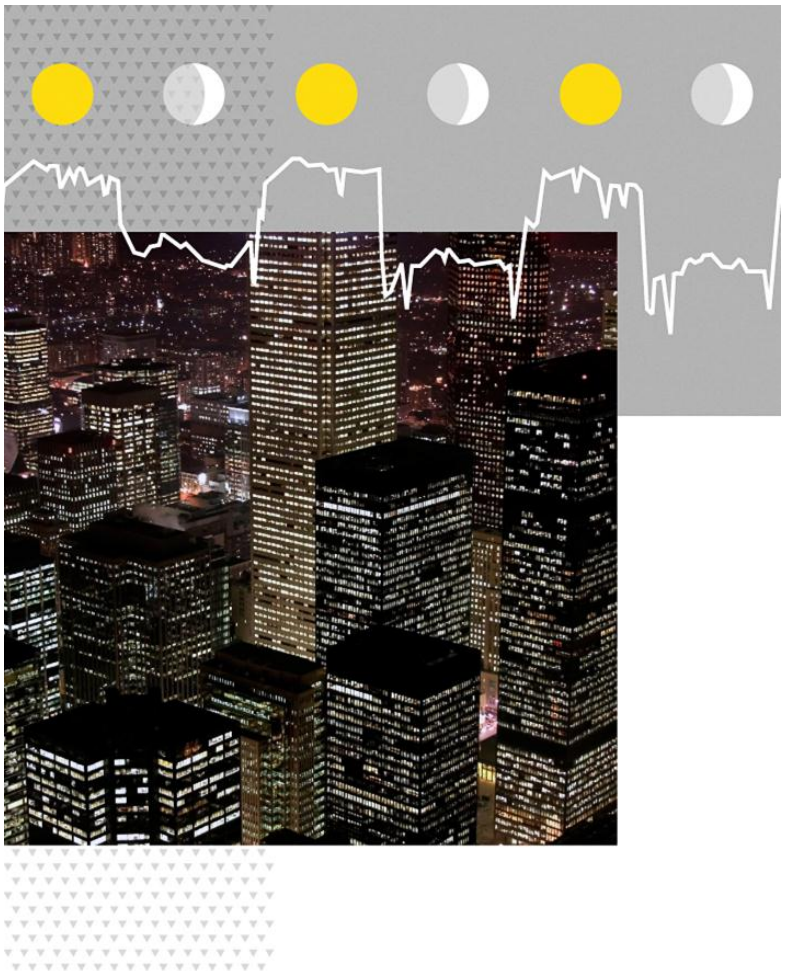
Landlord Energy Rating: Outline Specification

A contribution to the development of a Landlord's Energy Rating for the Better Buildings Partnership



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1. Introduction

The Better Buildings Partnership (BBP) strongly supports the roll out of Display Energy Certificates (DECs) to the private sector, but believes that, in their current form, they may not achieve their vital aim of driving market change in reducing energy consumption, in addition to their primary purpose of reporting operational energy use. Our members believe that by making energy performance data accessible and simple to understand it will influence both owners and occupiers to increase efficiency. The BBP has, therefore, taken the findings of the UKGBC Task Group Report 'Carbon Reductions in Existing Non-Domestic Buildings (March 2011)' and has initiated a project which it hopes will result in the development of a methodology which can be used to produce a robust 'Landlord DEC'.

In this context, the BBP is seeking to develop a Landlord's Energy Rating (LER). The project will focus on the multi-let office sector, but the intention is to address other sectors over time. The LER aims to differentiate energy efficient office space in the marketplace, creating the potential to feed through into market valuations, as the NABERS[1] Energy system is reported to be doing in offices in Australia. The LER project is looking to build upon the existing Landlord's Energy Statement[2] (LES) and be consistent with the DEC operational rating, to develop a LER which provides additional granularity to that available from whole building or tenant DECs by focusing on the energy use which can be influenced by the landlord.

By virtue of sharing a common data collection platform, the LER is designed to be completed at the same time as a whole building and/or tenant DECs, although the LER delivery system may remain separate, at least initially. It is hoped that it could be complementary to compliance with other legislative requirements such as CRCEES and potentially the requirement for energy audits under the EED.

The primary objective of the BBP is to develop an authoritative label to benchmark the energy performance of the landlord's services provided to office buildings, where these include shared HVAC services to the whole building (tenanted areas and common parts). This outline specification document sets out the requirements for such a Landlord's Energy Rating scheme. It defines the assessment process, the calculation method for rated area and rated hours, the minimum energy data requirements and the corresponding meter coverage and accuracy needs.

The outline specification is designed to be a precursor to a full specification in which all terms would be carefully defined. It is anticipated that a full specification would be written in Stage 3 of the LER development process and would capitalise on an emerging 'case law' based on user experience with a preliminary application of the LER during Stage 2. In short, this outline specification report is a working draft, some of which will be tested in Stage 2 and may change: it is indicative of the core content of the final specification.

[1] National Australian Built Environment Rating System
[2] Available at www.les-ter.org.uk

2. Key Concepts

2.1 Rating Scheme

The LER assesses the energy used for landlord's services supplied to [multi-tenanted] office buildings against a 7 star scale, with a half star star resolution. A higher star score signifies a more efficient energy performance of the landlord's services. The scale is calibrated to give 3.5 stars to a building which uses an amount of energy for its landlord services which is consistent with the DEC benchmark for offices.

2.2 Assessment Levels and communication

Two levels of assessment can be conducted; formal certification and informal performance appraisal. A formal certification must be undertaken by an accredited assessor, meet estimation and the results lodged with a central authority which has the powers to audit the assessment. An LER certificate will then be issued and can be displayed to the public (physically and/or on-line). Provided maximum estimation thresholds have not been exceeded, the LER star rating can then be used to promote the building (e.g. in property marketing materials to supplement the theoretical energy performance certificate rating). An informal performance assessment would be given an LER certificate clearly watermarked 'Draft' and should not be publicly disclosed but could be used as an internal energy performance benchmarking tool.

2.3 Formal Assessment Process

To claim formal compliance with the LER process and receive an LER certificate, applicants must seek assessment by a third party assessor. This person would need to be accredited or licensed by an appropriate authority.

The system has been designed to be used by an assessor without disturbing occupiers. However, it does require landlords to be aware of various occupier systems, in particular where supplementary HVAC services (like fan-coil units) take their energy through tenant meters.

To undertake an LER assessment the assessor will need to calculate the following:

- Rated area – the included floor area allocated to building functional spaces.
- Rated hours – the Contracted Hours of operation for functional spaces, plus Extra Hours if recorded.
- Rated energy consumption – the included consumption linked to relevant end uses.

2.4 Rating Period

The Rating Period is the period over which the Landlord Energy Rating metric is assessed. A measurement period is the period over which any individual energy source is measured.

The Rating Period must be any one year period (365 consecutive days). The Rating Period remains as 365 days during a leap year. Sequential Rating Periods should be continuous ie the end date of one must be the start date of the next. An LER would remain valid until 3 months after the end of the Rating Period.

Ideally all energy sources are measured over the same 365 day period, aligned with the Rating Period. However, provided the differences in measurement period length are within reasonable limits, the calculation can accommodate these by extrapolating or interpolating from shorter or longer measurement periods. Similarly, reasonable displacements in time (or lack of synchronisation) between the measurement periods of different fuels are allowed, as follows:

- The energy measurement period for each energy source must be 365 days +/- 15 days
- The start and end dates of the energy measurement period for each energy source must be aligned respectively with the start and end dates of the Rating Period within +/- 15 days.

A simple linear extrapolation or interpolation of energy use from measurement periods that are not exactly one year to 365 days is applied on a pro-rata basis according to the length of the measurement period.

The assessor should examine the start and end dates of the energy measurement period of all energy sources before setting the start or end date of the Rating Period. This may help to determine the 365 day period which requires least adjustment of the measured values.

2.5 Estimation thresholds

The LER has a default estimation tolerance of 10% for all parameters relating to energy data. Where a professional estimate is used to calculate the energy usage associated with supplementary activities the estimation threshold is increased to 25%.

Floor area inputs must be accurate.

2.6 Data collection and documentation requirements

The Landlord's Energy Statement (LES) will be used to collect site data. The data collection tool was developed to support the apportionment of the energy use by landlord's services. The input fields are set out below along with appropriate base data:

Table 2 - 1 Data collection requirements

Area	Input Fields	Data Requirements
General Information	- Site location details - Landlord service provision details - Author details - Dates of construction or renovation	- Site details - Applicant details
Rated Area	- Whole building floor area (nett and gross where available) - Tenancy floor areas - Floor areas of remaining functional spaces - Void areas	- Site plans - Surveyor reports - Functional space calculations
Rated Hours	- A table of hours of contracted service provision is required. This is based on the hours for which the occupiers require full landlord's service. - The contracted provision includes separate provision for "extra hours" provided outside of agreed hours - Void areas and times are captured	- Tenancy agreements - Documentation notifying the building manager of agreed hours of service for normal and after-hours operation.
Energy Usage	- Total annual energy consumption must be provided for each source of fuel and energy - Submetered consumption should be recorded and allocated either to occupiers or to landlord services - On-site energy generation (renewables) should be recorded, with separate totals for energy used on site and energy exported - Details of excluded consumption arising from separable uses	- Meter system schematics - Evidence of metering system accuracy - Documentation of agreement between landlords and occupier regarding provision of landlord services - Evidence of separable uses

3. Performance Metric

3.1 Core calculation

The method has three basic steps:

1. Calculate the kWh of electricity equivalent (kWhe) arising from all types of energy imported across the site boundary over a 365-day year in order to provide the landlord's services and divide by the total occupied net lettable area, NLA(o) – defined in Section 5, to give the 'Actual' kWhe/m^2.
2. Calculate the 3.5 stars benchmark, adjusting the standard value of 105 kWhe/m^2 for each functional space[3] to take account of requested hours of service per week and the local heating and cooling degree days for the year. Sum the area weighted benchmarks for each functional space and divide by the total net lettable area, to calculate a tailored 3.5 stars benchmark for the whole building.
3. Divide the Actual electricity equivalent by the tailored benchmark to produce a non-dimensional performance ratio (NDPR) and calculate the decimal star rating (DSR) using the formula:

   For NDPR ≥ 2, DSR = 0

   For NDPR < 2, DSR = 7 – (3.5 * NDPR)

4. The DSR is rounded down to determine the whole star rating.

3.2 Detail for getting the Actual kWhe per m^2

The measurement of energy supplies should be for a period as defined in section 2.4.

The electricity equivalent weighting factors to be used are as follows:

Electricity	1.0
All fuels	0.4
All thermal energy	0.5

[3] A space identified by an Assessor as a distinct space in order to calculate the effects of vacancies and differing operational hours across the total area. These spaces should be based on existing functional distinctions such as physical boundaries, leases, or operational divisions. Functional Spaces must be the smaller of:

1. each individual contiguous floor of the building (for buildings with multiple units or towers, each floor of each unit or tower),
2. each individual and distinct tenancy, regardless of its size,
3. any computer server room,
4. within any tenancy, any section that must be treated as distinct because of a significant difference in period of occupation or operating hours. This does not include office support facilities whose operating hours depend on the spaces nearby. It does include spaces in which significant construction activity has taken place for fitting out or remodelling during the Rating Period.

The minimum size for a Functional Space is 5% of the total floor area of the tenancy containing it.

3.3 Adjustment for hours of use

For each functional space, the benchmark allowance for void weeks (and fractions thereof) is zero. For the periods a functional space is occupied, the adjustment of the benchmark (BM) for hours of use is in the same proportion as the adjustment of the DEC benchmark for offices, as follows:

$BM_{h\ adj}$ (gas) = W.(51.75 + 0.2063 * h) / 52; $BM_{h\ adj}$ (electricity) = W.(29.953 + 0.3762 * h) / 52

$BM_{h\ adj}$ (total) = W.(81.703 + 0.5824 * h) / 52

Where h = average weekly hours of contracted service during occupied periods of functional space.

And W = number of weeks the functional space is occupied in the year of measurement.

3.4 Adjustment for heating degree days

For each functional space, the benchmark allowance for occupied spaces is adjusted for heating degree days in the same way as the DEC benchmark for offices: take 55% of the fossil fuel benchmark ($BM_{h\ adj}$ gas) and adjust in proportion to the ratio of actual degree days to standard degree days base 15.5˚C for England and Wales for the measurement period.

$BM_{adj\ HDD} = BM_{h\ adj}$ (elec) + 0.45* $BM_{h\ adj}$ (gas) + 0.55* $BM_{h\ adj}$ (gas) *($HDD_{actual\ base\ 15.5}$/ $HDD_{Standard}$)

3.5 Adjustment for cooling degree days

There is no established formula applicable to UK office buildings for adjusting a cooling benchmark for cooling degree days. We therefore propose an adjustment for cooling degree days based on a theoretical calculation of the energy needed to cool incoming fresh air[4].

For each functional space, the benchmark allowance is adjusted for heating and cooling degree days as follows:

$BM_{adj} = BM_{adj\ HDD} + (CDD_{actual\ base\ 10.5} - 1100)*0.0187$

[4] This is provisional, and will be subject to further examination in Stage 3.

4. Rated Area

The LER rated area will be the net lettable area (NLA) of office space in the building. This metric is commonly available, and relevant to likely users of the standard, such as building owners. It represents the “business area” of the building and encourages an efficient net to gross area ratio. It also follows the approach used by NABERS.

4.1 Building Area

To be rated a total building net lettable area is required. Acceptable evidence would be measured surveys by qualified professional surveyors or an equivalent.

4.2 Functional spaces

Where possible the overall building floor area should be allocated against functional spaces. These help account for void periods and different hours of occupancy of building areas. They should be defined on the basis of clearly distinguishable levels of service provision.

The calculations for functional spaces must be stored. They should be derived from the buildings formal floor plans.

5. Rated Hours

The Landlord's Energy Rating will adjust the benchmark to account for the hours that a building is used. Three factors affect the calculation of rated hours;

- Contracted standard hours of use
- Extra hours of use
- Voids

The calculation of each is set out below;

5.1 Contracted standard hours of use

This should be based on contracted hours as agreed within the service charge. This information should be recorded for each functional space. If there is no written evidence of the hours for which the space must be comfortable for office work a default value of 40 hours per week should be used.

5.2 Extra hours of use

This covers the Extra Hours as provided and determined by a direct charge to the tenant(s) demanding them, as an addition to the standard Contracted Hours covered by the service charge.

5.3 Treatment of voids

Voids are accounted for in the benchmarking method. The building area and contracted hours of use are reduced to recognise void periods.

All functional spaces which are temporarily void throughout the scheme year should be recorded. The area and the number of weeks for which they were void are used to adjust the rated hours and rated area.

5.3.1 Adjustment of building rated area

The total *occupied* building rated area, NLA (o), is calculated as follows;

1. Calculate total possible occupied area weeks per year ($AW_{O,Tot}$) by multiplying total included NLA (A_{Tot}) by the annual period in weeks (W_{yr}) e.g. 52.
2. Divide the NLA into the necessary number of functional spaces, n.
3. For each functional space, a, determine the respective weeks void in this area ($W_{v,a}$)
4. Calculate the total void area weeks ($AW_{v,Tot}$) by summing the void area weeks for each functional space:

   $AW_{v,Tot} = \Sigma(A_a W_{v,a})$, for a = 1 to n

5. Calculate the void factor (F_v) by dividing the total void area weeks by the total possible occupied area weeks:

   $F_v = (AW_{v,Tot}) / (AW_{O,Tot})$

6. Calculate total *occupied* building rated area, NLA (o):

   $NLA\ (o) = (1 - F_v) . (A_{Tot})$

5.3.2 Calculation of hours of service per week

The total hours of service per week, h(o), is calculated as follows;

1. Calculate total possible occupied area hours per year ($hA_{Tot,yr}$) by multiplying the area of each functional space (A_a) by the functional space contracted hours of service per week (h_a) and the annual number of weeks in a year (W_{yr}) i.e. 52, and adding any extra hours of service provided to the functional space during the year ($h_{e,a}$):

   $hA_{Tot,yr} = \Sigma(A_a(h_a W_{yr} + h_{e,a}))$ for a = 1 to n

2. Calculate the total area week void hours per year ($hA_{V,Tot}$) by multiplying each functional space area (A_a) by the respective weeks void in this area ($W_{v,a}$) and the functional space contracted hours of service per week (h_a):

   $hA_{V,Tot,yr} = \Sigma(A_a h_a W_{v,a})$ for a = 1 to n

3. Subtract time weighted void area hours per year from the total possible occupied area hours per year to calculate actual occupied area hours per year ($hA_{Act,yr}$):

   $hA_{Act,yr} = hA_{Tot,yr} - hA_{V,Tot,yr}$

4. Divide actual occupied area hours per year by the building NLA and the annual number of weeks in a year to calculate the total hours of service per week, h(o):

   $h(o) = hA_{Act,yr} / (A_{Tot} W_{yr})$

6. Separable uses

Services provided in the building that are used by the general public (eg retail outlets, cafes, etc.) [or are an identified exceptional use] may be removed from the assessment if the landlord energy supplies are separately sub metered.

If a use is deemed a separable the landlord energy consumption and, where necessary, the relevant office NLA will be reduced.

6.1 Services with public access

Services used by the general public can be excluded from the Landlord Energy Rating. Where this is the case both the rated area and rated consumption should be adjusted. Example uses with public access are considered below.

Table 6.1: Examples of public access separables

Example	Uses that can be separated	Uses that cannot be separated
Commercial cafés, retail stores, etc.	With public access (but can also be used by occupiers)	Exclusively for the use of office occupiers (and their visitors)
Gymnasiums, child minding centres, treatment rooms and similar	With public access (but can also be used by occupiers)	Exclusively for the use of office occupiers and their visitors)

6.2 Exceptional uses

There are a number of uses, which are outside of the scope of the Landlord Energy Rating. They relate to activities which do not fit a standard office use. These uses may be excluded from either rated area or rated consumption or both. Examples are set out below, along with the required adjustments:

Table 6.2: Examples of exceptional use separables

Example	Rated Area	Rated Consumption
Telephone Masts	Unadjusted	Reduced if sub-metered
Laboratories or other process	Reduced	Reduced if sub-metered
Computer Server Rooms	Reduced	Reduced if sub-metered

7. Energy Coverage

The assessment must cover every external energy source supplying the site, all energy generation sources on site and, where possible, details of all landlord end uses.

7.1 Minimum Energy Coverage Requirements

All energy consumed in supplying building central services to office lettable and common spaces during the Assessment Period should be included, such as:

- common-area lighting and power (including lift lobbies, plant rooms and common-area toilets)
- vertical transportation eg lifts and escalators
- heating (including HWS), cooling and ventilation which ensure the whole premises are safe and comfortable for office work, typically to a BCO specification[5]
- exterior lighting
- exterior signage provided by the building owner for the benefit of office occupiers
- generator fuel where it serves central services
- car park ventilation and lighting, where internal or external car parks within the legal boundaries of the site are provided for occupier use.

Upon formal assessment, an assessor will seek evidence that all of the above uses have not been excluded.

7.2 Determining Landlord Energy Consumption

Landlord energy consumption may be derived by taking the total net building consumption and subtracting the submetered occupier consumption[6]. The remaining building energy consumption can be further reduced if separables have been identified. The outstanding energy balance can then be apportioned to the landlord.

[5] Supplementary HVAC services to a tenant's energy-intensive areas including server rooms, dealer rooms and laboratories would not normally be provided by the landlord and so are therefore excluded.

[6] The default position is that a formal LER can only be completed if the metering arrangements enable it. In principle this means either that the landlord's service is fully metered or that all energy exclusive to tenants is sub-metered and therefore excludable. Stage 2 B will need to consider if a de minimis uncertainty in metered energy can be allowed. As discussed in the Issues Report (section 4.2), in some cases the LER calculation will tend to give a conservative result, whilst unknown tenant supplements could produce an unfairly good result.

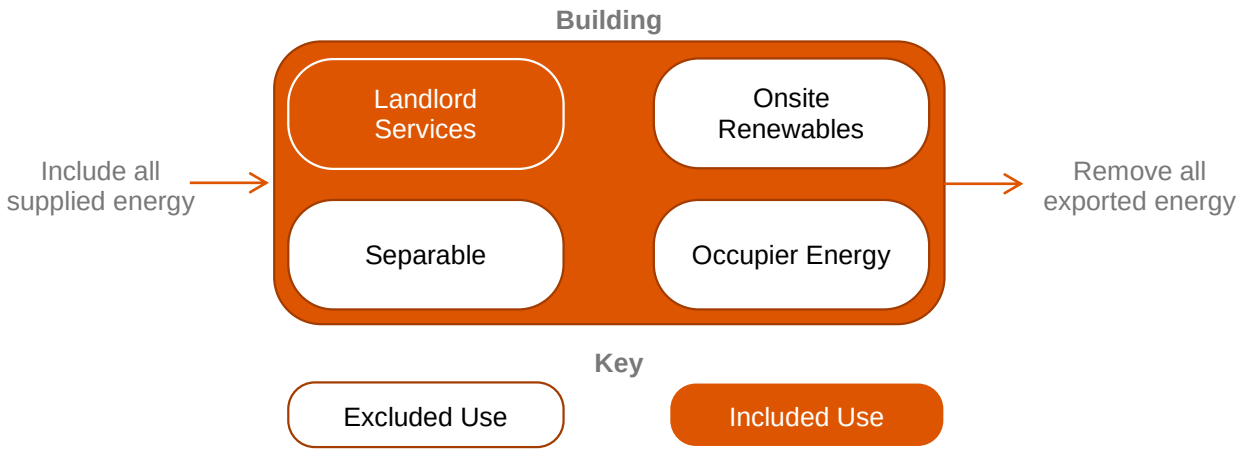

Figure 7 - 1 Schematic of LER scope

It is noted that this calculation will allocate all the benefit of any on-site renewables to the landlord (see section 7.3). On-site electricity generation equipment, such as CHP or tri-generation, can also benefit a landlord if the electricity equivalent of its outputs exceed the electricity equivalent of its input. However, the LER process does not need to measure the inputs and outputs for such equipment.

7.3 Accounting for tenant supplements to landlord services

Where relevant energy uses are supplemented by occupiers to ensure minimum service standards are met, then the energy used to provide these services should be captured under the Landlord Energy Rating. For example, where HVAC supplies to a tenant are supplemented by energy coming off the tenant meters and for example feeding fan coil units, electric perimeter heating, split system cooling, unitary heat pumps, and/or local ventilation plant, then the LER would be unfairly better unless the energy used for these purposes is also taken into account.

To determine the rated consumption the energy delivered to tenants, through supplies that the landlord or the tenant is counterparty, may need to be allocated to end uses. Where a tenant supplements landlord services through the use of delivered energy to provide HVAC or hot water services within their demises this consumption should also be included. The flow chart below sets out what consumption falls within the scope of the LER:

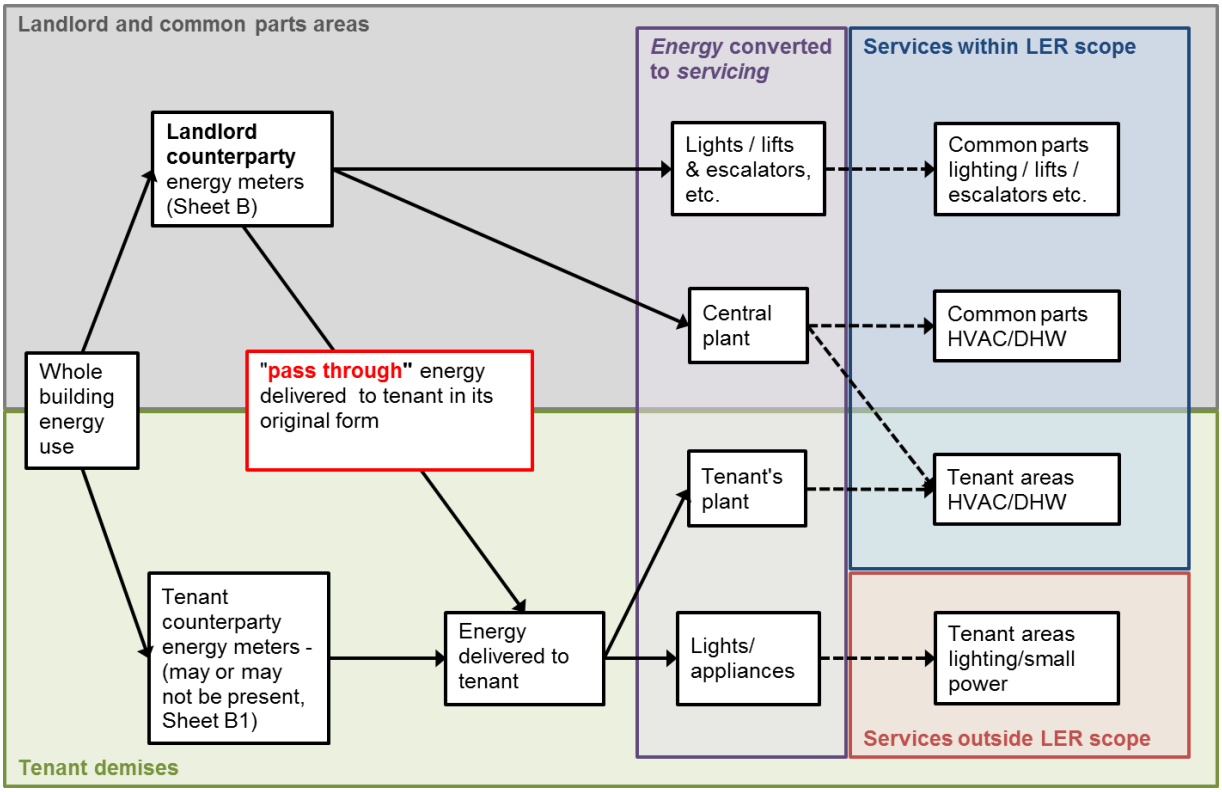

Figure 7 -2 Treatment of tenant supplements

7.4 Renewable Energy Generation

As described in 7.1, the reductions in energy imports arising from the installation of on-site renewable energy systems are normally allocated to the landlord. Where occupiers have made a partial or full contribution for the cost of such systems and wish to claim the benefits, then ideally the renewable energy should be supplied directly to their premises. More complex arrangements in which it is appropriate to share the benefits should be dealt with by special calculations by the LER assessor[7].

[7] It is suggested to deal with these on a case by case basis to build up a case law rather than deciding a definitive position in this outline specification.

8. Metering Systems

Metering systems installed must be accurate and comprehensive. Non fiscal meters must also be validated to ensure data is correct.

8.1 Requirements

The installed meter system should be in line with minimum industry standards. The government has developed a list of energy efficiency products that are eligible for Enhanced Capital Allowances. This specifies acceptable industry standards for product performance. To maintain consistency with these recommendations the metering system must meet the requirements as set out under the ECA Energy Technology Criteria List 2003 (revised 2011) for automatic metering and targeting systems.

8.2 Coverage

Actual energy use data is required for a full year of occupation in order to calculate the Landlord Energy Rating metric. In the ideal situation all relevant energy uses (as set out in section **Error! Reference source not found.**) should be either sub-metered or derivable by the difference between utility meter measurements and sub-meter measurements of uses not in scope.

8.2.1 Services supplemented by Occupiers

Where all this energy is not definitively metered, it is possible to use estimates. There are two accepted estimation techniques that can be used; professional or default estimates.

Professional estimates can only be completed by a qualified assessor. The supplementary energy consumption is calculated from first principles and requires evidence to be gathered on the equipment used and its hours of operation. Where a professional estimate is applied, the estimation threshold is increased. This is because this technique is deemed more robust.

Default energy intensity estimates for supplementary uses are available within the rating tool. These are based on harsh assumptions, to ensure the LER rating is conservative. The energy intensity is applied to a specified floor area of the building and adopts the building level weighted occupancy for usage hours. For a schedule of default values please refer to appendix A.

The two approaches are shown below;

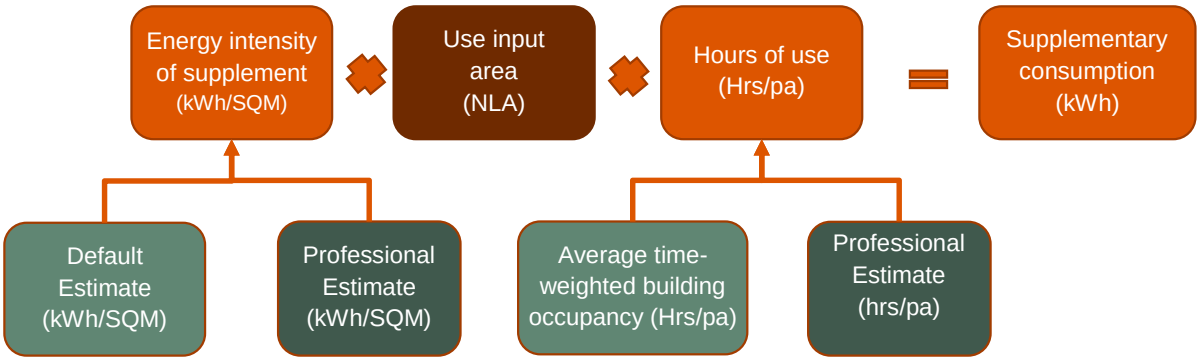

Figure 8 - 1 Tenant supplement calculation options

8.3 Validation

Non-fiscal meters must have proof of validation. A record must be maintained that the meter has been properly installed, is correctly functioning and the readings are being correctly interpreted. The assessment must have been undertaken by a professional certified under the relevant body.

Appendix A: Suggested values for supplements and subtractions

A.1 Introduction

Supplements are discussed below. They include HVAC systems within tenanted areas that fall within the scope of the LER but are supplied with energy through tenant meters. If these are not explicitly metered, estimates of their annual energy use needs to be added to the metered landlord's services to calculate an estimated LER. For the purposes of the LER, all energy use is expressed in kWhe, kilowatt-hours of electricity equivalent, per year per square metre of nett lettable area, NLA.

Subtractions are outlined in Section A.3. These are where items that fall outside the scope of the LER are supplied with energy through landlord's meters.

A.2 Supplements

Tables A-1 and A-2 identify values for supplements: where part of the total metered energy passed through to tenants is used for services within the scope of the LER, and could be used for estimation where full metering is not available for the completion of an LER assessment. All values are shown in kWhe/m^2 NLA, at a standard 70 operating hours per week.

- Table A-1 includes minor adjustments, where both the magnitude and uncertainty of the adjustment is relatively small, e.g. for water heaters and fan coil unit fans, which are within the scope of the LER, but are often fed through tenant meters. An LER rating that includes only minor adjustments of this kind may provide a reasonably fair reflection of the situation if the building was fully metered.
- Table A-2 includes major adjustments, in particular for heating and ventilation systems that fall within the scope of the LER but are fed through tenant meters, and where both the magnitude and uncertainty of the values can be large. If any major adjustments are required, the estimated LER rating should be viewed with a low degree of confidence.

A.3 Subtractions

Table A-3 presents suggested values for subtractions that could be made where some or all of the energy passed through to tenants is not metered, and so the metered energy use attributed to the landlord exceeds the scope covered by the LER. Metering of pass through energy to tenants is essential for calculation of an acceptable LER rating. All tenant subtractions should be viewed as major adjustments. Since the variation in tenant pass through energy use is very large, any estimated LER rating which uses them will be subject to a very high degree of uncertainty.

Table A-1: Tenant supplements – Minor adjustments

Type	Description	Informed by	Lower bound (kWhe/m^2.yr)	Suggested value (kWhe/m^2.yr)	Upper bound (kWhe/m^2.yr)	Basis (suggested value)	Confidence & comments
Tenant supplement – HVAC	Fan coil units electricity for fans only	ECON 19, calculation, case studies	<7	12	>16	4 litres/sec per m2 (ECON 19 value) at between 0.5 and 1.1 W/l/s for 70 hours per week	Moderate to good. Significant variance possible but impact on star rating likely to be small
Tenant supplement - DHW	Hand basins in WC's only	ECON 19, case studies	<3	7	>14	Verco estimate, assumed electric	There may be significant variation based on fuel & tenant behaviour
Tenant supplement - DHW	Hand basins and showers	ECON 19, case studies	<5	10	>20	Verco estimate, assumed electric	There may be significant variation based on fuel & tenant behaviour*
Tenant supplement - DHW	Hand basins & kitchenettes	ECON 19, case studies	<5	10	>20	Verco estimate, assumed electric	There may be significant variation based on fuel & tenant behaviour
Tenant supplement - DHW	Hand basins, kitchenettes & showers	ECON 19, case studies	<6	12	>24	Verco estimate, assumed electric	There may be significant variation based on fuel & tenant behaviour*

*** It is debatable whether showers should be included as part of the hot water provision in LER scope. It might be considered inappropriate if the LER were to be seen to disincentivise landlords or tenants from providing facilities which encouraged their building occupants to travel to work by bicycle.**

Table A-2: Tenant supplements – Major adjustments

Type	Description	Informed by	Lower bound (kWhe/m^2.yr)	Suggested value (kWhe/m^2.yr)	Upper bound (kWhe/m^2.yr)	Basis (suggested value)	Confidence & comments
Tenant supplement – HVAC	Perimeter heating (electric) in AC building	ECON 19	< 10	65	>130	50% of ECON 19 Type 3 Typical gas heating, reduced by 20% (avoided gas system losses) and converted to electricity equivalent.	Low confidence, HVAC conflicts & building fabric have very large impact.
Tenant supplement – HVAC	Perimeter heating (gas fired)	ECON 19	< 10	35	>70	50% of ECON 19 Type 3 Typical gas heating, converted to electricity equivalent.	Low confidence, HVAC conflicts & building fabric have very large impact.
Tenant supplement – HVAC	On floor AHUs	ECON 19, calculation	<20	35	> 50	4 litres/sec per m2 (ECON 19 value) at between 1.5 and 3W/l/s for 70 hours per week	Moderate – design, controls, operation & maintenance have a major impact
Tenant supplement – HVAC	Fan coil units electricity for fans and terminal reheat	ECON 19, case studies, calculation	<20	47	>> 90	25% of ECON 19 Type 3 Typical gas heating, reduced by 20% (avoided gas system losses), converted to electricity equivalent, plus 12 kWh/m2 for fans.	Low. Very substantial variability; conflict between heating & cooling possible

Type	Description	Informed by	Lower bound (kWhe/m^2.yr)	Suggested value (kWhe/m^2.yr)	Upper bound (kWhe/m^2.yr)	Basis (suggested value)	Confidence & comments
Tenant supplement – HVAC	All HVAC – building with heating only, gas heating.	ECON 19, case studies	< 10	70	> 90	ECON 19 Typical heating/hot water/ cooling/pumps & controls, Type 2. Gas converted to electricity equivalent.	Low confidence, HVAC system, controls & building fabric have very large impact.
Tenant supplement – HVAC	All HVAC – Mech vent, no cooling	ECON 19, case studies	< 40	120	>200	ECON 19 Typical, average type 2-3	Extremely low confidence.
Tenant supplement – HVAC	All HVAC services – full air con	ECON 19, case studies	< 50	180	>320	ECON 19 Typical, type 3	Extremely low confidence.

A.4 Subtractions for tenant small power and lighting

Table A - 3 presents suggested values for subtractions that could be made where energy passed through to tenants is not metered. These should be viewed as major adjustments; metering of pass through energy to tenants is essential for calculation of an acceptable LER rating, and variation in tenant pass through energy use is very large, so any estimated rating will be subject to a high degree of uncertainty. .

Table A-3: Suggested values for subtractions (NB suggested value taken at level of good practice benchmark to be conservative)

Type	**Description**	**Informed by**	**Lower bound** (kWhe/m^2.yr)	**Suggested value** (kWhe/m^2.yr)	**Upper bound** (kWhe/m^2.yr)	**Basis (suggested value)**	**Confidence & comments**
Landlord to tenant	Small power	ECON 19	< 20	25	>50	ECON 19 Good practice, type 2	Excludes servers, catering, “other”. Poor: Not to be used as a substitute for tenant metered energy use
Landlord to tenant	Lighting	ECON 19	< 15	22	>50	ECON 19 Good practice, type 2	Moderate – design, controls & maintenance have a major impact
Landlord to tenant	Small power and lighting	ECON 19	< 35	47	>100	ECON 19 Good practice, type 2	Very poor – highly dependent on both systems fitted and tenant behaviour.