EeMAP
Energy efficient Mortgages Action Plan

CREATING AN ENERGY EFFICIENT MORTGAGE FOR EUROPE

BUILDING ASSESSMENT BRIEFING: UNITED KINGDOM

UK GBC

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 746205

ABOUT THE UK GREEN BUILDING COUNCIL

The UK Green Building Council (UKGBC) is an industry network with a mission to radically improve the sustainability of the built environment, by transforming the way it is planned, designed, constructed, maintained and operated. As a charity with over 400 member organisations spanning the entire sector, we represent the voice of the industry's current and future leaders who are striving for transformational change.

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FEBRUARY 2018

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This briefing was produced by the UK Green Building Council with the support of WorldGBC's Europe Regional Network. Its purpose is to assist actors interested in piloting an energy efficiency mortgage product to understand and navigate technical and regulatory aspects of energy efficiency and environmental performance of buildings in United Kingdom. It has been produced as part of the EU Horizon 2020 funded 'Energy Efficient Mortgages Action Plan' initiative.

www.energyefficientmortgages.eu

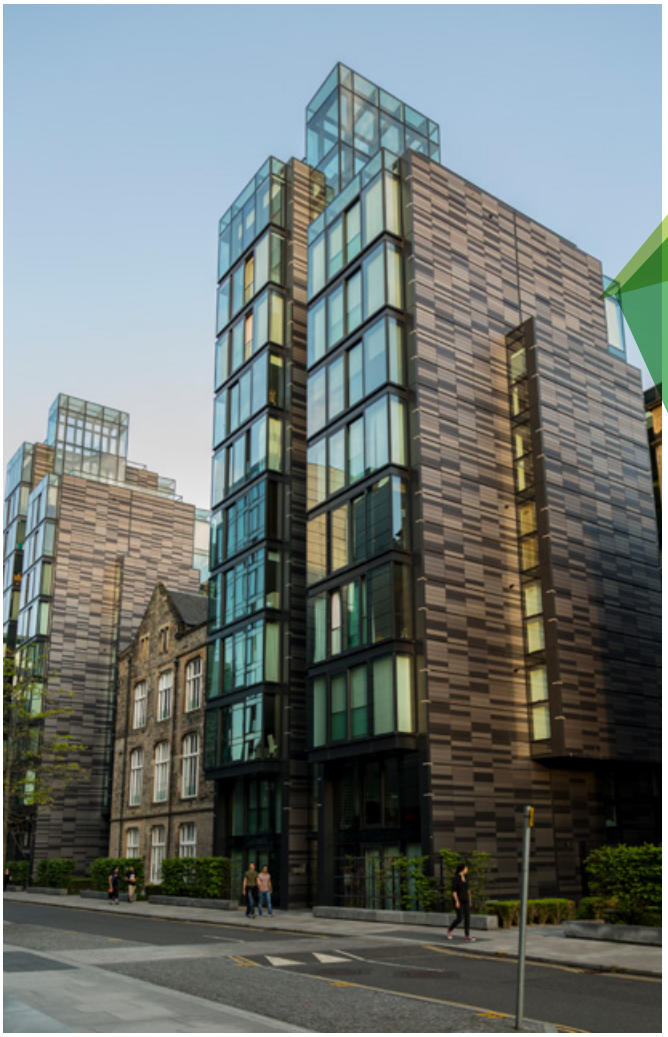
INTRODUCTION

The UK has some of the oldest domestic building stock in Europe. Existing domestic properties therefore represent both a significant opportunity and major challenge in terms of meeting UK, EU and international legislation on energy and climate change.

The Government's Clean Growth Strategy published in October 2017 set out an ambitious vision for bringing all homes up to EPC band C by 2035 but a recent history of inconsistent policy development has meant that current rates of retrofit will be inadequate to achieve this aim. The Green Deal was introduced in 2013 and hailed as a key policy to stimulate a market for home energy efficiency but it was poorly implemented and government funding was removed in 2015. Supplier obligations have driven significant numbers of installations over the past fifteen years but current policies have been scaled back and it appears that only low levels of funding will be available for the next decade. While new minimum standards for rented properties have set a precedent for regulating energy performance in existing buildings but are currently at risk from poor policy design and outstanding questions about enforcement.

Against this backdrop the cost of energy in the UK has continued to rise. The percentage of household income spent on energy increased rapidly between 2002 and 2012* and the number of people estimated to be living in fuel poverty stands at 2.5 million households, which is more than 1 in 10**.

There is therefore a pressing need for improved policy with greater ambition as well as market incentives to drive greater uptake of energy efficiency retrofit measures. The benefits of an Energy Efficient Mortgage (EEM) product, as set out in the EeMAP project, would clearly be very tangible and applicable to the UK. The Clean Growth Strategy specifically highlighted green mortgages as a key opportunity and relevant work has already been undertaken as part of the LENDERS project[03]. The high rate of home ownership compared to other EU countries makes the UK a particularly important market for the EeMAP initiative, while the outworking of the recent Mortgage Market Review (MMR) might offer increased scope to incorporate energy costs into mortgage affordability assessments****.



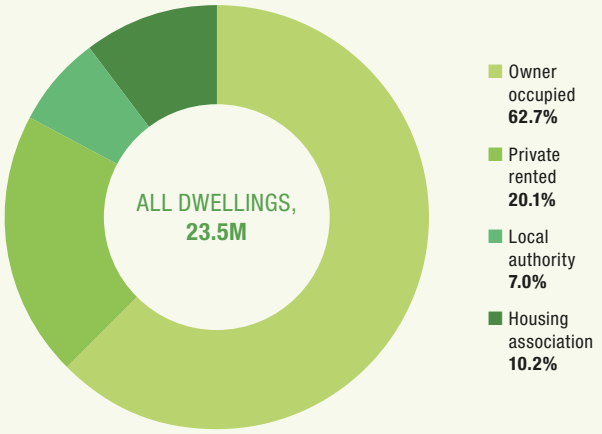
However, various barriers exist to implementation. This report discusses these barriers and related opportunities with reference to potential mechanisms for assessing the energy performance of buildings in connection with an EEM product.

* Griffiths, R., Hamilton, I. & Huebner, G. *The role of energy bill modelling in mortgage affordability calculations.* (UK-GBC and UCL, 2015).
** DBEIS *Annual Fuel Poverty Statistics* 2017
*** LENDERS Core Report (2017): http://www.epcmortgage.org.uk/
**** Laurent, M.-H. *et al.* Back to reality: How domestic energy efficiency policies in four European countries can be improved by using empirical data instead of normative calculation. in *European Council for an Energy Efficient Economy (ECEEE)*, 2013

UK HOUSING STOCK

In 2015, there were an estimated 23.5 million dwellings in England, including both occupied and vacant homes. Of these, 14.8 million (63%) were owner occupied, 4.7 million (20%) were private rented, 1.7 million (7%) were local authority and 2.4 million (10%) were housing association homes.

Fig. 1 – Dwellings by tenure, 2015

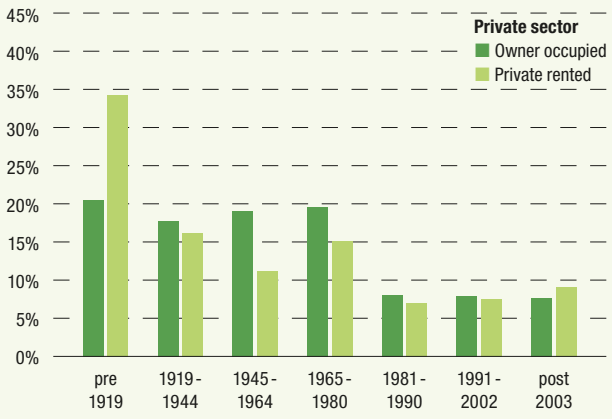


Source: English Housing Survey 2015-16

The age of dwellings varies by tenure. Privately rented dwellings were more likely to be older with a third (34%) built before 1919, compared with 20% of owner occupied and 6% of social sector homes, Figure 2.2.

Just under three quarters (72%) of local authority housing stock was built between 1945 and 1980, compared with 47% of housing association homes. Just 8% of local authority stock was built after 1980, compared with 37% of housing association homes.

Fig. 2 – Dwelling age in England, by tenure, 2015



Source: English Housing Survey 2015

The majority of owner occupied dwellings are houses and bungalows (92%), in comparison with 62% of private rented and 57% of social rented stock. There were very few detached houses in the social sector (less than 1%) or private rented sector (5%), but a quarter (25%) of owner occupied properties were detached, Figure 2.3.

The private rented sector had a comparatively high proportion of flats that have been converted from houses (11% compared with 3% of social rented and 1% of owner occupied stock). The proportion of low rise purpose built flats was lower in the owner occupied (6%) and private rented (24%) sectors than in the local authority (36%) or housing association (35%) sectors. High rise flats were more common in local authority (7%) than housing association (3%) stock.

ENERGY PERFORMANCE CERTIFICATES*

Energy performance certificates (EPCs) are required whenever a dwelling is sold or rented in the UK and are valid for ten years. Domestic EPCs are produced using the Standard Assessment Procedure (SAP), which calculates the estimated annual primary energy demand for regulated energy (heating, hot water and lighting) per square meter and is expressed on a scale of 1 (highly inefficient) to 100 (highly efficient with 100 representing zero energy cost). It also estimates associated greenhouse gas (GHG) emissions and annual energy costs for the dwelling. The calculation is based on building geometry, insulation and air tightness, heating system and types of lighting, and fuel types.

As with other domestic EPC schemes in Europe, it is only intended to assess the building's regulated energy performance. So all SAP calculations are based on standard assumptions about occupancy and exclude non-regulated energy such as cooking, domestic appliances and other small power use.

In general, the social sector is more energy efficient than the private sector, in part due to wider use of wall insulation, but also because of dwelling type. In particular, the social sector contains a higher proportion of flats, which have less exposed surface area (external walls and roofs) through which heat can be lost, than detached or semi-detached houses.

Owner occupied and private rented stock both had an average SAP rating of 60 in 2015, but the distribution of EPC bands varied. More private rented dwellings were in EER band C (25%) than owner occupied dwellings (23%), while there were more EPC band D homes in the owner occupied sector (52%) than in the private rented sector (49%). This was in part due to the private rented sector containing a larger proportion of flats than the owner occupied sector and these flats, especially newer purpose built ones, tend to be more energy efficient than the average dwelling.

Fig. 3 – Energy performance certificate rating bands in England, by tenure, 2015

Source: English Housing Survey 2015

* The following information is based on EPC requirements for England and Wales. Slightly different mechanisms and requirements apply in Scotland and Ireland. Whilst the differences have not been analysed in detail for this report, they are not expected to be significant.

As the basis for assessing properties with respect to an energy efficient mortgage product, the UK EPC scheme has a number of advantages. Firstly, all EPCs are kept on a national register and so availability would not be a barrier. Secondly, the UK has a comparatively robust quality assurance (QA) process in place for energy assessors and for EPCs. Thirdly, compliance is not considered to be a problem, with estate agents and conveyancing solicitors routinely asking for or arranging for EPCs to be produced. As of 2016, almost 16 million domestic EPCs have been lodged in England and Wales, compared to a total of 25 million dwellings*. Finally, the SAP software already includes a feature which generates a list of recommended energy efficiency measures that are considered to be appropriate and cost effective, although these are currently produced generically for different property types.

However, the limitations of the EPC to fulfil this function are significant. The EPC is a static document; once produced it has no link to the initial SAP calculation which is held by the energy assessor. Gaining access to the SAP calculation and the input data used might be an important consideration in establishing how accurate the EPC result is likely to be for a given dwelling.

Research has shown that EPCs for many EU countries, including the UK, consistently overestimate energy demand for older properties. Steps are being taken to update u-values for older properties**, but this does mean that energy savings based on current EPCs are often overestimated. This in turn undermines their use as a predictor of future energy spend, an important factor underpinning the EEM research into both the probability of default and property value. Furthermore, whilst QA systems are in place, anecdotal evidence suggests that the quality of assessor training is variable between the 11 approved accreditation bodies. UK EPCs are amongst the cheapest in Europe and this may be both an indicator and a driver of reduced quality. A lack of adequately qualified assessors with the skills to make appropriate recommendations and accurate predictions of energy savings may be a further barrier to successful EEM roll out.

Barclays bank has recently issued a green bond based on EPC ratings of properties in their mortgage portfolio. Working with the Carbon Trust, Barclays has created a bond to consolidate mortgages for properties which are within the top 15 per cent of EPC ratings nationally. The green bond has been certified by the Climate Bonds Initiative, setting a precedent for the use of UK domestic EPCs in the bond markets, and is a clear response to the growing demand for green bond investments.

* DBEIS, Statistical dataset on Energy Performance of Buildings Certificates: https://www.gov.uk/government/statistical-data-sets/live-tables-on-energy-performance-of-buildings-certificates

** DBEIS, Consultation on proposals to amend the Standard Assessment Procedure: https://www.gov.uk/government/consultations/public-consultation-on-proposals-to-amend-the-standard-assessment-procedure-sap

PREDICTING ENERGY CONSUMPTION

The EEM mortgage concept requires accurate predictions of future energy consumption for a standard scenario where no interventions are made and one where energy performance improvements are made. In contrast to previous initiatives, such as Green Deal, the EEM also requires predictions of total household energy spend in order to assess probability of default.

The Green Deal scheme has widely publicised limitations but it has similar goals to the EEM in terms of energy savings so will be a valuable source of evidence. Originally launched as a Government-backed scheme in 2013, the Green Deal was originally intended to stimulate a market for energy efficiency by providing a Pay As You Save mechanism for funding energy saving measures. However, the scheme faced delays in rollout and poor take-up from consumers which led to Government funding being removed in 2015. The Green Deal Finance Company which managed the funding has since been privatised and began selling Green Deal loans once again in 2017.

Green Deal loans are limited by the Golden Rule which states that ongoing repayments should not exceed the energy bill savings from the improvements. The loans are attached to the electricity meter and repayments are collected through energy bills, with any remaining loan amount passing onto a new owner if the property is sold. The loans are linked to an accreditation framework for energy assessors and installers, and utilise Green Deal Assessments (GDAs) as a method of assessing properties and estimating energy savings. GDAs combine an EPC with a basic Occupancy Assessment (OA) to help understand household energy use and therefore provide an EPC+ approach which has clear similarities with proposals for the EEM. The resources required for GDAs and the accuracy of these assessments set a benchmark that the EEM must seek to exceed.

Recent research carried out for UKGBC by the UCL Energy Institute examined how the EPC could be used for assessing mortgage affordability. The SAP rating was supplemented with information on the region, dwelling age, type and size – which are also outlined on the EPC – as well as the household income and occupancy. The study compared this 'EPC+' approach to a typical current mortgage lender's energy cost model and found that the predictive power of the model was doubled*.

This approach was taken forward by the LENDERS project which sought to build the evidence base for the link between property energy performance and energy costs**. This could allow mortgage providers to adjust their lending according to the energy performance of the property, with the buyers of more efficient homes having lower monthly outgoings in terms of energy bills and therefore more available income to cover mortgage repayments. The project developed a methodology for integrating the EPC+ approach into mortgage affordability which would enable a more accurate estimate of energy costs than those currently used by lenders. If implemented in the mortgage market, this approach could lead to preferential lending for more efficient properties and for mortgage extensions to fund energy efficiency retrofit.

However, SAP calculations are only designed to predict regulated energy consumption so predictions of total energy costs based on this methodology will be limited in their accuracy. SAP is based on a domestic energy model developed and owned by BRE known as BREDEM. BREDEM allows greater manipulation of parameters and might therefore offer a ready means to develop a SAP+ tool that allows improved predictions. However, BREDEM also focusses on regulated energy. To predict total energy spend, additional data on unregulated loads is needed.

This UKGBC mortgage study cited above was conducted in collaboration with the Centre for Energy Epidemiology (CEE) based at UCL. One of CEE's objectives is to improve the availability of high quality, high granularity energy demand data. This data will cover both regulated and unregulated energy. CEE is also undertaking research into the real impact of energy efficiency retrofits. Their current and future work is therefore likely to be of particular relevance to the EeMAP initiative in terms of identifying additional predictors of future energy spend.

Energy suppliers may also be a useful source of data for making predictions of unregulated energy use. When setting up an account the suppliers establish a monthly payment based on models of predicted consumption. The models and data used to create these benchmarks are not made public. But it is assumed that they are, in part at least, derived from actual customer consumption data.

Despite the limitations of the EPC, these examples give reason to be optimistic that an effective 'EPC+' approach to predicting energy use could be developed to underpin an EEM product in the UK.

* Griffiths, R., Hamilton, I. & Huebner, G. *The role of energy bill modelling in mortgage affordability calculations.* (UK-GBC and UCL, 2015): https://www.ukgbc.org/ukgbc-work/role-energy-bill-modelling-mortgage-affordability-calculations/

** LENDERS Core Report (2017): http://www.epcmortgage.org.uk/

MEASURING ACTUAL DEMAND

Standard meters are only required to be read by the supply company once every two years. However, most suppliers actively encourage customers to submit readings more frequently and many have developed simple online methods to do this. Customers are also now encouraged by the Government to switch suppliers, a process which requires readings to be submitted. These initiatives suggest that some customers may already be reading their standard meters more frequently, though this has not been verified.

The UK Government is currently rolling out smart meters, and has imposed a requirement that every customer should be offered the chance to have one installed by 2020. But the initiative is still in its infancy and has suffered from various delays and set-backs. Latest figures suggest that just 12% of properties now have a smart meter. Whilst this is set to increase, the meters are optional and the scheme has received negative press in its early stages.*

With the roll-out of smart meters, the availability of actual energy data will be greatly increased. Initially data are stored on the meter and this is transmitted to the energy supplier either monthly, daily or half-hourly depending on the customer's preference. Customers are also offered an in-house display which gives them access to their most recent consumption data. Studies have shown that this alone can lead to energy savings, and if this feedback is detailed down to appliance level these savings have been shown to increase further**. The government scheme only replaces the main meter for the gas and electricity supply and sub-metering is not required and therefore seldom installed in domestic properties. However, the technology to do so exists so this may be something an EEM provider could incentivise, particularly given the growth of smart-home technology and appliances which suggests the availability and cost of such equipment may improve over time.

* Brignal, M. Smart meters: an energy-saving revolution or just plain dumb? *The Guardian* (2016).

** Committee on Climate Change, *Annex 3 - Best practice in residential energy efficiency policy: A review of international experience.* (2016).

BEYOND ENERGY

Energy efficiency is just one small aspect of sustainable living. And since property purchases are primarily driven by non-technical factors such as location, aesthetics, access to amenities etc. there may be other sustainability indicators which could drive greater value.

Sustainability rating schemes such as the Code for Sustainable Homes (CfSH) and its successor the BREEAM Home Quality Mark (HQM), offer potential starting points for expanding the EEM concept. Both schemes cover energy and carbon performance but also addresses water, waste, transport and health, among other categories. CfSH has previously been used by local authorities to set planning conditions but is being phased out with planning authorities now only permitted to require equivalent energy standards. HQM is being developed as a replacement for CfSH and is intended as a consumer-facing label for assessing properties. Whilst typically aimed at new builds, the principles could be applied to existing dwellings with some adaptation.

The WELL standard currently only has ratings available for commercial buildings but pilots are underway to extend the standard to multi-unit residential buildings. The scheme assesses aspects of a building that affect occupant health including air quality, lighting and comfort, which are issues that may well be of greater concern to occupants or prospective buyers than energy. Combining them with energy into a 'sustainable living mortgage' could therefore help to drive interest in green mortgages.

The challenge will be to identify factors which are measurable or verifiable and which a current or potential homeowner has some influence over. Consideration would need to be given to the scope. For example, it might be unreasonable to offer preferential conditions for properties simply by virtue of their location, even though this is an important driver of sustainable living. On the other hand, some of the issues covered in CfSH and WELL are only indirectly connected to the property. For example, WELL assesses access to sources of healthy, sustainable food, an issue perhaps more closely linked to health insurance than to mortgages.

KEY LESSONS FOR EEM

The UK has a number of promising building blocks in place which could form the basis for developing an EEM product:

- The UK EPC scheme is thought to be one of the more robust examples in the EU.
- There is existing evidence that integrating EPCs with additional metrics significantly improves energy demand predictions.
- Some metrics for an EPC+ are readily available, e.g. household income, region, occupancy.
- Others, such as improved energy models which extrapolate from a short term actual data sample, could be developed in the foreseeable future.
- The ongoing smart meter roll-out will improve the availability of actual energy data for individual properties which opt to have one fitted.
- Lenders may wish to consider incentivizing additional sub-metering and occupant feedback as this has been shown to increase energy savings compared to standard smart-meter feedback devices.

There are many barriers that need to be overcome. Ultimately, technical and structural barriers such as the systematic over-estimation of energy demand in EPCs or a possible lack of adequately trained energy assessors may be easier to overcome that societal ones. The Green Deal, a high profile, government backed energy efficiency financing scheme, failed to live up to expectations and was ultimately sold to private investors. This may be an indicator of public scepticism of the benefits of energy efficiency improvements as well as complexity with the design and implementation of the scheme. As such, simplicity and a clear offer for the customer must be a priority if the EEM is to be a success.

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