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National Energy Foundation

The Impact of Retrofitted Energy Efficient Measures on Residential Property Market Values

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1. Introduction

Trinity Rose Chartered Surveyors, the National Energy Foundation and partners developed this project to establish whether retrofitted energy efficient measures (EEMs) had an impact, if any, on that property's Market Value (MV); and if so, to what extent?

When considering what factors affect a property's Market Value, one can easily find themselves struggling to determine what Market Value definitively means. Within the world of Market Valuation, the International Valuation Standards Council (IVSC) defines 'Market Value' as

"The estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion". (RICS Valuation, Global Standards 2022).

However, to those who find themselves outside of these governing bodies, this can be interpreted as 'how much is someone willing to pay in order to purchase that house or complete that transaction'. Whilst this may initially suggest that Market Value is subjective, there are undoubtedly mechanisms in place that dictate trends in Market Value for example; Location, Size, Age and our Economy; however, are we, or should we be, on the horizon of a new dictating mechanism that could influence the future of our residential housing stock?

1.1 Current literature surrounding retrofitted energy efficient measures

The use and retrofitting of energy efficient measures (EEMs) is not new within residential households but current research indicates that this 'green shift' is causing a positive financial influence alongside its wider known sustainable benefits. Reports from mainstream lenders such as Halifax and Santander are seeing that purchasers are willing to pay a "'green premium' of up to £40,000" when purchasing a property that is notably more energy efficient, for example comparing a property with an EPC rating of G to a rating of A (Halifax, 2021). Halifax have also provided the impact of improving an EPC rating by one band (figure 1). The table provides an indication that with an improvement to a Property's EPC rating, it would be expected to achieve a higher Market Value than one with a lower rating. Whether this is a correlation directly to the property's EPC or if there is a combination of variables that are inter-influencing this dataset, is to be determined.

Value added per property based on EPC upgrades:

	Change in EPC rating					
	G→F	F→E	E→D	D→C	C→B	B→A
Average difference in price (% increase on average house price)	£9,954 (3.8%)	£7,584 (2.9%)	£6,162 (2.4%)	£5,214 (2.0%)	£5,214 (2.0%)	£4,740 (1.8%)

Figure 1: (Halifax, 2021)

Santander, have also commented with their own findings in relation to homebuyers paying for a 'green premium' where properties are retrofitted with EEMs. In October 2022, "homebuyers (were) putting a 9.4% premium on homes that (had) been retrofitted", (Santander, Oct 2022). On average this was equating to £26,600 for the average house price and vastly outweighs the average cost of installing EEMs at £10,000, (ONS, May 2022) (IPPR, Oct 2022). Whilst these findings support the hypothesis that energy efficiency affects a property's Market Value, one focuses on the suggestion that the influence is attributable to EPC ratings, the other generalising it to EEMs. Whilst there must be a correlation between both, these studies leave the question - does one specific measure have a greater impact on a property's Market Value?

In July 2022, Rightmove published their 'Green Homes Report' within this they present their data showing that an improvement of a property's EPC rating from F to C "could add an additional 16% to its value" (Rightmove, 2022). Their analysis of

over 200,000 homes which had sold twice whilst also having an improvement of their EPC showed this potential increase in Market Value; this was also in addition to general local house price growth. From data provided by the ONS, the average house price at this time was approximately £283,000 (ONS, May 2022), therefore, one could anticipate an increase of over £45,000 based solely on the improvement of a property's EPC rating. However, are there more impactful methods of retrofitting that affect a property's EPC rating to allow for this proposed increase?

Whilst we have only mentioned a few of the articles that are currently circulating this market, there are a host of others dictating similar messages. This report is intended to be, impartial, practical and applicable; in comparison to the possibly 'greenwashing' headlines that some literature is possibly using. The majority of current literature is provided by lenders, mortgage advice, sales agents, marketing agents etc. this report endeavours to add the perspective of the valuer, the surveyor and the public.

Our Approach

Previous literature, such as Santander or Rightmove, have either focused on EPC ratings or one specific component/EEM; we are proposing to determine if we can attribute a greater influence on Market Value to a specific component/measure or whether the combination of providing improved energy efficiency is the likely cause for a change in a property's Market Value.

Prior to undertaking any valuation work, it was deemed prudent to determine, if from reading current literature, we could hypothesise the extent of impact retrofitted EEMs may have on a property's Market Value. These were laid out in Table 1below:

Table 1: Proposed 'Value Difference' per component

Energy Efficient Measure	Proposed Value Difference	Comments
Cavity Wall insulation (various)	+2%	Different methods and materials of retrospective cavity fill are practiced. The proposed value difference is a general value to expect from the introduction of cavity fill up to 100% of external walls within the ownership of the freehold.
Loft Space Insulation	N/A	The updating and renewal of loft space insulation should be a routine practice for any property that contains it. We wouldn't expect it to be a factor that would allow a vendor to see an increase in the Market Value of their property. Nevertheless, it could be argued that the burden of the installation and maintenance of this could allow for the cost of the works and materials to be seen within a completed purchase price. It could also be a factor in relation to if a property had loft space insulation installed for the first time, having an improvement on its EPC rating. However, we would consider it unlikely that a figure or percentage change could be made attributable to loft space insulation as a component.
Double-Glazed / Triple-Glazed Windows	+3 – 4%	The Installation of double/triple glazing is known to have a range of comforts and other benefits as well as the betterment to energy efficiency. Therefore, we believe that whilst these will have an effect on Market Value, it should not solely be in the belief that this is fully attributable to its effect on energy use, but its additional comforts and other effects on the building user.
External and Internal Wall Insulation	Due to the extent of installation being varied and somewhat less common than other measures we believed this component would be discussed on a case by case basis.	This method of insulation is restricted in the ability for it to be installed. We believe that the limited use of this installation would therefore inhibit a blanket 'Value Difference' if it were to be installed and that any difference or 'Green Premium' would be subject to a prospective purchaser.

ASHP	+6 - 7%	An ASHP is likely seen across more types of properties given its ability to be installed in many different applications. Whilst we have provided a 'Value Difference' the financial benefit to this may not be realised dependant on the additional costs of installation, system alterations, appliances and servicing.
Photovoltaic Panels	+4 – 5%	The installation of PV Panels is likely to have the most impact on an EPC rating, and may be viewed as a correlation to an EPC's effect on Market Value. The true 'value Difference' may be the increased desirability to be less reliant on third party energy sources, therefore increasing the ability to maintain at a higher Market Value than a comparable property without the installations.
Solar Battery	+1% (in addition to Solar PV)	The installation of a solar battery in addition to Photovoltaic Panels will allow a homeowner to used stored power from the PV Panels at times where solar input is reduced. Likely reducing the homeowner's reliance on external energy inputs which may be a desirable factor when considering Market Value.
Electric Water immersion – Solar Boosted	N/A	To be accounted for within Photovoltaic Panels
Heat Recovery System (MVHR)	Due to the extent of installation being varied and somewhat less common than other measures we believed this component would be discussed on a case by case basis.	In likeness with the External Wall Insulation, a full HRS is one of the more intrusive methods of energy efficiency available. We believe that the introduction of this system is more likely to benefit the owner and occupants more than its effect on Market Value. The financial and social burden of retrospectively installing an HRS may not breakeven for a significant time on a rate of return basis. Therefore, we believe that the Market Value is likely not to be affected to the same cost borne by the owners at the time of installation.

2. Research into Retrofit Homes – Part I

Part of this report will showcase the thoughts and beliefs regarding Energy Efficient Measures (EEMs) from two subject groups. Whilst both groups have undertaken surveys, their surveys differed due to their contrasting positions. Our first group (**Group 1**) of participants are known by the National Energy Foundation to have undertaken energy efficient retrofits to their own properties, a specific and similar group of participants.

Our second group (**Group 2)** are all participants that have purchased, or are in the process of purchasing, a property within the last 9 months; this provides a more general public view whilst also having a current interest. The aim of the surveys was to determine the extent of our groups current beliefs surrounding the correlation of EEMs and Market Value and their reasonings for undertaking/being willing to undertake efficiency retrofits.

2.1 – Survey Responses, Analysis and Findings – Group 1 - Retrofit + 'Super Homes' Owners

This section endeavours to determine the general opinions between Market Value and retrofitted homes, within the demographic of retrofitted homeowners. We also undertook this survey to determine the social opinions this demographic have for themselves and their assumptions of others who don't currently live in a retrofitted home. The full survey questions are shown in Appendices B and C.

To justify that this group of participants were indeed occupying a retrofitted home we asked them from the list of EEM components, seen in Appendix A, had they had installed to their home. From this 84% had Photovoltaic panels, 77% had retrospective double / triple glazing, 94% had loft space insulation and 50% had an Air-Source Heat Pump (ASHP). These were more of the common components fitted to the homes, others included Solar thermal (28%), Solar battery (33%), Solar boosted immersion (33%), External Wall insulation (44%).

From this we can determine that the demographic of Group 1 is those that have retrofitted their homes with EEMs, some more intrusively than others but the consensus is that this group have a greater understanding of EEMs compared to Group 2, discussed below.

Link between installing EEMs and a Property's Market Value

Group 1 were asked in the scenario, what would be the influence if there was "a possible link between installing EEMs and an increased Market value"? 64% responded with it either not being significant or not important at all, 5% claiming it was either the main or sole reason for installing EEMs.

Further to this, we asked them about their current beliefs on whether a property's Market Value can be increased with the installation of EEMs. On the majority (55%) were uncertain if there would be a link between the two variables, as we see above, this group aren't motivated by a financial incentive for example Market Value, however 38% did suggest that there would be an increase in a property's interest if it were to go to Market.

This group are clearly not driven by a possible financial benefit from installing EEMs, with 98% agreeing that they would still recommend retrofitting EEMs to someone's property even if it didn't have a tangible effect on Market Value. So, what were they driven by to start retrofitting their homes if they weren't by economic benefits?

Drivers for Retrofitting Homes

We provided 5 options for Group 1 to select from when asking what was their reasons for installing EEMs to their property, please see Figure 2:

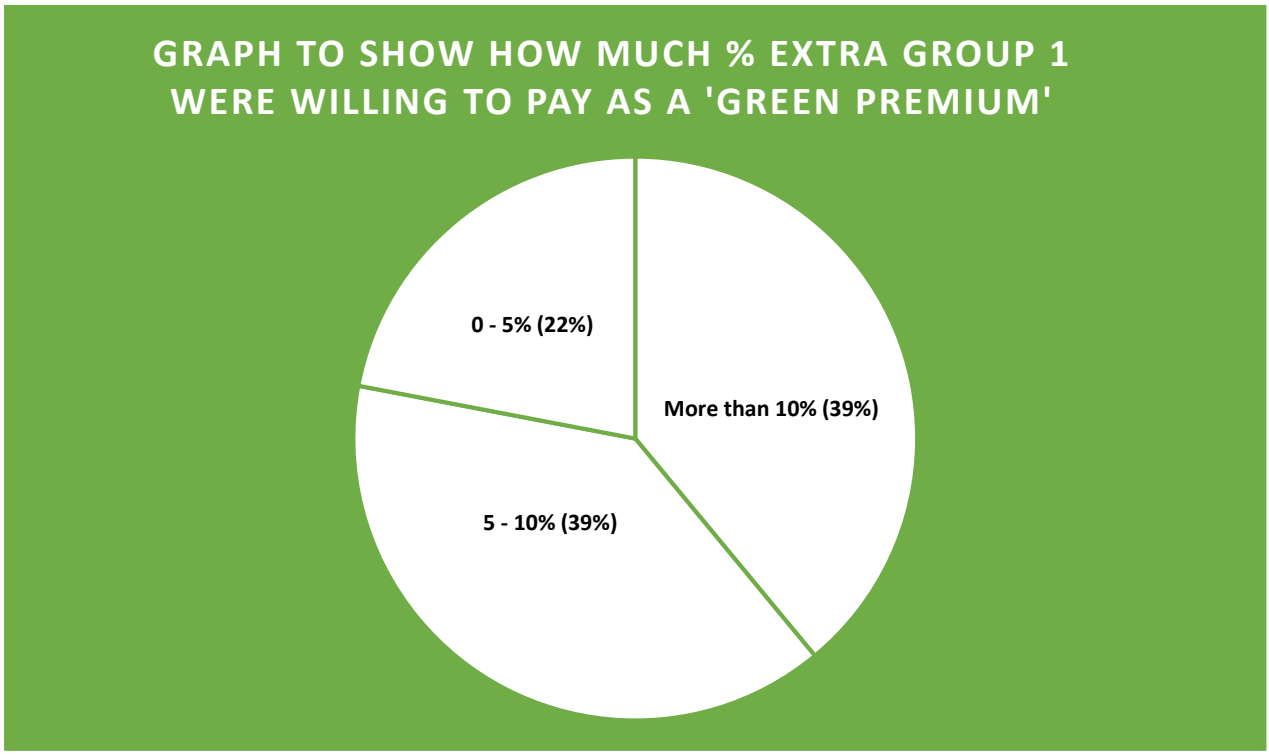
Reasoning	Percentage Chosen
Reducing the need to actively heat your property	**16%**
Improving your property's Energy Performance Certificate	**0%**
Reducing/Eliminating the reliance on the use of fossil fuel sources	**66%**
Reducing monthly/annual energy bills	**9%**
Improving occupant comfort	**9%**

Figure 2: Table of 'Drivers' for Retrofitting EEMs

From Figure 2 whilst we have controlled the breadth of responses, we can see a similar trend in the responses, as this group are not motivated by a financial benefit or incentive with 9% being driven by reduced energy costs. However, with 66% of respondents being driven by environmental factors, we can see that this group are more motivated with the reduction of their carbon footprint than their energy bills.

'Green Premium'

If we were to turn the question the other way around, would our respondents be willing to pay more for a property that had retrofitted EEMs (if all other factors had been satisfied)? Simply, yes, 100% of Group 1 agreed that they would pay a 'Green Premium' in order to purchase a house with retrofitted EEMs, but to what extent?
39% of this group claimed that they would be willing to spend an additional 5 – 10% on top of their original offer, with again 39% claiming that they would pay more than 10% more on their offer. According to average price data from the ONS this would equate to more than an additional £28,300 for a property with retrofitted EEMs (ONS, May 2022). Therefore, Group 1 are willing to be exceed their financial investment in order to be provided with EEMs, in addition to, also being aware that they may not be financially benefitted for having them installed.



Thoughts on the Public opinion to a possible link between EEMs and Market Value

We asked this group;

'Do you think that the majority of the population, increasing the Market Value of a property is the most significant reason to installing Energy Efficient Measures?'

19% agreed, 81% disagreed. We asked those who disagreed to comment on what they believe could be the population's drive to retrofitting EEMs to their property. The participants had free choice of writing their answers for this, different to when we controlled the responses above. 71% of these answers are in relation to the 'Reduction of Energy Bills', many describing current events affecting their perception that this is a key drive for the retrofitting of EEMs. Second to this the most common answer relates to occupier comfort. Surprisingly when these two options were provided in the controlled question directed at our groups' reasonings for their own choice, these options returned a relatively low selection, compared to reducing reliance on fossil fuels.

We see that Group 1's perception of the wider public is that they assume the public's reasoning to retrofitting EEMs is for a financial benefit or relief. In order to determine this, we follow on to Group 2's responses.

2.2 – Survey Responses, Analytics and Findings – Group 2 - Recent Property Purchasers

In order to determine the difference between the participants from this group and the owners of retrofitted homes, it is key to establish what proportion of these participants purchased a property already containing EEMs. 33% of participants claimed their property did not contain any energy efficient measures from a list in Appendix A. From the remaining 67% of participants, they claimed that their property does contain energy efficient measures; these mostly were additional loft space insulation, double/triple glazing and cavity wall insulation. The survey questions in full are shown in Appendix C.

Whilst there is a high number of this group that could be interpreted as being 'green thinkers', the measures that were indicated the highest are the more common components seen in properties as standard, with none of this group stating they had an air/ground-source heat pump, solar water heating, heat recovery system etc. One response indicated that they had photovoltaic panels, however, therefore the questions from Appendix C are more suited to participants where the majority do not have a retrofitted home.

Link between installing EEMs and a Property's Market Value

70% of this group agreed or strongly agreed that "installing EEMs will likely have an effect on a property's Market value", with a similar response to agreeing that Market Interest would be greater on a property that had EEMs installed as opposed to one without. This group align their views that energy efficient measures have an affect on the way a property is perceived from the outset. When Market Interest is greater we can assume that the likelihood of a purchaser exceeding their initial offer also increases. Whilst each property purchase is unique, it is inherent to determine that a property with greater Market Interest, including viewings and interested parties, will likely complete at a higher price than originally expected, compared to a property of low Market Interest, where fewer interested parties are involved and a 'bidding war' is less likely to occur. It is apparent that the group who initially have little personal interest in EEMs have this positive opinion regarding the relationship between energy efficiency and Market Value.

Market Value retention

Within Market Valuations there are a number of influencing considerations that differ over time, but do affect residential markets. These are commonly summarised within the RICS residential Market Surveys, outlining recent residential market fluctuations; what they've been influenced by and what this means for homeowners. We wanted to determine if this group of participants believed that current market affecting factors could be changed by owning a property with EEMs. Currently we see that "house prices are under pressure in the face of high mortgage rates", along with high

rates of inflation and excessive utility / energy prices (RICS, 2023). Our participants were asked if they agreed with the statement:

"A property with (EEMs) installed is likely to retain its Market Value better in a turbulent market than a property without"

68% agreed or strongly agreed with this statement, whether this may be 'wishful' thinking from the participants or not, only 4% strongly disagreed with this statement. The reasonings for why a property with EEMs installed may be more resilient than one without are the participants own sense of desirability for the measures. Commonly these desires are related to benefits with utility bills and are often subsidised by the government with the use of grants. By adopting measures to combat these influential external market factors, it allows the property to be affected less than a property that is fully mains connected with gas and electricity. This is what can be determined as being more resilient within a turbulent market.

The significance of EPC ratings

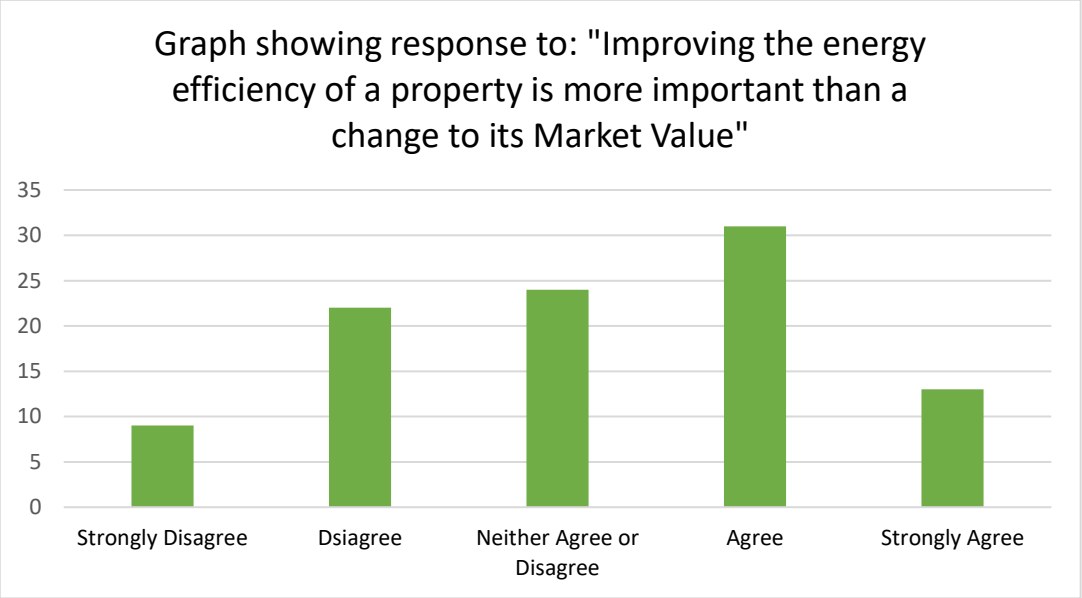
If a property can retain its Market Value during uncertain financial times with the benefit of EEMs then this is likely a point of attraction to increase its Market Interest and therefore have a positive influence on that property's Market Value.

With this group, we wanted to determine what factor was more important to themselves and their property. We asked if they believed that:

"Improving the energy efficiency of a property is more important than a change to its Market Value"

Whilst the results were varied, 44% agreed or strongly agreed and 30% disagreed or strongly disagreed, see graph below. Within this current period of higher utility and energy costs, the majority of the participants are choosing to have preference over their property's energy efficiency as opposed to affecting its value.

If one could assume, that if this question was posed at a time where energy security was high and there were different market influences, we might expect to see a different range of results. As previously discussed, within the residential market, there will always be influencing factors combined with a building owner's personal requirements and beliefs.



Within previous literature, we commonly see a focus on a property's EPC rating and if that is a common theme in which to apportion a higher Market Value. Within this group of participants, the large majority don't have a property fitted with EEMs we would commonly see being used to improve an EPC rating. This is supported by 35% of the group saying that EEMs were not a consideration when they were searching for properties and 38% being neutral. We would therefore assume that an EPC rating would be less of a consideration when searching for a property; however, 54% of the group strongly considered the property's EPC rating during their purchase.

The ability to compare EPC ratings of properties is an easy comparable exercise, providing a clear difference between them. On the other hand, whether a property has an air-source heat pump, cavity insulation or photovoltaic panels and comparing those, is a more arduous task for a homebuyer, especially one that was not considering their influence prior to searching for a property. The Rightmove 'SCT' (Surveyor Comparable Tool) comparable based system has, within the past six months, introduced a dedicated field.

From understanding what our groups beliefs regarding EEMs and Market Value were during the time of their purchase, we can also now attempt to build a picture regarding the future relationship between EEMs and Market value, and how they could influence one another.

Links between the current energy crisis, EEMs and Market Value

We have discussed previously about a number of influencing variables that were considered when compiling this survey. The timescales were within a period of time that included uncertainty regarding energy and utility costs. We therefore wanted to ascertain whether the current energy crisis within the UK and Europe had increased their considerations to install EEMs. 66% agreed or strongly agreed that they would consider alternative measures due to the current energy crisis. 69% of the participants agreed or strongly agreed that they would install EEMs to their property if there would be the opportunity to increase its Market Value. Unsurprisingly we see that people are willing to both improve the value of their property whilst also improving its EPC rating and probably savings on energy bills. In contrast only 4% say they would not install EEMs even if it were to increase the Market Value of their property.

44% of the group would increase an offer on a property if it were to have EEMs installed. In relation to Market Value, this is quite interpretive, however when we consider that Market Value is being defined as being 'how much is someone willing to pay'. Omitting neutral responses, the majority of our group are willing to pay a premium on a property solely based on it having EEMs installed, this therefore suggests an increased Market Value. However, if the addition of EEMs is a genuine benefit to the purchaser and if this is to be seen across the whole market, it is likely that we can attribute an increase of Market Value based on the addition of energy efficient measures.

What measures would current homeowners be willing to install?

From this we also asked what measures this group would install in the future to their home. The most likely choice of EEM to install has been to introduce additional loft space insulation; whilst this is a non-invasive and relatively cheap measure to undertake, the benefits from its application are proven. In addition to this, the next most likely measures to be installed include; air-source heat pump, photovoltaic panels and solar batteries. These are measures we would have expected to be already installed to properties within Group 2, however, we understand that this group is willing to add the measures to either improve their energy efficiency or affect the Market Value of their property.

We are of the opinion that they have a desire that these measures would affect the Market Value of their home, and they would pay a premium in order to not have the inconvenience of undertaking the works themselves. It was unclear whether, by being willing to install them whilst they are the owners, are they of the opinion that they can install these measures for a quick return on their investment and increase the Market Value of their property? Or are they willing to undertake the works for the "cost savings" regarding energy efficiency and utility bills?

3. Research into Retrofit – Part II

3.1 – Home Value Comparisons – Methodology

We have seen from previous published reports/literature that an increase to a property's Market Value is to be expected when retrofitted with EEMs, however, to what extent? We have undertaken and analysed subject group data and also completed a number of our own valuations to properties that have all undergone energy efficient measure retrofits. Our method of valuation is the "Comparable" method, which is the most common for residential properties and therefore has suited well for this research.

When following the comparable method, the data you're able to access is key to reliability of the valuation. We have access to Rightmove's (Surveyor Comparable Tool) SCT database, the largest pool of comparable data accessible to valuing surveyors. We also relied on discussions with selling agents for when the data online hasn't been updated, allowing ourselves to provide information on a case-by-case basis, further validating the comparable data.

Our investigation proposal was to determine whether a property Market Value was affected based on the addition of energy efficient measures, and if so, to what extent. We were invited, by the National Energy Foundation to provide a current day Market Valuation (MV) and a further valuation to determine a value prior to the measures being installed, a Pre-Retrofit Valuation (PRV). We undertook this exercise to 15 properties within Hampshire, all of which were different to each other regarding age, size, amenities and EEMs installed. With multiple retrofitted measures installed, these homes have followed a more whole home retrofit approach. We have summarised 4 of these properties as case studies, with the remainder being detailed in the Valuation Summary Table, Appendix D. The Valuation Summary Table shows the MV, PRV and EEMs installed relating to each property.

Whilst we have confidence in our valuations and reasonings by following current RICS Valuation – Global Standards 2022 ('Red Book Global'), we also refer to the case of Webb Resolutions v E.Surv (2012) to determine the appropriate margin of error. In the Webb case, the Judge held that for a standard residential property with lots of direct comparables the margin of error may be as low as +/- 5%. For a one-off property the margin of error will usually be +/- 10% reflecting the fact that direct comparables will not be available and therefore a valuer will have to make subjective adjustments to arrive at a valuation. If the property has truly exceptional features, then the margin of error could be +/- 15% or even more.

3.2 – Case Studies (4 no. Explained)

Property A – Standard Detached House

Market Valuation (MV) - £1,080,000
Pre-Retrofit Valuation (PRV) - £1,065,000
% Change - +1%
Property – 4 Bedroom Detached House built 1988
EPC Rating - C
Retrofitted Measures – Cavity wall insulation, Solar thermal tubes with hot water tank, Modern uPVC double glazed windows, additional loft space insulation, Air-source heat pump and exchanger.

This property was located within a sought-after location surrounded by properties that did vary in specification, with some being older or having additional bedrooms, however there was plenty of comparable data in which to proceed in. The measures were installed over a period of 20 years along with various alterations to the internal spaces including a garage conversion. When considering the installed components, we considered what would be a beneficial 'additional' feature for this property and its age etc.

Within this case the installation of double-glazing, for example, would be considered standard for the type of property, even a more modern style than this property had so the previous specification wouldn't warrant a potential difference in this case. We

also consider that for a property of this specification and age, that cavity wall insulation would be a standard detail and would not significantly provide a justifiable difference to comparable properties.

When considering that this property has adopted a solar thermal system, an air-source heat pump both combined with an electrical hot water tank we see that this is significant adaptation to the property providing the benefit of reduced reliance of external energy supplies, such as gas.

This property had removed its gas heating system due to the EEMs installed, and would therefore have the benefit of being less influenced by fluctuating energy markets. This adaptation to the property would be a factor considered beneficial by a prospective purchaser and therefore a justifiable difference to the property's Market Value can be expected, but to what extent.

When assessing the Market value, we have considered the cost to install the relevant measures and their influence on the property in order to provide a quantifiable value of what we would expect the property to achieve in the current market. For this property we took into account the removal of gas heating and installation of solar thermal and ASHP.

Property B – Standard Detached House

Market Valuation (MV) - £560,000

Pre-Retrofit Valuation (PRV) - £550,000

% Change - +2%

Property – 4 Bedroom Detached House built early 2000s

EPC Rating - C

Retrofitted Measures – Photovoltaic panels, Cavity Wall insulation, Additional loft insulation, Air-source heat pump, Gas boiler and supply removed/capped, Hot water tank, Solar boost to hot water tank.

This property is located within a residential cul-de-sac amongst properties built at the same time as this subject property and this style and specification of property is common to many other surrounding residential estates. Property B has adopted similar EEMs to Property A including an ASHP, removal of gas-powered boiler for heating and use of a hot water tank. The works relating to the retrofitted measures were undertaken within the past 10-12 years, with the ASHP being installed 18 months ago. This valuation took a similar approach to Property A, in relation to measures that would typically be expected of a property this age not influencing a change to its Market Value. The consideration has therefore focused on the addition of the ASHP, Photovoltaic panels and the heating arrangement and how this would be perceived on the open market.

If we were to compare Property A and B, the similarities of the two are within their EEMs, age, specification etc. There are differences to the location, size and neighbour arrangements of the two. We could hypothesise that if two properties were to install similar measures then any difference to their MV would be in correlation to this. From Property A and B we see that both have experienced an increase of their Market value, the extent of this increase against the monetary value of the property shows that EEMs have varying application on Market Value, which is driven both by individual property type, and market forces such as location, garden size, and condition of fixtures and fittings.

Property C – Standard End-Terrace House

MV - £405,000

PRV- £385,000

% Change - +5%

Property – 3 Bedroom End-Terrace House built circa 1885

EPC Rating – D (expired – not updated since retrofitting)

Retrofitted Measures – External wall insulation, Triple Glazing, Cavity wall insulation, Photovoltaic panels.

Property C, is located within an area that provides a good source of comparable data, being situated within a road of similar Victorian built terraces. This property is one that stood out amongst our pool of properties with the works focused on achieving a 'Passivhaus' status and therefore introduced measures that would have been beneficial in reducing the need to actively heat the home as frequently, if at all. This property is aiming to reduce the influence external energy sources have on the occupier. These measures are justifiably ideal on the open market but their extent, like all measures, will vary on a case-by-case basis. All the measures installed are not typically found on surrounding properties in the area, creating a justifiable adjustment for this property.

Property D – Non-Standard Detached Bungalow

Market Valuation (MV) - £700,000

Pre-Retrofit Valuation (PRV) - £700,000

% Change - 0%

Property – 2 Bedroom Detached bungalow built circa 1905

EPC Rating - D

Retrofitted Measures – Additional loft space insulation, cavity wall insulation, Air-source heat pump, Photovoltaic panels, electric boosted hot water tank, secondary glazing.

This property is located within a sought-after area and is more unique than Properties A and B. This property is an example where we as valuers make reasoned assumptions due to a lack of suitable comparable data. We have used comparable properties that have been larger regarding their internal floor area but we have made adjustments on a £/sqm basis. This property has undergone a number of extensions and internal renovation and as part of these improvements updating and upgrading of their energy systems has also been undertaken.

Property D is an example of where we can see extensive retrofitting being undertaken, but no change to a property's Market Value. These additions are likely beneficial for an occupier, however in the case of more unique (likely older) properties, the justification of the benefit to the property is difficult to reason. In some extreme cases, aggressively retrofitting your property could perhaps have an unwanted effect on Market Interest. Whilst there is a benefit regarding energy efficiency and reduced reliance on fossil fuels within this property, to attribute a Market Value difference based on this is much less justifiable than for Properties A and B.

4.0 Conclusion

4.1 - A comparison of Previous Literature and Research Findings

Our understanding of previous published reports/literature, our own hypotheses and our result findings have varied in outcomes; some mainstream lenders and marketing agents, such as Santander and Rightmove, are reporting significant increases to Market Value and our own hypotheses were expecting to have a larger effect on the value of a property than our own research by RICS Valuers has concluded.

Overall, the findings of this research are positive, suggesting that installing energy efficient measures to your property is more than likely to have a positive effect on the Market Value. We know that the basis of Market Value is how much someone is willing to pay for a property and from our public surveys, it is evident to suggest that there is a wider interest in seeking out properties with EEMs or installing EEMs to an occupied property. We also acknowledge that people are more likely to pay a 'Green Premium' on a property due to its efficient measures. Whilst this does support some of the general literature, for example the Rightmove report (Rightmove, 2022), it does contrast with the extent of their findings. On average from our 15 inspected properties, the value increase was 2%, significantly less than reported from lenders and agents across the country. The properties valued within the report had a lot of similar measures installed, however apart from having that in common they were all different and not comparable as subject properties. Therefore, it would be unwise to apportion a percentage change one could expect from installing EEMs to their property.

Whilst we currently see an increase in a property's Market Value based on its ability to be less reliant on external energy sources, the extent of the increase is not as high as one first anticipated. We are still of the opinion that each valuation is taken on a case-by-case basis with a conservative approach to applying a blanket percentage increase per component. We have surveyed a relatively small number of properties within our data field, in comparison to larger firm's data sources. Nevertheless, the opinion from ourselves as valuers is impartial and driven by justification-based adjustments. We would only expect the average percentage change to Market Value to strengthen with the introduction of more external drivers discussed below.

Overall any potential change to Market Value and its extent is going to be driven further by external factors, as opposed to the action of having them installed. We have discussed the likely reduction in the reliance on external energy sources and fossil fuels being a driver of installing more EEMs, linked to an increase in utility bills. We would also suggest that perhaps another driver to installing these measures would be to offer a financial benefit, whether this be reduced mortgage interest rates or reduction in Stamp Duty as seen within the UKGBC Report "A housing market catalyst to drive carbon emission reductions" which discusses that in order to meet target emission reductions the UK's housing stock would require "near complete decarbonisation" (UKGBC, April 2021). In order to create a viable route for decarbonisation, the UKGBC discuss a "low-energy adjustment to Stamp Duty Land Tax" (UKGBC, April 2021). Examples of current incentive schemes can be seen on the gov.uk website including the Boiler Upgrade Scheme (Apply for the Boiler Upgrade Scheme: Overview - GOV.UK (www.gov.uk)) These would be tangible benefits that can be quantified and therefore more likely to be a justifiable reason for paying a 'Green Premium' as well as encouraging people to consider retrofitting EEMs.

4.2 - A Comparison between the Survey Responses

The contrast between the demographic of Group's 1 + 2 and also their responses to their surveys show that there is a number of opposing drivers for the retrofitting of EEMs to people's properties. We see clearly that when discussing Group 1, they did not have previous, current, or future consideration that the retrofitting of EEMs would have a significant link to affecting Market Value. They do however have a strong sense of stewardship in regard to the reduced reliance on fossil fuels and lowering carbon emissions.

However, on the other hand, we drastically see that Group 1 are willing to pay a significant amount more for a property based on the implementation of EEMs. As we are aware, Market Value is 'how much someone is willing to pay', therefore Group 1, to an extent, seem to oppose their initial belief, that they wouldn't expect Market Value to be affected by retrofitting EEMs, when 100% are willing to pay more for a property due to retrofitted EEMs. We understand, however, that Group 1 are

implementing these measures more for their personal and environmental matters and not for a financial gain initially. Nevertheless, they agree that, to an extent, the retrofitting of energy efficient measures does have an impact on the Market Value of property.

Whilst Group 2 are willing to undertake retrofitting of measures in the efforts to possibly increase their property's Market value, both groups agree that a significant factor of installing EEMs is to possibly reduce energy bills. Any financial benefit in relation to Market Value, would be a bonus in addition to this.

When comparing the financial differences between Pre-Retrofit Value and Market Value then a pattern appears, providing a reason to believe that there may be a finite amount a property's Market Value can be affected when retrofitted with EEMs. If we were to conclude by providing a suggestive 'blanket' percentage change to properties, which had undergone whole home retrofit, then this would result in disproportionate effects to their financial outcome, which has not been the conclusion of our research. Therefore, it would be more reasonable to comprehend that retrofitting EEMs to a property could provide up to (but not on average) £15,000 to its Market Value. Nevertheless, this interpretation should not be relied upon, as we have reported properties with a larger value uplift and, in comparison, properties where there has been no change to their Market Value despite undertaking whole home retrofit. Each property valuation should be taken on a case-by-case basis, with the influence of EEMs being considered but not a definitive factor to be relied upon to affect Market Value.

Overall it seems that the installation of any energy efficient measure should not be seen as a short-term method to increase Market Value, but a factor to consider increasing the future desirability of the property, therefore increasing the potential opportunity at achieving a higher Market Value as well as improving the comfort and lower bills for the current occupiers.

Appendices

Appendix A – List of survey components.

Retrospective Cavity Wall Insulation (Foam, fibre or Polystyrene etc.)

Ground Floor insulation

Additional loft space Insulation

Retrospective Double / Triple Glazed windows and external doors

Solid wall insulation - either External (EWI) or Internal (IWI)

Air Source Heat Pump (ASHP)

Ground Source Heat Pump (GSHP)

Photovoltaic Panels (Solar PV)

Battery Power Storage

Solar Thermal Heating

Heat Recovery Ventilation System

Electric Water Immersion – Solar boosted

Appendix B – 'Superhome' Owners' Full Survey Questions (Group 1)

1. From the list of Energy Efficient Measures, please select any that are currently installed to your property. Please select all that apply:

   (Options from Appendix A were provided)

2. From the list of Energy Efficient Measures, please select any additional measures you would consider installing to your property in the future. Please select all that apply:

   (Options from Appendix A were provided)

3. A possible link between installing energy efficient measures and an increased Market Value of my property was:

   a. *The sole reason I/we made the decision to install energy efficient measures*
   b. *One of the main considerations in the decision*
   c. *A consideration*
   d. *Not significant*
   e. *Not important at all*

4. My perception of the link between energy efficient measures and an increased Market Value of my property was:

   a. *I was made aware that by installing energy efficient measures, I would likely significantly increase the Market Value of my property*
   b. *I believe that the installation of energy efficient measures will increase the interest of the property in the event the property was to be put on the market*
   c. *I am uncertain as to whether there will be an uplift in value from the installation of energy efficient measures; this is more of a long-term venture and not a short-term decision for financial gain.*
   d. *I do not believe that there is an uplift in value from energy efficient measures.*

5. Please choose from the following options on your opinion of recommending installing energy efficient measures to other home-owners;

   a. *I would still recommend the installation of energy efficiency measures to someone's property even if it did not have a tangible effect on that property's Market Value.*
   b. *I would only recommend the installation of energy efficiency measures to someone's property if they each had a tangible effect on that property's Market Value.*

6. Which of the drivers for energy efficiency would you consider most significant:

a. Reducing the need to actively heat your property
b. Improving your property's Energy Performance Certificate (EPC)
c. Reducing/Eliminating the reliance on the use of fossil fuel sources
d. Reducing monthly/annual energy bills
e. Improving occupant comfort

7. If you were purchasing a property in the future, would you consider the installation of energy efficient measures a more significant factor than (please select all that apply):

a. Size of Bedrooms
b. Size of Garden
c. Availability of local amenities (e.g. shops, restaurants and leisure facilities)
d. Parking/Garage availability
e. Age of the property
f. None of the above

8. If you were purchasing a property in the future, would you be willing to pay extra for an energy efficient property, provided that it met your requirements for location, size etc.

a. Yes
b. No

9. If yes, please give an estimate of home much extra you might be willing to pay:

a. 10% or more
b. 5 – 10 %
c. 0 – 5%
d. Not willing to pay a premium
e.

10. If you were willing to pay more, please indicate which measures would encourage you to pay an uplifted value. Please select all that apply:

(Options from Appendix A were provided)

11. If there had been more information made available, to yourself and the public, regarding the effect energy efficient measures have on a property's Market Value would you have installed the measures at an earlier date?

a. Yes
b. No

12. If not, why?

(Open text responses)

13. Do you think for the majority of the population, increasing the Market Value of a property is the most significant reason to installing energy efficient measures?

a. Yes
b. No

If not, what would be?

(Open text responses)

Appendix C – Trinity Rose Chartered Surveyors Full Survey Questions (Group 2)

1. Does the property you have recently purchased, or are currently purchasing, have any of the energy efficient measures installed retrospectively? Please select any of the measures that apply. (*The list give in Appendix A was provided)*

2. Installing energy efficient measures will likely have an effect on a property's Market Value. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

3. Market interest on a property with energy efficient measures installed would likely be greater than a property without. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

4. The upfront cost and associated interference of installing energy efficient measures is not worth the benefits they likely produce, for example reduced fuel bills or change in Market Value. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

5. A property with energy efficient measures installed is likely to retain is Market Value better in a turbulent market than a property without. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

6. Improving the energy efficiency of a property is more important than a change to its Market Value. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

7. I/We strongly considered the EPC rating of my/our property during our purchase. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

8. I/we would install energy efficient measures on my/our property if there were an opportunity to increase the property's Market Value. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

9. Energy efficient measures were a key factor/consideration when I/we purchased this property. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

10. I/We would likely increase an offer on a property if it were to have energy efficient measures installed. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

11. The current energy crisis has increased my/our consideration to install energy efficient measures to my/our property. (*Scale from Strongly disagree, Disagree, Neutral, Agree and Strongly Agree was provided)*

12. From the list of Energy Efficient Measures, please select any or additional measures you would consider installing to your property in the future. (*The list give in Appendix A was provided)*

Appendix D - Valuation Summary Table (EEMs Installed)

MV	PRV	% Change	£ Change	Cavity Wall Insulation	Loft Space Insulation	Internal Wall insulation	External Wall Insulation	Floor insulation	Double Glazing	Triple Glazing	Secondary Glazing	Solar Thermal Tubes	Heat Recovery Ventilation System	Solar Boosted Immersion	ASHP	Photovoltaic Panels	Battery Power Storage
£710,000.00	£690,000.00	3%	£20,000.00	■	■				■					■	■	■	
£625,000.00	£615,000.00	2%	£10,000.00	■	■					■					■	■	
£1,080,000.00	£1,065,000.00	1%	£15,000.00	■	■				■			■		■	■		
£915,000.00	£905,000.00	1%	£10,000.00	■	■				■					■	■	■	
£560,000.00	£550,000.00	2%	£10,000.00	■	■				■					■	■	■	
£430,000.00	£415,000.00	4%	£15,000.00		■				■						■	■	■
£660,000.00	£660,000.00	0%	£ -	■	■				■					■	■		
£395,000.00	£390,000.00	1%	£ 5,000.00	■	■	■			■						■	■	■
£900,000.00	£900,000.00	0%	£ -	■	■				■						■	■	
£700,000.00	£700,000.00	0%	£ -	■	■				■		■			■	■	■	
£310,000.00	£305,000.00	2%	£ 5,000.00	■	■			■	■	■					■	■	
£405,000.00	£385,000.00	5%	£20,000.00	■			■			■			■			■	
£685,000.00	£670,000.00	2%	£15,000.00		■			■	■	■		■	■		■	■	
£700,000.00	£700,000.00	0%	£ -	■	■				■						■	■	■
£870,000.00	£850,000.00	2%	£20,000.00	■	■		■	■					■	■		■	■

Appendix E – Table of References

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