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Energy performance certificates in the context of sustainability and the impact on valuations

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Abstract

Purpose – The Government of UK is committed to reducing Green House Gas emissions by 80 per cent based on the 1990 levels, by 2050. In order to achieve this reduction, the UK Government, along with their European counterparts, have implemented various directives and incentives, which progressively and incrementally are intended to move them towards this target. One such directive is the European Energy Performance of Buildings Directive, which sets the policy for achievement. The paper aims to discuss these issues.

Design/methodology/approach – This paper seeks to examine the complexities of these changes when considered against the real world use and operation of buildings, most particularly at lease end. It explores the inter-relationship of landlord and tenant at lease expiry and renewal.

Findings – It argues that the Energy Act regulations might have significant impact on the actions of landlords and tenants; both in advance of and shortly after the lease is determined.

Practical implications – One of the key mechanisms contained within this directive for the reduction in emissions is the Energy Performance Certificate (EPC). An EPC must be produced where a building is being constructed, rented or sold. EPCs rate buildings on their asset energy performance and in conjunction with building regulations are becoming increasingly more stringent to achieve targets. Regulations under the Energy Act 2011, due to take effect from April 2018, will mean that it will be unlawful to let or re-let a building which fails to reach minimum energy performances standards, currently defined as an E rating; further it is intended that the regulations will extend to all lettings from 2023.

Originality/value – This paper looks at the inter-relationship of landlord and tenant at lease expiry and renewal with the proposed directives on EPCs.

Keywords Dilapidations, Building alterations, Energy act, Energy efficiency in buildings, Energy Performance Certificates, Lease renewals

Paper type Viewpoint

Introduction

It is now some six years since the UK Government implemented the requirements of the European Union's Energy Performance of Buildings Directive (Directive 2002/91/EC: European Parliament and European Council, 2002) by introducing a mandatory requirement to obtain an Energy Performance Certificate (EPC) in respect of any building, with some exemptions, that was sold or leased. There was and still is no requirement to obtain a Certificate where the building was not transacted on the open market. The main objective of the Directive, which was re-cast in 2010 (Directive 2010/31: European Parliament and European Council, 2010) was both to raise awareness of the energy efficiency of buildings and to provide a measure which member states could incorporate



into their own methods to drive retrofitting of buildings to achieve better efficiency standards. The re-cast was an important step in increasing the requirements on governments to take action.

Under paragraph 10 of the Directive, member states were placed under the responsibility to set minimum requirements for the energy performance of buildings and building in order to achieve a “cost-optimal balance between the investments involved and the energy costs saved throughout the lifecycle of the building”. The Directive then goes on to make it clear that member states have the right “to set minimum requirements which are more energy efficient than cost-optimal energy efficiency levels” and to “review regularly their minimum energy performance requirements for buildings in the light of technical progress”.

The UK has since the enactment of the 2008 Climate Change Act been statutorily committed to reduce carbon emissions in an attempt to mitigate against some of the climatic changes which scientific evidence is now agreed are related significantly to human actions (Intergovernmental Panel on Climate Change, 2014). In order to do this reduction of carbon from both construction and use of buildings is a vital component, given that they are estimated to be responsible for some 40 per cent of carbon emissions (United Nations Environment Programme Sustainable Buildings and Climate Initiative, 2009). Further the Intergovernmental Panel on Climate Change has suggested that the built environment holds the greatest opportunity for cost-effective emissions mitigation of any sector (Vorsatz *et al.*, 2007).

Consequent on UK Government’s intent the Climate Change Act (2008) sets out a timetable for achievement of carbon emission reductions of 80 per cent by 2050 on 1990 baselines, with intermediate targets. Part of the package of measures intended to bring about such reduction is through the upgrade of building stock to increase its energy efficiency.

Initial hopes that the introduction of EPCs would change behaviours and lead to upgrading of properties on a large scale proved largely unfounded. Whilst there has been some evidence that EPCs and indeed energy efficiency may have started to impact on values and consumer purchasing decisions (World Green Building Council, 2013) the majority of the evidence cited relates primarily to the USA and Australia, although there is some more recent evidence from the UK (see, e.g. Fuerst *et al.*, 2013a in relation to offices and Fuerst *et al.*, 2013b for residential). Both these last named studies are insufficient for firm conclusions given that properties with higher EPCs tend to have other characteristics which impact on price but it demonstrates an emerging relationship.

The reasons for the lack of effectiveness of EPCs in driving building owner and occupier behaviour are complex but, as discussed in a report by a working group to UK Government (Energy Performance Standards Working Group, 2013), the initial lack of trust in their reliability, lack of knowledge and awareness and a weak enforcement regime (Green Construction Board (GCB), 2014) contributed to the failure.

In the light of the lack of large scale behaviour change in 2011 the passing of the Energy Act brought in an obligation on government to regulate towards the attainment of minimum energy efficiency standards (MEES) within buildings with effect from 2018. However Ss 42-53 of the Act relates only to properties (domestic and non-domestic) within the private rented sector. They do not apply to owner-occupied buildings. This paper is concerned only with non-domestic property and in relation to these the Act will prevent the letting of a property which fails to meet MEES until the landlord has undertaken “such relevant energy efficiency improvements as are provided for by the regulations” (Energy Act S.49(2)).

The passing of the Act provided a catalyst whereby, for the first time, there was the prospect of a real value implication for landlords of the energy efficiency standards of their holdings combined with uncertainty surrounding both the measure to be adopted (would it be the EPC or something else?) the level of efficiency to be required (if EPC – what grade?) and the scope of the measures (would it apply to re-lettings?). The expectation of the many within the property market was that MEES would be set at an EPC rating of E. In that case, it was estimated (GCB, 2014) that the number of properties potentially affected could be as many as the estimates 19 per cent with F and G ratings and a further 17 per cent with E ratings, if standards were to be subsequently ratcheted up.

In February 2015 the government issued the regulations[1]. As widely predicted these will apply initially (1 April 2018) to new lettings of properties which fail to achieve an E rating at EPC but additionally they will be extended to existing lettings from 2023. What was less expected was that the regulations would apply, not just for new open market lettings, but for lease renewals where the landlord may have no choice but to re-let.

Whilst it is still unclear how the regulations will work in practice there is now sufficient certainly to consider the practical implications for landlords and tenants in relation to the situation at lease renewal. It is with the practical impact of some aspects of these regulations to the commercial property sector that this paper is concerned. In particular the paper considers the likely interaction of the MEES regulations with existing landlord and tenant practice and legislation.

EPC in more detail

An EPC is an asset rating; it does not measure the actual energy use of a building. The ratings are informed from a government adopted standardised assessment process ratings, which, respectively, draw their calculations from determinants concerning:

- the elements of structure;
- the heating, ventilating and air conditioning system (HVAC);
- the lighting; and
- renewable technologies employed.

Originally developed by the Building Research Establishment, EPCs are based on a rating of A-G, with “A” being the most energy efficient buildings and “G” the least efficient. It should be noted that EPCs do not sit in isolation: they are calculated through the use of statistical data derived from the building’s information. Other external factors influence the grading of an EPC; in particular as building regulations are systematically revised and upgraded, so too the benchmarks for achieving any grade become more stringent. In summary EPCs are the culmination of various sets of empirical data with the result that, as external factors change so the achieved EPC of any individual building will decrease unless upgrade investment takes place. An EPC obtained five years ago on a commercial building may not achieve the same rating if undertaken today. Furthermore, if an EPC were to be conducted on that same building five years from now, it is unlikely that the rating would remain constant. Therefore, it is possible that a building with an EPC of “D” five years ago, could be rated as an “E” today, and conceivably an “F” or worse in five years’ time. For this reason, any building which is currently rated E is quite likely to be regarded as “sub-standard” under the Energy Act regulations by 2023.

The regulations in more detail

The headline of the regulations is that it will be unlawful to let or re-let to an existing tenant a property that is “sub-standard” in relation to MEES from 1st April 2018 and that this “unlawful” to let provision will extend to all existing lettings from 2013. Under the current regulations “sub-standard” is defined as F or G EPC rating. However this is only the headline: there are a number of caveats.

First, the property must have an EPC. Therefore any property for which there is no requirement to obtain an EPC will be unaffected; further any property that has been subject to a lease granted before the EPC requirement was introduced and which is not due to end until after 2023 will not fall into the all lettings provision until such time as the lease does end and a re-letting is in contemplation.

Second, the provisions within the regulations provide the ability for the landlord to claim an exemption if:

- the measures are not cost effective, either within a seven year payback, or under the Green Deal’s[2] Golden Rule[3]; or
- despite reasonable efforts, the landlord cannot obtain necessary consents to install the required energy efficiency improvements, including from tenants, lenders and superior landlords; or
- a relevant suitably qualified expert provides written advice that the measures will reduce a property’s value by 5 per cent or more, or that wall insulation required to improve the property will damage the property.

In the case of proposed lettings, the payback period of seven years may be important; in the case of re-lettings or continuing tenancies it is the ability to gain consent that may give rise to the exemption claim.

Failure to comply with the Energy Act 2011 Regulations

As the impact of the Act is that a “sub-standard” (as defined) building may become non-income producing unless or until either investment is made or an exemption obtained, the capital value of the asset may be at risk. Work to examine this contention undertaken in advance of the regulations (GCB, 2014) analysed the potential impact against 14 typologies of buildings. Using data obtained from the EPC register and modelling the likely costs of upgrade for each type of building, the conclusions were that the likely costs of compliance would work through to pricing on transactions. However, the research also pointed to the fact that most buildings would be capable of bringing up to standard both physically and economically at a cost of less than one year’s rent – and that is often the void that can be experienced in weaker market conditions. However the researchers found that some types of buildings, such as industrial units in lower value locations, could prove less cost effective to improve. In such cases, it was concluded, the investment would need to be able to demonstrate clearly that the occupier would obtain the projected energy savings.

Until the regulations are in force, the actual impact will not be known but it is likely that many landlords and tenants will be undertaking strategic positioning to lower their risks and ensure continued lettable, although in some cases it is possible that redevelopment decisions will be brought forward where market conditions allow. Once the regulations “bite” the cost of compliance, whether achieved through the Green Deal or other incentive arrangement, may become a negotiating factor in capital transactions, potentially either or both increasing the time to sell or the capitalisation yield.

However, when works to obtain compliance are carried out, if the building becomes more efficient and cheaper to run, the energy cost savings may, at least in part, work through the rental line – and hence the capital value. It is therefore still far from clear the extent to which capital value risk arises; it will be dependent on building type, the cost of works required, if indeed they are, and the market conditions. Further research for the GCB (2015) points to the possibility that MEES may also in time link to lending criteria – in which case the relationship between the asset rating as expressed through the EPC and value may become strengthened.

In summary, the statutory and regulatory position provides fruitful ground for speculation but also gives clarity to the government’s clear direction of travel, sufficiently so to enable landlords to consider with some increased certainty the role that energy efficiency is likely to exert moving forward and to incentivise improvements, where these are likely to be cost effective. Whilst the definition of “cost effective” is still very much open for discussion and debate, the demand shift already showing through in hedonic price analysis is likely to escalate.

The paper now goes on to consider, first the ways in which a building’s rating can be improved and second how the regulatory position may impact on the situation at lease end when dilapidations claims are under consideration.

Improving a buildings EPC

The original intention of government in introducing MEES was to link them to Green Deal funding to obviate the need for landlords to provide upfront funding; however this has not yet been introduced for non-domestic property; therefore any works of energy upgrade will have to be funded by other mechanisms. This however does give greater freedom as to the nature of the works undertaken as the proposed provisions of the Green Deal were specific in terms of fundable work. Whilst the requirement is to undertake works to raise the standard to an E rating, given the trajectory of regulations towards increasingly more stringent standards and in the light of research findings (GCB, 2014) that it will be more cost effective in many cases to raise the standard to a D, it is probable that long-term investors will seek to “future-proof” their assets accordingly.

These alterations or improvements, tabulated in Table I, could include but are not restricted to:

- elements of structure – wall, floor, roof insulation or draught proofing;
- heating – more energy efficient systems or “greener” installations;
- lighting – complete energy efficient lighting installations and/or smart switching or retro LEDs; and

Building element	Improvement	Effect on building
Wall, floor, roof	Alteration: addition of insulation or draught proofing	Reduction on NIA/alterations to external envelope
HVAC	Renewal/alteration: energy efficient or “greener” installations	Alterations to existing installation, its functionality, controllability and performance
Lighting	Renewal/alteration to lighting installations and/or smart switching or retro LEDs	Alterations to existing installation different layouts/cable runs
Glazing	Renewal of installations or secondary glazing	Replacement/alteration of existing installations

Table I.
Effect on building through alterations

- glazing – complete installation of more thermally efficient units or unit replacement and/or secondary glazing.

Depending on the type of building, its age, use and construction the cost effectiveness of works and their applicability will vary. Work conducted by Sweett Group (Quartermaine *et al.* 2012) found that “quick wins” through, e.g. upgraded boilers can often be obtained through the normal refurbishment cycle at minimal extra over cost; however some buildings are harder to treat, notably older air-conditioned office buildings, where the cost increase could be significant; further the possibility of achieving an A or B grade is unviable or even impossible.

When considered against an existing building, the subsequent effect of these alterations mentioned can be significant in terms of enhancing performance but due to the wide variation of building types, cost effectiveness has to be considered in relation to typologies and the individual building. From an owner’s perspective, therefore care needs to be taken to appraise each building in accordance with its characteristics.

The position at lease end

Under existing statute law for England and Wales, at lease end an occupational tenant of non-domestic premises will normally be entitled to take a new lease under the provisions of the Landlord and Tenant Act 1954, part 2, unless either the landlord is able to prove one of the S.30 grounds specified in the Act or the tenancy has been specifically excluded from protection. Further, in the event of a tenant breach, the landlord may have a claim in damages for any dilapidations or breach of repair that results from a failure of the tenant to comply with their obligations. In determining the level of compensation to the landlord, should any claim arise, the courts will consider the terms of the lease, the type and cost of repairs required bearing in mind the quality of the building, its age and context and any diminution in the value of the reversion, with damages limited to value loss.

The Energy Act does nothing to alter this well-established position. Therefore at lease end one of the following scenarios will arise:

- the tenant will vacate;
- the tenant wishes to renew but the landlord will resist normally on either the ground that the tenant is in covenant breach or the landlord wishes to redevelop/refurbish or that they wish to occupy themselves or on the basis that it is an excluded tenancy; and
- the Landlord and Tenant agree to a re-letting.

The two options (vacate or remain on a re-letting) are now considered in the light of the Energy Act regulations.

The tenant wishes to or is required to vacate

If the tenant wishes to or is required to vacate, the landlord will be in a position whereby they must ensure the building is compliant prior to a re-letting. Although they may wish to pursue the tenant for breaches within the lease, the Act is quite specific that the requirement to upgrade to compliance is a landlord’s – not tenant’s – obligation; therefore any attempt to ask the tenant to carry out or pay for the upgrades will fail. In many leases there is a provision that the tenant is under an obligation to comply with all statutory requirements. This raises the question – would compliance

with Energy Act come into this category of covenant? Unless case law develops to hold a different view, this is regarded as not the case. The Act does not make it unlawful to occupy a non-compliant building – the unlawful act arises on the letting or re-letting until 2023 when the provision extends to occupation by the tenant. Even here, by inference, the obligation rests with the landlord a view reinforced by the enforcement provisions which relate only to regulatory breaches by the landlord.

In furtherance of this point, for a liability under dilapidations to arise, Dowding *et al.* (2013) refer to the five-point test:

- (1) What is the physical subject matter of the covenant?
- (2) Is the subject matter in a damaged or deteriorated condition?
- (3) Is the nature of the damage or deterioration such as to bring the condition of the subject matter below the standard contemplated by the covenant?
- (4) What work is required in order to put the subject matter of the covenant into the contemplated condition?
- (5) Is that work nonetheless of such nature that the parties did not contemplate that it would be the liability of the covenanting party?

Using this test, it would be difficult, if not impossible, for a Landlord to suggest that a Tenant should be liable for undertaking the works. “Repair” has been defined as “restoration” by renewal or replacement of subsidiary parts of a whole, in contrast with renewal, which is reconstruction of substantially the whole of the building (Hindle, 1989). Combining this with the wording of the regulation, the authors’ untested view is that there is unlikely to be any realistic possibility for a liability under dilapidations to arise. The landlord will simply have to make a strategic decision regarding his/her future intent – a decision which will be taken in the light of the cost effectiveness of the work combined with a presumed desire to ensure that the property remains competitive in the market place – and this might trigger a move to go “beyond compliance” especially if the property is one which might appeal to a tenant with an established corporate responsibility policy.

The position where the tenant is to take a new lease

The position where a re-letting is in prospect raises a rather more intriguing scenario. If the expiring lease is with the Act then the new terms including rent will, in the event of a failure to agree terms, be decided by the courts. If it is not the new terms are entirely down to negotiation. Taking the position where the lease is inside the Act, the new rent, as defined in S.34 will be the open market rental value likely to be paid by a willing lessor, but disregarding:

- any effect on rent of the fact that the tenant has or his predecessors in title have been in occupation of the holding;
- any goodwill attached to the holding by reason of the carrying on thereof of the business of the tenant (whether by him or by a predecessor of his in that business); and
- any effect on rent of any improvement carried out by the tenant or a predecessor in title of his otherwise than in pursuance of an obligation to his immediate landlord.

Given this definition and that the obligation to pay for the premises to be made compliant, the question before the court should be: do the works enhance the open market rental value? If they do they should be reflected in the S.34 rent. Any question as to whether or not it is lawful to let the premises should not arise, given that the landlord is obligated to do the work and grant a lease.

However, for the landlord to do the work requires the tenant to consent and the regulatory position is that the tenant may refuse in which case the landlord can claim an exemption for up to five years. But why might the tenant refuse? Two possible scenarios are suggested:

- (1) the impact of the works would enhance rental value and the tenant does not or cannot afford to pay such enhanced value; or
- (2) the works would be intrusive during execution in which case doubtless the tenant would wish for financial consideration to compensate for the disruption.

From the landlord perspective a refusal to agree by the tenant could be seen as saving money (at least in the short term). However, the building, whilst it would still be lawfully let, even though non-compliant, would potentially lose market attractiveness and this failure to be future proofed could reflect in a loss of capital value. It would therefore most probably be in the landlord's interest to ensure the works are carried out, even if by so doing they have to waive any additional rental value in order to gain the tenant's cooperation[4].

Whilst undoubtedly the market will find other solutions, those posited above represent likely interactions between the existing landlord and tenant legislation and the position under Energy Act.

Conclusions

It is still nearly three years until the provisions of the Energy Act 2011 come into effect. In producing regulations so far in advance and by setting out part of the future trajectory for regulatory change, the government is giving a very clear message to the private rented sector: buildings which are not energy efficient are to be classified as sub-standard and over time the definition of sub-standard will tighten. Whilst the regulations are not unduly harsh, given that they require landlords only to comply where it is "cost effective" over seven years to do so, they are likely to have significance in both value and property asset management terms. Not only does non-compliance bring significant penalty but it is likely that buildings that fall out of compliance, due to lack of cost effectiveness or resistance on the part of the tenant to agree to the work, will lose capital value and suffer increased obsolescence. Landlords are therefore likely to be incentivised as much by the requirement to achieve longer term "future proofing" of their investment as they are any enhanced rental return consequent of the building becoming more efficient to operate.

From a tenant's perspective, those with a strong corporate responsibility policy are already seeking to occupy properties whose credentials align with their own corporate values; this much has become increasingly clear through the published research. However for tenants who are not in the market for prime stock, any agreement to pay additional rent in return for lower energy consumption costs will be a market decision. Indeed, as awareness grows of the likely value discount of buildings which are either non-compliant or only just compliant, so tenants may negotiate harder to renew existing leases in the knowledge that the landlord's reversionary interest may be more

adversely affected by a poor EPC than by any slight discount on rental value conceded in return for the tenant's consent to the works.

Whilst these views are not yet tested in the market place and the courts will be the ultimate arbiter of the responsibilities of landlords and tenants, it is already evident that the regulations are unlikely to prove to be catastrophic to value or supply that at first sight they may appear to infer. They do however require careful strategic thinking at the level of the portfolio and the individual investment asset.

Notes

1. Available from www.gov.uk/government/uploads/system/uploads/attachment_data/file/401378/Non_Dom_PRS_Energy_Efficiency_Regulations_-_Gov_Response_FINAL_1_1_04_02_15_.pdf
2. The Green Deal is the proposed funding mechanism to enable owners to install certain prescribed efficiency measures at no upfront cost, with recoupment taking place through energy cost savings.
3. The "Golden Rule" is a complex arrangement whereby no measures which would not be capable of gaining payback will be required.
4. Our thanks to the views expressed by practitioner colleagues in respect of this interpretation.

References

- Dowding, N., Reynolds, K. and Oakes, A. (2013), *Dilapidations: The Modern Law and Practice*, 5th ed., Sweet & Maxwell, London.
- Energy Performance Standards Working Group (2013), "The non-domestic minimum building energy performance standards working group – report to government", available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/335766/non_domestic_minimum_building_energy_performance_standards_working_group.pdf (accessed 3 July 2015).
- European Parliament and European Council (2002), "Directive 2002/91/EC of the European Parliament and of the Council on the energy performance of buildings", available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32002L0091> (accessed 3 July 2015).
- European Parliament and European Council (2010), "Directive 2010/31/EU of the European Parliament and of the council of 19 May 2010 on the energy performance of buildings", available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF> (accessed 3 July 2015).
- Fuerst, F., Van de Wetering, J. and Wyatt, P. (2013a), "Is intrinsic energy efficiency reflected in the pricing of office leases?", *Building Research & Information*, Vol. 41 No. 4, pp. 373-383.
- Fuerst, F., McAllister, P., Nanda, A. and Wyatt, P. (2013b), "An investigation of the effects on house prices of EPC ratings: final report for DECC, available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/207196/20130613_Hedonic_Pricing_study_DECC_template_2_.pdf (accessed 3 July 2015).
- Green Construction Board (GCB) (2014), "Valuation and demand working group project GCB630 – mapping the impacts of minimum energy efficiency standards for commercial real estate final report", available at: [www.greenconstructionboard.org/images/stories/Valuation_and_Demand/GCB630 – mapping the impacts of minimum energy efficiency standards for commercial real estate final report](http://www.greenconstructionboard.org/images/stories/Valuation_and_Demand/GCB%20630%20final%20report.pdf), (accessed 3 July 2015).
- Green Construction Board (2015), "Mapping the real estate lifecycle for effective policy interventions", available at: www.greenconstructionboard.org/images/stories/Valuation_and_Demand/GCB610%20Final%20Report.pdf (accessed 3 July 2015).

-
- Hindle, A. (1989), "Repairs and dilapidations – the tenant's view", *Facilities*, Vol. 7 No. 12, pp. 12-14.
- Intergovernmental Panel on Climate Change (2014), "Climate change synthesis report", Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K. and Mayer, L.A. (Eds)) IPCC, Geneva, p. 151, available at: <http://ipcc.ch/report/ar5/syr/> (accessed 3 July 2015).
- Quartermaine, R., Dezfouli, A. and Sutton, D. (2012), *Costing Energy Efficiency Improvements in Existing Commercial Buildings: A Report for Investment Property*, IPF Summary Report, Forum (IPF), London, available at: www.sweettgroup.com/wp-content/uploads/2014/03/costing-energy-efficiency-improvements-in-existing-commercial-buildings-summary-report1.pdf (accessed 3 July 2015).
- United Nations Environment Programme Sustainable Buildings and Climate Initiative (2009), "Buildings and climate change: summary for decision makers", available at: www.unep.org/sbci/pdfs/SBCI-BCCSummary.pdf (accessed 3 July 2015).
- Vorsatz, U., Koepfel, D. and Mirasgedis, S. (2007), "Appraisal of policy instruments for reducing buildings' CO₂ emissions", *Building Research and Innovation*, Vol. 35 No. 4, pp. 458-477.
- World Green Building Council (2013), "The business case for green buildings", available at: www.worldgbc.org/files/1513/6608/0674/Business_Case_For_Green_Building_Report_WEB_2013-04-11.pdf (accessed 3 July 2015).

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