

Improving your grades

Glenn Massey discusses what influences an EPC rating and how this will help a building surveyor make a more efficient assessment

An Energy Performance Certificate (EPC) rating gives prospective tenants or owners a guide as to how efficient a building will be. They can compare an A rating with an F and know that the A-rated building is likely to cost less to operate, will emit fewer CO₂ emissions and assist in meeting corporate social responsibility commitments. EPCs will also, inevitably, have an impact on rent and asset values, this follows the trend established in the US by Leadership in Energy and Environmental Design (LEED) assessments.

Since April 2008, Hoare Lea has completed more than 1,000 commercial EPCs throughout the UK. The majority of properties assessed were existing buildings and these tended to score in the D rating band – this is in line with the UK government’s anticipated rating for existing building stock (see Figure 1). New buildings tend to achieve ratings in the C band.

The data forming the EPC calculations relates to building fabric, airtightness and fixed building services (including heating; cooling; hot water services; metering, monitoring and targeting; lighting and controls; plus any renewables or low to zero carbon technologies). Each stream of data has an appropriate place in the EPC calculation but it appears some items have more influence than others on the final result.

EPC results can be affected detrimentally if the site survey is not thorough – accuracy tends to result in a better score. It is also helpful to have an understanding of the data that has the greatest influence in the EPC calculation in order to ensure sufficient information is obtained. Overlaying changes on to the Building Research Establishment (BRE) Simplified Building Energy Model (SBEM) can help to get a feel for the influences of the different data on the EPC band and therefore help in the effective allocation of resources.

Fabric

Knowing when the building was constructed is important because the calculation tool provides links to a database that contains building regulation compliance values dating back to 1965. This identifies and applies the relevant U values and thermal capacity values.

Figure 2 illustrates the difference in an EPC rating when comparing the SBEM example building, which complies with 2002 Building Regulations, with the building when fabric values are changed to comply with 1965 regulations.

The SBEM example yields an EPC rating of 63 and a C. Changing the fabric properties to align with 1965 Building Regulations compliance results in a rating of 69. The grade would remain a C.

This difference has been influenced by the thermal transmittance and thermal capacity of the fabric. It illustrates a small step change. Obviously, the surveyor will make the best assessment possible regarding the building’s age. However, if the only information available gives just a broad indication of the time of construction, the assessor can be satisfied that the EPC results should not be adversely affected by adopting a conservative estimate regarding the age, as the fabric values do not have a heavy weighting.

Air infiltration

It is rare for existing buildings to have an airtightness certificate. In the current EPC calculation tool, the default setting has been increased from 10 to 25m³/h/m² at 50Pa. This seems fair as older buildings are likely to have greater air leakage.

Figure 3 uses the SBEM example building, changing just the air leakage test results. If the air leakage of 8m³/h/m² is applied, the result is a C grade with an EPC rating of 63. If airtightness is improved to 4m³/h/m², the EPC result of 62 still falls within the C band. If the airtightness setting is changed to 25m³/h/m² the rating only moves to 64.

Improving air leakage does not therefore influence the result as much as may possibly be anticipated.

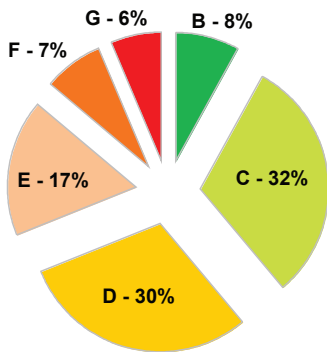


Figure 1 – Rating bands for EPCs (sample of 200 commercial buildings by Hoare Lea)

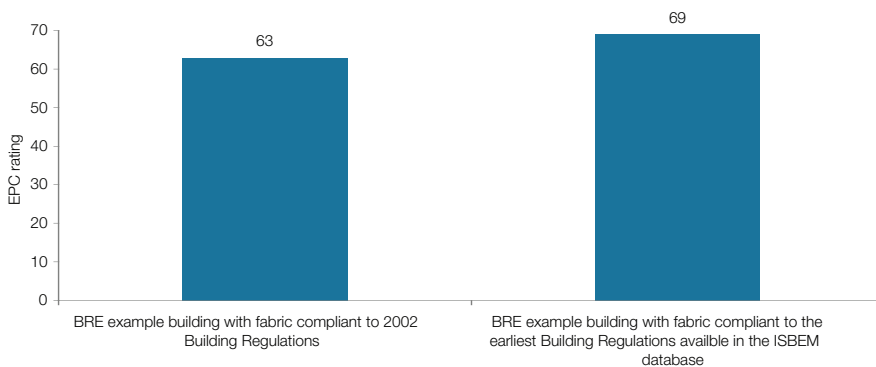


Figure 2 – Typical influence of building fabric on EPC ratings

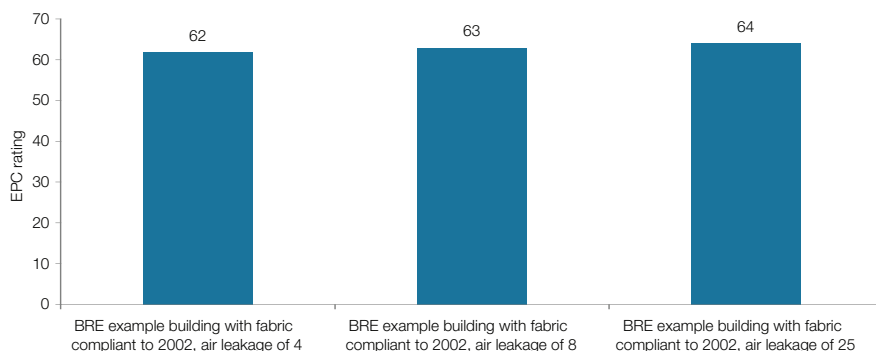


Figure 3 – Typical influence of building air leakage on EPC ratings

With the default air leakage set at 25m³/h/m² at 50Pa it may appear advisable to undertake a test if it is believed that a building's air leakage is better than 25. However, the results above suggest that the improvement in EPC rating may not justify the expenditure incurred.

Heating and cooling

The efficiencies of the heating and cooling systems have a significant influence on the EPC calculation.

The assessor needs to spend time while on site (and back at the office) looking up efficiencies of chillers and boilers. Gathering nameplate data and data from Operation & Maintenance manuals enables the engineer to search on the Carbon Trust Energy Technologies List for equipment efficiencies. The items listed have been tested and the data is reliable. If items are not listed, the manufacturers can often provide documented evidence for their chiller and boiler efficiencies. Relying on calculation tool defaults can result in negative influences on EPC ratings.

The age of the boiler is particularly important because of the step change in boiler efficiencies that occurred in 1998. This information will assist in anchoring the seasonal efficiency to an appropriate point in time. If the assessor does not obtain the correct information the results will be skewed.

In the absence of data from the Energy Technologies List or manufacturers, engineers assessing a building with a boiler manufactured after 1998 can use the appropriate boiler efficiency rating as found within the calculation tool. Engineers should invest time in extracting exact efficiency information, it pays dividends.

The SBEM building has a chiller with a Seasonal Energy Efficiency Rating (SEER) of 2.5. Figure 4 uses the SBEM building to demonstrate the improvement in the EPC result if a chiller with a SEER of 4 was to be installed. The result would improve from a rating of 63 to 56, but remain a C. If the SEER was 2, the EPC rating would slide to 68 but remain a C. In terms of improving the grade, it is worthwhile undertaking this improvement within a wider programme to achieve a better rating. The key is to identify what combination of improvements will give the best result, while keeping an eye on available capital for refurbishments.

To encourage a reduction in the need for air conditioning, the EPC calculation tool imposes a penalty on air-conditioned buildings – this can result in the building rating moving by as much as one band. The benchmark building for offices does not use air conditioning as we know it – it uses a system termed 'seasonal mixed mode' (i.e. the air conditioning does not start until 27°C is reached).

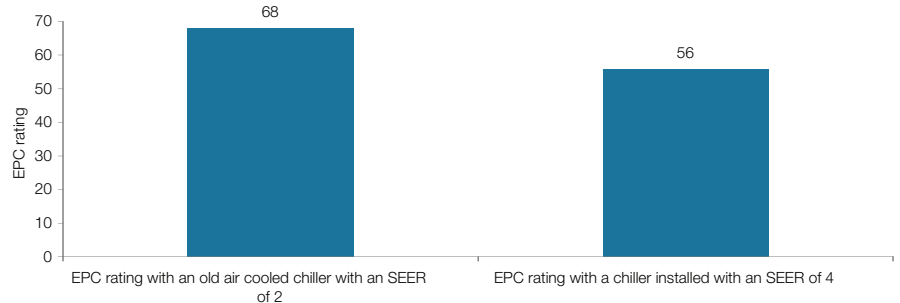


Figure 4 – Typical influences of cooling efficiency on EPC ratings

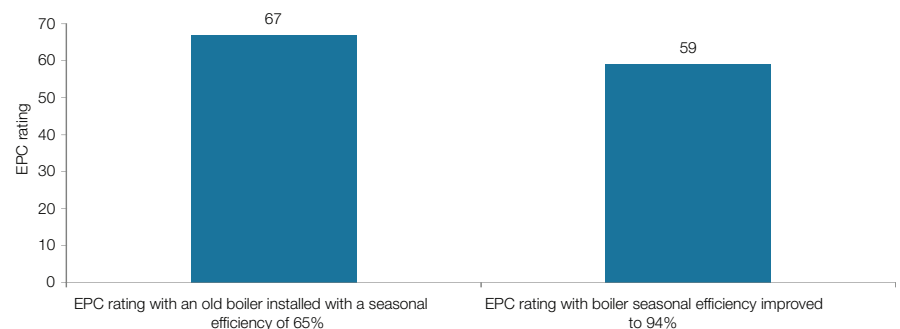


Figure 5 – Typical influences of heating system efficiencies on EPC ratings

This means the SBEM building uses much less energy than a fully air-conditioned office and air-conditioned offices are therefore penalised.

For new buildings this can be offset by making improvements in other areas in the design stage. However, if an existing building has air conditioning and it is clear that the internal environment would be compromised by its removal, the only option is to optimise the SEER of the chiller. This would assist the rating, but the building would still be at a disadvantage because of the penalty.

Figure 5 uses the SBEM example building to demonstrate the improvement in EPC rating if an older boiler with a seasonal efficiency of 65% was replaced with a boiler with a seasonal efficiency of 94%. The result would improve from a rating of 67 to 59 but the EPC rating remains a C.

Changing single heating/cooling items, such as the boiler or chiller, is unlikely to change the EPC band. However, if combinations were selected it should be possible to move up by a band. It is fortunate that upgrading the boiler and chiller can have a significant impact, as a landlord would expect to replace these items at points during the building's lifecycle and is likely to have budgeted accordingly. The landlord is not so likely to have made the same provision for major work on the fabric of a building. >>

» Lighting

This area has an important role to play in the rating of a building. Using the SBEM example building (with a rating of 63) and changing the lighting to T5 from T8 standard ballast fittings has a positive effect, resulting in a C and an EPC score of 56. This is a worthwhile improvement but would need to be combined with other enhancements for the building to move up a band. In contrast, changing the lighting to tungsten halogen moves the building score to 220 and into the G band (see Figure 6).

Control technology, such as daylight and occupancy sensors, is recognised as a good thing but does not have such a heavy influence on the EPC band as the fitting type. In the SBEM example building the extent of the glazing (and therefore the availability of natural daylight) is limited. This contrasts with typical contemporary steel and glass office buildings in which there is more scope for the effective use of lighting controls. Control technology should therefore have a greater influence on the score.

Summary

Achieving the correct balance between the different items required by the EPC calculation is a delicate process. There isn't a solution that can be applied to all scenarios. From the results highlighted, building fabric and airtightness have less of an influence and it is safe to say that if all items of fixed building services are as efficient as possible, a building is likely to achieve a good EPC rating (C or above) regardless of the age

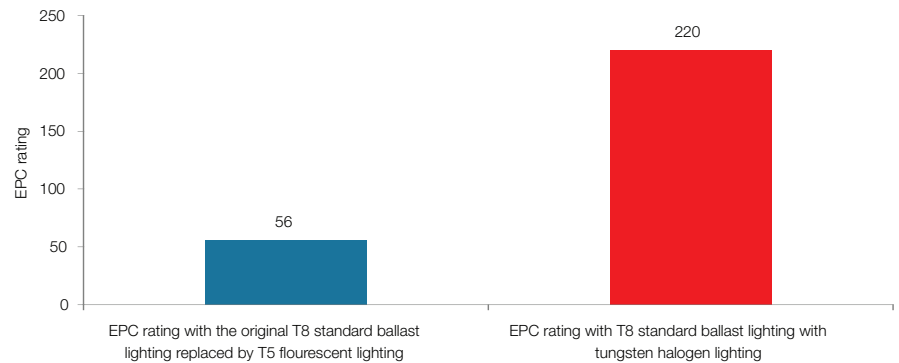


Figure 6 – Typical influence of lighting on EPC ratings

of construction. Time spent collecting information regarding the fixed services is therefore well spent.

EPC calculation software packages do not offer sufficient depth of information in the recommendations to allow informed decisions concerning any suggested improvements to be made. Each individual building's EPC result should be analysed by the assessor to uncover the negative influences on the EPC. By offering costed recommendations that consider issues such as building and plant lifecycle and responsible investment strategies, the assessor can help to ensure that capital and resources are channelled into the most appropriate areas. If improvements are applied in a broad brush manner there is a danger that money will be spent in areas that do not significantly influence improvements in the EPC rating.

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Related competencies include: T013, T021, T051, M009