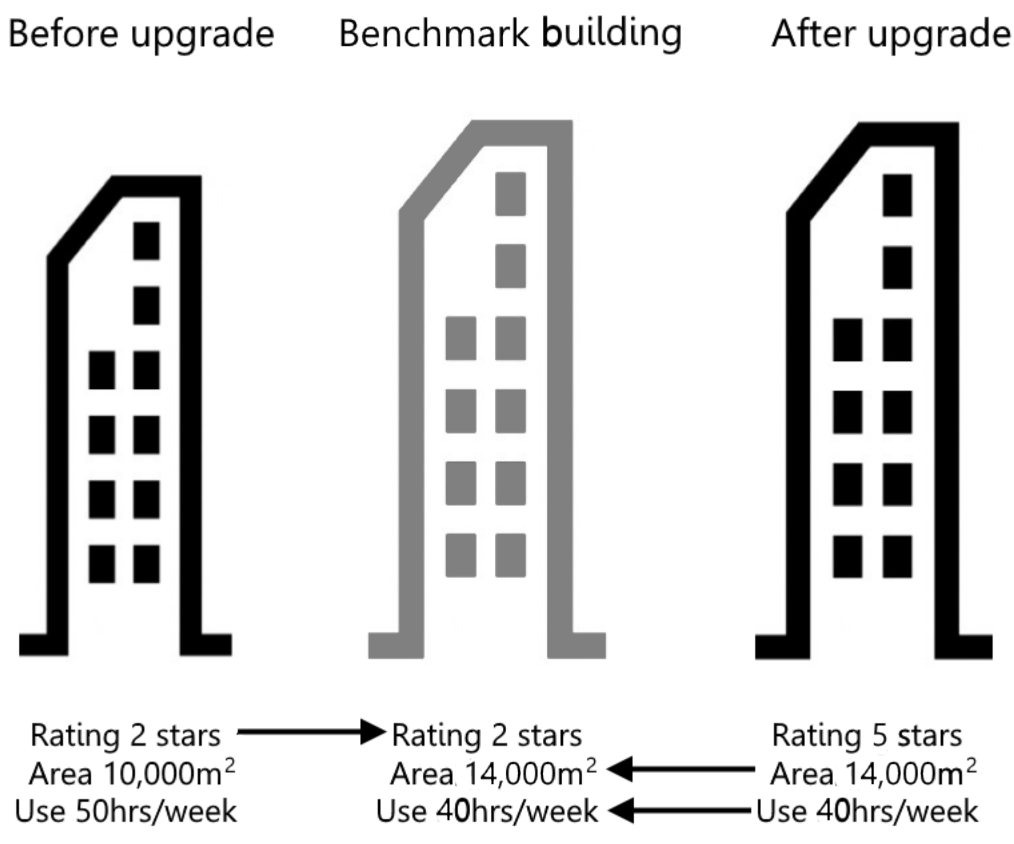

Figure 15 NABERS sub-method adjustments

NABERS ratings are based on utility meter measurements. The metering configuration must be equivalent for both the before and after NABERS ratings – specifically, if an energy use in the building is excluded from one of the ratings, it must also be excluded from the other rating. For example, if energy used in a building car-park has been excluded from the Benchmark NABERS Rating of the building, it should also be excluded from the current utility consumption for the building. Conversely, if an energy end-use was included in the Benchmark NABERS Rating, it should also be included in the Current Rating. This requirement in the sub-method is to ensure that any improvements in the Current NABERS are the result of efficiency improvements, not from installing sub-metering systems to exclude energy end uses from the rating.

The actual steps in this sub-method are very similar to the corresponding Predicted Savings sub-method P3. To avoid repetition, this section of the guide will highlight the differences between sub-method P3 and M3, and refer to section 6.6 for detailed guidance on the sub-method where relevant.

For the purposes of the guide, calculations for a fictional building upgrade are shown in the steps below. The example building is the same as that used in section 6.6, as outlined in Figure 7 in that section.

Additional details will be detailed through the following section as example calculations.

For each utility, the Savings Made are calculated as follows.

Step 1 – Calculate Current Utility Consumption for the Current Rating Year

Calculate the utility consumption for the reporting year, based on the utility meter data used for the NABERS rating after the upgrade (the Current NABERS Rating in the sub-method). The consumption for each utility is provided on the rating report for the Current NABERS Rating for the building. Figure 16 below shows an example NABERS rating report for the fictional example NABERS rated building. The building achieved 5.5 stars after the building upgrade.

The example report includes the detailed energy data sources needed to establish the NABERS Electricity and NABERS Gas for the sub-method. In this example, the NABERS Electricity is 300000 kWh and NABERS Gas is 400000 MJ. For the sub-method, the NABERS Electricity must be converted to MWh (by dividing the kWh figure by 1000), so NABERS Electricity is 300 MWh.

Note also that in the example that 10% of the NABERS Electricity was purchased as GreenPower™ which is accredited renewable energy. This purchase is likely to impact on the Utility Tariff for the upgrade, but does not affect the Utility Savings calculation – all GreenPower™ is counted in the NABERS Electricity figure. In the example the quantity incorporated in the NABERS report is inclusive of GreenPower™ so there is no need to make any additional calculations.

Energy **5.5 stars**

Excellent performance

Your office demonstrates excellent greenhouse performance and reflecting excellent design and management practices, high efficiency systems and equipment and/or energy sources with low emissions.

Your detailed energy results (Calculator version number 10.0)

Results for the 12 month rating period	NABERS Energy rating	NABERS Energy rating without GreenPower™
Star rating		
GreenPower™ included	10.0%	0%
Energy intensity	148 MJ/m^2	148 MJ/m^2
Total greenhouse gas emissions (scope 1 & 2)	185232 kg CO_2-e p.a.	203532 kg CO_2-e p.a.
Total greenhouse gas emissions (full fuel cycle – scope 1, 2 & 3)	219092 kg CO_2-e p.a.	240692 kg CO_2-e p.a.
Greenhouse gas intensity (scope 1 & 2)	19 kg CO_2-e/m^2 p.a.	20 kg CO_2-e/m^2 p.a.
Greenhouse gas intensity (full fuel cycle – scope 1, 2 & 3)	22 kg CO_2-e/m^2 p.a.	24 kg CO_2-e/m^2 p.a.
Benchmarking factor (previously know as Normalised Emissions)	N/A	N/A

– Your energy data source inputs

Fuel type	Quantity	Unit	Emissions (full fuel cycle – scope 1, 2 & 3)	GreenPower™
Electricity	300000.0	kWh	194400 kg CO_2-e	10.0%
Natural Gas	400000.0	MJ	24692 kg CO_2-e	Not applicable

Figure 16 Example NABERS Energy rating report

A similar report for a NABERS Water rating of the same building is shown in Figure 17 below. Note that the NABERS Water for the building includes both the "externally supplied water" and any recycled water consumed by the building.

Water rating **5.5 stars**

Excellent performance
Your office has excellent water performance, reflecting excellent equipment and management practices.

Detailed water results (Calculator version number 2.0)

Results for the 12 month rating period	NABERS Water rating (excluding externally supplied recycled water)	NABERS Water rating if no externally supplied recycled water was used
Star rating		
% of externally supplied water that is recycled water	10.0%	0%
Total water consumption excluding the externally supplied recycled water	2307.6 kL p.a.	2564.0 kL p.a.
Normalised consumption	0.239 kL/m^2 p.a.	0.264 kL/m^2 p.a.

– Your water data source inputs

Externally supplied water (excluding recycled water)	2307.6	kL
Recycled water	256.4	kL

Figure 17 Example NABERS Water rating report

In this example, the NABERS Water for the building is reported in the “water data source inputs”, and is the sum of the externally supplied water and recycled water (2307.6 + 256.4) = 2564 kL. For this sub-method, NABERS Water is calculated in ML (by dividing the kL figure by 1000), so NABERS Water = 2.564 ML.

The utility consumption for the sub-method must also include any “on-site unaccounted electricity”, which is the electricity that is consumed on-site that has not been accounted for in the NABERS rating. This may include, for example, electricity that is generated on-site by solar PV or biogas generation where the fuel input has not been included in the rated energy consumption reported on the NABERS energy rating report. All energy consumption must be converted to MWh.

Section 6.6 determined that the example building has a 10kW solar PV system. The actual electricity generated by the system and used in the building needs to be determined for this Savings Made calculation. For the purposes of the example, utility meter records show that the solar system generated 13,423 kWh of electricity during the Current Rating period. This electricity was all consumed in the building and must be added to the calculation as unaccounted electricity.

Data sourced from the Current NABERS Rating:

- NABERS Electricity: 300 MWh
- NABERS Gas: 400,000 MJ

Data sourced from the water audit:

- NABERS Water: 2.564 ML

Data sourced from on-site energy generation that was not included in Current NABERS Rating:

- On-site unaccounted electricity: 13,423 kWh = 13.423 MWh

Therefore the current utility consumption for the building is:

- Current Electricity Consumption = 300 + 13.423 = 313.423 MWh
- Current Gas Consumption = 400,000 MJ ÷ (1000 x 3.6) = 111.111 MWh
- Current Water Consumption = 2.56 ML.

Figure 18 Current consumption for example building after building upgrade

Step 2 – Calculate Benchmark NABERS Rating

This step is the same as for sub-method P3. Refer to section 6.6 for detailed guidance.

Step 3 – Calculate Benchmark Utility Consumption (Electricity, Gas and Water)

This step is also very similar to that used in sub-method P3 as described in section 6.6.

As in sub-method P3, this step uses a relevant NABERS Reverse Calculator to estimate the benchmark utility consumption for the building given the benchmark NABERS rating, using the building configuration after the upgrade (e.g. the size, hours and other comparison factors used by NABERS). In this method, the actual building configuration after the upgrade is known as it is established for the Current NABERS Rating.

Step 4 – Calculate Utility Savings

The Utility Savings are the difference between the benchmark consumption and the measured consumption for the current year. This step is also very similar that used in sub-method P3 as described in section 6.6, using Current Electricity, Gas and Water Consumption in the place of predicted.

Relevant documentation includes:

- The output report from the NABERS reverse calculator
- Copies of the relevant NABERS Rating Certificates.

6.8 Sub-method P4 – Energy Audit

This method can be used for any upgrade to the building that improves energy efficiency.

Sub-method P4 is a Predicted Savings estimate.

The savings are estimated as part of an energy audit of the building that shows the predicted savings from the building upgrade. It can calculate electricity or gas savings.

To use this method the building must have obtained an energy audit that meets the Australian Standard 3598:2014[14], or a standard that supersedes this. This standard provides a standard method for conducting three types of audits:

- Type 1 Energy Audit: a quantitative overview typically suited to smaller sites with lower energy expenditures, or as scoping for larger sites. The accuracy of this is sufficient only to identify low cost and no-cost opportunities with payback periods of up to 2 years
- Type 2 Energy Audit: a detailed review and analysis of energy performance to quantify the full range of opportunities for a site. It includes financial analysis of recommended energy performance improvement actions, using estimates that are of sufficient accuracy for operational expenditures or medium-scale capital investments. For commercial buildings these are often referred to as "investment grade" audits
- Type 3 Energy Audit: Detailed audits of specific subsystems, with additional data gathering and measurement (over a period long enough to capture the various operating conditions and relevant variables) to provide a higher level of accuracy. Costs and benefits are quantified sufficiently to meet the site's capital expenditure process requirements. Often referred to as "investment grade" audits for industrial and related operations.

Type 2 or Type 3 energy audits may be used to predict savings for the building upgrade. The Utility Savings for the project are established from the energy audit for the upgrades that will be installed as part of the building upgrade. Note that the energy audit may include other potential opportunities that are not part of the building upgrade works – any savings associated with these potential opportunities should not be included in the Utility Savings calculation.

The Australian Standard also includes a guide to the competencies that an energy auditor should hold. The Methodology suggests that the energy audit calculations should be made by a "suitably qualified" individual, and includes a

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[14] Available from the SAI Global website at http://infostore.saiglobal.com/store/Details.aspx?ProductID=1759652.

number of industry certifications that an energy auditor may hold to demonstrate their competence as an auditor. The listed certifications are:

- A Certified Energy Efficiency Specialist (CEES) or Certified Energy Efficiency Leader (CEEL) with the Energy Efficiency Council[15]
- A Certified Energy Manager (CEM) or Certified Energy Auditor (CEA) with the Association of Energy Engineers[16].

The method also allows for an individual to demonstrate their competency through proven experience in delivering energy audits.

An "investment grade" type 2 energy audit may be done for the business case of the upgrade, which will mean that the information required for this sub-method should be available.

Note that annual reports for upgrade works that have used this sub-method for Predicted Savings will use sub-method M3 – NABERS or M5 – Project Impact Assessment with Measurement and Verification to report on Savings Made.

Relevant documentation includes:

- A type 2 or type 3 energy audit report for the building that predicts the energy savings for the building upgrade works.

6.9 Sub-method P5 – Project Impact Assessment with Measurement and Verification

This sub-method can be used to predict utility savings where there is metering data available for the upgraded equipment before and after the building upgrade. It uses the Project Impact Assessment with Measurement and Verification (PIAM&V) method from the NSW Energy Savings Scheme (ESS).[17]

The calculations in this sub-method should be made by a Measurement and Verification Professional, such as:

- a Certified Measurement and Verification Professional (CMVP), having demonstrated their proficiency in best practice measurement & verification techniques to the satisfaction of the Efficiency Valuation Organization, or

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[15] See the Energy Efficiency Certification Scheme website http://www.efficiencycertification.org.au/.

[16] See the Association of Energy Engineers website http://www.aeecenter.org/custom/cpdirectory/index.cfm.

[17] See PIAM&V method on ESS website, http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Project_Impact_Assessment_with_MV.

- a person certified by the Energy Efficiency Council as a Certified Energy Efficiency Leader or Certified Energy Efficiency Specialist.

The Energy Efficiency Council facilitates CMVP training and certification in Australia[18].

Sub-method P5 produces predicted savings. It calculates savings for the following utilities:

- electricity
- gas
- water.

The PIAM&V method is based on the International Performance Measurement and Verification Protocol (IPMVP). Although the PIAM&V method in the ESS is only for electricity and gas models, IPMVP also includes water savings. Sub-method P5 allows for calculation of electricity, gas and water savings using the PIAM&V method and processes.

For each utility, the sub-method works by developing mathematical *models* of the utility-consuming equipment within the measurement boundary before and after the building upgrade.

The utility models establish which *independent variables* affect utility consumption and the relationship between each of those variables and consumption. The independent variables could represent, for example, outside air temperature, day of the week, or the number of human occupants of the building. Utility consumption could be, for example, daily electricity use.

The utility model is often expressed as a linear function of each of the variables. In a linear function, the coefficient of each variable determines how much consumption changes with changes to the variables. More efficient equipment will generally be modelled with smaller coefficients, indicating lower energy use for the same value of the independent variable.

At the heart of the PIAM&V method is the establishment of a baseline utility model. The model represents the *counterfactual* against which savings are calculated, and allows the Measurement and Verification Professional to model pre-upgrade building performance after the upgrade has been completed.

To establish predicted utility savings, three steps are taken, as outlined below.

Step 1 – Measure building performance before and after the upgrade

The PIAM&V sub-method is based upon statistical models of the utility consumption of the upgraded building equipment before and after the

[18] See the EEC website http://www.eec.org.au/events/measurement-and-verification-training/overview-12#/overview-12

upgrade. The performance of the building needs to be measured to gather enough evidence to build a utility model of pre- and post-upgrade performance. Utility consumption and independent variables are all measured, usually on a daily basis.

The utility models will be valid for an *effective range* of the independent variables for the upgrade. The effective range is based upon the range of measurements of the independent variables before the building upgrade (for the baseline utility model) and after the upgrade (for the operating utility model). To ensure that the utility models adequately describe utility performance, the measurements should represent as much as possible of the full expected range of possible values for the independent variables.

For example, outside temperature is likely to be an independent variable for the utility models in heating, ventilation and air conditioning equipment upgrades. To establish a baseline utility model for the upgrade, building performance will likely need to be measured through both summer and winter seasons prior to the building upgrade to ensure that the full range of possible outside air temperatures is covered. Similarly, the operating utility model will likely require measured building performance through a summer and winter season after the building upgrade.

Step 2 – **Establish the Baseline Utility Model and Operating Utility Model and Normal Year**

After the building performance has been measured, develop the utility models for baseline and operating utility consumption.

The baseline utility model relates utility consumption to the independent variables based on the measurements taken before the building upgrade. Many utility models are linear models determined by statistical regression of the building performance data. In the case of a linear model, the utility model is a line of best fit through the measured data.

The operating utility model forecasts the future performance of the building in a “normal year” of operation after the building upgrade, based on measured utility consumption after the upgrade. The normal year reflects expected values for the independent variables over a typical year.

Step 3 – Calculate the predicted utility savings for each year

Estimate the annual utility savings over an entire year. For this purpose, the normal year is used. For each day (assuming a daily model), the values of the independent variables are input into both the baseline utility model and the predicted operating utility model to estimate consumption before and after the upgrade. The difference between the two is the utility savings.

Further guidance on the ESS website

The ESS Administrator has published a PIAM&V Method Guide for calculating savings[19]. That guide provides greater detail on the PIAM&V process and the steps required to estimate utility savings in this sub-method. A Measurement and Verification Professional can use that guide to determine how to properly measure consumption and the independent variables, and develop the utility models and normal year.

While the ESS PIAM&V Method Guide is helpful for each of the steps in sub-method P5 (and M5), it has been written for use in the ESS, and contains some information specific to administration of the ESS that is not needed for sub-method P5. The PIAM&V method in the ESS also allows multi-site models to be developed, but these are not used in sub-method P5.

In addition, the NSW Government maintains a PIAM&V Tool spreadsheet, which can be used by a Measurement and Verification Professional to help prepare and present building performance measurements and savings estimate for this sub-method. When using the spreadsheet for a Lessee Savings calculation, the Measurement and Verification Professional may need to input notional values into some fields that are only relevant to the ESS.

If so desired, the Methodology allows the use of an equivalent calculator to the PIAM&V Tool spreadsheet. For example, the Measurement and Verification Professional may use an internally or commercially developed calculator to support the measurement and verification of the project.

Relevant documentation includes:

- A report on the two models and utility savings calculations (using the PIAM&V Tool or equivalent)
- An explanatory statement by a Measurement & Verification Professional confirming that the approach and reported savings comply with the PIAM&V method (using a template provided by the ESS Administrator) and the evidence and reasoning used to predict the performance of the utility models.

6.10 Sub-method M5 – Project Impact Assessment with Measurement and Verification

This sub-method can be used to estimate savings made where there is metering data available for the upgraded equipment before the building

[19] ESS PIAM&V Method Guide is accessible at http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Project_Impact_Assessment_with_MV.

upgrade. It uses the Project Impact Assessment with Measurement and Verification (PIAM&V) method from the NSW Energy Savings Scheme (ESS)[20].

This sub-method must be used to estimate savings made for projects that used sub-method P5 to predict utility savings. It can also be used to estimate savings made for projects that used sub-method P4 – Energy Audits.

The sub-method is very similar to sub-method P5. While that sub-method predicts utility consumption in a Normal Year based on an operating utility model, this sub-method compares actual measured data from the building over a twelve month period to the baseline utility model. The two sub-methods are compared in Table 6 below.

Table 6 Comparison of sub-methods P5 and M5

Differences between P5 and M5	Sub-method P5	Sub-method M5
Measurements required before building upgrade	Building performance representing likely range of Independent Variables measured to establish Baseline Utility Model	Same as P5
Measurements required after building upgrade	Building performance representing likely range of Independent Variables measured to establish Operating Utility Model	Twelve months of building performance measured
Utility savings calculations	Based on difference between building performance before upgrade (Baseline Utility Model) and predicted building performance after upgrade in a normal	Based on difference between building performance before upgrade (Baseline Utility Model) and measured annual performance after upgrade

[20] See PIAM&V method on ESS website, http://www.ess.nsw.gov.au/Methods_for_calculating_energy_savings/Project_Impact_Assessment_with_MV.

	year (Operating Utility Model)	
Who can do calculations	A Certified Measurement and Verification Professional (CMVP[21]), having demonstrated their proficiency in best practice measurement & verification techniques to the satisfaction of the Efficiency Valuation Organization, or a person certified by the Energy Efficiency Council as a Certified Energy Efficiency Leader or Certified Energy Efficiency Specialist.	Same as P5

Further guidance on the calculations in this sub-method is published on the ESS website. See the “further guidance” comments in section 6.9 above for more information.

Sub-method M5 calculates *savings made*. It calculates savings for the following utilities:

- electricity
- gas
- water.

For each utility, the sub-method works by developing a mathematical *model* of the utility-consuming equipment within the measurement boundary before the building upgrade. The Baseline Utility Model is the same as that used in sub-method P5, if that was done for the building. See the previous section for more guidance on creation of that model.

Three steps are taken to establish utility savings made in this sub-method.

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[21] See the EEC website for details on CMVP training http://www.eec.org.au/events/measurement-and-verification-training/overview-12#/overview-12.

Step 1 – Establish the Baseline Utility Model

This step is the same as described for sub-method P5. See the description in section 6.9 for guidance.

If sub-method P5 was used to predict savings for the upgrade, the same baseline utility model must be used for this sub-method.

Step 2 – Measure building performance after the upgrade

Sub-method M5 requires a full year of measured building performance after the building is upgraded. Utility consumption and independent variables are all measured, usually on a daily basis.

Step 3 – Calculate the utility savings made for a year

The annual utility savings are estimated over the entire year of measurements. For each day (assuming a daily model), the values of the independent variables are input into the baseline utility model to estimate consumption before the upgrade under the observed conditions.

The utility savings is the difference between the modelled baseline consumption and the measured consumption.

As noted in section 6.9, the NSW Government maintains a PIAM&V Tool spreadsheet, which can be used to present the evidence of building performance and to estimate savings. However, the PIAM&V Tool does not currently support calculation of measured savings. The Measurement and Verification Professional can develop a similar report to document the baseline utility model and estimated savings made for the upgrade in a spreadsheet format for M5.

Documentation includes:

- A report on the baseline model, measured annual consumption and utility savings calculations (using a format similar to the PIAM&V Tool)
- An explanatory statement by a Measurement & Verification Professional confirming that the approach and reported savings comply with the PIAM&V method (using a template provided by the ESS Administrator).

7 Converting utility savings to cost savings

This section describes how to convert the estimated electricity, gas or water savings into dollar savings. It includes finding the appropriate tariff for that utility, from utility bills or agreed payment rates between the lessor and lessee, and applying appropriate confidence factors for the selected sub-method.

Utility savings attributed to a particular lessee are converted to cost savings by using a *utility tariff*.

As noted in section 4.2, the utility tariff is a variable, volume based charge that is based on the use of that utility, expressed in dollars per billing unit. The utility tariff must reflect actual contracted marginal rates for supply of that utility to the lessee. Those rates will be contained either in a lessor-lessee agreement or in published utility retail price lists. In addition, the utility tariff must correspond with the appropriate:

- Measurement boundary – the rates should reflect the rates applied to the utility meter(s) contained in the measurement boundary
- Estimate period – where only historical rates are available and forward prices are not contracted, the tariff can be adjusted by 3% per annum to account for price increases
- Level of consumption – some rates change with increased consumption; the rate chosen should be the marginal rate (the rate for the final unit of consumption)
- Any supplier discounts – if the Utility Supplier has applied a discount to the utility bill, this discount must also be applied to the Utility Tariff
- Changing tariffs – in some cases the tariff may change during the estimate period; in this case a weighted tariff should be calculated.

Retail prices are also provided in utility bills, and this is the preferred method for determining the applicable tariff. Often, utility tariffs change depending on consumption, so using a bill can clarify the correct marginal rate to use.

Note that when the upgrade works include a renewable energy installation and the energy generated is sold to the lessee, the Utility Tariff applied to savings for this energy is to be discounted by the tariff charged for the renewable energy. This is to ensure that the Lessee Savings take into account both the savings from the avoided purchase of energy from the public network, and the cost of purchasing the energy generated on site. The Methodology includes an equation to achieve this discount.

The following sections provide more information on how to find the correct utility tariff from a utility bill. Where the tariff is set in lease conditions or other agreement between the lessor and lessee, the agreement should be used to identify the actual tariff that is denoted in cost per unit of utility used (e.g. $/ML for water, or $/kWh for electricity).

7.1 Finding the utility tariff on electricity bills

An example commercial electricity bill is provided in Figure 20 below. This is the back of a bill. Often breakdowns of consumption and prices is provided on the back of the electricity bill. For electricity in particular, there may be different tariffs for different times of day. In the example bill, those are "peak" and "off peak" prices. Usually the prices are per kWh or per MWh.

To calculate a utility tariff to use to estimate the savings, a weighted average is taken, based on the actual consumption in the billing period. In the example bill, consumption is the "units" against each of the tariff types. The weighted tariff would be calculated using the formula in the Methodology:

$$UT = \sum_i (UT_i \times E_i) \Big/ \sum_i E_i$$

Note that in the example bill a 12% Guaranteed Discount is applied, which is applied to the Utility Tariffs from the bill to reflect the actual price paid by the lessee for this utility.

In this example, UT_1 = $0.3312/kWh x (12% discount), E_1 = 5498.662 kWh, UT_2 = $0.1755/kWh x (12% discount), E_2 = 4399.136 kWh. The 12% discount is calculated by multiplying by (100-12) = 88%.

Therefore UT = (($0.3312 x 0.88 x 5498.662) + ($0.1755 x 0.88 x 4399.136)) / (5498.662 + 4399.136) = $0.2306/kWh.

If calculating the UT for a multi-year Estimate Period, the tariff would be established in steps to determine the appropriate tariff for each year in the Estimate Period. In this example the forward price is not contracted so a 3% inflation applies to the Utility Tariff:

Year	1	2	3	4	5
UT	$0.2306	$0.2306 * 1.03 = $0.2375	$0.2446	$0.252	$0.2595

Figure 19 Example Utility Tariff calculation for electricity bill

Electricity supply details.

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Supply address:	18 Sample Avenue SAMPLETOWN SA 5555
Supply period:	4 Feb 2014 to 3 Mar 2014 (28 days)
NMI:	00000000000
Energy Plan:	Select 12%

Meter no.	**Read date**	**Rate description**	**Start read**	**End read**	**kWh**
00000	3 Mar 14	Peak	18,000.111	23,498.773	5,498.662
00000	3 Mar 14	Off peak	21,000.444	25,339.58	4,339.136

Your next meter read is due between **28 Mar 14 and 3 Apr 14**. Please ensure easy access to your meter on these days.

How we've worked out your bill.

Previous balance and payments.

		Total
Previous balance	$3,059.45	
1 Feb 14 payment	$3,059.45cr	
Balance brought forward		**$0.00**

New charges and credits.

Usage and supply charges	**Units**	**Price**	**Amount**		
Peak	5,498.662kWh	$0.3312	$1,821.16		
Off peak	4,339.136kWh	$0.1755	$761.52		
Supply charge	28 days	$1.8275	$51.17		
Total charges				+	*$2,633.85*
Credits					
12% Guaranteed Discount			$309.92cr		
Total credits				-	*$309.92cr*
Total new charges and credits				=	*$2,323.93*
Total GST				+	*$232.39*
Total due (includes GST)				=	**$2,556.32**

Figure 20 Example business customer electricity bill (source: AGL Energy). Note that this is an example bill and the tariffs shown are for illustration purposes only.

7.2 Finding the utility tariff on electricity bills for a large business

The energy bill for a large business customer may have a large number of tariffs charged against the electricity used on site reflecting volume based different regulatory and market charges. The Utility Tariff to be used in this case will be based on a weighted average tariff for electricity charged at different rates during the billing period (e.g. time of use tariffs), along with any additional volume based charges for the electricity used.

An example bill for a large business customer is shown in Figure 21 below. Note that only the volume charges are relevant for the calculation of a Utility Tariff (shown on the example bill as c/kWh). This bill also includes Transmission and Distribution Loss Factors as part of the Utility Tariff.

Demand charges that are not based on overall electricity use are not included in the savings estimate. In this example bill, these non-included demand charges are noted as "KW/Mth". Fixed charges based on $/Days are also not included.

Site Address	NMI Site Address Melbourne VIC 3000		
NMI	10987654321		
Usage Period	01/01/2013 to 31/01/2013	Account number	700076
Bill days	31	Invoice number	101287

Electricity Charges

Charge	Quantity	Price	Transmission Loss Factor	Distribution Loss Factor	Amount (ex. GST)
Energy					
Peak	1,021,422.29 kWh	4.775 c/kWh	1.1291	1.038	$57,162.14
Off Peak	1,082,930.41 kWh	2.505 c/kWh	1.1291	1.038	$31,793.47
Environmental					
GEC Charge	2,104,352.70 kWh	0.024 c/kWh	1	1.038	$524.24
LGC Charge	2,104,352.70 kWh	0.394 c/kWh	1	1.038	$8,606.21
STC Charge	2,104,352.70 kWh	0.715 c/kWh	1	1.038	$15,615.25
Network					
DUOS Network Daily Charge	31 Days	187.147 $/Days			$5,801.56
TUOS Fixed Common Service General Charge	31 Days	763.386 $/Days			$23,664.97
TUOS Network Daily Charge	31 Days	107.231 $/Days			$3,324.16
DUOS Volume	2,104,352.70 kWh	0.421 c/kWh			$8,859.32
TUOS Volume	2,104,352.70 kWh	0.809 c/kWh		1.038	$17,671.13
DUOS Capacity	4,710.00 KW	11.480 KW/Mth			$54,070.80
DUOS Demand	4,230.00 KW	6.827 KW/Mth			$28,878.21
TUOS Capacity	4,710.00 KW	4.495 KW/Mth			$21,171.45
Market					
AEMO Ancillary Charge	2,104,352.70 kWh	0.040 c/kWh	1	1.038	$873.73
AEMO Pool Fees	2,104,352.70 kWh	0.039 c/kWh	1	1.038	$855.82
Metering					
MDA Meter Reading	31 Days	18.904 $/Days			$586.02
Other					
Retail Service Charge	31 Days	0.020 $/Days			$61.69
Clean Energy Charge	2,104,352.70 kWh	2.070 c/kWh	1.1291	1.038	$51,052.69
Sub-Total					**$330,572.86**
GST					$33,057.29
Total (inc. GST)					**$363,630.15**

Figure 21 Example of a large business electricity bill (source: Alinta Energy). Note that this is an example bill and the tariffs shown are for illustration purposes only.

The “Energy” section outlines the different time of use tariffs that apply to billed energy use. The weighted tariff would be calculated using the formula in the Methodology:

$$UT = \sum_i (UT_i \times E_i) \Big/ \sum_i E_i$$

UT_1 (Peak) = 4.775 c/kWh x 1.1291 x 1.038 (loss factors) = $0.056/kWh, E_1 = 1021422.29 kWh

UT_2 (Off Peak) = 2.505 c/kWh x 1.1291 x 1.038 = $0.0294/kWh, E_2 = 1082930.41 kWh

In this example, in addition to the weighted tariff for peak and off peak energy use, there are a large number of additional volume charges applied to billed electricity use. These additional charges are added to the Utility Tariff:

UT_3 (GEC charge) = 0.024 c/kWh x 1 x 1.038 (loss factors) = $0.0002/kWh

UT_4 (LGC charge) = 0.394 c/kWh x 1 x 1.038 = $0.0041/kWh

UT_5 (STC charge) = 0.715 c/kWh x 1 x 1.038 = $0.0074/kWh

UT_6 (DUOS volume) = 0.421 c/kWh x 1 x 1 = $0.00421/kWh

UT_7 (TUOS volume) = 0.809 c/kWh x 1 x 1.038 = $0.0084/kWh

UT_8 (AEMO ancillary charge) = 0.040 c/kWh x 1 x 1.038 = $0.0004/kWh

UT_9 (AEMO pool fees) = 0.039 c/kWh x 1 x 1.038 = $0.0004/kWh

UT_{10} (Clean Energy charge) = 2.070 c/kWh x 1.1291 x 1.038 = $0.0243/kWh

The final Utility Tariff for this example bill is

UT = ((0.056 x 1021422.29 + 0.0294 x 1082930.41) / (1021422.29 + 1082930.41)) + 0.0002 + 0.0041 + 0.0074 + 0.00421 + 0.0084 + 0.0004 + 0.0243 = $0.0917 per kWh.

For savings estimates over multiple years, the tariff will need to be calculated for each year. It may change based on forward contracted rates, or by a 3% annual increase after the last contracted rate.

Figure 22 Example Utility Tariff calculation for large energy customer

7.3 Finding the utility tariff on gas bills

An example gas bill is provided in Figure 23. This is the back of a bill showing the bill details. Often breakdowns of consumption and prices is provided on the back of the gas bill. For gas, there are often different rates based on how much gas is consumed, also known as “block tariffs”. Under these arrangements one block or quantity of gas use is charged at a different rate to the next. The rate to use for Utility Tariff calculations is the marginal rate – that is, the rate at which the next unit of gas consumption would be billed. In the example bill below, there are two rates, “peak” and “peak next”. They are provided as a price per unit – in this case, $ per MJ. Usually the prices are per MJ or per GJ.

“Peak” and “peak next” are block tariffs, with the first 47,600 MJ on the bill charged at the “peak” block rate, and any gas use after that charged at the “peak next” rate. On this bill, “peak next” is the last block tariff - any more gas used in the building would have been charged at the “peak next” rate. This means that “peak next” is the marginal tariff rate to use for Utility Tariff calculations.

Gas supply details.

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Supply address:	18 Sample Avenue SAMPLETOWN QLD 4444
Supply period:	13 Feb 2014 to 12 Mar 2014 (28 days)
MIRN:	00000000000
Energy Plan:	Select 7%

Meter no. 000000

Read date	Read type	Start read	End read	Heating value	Pressure factor	Usage MJ
12 Mar 14	Actual	12,272	15,345	37.2414	1.0296	117,830.32

Your next meter read is due between **8 Apr 14 and 14 Apr 14**. Please ensure easy access to your meter on these days.

How we’ve worked out your bill.

Previous balance and payments.		Total
Previous balance	$3,237.25	
1 Feb 14 payment	$3,237.25cr	
Balance brought forward		**$0.00**

New charges and credits.

Usage and supply charges	Units	Price	Amount		
Peak	47,600.00MJ	$0.02187	$1,041.01		
Peak next	70,230.32MJ	$0.02035	$1,429.19		
Supply charge	28 days	$1.0889	$30.49		
Total charges				+	*$2,500.69*
Credits					
7% Guaranteed Discount			$172.91cr		
Total credits				-	*$172.91cr*
Total new charges and credits				=	*$2,327.78*
Total GST				+	*$232.78*
Total due (includes GST)				=	**$2,560.56**

Figure 23 Example business customer gas bill (source: AGL Energy). Note that this is an example bill and the tariffs shown are for illustration purposes only.

In the example gas bill, the bill is also discounted by the Utility Supplier by 7% (shown on the bill as a 7% Guaranteed Discount). This discount must be applied to the Utility Tariff. Therefore, in the example shown, the Utility Tariff to be used for the Lessee Savings calculation is:

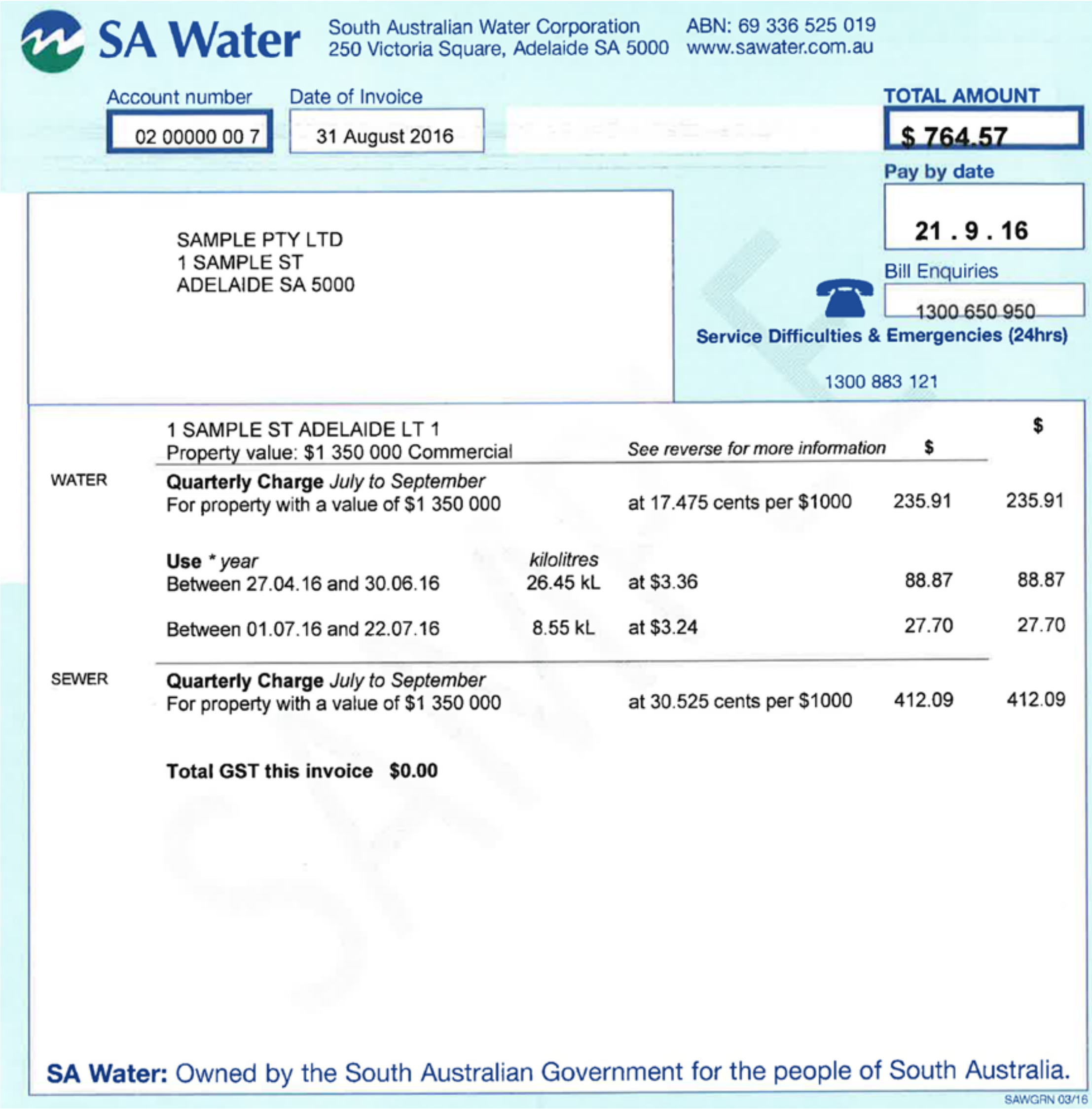
$0.2035 (the marginal tariff for the use of gas on the premises) x (100-7)% = $0.1893 per MJ

For savings estimates over multiple years, the tariff will need to be calculated for each year. It may change based on forward contracted rates, or by a 3% annual increase after the last contracted rate.

Figure 24 Example Utility Tariff calculation for gas bill

7.4 Finding the utility rate on water bills

An example South Australian water bill is provided in Figure 25 below. The itemised volume-based charges are outlined in the “Use * year” section. Similar to gas, there may be a different rate based on how much water is consumed. The second item is the marginal rate, which is the rate that would be adopted for the utility tariff calculation.


SA Water
South Australian Water Corporation
250 Victoria Square, Adelaide SA 5000
ABN: 69 336 525 019
www.sawater.com.au

Account number	Date of Invoice	TOTAL AMOUNT
02 00000 00 7	31 August 2016	$ 764.57

Pay by date: 21 . 9 . 16

Bill Enquiries: 1300 650 950

Service Difficulties & Emergencies (24hrs): 1300 883 121

SAMPLE PTY LTD
1 SAMPLE ST
ADELAIDE SA 5000

1 SAMPLE ST ADELAIDE LT 1
Property value: $1 350 000 Commercial

		kilolitres	*See reverse for more information*	$	$
WATER	**Quarterly Charge** *July to September* For property with a value of $1 350 000		at 17.475 cents per $1000	235.91	235.91
	Use * *year* Between 27.04.16 and 30.06.16	26.45 kL	at $3.36	88.87	88.87
	Between 01.07.16 and 22.07.16	8.55 kL	at $3.24	27.70	27.70
SEWER	**Quarterly Charge** *July to September* For property with a value of $1 350 000		at 30.525 cents per $1000	412.09	412.09

Total GST this invoice $0.00

SA Water: Owned by the South Australian Government for the people of South Australia.

SAWGRN 03/16

Figure 25 Example water bill (source: SA Water). Note that this is an example bill and the rates shown are for illustration purposes only.

In this example, the rate has changed during the billing period. In this case, a weighted rate would apply based on the usage during each of the noted periods, using the formula in the Methodology:

$$UT = \sum_i (UT_i \times E_i) \Big/ \sum_i E_i$$

In this case, UT_1 = $3.36/kL, E_1 = 26.45 kL, UT_2 = $3.24/kL, E_2=8.55kL. Therefore UT = ((26.45 x $3.36) + (8.55 x $3.24)) / (26.45 + 8.55) = $3.33/kL

For savings estimates over multiple years, the tariff will need to be calculated for each year. It may change based on forward contracted rates, or by a 3% annual increase after the last contracted rate.

Figure 26 Example Utility rate calculation for water bill

7.5 Conversion to billing units and calculating cost savings

Once the utility tariff has been determined, it must be matched with the utility savings. The calculation sub-methods may calculate savings using different measurement units from the units used for billing the utility. That may require conversion of the utility savings to the same units of measurement as the utility tariff. Then the two values can be multiplied together to estimate the cost savings. Refer to the Methodology for further information.

7.6 Applying a confidence factor appropriate to the utility savings sub-method

A confidence factor is applied to utility savings to ensure that the reasonable estimate is a fair and conservative representation of the savings to each lessee in the building. The confidence factor for the savings varies depending on whether the reasonable estimate is based on predicted energy savings, or measured energy savings.

The confidence factor for most Predicted Savings methods (all apart from P5 – Project Impact Assessment with Measurement and Verification) is set at 0.8. This effectively discounts the savings estimate by 20%. This discount takes into consideration the expected accuracy of these predictions, and possible variations between the average utility savings predicted by the method and the actual savings generated by this particular upgrade.

The confidence factor for Savings Made sub-methods and for the Predicted Savings method based on measured data (P5) is set at 1.0. This means that savings that have been measured for the completed upgrade works where measured data is available are not discounted, as they reflect an accurate estimate of the savings for this particular upgrade.

For buildings with multiple lessees and/or upgrade works that affect multiple utilities, separate confidence factors may apply for each Utility Savings calculation. An example for a fictional building upgrade is shown in Figure 27.

Confidence Factors for 131 Example St, Adelaide 5000.

Brief upgrade works summary (from method boundary)

Whole building upgrade including HVAC system upgrade, LED lighting upgrade to tenancies and common areas, shared bathroom refurbishment.

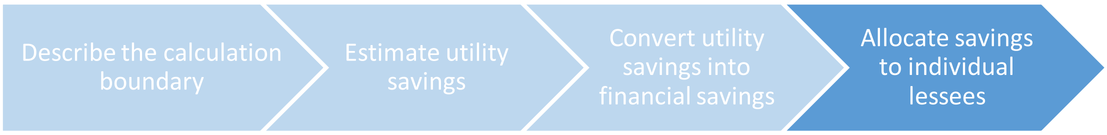
Utilities affected: Electricity – common areas, Electricity – lessee 1 tenancy, Electricity – lessee 2 tenancy, Water and Gas.

Confidence Factors for each utility:

Utility	Sub-method used	Confidence Factor
Electricity – common areas	P5 (Project Impact Assessment with M&V)	1.0
Electricity – lessee 1 tenancy	P1 (lighting)	0.8
Electricity – lessee 2 tenancy	P1 (lighting)	0.8
Gas	P5 (Project Impact Assessment with M&V)	1.0
Water	P3 (NABERS)	0.8

Figure 27 Example confidence factor calculation for a Predicted Savings estimate

8 Allocating savings to the lessee



This section outlines how to attribute savings from the upgrade works to each lessee. The attribution of these savings must be supported by documentary evidence that shows how the utility is normally paid by the lessee.

Allocating savings to each lessee in the building involves determining both the appropriate Attribution Factor for each lessee and each utility, and the Estimate Period for the estimate to ensure that the savings estimate matches up to the required contribution.

Note that only lessees that would normally pay for the utility may be included in this calculation.

8.1 Attributing savings to each lessee in the building

There may be a number of Attribution Factors for a particular upgrade works, depending on the number of lessees that will be required to contribute to the building upgrade charge, and the number of utilities that are improved by the upgrade. Table 7 outlines the number of Attribution Factors that will need to be determined for a particular upgrade works, based on the number of utilities improved by the upgrade and the number of lessees benefiting from the savings.

Table 7 Attribution Factors to be determined under different upgrade scenarios

	Single Lessee	Multiple lessees (*m* lessees)
Single utility	1	*m*
Multiple utilities (*n* utilities)	*n*	*n* x *m*

For example, if a building upgrade benefits two lessees in a building with electricity, gas and water savings (three utilities), the number of Attribution Factors to be established is six (three utilities x two lessees).

Note that the Lessee Savings will need to be calculated separately using each Attribution Factor.

Where the lessee pays directly for a particular utility, the savings for that utility will be fully attributable to that lessee – the Attribution Factor for that utility will be 1. For example, the Attribution Factor would be 1 for a tenancy lighting upgrade, in which the upgraded lights are on a lessee-paid electricity bill.

Where lessees pay indirectly for a particular utility, the savings for that utility will be attributed to each lessee using the same formula that determines how much they would normally pay for a bill. This is normally established in the lease. The building lessor should have ready access to the information required to establish the proportion paid by each lessee in the building for a particular utility bill. This proportion may be based on property size, or value, or as otherwise negotiated in the lease, and may vary between utilities.

Figure 28 shows an example calculation for the Attribution Factors of a fictional upgrade.

Attribution Factors for 131 Example St, Adelaide 5000.

Utility payment arrangements for the building: (from Method Boundary documentation)

Utility	Supplier	Pays bills	Lessee pays by
Electricity – common areas	Energy Australia	Lessor	Bills passed through to all lessees under lease conditions. Lessee 1: pays 25% of bill Lessee 2: 75%
Lessee 1 electricity	AGL	Lessee 1	Direct payment by Lessee 1
Lessee 2 electricity	Origin Australia	Lessee 2	Direct payment by Lessee 2
Water	SA Water	Lessor	Bills passed through to all lessees under lease conditions Lessee 1: pays 45% of bill Lessee 2: 55%
Gas	AGL	Lessor	Bills passed through to all lessees under lease conditions Lessee 1: pays 30% of bill Lessee 2: 70%

For this upgrade there are 2 lessees and 5 utilities, so will need 2x5 = 10 Attribution Factors.

Attribution Factors:

Utility	Lessee 1	Lessee 2
Electricity – common areas	0.25	0.75
Electricity – lessee 1 tenancy	1	0
Electricity – lessee 2 tenancy	0	1
Water	0.45	0.55
Gas	0.3	0.7

Figure 28 Example attribution factor calculation

8.2 Estimate period

The estimate period ensures that the Lessee Savings for the upgrade works match the contribution for the lessee.

Each of the sub-methods to calculate Utility Savings estimate the annual savings from the upgrade. The estimate period converts this annual savings figure to the appropriate period for calculating Lessee Savings – either to match a contribution notice for Predicted Savings estimates, or to match annual reporting dates for Savings Made estimates.

The dates for the estimate period must match the Estimate Period that is documented as part of the method boundary (see section 5.4 above). Figure 29 shows an example calculation for the estimate period of a fictional upgrade.

Estimate Period for 131 Example St, Adelaide 5000.

Estimate Period: 1 July 2017 – 30 June 2020 (inclusive) (1096 days)

Estimate Period = 1096 / 365 = 3

Figure 29 Example estimate period calculation

9 Supporting evidence

The lessor should retain a copy of the documentation used to make the reasonable estimate of cost savings to lessees. This protects both the lessor and lessee by ensuring that the calculations can be reviewed by both parties to confirm that the estimate of savings is appropriate. This will be particularly important to avoid potential disputes.