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**Understanding the user in low energy housing:
a comparison of positivist and phenomenological approaches.**

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Abstract

This paper, based on UK practice, sets out a series of examples of previous studies of low energy housing and housing modernisation which illustrate the main approaches to studying housing and energy issues. The four approaches exemplified are technical assessments, building oriented research, people oriented research and in-depth qualitative studies, each of which sit at different points along a spectrum running from positivism to phenomenology, with the former two examples sitting further towards the positivist end and the latter two further towards phenomenology. Through an assessment of examples of each approach, we explore the argument that qualitative and discursive research methodologies have a useful role to play, complementing more quantitative approaches in the field of domestic energy. The paper supports this view, underlines the importance of triangulation and recognises the continuing relevance of studies of building performance. It goes further, however, by questioning which of these approaches should take priority. It is concluded that open-ended qualitative research, exemplified by phenomenological and hermeneutic traditions, are better equipped to investigate the home, as experienced and, in doing so, to identify the range of factors that influence domestic energy consumption.

Keywords:

low energy housing, phenomenology, positivism, the home.

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1. Introduction

The 2008 Climate Change Act established the world's first legally binding climate change target, aiming to reduce the United Kingdom's (UK) greenhouse gas emissions by at least 80% (from the 1990 baseline) by 2050 (UK Government, 2015). Domestic energy use is a major contributor to carbon emissions, currently accounting for more than a quarter of energy consumption in the UK, far outweighing the energy demands of both industry and transport (Palmer and Cooper, 2013). This situation is not unique to the UK: the energy and carbon burden associated with domestic dwellings is a global challenge and is critical to the attainment of policy agendas including carbon reduction, energy security, the eradication of fuel poverty and allied to this, the improvement of health and wellbeing (Ambrose, 2017). Improving the energy performance of domestic buildings is therefore an area where some of the greatest gains stand to be made in terms of carbon reduction and allied policy goals.

Ambitious carbon reduction targets require, in turn, large-scale investment in improving the energy performance of both the existing housing stock and new build, as well as evaluations of the impact of investment projects. Specific initiatives and exercises have been evaluated thoroughly, both in relation to their effectiveness in terms of reducing carbon emissions but also their acceptability to end users- a critical factor in their ultimate success (Faiers, Cook and Neame 2007; Goodchild et al 2014; Stevenson and Leaman 2010). The user perspective is, moreover, particularly important in low energy and low carbon housing, given the extent of change to the urban fabric and the likelihood of radical changes in the appearance of buildings, their technologies and layouts, both internal and external. As programmes increase in scale, their impact and social acceptability becomes more problematic, especially in the context of a diversity of residential communities and user groups, varying by age, class, ethnic group, biography and so forth. Generalisations made across so many fundamental social divisions are bound to be suspect (Lynch and Hack 1984, 69).

The literature on the user in building design, urban design and housing design is very extensive indeed and, in some cases, possesses a very long history. There is no single, specific gap to be plugged. Instead, as this article will seek to show, there is, rather a blank space in energy research, a space that needs to be explored and this is best done through conceptualising the basic approaches, whether discursive (qualitative) and interpretive or technical and statistical with reference to specific examples. Part of the aim of this paper is, therefore, to understand which approaches are best suited to understanding the user in low energy housing and whether some mixing of approaches is desirable. By user is meant the principal end user, usually the resident. By understanding is meant drawing out their actions and behaviour, their valuations and perceptions and experience, all of which are interrelated.

A previous review of social research into renewable energy technologies by Devine-Wright (2007, p.11) suggests that 'qualitative, visual and discursive research methodologies have a useful role to play, complementing more quantitative, empirical studies based upon questionnaire surveys.' The obvious implication is to argue for a pragmatic mixture of approaches, combining qualitative and quantitative data (Onwuegbuzie and Leech, 2002). Such is also the implication of methodological pluralism, with its insistence that findings generated by one method are triangulated against the findings generated by others. However,

methodological pluralism, complementarity and triangulation all beg the question as to which approach should offer the starting point and therefore have priority. The answer, presented here and based on the experience of researchers from different disciplinary backgrounds, is that qualitative methods should be given a greater priority and that triangulation raises issues of philosophy and methodology that have rarely been explicitly discussed in relation to studies of housing and energy (Ambrose, 2017).

The paper has three main sections. Section 2 is a review of the main conceptual approaches. Section 3 discusses the selection of examples of the main approaches and then goes through each example in detail. Section 4 draws on insights from these case studies and highlights some key lessons for research in the field of energy-related research in the context of housing and home.

2. The main conceptual approaches to studying user and home

In principle, in the assessment energy of energy use in the home, four different approaches may be identified, as follows:

- Technical assessments that examine the building performance evaluation of low energy housing;
- Building oriented research that examine the energy performance of new build houses in use and therefore give at least some consideration to the user;
- People-oriented surveys, often dealing with ratings of satisfaction in use and statistical analyses of these rating;
- In-depth qualitative studies of schemes on completion.

The four approaches can, in turn, be organised along two dimensions, as shown in the Diagram below.

Diagram: Classifying the different approaches

Technical assessments and building-oriented research are mostly positivist in character, though they vary in the extent that they include surveys of or discussions with people, both users and institutional actors. Positivist approaches are typically characterised by a focus on objects rather than the subjects. They assume that the researcher, the self, is detached from the object - the object (the world 'out there'); in addition, they commonly rely on quantitative research methods and technical instruments, including rating scales that seek to measure attitudes and are rooted in psychology and environmental psychology. If positivist studies engage with users at all, this is likely to be in a light touch manner and considerations of society or social practice are largely excluded. People-oriented surveys and in-depth qualitative studies conform, in varying degrees, to the tenets of phenomenology and other forms of interpretive research that involve the direct engagement with the user. Phenomenology can broadly be defined as 'the study of structures of consciousness as experienced from the first-person point of view' (Smith, 2011).

Approaches closer to positivism and allied to the tradition of environmental psychology are far more common in domestic energy research (illustrated here by the examples of 'technical

assessments and 'building oriented research'). This approach has been characterised by Shove (2010) as an 'ABC paradigm' that involves both a strategy for social change and a model of research. The ABC paradigm assumes that social change, in particular changes in consumption patterns, depends 'upon values and attitudes (the A), which are believed to drive the kinds of behaviour (the B) that individuals choose (the C) to adopt' (ibid, p.1274). At the same time, this paradigm seeks to explain behaviour (B) with reference to personal attitudinal variables (A) and contextual constraints (C). In others words, subscribers to this model believe that values and attitudes can be used to predict behaviour and choices within contextual constraints. Whatever the detailed variant, the ABC approach, like other positivist approaches, involves a separation of the subject (the self) from the object (the world 'out there') and tends to focus on the individual and the household (or on aggregates of these) rather than society or social practices.

In essence, the ABC paradigm is commonly associated with a highly quantitative methodology intended to reveal patterns of energy consumption and their determinants. To give a specific example: the UK government department formerly known as the Department of Energy and Climate Change (DECC) invested heavily in the preparation of a large-scale database, the National Energy Efficiency Data (NEED) Framework that covers millions of cases and enables a systematic examination between four variables, namely property types (age, form, size), the take-up of energy saving measures, household type (notably income) and the level of energy consumption (as recorded by energy companies) (DECC, 2011). Analysis of this database has in turn enabled an initial identification of the factors that predict low and high levels of energy consumption. The analysis has provided a global overview. The detailed and complex interactions between occupants and their homes and the routines of daily life and how these affect energy consumption have received much less attention from policy makers in their pursuit of models capable of prediction.

There are several reasons why the ABC paradigm and its positivist assumptions have proved so influential. First, the language of attitudes, behaviour and choice fits in well with the language of personal responsibility and therefore, with much of the discussion of environmental ethics and sustainability in business (Shove, ibid, P.1274). Second, the separation of object and subject aids simplicity and helps to identify design and technology as separate, independent variables. Thus, in the NEED database, different energy saving measures may be isolated to see whether and to what extent they are associated with reductions in energy consumption. Third, the positivist model aspires to prediction and generalisation and is therefore well suited to the demands of official research.

However, not all positivist studies within the field of housing energy can be characterised according to the ABC paradigm and building performance evaluation (illustrated in our examples by 'technical assessments') deserves a particular mention in this context. The typical building performance evaluation consists of a mixture of technical measurements (i.e. air tightness, u-values, thermal retention etc.), sometimes supplemented by a basic, standardised satisfaction survey and a 'walk through'. Proponents of this approach might argue that the walk through and associated observations cover phenomenology and that the satisfaction survey covers perceptions. However, the satisfaction survey is likely to be rigidly constructed using largely closed questions and will afford limited opportunity for the

respondent to elaborate their perspective and to explain their views (Furbey and Goodchild 1986a). The satisfaction survey does not, therefore, reflect the use of phenomenological assumptions in social research, though arguably it does correspond to how phenomenology has been interpreted or misinterpreted within architecture (Seamon, 2000a).

The main strength of building performance evaluation is therefore as a source of initial assurance that a building is performing as expected in a technical sense and for garnering initial insights into user satisfaction. The approach is, however, more limited in dealing with other types of research question. For example, due to the fact that it takes place at the beginning of a building's life, it cannot capture the user experience of living in a property over time (and any attitudinal changes that may occur over this period), nor can it hope to explore users' assessments of a building's performance in the role of home. In this sense, building performance evaluation fails to engage with important lessons from in-depth studies in housing studies which have revealed that occupants satisfaction with a property can operate independently of its physical characteristics (including design and technology) and are heavily influenced by demographic and economic factors, the surrounding neighbourhood, community and external spaces and by personal identity (Goodchild et al, 2014; Ambrose 2017; Kearns et al, 2000). Also worthy of note is the fact that these studies have also identified a reflexive relationship between occupant and home, whereby housing choices do not just reflect the identity of occupants but how the attitudes, practices and identities of occupants can also be shaped by their home over time (Goodchild et al, 2014, Ambrose, 2017). Recognising the complexities in the relationship between occupant and home identified by these studies, it is possible to argue that assessments of building performance should move beyond the treatment of the home as a physical container and recognise it as a place shaped by and understood through the personal and social characteristics of the occupants and their surroundings.

Towards the other end of the spectrum are the smaller numbers of studies rooted in phenomenology or, to be more accurate, in models of social research influenced by phenomenology (illustrated here by the examples of 'people oriented research and 'in-depth qualitative studies'). Phenomenological approaches seek to dissolve the distinction between subject and object and focus instead on the qualitative experience of being in places and spaces, including buildings and the home, recognising an 'undissolvable unity' between people and the world in which they live (Seamon, 2000b). The aim is to provide a far richer understanding of motives, rationales and routines than is possible in quantitative surveys (Furbey and Goodchild 1986a; Coatham and Jones, 2008). The main test of quality in this context, is whether research reveals subjective meanings associated with places, people and specific phenomena (Hastorf et al., 1970: cited by von Eckartsberg, 1978, p.187).

Phenomenology has long been characterised by a distinction between descriptive or existential approaches, on the one hand, and interpretive or hermeneutic approaches on the other (Alvesson and Sköldbberg 2008, 116-39). However, in contemporary social research, phenomenological approaches more typically subscribe to a mode of interpretation, described by Giddens (1984, 221) as 'double hermeneutics'. Conventional, single level hermeneutics involves the interpretation of a text or, in its architectural equivalent, first hand interpretations of buildings and landscapes, undertaking that interpretation in the light of a tradition of ideas

as well as through description and introspection analysis or 'reduction' to use the relevant phenomenological term. Double hermeneutics is different again, as it involves an interpretation of interpretations, for example the interpretation by a social researcher of the accounts provided by respondents in answers to questions or in diaries or focus groups. The usual source material comprises texts, statements and practices. However, visual representations, including the use of photographs and film, have also proved useful in revealing the meanings associated with the home and the urban landscape, (Knowles and Sweetman, 2004). For the most part, therefore, double hermeneutics, starts with and interprets the frames of meaning that people have already started to construct from their daily experience.

Phenomenological and qualitative researchers have been highly critical of positivist research for what they would regard as its artificial character and tendency to promote fragmented explanations, based on lists of variables. Furbey and Goodchild (1986a) argue that positivist surveys reduced people to objects, the passive recipients of an environment that is designed and developed by others. Seamon (1982, pp.120-121) criticises the reductionist nature of positivism evident in attempts to *'convert the so called subjectivity of behavioural and experiential processes into empirically measurable images, attitudes, preferences, territories [...] that can be identified and ordered in some regular matrix form, usually mathematical.'* Similarly, Coatham and Jones (2008) observe that research subjects are naturally inclined to express their experiences of regeneration as 'holistic visions' using 'emotive aesthetic reasoning' which cannot be captured by quantitative techniques. And, in a more recent critique, Boehm et al (2013) point to a clear preference for the positivist research paradigm amongst social policy makers based on a discernible belief that the most authoritative research is that which is objective, neutral and scientific. They warn that a reliance on positivist methods in isolation (especially large-scale surveys) within social policy risks reinforcing existing *"world views, power relations and a narrow construction of social issues."* (pp.309). They go on to argue that more 'open approaches' are required to capture the complexities of everyday life, yet are unlikely to be implemented given the dominance of particular epistemological leanings amongst the commissioners of social research.

Research approaches allied to phenomenology are not without their drawbacks, either. The first disadvantage is that qualitative methods are generally more expensive and do not represent a viable alternative to large-scale surveys where a large sample is required to generate statistically significant insights of the type that indicates the phenomena or change observed is 'real', rather than a random or chance fluctuation. Large scale surveys invariably use relatively closed questions in order to be manageable and enable a tabulation of the relationship between the personal characteristics of respondents (age, income level, ethnic background etc.) and their patterns of routine behaviour, expectations and preferences. The second reported disadvantage is that phenomenology is less helpful in terms of formulating predictions and is therefore 'less scientific' and useful. The phenomenological position is summarised by a remark of De Certeau and Giard ([1980] 1994) that, because everyday life conceals a multitude of diverse practices, its study can only aspire to a 'practical science of the specific' (De Certeau and Giard [1980] 1994). Yet a science of the specific might be considered a contradiction of terms. Positivist science is commonly said to involve the replicability of results and not specific interpretations. When the same events are repeated,

the outcomes should be the same (Eysenck, 2004, 8). Replicability allows prediction and provides an assurance of the reliability of the finding. The response of phenomenologists would be, following Schutz (1967), that a different type of replicability is possible in social research. Complete replicability is impossible as the response to questions is so variable. However, it is possible to make generalisations based on the expectations of the subjects in a specific context. The positivist critique assumes that general, context free knowledge is more valuable than concrete, contextually specific knowledge. The phenomenological response would be that it is the specific character of findings that increase their usefulness (Flyvbjerg, 2006) and that; in addition, well-conducted phenomenological research provides a degree of depth and understanding that allows the reader to interpret events and outcomes in a meaningful manner (Polkinghorne, 1983, p. 46). In any case, as is the method of grounded theory, generalizations may be formulated through the refinement and testing of ideas in a succession of different case study settings (Mjøset, 2005).

3. The examples

Rather than assert the strengths and weaknesses of the various approaches in a general manner, it is best to give some examples. There is a complication here, namely that building performance evaluations have, to an extent, moved away from narrow technical assessments that seek simply to assess the technical performance of a building once constructed (air tightness, u-values, thermal retention etc.) and to compare this against its design specification, perhaps with the supplementary use of a light touch occupant satisfaction questionnaire with closed questions. The performance gap, the gap between designed energy consumption and actual use after completion (Sunikka-Blank and Galvin, 2012), together with issues of social acceptability have led evaluations to consider the interaction between people and buildings in more depth, recognising that energy use is determined in part by human behaviour (Janda, 2011). Building performance evaluations have also evolved to incorporate techniques such as 'walk-throughs' (architects or other experts touring the building, offering a first-hand interpretation of the building sometimes on the basis of discussions with other experts), focus groups with occupants and surveys (Stevenson and Leaman 2010). The extent of non-technical evaluation varies substantially, however. For example, the main report of the UK government's flagship 'Building Performance Evaluation Programme' (Innovate UK 2016) says very little about the experience of living in low energy homes, even though the evaluation method involved the use of a standardised post-occupancy 'Building User Survey' (BUS) questionnaire.¹

As a result, as is shown in Diagram 2, it is possible to give examples of studies that illustrate the strengths and weaknesses of different approaches, using studies that are concerned with the modernisation of the housing stock as well as studies with a specific focus on low energy homes.

¹ The method is documented here:
'Building Performance Evaluation' available at the website of the National Energy Foundation
<http://www.nef.org.uk/service/search/result/building-performance-evaluation> (Accessed June 2017)
'BUS Methodology' available at the web site of the same name at
<http://www.busmethodology.org/history/> (Accessed June 2017)

Diagram 2: Illustrating the different approaches

Diagram 2 offers a series of examples within a typology of research methodologies. At the same time, the examples serve to illustrate the evolution of approaches to researching the home over a period of almost 40 years since the commencement of the English Housing Survey and its predecessors. Example 3, based on the English House Condition Survey, shows the typical approach to housing user research in the 1970s and 1980s, before the recent wave of energy related studies. It deals with the willingness and ability of owners to improve their property and is therefore of continuing relevance to energy research- for example the retrofitting of the existing stock. It also shows how systematic statistical analysis can find correlations and differences in attitudes towards home improvements and is a reminder, therefore, of the value of systematic survey research. It is a very large scale national survey of a type that only governments could probably organise and undertake.

The other examples are drawn from the authors' own published research over the last ten years. Examples 1 and 2 offer a classically positivist study of low energy homes. The first example illustrates a classic example of a building performance evaluation (or 'technical assessment') seeking to assess (through a series of technical measurements) the 'as built' technical performance of a purpose built low energy housing development, compared to its design specification. The second example illustrates 'building oriented research', providing a fairly typical example of a mainstream positivist approach using a mixture of quantitative and qualitative methods, but prioritising insights from the quantitative data. Example 4 illustrates 'in-depth qualitative studies' and draws on another, more recent example of housing modernisation, the Decent Homes programme operated by the UK government between 2001 and 2010. The Decent Home programme required all social housing units in England to be brought up to the Decent Homes Standard, defined as homes that were warm, weather tight and had modern facilities. The programme in the case study area involved the replacement of kitchens, bathrooms, windows and doors and new central heating systems. The study provides a rare example of a study of the user experience of housing that is rooted in phenomenological approaches

The authors come from different disciplinary backgrounds with two emanating from planning and housing studies and the other from building science and engineering, who have been brought together as part of a greater emphasis on interdisciplinary working in the field of housing and energy. None of them started their research careers looking at issues of housing in relation to energy consumption, but their research has evolved to encompass this as it is, in their view, the most important consideration for the future of housing. One of the authors entered the field a staunch positivist, while the other two had a more phenomenological leaning, but over time (and through exposure to each other's research) there has been some convergence. The examples therefore illustrate how their research approaches have evolved down two different tracks, neither of which has provided the 'whole picture' in terms of the technical, environmental, economic and psycho-social performance of housing initiatives (whether related to energy or not) and the factors underpinning this performance.

The four examples are presented in an order that starts with the most positivistic, most building oriented example and finishes with an example that most closely corresponds to a phenomenological, experiential method.

3.1 Example 1: building performance evaluation of a low energy housing scheme in South Yorkshire

This study, prepared as part of the evaluation programme of Innovate UK took place between 2010 and 2011 at a purpose built low-energy housing scheme in South Yorkshire and is published as part of the data exchange of that programme (Digital Catapult 2011). The study was conducted against the backdrop of the UK government's now defunct Zero Carbon Homes target (cancelled in 2015), the attainment of which relied, in part, on the elimination of heat loss mechanisms (Gorse et al, 2012) and in a context where the measurement of heat loss and air tightness of completed new-build properties generally showed that they underperform against their design specification.

Example 1 is typical of a building performance assessment, predominantly involved a taking a series of measurements (e.g. heat loss, air tightness, U-values, thermographic survey etc.) to enable a comparison of the 'as-designed' and the 'as built' performance of properties. The study also involved some additional elements that are less typical of a building performance evaluation, specifically discussions with stakeholders involved in the construction and project management process in order to explore the relationship between construction management processes and the as-built performance of a development. In doing this, the study demonstrated how construction management processes may influence as-built performance.

The quantitative, physical building performance tests in Example 1 were conducted prior to the properties being occupied. Conducting tests with residents in occupation simply raised too many obstacles - disruption to the residents, difficulties of access, the risk of disturbance to equipment and unstable testing assumptions. The obstacles were, moreover, too substantial to be resolved without the support of the commissioners of the research. Therefore qualitative in-depth research was not possible alongside the physical tests. Because the occupation of the case study scheme took place in stages, it was possible to use the standardised 'BUS' questionnaire on other occupied properties. However, the disjuncture between the study of building performance and the social survey, together with the brief character of the 'BUS' questionnaire form meant that the study failed to take account of the influence of human behaviour and choices on the performance of the building once occupied (Janda, 2011).

The eventual findings of the study were very positive and provided a rare example of a development which outperformed its design specification. There was therefore little incentive or motivation for the commissioners of the research to question the methodology or consider exploration of the user experiences.

3.2 Example 2: Evaluating the impact of retrofitting projects (building oriented research)

The second example study, conducted between 2007 and 2009, sought to evaluate two domestic renewable energy schemes- one of which was a retrofit scheme and the other part of a purpose built development- in terms of their impact on residents' energy consumption practices. The research was commissioned by a social housing agency and the report remains confidential to the client.

Broadly in line with the ABC paradigm identified by Shove (2003), this study sought to assess the extent to which the two schemes had achieved their objectives of encouraging residents' to adopt more sustainable lifestyles as indicated by a positive perception of their low energy property (satisfaction) (and the low energy technologies within it) and changes in their attitudes towards energy consumption and the extent to which improved attitudes translated into positive behavioural change and the adoption of other 'green practices' such as recycling, for example. It also sought to establish the extent to which any financial benefits observed by residents may help induce positive changes in their attitudes and behaviour regarding energy consumption. In common with Examples 3 and 4, this study is also broadly concerned with assessing the relationship between physical enhancements and the satisfaction, attitudes and behaviours of the occupants.

A closed or fixed answer questionnaire survey issued to 250 households formed the basis of the methodology, supplemented by short, semi-structured interviews with 30 participants in order to provide further insights into trends and contradictions revealed by the survey. The following extract, taken from the project report provides an example of how qualitative insights were used to provide possible explanations for trends identified by the survey:

"In [location removed], the questionnaire results suggested that a large majority of residents were satisfied with their solar panels, however the majority of residents hadn't seen any financial benefits from the installations. This could be attributed to a number of factors, including that the solar thermal system had only been recently installed, which means that residents had not had sufficient time to notice any year-on-year difference in their energy bills ("We've got big hopes for the summer months that the bills will be less")."

As this extract illustrates, findings from the survey are given precedence over the qualitative material primarily, as the report states, due to concerns that the remarks of a small number of residents are not always verifiable and do not necessarily represent the majority view. The emphasis in this study is therefore on the identification of generalizable findings about the impact of the technology on satisfaction, attitudes and behaviours which can be extrapolated with confidence.

It is important to bear in mind that the approach taken to this study was largely dictated by the relatively short period over which it was conducted and the more constrained resources at the researchers' disposal. These constraints reduced the scope to develop more innovative methods and to collect longitudinal data which would have enabled the identification of

changes in attitudes and behaviours over time as residents became more accustomed to the technology. In the face of constrained resources, the use of a questionnaire survey will nearly always represent the most expedient means of canvassing the views of a large sample of residents. The results from this study therefore represent a 'snapshot' of the experiences of a relatively small sample of residents at one particular point in time. The project report provides an example of the conventional juxtaposition of statistical analysis presented in charts and supplemented with short quotes which is typical of positivist studies.

Despite these constraints, the study succeeded in revealing some insights into the impact of the low energy technology found within the properties on occupants' attitudes and behaviours in relation to energy consumption. However, there are some obvious weaknesses to this approach. Most notably, this methodology was 'light touch' and only capable of identifying broad impacts of the intervention and establishing overall levels of satisfaction. Whilst this approach is not a problem in itself, it is possible to see how, had the research team had the opportunity to adopt a more probing and participatory approach it would have been possible to address some of the unanswered or partially answered questions raised by the study. For example, the study revealed that many of the residents surveyed found the low energy technology within the home difficult to operate- a major barrier to realising the full potential of these technologies and one which warrants a full investigation of the user experience.

3.3. Example 3: A national housing survey (people oriented survey)

For governments committed to improving the quality of the housing stock it is important to understand why owners (whether private landlords or home owners) fail to improve or invest in their stock. This became a pertinent question in England from the mid 1970's as policy shifted away from a presumption in favour of the demolition of poor quality housing and towards renewal (Davidson, 1995). This remains a prominent policy dilemma to this day as policy makers attempt (with limited success) to devise regulations and incentives to encourage private landlords and home owners to invest in energy efficiency measures (Ambrose, 2015, 2017). Identifying the barriers to greater investment in the housing stock was the task of the first social questionnaire surveys attached to the English Housing Condition Survey (EHCS) from 1976 onwards. Prior to this the EHCS had not sought the views of occupants, relying instead on technical assessments of the fitness of dwellings made by professional surveyors.

The first of these surveys in 1976 provided some insights into the problem. Those living in poor quality dwellings seemed to accept poor conditions as inevitable and had a consistently more favourable view of their home than that of the professional surveyors and were less willing to recognise its defects. The reports of the 1981, 1986 and 1991 surveys contain similar, but less detailed findings. Subsequent, more in-depth qualitative case study work was independently undertaken during the 1980s to provide greater insight into this persistent problem: see for example the work conducted with older households and the agencies working with them by Niner and Forrest, 1982, 113-115 and Wheeler 1985. These studies built upon the initial insights garnered by the EHCS and revealed a greater level of complexity to older people's reluctance to invest in their homes. For example, it was revealed that as people age, they are less able to tolerate the disruption associated with building work;

they have less energy to organise the work and to cope with building contractors; they are often highly cautious in borrowing money for home improvements and, finally, they are worried about the poor quality of building work. Thus, between the survey- which established the existence of the problem- and the later qualitative work, something closer to the 'whole picture' was achieved.

The example illustrates how the full breadth and complexity of the factors influencing older people's resistance to investing in their homes was only revealed by a combination of a large-scale survey and the in-depth qualitative case study research which (independently) followed. Taken together the combinations of studies exemplify the benefits of triangulation. The EHCS revealed resistance to investment on the part of older people as a widespread issue and due to the sample size achieved by a national survey such as the EHCS, placed this issue firmly on the research agenda. Thus, the role of large scale surveys in determining how widely experienced general patterns of behaviour are is underlined, as is their role in providing a frame for more detailed qualitative investigation which reveals a fuller understanding of the processes at work (Devine-Wright, 2007).

3.4 Example 4: Evaluating local implementation of the Decent Homes Programme (in-depth qualitative study)

The third study, published in report form as Hickman et al (2011), was concerned with establishing the impact of a comprehensive programme of housing modernization undertaken in two neighbourhoods in West Yorkshire (the study area), particularly in relation to the satisfaction of residents. Under this programme all properties received, as a minimum, new kitchens, bathrooms, central heating systems, and replacement windows. The study was conducted between 2007 and 2011. The commissioners of the research- a social housing agency, were keen to understand the impact of the housing modernisation on tenants. As such, they were more open to methodological innovation than commissioners of social policy research might usually be (Boehm et al, 2013) and accepted the need for a longitudinal approach in order to capture change over time. The potential for the study to generate rich material which would help them to justify their investment in the modernisation programme was a tacit driver here. The researchers were therefore given a mandate to develop a research approach which put residents at the heart of the research process and to track outcomes and changes in attitudes towards the home at the level of the individual and household over time.

In order to establish the most detailed insights into the impact of the programme, a multi-method approach was developed comprising a range of innovative, non-traditional research instruments allied to phenomenology, including diary keeping (residents recorded their activities and experiences of the home over two weeks- the exercise was repeated bi-annually), film making (featuring residents talking about their homes before, during and after modernisation) and photo elicitation exercises (residents were given cameras to record likes and dislikes about their home and neighbourhood. The images were used as the basis for an in-depth interview). Around 100 in-depth interviews with residents were conducted over the course of the study and a panel of 20 households were also interviewed each year for four years- providing a longitudinal sample. These 'deep qualitative' methods were supplemented

with a range of traditional research instruments, including: a longitudinal questionnaire surveys, in depth interviews and secondary data analysis.

The employment of these non-traditional instruments-so seldom used in policy evaluation-stemmed from the realisation that in order to truly capture the impact of the modernisation programme on residents, it was necessary to enable them to tell their own story. The intention being that insights garnered in this way would be triangulated with data generated using more traditional methods which offer the opportunity to establish overall levels of satisfaction across the study area and to contextualise and test the extent to which the findings garnered from non-traditional research methods could be extrapolated to the rest of the study area.

Overall, this combination of methods proved effective in identifying a wide range of impacts associated with the modernisation programme and moreover, generating a wealth of rich visual and written material detailing the impact of the programme 'first hand'. This material enabled the study team to provide a rich illustration of these results through residents' rich narrative and visual accounts of the programme as well as explaining the area wide trends of increased housing satisfaction garnered from the longitudinal questionnaire survey.

Each of the different methods, such as diary keeping and photography exercises had an individual value. For example, the diaries indicated where people went and how they spent their time. The excerpts illustrated in Figure 2 below show how socialising with friends breaks up the monotony of daily life.

Figure 1:
Examples of diary entries

Likewise the photographs indicated likes and dislikes, as shown in Figure 3 below. Residents commonly point to the mundane features of the external environment such as greenery (invariably liked), well maintained gardens and houses (also liked), boarded up property and potholes in the street (signs of neglect which are invariable disliked). In relation to the interior of the homes, newly modernised kitchens stood out as well liked.

Figure 2:
Illustrating likes and dislikes

Sometimes, in addition, the photographs and diaries are used together by respondents to provide a narrative or 'photo novella' of events or routines, as in the following extract where a boy talked about taking his dog to a memorial garden and then to a viewpoint.

Figure 3:
Diary and photographs combined

The non-traditional instruments were particularly effective in drawing out the range of factors influencing perceptions of and satisfaction with the home, some of which were quite

unanticipated. For example, the quality of the broader neighbourhood and its setting came out strongly as an influence on perceptions of home, even though the external environment was outside of the modernisation programme. Changes in behaviour resulting from increased levels of satisfaction were also revealed. Again, some were unanticipated by the researchers. Photographs of ambitious DIY projects helped identify a trend towards greater investment (time and money) in the maintenance and enhancement of the homes and a greater level of pride in the property.

In-depth interviews, conducted with a longitudinal sample of households, revealed that shifts in residents' attitudes towards the home were not just evident on a functional level, but also on a psycho-social and emotional level. In the years following the modernisation of their homes, a discernible shift occurred in the discourse residents used in relation to their property, describing it less often as merely a house that they rented from someone else and more often as a 'home' that belonged to them. This phenomenon was particularly discernible amongst longitudinal respondents who participated in the film making and photography exercises and emerged gradually over time suggesting that had a longitudinal approach and the use of visual methods not been employed, these more subtle emotional impacts may not have been captured.

4. Reflections on the strengths and weaknesses of different approaches

These four examples exemplify the reality of conducting research into the relationship between occupant and home and the pragmatic approaches to such research necessitated by limited budgets and short timescales and how this can often result in default to dominant research paradigms (Onwuegbuzie and Leech, 2002). Examples 1 and 2 were developed to respond quickly to tightly defined research questions and did not have the same temporal or financial resources at their disposal as Examples 3 and 4, leading to the development of more expedient positivist methodologies. Example 3 emerged from a national programme of housing improvement and was concerned with monitoring its impact and effectiveness on mass scale. Example 4, in contrast, was conducted in a conducive context where the client's interest in establishing the residents' perspective led the study team towards a phenomenological approach. It is clear that each of the main approaches have their strengths and limitations.

Studies embedded in phenomenological and qualitative research traditions explicitly attempt to produce richer narrative data, exposing the 'emotive-aesthetic reasoning' of residents and thus revealing deeper insights into the complexities and nuances of the relationship between user and environment (Coatham and Jones, 2008, Ambrose 2017). Longitudinal and participatory studies are particularly useful in revealing the changing meaning of the home and merit more frequent use, despite their additional costs. The qualitative, phenomenological tradition also allows respondents relative freedom to express their feelings. Applied to low energy housing or housing modernisation, the result is to place specific technical measures in a broader context of the home and the local environment. Residents assess the impact of interventions in the home both separately and in terms of their contribution to a total package or 'holistic vision' of the home (Coatham and Jones, 2008). Images and experiences of the

home are therefore likely, in part, to mould public acceptance of energy saving measures as well as other innovative technologies.

Positivist studies which prioritise technical assessments or the collection of quantitative data, usually generated by questionnaire surveys, offer an effective solution to the need to canvass the views of a large number of people quite quickly and cost effectively and to identify generalizable trends. However, such studies commonly suffer from the partial and fragmented answers that typically emerge from a closed questionnaire survey or a one-off technical assessment conducted at a particular point in time. The survey documented in Example 3 demonstrates the point exactly. The survey was able to identify an issue, namely the ability and motivation of elderly owner-occupiers to invest in their homes. Providing a better understanding required other, more detailed case studies. The limitations of questionnaire surveys can nevertheless be overcome, to some extent, by the incorporation of supplementary qualitative data collection as illustrated by Example 2, dealing specifically with low energy housing.

In all examples, the importance of triangulation between approaches allied to positivism and those closer to phenomenology is underlined, particularly in terms of the capacity this creates to combine statistically robust insights into how widespread particular beliefs or phenomena are with detailed understandings of the factors underpinning these trends and their drivers (Devine-Wright, 2007). However, the advocacy of methodological pluralism avoids the question as to which approach should have priority- a question considered in the final section of this paper.

5. Conclusions

Although we are now witnessing increasing recognition of the need for a greater degree of methodological pluralism in research into domestic energy efficiency in general and low energy homes in particular, there remains a reluctance to fully acknowledge the validity of qualitative social research in this context. The examples set out in this paper help to make the case for the prioritisation of qualitative methods in domestic energy research. This is not to advocate the cessation of building performance studies or large-scale surveys. Data has to be interpreted, however, and interpretation requires a qualitative understanding of the context and of the user's response.

The paper ultimately advocates a move away from the assumption that the primary role of qualitative methods is as a supplement to quantitative surveys and provides material to illustrate the deeper level of understanding of the relationship between user and home that can be achieved through a more discursive qualitative approach. The prioritisation of qualitative research methods and the achievement of these deeper and more nuanced insights will be particularly important in rebalancing energy research in buildings and the home, moving further away from the long-standing dominance of technical evaluation and quantitative survey methods, as identified by Stevenson and Leaman (2010), Boehm et al (2013) and others. Positivist, building-oriented approaches do not deal with the experience of the home as a place to live and fail to appreciate either the sheer complexity of the challenge of improving domestic energy efficiency or the web of social, technical and economic factors

that must be navigated by anyone seeking to do so. Nevertheless, positivist, building-oriented approaches have other strengths in providing detailed data on energy consumption. Therefore, as is an implication of the limitations of Example 1, it would be desirable to provide a more direct and co-ordinated link between social survey and interview research and the physical measurement of energy consumption within the home.

As is shown in Example 4, the relationship between the home and its occupants is also emotional as well as practical and technical and that physical interventions and material changes in the home can have far reaching consequences, including for our social and emotional wellbeing. These findings support the phenomenological position that people and their physical world have to be considered together and often change together. These consequences could not have been identified in their entirety and certainly could not have been fully understood through a survey approach alone and would not have been detectable at all within the results of a technical assessment. It is therefore possible to appreciate how open-ended qualitative research, exemplified by phenomenological and hermeneutic traditions, are better equipped to help us identify the range of factors that influence attitudes, behaviour and choices in a particular case. Indeed, it is difficult to see how quantitative studies could even hope to identify the key issues without careful pilot studies in advance, guiding the questions that are to be asked. Researchers have to approach the subject matter with some form of pre-understanding based on their prior experience or discussions with significant actors. In addition, the very interpretation of quantitative questionnaire surveys is likely to depend on the simultaneous use of qualitative material, drawn either from within the survey by open questions or by the use of other parallel methods such as focus groups.

In terms of the implications of the arguments made within this paper for the evolution of domestic energy research and the study of low energy housing, it is our hope that we succeeded in highlighting the significant contribution that more discursive, qualitative methods can make, challenging the idea that they should merely complement quantitative surveys. Moreover, the acceptance of this message should not just be evident in pragmatic choices made by domestic energy researchers when designing methodologies but should also be reflected in a greater level of explicit debate regarding the epistemology and ontology of domestic energy research.

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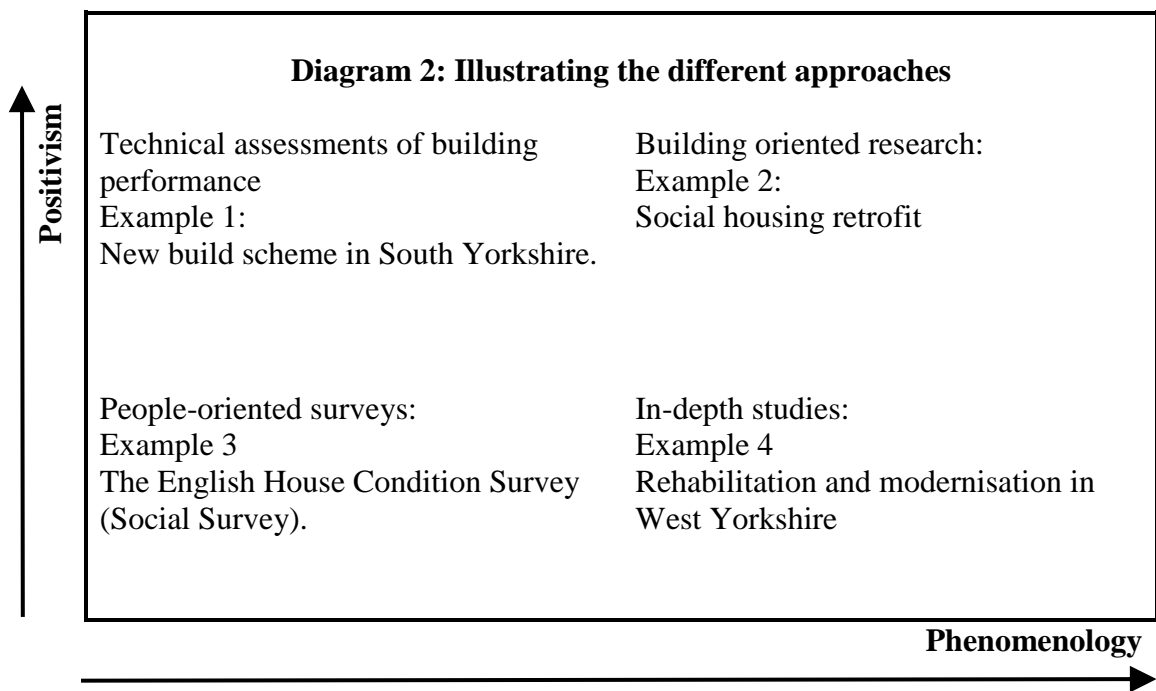
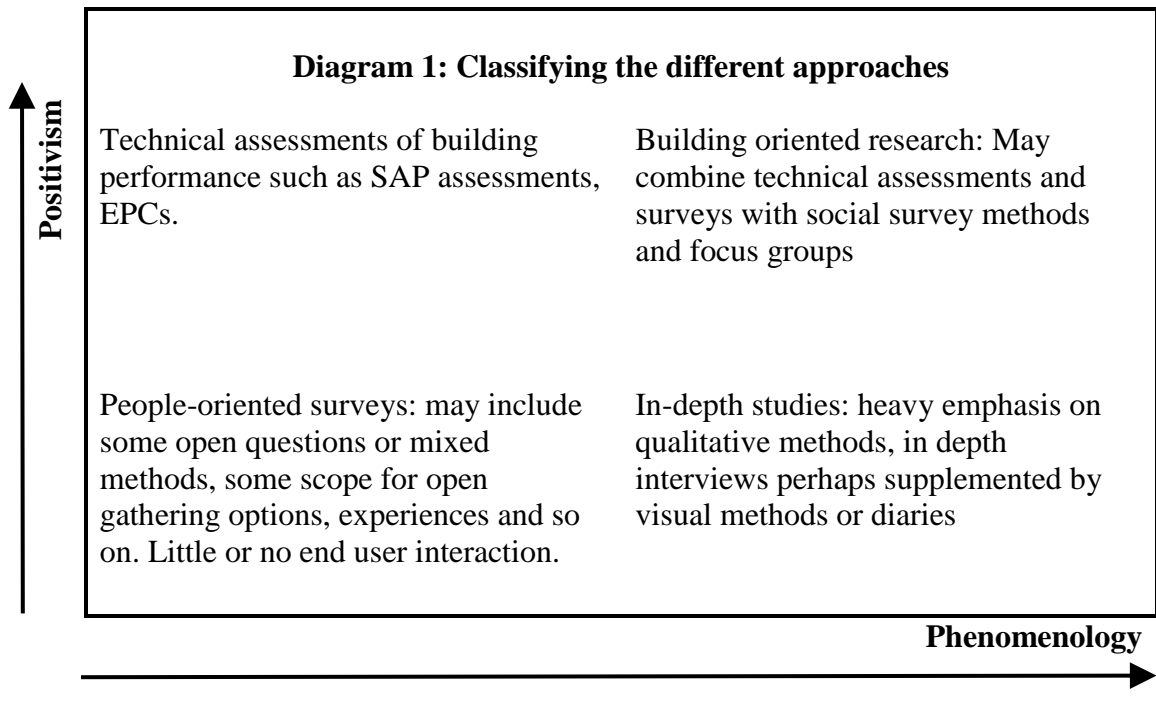


Figure 1
Examples of diary entries

Monday	
1. Activities	
<ul style="list-style-type: none"> What did you do today? (Please remember to include your feelings about what you did) 	
For example, places you went to, people you met, things you did.	
<p>On Monday, I went to have a look what was going on at the cafe. Until I met one of my friends, who was doing volunteering work by helping the soul potterers. After that I went to her house and played on the computer with her. (this soul potterers only happens once a year so there is no point</p>	
2. Your thoughts on today as a whole	
Thinking about your day was it a good, bad or okay day?	
good.	
Why do you think this?	
<p>it was interesting by seeing what was happening at the cafe plus when I went to her house and she said like playing I...</p>	

Continue on the back of the page, if necessary

... Was delighted.

To protect anonymity, references to the names of people have been deleted.

Friday	
1. Activities	
<ul style="list-style-type: none"> What did you do today? (Please include your feelings about what you did) 	
For example, places you went to, people you met, things you did.	
<p>On Friday it was like every other day. I am starting to feel like and my home is like the only entertainment I have. Later on today and guess what I went to</p>	

2. Likes and dislikes

Thinking about your day was it a good, bad or okay day?

good

Why do you think this?

it's always a good day to see you friend's house.

Figure 2
Illustrating likes and dislikes

like



dislike



Figure 3
Diary and photographs combined

Monday 30th July
1. Activities
<ul style="list-style-type: none"> • What did you do today? (Please remember to include your feelings about what you did)
For example, places you went to, people you met, things you did.
<p>My mum and I took my dog Sandy for a walk. We went first to the Phillip Bennet's memorial garden (this was done by the kids of Portobello in memory of Phillip who died age 12 from meningitis). I like it here as you can see for miles, even as far as the Emlymoor mark. We then went to the field to let Sandy have a run.</p> <p>One thing I don't like about Portobello is the vandalism, I've taken a photo of the phone box near us covered in paint and the door ripped off. Also Jacque came round.</p>
2. Your thoughts on today as a whole
Thinking about your day was it a good, bad or okay day?
<p>Why do you think this?</p>

Continue on the back of the page, if necessary

To protect anonymity, references to the names of people have been deleted.

