

Renovation through quality supply chains and energy
performance certification standards

Energy efficient building blocks for Europe; putting the theory into practice



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Project Request Disclaimer

Cover photos: CRES pilot project - renovation of multi-family building

Executive Summary

Households account for 25% of final energy consumption across the EU and many homes will need to be renovated to improve their energy efficiency if EU energy and CO₂ reduction targets are to be met. Although renovation can bring environmental, social and health benefits, it is a significant challenge to overcome the barriers – both real and perceived – that owners and tenants have towards installing energy efficiency measures and changing behaviour. These barriers are not only practical but emotional and social as well.

So how do we inspire and persuade people to improve their homes when it can be costly and can create additional hassle? The Energy Performance Certificate (EPCs) is a starting point in this process – it gives people greater information about the energy performance of their home when they rent or buy it, encouraging them to make improvements.

The REQUEST project aimed to create favourable conditions for the homeowner – so they felt informed and confident enough to improve the energy efficiency of their homes by acting on the information in EPCs. REQUEST was an Intelligent Energy Europe funded collaborative project across 11 EU Member States. The project had two central objectives:

- To develop tools and practices to increase the uptake of EPC recommendations
- To provide a quality standard for low carbon renovation

It developed these tools by carrying out ‘pilot projects’, which tested ways of bringing together the supply and demand sides to increase the rate of renovation. 11 pilot projects, each in a different EU Member State¹, and many following actual renovation projects. These pilots reached over 1000 trades people, energy advisors and suppliers, over 500 individual householders and instigated cooperation with more than 50 federations and governmental bodies in the respective EU partner countries involved. Collectively they have **triggered over 36,000 MWh of energy savings** and almost **10,000 tonnes of CO₂ savings** within the lifetime of the project which is expected to be at least 5,500 GWh of energy savings and 183 ktonne CO₂ by 2020 if multiplier opportunities are fulfilled as expected. Across Europe homeowners have **invested well over €18 Million EUR**, with this expected to increase to €1 Billion EUR by 2020.

1. Headline findings from the pilot projects

Through the REQUEST pilot projects we have identified the key conditions required to build trust and created favourable conditions for homeowners to take up energy efficiency measures :

1.1 Tailored, face to face advice

Face to face advice was found to be the most effective way to advise homeowners. The nature of face to face advice inspires confidence for the homeowner to act - they are provided with tailored information and are able to ask questions relating to their own personal circumstances, meaning any doubts they have can be allayed. Vital to this is the need for the advice service to be trusted by the homeowner. The independent nature or reputation of the

¹ Partner countries are: UK, Italy, Portugal, Germany, Austria, Belgium, Poland, Greece, Bulgaria, Slovakia and Denmark

various REQUEST partner organisations meant that this was something we were able to ensure within the REQUEST pilot projects that addressed actual renovations.

1.2 Empowering the supply chain

Face to face advice although very effective is expensive. It may not be feasible for energy agencies or governments who are facing financial constraints, to have trained advisors visiting people in their homes. The REQUEST pilot projects demonstrated that the supply chain can be empowered to provide this face to face advice, as long as the advice they provide is independent and impartial. This can be achieved if the advice provided by the supply chain is shown to be supported by and / or backed by a trusted organisation. In the REQUEST pilots this backing / support manifested itself in a variety of forms including: training on energy efficiency concepts; independently verified information that could be shown to the homeowner and signposting to recommended installers by the independent organisation.

1.3 Partnership structures

Partnership structures between supply and demand side actors proved to be very effective for improving communication and building trust at all levels – from project specific partnerships to partnerships at the local, regional and national levels. Creating a partnership structure brings together a wide range of expertise, strengthening the insight of all parties and improving the ability for problem solving – particularly with respect to changes in policy when considering national partnerships.

1.4 On-site project management

REQUEST has identified a gap in the knowledge and skills that currently exist on-site where real energy efficiency renovations are being delivered. In large scale renovations a project manager often oversees the whole process and on smaller renovations the lead contractor may fulfil this role but in both cases there is little or no emphasis on ensuring that the quality of the energy efficiency measures delivered is high. As such, there is a real risk that predicted energy savings (and the associated comfort benefits promised to the customer) are not actually realised and trust in the supply chain is reduced. The REQUEST quality assurance process developed within the project tackles this knowledge gap which has been tested and refined in real renovation projects. The REQUEST pilot projects also demonstrated that this gap could be addressed through provision of training, incorporating a blend of knowledge on issues such as good project management for energy efficiency renovations and more technical information on issues such as thermal bridging.

Contents

Executive Summary	iii
1. Headline findings from the pilot projects	iii
1.1 Tailored, face to face advice.....	iii
1.2 Empowering the supply chain.....	iv
1.3 Partnership structures.....	iv
1.4 On-site project management	iv
Contents	v
CHAPTER II Introduction.....	1
CHAPTER III Refurbishing Europe's homes	2
1. Background.....	2
CHAPTER IV Results and lessons learned.....	4
1. REQUEST: Best practice in the customer journey from EPC to action.....	5
CHAPTER V Lessons Learned and Resources for the Future	7
1. Intervention: Communication and information campaigns	7
1.1 Motivating customers to use the EPC	7
1.2 Face to face advice.....	8
1.3 On-site engagement with residents in multi-family dwellings	8
1.4 Building new partnership structures	9
2. Intervention: Training and buildings skills in the supply chain.....	9
2.1 Improving the knowledge and skills of the SME supply chain	9
2.2 Delivering a high quality product chain.....	10
3. Changing support structures for energy efficiency programmes	11
CHAPTER VI Pilot projects – step by step	12
1.1 Information measures – improving EPC recommendations.....	12
1.2 Linking supply and demand for householders	15
1.3 Following the customer journey in a multi-family building renovation.....	17
1.4 Quality when carrying out measures.....	20
1.5 A co-ordinated supply chain.....	21
1.6 Evaluation & monitoring.....	21
ANNEX I. REQUEST – a lasting resource.....	23
ANNEX II. References	25

CHAPTER II Introduction

REQUEST was an Intelligent Energy Europe funded collaborative project across 11 EU Member States. Its aim was to increase the uptake of low carbon renovation measures in residential properties throughout Europe, following receipt of an Energy Performance Certificate (EPC). The project has two central objectives:

- To develop tools and practices to increase the uptake of EPC recommendations in domestic properties
- To provide a quality standard for low carbon renovation to support the supply chain

Selling and installing home energy efficiency measures can be complex for customers and suppliers. REQUEST aimed to identify and undertake the actions necessary to build a smoothly functioning market for energy efficiency products and services in this area.

The first stage of the REQUEST project involved a review of the schemes or tools currently available to promote uptake of EPC recommendations and improve quality in the supply chain. The information gathered was compiled into a comprehensive database. Identifying the gaps in the current tools, and in consultation with the supply chain in each partner country, REQUEST also developed new tools to further support project partners in achieving the two key objectives outlined above. Each partner took this information and tested a new approach, or built on a best practice approach identified in the review of schemes, through a pilot project in their own country. These pilots either promoted uptake of EPC recommendations or improved quality in the supply chain – or did both. Each pilot project was different and was designed to address the specific and distinctive policy and market conditions in each of the pilot countries. The results from the pilot projects were used to develop a blueprint of the components required for a well-functioning energy efficiency refurbishment market to develop and flourish.

REQUEST principally involved national and regional (often government funded) energy agencies. At the end of the project these organisations had developed a new set of tested tools and techniques which can be used to:

- Promote an integrated customer journey leading householders from receipt of EPC information through to taking action, making energy saving improvements to their home.
- Promote an integrated supply chain for professionals involved in renovation processes, with mutual recognition and respect for the roles of the various trades involved. Such an integrated supply chain enhances quality and professionalism and therefore householders' confidence in the outcome of renovation activities.
- Build a clear picture of how a functioning energy efficiency market operates and where it needs to be supported.

What is Intelligent Energy Europe (IEE)?

IEE offers a helping hand to organisations willing to improve energy sustainability. Launched in 2003 by the European Commission, the programme is part of a broad push to create an energy-intelligent future for us all. It supports EU energy efficiency and renewable energy policies, with a view to reaching the EU 2020 targets (20% cut in greenhouse gas emissions, 20% improvement in energy efficiency and 20% of renewables in EU energy consumption).

Running until 2013, the programme is open to all EU Member States, plus Norway, Iceland, Liechtenstein, Croatia and the Former Yugoslav Republic of Macedonia. A budget of € 730 million is available to fund projects and put into place a range of European portals, facilities and initiatives.

1. Background

Households account for 25% of final energy consumption across the EU (Eurostat, 2010). Increasing the energy performance of buildings across the EU is vital if we are to meet the EU's 2020 energy efficiency and CO₂ targets - reducing the reliance on imported fuel and critically, reducing the impact of climate change.

It is widely acknowledged that energy efficiency improvements provide one of the lowest cost and simplest routes to reduce CO₂ emissions (IEA, 2013; DG ENER, 2012). But promoting home energy efficiency is not just about saving energy and carbon. It also offers the opportunity to improve the living conditions of millions of people across Europe and help countries out of the current recession:

- The link between homes with efficient thermal performance and improved health has long been established (WHO, 1985; Marmot Review Team, 2012), particularly for the elderly and the young. There are also indirect health effects of cold homes including the education and mental well-being of children and adolescents. Tackling the thermal efficiency of the housing stock can improve the well-being of the resident and also reduce public spending on health.
- Addressing fuel poverty – where families or individuals cannot afford to heat their home to a healthy, warm temperature² – is a common goal of Governments across Europe and is particularly pronounced in eastern and southern European states (EU Fuel Poverty Network, 2012). The three factors that affect fuel poverty are: fuel price, income and home heating/cooling requirements. Member States have the greatest ability to influence the latter through improving and renovating inefficient buildings.
- Investing in energy efficiency has direct benefits for industry; including many industries most directly affected by recession and reduced growth in the European economy. An increase in demand for renovation/construction work as a result of investment in energy efficiency would increase the outputs from the construction industry and potentially lead to an increase in GDP and an increase in employment. This effect has been modelled and evidenced in several countries (Consumer Focus, 2012; example of Germany's KfW bank³) and the impact is heavily dependent on country-specific policies. The European Commission estimate that by meeting the 20% energy efficiency target 400,000 jobs could be created across the EU and 600,000 jobs if the 20% renewable energy target is met (European Commission, 2012). However, local labour markets will need support to be able to adapt to these demands (OECD, 2010).

For these reasons the improvement of the European housing stock is increasingly recognised as a priority and the new Energy Efficiency Directive (EED, 2012) requires Member States to establish a long term strategy for improving the energy performance of buildings and to mobilise investment. However, delivering significant energy savings from buildings across Europe raises several challenges and a recent report from BPIE (2011) highlighted some of these:

- Energy use in buildings has been increasing over the last 20 years and this trend is set to continue particularly with increasing appliance use (EST, 2012).

² There is no EU-wide definition of fuel poverty, however the European Fuel Poverty and Energy Efficiency project (<http://www.fuel-poverty.org/>) suggest it should be: "a household's difficulty, sometimes even inability; to adequately heat its dwelling, at a fair price".

³ In 2009 the German KfW eco-refurbishment programme stimulated nearly €8bn of private and public sector investment in energy efficiency building, leading to 128,000 additional jobs. From: Consumer Focus, 2012.

- The demand for single occupancy homes is increasing, contributing to an increase in floor space over time.
- Older buildings built when little or no efficiency standards existed make up a significant proportion of the European building stock.
- Most residential buildings in Europe are in private ownership with 50% occupied by the owner. Individual or family owner occupiers can struggle to raise the finance required to make energy saving improvements, even if these improvements are cost effective in the medium or long term. Further, owner occupiers may lack the knowledge, energy, time and enthusiasm to make improvements, even where the measures are financially viable.
- In tenanted and multi-occupier buildings, building owners can have little or no incentive to make energy saving improvements where the energy bill is paid by the occupier. Further ownership arrangements can make it difficult when improving a multi-family building where decisions need to be agreed by all apartment owners – e.g. installing external solid wall insulation in a multi-family building.

Energy Performance Certificates (EPCs)

To overcome these barriers the Energy Performance of Buildings Directive recast of 2010 (EPBD, 2010) requires Energy Performance Certificates to be available upon sale or rental of a property. The EPC particularly targets the informational barriers around housing improvements – it enables the building owner or occupier (or potential owner/occupier) to see what the current energy efficiency condition of the property is. Some EPCs also calculate how much energy could be saved by improving insulation, windows, heating systems or installing renewable energy measures⁴. Further, some EPCs also provide basic information about how to take forward the renovation.

As an informational measure, it is important that the EPC is accurate, well designed and produced, and seen by the householder: and a number of IEE projects have focused on ensuring that this is the case e.g. IEE IDEAL EPBD project⁵). But for EPC information to be turned into action, the customer needs to be motivated and they need to be able to trust the suppliers of renovation products: they need to be able to easily commission a ‘joined up’ renovation product where they can trust the quality of the delivered renovation. Central to this is ensuring that different trades and professions can work together effectively to deliver the energy saving measures, and that homeowners are well-informed and motivated to invest in renovations of their properties.

This is what the REQUEST project has done. It aimed to create favourable conditions for the homeowner, so that they felt informed and confident enough to act on the information in EPCs to improve the energy efficiency of their homes. The key focus was on finding ways to ensure the demand side and the supply side were joined up and worked well together.

The REQUEST project did this by analysing current best practice and developing tools and strategies that were tested in ‘pilot projects’. These pilot projects were often tested tools in actual renovation projects and a pilot project was carried out by each of the 11 REQUEST partners. The overall aim was not to produce a ‘one size fits all’ solution, but to develop a framework, or blueprint of what a favourable customer journey looked like that could be taken and adapted by each country to suit their needs.

This report summarises the findings from the REQUEST project as a whole, with many of the lessons learned coming directly from the REQUEST pilot projects themselves.

⁴ The EPC also has another key function – by providing a standard measure of energy efficiency at the point of sale or rental, it helps ensure energy efficiency becomes a factor that is more widely considered in the valuation of European real estate.

⁵ <http://www.ideal-epbd.eu/>

To create favourable conditions for the homeowner to act, the whole customer journey was considered within the REQUEST project. Through the analysis of existing schemes and the results of the pilot projects the following summary of a typical customer journey was developed with a number of clear stages – from the issuing of the EPC, to the customer considering possible improvement measures, to engaging with a supplier and having measures installed (figure 1). For the customer proposition to be as attractive as possible, the whole process must be seamless for the consumer. This requires an unbroken supply chain with smooth transition from one stage to the next.

To achieve the the complete customer journey it may be necessary to provide support to both the supply or demand (customer) side and four broad interventions where this can be provided are identified in figure 1:

1. Communication and information campaigns
2. Training and building skills in the supply chain
3. Financing mechanisms
4. Energy performance tracking (before and after)



Figure 1. The unbroken customer journey and quality assured supply chain

1. **REQUEST: Best practice in the customer journey from EPC to action**

The REQUEST project proposes an optimum customer journey following the process outlined in figure 1. Each of the following key steps must be in place:

1. **List of recommended measures**

Currently some EPCs only give information on the existing energy performance of a home, making it difficult for the homeowner to know what they must do next. The Energy Performance of Buildings Directive requires EPCs to state recommended measures that will improve the energy efficiency of the home. It is vital that these recommendations are communicated effectively and that they are accurate and based on robust data and analysis to support decision making by giving visibility to and promoting the benefits of the energy efficiency improvements.

2. **Practical information**

To give more meaning to the list of recommended measures further information must be made available to the homeowner. This can be in the form of a range of material such as typical costs and payback periods, information on what the installed measures look like, available grants and financial help, what quality controls exist (e.g. registered installers or guarantees on measures). Ultimately this information must inspire and give confidence to the homeowner, answer any questions they may have, and crucially guide them to the next step in the process.

3. **Craftsmen/expert visit**

Ideally the next step is a visit from an independent expert to the homeowner to carry out a more detailed assessment of the potential for installing recommended measures and to give tailored advice on the most suitable measures face to face. The main purpose of such a visit is to build trust with the homeowner and give them as much information as possible so that they see the benefits and make a positive decision to install energy efficiency measures in their home. The REQUEST project recognised that face to face advice is resource intensive, particularly in a time of reduced budgets for many organisations. Chapter VI looks at how some of the pilot projects explored other ways to develop this trust and test innovative ways to deliver the necessary support to the homeowner.

4. **Measures decided**

Following the issue of an EPC, provision of a range of practical information on the relevant energy efficiency options available and provision of tailored advice to the householder, a decision on the measures to be installed is reached. This still does not guarantee that the homeowner will go through with the renovation as final costs and suppliers are yet to be decided.

5. **Builders price/quotation**

Obtaining a quote and deciding on a builder that is trusted and knowledgeable can be difficult for a homeowner. Making it easier to trust a builder – through a quality mark or minimum training requirements ultimately makes it easier for the homeowner to make a positive decision. Builders should also be supported, for example through training or by providing access to information, to ensure they have adequate knowledge of energy efficiency measures and are able to talk authoritatively about the benefits for homeowners.

6. **Financing solutions**

The cost of installing low carbon measures is too often a barrier for householders. Ensuring easy access to low cost finance can help to remove one of the last hurdles preventing a positive decision to act. Grants can offer an incentive to decision makers and make them feel like they have got a 'good deal' – often a more influential

factor than the actual price that is paid. But removing the hassle factors for financing low carbon refurbishment can also be an effective incentive by providing template contracts or a simple process for applying and approving finance.

7. Acceptance/decision making

Finally, the homeowner feels confident enough to decide to install energy efficiency measures in their home.

8. Carrying out measures

Ensuring a high quality final product / service is delivered can be a difficult task given the fragmented nature of the construction supply chain. However, this is key to building trust between customers and suppliers and ultimately ensuring customer satisfaction with the delivered work. REQUEST identified that there is a lack of 'project management' knowledge within the supply chain, particularly with regard to energy efficiency. Communication between trades on-site must be improved to ensure that principles such as air tightness and thermal bridging are fully understood and to ensure measures are installed correctly so that the maximum energy savings can be guaranteed

The homeowner must be able to see the benefit of installing energy efficiency measures. Updating the EPC (as long as the EPC is able to effectively capture the improvements) is the clearest way to do this. The new EPC can then be used to give visibility for the measures installed, including the associated financial benefits to the next occupant if the home is rented or sold.

9. Monitoring

Monitoring of schemes and EPCs should be necessary to evaluate their effectiveness and data should be aggregated to identify opportunities and to inform the debate regarding further interventions or support required for the market. For example, policy makers need to understand how EPCs are being used and when they are acted upon to inform policy development, and the market can use aggregated data to identify market and investment opportunities. With the roll out of smart meters across Europe there is an opportunity for smart metering to play a role in tracking these improvements.

CHAPTER V **Lessons Learned and Resources for the Future**

The REQUEST project has been unique in focusing on the link between the supply side and the demand (customer) side of low carbon renovations, to increase the number and quality of renovations that achieve energy and carbon savings across the EU. The project had a very broad scope, encompassing a wide range of stakeholders across the supply chain and demand side including builders, EPC assessors, householders, landlords, tenants, policy makers and municipalities.

Selling and installing home energy efficiency measures is complex for customers and suppliers. The evidence and experience gained from the work of REQUEST, and particularly the pilot projects, has enabled the project partners to develop a comprehensive understanding of the various steps that a householder should follow to realise a high quality and cost-effective low carbon renovation. This optimal “customer journey” starts from the issue of an Energy Performance Certificate and requires the supply side to work collaboratively so that the householder experiences an unbroken supply chain from the beginning right through to completion of their renovation project. The REQUEST project has identified a series of critical market engagement opportunities where energy agencies in particular can support the development of that unbroken supply chain.

1. Intervention: Communication and information campaigns

1.1 Motivating customers to use the EPC

The Energy Performance of Building Directive sets out the requirements for EPCs and for recommendations to be included. Feedback on the value of EPCs and role they can play in improving the uptake of measures from the pilot projects has been extremely positive. However, although the public’s awareness of climate change has improved, individuals are still often unfamiliar with energy efficiency measures and are therefore unwilling to act on the recommendations made. This is often compounded by a lack of trust in the construction industry and estate agents who can be perceived as trying to sell measures that are not needed.

To encourage householders to use the EPC, the second step outlined in the REQUEST customer journey (see pages 5-6) is often underdeveloped – more practical information is needed. This can consist of a range of tools such as ‘inspiration catalogues’ – a collection of case studies of homes that have installed measures such as those used in the Danish pilot; or web tools that allow householders to consider the range of ways they can improve their property, based on the property data that has been collected from EPC assessments, such as those developed by the Belgian and Slovakian pilots. It can also go further than this – a developing concept in the UK is ‘Open Home’ events where those homeowners who have had measures installed open their homes to those interested in installing measures – in this way visitors can really see what the installed measures look like and gain a better understanding of the benefits, giving them the extra confidence they need to make a positive decision themselves.

Improvements need to be made to strengthen the linkages between the processes and structures around EPCs and the low carbon refurbishment supply chain – for example providing a list of local suppliers, or improving the interaction between the national or regional EPC issuing body and the supply chain can have a real impact. These kinds of positive interventions don’t cost a lot to implement and can greatly enhance communication

channels between the sellers of products and services and householders who have recently received a certificate.

1.2 Face to face advice

Several pilots demonstrated the effectiveness of face to face advice. The Danish pilot was an evaluation of effective interventions in the energy efficiency market in Denmark (see section VI) and, as such, was able to best demonstrate the impact of this measure. One aspect of the evaluation looked at the well-developed market for energy efficiency that exists in the County of Sonderborg. This concluded that a key link in customer journey, helping to ensure the unbroken supply chain was an independent energy expert called “Charlie”. Charlie was not only able to provide free face to face advice for homeowners during the decision making stage, but also went on to provide support and guidance for them throughout the renovation process.

During the REQUEST project Charlie advised over 750 households. More than 400 households (55%) went on to undertake energy saving renovation projects. By the end of REQUEST approximately 250 energy saving renovations had been completed and additional interested households were on the waiting list. The final expected success rate of 60-70% of households visited that go on to complete a renovation speaks for itself and demonstrates the impact that tailored, trusted face to face support can provide

Face to face advice is expensive and not always practical. Although it is known to be the most effective method of communication, it may not be feasible for energy agencies or other organisation to perform this function at the scale that will be required to drive mass market uptake of energy efficiency, from both a practical and economic point of view.

The UK pilot project identified new ways to deliver face to face advice in a highly cost effective manner. In Denmark “Charlie” provided a trusted, independent source of information, but also performed a “process management” role. In the UK pilot builders were trained on low carbon theory and practices, and given additional technical guidance (in the form of a brochure) on how to incorporate energy efficiency into typical renovation projects. A version of the information brochure was also provided for their customers. Everything was backed by an impartial and trusted organisation (EST). The builders, once armed with the confidence and knowledge they needed to talk about low carbon measures, and backed up by an independent source, proved very effective at convincing their clients to incorporate low carbon measures into their renovation plans. In effect, they were able to become the UK equivalent of “Charlie”.

Using “trigger points” to drive the uptake of energy efficiency measures outside of what are only emerging low carbon refurbishment markets in most EU countries is important if we are to achieve the step change that is needed to meet the ambitious 2020 targets. Innovative approaches for “piggy backing” on well-established markets, such as the home improvement market in the UK, could make a significant contribution. For these one room/small scale refurbishment projects the builder may be the only person the homeowner engages with before making a final decision on their refurbishment specification - empowering the EU’s blue and brown collar workforce to positively influence these decisions is therefore vital.

In summary, the REQUEST project has demonstrated that, with the right level of training and, importantly, with the necessary independence and impartiality to ensure they are trusted, the role of advisor can (at least in part) be performed by different actors.

1.3 On-site engagement with residents in multi-family dwellings

The customer journey concept is just as relevant for a building block as it is for a single householder and for a policy maker putting together a support scheme. For those pilots who followed the customer journey in multi-family dwellings owned by private individuals during the renovation process (Polish, Greek and Bulgarian pilot projects) – strong communication, including face to face advice, was identified as a critical success factor.

In the Greek pilot project a detailed communication plan was put in place with a great deal of emphasis on face to face communication including a continuous presence of the REQUEST partner's staff on-site, often going door-to-door to speak to residents and follow up on any issues identified especially those that might jeopardise the success of the renovation project. The campaign was so effective and the residents were so actively engaged that one fifth showed an interest in getting professionally involved with the project to gain new skills on low carbon measures. The contracting companies who have expressed an interest in undertaking the refurbishment of the other three buildings (that will take place after the end of the REQUEST project) are committed to hiring local residents to be part of their staff.

The Polish pilot also discovered the benefit of strong communication, concluding that the more information the tenants in the building had, the more likely they were to make a positive decision to undertake energy efficiency improvements.

1.4 **Building new partnership structures**

Partnership structures between supply and demand side parties proved very effective for improving communication and building trust at all levels – from project specific partnerships through to partnerships at the local, regional and national levels. Creating a partnership structure brings together a wide range of expertise, strengthening the insight of all parties and improving the ability for problem solving – particularly with respect to changes in policy when considering national partnerships.

At the local and project level the Polish pilot developed a new collaborative approach to consultation and dialogue with housing cooperatives that ensured all stakeholders were appropriately involved in all aspects of the proposed renovation. This resulted in positive attitudes and engagement from the tenants on the prospect of improving the energy efficiency of a multi-family dwelling, so much so that it was decided to share this best practice, and others developed during REQUEST with a wider audience. A knowledge partnership programme was put together bringing together supply and demand side actors such as building owners, and economic institutions who could benefit from experiences gained in the REQUEST project and this cooperation will continue beyond the lifetime of the REQUEST project.

Partnerships at the national level are also important as demonstrated by the Italian pilot project's consortium 'Tavoli di Lavoro 4E'. The consortium was established within the framework of the Italian REQUEST pilot project. And the demand for such a partnership in Italy was demonstrated by the fact that within a year the network almost doubled in size, with 32 voluntary organisations participating by June 2012. The stakeholder engagement and networking opportunities established facilitated the development of strategies and common activities to accelerate the move towards achieving energy efficiency targets and improving the implementation of standards and policies in Italy. The partnership has already submitted two proposals to the Ministry to influence current legislation to encourage greater uptake of EPC recommendations.

2. **Intervention: Training and building skills in the supply chain**

Section 1.2 above outlined how, as demonstrated by the UK pilot, supply chain actors could play a more active role in delivering energy efficiency advice to householders. However, for this to be effective several critical success factors must be addressed:

2.1 **Improving the knowledge and skills of the SME supply chain**

Most important is the need to build trust between homeowners and the supply chain. This can be achieved by improving the knowledge of builders and craftsmen on energy efficient measures and their benefits. For a minor renovation a builder may be the only person that the householder engages with when deciding what work to undertake. It is therefore essential that the supply chain has the knowledge required to talk confidently about the

benefits of energy efficiency to their clients and necessary skills to install energy efficient measures correctly so that customer satisfaction is maximised.

The supply chain for housing refurbishment in the EU is predominantly SME dominated and therefore highly fragmented in most countries. Consequently, the resources that would be invested to build consumer trust in new (and unfamiliar) products in a less fragmented market do not currently exist. The REQUEST project has demonstrated that provision of consistent information and training for the supply chain is an important and cost-effective measure for overcoming this important barrier to uptake of energy efficiency by homeowners.

The nature of the SME industry also means that the supply chain can be difficult to reach and the role of partnerships was again demonstrated to be important here. Almost all REQUEST pilot projects partnered with an industry organisation, often at the local level, to better reach the supply chain and take advantage of the multiplier effect they offer for reaching SMEs quickly and at a much lower cost than targeting organisations individually.

2.2 Delivering a high quality product chain

Tackling gaps has been key to the REQUEST project – gaps in knowledge, gaps in information, the list goes on... But let's not forget that the net result is literal gaps in the building! That is why coordination within the supply chain is so important. Poor coordination in the supply chain is a gap in itself but more often than not it leads to physical gaps – from poor air tightness in a building. And poor quality installation doesn't deliver the promised energy savings or cost and comfort benefits, resulting in a gap in customer expectations and an unsatisfactory customer experience.

Ensuring the delivery of high quality products and services and associated benefits is important for building trust between customers and suppliers. This is a further challenge in a market where the supply chain and installation process is so fragmented. Critical to a high quality energy efficiency renovation is ensuring that different sub-contractors work together effectively. Most energy efficiency projects where several measures are being installed will require the collaboration of a number of different supply chain actors, such as general builders, plumbers, electricians and specialist installers. Without proper coordination and quality assurance between these different tradespeople, the result is a poor quality installation.

To overcome this gap, of the pilot projects that followed an actual renovation, the most successful ones always involved the provision of project management support in one form or another. Most important was the need for the person/s providing this support to understand the energy efficiency implications of different decisions across the whole build or renovation. For example:

- In the Danish pilot project this support was provided by 'Charlie' (see 1.2, page 8) who was able to advise householders throughout the renovation project
- In the Greek pilot project it was provided by the REQUEST project partner, CRES, who were on-site every day providing support and advice
- In the German pilot it was provided by the 'REQUEST representative' who was the person selected on-site who had an overall view of the renovation and was backed by dena and the REQUEST quality process
- In the UK pilot project it was provided by builders trained and backed by the Energy Saving Trust.

For large scale renovation projects a project manager is, more often than not, appointed to oversee the whole process, coordinating the various trades and working to ensure a high quality renovation is delivered. But within this process there is little or no emphasis on ensuring that the quality of the energy efficiency measures delivered is high. This was a real missed opportunity for the REQUEST partners as the framework is there to be exploited. The REQUEST quality assurance process developed within the project tackles this knowledge gap – it has been tested and refined in real renovation projects – and work is now under way in some of the partner countries to roll it out into business as usual.

For smaller builds or renovations, more often than not, there is no formal “project manager” role on-site – it’s a cost that is too expensive to bear. So the lead contractor frequently performs this role and, in most instances, it is clear that for the energy efficiency aspects proper coordination between tradespeople and an emphasis on quality assurance do not exist. As such, there is a real risk that predicted energy savings (and the associated comfort benefits promised to the customer) are not actually realised. In an industry where word of mouth has a powerful influence over customer decisions, ensuring customer satisfaction with energy efficiency improvements made to the home is very important. The REQUEST pilot projects demonstrated that this gap could be addressed through provision of training, incorporating a blend of knowledge on issues such as good project management for energy efficiency renovations and more technical information on issues such as air tightness and thermal bridging. In some of the REQUEST partner countries, further work is underway to adapt the detailed quality assurance process developed for larger projects (as above) so that it is relevant and cost effective for smaller scale renovation projects.

3. Changing support structures for energy efficiency programmes

Almost all of the partners involved in the REQUEST project are national energy agencies. During the course of the REQUEST project (which began in 2010), energy agencies and other organisations performing a similar role have faced profound pressures to change their traditional programmes and modes of operation for the following reasons:

- As with other parts of the European public sector, the financial crisis has had a significant impact on budgets available for energy efficiency programmes
- The growing profile and interest in energy efficiency and renewable energy has increased the demand for services. Not only are the public more aware of the need to reduce energy bills and carbon emissions, but there is a growing complexity in the market – more products, more suppliers and more interest from large scale investors.

With growing demand for services and reducing budgets, REQUEST has played a vital role in the development of new approaches to help build an unbroken supply chain and deliver a cost-effective customer journey to drive the uptake of domestic energy efficiency improvements across Europe. Mostly the new approaches pioneered through REQUEST have involved working in partnership with the private sector: while previously energy agencies and similar independent organisations might have led large-scale communication, certification and subsidy programmes in their own right, REQUEST pilot projects were mostly delivered with the support of, or in support of, the private sector.

The REQUEST project has identified a number of new cost-effective models that organisations with a role in promoting domestic energy efficiency can adopt and adapt. Within these, two themes are central:

1. Building trust – by improving quality and providing reassurance to customers engaging with new products and suppliers for the first time; and
2. Improving communication – at the implementation level between customers and suppliers and different parts of the supply chain and at the policy level between all stakeholders with an interest in the energy efficiency market.

The focus of the 11 REQUEST pilot renovation projects varied, with some focussing on improving one area of the unbroken customer journey in detail e.g. Germany tested a project management process to be implemented on-site when installing measures. Several other pilot projects focused on approaches that covered more than one stage of the customer journey – assessing in detail how the process could be made to work in a way that builds trust between all parties. The common aim of the REQUEST projects was to work towards improving the link between the consumer and the supply chain to achieve an unbroken, quality assured supply chain for energy saving home refurbishment.

Each of the 11 pilot projects addressed problems relevant to their country's existing policies and refurbishment market and therefore each project has its own set of recommendations and lessons learnt⁶. Together the pilot projects have reached over 1,000 tradespeople, energy advisors and suppliers, over 500 individual householders and have instigated cooperation with over 50 federations and governmental bodies in the respective EU partner countries involved. The pilots are described briefly below and broadly follow the steps of the customer journey.

The pilot projects have triggered over 36,000 MWh of energy savings and almost 10,000 tonnes of CO₂ savings within the lifetime of the project which is expected to be at least 5,500 GWh of energy savings and 183 ktonne CO₂ by 2020 if multiplier opportunities are fulfilled as expected. Across Europe homeowners have invested well over €18 Million EUR, with this expected to increase to €1 Billion EUR by 2020.

1.1 Information measures – improving EPC recommendations

In a number of countries, standard systems to support the issuing of recommendations for energy saving improvements alongside the production of the official EPC had not been developed. REQUEST pilot projects in these countries therefore focused on improving the process of issuing effective recommendations as the key component of the first stage of the customer journey.

⁶ Further detailed information regarding each pilot project is available in the pilot project evaluation report available on the REQUEST website: http://www.building-request.eu/sites/default/files/D5.5_5.7_Pilot%20and%20evaluation%20report_final.pdf

Austria: Accurate and motivating information about potential energy saving improvements, even for Vienna's most historic homes



Figure 2. A typical 19th century Viennese apartment. Copyright: The Ritz-Carlton, Vienna.

Figure 1 on page 10 illustrates the customer journey that is followed by individual home owners. But a similar journey from assessment of renovation options through to refurbishment planning installation of measures needs to be followed by multiple building owners. In the REQUEST Austrian pilot project AEA – the Austrian national energy agency worked with the largest public housing owner in Europe, the City of Vienna (with 220,000 homes), to improve the methodology calculation, and therefore accuracy, of refurbishment recommendations which are issued alongside an EPC.

To improve the recommendations issued AEA created a building typology – a picture of several thousand Viennese home types, their typical heat demand and their potential for energy saving improvements, wall or roof insulation, new or improved windows, and improved heating systems. In particular identifying the effective recommendations for Vienna's homes involved assessing improvement options for dwellings built in the classic nineteenth century Wilhelminian Style. In this regard the Austrian pilot project addressed an energy efficiency challenge that is important and distinctive in Europe – how to deliver modern energy saving upgrades in historic buildings with protected features.

For the City of Vienna as a building owner, the building typology acts as a new tool to support the decision making process during the planning of housing upgrades at the municipal level and to assess the Viennese multifamily housing stock. More broadly the data will be used by the Austrian energy experts to support the provision of accurate information about the potential for energy saving for building owners in Vienna. The typology has been introduced to 12 consultants and 3 universities, and this is expected to increase to 20 consultancies through further promotion. The website describing the typology has had approximately 450 unique expert visitors and it is expected to increase by at least another 100. The building typology has also been promoted in two journals (online and printed with circulation of 6,000) for consultants and energy efficient building stakeholders.

For further information please contact: Naghmeh Altmann-Mavaddat (naghmeh.altmann@energyagency.at) at the Österreichische Energieagentur/Austrian energy Agency.

Belgium- Flanders Region: a dynamic tool to communicate the benefits of action of refurbishment for experts and homeowners

The EPC gives an idea of the energy efficiency of a home. However before, during and after the EPC is issued both experts and home owners can find it useful to explore scenarios for possible energy saving home improvements. Also access to wider information about home energy saving in a flexible, dynamic way is desirable. This is particularly important as the EPCs in Flanders only contain generic recommendations for improvements, but do not give the home owner insight in the possible benefits for their specific house.

The REQUEST partner in Belgium – VITO, a technical research agency – created a tool for EPC assessors to calculate the impact of renovation measures and launched a new website with trustworthy and easy comprehensible information about potential renovation measures for homes. The tool delivers tailored information on the individual home, recommending specific measures – and allowing experts to calculate the return on investment for energy saving improvements for the particular property so home owners can easily see the benefits of the suggested renovation measures. The website gives additional information for the home owners on the suggested renovation measures. Since it was launched in December 2011, the website has had over 1,200 unique visitors and is available as an on-going information resource for home owners www.EPCInfo.be.

To test the tool in practice, some 5,000 EPC assessors were contacted. 200 of them responded to say they were interested in the project and approximately 75 assessors participated in an introductory workshop. 72 assessors subscribed to participate in the pilot, of which 35 delivered useful results within the timeframes. The participating EPC assessors were surveyed and 90% indicated that tailor-made advice, as tested in the Belgian pilot, would add value to the EPC. The home-owners who received tailor-made renovation advice were also surveyed, although the responses were more limited. However, they showed that 70% of the home-owners had the intent to implement at least some of the suggested measures. Another 20% indicated that they might implement the suggested measures in the future.

Given these data, and if tailor-made advice was to become part of the official EPC in all three regions in Belgium, it has the potential to save approximately 80,000 tCO₂ per year by 2020.

For further information please contact: Marlies Van Holm marlies.vanholm@vito.be at the Flemish Institute for Technological Research- VITO

Slovakia – a web tool providing practical information on energy efficient renovations

Currently not enough information exists in Slovakia to help householders, tenants and their representatives carry out energy efficient renovations or obtain an EPC. Therefore SIEA developed a web tool that provides clear, simple and easy to use information for a range of different stakeholders, to ensure all appropriate parties have enough information to address this.

SIEA held a workshop with more than 30 experts involved in different stages of the renovation process to collate information for the advisory tool. Following this the website was developed and is divided into three sections:

- General building renovation advice: a step-by-step guide on how to carry out a refurbishment, including how to select a contractor and ensure high quality.
- Description of energy efficient and renewable energy measures.
- Energy Performance Certificates: explains the purpose and benefits of the EPC.

The tool was tested with over 20 SIEA and external energy experts who all said they found the tool interesting – 50% found it very interesting and 50% found it quite interesting. It was also considered fit for purpose with over half respondents (55%) finding it very useful and the rest (45%) saying it is able to help make different phases of the

refurbishment process much clearer to them. 50% found the tool very user friendly and the remaining 50% found it at least sufficiently clear for their needs. Concerning the information on EPCs, three quarters (75%) said that it provided all the necessary information they need regarding certification procedures and the rest (25%) said that it provided adequate or basic information in this field.

The web tool was launched in May 2012 and by the end of January 2013 had 2,850 unique visitors. It is expected that this number will increase and SIEA are aiming to reach 3,000 people by the end of February 2013. The tool has been promoted to householders and other target groups through the SIEA company website and also through multiple articles and press releases. The distribution and impact of the tool is expected to continue to grow.

For further information please contact: Eduard Jambor (eduard.jambor@siea.gov.sk) at the Slovak Innovation and Energy Agency (SIEA).

1.2 Linking supply and demand for householders

Portugal – providing in depth technical support to give homeowners the confidence to implement EPC recommendations

The Portuguese pilot provided extensive support to householders throughout the customer journey to give them greater confidence to act on EPC recommendations. ADENE identified homes with an EPC rating of at least a C or lower through the database of the Portuguese certification system (SCE) and partnered with a regional energy agency to engage with the homeowners. Information regarding the pilot was sent to more than 10,000 home owners in Lisbon. From this 69 homeowners participated in the pilot and workshops were held with interested homeowners where EPCs were issued and explained using information developed during REQUEST. To build trust with the supply chain, tradespeople also attended the workshops and were able to explain potential installation measures and their benefits – this included 4 qualified experts (energy assessors), 5 trades people associations (for solar thermal, insulation, heating/ventilation/air conditioning - HVAC, boilers, and double glazing) and 1 regional energy agency (Lisbon municipality).

Those homeowners interested in implementing measures were given technical support to help prepare budgets and project manage the construction work. This process also helped to build closer cooperation between the trades. From the 69 home owners that have agreed to participate on the project, 50% asked for quotes to implement the EPC recommendations. There were 12 requests for HVAC and domestic hot water systems, 12 requests for thermal insulation, 9 requests for solar systems and 12 requests for windows. So far 7 of these home owners have decided to implement the recommendations (2 for HVAC equipment, 2 for thermal insulation, 2 for thermal insulation and windows and 1 for just windows). After the renovation, the process was checked and if satisfactory a new EPC was issued to quantify the energy savings. Based on the experience from REQUEST, ADENE are developing an on-line platform that will continue the work of the pilot. This on-line platform (www.casacertificada.pt) looks to bridge the gap between the EPC and the supply chain and home owners, based on the information in the EPC. It will provide more technical information and will allow householders to check trusted installers, companies and builders who can carry out the recommended measures.

During the pilot, homeowners invested significant amounts (of their own money) in the renovations with an average of around €3,650 per household and a total of €25,580 invested. It is expected that, based on an increased rate of refurbishment of 2.2% per year this will be €65 million by 2020. The primary energy and CO₂ savings during the pilot were 36,500 kWh and 4.4 tCO₂ per year respectively – and assuming the same increase in the rate of refurbishment this is expected to increase to 123.605 MWh and 14,756t CO₂ by 2020.

For further information please contact: Manuel Casquico (manuel.casquico@adene.pt) at the Portuguese Energy Agency/ADENE - Agência para a Energia

UK – making all renovations energy efficient and building capacity within the industry to do this

Energy efficiency improvements are often overlooked in small refurbishments, despite the fact that they can be integrated for little additional hassle and cost. Through its pilot project, EST aimed to increase the uptake of energy efficiency measures within existing domestic refurbishment projects, demonstrating that deep renovation could be achieved by taking a step by step approach.

To enable this EST developed a series of ‘trigger point’ guides presenting the energy efficiency options available when doing specific projects (kitchen, bathroom, loft and living room refurbishments). Two guides for each project were produced – one for homeowners and a more technical guide for builders. Homeowner guides were disseminated to the public, via EST’s monthly e-bulletin sent to 100,000 homeowners, and trade guides to builders via the Federation of Master Builders, to their 400 members. To ensure builders were able to make full use of the guides, and to tackle the lack of knowledge around energy efficiency in the supply chain, two training sessions for 55 builders and architects were held.

The workshops were evaluated and 100% of attendees said that the guides help them to show customers the advantages of including energy saving products in their homes and that the guides ‘add weight’ to their suggestion of including energy saving measures.

- 75% of builders said that the technical guidance on airtightness and thermal bridging sections within the guides was particularly helpful.
- Builders’ awareness of energy efficiency has increased for 75% of those who attended the training events.
- The remaining 25% of builders said they were already knowledgeable about low carbon retrofit prior to seeing the guides, so the guides only had a limited impact on these builders.
- 35% of those stating that the builder’s training events and trigger points guides were the first time that they had been introduced to the low carbon retrofit topic and the opportunities it presented.

They all saw the benefit in promoting energy efficiency as they can come across as knowledgeable and helpful, particularly ahead of the introduction of new UK policy (Green Deal). Builders have fed back anecdotally that they are continuing to use the guides with all new clients: *“These [guides] can be given to our clients from our initial survey in order for the client to start thinking about what measures they can afford and plan for. They also help understand about future proofing.”*

To measure the impact of the guides in practice, renovation projects were identified by the trained builders where their clients were willing to use the guides and the renovation process was followed from beginning to end. Approximately 22 measures were installed across 7 projects, including: wall, floor, loft or roof insulation; improved glazing; low energy lighting; energy efficient heating systems; low energy appliances; draft exclusion and improving airtightness.

8 thermal images and EPCs were taken pre-pilot and 7 taken post-pilot works, showing improvements in the thermal performance of the properties. Feedback was obtained on the guides from the builders and homeowners to improve them and learn how to promote them effectively after REQUEST finished. Of the 8 homeowners that were involved in the pilots 75% increased their awareness/knowledge after reading the guides.

The guides are being promoted with a range of stakeholders, and primarily with the supply chain as there was a greater impact targeting builders compared to householders during the pilot. The guides have been incorporated

into EST builder training programmes and a different approach to householder communication is taking place to improve the impact – targeting them at a much earlier stage in their renovation planning.

The energy and CO₂ savings from the 7 room improvements are estimated to be 7 MWh/year and 1 tCO₂ respectively – although small, this represents improvements that would not have otherwise taken place. One home, had previously renovated several rooms in the home over a number of years and increased from EPC Band F to Band C. The investment in the renovation is unknown as homeowners were funding it themselves, with no support from EST or others.

For further information please contact: Emilie Carmichael (emilie.carmichael@est.org.uk) at the Energy Saving Trust

1.3 Following the customer journey in a multi-family building renovation

The development of an effective EPC regime across Europe is progressing at different rates in different countries. In a number of countries, EPCs were not yet mandatory at the time of the REQUEST project. Three REQUEST pilot projects in countries where EPCs were not yet mandatory focused on the whole customer journey from EPC to action in a small number of buildings, working in partnership with municipal property owners and occupiers.

Poland: Building towards effective EPCs and recommendations

In Poland, KAPE, the energy agency, collaborated with the Building Administration of Ochota District to select 30 multi-family buildings for its pilot project. Most of the buildings selected were quite old and in need of comprehensive renovation.

The project focused on the challenges of delivering an effective EPC regime through the whole customer journey – going from issuing the certificate, providing motivating recommendations, and overcoming barriers to action, particularly in relation to getting collaboration and buy-in for improvements from the communal owners of the properties. Because the buildings are in communal ownership, decision making problems were expected, particularly in relation to the funding of renovation measures. The pilot aimed to achieve appropriate involvement and engagement of owners, tenants and tradesmen in an atmosphere of responsibility and transparency.

During the pilot KAPE cooperated closely with BASF – the chemical company and the Mineral Wool Manufacturers Association: glass and stone (MIWO) who co-financed REQUEST in Poland. A range of tools were used to help inform the tenants about low carbon renovation: KAPE developed a new methodology and software to carry out EPCs that gave additional information from standard EPCs. It gave comprehensive analysis of building renovation options from a technical, economic and environmental point of view and was applied to the 30 multifamily buildings. Additionally 2 workshops for tenants were held and more than 50 meetings with cooperatives and tenants were organised. Guidelines were prepared for tenants on low carbon investments, with particular emphasis on maximising return on investment by gaining the highest possible insulation and extend the life of the façade – these will ensure better quality and the actual energy savings are achieved. These guidelines will also be used by the Administration Office after REQUEST is finished. BASF undertook (at their own cost) thermo-imaging of all 30 buildings as an extra tool to help tenants gain a better understanding of the range of refurbishment measures/options as the key decision makers in the process. The thermo-imaging is also used to check the quality of the thermomodernisation works after the project was finished. This very detailed information on the benefits of renovation aimed to encourage all parties in the decision chain to carry out the recommended refurbishment. An additional document of instructions was developed for use for tenants which meant more trust was gained and more energy savings could be achieved.

A positive effect of the pilot (and something not foreseen in the work programme) was the creation of a knowledge database with exemplar, complex renovation examples and an explanation of responsible partnerships that carried

them out. This is a part of a larger Polish REQUEST initiative called the Knowledge and Innovative Technologies cluster “BuildNewCities” which brings together both individual experts and organisations such as the University of Technology, MiWO or BASF that benefited from experiences learned in the REQUEST project and want to work together after REQUEST has finished.

The impact of REQUEST will be the continued use of a template for improved terms of reference for the contracts that requires higher energy performance of buildings – it will be used by the Building Administration of Ochota District and by participants of the “BuildNewCity” Cluster that was created within the pilot project.

The REQUEST pilot project also had an impact on policy making in Poland. The pilot results were input into the National Programme for Low Carbon Economy where a section was dedicated to the quality of refurbishment works.

Most of the 30 housing cooperatives thanks to the REQUEST pilot project have taken the decision to do a low carbon renovation according to the recommendations in the improved EPCs. Due to delays in the decision making process, particularly related to the limited sources of funding for the renovation measures (i.e. the buildings are in communal ownership or buildings were under supervision of a conservation officer) all the 30 investments could not take place within the duration of REQUEST. Nevertheless, the decisions have been taken and search for the financial sources has started. 3 investments have been started and the rest of the investments will be finished by 2020. The figures in the table show the savings that will be made when the measures outlined in the 30 EPCs are installed:

Results of the energy efficiency measures installed (taken from the 30 EPCs for 30 pilot project buildings)			
Energy saving kWh/y	CO ₂ reduction ton /y	Investment cost PLN	Simple payback time (SPBT) yr
14,901,570	5,892.1	30,276,114	9.1

After finalisation of the REQUEST project KAPE will continue to monitor and assist the Building Administration of Ochota District in Warsaw in carrying out the refurbishment work.

For further information please contact: Karolina Loth-Babut (kloth@kape.gov.pl) at KAPE/ Projektów Krajowa Agencja Poszanowania Energii S.A.

Greece: Effective engagement of residents, tradesmen and other municipalities in the energy efficient renovation of a social housing building.

EPCs did not exist in Greece when the REQUEST project began. To raise awareness of the benefits of EPCs and energy efficient renovation projects the Greek pilot carried out a demonstration renovation project in a social housing block. The aim was to improve the public and tradespeople’s knowledge of energy efficiency renovations and to create a replicable renovation process that could be disseminated to other municipalities. CRES, the Greek energy agency, worked with Municipalities in the Attiki region of Greece to identify municipalities with social housing blocks interested to join – as a pilot case – the National Programme “Green Neighbourhoods”. The Municipality of Agia Varvara was selected as the most appropriate. The project will renovate four multi-family buildings, but only the Agia Varvara property was carried out during the timescale of the REQUEST project.

One EPC was issued before the refurbishment project. Another EPC will be issued after the completion of the second phase of the project (the refurbishment of the other 3 buildings and replacement of the existing electromechanical installations, integration of renewable energy etc.). The target of the Greek pilot project was the upgrade of the energy classification of the building from class G (lowest performance class) to class D, with a total energy saving in primary energy consumption of approximately 60%, by improving the building envelope performance. Further

reductions in CO₂ will be achieved with the installation of geothermal heat pumps, achieving, thus an energy saving of approx. 70% in primary energy consumption.

Best practice examples identified during the REQUEST project and innovative techniques were used to engage industry and the residents: for example companies, when informed about the pilot project offered to sponsor the build and provide material and labour for free in return for publicity (through promotion of the demonstration build). Communication was key to CRES's strategy for engaging the residents and the tradespeople. Alongside other measures, meetings were held with residents to inform them of progress, with the trade partners in attendance to answer any questions and feedback was obtained on their experience of the renovation. Questionnaires were also distributed to residents to ensure all feedback was captured and to refine the renovation process for the future renovation of the three additional buildings. A detailed project plan was developed with technical and legislative barriers identified. This will be disseminated for use by other similar neighbourhoods once the projects are complete via Municipalities interested in implementing similar projects.

The pilot project involved active collaboration with 2 policy makers, 72 householders, 8 companies that sponsored the products (rockwool and polystyrene insulation, double glazing aluminium frame windows with low-e coating, external shades), 3 energy auditors and 5 architects. Also, a significant percentage (21%) of the residents showed an interest in getting professionally involved in the renovation of the other 3 buildings. It is important to note that the majority of the residents are unemployed and pensioners (33% and 29%, respectively).

It is expected that the primary energy saving will be 34,777 MWh/yr. After the completion of the renovation of the four buildings, the primary energy saving will be 1,597,317 MWh/yr. The corresponding reduction of greenhouse gas emissions will be 9t CO₂. After the completion of the renovation of the four buildings, it will be 681t CO₂.

For further information please contact: Lena Lampropoulou, email: llampro@cres.gr, at the Centre for Renewable Energy Sources and Saving (CRES)

Bulgaria: addressing the difficulties of renovating multi-dwelling residential buildings and discrepancies between EPC predicted savings and actual savings

Bulgaria is developing its thinking on energy efficiency in buildings and is looking to increase its experience in issuing and using EPCs and carrying out low carbon renovations. As in Poland, multi-family homes were the focus of the Bulgarian pilot as they are common across Bulgaria and pose a problem when it comes to renovation because decisions have to be agreed by all homeowners in the housing block. The aim of the pilot was to develop a replicable scheme for the renovation of multifamily buildings in Bulgaria.

The Bulgarian Sustainable Energy Development Agency (SEDA) identified six multi-family homes, involving a total of 97 private households. SEDA worked with 2 government decision makers, 10 local authorities, 1 housing association, 12 building professionals/associations, 5 contractors/ESCOs, 3 investors (banks/funds), 3 energy assessors and 1 certification body (Bulgarian Institute for Standardization) to carry out the renovation of the six multi-family homes. Due to the lack of knowledge of energy efficiency in Bulgaria the pilot experienced difficulty in engaging homeowners, and also ensuring compliance on the building site in terms of products used, correct installation and adhering to the relevant legislation. To help address these issues SEDA developed an improved methodology for EPCs for refurbishment of multifamily residential buildings. This meant that the EPCs have clearer and more accurate recommendations and more information on integrating energy efficiency measures into a building refurbishment.

In order to develop a replicable project plan for other municipalities SEDA analysed the refurbishment process in detail to identify where problems exist and to develop replicable solutions and recommendations. The process was

analysed from first engagement with householders, installation of measures, through to the follow-up with homeowners afterwards.

The impact of the pilot is to be a demonstration project to other municipalities to encourage them and relevant building associations (condominia) to put into practice E.P. Certificate recommendations. The experience, lessons learned and the improved EPC methodology developed by the pilot project will be used for the future implementation of the National Programme for the Renovation of Residential Buildings, as well as for the implementation of Action 1.2 “Housing Policy” of Operational Programme Regional Development, co-financed by the European Regional Development Fund. Investment resource triggered by the pilot amounts to a total of 914,540 BGN or €467,600 EUR, which contributes to a primary energy savings total of 1,417 MWh/year and reduction of greenhouse gas emissions totaling 968 tons CO₂eqv./year. The calculation is based on the actual measurements before and after the implementation of the energy efficiency measures in 5 representative blocks of flats, that are part of the pilot project.

For further information please contact: Ognian Markovski (o.markovski@seea.government.bg) at the Sustainable Energy Development Agency (SEDA).

1.4 Quality when carrying out measures

Germany: building a comprehensive quality process for energy efficient renovations

The German pilot tested and refined the quality assurance mechanism produced during the REQUEST project. The quality assurance process was developed by dena – the Germany energy agency and consisted of a series of checklists covering the renovation process from diagnostics through to handover with the homeowner. dena worked with the Chamber of Crafts in two of their regional offices in Münster and Leipzig, who have good relationships with tradesmen. 27 projects were identified by the Chamber of Crafts to test the process, and for each project a ‘REQUEST representative’ as they were called in the pilot project, was decided in consultation with the contractor involved and the contracting companies. This person was responsible for tracking and documenting the process of quality assurance, and for facilitating communication on site. Ideally this would be someone who was on-site regularly had an overview of the whole renovation - for example it could be an employee of a trade company, the site manager, the energy expert or architect.

The 27 projects, carried out by 24 companies were refurbishments of single or multi-family homes with 11 single family house renovations, 14 multi-family house renovations, 2 non-residential buildings and two of the projects were renovations to the passiv-house standard. 14 of the projects were full refurbishments with 13 partial refurbishments within the timeframe of REQUEST. In total all the projects involved 30 craftsmen, architects, engineers and energy consultants.

dena collected the final and completed checklists from the REQUEST representatives for each of the renovation projects and information was entered into a database for analysis and to start to build a picture of renovations. dena held two workshops with tradespeople and energy experts to get feedback on the checklists and process and is now looking to integrate the checklists into existing funding schemes in Germany. It is estimated that 20% higher energy savings are achieved by using the REQUEST renovation process and the following figures show the estimated investment and savings from the German pilot project:

- It is estimated that within the 27 projects a cumulative investment of €1,400,000 was made and that this could increase to €15,000,000 by 2020
- The renewable energy production from the 27 projects was 2,770 MWh/year and it's estimated this could increase to 19.800 MWh/year 2020.

- The energy and CO₂ savings from the 27 projects are estimated to be 2,218 MWh/year and 450 tCO₂ respectively and could potentially increase to 20,616 MWh/year and 4,190 t CO₂ by 2020.

For further information please contact: Katharina Bensmann bensmann@dena.de from the Germany Energy Agency - dena

1.5 A co-ordinated supply chain

Italy: a national level consortium of supply and demand stakeholders to further legislation, and a local initiative to improve quality in energy performance contracts

The Italian pilot had two parts to it. At the national level, ENEA the Italian National Agency for New Technologies, Energy and Sustainable Economic Development set up and coordinated a consortium 'Tavoli di Lavoro 4E' bringing together 34 stakeholders from across the building renovation industry that represent over 200 organisations with the aim of improving relationships between trades, social housing companies, ESCOs, professional associations and those representing consumer interests in order to hasten the implementation of legislation. Bringing together different viewpoints from across the industry, as well as working closely with the Ministry of Economic Development department meant the consortium gained an in-depth knowledge, fostered through thematic meetings on topics such as certification, contract and qualification/education. The consortium submitted two reports to the Ministry designed to influence the current Italian legislation on renovation. The first focussed on improving financial schemes for energy renovation and some recommendations have been included in the recent Decree (Decreto Conto Termico - DM 28-12-2012) to incentivise small interventions to improve energy efficiency and production of thermal energy from renewables. The second report focussed on energy performance certification related to the transposition of EPBD and is still being discussed. The impact of the Tavoli di Lavoro initiative, if recommendations are taken up, is estimated to be an energy saving of 2,000 GWh a year and avoided CO₂ emissions are estimated to be 430kt/year.

The second part of the pilot followed the energy renovation process of a social housing company, ACER Reggio Emilia, with the aim of integrating the REQUEST quality framework into its Energy Performance Contracts. The example analysed was the renovation of 34 homes in the Compagnoni neighbourhood (11 buildings built in 50s') which began in 2003. Post occupancy evaluation questionnaires were carried out with the occupants and the social housing manager to evaluate their satisfaction and to identify areas for improvement in the contract. 14 responses were collected which were positive and the results were used to inform future work undertaken by ACER and were also discussed at the Tavoli di Lavoro 4E contracts meeting. Despite outstanding legal and technical challenges it does seem possible to integrate the quality process into energy performance contracts this will be carried out outside the timescales of REQUEST. The estimated impact of the work done with ACER – a combination of adopting energy performance contracting and quality integrated renovation - is a reduction from the current energy use of Mtoe of 1.04 down to 0.41Mtoe by 2020.

For further information please contact: Ezilda Costanzo (ezilda.costanzo@enea.it) at the Italian National Agency for New Technologies, Energy and Sustainable Economic Development/ENEA

1.6 Evaluation & monitoring

Denmark – an evaluation of a programme to promote energy efficiency with households and the supply chain

Denmark has a well-developed energy efficiency market in comparison to many other European countries, therefore their pilot project focussed on the evaluation of the 'Danish Knowledge Centre for Energy Saving in Buildings' – designed to increase the uptake of energy efficient renovation measures in buildings. The Knowledge Centre runs a

number of programmes and the evaluation assessed its impact and identified areas for improvement if it was to run for more than the three years planned. As part of the evaluation the energy and leader training programme for builders and installers was assessed, and to capture the full impact of the training, one energy leader's impact on the supply chain in the nearby municipality of Sonderborg was assessed. This area was chosen as it was running an initiative called Projectzero' and had very high levels of energy efficient renovation.

The evaluation of the Knowledge Centre took place through interviews with key staff in branch associations, within building firms and those who had been trained through the Centre. The other end of the supply chain was also interviewed including leaders and teachers at vocational schools. The intensity of contact with professionals is illustrated by the number of visitors at the Knowledge Centre's website which reaches up to around 3,000 monthly, with a peak of 4,500 unique visitors in one month. The Centre provided a large number of energy solutions aimed at a range of professionals. At the time of writing, 27 solutions concerning energy upgrading of the building envelope and 20 energy solutions for energy improvement of installations have been made available / disseminated. Additionally a number of tools were available such as a calculator for estimating energy saving potential for single family homes and an energy label booster for calculating the energy saving for a one energy-label step upgrade.

To assess the energy leader training programme over 1,000 surveys were sent out and 305 were returned (a high response rate of 37%). There was an 80% satisfaction level with the training and training materials. As of June 2012 those who were trained reported an average of 19% electricity saving and 23% heat savings from the training.

The evaluation of the supply chain in Sonderborg proved one of the most useful findings – highlighting the steps required to ensure an engaged supply chain: it was found that an independent energy expert called "Charlie" acts as the key link in the chain for the now well established energy efficiency market that exists there. During the REQUEST project Charlie advised over 750 households. More than 400 households (55%) have gone on to undertake energy saving renovation projects. Currently, around 250 energy saving renovations are already fully completed. Other interested households are currently on the waiting list and a final success rate of 60-70% is expected (houses renovated/households visited) and the average CO₂ saving per house is 1,500 tCO₂.

Employment in the building sector, in contrast to the rest of Denmark, has gone up in the county of Sonderborg. This can be attributed to the awareness raising undertaken to promote available for the building sector. As a result of this, awareness has extended beyond traditional building companies to, for example, glaziers and insulation companies.

For further information please contact Kim B Wittchen: kbw@sbi.dk at the Danish Building Research Institute, SBI.

ANNEX I. REQUEST – a lasting resource

REQUEST has a vast amount of information available to help enable energy efficient renovations. The tools are primarily designed to help energy agencies and Governments, however they can easily be adapted and developed by industry or other relevant organisations.

Listed below are all the tools and reports, and more information is available on the REQUEST website – found by following the link given.

Resource name and description	Who is it useful for?	Where can it be found?
REQUEST Database: a database of schemes techniques and methodologies that exist across Europe and beyond that aim to improve the quality of renovations or the uptake of EPC recommended measures	Anyone interested in what schemes already exist in other countries to promote energy efficient renovations. Useful for organisations involved in EPBD implementation	On the website or by emailing: ezilda.costanzo@enea.it http://www.building-request.eu/info/review-and-research
Best Practices Report: Highlights the very best of all the schemes that can be found in the REQUEST database (above)	Anyone interested in what schemes already exist in other countries to promote energy efficient renovations. Useful for organisations involved in EPBD implementation	On website (http://www.building-request.eu/info/review-and-research)
Efficiency Assistant tool: A tool for a range of audiences providing them with advice, what to look out for and best practice when carrying out an energy efficient renovation.	There are 5 audiences that the efficiency assistant is designed for: <ul style="list-style-type: none"> • Homeowners • Policy makers • Designers • Builders • Qualified experts 	Online: http://www.building-request.eu/content/wp3-d31-fact-sheets-tools-and-techniques
'How to' guide for communication schemes: A guide explaining how to put together a scheme to promote the uptake of EPC recommendations with examples from the best practices report (above)	Policy makers or energy agencies interested in promoting the uptake of EPC recommendations and implementing EPBD	On the website: http://www.building-request.eu/content/wp3-bridging-gap-between-epc-and-supply-chain

<p>A quality assurance process for on-site: A guide for use by builders and craftsmen on-site to ensure renovations are of a high overall quality and high energy efficiency. It includes information on how the process could be developed into a quality label.</p>	<p>For those working in the renovation industry, particularly organisations that work closely with tradespeople – e.g. trade associations, energy agencies.</p> <p>Also for policy makers looking to implement quality schemes.</p>	<p>On the website www.building-request.eu/info/request-quality-assurance-instruments-housing-renovation-processes</p>
<p>A summary of the pilot projects: A 2-page summary of each pilot project that gives a quick overview of its aims, activities and outcomes.</p>	<p>A range of audiences wanting to have a quick overview of the tools tested by each partner in their own country</p>	<p>On the website on each pilot project page: http://www.building-request.eu/pilotprojects</p>
<p>Detailed evaluation report of the 11 pilot projects All 11 pilot projects are described in detail in this report, including, how each one was implemented and what the impact has been.</p>	<p>A range of audiences wanting to know more about a project in detail – e.g.: policy makers, public bodies, Energy agencies, consultants, professionals in the supply chain, property management companies or tenant associations</p>	<p>On the website: http://www.building-request.eu/content/wp5-pilot-and-evaluation-report</p>
<p>Final international conference material. Presentations given and documents from the REQUEST international conference held in Sept 2012.</p>	<p>Policy makers, energy agencies and organisations involved in promoting energy efficient renovations.</p>	<p>On the website www.building-request.eu/closing-event</p>
<p>National conference material. Each partner held a conference to disseminate the results of the project within their country and the material from this is available.</p>	<p>Stakeholders from each partner country interested in how the REQUEST project is being taken forward. Material is in partner languages and not translated.</p>	<p>On the website: http://www.building-request.eu/content/d62-report-national-and-international-dissemination-through-conferences-workshops</p>
<p>Summary of dissemination activity. Compilation of the publications on REQUEST in national media, emailing actions, web coverage and conferences.</p>	<p>Reference document summarising all the dissemination activity carried out by each partner.</p>	<p>On the website: http://www.building-request.eu/sites/default/files/D6.2_3_4_withAnnexes.pdf</p>
<p>Feedback from the pilots to REQUEST. Explains what elements of the REQUEST tools were tested in the pilots and what the feedback is.</p>	<p>Those stakeholders interested in how information from each pilot has fed back to the overall REQUEST project.</p>	<p>On the website: http://www.building-request.eu/content/wp5-report-feedback-pilots</p>

ANNEX II. References

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P **Project Details**

Duration: April 2010 – November 2012

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