Shaping consumer energy advice to achieve energy and climate targets

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Abstract

The European Union has climate and energy targets for 2020 and 2030 that include an indicative target for energy savings. In November 2016, the European Commission launched its proposals for a new energy package, to include a binding energy efficiency target of 30 % by 2030. The three headline goals of the new package entitled 'Clean Energy for All Europeans' are: putting energy efficiency first, achieving global leadership in renewable energies and providing a fair deal for consumers.

In moving from a model focussed on energy supply solutions to one that gives priority to reducing/managing demand, the consumer is placed firmly at the centre of the market. The reliance in this new decentralised model on large numbers of individual actions by consumers creates a huge need for consumer information, advice and support. The emphasis must be on ensuring consumers have the right tools and information to make appropriate decisions on energy renovations, and are supported to take these decisions through to action. Consumer advisory services can help to: create consumer awareness that leads to increased demand for ambitious energy renovations, overcome market barriers and distortions from a malfunctioning market, secure actual delivered energy and carbon savings, and address social inclusion and fairness.

It is argued that in order to be effective in supporting consumers to achieve deep energy renovations, advisory services must be expert, impartial, accessible and practical. The advice provided needs to cover a range of technical, financial and behavioural issues, and cannot be delivered effectively through a remote and depersonalised approach. Based both on practical delivery experience and recent research studies (both in Europe and throughout the OECD), a model for delivery is suggested, with local or regional hubs for consumer contact, and the inclusion of a practical long term plan for the renovation of each building. The latter takes account of the likelihood for many buildings that a deep renovation will be staged over time, and integrated with other repair, maintenance and improvement works.

Introduction

Against a background of climate and energy targets and the wider context of Europe's transition to a competitive low carbon economy, secure in its supply of energy, the EU created the Energy Union, which is based on the three long-established objectives of EU energy policy: security of supply, sustainability and competitiveness (EC, 2017). To reach these objectives, the Energy Union focuses on five mutually supportive dimensions (the pillars): energy security, the internal energy market, energy efficiency, decarbonisation of the economy, and research, innovation and competitiveness. In November 2016, the European Commission published the 'Winter Package' proposals for 'Clean Energy for All Europeans', with three headline goals: putting energy efficiency first, achieving global leadership in renewable energies and providing a fair deal for consumers. The first of these is supported by the introduction of a new binding EU energy efficiency target of 30 % by 2030 (EC, 2016a).

Perhaps the most significant opportunity to deliver energy savings in Europe is in its building stock, with the sector accounting for 40 % of total energy consumption, and 75 % of buildings considered to be energy inefficient (ibid). This potential has already been acknowledged in several framework Directives that focus on energy use and renewable energy potential in buildings, but in light of the scale of the challenge, there are many arguing for a more ambitious approach to building renovation (Economidou et al, 2011; JRC, 2015; Saheb, 2016). The 'Winter Package' communication acknowledges that at today's rate of renovating only around 1 % of buildings a year, it would take a century to upgrade the stock to modern near-zero energy levels (JRC, 2015).

This paper reviews the fundamental role of energy advisory services in achieving building energy renovations, drawing upon both practical delivery experience and recent research studies (both in Europe and throughout the OECD). A model for delivery is suggested, taking into account the need for deep renovation, and that for many buildings this may be staged over time, and integrated with other repair, maintenance and improvement works. Reference to energy advice and information in current policy is reviewed, and recommendations made for strengthening their role. The focus is on the residential sector and, where appropriate, non-industrial SMEs, as these two consumer groups share many of the same energy performance concerns, such as thermal insulation, heating and cooling to provide comfort conditions for occupants, ventilation and lighting. Both sectors are characterised by a plethora of small, disconnected and diverse actors. The authors are independent consultants collaborating through an informal group, the Energy Advice Exchange.

Why energy advice matters

To achieve the transition to an 'Efficiency First' model that delivers deep efficiency savings from our building stock, considerable barriers must be overcome, many directly relating to consumer behaviour. The reliance in this new decentralised model on large numbers of individual actions creates a huge need for consumer information, advice and support. The consumer might be a building resident (whether owner-occupier or tenant), landlord or facility manager. In 2012 more than 70 % of the European population were owner-occupiers, making this category of consumers a key group of decision-makers in the journey towards a lower carbon future (JRC, 2015). As building owners, it is they who ultimately decide when and how to renovate, and how ambitious to be about energy improvements.

Effective advisory services can help to: create consumer awareness that leads to increased demand for ambitious energy renovations, overcome market barriers and distortions from a malfunctioning market, secure actual delivered energy and carbon savings, and address social inclusion and fairness (EEPH, 2002 & 2004; Green et al, 1998; Boardman and Darby, 2000; Janssen et al, 2016; Maby et al, 2007). With this in mind, the lack of clarity on requirements for advisory services for consumers within the EU energy efficiency policy framework is a matter for concern (Janssen et al, 2016). The launch of the 'Winter Package', including recommendations for specific changes to both the 2012 Energy Efficiency Directive and the 2010 Energy Performance of Buildings Directive, provides a key opportunity to address this issue more effectively (EC, 2016 a, b and c).

Not only are EU Member States not (yet) undertaking enough energy renovations, it is also clear that renovations will need ultimately to achieve much deeper energy demand and carbon emission reductions if targets are to be reached. To drastically reduce the energy use of the existing stock, ambitious energy renovations must be delivered, and on a large scale (Economidou et al, 2011; JRC, 2015; Saheb, 2016). That means we need a much more holistic approach addressing the building envelope, the heating and cooling systems, lighting and fixed appliances, opportunities for renewable heat and power and integrating smart appliances, systems and controls. EU renovation strategies needs to go beyond "cherry picking" just those measures offering a quick return on investment. The decisions to be made can be technically challenging to understand and there may be multiple options to consider, while the measures for deep renovation are ideally seen as an integrated whole, both in terms of design and investment. This adds a level of complexity that needs to be better explained to consumers if they are to make the decision to undertake a deep renovation. From the consumer's perspective – in particular, the building owner – this is a major step change and a significant investment.

If the consumer is confused, not convinced about the recommended actions or does not know where to go for programme support (such as financial subsidies that may be available), they may do nothing.

The state of the art in energy advice provision

Energy advice has been provided in some form in most EU countries for many years, in some cases going back as far as the oil crises of the 1970s - so a body of experience exists (IEA, 1987; PREDAC, 2003; Praznik, 2013; Timmins, 2001, Maby et al, 2007, Green et al, 1994). With minimal published data on service delivery and outcomes, however, there is little consolidated understanding of what energy advisory services can achieve in practice, and how (Maby et al, 2007; ECEEE, 2016). Notwithstanding some exemplary programmes, there is also little evidence that energy advisory services in general across the EU are sufficient to support the scale of ambitious renovations that need to be delivered. There is a risk that this type of 'soft' service is taken for granted and not adequately planned or resourced, and in times of economic constraint may be an early casualty of cuts.

WHAT IS ENERGY ADVICE?

A feature of the debate around energy advisory services is the wide range of interpretations of what 'energy advice' means in practice. This lack of an agreed-upon definition leads to significant misunderstandings as to what is and is not being provided, what can be achieved by these services, and what resources are required to provide them. The lack of clarity is reflected in energy efficiency policy documents, such as the proposals for revisions to the Energy Efficiency Directive and Energy Performance of Buildings Directive (EC, 2016 b and c) which make reference to aspects of advisory services in various ways, using terms such as promotion, stimulation (to take action),

Table 1. Working definitions of terms used in relation to energy advisory services.

Activity	Working definition	Examples
Awareness-raising	Generating interest and imparting a generalised level of knowledge of the benefits of, and potential for, improved energy efficiency through behaviour change and technical measures.	Media campaigns, shows and events, competitions, direct mailing, advertisements, referrals by intermediaries and from other services.
Information	Explanation of problems with regard to energy use and energy efficiency, and relevant actions with general applicability to any situation and consumer.	Leaflets, websites, fact-sheets, guidebooks.
Advice	Guidance on actions to improve energy efficiency tailored to needs of specific building, consumer and/or situation, and requiring some level of interaction between advisor and consumer.	Dialogue by telephone, e-mail, interactive website, interview in advice centre or on site, advice stands in public places, written reports with specific, tailored recommendations.
Education and training	Raising level of knowledge of energy efficiency with a longer term perspective – not necessarily to stimulate immediate action.	Inclusion in school or further education curricula, professional or vocational training, community based adult education.

education and training, awareness-raising, information, and advice. There is also a degree of confusion and potential overlap between advisory services, energy audits, and Energy Performance Certificates. Furthermore, energy advisory services may also be conflated with technical consultancy and energy management services.

The most extensive review of European energy advisory services is the 2007 study carried out by the SErENADE (Sharing Expertise in Energy Advice Across Europe) project, supported by the Intelligent Energy Europe programme of the European Commission (Maby et al, 2007). The project developed working definitions as a basis for a review of energy advice in EU Member States. These definitions help to clarify what is being delivered in practice – and hence what may not be covered, and have been adapted in Table 1.

The difference between awareness, information, and advice can also be illustrated on a spectrum from broad, generic messaging through to full support in both decision-making and implementation – with practical assistance in implementing renovation added as a further element (eceee, 2016).

HOW CAN ENERGY ADVICE BE DELIVERED IN PRACTICE?

In order to understand the detail involved in establishing and running energy advisory services, a breakdown of the different elements of delivery has been developed in Table 2. Some aspects of the characteristics described here are developed further in the next section as issues affecting the delivery of energy advisory services.

Key issues in delivering energy advisory services

There are several key issues that arise when reflecting on the importance of advice and how it should be provided, in order to fully support consumers to achieve deep energy renovation of existing buildings.

WHAT ADVICE DO CONSUMERS NEED TO ACHIEVE DEEP LOW CARBON BUILDING RENOVATION?

In defining the type and level of advice service needed by consumers, it is necessary to start with a clear understanding of what macro outcomes are desired. If the starting point is the step change we need to achieve in building renovation, consumers need to be able to take action on achieving the best possible level of energy improvement to every aspect of the building, as well as adjusting to an optimum level of efficiency in user behaviour, and incorporating smart technologies and enabling interaction with the energy network.

This means that cherry picking only the quick return measures is not enough. It could in fact be damaging, in that it leaves the most difficult work to do later – when it may be even more difficult and expensive. A less than comprehensive approach to the building fabric can also introduce new problems, such as poor ventilation, damp from condensation, or over-heating. Advice therefore needs to encourage and enable a holistic approach to the building and its use, with a long-term aim of transformation to a nearly zero energy, smart, building. This may well include technical advice, help with sourcing suppliers and installers, and in sourcing finance for measures. It may involve knowledge of local services, building codes and planning regulations.

Advice needs to cover all relevant technologies, and ideally commercially impartial to be credible. Distinctions between types of technology tend to be of more relevance to the provider than the customer, whereas advice needs to cater for all the building energy service needs (heating, cooling, hot water, lighting, cooking, laundry, ICT, entertainment) rather than be defined by industry silos such as energy efficiency versus renewables.

Any advice work must be bounded in some way – and customers reaching the boundaries of the service should not be left unsure of where to go next, but referred on appropriately. One of the boundaries to be aware of is where advice stops and design and specification start: for example, the precise products, materials and dimensions within a renovation.

A related issue is the need to look at the 'whole house' as an integrated system of building fabric, services and users, with different measures taken impacting on each other and the whole system. Given that humans live there, it cannot be a perfectly controlled system, and effective solutions cannot be just a 'technical fix' that does not take account of the occupants. Judson and Maller (Judson and Maller, 2014) argue that "Current policies and programmes focused on technical interventions to improve energy efficiency will have limited reach and impact. Instead, it is suggested, among other interventions, that policies to reduce the environmental impact of housing should be reframed around and positioned to address the mundane practices of everyday life."

Table 2. Energy advice – elements of delivery.

Element	Description
Purpose	Key aims and objectives of advice service, for example: Reducing energy consumption Reducing carbon dioxide emissions and other environmental impacts Improving indoor comfort and indoor environment Achieving socio-economic benefits through: Reducing the costs of energy to consumers Alleviating and avoiding the risk of fuel poverty Creating /maintaining jobs in delivering energy efficiency work/related services
Target Audience	Geographical: range from a local community through to a regional, national, international. By sector, and by segmentation of sectors, for example: **Households:** ***Tenure:*** owner occupied, private rented, social housing, residential: care homes and hostels, temporary accommodation ***Household characteristics:*** Number and ages of household members, income and savings, permanence, health, occupations ***Structure:*** single or two family home, apartments/multi family home, house in multiple occupation (individual room rentals with shared facilities such as kitchen and bathroom) **SMEs:** offices, manufacturing, retail outlets, services By built form or technology, for example: **Buildings**: ***Built form:*** detached or semi-detached houses, terraced houses, apartments ***Age of building*** ***Energy performance of building*** **Building systems:** heating, cooling, hot water, micro-generation, cogeneration **Electrical appliances**: lighting, refrigeration, cooking, ICT **Business and industry**: specific energy consuming processes and services, ranging from manufacture to services such as hairdressing, car mechanics, refrigeration for food retail.
Delivery method	Examples of the range of approaches used include: Written information sent out with energy bills; Telephone helplines; E-mail or web-based enquiry services; Face-to-face advice in advice centres, stands in public spaces such as trade fairs, shopping malls or the public spaces within municipal buildings; Home visit personalised advice; Energy audits and surveys, involving site visit and quantification – with written reports ranging from basic summary to a detailed action plan to take the building closer to near zero carbon over time; Systems for monitoring and feedback on consumption, peer support and motivational messaging – targeted to supporting user behaviour and adaptation.
Process, structure and links to other programmes and services	Linked to the varying levels of provision above is the specifics of what is provided in practice – in particular whether advice is: A single contact or multi-stage; Formulaic approach (such as set questionnaire or survey process) or client-led interaction; Focussed on the installation of measures or behavioural – or both Stand-alone service or part of something broader, for example: Linked to a provider of finance for measures Provided by a supplier of energy efficiency products or services Part of a wider sustainability approach Linked to housing provision Part of a broader consumer or citizen advice programme Part of a programme focussed on lower income or otherwise vulnerable consumers including welfare benefits, tariffs, supplier switching advice Part of a one-stop-shop approach combining several of the above.

This leads directly on to the question of the level and depth of advice delivered. This might range from a front-line service which, through answers to simple questions, simply 'signposts' on to more specialist support, to detailed technical surveys, support through the process of getting works done and medium to long term user behaviour change programmes. Another aspect of the level and depth of advice required is the degree of knowledge of the consumer in question, and how the advice being given fits within the broader spectrum of support. In relation to building renovation, for example, there may be several 'key actors' involved including general and specialist building trades, technicians, designers and/or architects, surveyors, suppliers of materials, products and equipment, building inspectors, planning or buildings development control officials, as well as the building owner or manager. Another factor influencing the depth of advice needed will be the source of finance for the renovation, which may carry its own requirements and restrictions.

WHAT ARE THE TIMING ISSUES AND TRIGGER POINTS FOR ENERGY RENOVATION?

There are a number of things to consider in relation to the timing (and time required) for renovation advice. Firstly, the advice that is needed is unlikely to be just a one-off event (such as a single call to a helpline, or even an audit visit to a site). A building owner has a journey to take to carry out a renovation, and advice and support may be needed at several stages through this journey, from an initial raising of awareness through identification of measures appropriate for the building in question, reviewing the costs and benefits of these, working out how and when to do them, and adjusting user behaviour to maximise the positive impact.

Supporting behaviour change is in itself not a one-off event, but needs to be built into policy and programmes for the ongoing motivation and support for energy efficient user behaviour and maintaining it. Support for maintaining behaviours might include clear and understandable feedback on consumption and changes to consumption, benchmarking against similar consumers, motivational messaging and the opportunity for further advice and information, all of which may be linked to the delivery of energy advisory services (Darnton, 2004; Martiskainen, 2007; Phillips and Rowley, 2011).

Secondly, the prioritisation of, and order in which measures are taken is unlikely to be based only on the costs and benefits of the individual measures. Other factors include fitting around on-going use of the building and the ability of the occupants to adapt as works are done, the availability of finance, comfort needs and priorities, what is being said about different technologies in the media and the neighbourhood, and what relevant works are planned for other reasons that energy improvements (Tweed, 2013).

The ideal scenario is that a deep energy renovation can be carried out as a single carefully designed and delivered event, as this offers the best chance of effective integration of technologies to achieve a low carbon result without unintended negative consequences such as poor ventilation, damp or summer overheating. In practice this is unlikely to be the reality for many buildings, and the path to deep energy renovation may have to be a staged one (Fawcett and Mayne, 2012). This means that the building owner needs a plan with a long term perspective (and that can extend beyond their own ownership or occupation of the building) for how to move their building to a near zero energy one. This plan needs to be one which can inform decisions every time that the building owner arranges for works to be undertaken, within the usual round of repair, maintenance and improvements. This 'RMI' market is a critical trigger point for energy improvements (Killip, 2012).

In practice, many of the more substantial energy improvements (such as wall insulation) are very disruptive and expensive unless carried out in conjunction with other relevant works – when these are needed or wanted for other reasons (Maby and Owen, 2015). This 'triggering' (Energy Saving Trust, 2011) of energy improvements can have the benefit of rendering the cost of the energy improvement marginal to the cost of the more comprehensive renovation or improvement works being carried out. As it seems unlikely, going forward, that there will be sufficiently large scale publicly funded renovation programmes renovating a primarily privately owned building stock to be low carbon, we might consider these practical realities – what are the scenarios and how can we make sure the opportunities to make energy improvements are realised? What are the advice needs in each case? These may for example be where:

a. the building owner wants to do a deep energy renovation – how do they go about it?
b. the building owner wants or needs to do a general renovation – what advice do they need to make this a low carbon renovation?
c. the occupant wants or needs to reduce energy costs, improve thermal comfort or deal with damp related to low indoor temperatures – how do they go about this, including step by step over time, towards low carbon?
d. the building owner needs or wants general repair, maintenance or improvement work – how can it be ensured that this includes energy improvements and moves them along the road to low carbon?
e. a 'distress purchase' is required – for example a heating system which is beyond repair, a leaking roof or broken windows – how to ensure that it includes energy improvements and moves them towards low carbon?

WHO SHOULD PROVIDE THE ADVICE AND HOW?

Impartiality, trust and who pays?

Advice needs to come from an organisation or an individual that is not only credible due to their expertise and ability to communicate, but seen by the consumer as trustworthy (Craig and McCann, 1978) – for example this might be an advice provider that is known due to being visible within the locality.

Another issue is that of impartiality. Technological impartiality requires an equal treatment of all technologies in the advice given. Commercial impartiality would require the adviser to have no financial benefit from the consumer taking action – or what action is taken. In this case, how is the advice to be paid for? This is a question that arises in other sectors of advice as well, such as in financial services. One way to ensure commercial impartiality is to provide public funding for the advice service, and another is to charge a fee for advice to the consumer – or a mixture of these approaches, in which an initial level of advice provided for free, with charges for the next level (such as an energy survey and written report). A variation on this model could be to partially publicly fund the advice, charging the consumer a reduced fee, while subsidising the service fully for low-income consumers.

Locality

Local provision brings a number of potential benefits: local visibility and trust, local knowledge (of the building vernacular, installers, local regulations and services), and the ability to provide advice that is relatively personalised. Home visits and surveys could be carried out by assessors linked directly to a local authority or advice hub, and the knowledge and data shared in full. The ideal scenario is that an allocated adviser to a particular consumer carries out the technical assessment and the follow on advice. Another benefit is that installers can be part of a local network that ensures availability and the ability of the consumer to see examples of a tradesperson's work. It also

enables knowledge exchange and referrals between installers, for mutual benefit. This makes it more viable for suppliers to offer support, even to the smaller companies that tend to make up the majority of the RMI market in many countries (Killip, 2012; Maby and Owen, 2015).

The Upper Austria Energy Agency (ESV: www.energiesparverband.at) is an example of an independent, expert and trusted regional provider, offering advice to both households and businesses, covering energy efficiency and renewable energy, and linking building owners to suppliers and installers through their Sustainable Energy Cluster.

Delivery methods

The methods used for advice delivery impact on both what can be achieved and the costs of delivery, and in practice the balance between costs and effective delivery methods can be a difficult to achieve. A crucial factor is that the approach will need to be adapted to the needs of the different target audiences. While generalised information about the potential costs and savings of different measures can be a useful starting point, the specific advice for any building can only be provided by carrying out an actual site survey.

The 'Energy Performance Certificate' (EPC) as mandated under the EPBD (Article 7), involves such a survey, and provides an assessment of the energy performance of the building comparable to other buildings in the same country- however in their present form EPCs have several limitations as an advice tool for deep renovation. They are proposed in the EPBD primarily as an energy performance comparison tool. Article 7 does also require that the EPC includes recommendations for cost-optimal or cost-effective improvements, as well as an indication of where to get further information on the recommendations and the steps to be taken to implement them – however the detail provided tends to be very limited in practice (BPIE, 2016). Feedback from building craftsmen in the UK (Maby and Owen, 2015) endorsed the experience of energy advice providers, which indicated that although people would benefit from estimates of the costs and savings resulting from major investments in energy saving for their own homes, the energy performance certificate is too basic a tool for this. Action research results from the 'Countdown to Low Carbon Homes' project (Charalambous et al, 2014) suggested that even a well-delivered EPC needs explanation and 'interpretation' to the homeowner.

It would appear that little effective use has been made of the opportunities to use the EPC as a communication tool or as a trigger for renovation works, and that the need to keep the costs of delivery of the EPC as low as possible may have superseded the need for it to be an effective communication tool (Bonfield, 2016). Where recommendations are provided these tend to be simplistic and limited, and recommendations are typically prioritised on the basis of cost-effectiveness as one-off measures, which is particularly unsuited to achieving deep renovation. It is also unrelated to the real-life process of renovation over time in conjunction with other repair, maintenance and home improvement works, as discussed above. Added to this is the problem of over simplification of data collection, which can result in misleading results for more complex buildings – particularly for many older buildings which may have been added to over time. When an EPC clearly has not taken into account building elements or characteristics that the building user knows are there, they quickly dismiss its relevance. Another limitation is that the EPC is not generally undertaken for homeowners unless the building is for sale or rent – so long-term owners/residents are unlikely to have an EPC.

The concept of a 'Building Renovation Passport' could help to fill the gap in provision. This is a tool, currently under development and trialled in Flanders, France and Germany, which outlines a long-term step-by-step 'renovation roadmap' for a specific building, resulting from an on-site energy audit fulfilling specific quality criteria and indicators established during the design phase and in dialogue with building owners. The renovation roadmap is envisaged as a plan with a horizon of 15––20 years that, by looking at the building as a whole, suggests the installation of selected measures in a certain order to avoid that at any stage of renovation the future installation of additional measures is precluded. It could usefully be combined with a repository of building-related information, such as a logbook (Fabbri et al, 2016).

Accessibility, relevance and level – differentiating consumers

Another important issue is the *accessibility* of advice services for the consumer. This applies both to the physical access and the type of communication language that is used. Imparting technical information to a non-technical audience is a particular skill, which often requires an even better technical understanding on the part of the adviser than it does to deliver a dry technical report. Technical literacy amongst consumers varies enormously, as may general numeracy and literacy levels. Some consumers may struggle with written materials – in which case energy bills (and some energy advice literature) can be challenging.

Consumers vary a great deal not only in their level of technical knowledge, but also the level of interest they have in it. Communication of advice needs to take into account the person on the other end, and adjust accordingly (Haines and Mitchell, 2014). A good salesperson knows this – you need to be able to assess motivations and interests as well. Advice needs to cater for the full range of consumer characteristics, not just in terms of level of knowledge, but also consumer attitudes, for example to cost, comfort and environmental considerations (Owen, Mitchell and Gouldson, 2014). Different customers need to have different access options open to them – so to maximise reach, advice needs to be available through different media (internet, phone, drop-in centre or sessions in a public place, home visit).

The Guichets Energie in Wallonie, Belgium (http://energie.wallonie.be/fr/guichets-energie-wallonie.html?IDC=6946) are 16 centres across the region, providing advice through telephone, e-mail, public promotional events and home visits where needed. Advice covers measures, user behaviour, relevant regulations and further help where needed such as subsidies for low income households and solar energy installations.

An approach which can help to engage people's interest and illustrate what is possible for homes similar to their own is that of 'Open Homes', whereby homeowners who have carried out renovations open their homes to visitors, for example as part of a weekend event. Visitors can learn about improvements that have been made, and hear about the process from the occupants themselves. It also offers local suppliers and installers the opportunity to showcase their work, and consumers the chance to ask them questions. There are a number of Open Home schemes across Europe. In the UK, the 'Superhome' network (www.superhomes.org.uk) offers visitors the opportunity to visit old homes that have been refurbished to be 60 % less reliant on fossil fuels.

Advisory services also need to be able to cater for the most vulnerable consumers, for example where there may be particular health or social needs, such as for heating, cooling, hot water or lighting. This requires sensitivity to these needs, and knowledge of local services, and of protocols to protect vulnerable consumers. A good quality advisory service will have considered and agreed policies for such provision, and have well developed relationships and cross-referral arrangements with other support services.

The Energy Efficiency Advice Centres Network in the UK (discontinued in 2012) consisted of local centres across the country, with a uniform core advice delivery process funded by government through the Energy Saving Trust (www.energysavingtrust.org.uk). As the centres developed, they formed working relationships and referral networks with local housing, health and social care bodies. Some took an active role in forming fuel poverty or 'affordable warmth' strategies and partnerships. UK fuel poverty charity, National Energy Action (www.nea.org.uk), supports such local activity, and informs government policy.

WHO ELSE NEEDS ACCESS TO ADVICE APART FROM BUILDING OWNERS?

One feature of building renovation projects is the wide variation in the way these projects are organised in practice. There will always be a building owner involved – but the level of their engagement can range from 'hands-off' commissioning through to designing and project managing the work themselves, or even carrying out the work as a 'Do-It -Yourself' project. In the domestic sector, clearly owner-occupiers are the key target group. Other key groups are landlords, tenants and the general building trades who deliver services to homeowners – active mainly at a very local level and in direct contact with homeowners commissioning works on a daily basis. As we have argued above, this is essential to realise trigger point opportunities, rather than to rely on demand for energy improvements as a singular market distinct from the other building works. Larger projects may also involve architects and/or structural engineers, but this will not always be the case, and there would be benefits to ensuring the availability of advice and information to support building tradespeople in delivering low carbon renovation. This might, for example, be linked to sources of products and materials, or building permissions and planning control (Maby & Owen, 2015). Reliable sources of information and advice are needed (and need to be consistent) for all 'key actors' who are in a position to decide or to influence decisions.

ASSESSING THE IMPACT OF ENERGY ADVICE

Monitoring and evaluation of advisory services are essential, not only to check quality of delivery and maintain relevance of approach, but also to inform improvements and developments. Evaluation is also needed to provide evidence of the value of energy advice, and justify investment. However there are difficulties and barriers, which may account in part for the lack of evaluation studies to date, as was found in recent case study research (ECEEE, 2016).

The most basic form of monitoring is to keep a tally on numbers and nature of enquiries, customer satisfaction surveys, and the degree to which different outreach activities bring in users to the service, as well as service costs. Taking this a step further would be to assess the actions taken as a result of advice (results such as measures installed). A thorough evaluation would involve monitoring of actual outcomes, set against the aims of the service, for example in terms of energy (and associated carbon emission) or fuel bill savings, improved comfort conditions and health of occupants. Within this could be a more detailed analysis of whether all parts of the target audience is being effectively reached. A robust approach would involve before and after monitoring for several years – but this tends to be impractical for most advisory service, and too costly. As a result, a typical approach is to try to record actions taken as a result of advice, and to use 'deemed' outcomes for these actions. For example, an insulated roof of a house has a 'typical' saving. This approach is more accurate if adjusted for an actual house of measured dimensions rather than a standardised average, but will still be only an estimate based on standardised occupancy assumptions. Other inaccuracies include variations on material and quality of installation, and details of each building type, such as 'cold bridges' formed by structural elements or services. Another issue to take into consideration is the behaviour of the occupants, and whether this changes after improvements have been made.

It is also important to avoid double-counting. Advisory services do not operate in isolation – and are often most successful when supporting other policy measures, such as financial incentives. Savings resulting from these different policy tools need to be seen in this context and allocated accordingly.

These barriers are an indication of the need for careful, expert and robust evaluation of energy advisory services, and not a reason to avoid doing this at all. There is a strong argument for large scale analysis of energy advisory services to better understand what works and why.

A model for delivery of energy advice to support deep renovation

What kind of advisory services are needed to achieve the desired results? The answer, from experience, is that to decarbonise the building stock, a comprehensive framework of advice and oversight is needed as part of an effective policy landscape (Maby et al, 2007; Charalambous et al, 2014). This may sound expensive, as the time involved in direct one-to-one contact can be costly – but how does this cost compare to new supply capacity, particularly in a fossil-free future and one in which the

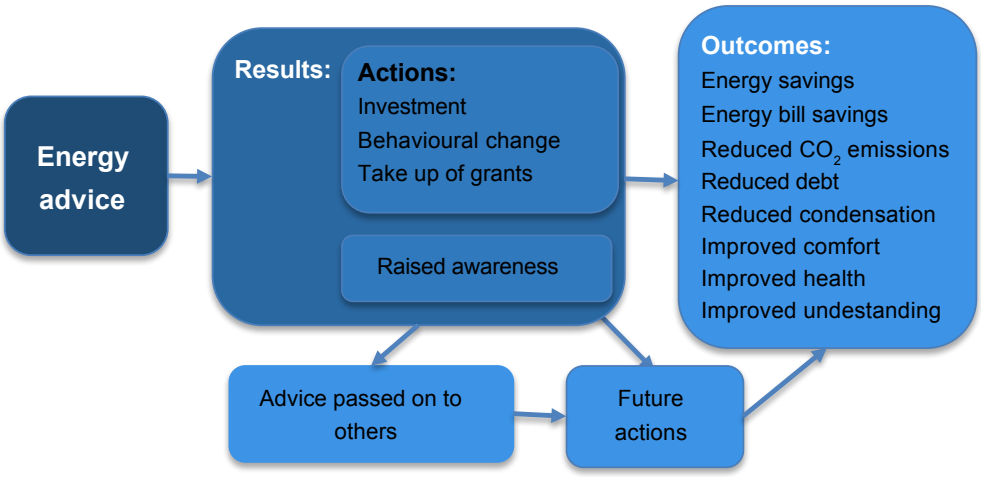

Figure 1. Energy advice: results and outcomes (Maby et al, 2007).

polluter pays principle is applied? As the 'glue' that can bring together financial, technical and other elements of support, the value of advisory services can easily be overlooked but without the navigation offered by these services other measures put in place, like finance or technical standards, may themselves be ineffective in achieving desired results.

INTEGRATED/HOLISTIC APPROACH – THE 'ONE-STOP-SHOP'

In designing practical delivery of energy advice, it is necessary to take into account certain critical ingredients: technical and social expertise, practical experience, social awareness, communication skills and commercial independence. Another issue to take into consideration is to ensure that the customer is not passed on from one service provider to another, risking losing them along the way – hence the concept of the one-stop-shop, where they can be supported through the whole 'journey' from awareness-raising through initial enquiry to installation and post installation user behaviour (change). From this perspective it is also necessary for the data about the building that has been collected for the assessment to be available to advisers, installers and the customer themselves, and for it to be easily updated as changes are made, as in the Building Renovation Passport concept highlighted above (Fabbri et al, 2016). There is potential for this to be integrated with other practical needs for a store of readily accessible information about a home, such as the details of electrical circuitry, water supply and where to turn it off, gas supply, drainage, damp-proofing. Taking this idea further, it might be developed into a cloud-based log book, or even an official log kept with official property or land registries, or the local authority.

The PRIS network in France (http://www.renovation-info-service.gouv.fr) provides end-to-end advice on home renovation and behavioural change. The network includes the Espaces Info Energie, which have delivered energy advice since 2001, and are supported by the national energy agency ADEME and local authorities, and the local information centres run by the National Agency for Housing (ANAH) and the Local Agency for Information on Housing (ADIL).

The idea of the one-stop-shop for building renovation might include a multi stage advisory service, offering awareness raising, generic information, detailed energy audits as well as the basic energy performance certificate, assistance in sourcing installers and suppliers and in identifying finance for measures, and support through the process. This support is particularly crucial where renovation is complex, as is typical in aiming for deep energy savings, involving the thermal quality of all building elements, upgrading of heating, cooling and hot water equipment, air-tightness, ventilation, and micro-generation, as well as user behaviour adjustments.

The 'Countdown to Low Carbon Homes' project developed a model for supporting home energy improvements, based around an advisory service at a local or sub-regional level, the scale envisaged being one which would enable a personalised service to home owners and a network of known installers and suppliers, who are available locally and familiar with the building stock. The model consists of several linked elements (Maby et al, 2014):

- A contact hub, with several options for contact including telephone, website, drop in if feasible;
- A proactive outreach programme, and an initial contact and simple advice service;
- A network of energy assessors able to carry out detailed home energy audits;
- A network of installers, and links to suppliers and retail outlets;
- Links to local building and planning control bodies;
- Information on and referrals for (or direct provision of) finance for measures, and assistance in applying for these, and in blending different sources where necessary;
- Links to other support services for vulnerable consumers;
- Appropriate monitoring and evaluation processes.

Crucial to this approach is the contact hub at the centre, which builds the connections and supports and encourages the customer through the whole process. It is essential to review the approach from the perspective of the 'customer journey'

through the process of renovation, looking at where intervention is needed and where support might be of benefit, and at which points the consumer could be confused or discouraged and drop out (ibid). Putting this approach into the context of a national renovation strategy, some supporting services might be provided at national level. Taking this into account, a possible model is proposed below, consisting of local/regional hubs providing a full advisory service (Maby et al, 2014), supported by a national resource centre providing technical support and joint services where appropriate (Janssen et al, 2016).

Conclusions

As the EU moves towards a more ambitious renovation schedule that requires more complex technical interactions with the building that need to be planned and staged over time, the consumer at the centre of each renovation has a greater need for support. The provision of effective advisory services to support deep retrofit is crucial to the successful decarbonisation of the building stock. In order to be effective, advice requires both technical expertise and communication skills, and to cover the full range of technologies, as well as financial and practical matters, such as sourcing contractors and dealing with issues that may arise during the course of the work. Advice is differentiated from generic information in that it is specific to the consumer and involves two-way interaction – and in the case of deep retrofit is likely to be multi stage, to guide a consumer through from general awareness to practical implementation of building energy renovation. Key issues include cost, monitoring and evaluation, and effective links with other services and policy measures.

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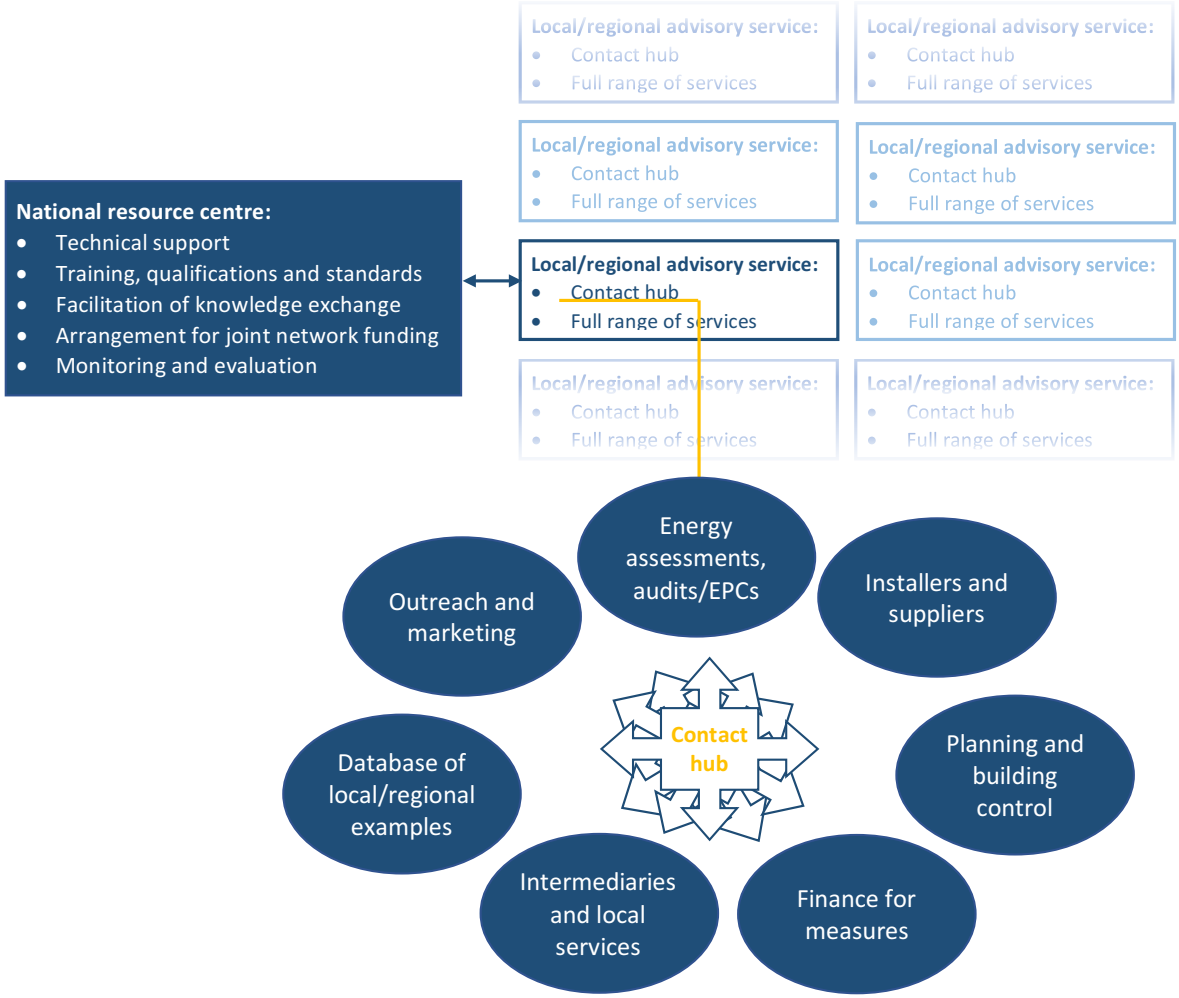

Figure 2. A model for energy advisory services within a national strategy.

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