REVALUE

The potential future impact of energy efficiency on capital values of residential buildings

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Executive Summary

The transformation of Europe's building stock towards near-zero by 2050 – the stated EC policy - requires investments in real estate at a scale that has never been seen before; covering over 100 million individual dwellings and requiring many thousands of billions of euros in investments.

This document speculatively explores possible future impacts of energy efficiency on rent and capital value in residential buildings. It is acknowledged that energy efficiency alone cannot deliver against the intended targets: meaning that unless there is an intention to complete demolish and rebuild existing stock, the achievable levels through refurbishment will not eliminate the need for operational energy. Changes to the energy supply will be required. Therefore, the goal is to inform the target audience of policymakers about possible scenarios and impacts, and how this may inform policy options.

REVALUE, the largest European research project covering this matter from both qualitative and quantitative angles, suggest that deep renovation is not always a financially viable option for lenders or investors in the short or medium term. Valuers report that the impacts of energy efficiency on capital values and rent are small compared to traditional value drivers. Whilst some impact is beginning to emerge, it does not support large scale interventions in most cases. Low energy prices, uncertainty about costs and benefits and, in the case of invested stock, the so-called 'split incentive' may form a barrier to investment. Although the topic is well-recognised as important by most market players, there are still financial barriers to investment and in many cases, short-lived grant schemes aimed at stimulating improvements have not worked as intended. Modernisation, comfort, fuel costs and security typically are important drivers for investors; but in relation to location, accommodation/size and accessibility, they are less critical to value.

The only recognised effective market driver is stricter policy. What has been witnessed through REVALUE is that the impact of increasing energy efficiency standards is more likely to lead to brown discounts (value decrease) of unrefurbished dwellings, rather than a green premium for renovated ones. This may particularly impact low-growth areas and certain building types such as high rises or older single-family dwellings, which could end up as 'stranded' assets.

In an attempt to reach scaled renovation programmes, financing instruments are beginning to meet conditions that allow deep retrofit – but to date, most moves have been to support differential lending to energy efficient homes which is not where the key issue lies. Further, technology and labour costs remain issues. Accelerated renovation programmes may actually increase prices, due to shortage of labour and there is some reluctance to adopt – or finance – new technology installations, which are not proven in practice.

Policymakers are encouraged to further explore the unexpected consequences of energy efficiency ambitions and identify appropriate measures. From a value perspective, the trade-off between investment in energy efficiency in dwellings and investments in abundant renewable energy sources for national grids could provide less disruptive and potentially more effective solutions, ideally combined with physical upgrade incentives.

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Chapter 1 Aim & Objective

This document aims to describe possible *future* impacts on rent and capital value of energy efficiency in residential buildings, taking a European perspective. The intended audience are policymakers; the goal is to suggest potential possible scenarios and impacts, and how this may inform policy options.

The climate change agenda has led to an urgent need to decarbonise all aspects of the economy, including buildings. This has led to Directives aimed at both transparency of energy efficiency levels and a trajectory of likely regulations surrounding energy levels of new builds as well as existing stock. The direction of travel is clear, and the ambition to reduce greenhouse gas emissions through energy efficiency renovations is undisputed. Unclear however is the impact of developments on capital value, and potential unintended consequences.

This document does not discuss the basic relation between energy efficiency, value streams and valuation. These are discussed in many of the REVALUE deliverables and a comprehensive summary can be found in RICS (2019) *"Energy Efficiency and Residential Values: a changing European landscape"*.

Chapter 2 Background

REVALUE is a Horizon 2020 research project that aims to explore the role of energy efficiency in valuation, with a particular focus on affordable housing. It used a mixed methods approach to the research undertaken which took place between 2015-2018. The strands of work included: A large-scale hedonic regression analysis covering four countries. It was based on reported 'book' valuations (2010 or 2012 and 2015) and 5-10 technical characteristics for in total over 120,000 dwellings. It thus allowed international comparison, trend analysis and crucially it went beyond energy labels alone as an indicator of relationship between value and energy efficiency.

- The qualitative studies included roundtables of valuers in four countries, interviews with lenders and four in-depth case studies on investor decision-making

This document builds upon the main project insights, and in particular as discussed in the RICS (2019) Insight Paper "*Energy Efficiency and Residential values: A Changing European Landscape*". This paper draws on academic literature and the findings from REVALUE and other recent projects in the field.

By looking at possible future value links to energy within residential properties, the authors have interpreted signals received from lenders, investors, and valuers on possible dynamics of value of energy efficiency under different uptake scenarios. This document ventures outside the scope of REVALUE and in particular outside the scope of valuation. In undertaking any market value instruction, the valuers' role is to reflect the market – not to influence it; so, they can only reflect the energy efficiency of a property to the extent that it is an identifiable value driver. For this report, it was important therefore to pick up on trends before they reach the level at which they can be evidenced empirically. The views expressed are speculative; they are offered to promote debate and discussion and future research.

Chapter 3 REVALUE research: Key findings from the work streams

Regression analysis

Consortium members at Maastricht University undertook this empirical work based on data obtained by the consortium members. It was based on 120,000 dwellings covering the Netherlands, the United Kingdom, Germany and Sweden. Available data included reported book values for two moments between 2010 (or 2012) and 2015, and typically 5-10 technical data points such as type of heating system, windows, and insulation. More data points would have been used but it was found that there was an inconsistency between the data sets the owners held.

Findings:

The evidence points to energy efficiency beginning to impact value, but the authors cautioned over-reliance on findings.

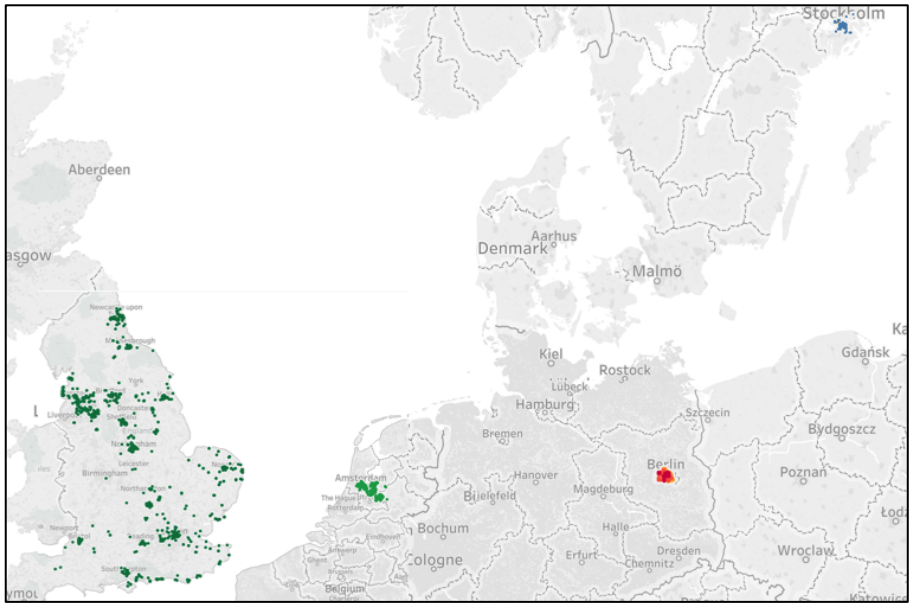
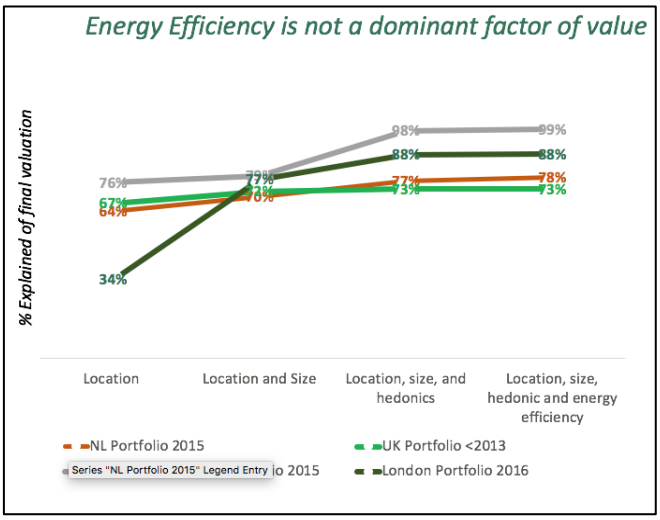
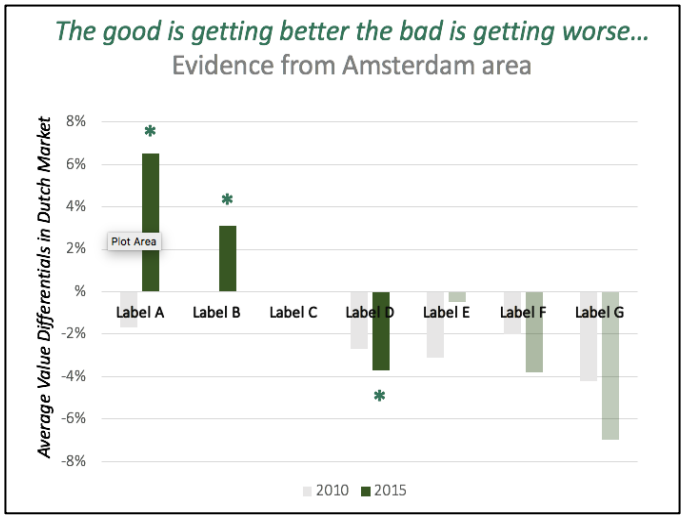


Figure 1 Distribution of data used in the regression analysis

- Academic quantitative studies show a positive relationship between energy efficiency and rental and capital values, but a stronger 'brown discount' relationship.
- There is a major caveat related to the methodology: energy efficient buildings tend to be newer and better maintained (e.g. heating systems well serviced and windows renewed etc.). Regression analysis for EPC labels might reflect a valuer's view on general building quality.





- REVALUE shows that the influence of energy efficiency is still small.
    - Approximately 1% of value can be explained by energy efficiency, compared with the 79% by traditional value drivers and 20% that could not be explained via the hedonic models.

- The value impact of specific - mostly visible - items such as double-glazed units is recognised. It is unclear if this comes from the energy or comfort and security agenda, but it is likely to be a combination of factors.
- Regression analysis does reflect trends. On energy efficiency, the trend seems to indicate growing value differentiation between high and low energy efficiency dwellings. However, brown discounts seem more pronounced than green premiums.

Roundtables with valuers and experts

RICS, assisted by Savills, undertook the qualitative interview and roundtable work. The research included semi-structured discussions with valuers and other stakeholders in the United Kingdom, the Netherlands, Germany and Spain on procedural, technical and financial aspects of energy efficiency. There were over 40 participants in total.

Figure 2 Example slide from roundtables

Findings: from roundtables with valuers

- Valuers presented the view that there was little evidence emerging of energy efficiency influencing market pricing.
- The expectation of what is normal or market standard in relation to energy efficiency is changing. Properties that fall short will face a brown discount.
- Using discounted cash flows to prepare investment valuations, the basic fact is that energy efficiency savings do not normally affect net cash flows for owners within the social housing sector in particular. The potential reduction of investment risk can be important and, for social housing providers, the ability to invest to both reduce fuel poverty and improve tenant well-being is an important factor.
- Novel energy saving and energy generation measures tend to be expensive, do not tend to generate the anticipated performance and are therefore not yet trusted by buyers – no value-add is perceived.
- In countries with comparatively strong energy regulations (such as England's minimum energy efficiency standards) or clear policies (phasing out of gas heating in the Netherlands and UK), the EPC and energy efficiency are beginning to command attention. But these policies are not normally feeding through to instructions to valuers to report in detail on energy efficiency.

Findings: from roundtable with housing providers

There is no single housing market. Discussing the future impact of energy efficiency on the value of the residential building stock suggests there is a single market, which is not the case. The European real estate market is extremely heterogenous. Any value driver or any policy measure will have a different impact in different market settings. For example, value, and the importance of energy efficiency vary significantly across countries and climate zones, market dynamics (supply/demand, growth/decline), urban versus rural settings, tenure pattern and building type

- The high cost of nearly zero energy renovation of dwellings means financial viability requires ultra-low financing rates – or a significant decrease in cost of renovations, or financial support. Financial instruments are being developed. In the Netherlands, mixed public-private funds offer 30-year home renovation loans at 1-2,5%, supported with grants covering process costs. ESCO models are being tested but have not reached scale in any geography (unless perhaps the entire affordable housing sector itself would be considered as service model…market penetration is 15% across Europe, with the Netherlands reaching over 30%).
- Costs of some building components such as PV are dropping, while others, like the heat pump, remain stable. Improving labour productivity through e.g. off-site building is still in infancy. Limited experience of companies and construction workers with new technologies and standards remain a major issue.

Ambitious, scaled renovation programmes are still scarce.

- EnergieSprong (NL, UK, FR) is oriented toward affordable housing. It builds momentum towards that large-scale but has not yet reached financial viability.
- A nearly zero-energy building (NZEB) renovation programme by the Economic Board of Utrecht (NL) offers net zero-costs performance guarantees to private owners.

The economic recovery (supported by Europe's low interest rates) adds pressure to the renovation market – as capacity flows to activities with highest returns.

- Due to large-scale new building, cost of renovations in the Netherlands have gone up by 10-25% in the period 2015-2018, with large and qualified companies focusing on new build.
- Countries like Latvia have a shortage of skilled labour as construction workers and companies focus on high-value markets such as Finland.

Case studies with investors

Bax & Company and Savills conducted interviews with dozens of affordable housing providers and detailed analysis of corporate and building stock-level decision-making processes regarding sustainability and refurbishment with four affordable housing providers, in the Netherlands, Germany, the United Kingdom and Sweden. They found that:

- Affordable housing providers operate in a policy-driven market. Where ambitious national or local energy efficiency policies exist, housing providers typically follow.
- Investment decisions are mostly based on an affordability point of view, not a value-add perspective.
- Sustainability is mostly considered as a matter of compliance, whilst non-sustainability factors such as availability, quality and energy poverty (affordable living) are major concerns.
- The ability and willingness to take large-scale or long-term investment decisions is hampered by a perception of a potentially changing public policy.

Figure 3 Housing providers who participated in REVALUE

Interviews with lenders

Savills and RICS conducted semi-structured telephone interviews with a number of large lenders and financial organisations, mostly from the United Kingdom, covering policy, operational, technical, and financial aspects of energy efficiency and valuation. They found that:

- Energy prices are not a key driver of value and change of market expectation is perceived to be slow or very slow.
- Ultimately, energy efficiency is viewed as a policy-driven matter, and regulation as a key driver of future value differentiation.
- Energy efficiency does not feature high in the lending process. Energy labels are considered as a proxy for building quality - a broader category than building energy efficiency alone.
- There is a growing recognition that 'Green Stock' is potentially less risky.
    - Costs of living of borrowers (expenditure on energy) is lower, and assets could be considered more 'future-proof'.
    - As corporate social responsibility becomes increasingly important, lenders are considering borrowers' energy aspirations, beyond the ambition to keep stock to a 'decent' level as required by regulation.

    - There is a view of markets moving towards differentiation of value, with Brown discount more likely than a green premium.

- Several banks offer basis point reductions on loan costs where properties meet or after renovation meet energy efficiency standards, and increased loan-to-value ratios. This would impact a project or properties' value from an investor perspective in the discounted cash-flow (DCF) method.

In summary, the overall findings – as reported through other deliverables and notably through RICS (2019) – point to a slowly changing scenario in relation to value and energy efficiency. But the key case for upgrading is not the prospect of capital or rental advantage, it is compliance, potential cost reduction on borrowing and responsibility towards occupiers.

Chapter 4 Interpreting findings for development of energy efficiency value over time

Drivers of value development

The initial presumption of REVALUE was that recognition of the value of energy efficiency quality of dwellings could lead to increased investments and financing in sustainability enhancements. This was seen as likely to provide a crucial step in supporting large-scale transition of the market. However, this it is not currently demonstrable to any major degree. But it is on the agenda of all stakeholders, including valuers. In the medium to longer term, energy efficiency and, it is suggested, energy sources, may become more recognisable value drivers. But it is likely to appear as discounted values where buildings fall below market expectations.

In summary, the impact of government and professional body regulation, energy pricing and incentives, the increasing numbers of tenants and owner-occupiers who are both energy-wise and environmentally aware, and the rise of corporate responsibility policies all point to market transformation. The issue is whether the combined effects will be sufficient to meet policy objectives. Recent reports[1][2] strongly suggest that regulation is the most effective route but that targets will not be met on current predictions.

Much will depend on how different stakeholder groups respond moving forward.

- Policymakers: Driven by sustainability considerations, regulation is able to force intervention which in turn might support the speed at which value differentiation occurs. An example is the UK's minimum energy standards on investment stock. Such policies are still rarely used. The 2018 EBPD requires countries to set targets for renovations by 2021, in order to achieve near-zero energy by 2050. Short-term interventions such as subsidies lead to increased uptake of supported technologies, but not to a sustained change of value.
- Investors and social housing providers: Driven by changing expectations on dwelling standards and amenities, combining mental and physical well-being (including feelings of security and comfort), sustainability, and energy cost considerations are firmly on the agenda. However, apart from a minority of green-conscious consumers, such changes are expected to be slow, with the exception of vanguard investors.
- Lenders: reduced credit risk is perceived for ´green-conscious´ client segments, and future-proofing for regulatory and consumer trends, leads some frontrunners to offer lower interest rates (a short to medium term impact). Large-scale impacts are expected only through regulation or policies such as favourable conditions for green renovation projects on the capital markets, loan-to-value ratios, or property-linked financing.
- Occupiers (tenants and owners): Over time, expectations in relation to standards and amenities change. Higher costs of energy, greater awareness of how newer, more efficient stock can provide health and well-being benefits all point to demand (and hence values) shifting towards energy efficient stock – but only if it is appropriately located, and has accommodation and facilities that meet needs, aspirations and budgets. As the majority of buyers require borrowed funds this ties in to the lenders' agenda. For tenants, often there is inadequate choice of units that they can afford; change here will be slow and incremental and point to 'brown discounts'.

Dynamics of value development

- Markets currently do not generally recognise energy efficiency as a significant value component in pricing. As so much residential stock is sub-standard, any which is significantly above the average energy efficiency may benefit from this 'halo' effect; but currently this is not strongly evidences. The current balance of stock between energy efficient and non-energy efficient will change over time, as new stock is built to higher energy standards, and as retrofits are undertaken. As a consequence, it is likely that any premium attached specifically to energy features will not be maintained. As refurbishment and new build shift the median from a C/D rating to an A/B level, then it is more likely that brown discounts will be more prevalent.

[1] Le Quere et al,(2019) Drivers of declining CO2 emissions in 18 developed economies Nature Climate Change volume 9, pages213–217 (2019) available at https://www.nature.com/articles/s41558-019-0419-7 or from Tyndall Centre https://tyndall.ac.uk/news/co2-emissions-developed-economies-fall-due-decreasing-fossil-fuel-and-energy-use

[2] Climate Change Committee (2019) *UK Housing: fit for the future?* Available at https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/

- A consequence of 'brown' discounting will be that over time, an increasingly number of properties will be viable for redevelopment or upgrade; the danger is that the costs will make these unaffordable to those of low financial means, unless upgrade costs can be contained.

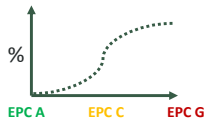
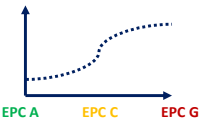
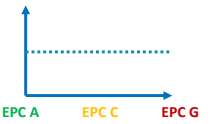
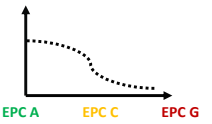
	CURRENT No recognition of value	PHASE 1 Green Premium	PHASE 2 Brown Discount	PHASE 3 Stranded Assets
Phase of Market Transition	<1% dwellings with EPC A;	≈10% of dwellings EPC A;	Balanced distribution	≈75% dwellings EPC A or B
Building stock profile All new buildings A or better Renovations towards C-A				
Expected Impact on value	Currently, retrofitting for better energy performance does not provide a guarantee for increased value. Some green premium is observed in specific markets	Once there is some choice of high EE dwelling on the market, a positive value compared to the similar dwellings with lower EE is expected	When there is significant share of EE dwellings in the market the green premium will go down, while brown discount will become more evident.	Changing standards (through regulation or market expectations) will make some dwellings unlettable without major upgrade.

Figure 4 Overview of market transition phases

Chapter 5 Implications for policymakers – the energy efficiency conundrum

Energy efficiency is increasingly treated as a goal in and for itself. Design of policies and optimising instruments for a single outcome increases the risk of not taking duly into account links with and impacts on other policy areas, with potentially suboptimal overall solutions as a result. Further, as it is only one part – and a small part – of real estate decision making, upgrades are normally more economic if conducted as part of holistic retrofitting schemes.

This section explores some of those potential links that might be overlooked in current policy discussions.

Impacts on market segments

The above findings suggest that, as the percentage of stock moves towards green efficiency, green premiums will decline, and brown discounts will increase.

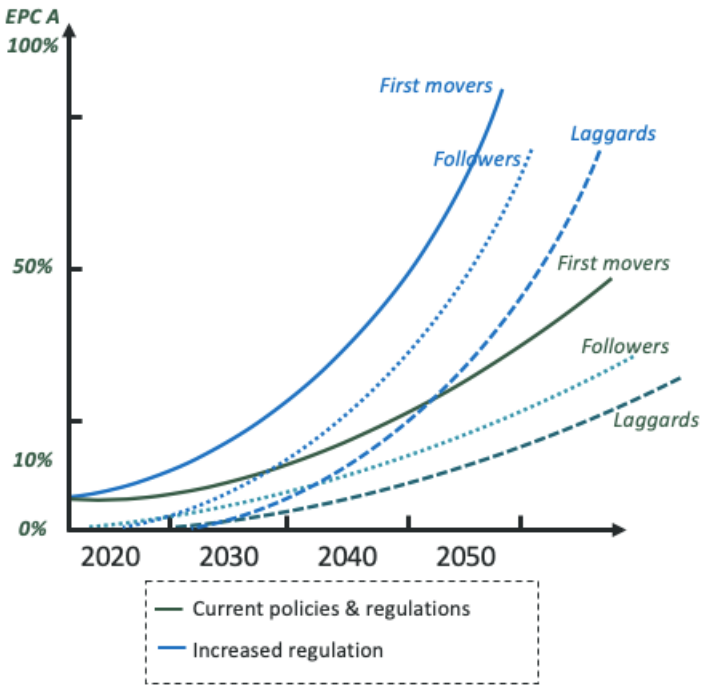
Since there is no single housing market, this may have unintended consequences for different geographies, owner types, or different economic cycles. This topic is not yet widely discussed or explored by policymakers.

The potential of impacts of significant loss of value of dwellings should be considered for:

- Experimental energy demand reduction and energy generation technologies with high maintenance requirements.
- Dwellings that cannot yet be renovated in cost-efficient way. Especially pre-1970 terraced houses, and larger homes in rural areas; these may face early demolition and redevelopment, which in turn adds to carbon usage.
- Lower-income home owners who face restricted access to finance and the ability to renovate.
- Regulatory schemes that may impact differently on different market sectors. For example, restrictions on letting stock that is not efficient, may as a consequence have negative impact on tenants with low ability to pay, as lower grade stock is removed from the market and redeveloped.
- Social housing providers find it difficult to upgrade where rent caps prevent them from gaining a return on the investment; but higher rents mean more income subsidy will be required.

Impacts on achieving policy targets

- The majority of refurbishments take place on average about every 10 years, based on modernisation and comfort, with replacements of components based on technical lifetime (up to 25-30 years). Residential kitchens and bathrooms are often refurbished on a 10 to 15-year cycle as boilers etc. need renewal.
- Reaching the EBPD target of a near zero-energy building (NZEB) stock by 2050 means that from 2025, renovations should be close to NZEB. Currently, the majority of refurbishments are based on today's standard, not tomorrow's - reaching label C or B at best. Incentivising more extensive 'future-proof' work might help to overcome the need for two deep retrofits.



- Market standards are changing slowly. But there is no positive business case for deep renovation currently given the current or future expected real cost of energy.
- Given the complexity of achieving the energy transition through the approach of housing renovation, analysing the trade-off between the cost of accelerating building energy demand reduction versus decreasing cost of abundant renewable energy seems appropriate from a social and economic perspective.
- Energy efficiency is only one part of the equations; a trajectory towards renewable energy servicing the grid would help particularly for houses for which on-site solutions simply will not work.