



REVALUE

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Executive Summary

This document presents a synopsis of the findings and a reflection on those findings and the lessons learned on an extensive project: REVALUE.

The context of the project relates to the drive for greater energy efficiency in the European residential housing stock. In the light of climate change ambitions and targets, the need to improve the energy efficiency of the building stock has never been greater given their large contribution, estimated at 40% to carbon emission. Across Europe the housing stock is old, with only an estimated 3% being constructed to the highest energy standards; this combined with low rates of building replacement provides an urgent need to retrofit. However, the pace at which this is happening is insufficient to meet targets.

Some academic work had indicated that there is a link between energy efficiency levels and residential values, with more efficient stock being found to command higher rents and capital values. However, these studies are all large-scale regression studies and it was unclear as to the role that valuers were playing at the level of the individual building; in particular it was unclear as to whether and to what extent they were investigating energy efficiency as part of their valuation process. It was considered that, although their role is to reflect markets, not lead them, the standards under which they operate could be influential in helping realise the value of energy efficiency and provide some motivation to upgrade.

The REVALUE project, therefore, sought to address the relationship between energy efficiency and values in the residential sector and specifically the rented sector, which in Europe is dominated by social housing providers. Partnering with the RICS, the lead valuation professional body the aim of the project was to “to lead the development of appraisal norms and standards that recognise Energy Efficiency Value in social and private residential real estate.” It has done this through a series of interviews and round tables, in-depth case studies of selected housing providers, the development of a prototype data modelling tool and a major regression study of social housing stock in the Netherlands and the UK.

The main findings from the project relate to valuation norms and standards; the matter of data, including EPCs; and the motivations and barriers to investment policy motivation and barriers. Among a large number of findings which have been the subject of separate papers (Deliverables) some key findings have emerged: These are that

- Valuation methods are inherently flexible and can accommodate the impact of sustainability so whilst a need to further develop guidance to valuers, no new techniques are needed.
- Energy Efficiency (EPC) labels do not currently play a key role in determining Values in the residential rented sector but some energy characteristics, notably visual ones such as high-quality glazing, are factored in.
- Energy Performance Certificates have raised awareness but could be more effective if consistency and currency were improved.
- Although EPCs do not exert a key role in determining value, there is often limited energy data availability is limited and where there is it does not readily integrate with valuations.
- Despite this, moves to encourage investment in greater energy efficiency, places a need for valuers to work with energy experts or/and develop greater knowledge around renewable energy sources and how they change the technology used in buildings.
- The motivation to upgrade is based on a range of factors: to social housing providers; making capital gains through 'value add' is not the key driver.

All these have implications for the valuation professional body, for building owners and many for policy makers.

The findings have led to reflections and 'lessons learned'. The ambition to achieve a much more energy efficient stock is a journey. Progress has been made; the project has been able to interrogate the barriers and motivation to upgrades and found these to be complex, however as clients become more aware and as financiers begin to connect energy efficiency to their own risk ratings, so the case becomes clearer. But it remains the case that social housing providers are motivated, not just by investment financial returns but by their mission to improve the comfort and wellbeing of their tenants and help lift them from fuel poverty.

The findings that it is building attributes, rather than labels that matter more to value is important as it ties in with the due diligence processes and required skills of valuers and underscores their need to work alongside energy experts; this in turn has a consequential impact on professional fees.

The issue of risk was important: it led to a deeper appreciation that the prospect of a 'green premium' achieved through energy upgrades may be a less compelling business case than the prospect of a 'brown discount' due to enhanced obsolescence as market demand changes.

The findings, reflections and lessons learned have culminated in revised guidance to valuers specifically addressing the changing European landscape for residential values.

Table of contents

Chapter 1	Introduction: Background to the Project.....	6
Chapter 2	Aims and objective.....	8
Chapter 3	Working Methods.....	10
Chapter 4	Main Findings and their implications for Stakeholders.....	11
	4.1. Valuation Norms and Standards.....	11
	4.2. Data, including EPCs.....	14
	4.3. Investment Policy: motivation and barriers.....	16
	4.4. Lessons Learned and reflections.....	17
	4.5. Overall Conclusions.....	20
References		22

Chapter I Introduction: Background to the Project

The matter of climate change and the need for a response from all sectors of society and industry is widely acknowledged. Previously, emphasis has been on how to mitigate against such change; now, there is recognition that this alone will not be enough: adaptation is required. Even before the 2015 Paris Climate conference (COP21) which set the stage for stronger concerted governmental action, the issue was of considerable concern within the member states of the EU. It was also acknowledged that the climate change agenda had a very strong tie to the build environment. Climate change means that demand for energy to heat and cool property will increase unless action is taken to increase the efficiency of the stock; furthermore, any supply issues will raise prices and fall hardest on those with poor purchasing power leading to negative health outcomes, continued fuel poverty and at worst, fatalities.

Therefore, the need for energy efficiency has never been greater. However, Europe's housing stock is old and energy inefficient; the Buildings Performance Institute Europe (BPIE), estimate only 3% of stock is constructed or improved to the highest energy standards (BPIE, 2017). The World Green Building Council (WGBC, 2018), found that the energy efficiency of stock correlates closely to its age; and rented stock is likely to have a lower efficiency than owner-occupied stock. As most energy still emanates from fossil fuels, residential emissions account for a large percentage of carbon emissions.

In addition, the replacement rate of stock is very low, seldom exceeding 1% per annum and less in periods of economic slowdown (see Balaras et al. 2007). It was argued that faster speed and depth of upgrade is required (Artola et al. 2016). There is a connection between building age and efficiency: residential stock across Europe tends to be old, particularly units that lie in the rented sector. The issue has been to support the case for investment in energy efficiency, by new build or renovation.

Before this was very firmly endorsed by the 2018 IPCC (Intergovernmental Panel on Climate Change), the EU supported a range of projects aimed at helping market transformation towards a more energy efficient stock.

The REVALUE project, funded under the Horizon 2020 funding call, is one such project. It addressed the residential sector and specifically the rented sector, which in Europe is dominated by social housing providers. Therefore, the project had a focus on social housing provision but nevertheless also addressed in some aspects of its work the private rented sector and owner-occupation.

Fundamental to the project was a consideration of the current and potential role of the valuer and of the content of their valuations in helping to address the need to upgrade property for greater energy efficiency. The main reasons for commissioning valuations are: sale / purchase; secured lending; investment monitoring / decision making and entry into company accounts. For each, valuation professionals will be mandated to work within the requirements of the RICS - Global Valuation Standards ('The Red Book') (RICS, 2017 [a]) but, with adherence to national variations, where appropriate. For most purposes the basis of valuation will be Market Value or, for investment decisions, Investment Value (worth).

In undertaking any market value instruction, the Valuers' role is to reflect the market – not to influence it. Therefore, if they consider that the energy efficiency of a property to the extent that it is an identifiable value driver. The challenge to the Valuer is how, using evidence of comparable transactions, to analyse the impact of energy against the numbers of factors that drive market buying behaviours. This will be a challenge when valuing within a context in which the evidence is primarily derived from owner-occupation sales.

However, where they are preparing a calculation of investment value on behalf of a specific client, the importance of energy efficiency factors will be factored in to any Discounted Cash Flow (DCF) prepared. To an investor, the future impact on rent and capital value of energy efficiency and pricing may be a consideration, particularly if this will impact on the value risk profile of the asset. Lenders too may be concerned regarding the future security of the loan.

In conducting their work, valuers are bound by the Standards issued by their professional body. For the purposes of this project the relevant body is the RICS (Royal Institution of Chartered Surveyors). The RICS also provides additional guidance which is not mandatory but advised. At the commencement of the project there was an advisory reference to collection of sustainability data contained in the Standards but the only additional advice specifically for residential valuations was focused on UK markets only and had been archived as it was deemed to be out of date. Whilst there

were many publications issued by RICS relating to sustainability and the built environment generally, there was no specific European level valuation guidance.

The project ran for an extended period from 2015 until 2019 and utilised a number of research methods; it also sought to interface not only with some other projects working in similar areas but with the key stakeholder groups whose actions are instrumental – or could be – in helping achieve the ambition of a far more energy efficient residential rented stock in Europe.

This report does not attempt to detail all the results from the REVALUE project; instead it seeks to synthesise the major elements of the work into a set of findings for each of which implications for the main stakeholder groups are distilled.

Finally, it presents a reflection on the 'journey' the research team have undertaken over the period of the project and draws some overarching conclusions.

Chapter 2 Aims and objective

The stated aim of REVALUE was to **“to lead the development of appraisal norms and standards that recognise Energy Efficiency Value in social and private residential real estate.”**

The background to this ambition lay in three main drivers. First, the strong policy commitment across the EU towards meeting energy targets, both through energy transformation to fossil-free fuels and through a reduction in energy use. Second, the recognition that the building stock must be improved to become more energy efficient as indicated in the introduction. Finally the hypothesis that the valuation profession had a key role to play in helping to support market transformation through integrating the impact of value changes arising from energy upgrades. It therefore pre-supposed that energy retrofits would – or did- lead to value increases, but that valuers had not adjusted their methods to account for this.

Underlying all these drivers was the belief that one of the reasons why investment to upgrade to greater energy efficiency levels was that the business case for such investments was not sufficient and that this was linked to a failure of improvements to be adequately recognised within capital value uplift consequent on the work.

Prior to the start of the project, some academic work had been undertaken which had started to indicate that buildings with a higher energy efficiency rating were commanding higher values (for example, Brounen and Kok, 2011; Amecke, 2012; Hyland et al. 2013; Cajias and Piazzolo, 2013). However, there was a concern that the practices and standards by which valuers operated did not adequately recognise the uplift value of energy efficiency. This project therefore set out to understand better the role of the valuer within the creation and articulation of the business case through, potentially, financial rental and capital gain. It was important that the RICS (Royal Institution of Chartered Surveyors) which is the leading professional body to which valuers belong, was part of the consortium.

In setting the aim to explore the norms and standards by which valuers operate, the REVALUE Team recognised that valuations normally underpin many real estate decisions, be these decisions for purchase/sale, development or management decisions. Importantly, valuations are normally relied upon for lending decisions where capital injection or purchase is considered. There was, therefore, an implicit assumption both that valuations did not, at the time, adequately recognise the value of energy efficiency, and that if did, would it prove an incentive to invest in energy efficiency. In the bid the argument was made that, whilst professional guidance to valuers sufficed to allow valuers to build in valuation impacts of energy efficiency, there was not an obligation so to do, or indeed instruction as to how so to do. The implication of this, it was argued, was that barriers existed to realising the benefit of energy efficiency improvements which in turn, locked up capital which could be released resulting in financial and energy saving gains.

Therefore, the key endeavour was to develop a deeper understanding of the relationship between value and energy efficiency and support the development of clearer guidance to valuers better to enable them to understand any links exposed during the research.

The key objectives, in essence, were to:

- work with the RICS (Royal Institution of Chartered Surveyors) as the leading property profession for valuers with a view to developing their norms and standards to assist valuers in building in due recognition of energy efficiency;
- in the light of these developing norms, to test against some pilot portfolios of social housing providers; and;
- work with stakeholder groups with a view to gaining their support for changes which would facilitate more engagement with energy efficiency investments.

A key part of the delivery of these objectives was dependent on working with the chosen professional body. It was identified that the RICS, which is the only truly global valuation professional body, and a member of the project consortium was critical to successful delivery. Although there are many valuation professional bodies, the RICS has, not only the largest in membership, but with the greatest regulatory control over members. It is, therefore, the most influential. RICS is a core member of the International Valuation Standards Council (IVSC) and works with it in developing standards which it then places into a regulatory framework to which qualified valuers must adhere. Importantly, whilst the framework (known as the Red Book) sets down the global processes and valuation consideration, RICS produces practice

guidance (Guidance Notes) and research papers (Insight Papers) which support valuers' understanding of best and emerging practice respectively.

To achieve REVALUE's objectives it was recognised that the Team needed to interface, with a range of stakeholder clients who instruct valuers and with valuers themselves. The role of the valuer has always been recognised as one in which they work to clients' instructions. It was therefore pertinent to this project that during the early stages it was confirmed that in most cases, valuers across a range of European countries (Michl et al., 2016) were seldom instructed to consider energy or indeed any other considerations related to the sustainability agenda.

Therefore, the Project Team have, throughout, worked closely with clients and RICS, to help support a trajectory towards closer understanding and integration of energy efficiency within the valuation process.

The intention overall was that the outputs to the project would:

- reduce uncertainty by adding clarity to valuation norms and standards by enabling a link to be made between EE and value;
- increase investor confidence by allowing banks and investors to realise value gains by the recognition of energy efficiency in the book value of their portfolios;
- enhance trust in valuation by mandated standards that are acceptable to the market; and
- clarify the link between energy certification and value;

It is against these outputs that the work has been directed and the results will be discussed.

Chapter 3 Working Methods

The project was designed as a series of work packages, collectively supporting changes in the way in which valuers undertake their work and better enable them to reflect energy efficiency within the valuation of residential stock.

First it was considered important to actually review the 'state of play' in terms of the standards and norms adopted (this was undertaken in Work Package (WP)¹). The second work stream of REVALUE (WP2) aimed to develop the data required at the building level, to enable energy efficiency to be appropriately recognised and applied to case studies to test its validity. This was to be done via analysis of a typology of building types and tested against the availability of building owner data. Furthermore, REVALUE (WP3) was designed to test the relationship that could be observed between value and EE by use of quantitative techniques finally REVALUE was (WP 4) providing recommendations to the Valuation profession to embed the findings.

Inevitably, as the work progressed, adjustments to the working methods were found to be needed. In particular the work envisaged in relation to data collection (WP2) that resulted in a major finding that the anticipated, detailed, data sets which were originally envisaged could be integrated into valuation practice, were simply not available to most building owners or valuers. Consequently, the work effort shifted to the investigation, via qualitative measures, of the views of stakeholder groups. The series of interviews, round tables and in-depth discussions with selected portfolio owners yielded the basis for much fruitful discussion among the Team leading to a series of key findings related to both the role of valuation and the motivations of stakeholders. As reported below, these findings have been key to successfully achieving the REVALUE objectives.

Alongside, this work, a major quantitative study of selected social housing providers, aimed at examining the link between reported values with not just certification, but data points was carried out. Whilst many studies already existed (e.g. Brounen and Kok, 2011; Fuerst et al 2015) which related rental or capital values to EPC labels, this work was unique in two ways. First it was based on book values (rather than transaction prices) of actual portfolios of social housing and, importantly, second, it went beyond energy labels to examine the links to specific building characteristics. It also, uniquely, compared two valuation periods so that it could be established if energy efficiency had gained in value importance over a five-year period during which the reliability of EPCs had been thought to have improved. This output ("Energy Performance and Valuation of Social housing in Europe: a quantitative analysis" D3.3) yielded critically important findings and enabled a greater explanation and depth of understanding of the relationship between reported values, energy labels and energy efficiency characteristics of buildings.

Finally, during the REVALUE project series of case studies have been undertaken to develop full understanding of how the REVALUE findings can help social housing providers develop their investment strategies (D2.3 and D2.6)².

The REVALUE was to deliver recommendations to the professional body for enhanced standards and guidance has been, in effect, an ongoing engagement with and by RICS. As a result of these dialogues and collaboration, REVALUE has not only been able to feed changes into the global Red Book³ but also into a focused Insight Paper summarising research and recommendations to valuers across Europe in relation to undertaking residential valuations has been approved and is, at the time of writing, with the publication team (RICS, 2019 forthcoming).

Overall, some of the challenges to the methodology were not inconsiderable but have been overcome by internal dialogue and flexing of the work undertaken to produce findings which have been described as comprehensive, and in the words of one very senior valuer "will assist valuers in understanding the potential impact on value and/or liquidity of energy efficient residential buildings".

¹The deliverables referred to this document are available for download at: <http://revalue-project.eu/downloads/>

² The deliverables referred to this document are available for download at: <http://revalue-project.eu/downloads/>

³ <http://revalue-project.eu/sustainability-gains-importance-in-new-global-real-estate-valuation-standards/>

Chapter 4 Main Findings and their implications for Stakeholders

The main findings from the project are now grouped under the following headings:

- Valuation norms and standards
- Data, including EPCs
- Investment Policy: motivation and barriers

For each of these the key findings are explained and the relevance of the finding to the impacted stakeholder groups is set out

4.1. Valuation Norms and Standards

Finding 1: Valuation methods are inherently flexible and can accommodate the impact of sustainability

The review of valuations standards, norms and policies confirmed that valuations are conducted using a number of different methodologies depending on the purpose for which the valuation is being produced. For the majority of cases, for example, purchase/sale, secured lending and some 'book' valuations, the method used relates to an analysis of comparable sales or rental evidence to establish a Market Value. Within this method, the valuer must assess the factors that influence value and translate the evidence from comparable transactions to the property under consideration. There is nothing in the method to either prevent or require the valuer to 'de-compose' the evidence to isolate any specific item such as energy efficiency; it is the valuer's judgement whether or not so to do. The valuer, through their knowledge of market participant behaviour is an interpreter or data. If they do not witness any reflection in transaction prices as a result of different energy efficiency profile, they will not reflect it in their valuations; where they do, they should reflect their assessment of market analysis. At the start of the project, there was a belief that energy efficiency was not feeding into the analysis process, despite academic evidence that, at the macro level, it was. But the method itself was not found to be a fundamental barrier; indeed, interviews with valuers confirmed that they were aware of the needs for enhanced energy efficiency but in general had not seen it as a motivation of purchasers or tenants.

Further, the findings from discussions with the major client base consulted (housing providers) revealed that increasingly, valuers to housing providers are utilising DCF approaches when undertaking 'book' valuations for the accounts. These better enable the valuer to specifically take account of EE as long as the client holds the appropriate data. This can be factored in either through adjustment to the actual cash flow (if the landlord pays for energy or the rent can be adjusted to reflect the level of EE), through the inclusion of specific cash flow injections to upgrade or/and more generally, through the discount rate applied to reflect any perceived risk to value moving forward. However, a caveat to this is that in relation to much of the European Social Housing provisions, statutory and regulatory requirements may impose rent 'caps' which restrict the right of landlords to reflect investment in rents charged and hence the cash flows feeding in to valuations. It was therefore found that valuation of social housing portfolios is prepared on adapted methods which result in reported figures below market value.

The final method adopted, that of cost replacement, is not generally used for valuations of residential units, although any costs for energy can be included, as demonstrated in the model produced by Luwoog consult (Deliverable 2.2).

Overall, the finding in relation to valuation methods, established through the literature, inter-action with the profession and interviews, is that the full range of methods approved and used can accommodate integration of energy efficiency providing the valuer has the data to support this and the skills/knowledge base both to recognise, through inspection, the general level of efficiency displayed by the dwelling and any supporting evidence and to feed this through to their analysis.

This finding is important as it has implications for several stakeholders:

- The Valuation Profession: for the RICS it means that there is no need to develop new models or techniques; instead the requirement is to help their valuer members to help develop the evidence data base and integrate this with upskilling as required. This has already taken place by the strengthening of process guidance in the Red Book (2017[a]) towards data collection and risk reporting and the imminent publication of an Insight Paper entitled: Energy Efficiency and

Residential values: A Changing European Landscape. Further during the life of the project, the RICS published on-line training materials (Renovalue) which is a free training package to valuers. These materials are in the process of updating and a section within the training relating specifically to residential valuation will be developed as part of the dissemination of the project. The further implication for the professional body is to work with various agencies and the valuation client base to ensure that data collection is enhanced through good asset management practices.

- Clients: for clients, it is important that when commissioning valuations they both instruct valuers to consider energy efficiency and to, where possible, collect and provide energy data. Where clients are portfolio landlords, it is important that they enhance asset management practices so that the data needed to underpin valuations is available
- Policy Makers: for policy makers, the implication is that there is a need to recognise that restrictions on rents chargeable may present a dis-incentive to social landlords to undertake energy improvements as they are difficult to reflect in subsequent portfolio valuations.

Finding 2: Energy Efficiency labels do not currently play a key role in determining Values in the residential rented sector, but some energy characteristics are factored in.

One of the key ambitions of REVALUE was that its outputs would, or could, lead to value differentiation based on levels of energy efficiency. This proved not to be the case when tested both quantitatively and qualitatively. The large scale regression analysis (Deliverable 3.3) found that, whilst it was possible to discern a relationship between EPC labels and reported valuations of a sample of large social housing portfolios in the UK and the Netherlands, and that this relationship had, at least in the case of one city strengthened over time, it was not significant in terms of total reported values (see figure 1).

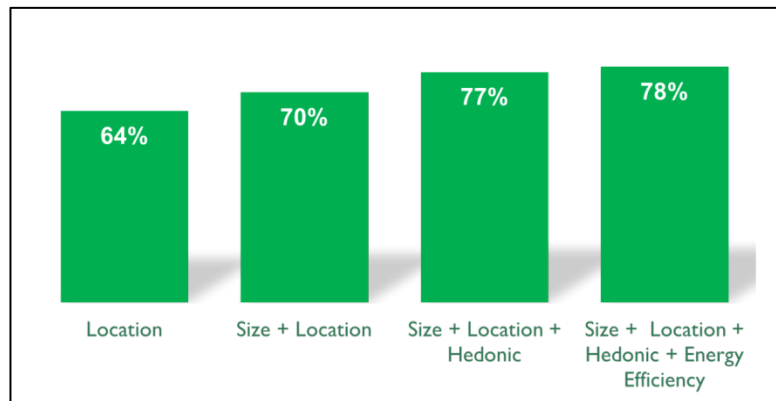


Figure 1 Explanatory power of different variables for assessed valuations. Dutch Sample.

Overall, traditional value ‘drivers’ still exerted the most influence on value (figure 2).

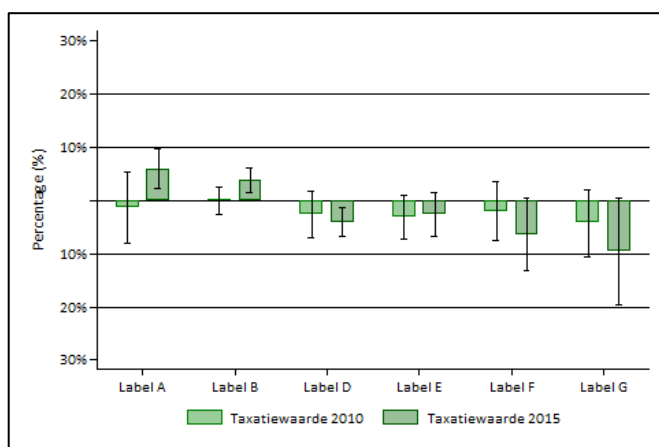


Figure 2 Estimated value differentials for the Dutch sample. The reference or comparison group is C label dwellings

These findings were corroborated by the findings from a series of Round Tables in which valuers generally maintained that EPC labels, even where available, were not a key factor affecting the behaviour of market participants (Deliverable 2.4).

However, what was perhaps less expected, was that, whilst EPC labels did not generally impact value, some of the building characteristics which can improve energy efficiency, did. Both the quantitative study and the qualitative research pointed to easily recognisable visual elements, such as windows (glazing and frames) and doors having a measurable positive value implications. Figure 3 presents the finding from the quantitative study, showing that, for example, windows and glazing, had an impact on value that was significantly in excess of the impact of EPCs.

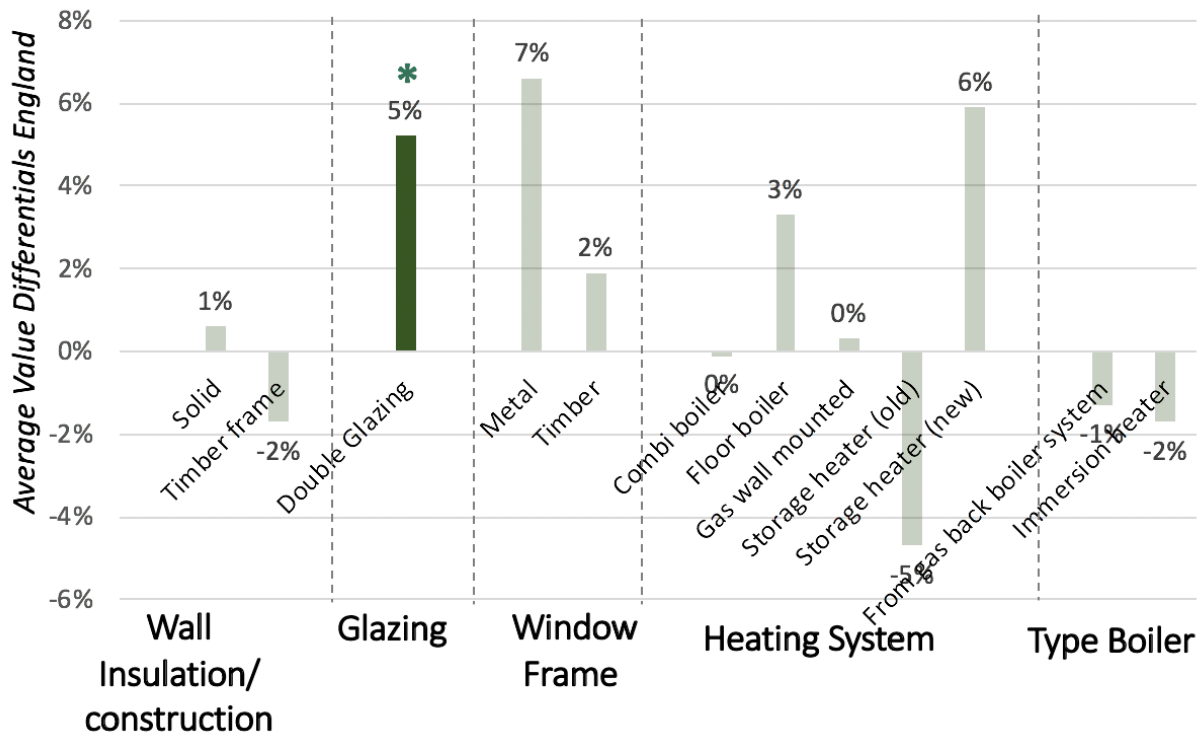


Figure 3 Average Value Differential - Component Level

However, less 'visual' elements were not found to have the same value impact. One explanation for this is that buyers and tenants often make decisions and place bid prices based on very limited inspections; further valuers have neither the time within their instruction constraints, nor in some cases, the skills, to assess energy implications of some less obvious features such as the age, and specification of boilers. This skills and knowledge issue varied depending on the educational background and training of the valuer. Whilst all have a 'base line' knowledge, in general there is core limited training in energy efficiency or building services.

The Implications of this finding for stakeholders are as follows:

- The Valuation Profession: the RICS acknowledged that the current knowledge of valuers to recognise and evaluate energy efficiency factors within buildings may be limited. This has a training implication which will be addressed in part through adaptation of the online training RenoValue and other CPD programmes. It may mean that valuers should be trained further on the impact of various building components that can affect energy efficiency and not rely solely on the EPC as the only energy data; alternatively, they should work alongside energy assessors.
- Building owners/Clients: The finding has the implication that, if valuers are to undertake more due diligence in collecting and analysing energy data- or work with energy assessors, there will be an impact on fees. Commissioning clients may wish to consider how they can assist with the making data readily available to their valuers

Finding 3: The moves towards encouraging greater energy efficiency places a need for valuers to work with energy experts or develop greater knowledge around renewable energy sources and how they change the technology used in buildings

During interviews conducted with valuers across four countries and their clients, it was confirmed and reinforced that a valuation is neither a building survey nor an energy audit, although as reported above, there is an expectation that valuers should have a basic knowledge. Not only do valuers generally not have the skills and training to undertake full surveys or energy audits, the fee basis generally agreed would preclude the level of work required so to do. However, given the

growing importance of both recognizing and assessing the contribution to energy performance of structural and service characteristics, it is critical that the valuer has contextual knowledge. What also was found was that the educational background of valuers tended to vary from country to country; for example, in Spain, and to a lesser extent Germany, many valuers came from an engineering background with a good knowledge of building physics; however, in the UK and Netherlands an economic or business background was more common. Whilst all have been through rigorous valuation education, a requirement for additional training for valuers to deal with an increasing range of energy matters may be required for many valuers. As quality and quantity of data improves so a more 'forensic' examination of characteristics will be required leading to a need perhaps for integrated professional services. This of course would have a fee impact, which may be challenging for clients unless they rely on the outputs of the report.

These findings have implications for a number of stakeholders

- **The Valuation Profession:** for the RICS it means that valuers should be encouraged, where possible, to work alongside energy experts so that they can better evaluate how the various building components that can affect energy efficiency can be integrated in their valuations, especially those conducted using DCF techniques. For this additional training would be beneficial. There is currently a developing 'PropTech' sector and by implication, these professional will be key to forming the link between technologists and valuers.
- **Building Owners/Clients:** if and as the matter of energy assessments lead to the requirement of extra levels of due diligence or the involvement of energy specialists, there will be a fee cost implication for clients; however, the upside is that they will be better informed, and this can lead to more appropriate decision-making.
- **Policy Makers:** the increasing integration of valuation with the work of technologists is important; by implication the encouragement of projects which enable technologists and valuers better to understand the work that each do respectively with a view to developing effective collaboratively ways of working could be instrumental in supporting policy objectives of reducing energy use in buildings.

4.2. Data, including EPCs

Finding 4: Energy Data availability is limited and does not readily integrate with valuations

Underpinning the initial work of REVALUE was an expectation that data was collected by building owners, and that, if passed on to valuers, it could (and should) be incorporated in valuation practice. Early explorations uncovered a lack of good benchmarking data as to what constituted an 'energy efficient' building, particularly as the majority of stock is old and there are many typologies. Put simply, the data to enable building owners to make sound investment decisions and benchmark buildings is often not in existence. Therefore, one strand of work was to develop a prototype tool to establish how energy efficiency for any type of residential unit could be modelled, quantified and built into a life cycle analysis as an input to a discounted cash flow (DCF) based valuation. However, whilst a prototype tool was developed, when discussed with valuers and clients, it proved to be unworkable in an accessible, scalable form. Put simply, the data that was held by building owners was currently insufficient to allow of the use of such a detailed model. Further, the level of time and expertise to apply the model would not be economically viable.

What did emerge from discussions within the Team, within stakeholder groups and through the detailed case studies of individual social housing portfolios, was that data availability and consistency was an issue. Indeed, it transpired that there were very few data points that were held by all the providers who took part in the study; from an energy viewpoint there was not even complete coverage of units by EPCs although this was the most common metric. This finding supported the initial view that good benchmarking data was missing; without it, valuers lack the evidence to systematically undertake analysis using energy efficiency as a variable.

The issue surrounding the lack of data was raised in interviews with building owners; they were also asked whether they were aware of moves by the Global Alliance for Buildings and Construction (GlobalABC) to develop a 'building passport' which it was hoped could overcome some of the data issues. The finding was that very few people had heard of it – but that there was considerable interest in the idea of such a notion, once it had been explained.

This finding is important as it has implications for several stakeholders:

- The Valuation Profession: valuers work with market evidence, even where they are using cash flow models, the data relates to evidence; this is widely, but not universally, understood. The profession is taking steps to educate and train valuers to support moves towards greater sustainability; for this they need data. By working with commissioning clients, recording data as it becomes available, as required under the Red Book and by and developing their own knowledge of the important energy related building characteristics, they will be better enabled to assess value risk profiles. Therefore, they would be better enabled to 'nudge' clients towards better data collection which can feed through to the assessment of value.
- Building Owners/clients: quite aside from any matter of valuation, good asset management requires good data. Whilst there was acknowledgement of a desire to improve their records and a strong move towards this, more needs to be done. This finding feeds through to the building passport project which is now underway, and in which RICS are a lead player. If this project succeeds it will help to overcome some of the data issues but in the meantime, the need to improve continues.
- Policy makers: the ongoing importance of EPCs as the prime metric is likely to remain for many years; therefore, it is important to ensure, as far as possible, that more buildings not only have EPCs but ones that are up to date and are ones in which all stakeholders can place confidence.

Finding 5: Energy Performance Certificates have raised awareness but could be more effective if consistency and currency were improved

An expected finding was that EPCs are the only commonly available metric. However, despite being widely available, they were not found to be necessarily useful in terms of planning investments, informing value judgements or providing an accurate assessment of energy efficiency. They are not developed to a uniform method; sometimes the methodology even varies across single member states. But notwithstanding this, it was reported by many of the valuers and other stakeholder that they do not normally take full account of the full range of environmental, locational or fuel source factors which have a bearing on consumption and carbon emissions. Furthermore, in some jurisdictions, EPCs, particularly those commissioned prior to 2012, were often reported as not trusted by valuers. This may sound like a very negative litany; it is not, as explained below.

EPCs are the only metric that has achieved deep penetration and is widely collected with several of the companies interviewed having almost complete EPC records for their portfolios. As EPCs are not required except at letting or sales trigger, this pointed to some landlords with long-term hold portfolios, commissioning voluntary certificates, for management purposes, this would not have been done had they placed some value of the measure. Further, even if imperfect, they are a benchmark and one that has been widely adopted as a surrogate measure to assess the relationship with transaction prices. They are also acknowledged to have raised awareness, with all stakeholder groups, having at least some, if not expert, knowledge.

From a wider perspective, interviews with financiers and with building owners revealed that the EPC is not widely used within financing decisions, although we did find that it might matter in some marginal cases. However, as other projects have found, this situation is changing rapidly, and it was found that financiers expressed the opinion that they would find information that could be related back to running costs and default risks useful – but it is the actual costs that are more important in relating to the risk of the loan rather than the label.

As data points, EPCs undoubtedly have a role, but for them to really influence decision making and be reflected in values, the view emerging from most stakeholder groups was that their accuracy, currency and methodology needs improvement.

This finding is important as it has implications for several stakeholders:

- Valuation Profession: Valuers should be aware of the limitations of EPCs but also ensure that they do not place reliance on older certificates when a property may have undergone change. When carrying out a valuation it is important that they verify the data.
- Building Owners: As EPCs are important in terms of market perception and provide what is probably the only real energy benchmark, portfolio owners are advised to ensure that they hold certificates that are up to date so that appropriate management plans can be put in place; however, EPCs should be seen only as one part of moves to develop better energy information. However, in making upgrade decisions, owners need to be aware that it was reported that some upgrade technology may make buildings more expensive and difficult to manage.
- Financiers: As revealed through REVALUE as well as other projects, vanguard financiers are beginning to view lending through the lens of energy efficiency: an energy efficient dwelling should be cheaper to run and may make lending default less likely; crucially, for financiers the link to credit risk is important. By requiring, within their standard instructions, information about EPCs and, eventually, other energy consumption factors, would allow more accurate risk profiling.
- Policy Makers: it is critical that EPCs are truly fit for purpose. Judging by the findings from this project there is scope to review the methodology to make it more consistent in application, to enhance training levels of assessors and ensure that more buildings not only have EPCs but ones that are up to date. This latter point is important. Currently EPCs last for ten years and any analysis based on a very old Certification may lack robustness.

4.3. Investment Policy: motivation and barriers

Finding 6: The motivation to upgrade is based on a range of factors: to social housing providers; making capital gains through 'value add' is not the key driver.

Throughout the project, the REVALUE Team explored what were the motivations for investment in energy improvements on the part of residential portfolio owners. From a starting hypothesis that return on capital was the main driver, the research led to a more complex set of findings. These must be placed in the context that the case studies examined and interviews with portfolio owners were primarily within the social housing sector. Whilst some contact was achieved with private sector landlords, most of these are either institutional style investors or funds, who invest in new or newly stock developed specifically for renting. This sub-sector has witnessed much growth within the last few years but is not where the focus of REVALUE lay. Approaching some-scale private sector landlords was not within the originally planned method and would not have been feasible. This because such small-scale investors are very large in number, are not a homogeneous group and many own only a few dwellings. They are therefore a 'hard to reach' set of stakeholders.

For this reason, the project concentrated on the owners of social housing portfolios (Deliverables 2.5; 2.6). To this group of stakeholders, the motivation for energy investment lies primarily in their social responsibility aspirations, rather than the achievement of profit levels. In many cases this is linked to the health and well-being agenda and this theme came through repeatedly throughout the research (Deliverable 2.5). However, capital spend is a general issue; the rent capping and constraints on capital spend that are imposed in some jurisdictions can be very real barriers to investment. To social housing providers it is important to work cooperatively with their tenants and, and in part, this dictates that energy improvements only take place as part of planned, holistic, retrofits.

None of this means that social housing providers do not work to business plans: they do. But the criteria for spending is more on 'soft' indicators, and qualitative measures such as tenant satisfaction survey results, reducing fuel poverty, lowering default rates and reducing void periods are as important as capital enhancement and rental increases, even where these are allowed. However, there was a general acknowledgement that greater knowledge of tenants' energy consumption patterns would allow for improved decision making in terms of upgrade work. It was therefore recommended in case Studies (which deliverable D2.3 and D2.6) that housing providers collect more comprehensive data on their stock. By so doing, it will allow them to move from decision making based on 'soft' indicators to decision-making which is more quantitative, though without abandoning their qualitative indicators.

The source of funding for investments is varied, with much spending coming from internal sources; where borrowing takes place, the arrangement is based on the financial status of the company rather than the value of individual property assets. While real estate valuations do underpin the company's financial position, the driver is the whole business position and the commitment to corporate responsibility principles.

It follows from this that we found that valuations do not drive decisions: they are required, but often do not play as active a role as had been originally anticipated. These valuers acting for social housing providers understood. However, it was also found that cash flow analysis was increasingly important both for management purposes and for financing. Where cash flow analysis lies behind reported values, the links to business efficiency and savings to go towards planned retrofits is an aid to decision making.

From these findings the following implications for stakeholder groups are:

- Social housing providers/clients: in order to inform investment decisions to retrofit, it is understood that a holistic view of criteria is taken; however better data collection and asset management records might enable the case to invest to be made more explicit.
- The Valuation Profession: the use of DCF models, rather than traditional methods of establishing value, better enable valuers to reflect how matters such as voids, etc can be reflected. Whilst DCF is not appropriate within the owner-occupation sector, greater use within the rented sector is to be encouraged; this has a training implication.
- Policy Makers: there is a need to understand that for many residential stakeholders, especially social landlords and owner-occupiers, the decision to invest in energy retrofitting work lies not only in financial criteria and the availability of money. Occupiers' satisfaction and comfort and revenue savings are also important. Better understanding the mix of motivations to upgrade, could help influence the design of initiatives aimed at improving rates of retrofit.

4.4. Lessons Learned and reflections

The REVALUE project has produced challenges to the Team. For example, the finding that data points were far less consistent than had been anticipated leading to a need to adapt working methods as the project progressed. Nonetheless, the challenges promoted deep discussion within the Team and the resultant adaptive and flexible approach has proved fruitful. Perhaps the single most important lesson is that all stakeholders are 'on a journey' and one to which the findings show that REVALUE has helped to develop thinking and awareness. Further, the project has been instrumental in providing resources which has enabled RICS to develop guidance and insight to its members. Finally, it has also helped and challenged social housing providers to think in a different way about their future plans for making their portfolios more sustainable

Below we reflect on some of the learning and achievements of the project. Collectively these present a positive picture and point a direction of travel for the 'journey' on which REVALUE Team have been engaged.

Client instructions and a changing market context

The role of the client is critical to the work of valuers. Towards the beginning of the project, a paper by Michl et al. (2016) confirmed that in many cases, clients were not asking valuers to comment on sustainability factors, although valuers were already collecting a lot of relevant data points when available. However, these were not explicitly reported. The project has helped to develop a greater awareness that, in both generating and asking for comment about energy efficiency and related factors, clients can help awareness develop; this is a precursor to market change. Over the project period, the Team witnessed greater exposure through all media channels of the importance of climate change. Whilst this is subliminal messaging, the clear policy messaging and in some cases regulation around energy efficiency has led to an observation, untested, that energy retrofitting is far higher up the agenda both of the client base we worked with and in the property markets generally.

- Further, at the start of the project, financiers were identified as essential stakeholders, but there was little knowledge as to whether they were taking account of energy matters within their lending policies; indeed, the consensus was that they were not. However, the Team found that by the end of the project evidence was emerging that some financiers were beginning to take interest in energy matters. This was explored in the REVALUE project through a Roundtable of financiers and interviews conducted (deliverable D3.1)

This is at two levels:

- occupational costs related to ability to pay. This was explored in the UK based Lenders project in which banks who lend to owner-occupiers are concerned with the ability to pay; thus, they concluded that a buyer of a unit that has lower energy bills and lower overall household costs, due to high levels of energy efficiency may be a less risky borrower. These findings were supported through REVALUE
- prospects of lower risk and added value. Green mortgages aimed at providing discounted mortgages for both energy efficient stock and for upgrade projects are now being developed through the EeMap project and other bank initiatives.

These represent important steps that may impact market values; however, the initiatives detailed above they are geared to individual lending, not corporate lending; for these different approaches may prevail

These moves are all positive; where there has been less progress, is in relation to valuer fees. To allow a detailed consideration of energy matters and value, requires more inspection time and possibly the instruction of other technical experts to work alongside the valuer. This issue appears as yet unresolved, but at least it is more clearly recognised.

Valuations: an improving Data landscape

The standards and norms in relation to valuation were extensively debated, discussed and reviewed (D2.4). What we distilled from the discussions was that, whilst norms and standards can – and are - set and revised, these have a primary purpose of ensuring consistency of process, rather than method, the choice of which is down to the valuer (Red Book, 2017) as long as it can show to be appropriate and is justified.

The result of the discussions has been that, intrinsically, all valuation methods are capable of being applied to include greater specificity regarding energy efficiency. That valuers do not generally explicitly consider energy efficiency is partly market driven - as it is hard to analyse deals undertaken on a range of criteria to extrapolate one factor. Whilst the influence of energy efficiency can be extracted successfully (as it was in this project) at a macro level through the use of multiple regression models, these models cannot be applied at the individual building level.

For the individual building, including energy efficiency explicitly into valuations is data dependent. A vital discussion point once it was revealed that, the data paucity issue was larger than anticipated. However, this finding is not restricted to REVALUE; indeed, RICS published an Insight Paper in 2017 relating to data availability on a global scale (RICS [b], 2017). The findings of these reflect the findings of REVALUE. However, much is now changing and since the start of REVALUE, various initiatives have commenced which collectively are likely to transform the data landscape and thus enable valuers better to integrate matters relating to energy efficiency and the wider sustainability agenda into their valuations.

Notably among these initiatives are the Building Passport project launched by the Global Alliance for Building and Construction (Global ABC) and the EeMAP (Energy Efficient Mortgage Action Plan). Members of REVALUE are involved with both acting within the RICS remit. Knowledge of the Building Passport proposal was explored through REVALUE interviews and whilst interviewees had little or no knowledge, they were supportive and could see how this would aid transparency to valuations. This combined with the further development of Automated Valuation Models (AVM) which can incorporate a wider range of data are positive steps to energy efficiency being further integrated. By the exposing of both the data landscape available to valuers and exploring fully how valuers in the field do/do not reflect energy efficiency has enabled deeper understanding which has fed back to the RICS and associated EU projects.

Further, over the period, there have been steps taken in some EU member states, to review and enhance EPCs; as the only common metric and one with which all stakeholders engage, these moves are welcome. Whilst REVALUE cannot claim to have been instrumental in this, the empirical findings might be different if replicated once EPCs have been reviewed.

Energy Efficiency is factored in by recognition of building attributes.

The dilemma of reconciling the findings from academic papers which have long maintained that higher energy efficiency results in higher rents and sales prices whereas practicing valuers have maintained that EPC labels do not impact residential values was one of the biggest challenges with which the REVALUE Team grappled. Who was right and could there be a reconciliation of views? If not, what was the explanation? The comprehensive reviews of literature did not provide an answer. Not only did residential studies such as Hyland et al. (2013) at first sight imply that valuers were failing to pick up on an apparent relationship between energy labels and values, so other literature implied that perhaps it was the valuer who was the barrier (Warren-Myers, 2013). However, through the empirical phase of REVALUE, light was shed on this conundrum which resulted in a much deeper understanding of the issue.

One way this was achieved was through the regression study which sought not only to analyse the impact of the energy label but also to assess the impact of individual building attributes which are associated with energy efficiency and which valuers had indicated were value drivers. By so doing, it became apparent that, at least for the social housing providers included in the study, it is the visual physical attributes that have a stronger observable relationship with reported values than energy labels. This was confirmed through the discussions with valuers who pointed out that physical building characteristics related to energy efficiency (e.g. high-quality double/triple glazing) can enhance value – but for reasons which extent beyond efficiency gains to enhanced visual appeal, greater comfort and higher levels of security against intrusion. All this is helpful to the debate as can inform decisions in terms of where capital spend as to which improvements can best yield value increases or protect from value decline. The findings from REVALUE in this area are feeding into the EeMap project, an output of which is a valuer checklist which aims to enable valuers to give information to lenders regarding the value risks relating to energy efficiency, better to enable them to build in the rewards associated with energy retrofits into the costs of borrowing. It is hoped that this key learning will be picked up and integrated in future empirical work.

Skills and Training of Valuers

The premise of REVALUE was that by reviewing and updating the standards and norms which apply to valuers, the impact would be that energy efficiency could be better reflected in reported values. The project findings were that data and evidence on which to form professional judgements were bigger barriers than the methods employed by valuers; there was therefore no requirement to change the basic approaches to establishing value. However, this did not mean that skills and knowledge of valuers were necessarily adequate, especially in the light of both technology advances and changing market contexts; indeed, as both Warren-Myers (2018) and Sayce (2018) argue, valuers still need to develop deeper knowledge of sustainability issues.

Discussions around valuers' skills and knowledge base fed into wider discussions within RICS leading to strengthening of the requirements on and recommendations to valuers within their Global Standards in 2017 (RICS, 2017 [a]). Whereas the strengthening of the Red Book could be argued to have been a part of an ongoing dialogue within RICS supported by the conclusions of REVALUE, the forthcoming publication of an Insight Paper providing guidance and recommendations to valuers (RICS, 2019) is an initiative which is a direct result of REVALUE and aims to update valuers with their knowledge of the energy efficiency and value relationships related to residential property in Europe. Further, the training package is under development to form part of the RenoValue training which is available free to all valuers. Collectively these new products and the revised standards should better ensure that as data streams are enhanced, the integration of energy efficiency will increasingly form part of the valuer's judgements.

Green Premium vs. Brown Discount

The green premium versus brown discount dialogue has been embedded in discussions and literature since around 2009. The evidence points to energy efficiency beginning to impact value, though at a small scale compared with traditional value drivers. The strongest statistical evidence comes from large-scale hedonic analyses. In REVALUE, the Team found evidence that whilst a premium may exist, the brown discount is more marked

However, such quantitative studies may give observation of what is happening but cannot provide the reasons why. The qualitative findings, therefore, were a very insightful complement in helping the Team to understand the observed changes. These vary depending on the stakeholder group but include regulation, the social agenda (health, well-being and relief from fuel poverty) and, critically, the changing views of the lender. This deeper understanding of motivations can start to drive policy forward in terms of what 'nudges' or grants might further stimulate market transformation. In particular to investors and lenders, the risks to value of properties with energy efficiency below the average are greater than the monetary gain of a green premium. Therefore, the financial business case is predicated on perceptions of risk, including the risk of regulation impacting on the future use of such buildings and, for social landlords, notions of delivering their mission responsibly. The project has, through its results, added to the professional knowledge base in the area; this is critical as it can feed through to policy making in relation to both grants and regulation and to investment decisions.

4.5. Overall Conclusions

The REVALUE project has been a journey, undertaken at a time of change in market environments. It has led to a deeper understanding of the role that valuers and their clients play. Valuations are not 'tick box' exercises, they involve a complex process involving careful judgement as value arises from a whole 'eco-system' of connected factors. It is therefore unhelpful to simplify it to a few factors. However, whilst it was found that valuers were more aware of energy efficiency matter than originally hypothesised and took into their overall judgements many building features which impact on energy efficiency, the process of valuation did not, at the start of the project encourage valuers to gather and analyse energy-related data. This is now changing, and the Insight paper contains a set of recommendations for valuers, which are detailed below. It recommends that valuers should:

- recognise and be knowledgeable about the potential impact of climate change on the residential building stock and the consequent need for the majority to be upgraded to meet carbon targets
- be aware of the changing market place and the varied motivations to upgrade, together with knowledge of the changing regulatory landscape
- work with clients to improve the quality and quantity of the data collected and analysed, in order that they have a firmer basis on which to undertake future valuations
- recognise that, overall, occupier and investor behaviour and demand is towards more energy efficient assets, which is leading towards the risk of value decline for non-resilient stock
- recognise the implications of the regulatory frameworks that exist and are being introduced, both by the EU and in member states, to impose increasingly higher mandatory energy standards to both new and existing buildings
- where possible (and appropriate), advise clients of the risks presented by properties that are energy inefficient; this may include the risk of such assets becoming 'stranded' in the event of increased regulation or suffering from 'brown discounts' and
- develop a more granular knowledge of services and structures that might influence the cost and feasibility of energy retrofits, and work with other professionals to ensure that appropriate advice is supplied to clients.

This set of recommendations, not only presents a real advance in thinking but sets a clear trajectory for the future.

But REVALUE has helped to develop not just a way to develop valuers' understanding of energy efficiency and practice, it has provided insight into what really drives investment decisions for energy upgrades among, in particular social housing providers. Notable among the areas in which a deeper understanding has emerged from the informal aspects of the project are the following additional key learning points depending understanding are the following key considerations:

- Some building quality factors and building services are reflected in values. Whilst it did not prove possible to analyse buildings according to the Tabula data sets as the data was simply not there, there was clear evidence that the expectations of owners and occupiers is changing, and these preference changes feed through to value. This is particularly evidence in clearly visible elements such as fenestration.

- investor upgrade decisions are based on a range of factors including costs, financial return and finance availability. However, health and wellbeing, relief from fuel poverty, comfort, security and social impact are important drivers.
- Investors generally wish to undertake works 'in-cycle'; therefore, there is a preference to undertake upgrades holistically and not in isolation and out of cycle; this may preclude the use of grants. Similarly, their access to upgrade finance is based on corporate strength not the value of improvements
- For individuals, however grant schemes may be effective, if promoted heavily but they can be tainted by perceptions of poor workmanship or their temporary nature. To achieve high uptake and effect real change, the German scheme KfW (which offers consistent long-term support) appears to be a model of success.
- Occupier Preferences are changing, driven by factors that impact on energy consumption and efficiency are impacted by local context, including costs of fuel, climate conditions and cultural and regulatory context. Therefore, the impact in countries such as Spain is likely to differ from those in Germany or Netherlands. As expectations change so buildings that are 'left behind' will increasingly suffer from 'brown discounting'.

It must be recognised that barriers to energy upgrading still exist. The business case is still at times unclear; technologies are not always understood and some fail; EPCs do not necessarily produce useful decision-making information; grant schemes can distort markets and data availability is a continuing (if reducing) issue.

However, in terms of the overall objectives, the project has achieved notable successes. It has:

- by working with the RICS helped to reduce uncertainty in how to link energy efficiency and value by adding clarity to valuation norms and standards through changes to the RICS Red book and provision of additional guidance, with further training planned by enabling a link to be made between EE and value;
- consulted with stakeholders better to enhance trust in revised valuation standards and guidance;
- by engaging with stakeholders and other bodies and projects, helped to contribute to the body of understanding and knowledge accessible to investors and financiers in how to recognise energy efficiency in asset values and, for lenders, in the risks to their lending; and
- through the various research instruments employed, added to the body of knowledge articulating the link between energy certification and value which combined with the proposed programme of CPD events and training, could and should lead to higher levels of skills and knowledge of energy matters amongst valuers.

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