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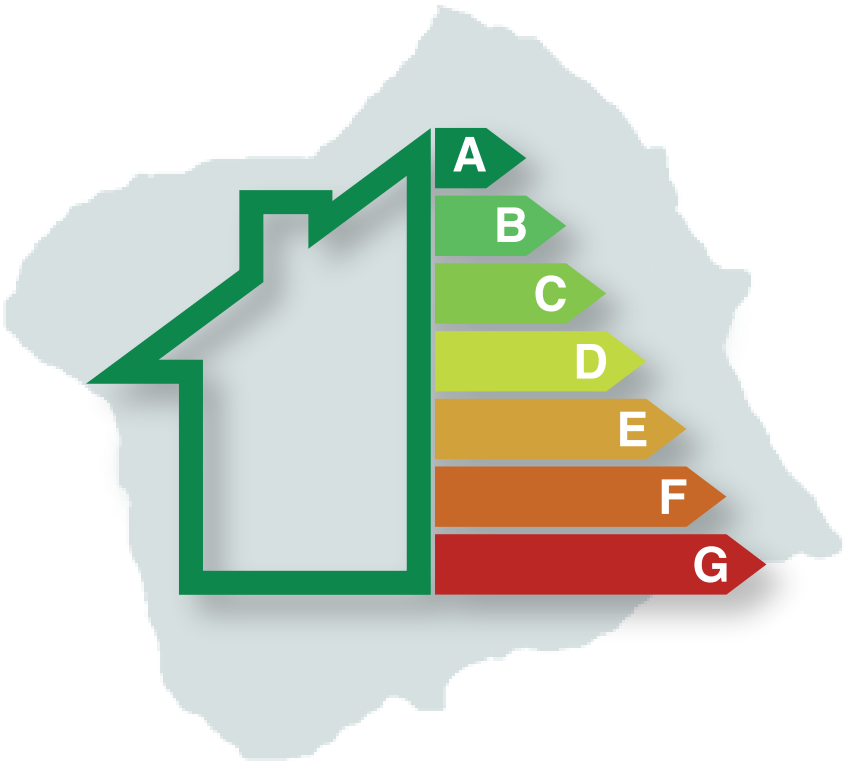
YORKSHIRE FORWARD

# Regional Supply Chain for **Energy Efficiency** Measures to Retrofit to Existing Housing

## :: Scoping Study for the Yorkshire and Humberside Region - Final Report

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## Purpose Statement

Yorkshire Forward has commissioned this project to The University of Sheffield to undertake the scoping study entitled “Energy Efficiency Supply Chain”.
This is a three months project designed to explore the key issues experienced by businesses that are operating in the energy efficiency measures supply chain for housing stocks. This project also identifies opportunities and appropriate interventions to maximise the benefits and impact of energy efficiency measures management and implementation to businesses in the region.
This project has investigated 17 different types of key energy efficiency measures in housing (social and privately owned). The energy efficiency measures investigated ranges from the ‘classical’ measure (e.g. cavity wall insulation) to ‘new green energy technology’ measure (e.g. CHP) to ‘renewable sources’ (e.g. photovoltaic). 151 companies have participated in the questionnaire survey, 20 businesses participated in the focus groups together with 5 Local Authorities representatives. Three local authorities and 15 businesses have also participated in telephone interviews. Involvement from this mix of stakeholders provides an excellent input in ensuring the robustness of this study.
The UK Government's Building A Greener Future: Policy Statement (2007) announced that all new homes will be zero carbon from 2016. The UK Government published Definition of Zero Carbon Homes and Non-Domestic Buildings: Consultation (2008) outlines the proposed an approach based on:

- High levels of energy efficiency in the fabric of the home;
- A minimum level of carbon reduction to be achieved onsite or through directly connected heat;
- A list of allowable solutions for dealing with the remaining emissions (including from appliances).

These are presented as a new Standard aiming to deliver a high yet practical energy performance level for all new homes. The Standard focuses on the fabric of the home, to secure long lasting benefit for home owners and occupiers, and to ensure that energy efficiency plays a proportionate part in the delivery of zero carbon homes. However, such Standard does not consider ‘hard to treat’ houses and housing stocks in deprived areas. This includes a mix of social housing, privately owned houses (not new build), terraces, semi-detached and detached houses that require retrofitting in order to improve their energy efficiency. Majority of the existing housing stocks are in this category. Hence, urgent action is required in order to provide a strategic framework to roll out energy efficiency measures retrofitting and implementation in this type of housing stocks particularly in deprived areas. With careful design and implementation of such a framework, it will provide an excellent opportunity to maximise supply chain, economic, social and environmental impact to the region, and improve energy efficiency.
This study has identified some ‘illuminating’ results, which have then led to the recommendations to propose required interventions on procurement methodologies; supply chain issues; information and visibility; education and training, in order to improve the uptake of energy efficiency measures throughout the supply chain, and to maximise the opportunities for the region economically, socially and environmentally for job creation and low carbon futures.

## Acknowledgement

We would like to thank Yorkshire Forward for their support and funding to this project. In particular we would like to thank Marina Ciaraldi who champions this very important initiative on energy efficiency and worked in partnership with us.

We would like to thank Joanne Pollard from CO2Sense, Helen Thompson, Catherine Bishop, Paul Turton, Eleanor Marshall, Gill Waite and Emily Hodgson from Yorkshire Forward for their valuable suggestions.

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We would also like to thank all the companies who participated in the study and supported this project:
3 Counties Energy Assessments Ltd, Abbots Gas and Heating Services, Abbey Windows Systems Ltd, Able Fuels Ltd, APP Inspections & Energy Services, AWE Energy ltd, Blue Flag, British Climate Services, Carbon Ready Ltd, Carbon Saver UK, Centurion Windows Ltd, City Electrical Factors, Complete Energy, D. Kelly Plumbing & Heating Services, Daley Plumbing & Heating, DC21, Dempsey Dyer Ltd, Design-A-Home, Dyson Insulation, EAGA, Earthmine, Eco Hometec Ltd, Ecoheat, Eco-One, Ecoskies, Electrotect, EMSc UK Ltd, Emtac Ltd, Energy Services Partnership, Energysave heating, Energytek Ltd, Envirogood Ltd, Express gas services, Forde Construction Ltd, Free EnergyforLife Ltd, GASS Ltd, Green Links Environmental, Hallam Glass & Glazing, Harding AuYong Ltd, Hays Gas, Help Europe Ltd, Home Energise, Home Solar, IGNITE GAS, Inhomeservices, Integrated Technical Systems Ltd, Jenkinson Electrical Engineering, John Aitken Plumbing & Heating, Konnectiv, Leed Solar, Litchfields, MD Tyas Heating Solutions, McDonald Plumbing and Heating, Manco, Middleton's Glas Ltd, NDS Fleet, Newtech Design Ltd, North Energy Associates, Pagets Green Energy Centre, Pagets, Phil France Plumbing and Heating, Ploughcroft Solar, Polypearl, Powermaster, Powersol Limited, Prestige Window Systems, Pure Solar Ltd, R.Davies Plumbing and Heating, RA Solar UK, RAI Systems Ltd, Recovery Insulation, Regenesys UK Ltd, Rotary Engineering UK Ltd, Solaglas, Solar Worxs Ltd, Swithenbanks Alternative Energy Ltd, The AGA Doctor, TH Michaels Ltd, The Home Improvement Advisory Service (UK) Ltd., The Yorkshire Insulation Project, Thermasys Ltd, Thomas Armstrong, Total Energy Saving Techniques Ltd, Very PC, Watsons Building Services Ltd, Wowheating.co.uk.

We greatly thank the contribution of Sheffield, Hull, Mid Yorkshire, Doncaster, Barnsley and Rotherham, Leeds, York and North Yorkshire Chambers of Commerce that provided us with a great help in identifying and contacting companies.

Moreover, we greatly thank Jacqui Wells (North East Lincolnshire Council), Robert Almond (Sheffield City Council), Gordon Smith and Paul Mablethorpe (Rotherham MBC), Richard Armitage (Calderdale MBC), Pete Betts (Bradford MDC), Andrew Jeffrey (South Yorkshire Housing Association) for sharing with us their valuable experience.

# 1. Executive Summary

## 1.1 Scope

Recent reports produced by several institutions give estimates for the UK Energy Efficiency (EE) market at around £2bn in 2010 (DTI/DEFRA, 2006; Shell Springboard, 2006). Despite these figures, research into the Energy Efficiency sector in the UK has historically been limited. Given the importance of this sector, Yorkshire Forward commissioned this scoping study in order to guide policy and identify the most effective interventions for job creation and economic development in the Yorkshire and Humberside region.

This study aims to create a more robust comprehension of the Energy Efficiency sector consisting of an understanding of:

- A map of the firms operating in the region providing Energy Efficiency measures;
- The services offered by the firms operating in the region;
- A map of the Supply Chain of the sector;
- Analysis of opportunities and barriers for its development driven by the approval of large-scale government and community projects oriented at the installation of Energy Efficiency measures.

The preliminary stage of this project has been the creation of a database of companies (with almost 1000 entries) thought to be active in the EE sector. This database has been obtained by accessing data sources (existing industry databases, directories, etc.) and complemented with further refinements to the listing. Then, firms within the database have been involved in a market research which aimed at clarifying the abovementioned points. In particular, the data gathering methodology has been based on:

- A web-based questionnaire (with 151 companies accessing it and a 27.6% response rate)
- A set of phone interviews (involving a selected sample of 15 companies and 3 local authorities)
- A focus group (involving 20 companies and 5 local authorities).

The methodology used in this study is described in Section 4, with further details provided in the Interim Report (EI/262/001, issued to Yorkshire Forward on 26 March 2010).

## 1.2 Findings

*Market Structure*

The following is shown by the research regarding the market structure and services provided by businesses operating in the region:

- Most of the work currently undertaken in the region in Energy Efficiency is delivered by large general-building contractors often national rather than regional companies;
- It is estimated that the size of this sector in the Yorkshire and Humberside region currently equates about to £200m in terms of turnover and around 5000 jobs; the market research has shown expectations of potential high-growth in jobs and turnover.
- In terms of companies based in the region (in the following, “regional businesses” or “local firms”), the Energy Efficiency sector sees a strong prevalence of region-based micro-businesses, employing a limited number of people, working on small turnovers and basically concentrated on the regional market;
- A large quota of businesses operating in the Energy Efficiency sector also provide services and products connected to Renewable Energy or Construction sectors;

- Regional businesses provide a skewed and unequal coverage of the wide range of available measures. Even traditional Energy Efficiency measures, like ones related to insulation, are dealt with by a very limited number of firms active in the region.

*Supply Chain*

Regarding the structure of the Supply Chain, it has been observed that:

- The small scale of the regional Supply Chain can be translated into a small capacity: most of the firms are only involved in small-value projects;
- The analysis of the sourcing pattern of regional firms reveals that a relevant quota of the firms' purchases is provided by out-of-region (and in some cases, overseas) suppliers; the supply chain is fractured and critical components are often shipped from overseas;
- The analysis of the sales pattern reveals that most of the sales of the regional businesses are concentrated within the region;
- The analysis of the customers' portfolio of regional businesses reveals that regional companies sell their products and/or services mainly to private owners-occupiers; Local Authorities and Housing Associations contribute only to a small quota of the sales.

*Opportunities*

As far as development opportunities are concerned, it can be drawn that:

- Regional businesses are optimistic about the growth prospect of the sector in the region;
- This last evidence is further testified by their willingness to involve in activities like workforce training, improvement of supplier relationship and of the whole supply chain, recruitment;
- On the other hand, firms do not seem to be likely to expand to other UK regional markets or to overseas market: this supports the evidence of a regional supply chain made up of micro-businesses.

*Barriers*

As regards barriers, regional businesses have pointed out the following ones:

- Regional businesses find bidding and participating in publicly funded Energy Efficiency large-scale projects difficult. This is in part because these tend to be quite large. Presently, local businesses lack the capacity to get involved;
- Most of the work related to publicly funded projects seems to go to large contractors out of the region; these businesses have their own subcontractor lists that very often do not include local businesses;
- Very often, main national contractors winning large projects act as a 'middle man', which increases costs;
- Implementation, verification, accreditation and commercialization of new technology are often too onerous, and require an intense use of capital, not always available to the regional micro-businesses.
- Lowering of Specifications has made market more competitive but reduced quality available;
- A general lack of education and knowledge on Energy Efficiency products and/or services, even in the Local Authorities.

### 1.3 Recommendations

In order to overcome the current barriers, some recommendations have emerged from this study and tested in the focus group in which regional companies and local authorities took part.

*Procurement Methodologies*

In order to help local firms be involved in local authorities driven projects, the following policies could be enacted:

1. A database of regional companies could be set up to enable local firms to be involved in Energy Efficiency projects;
2. Not all work should be packaged and let as a large contract: smaller work packages could be managed by local and regional resources, possibly to a better standard and at a lower cost, given the fewer overheads local firms can offer;
3. In framework contracts, Local Authorities should seek that a quota of sub-contracts has to be awarded to regional businesses (there are already some significant examples in place, e.g. Doncaster);
4. An assessment of the quality of the work delivered by contractors and subcontractors should be provided;
5. A change of perspective (from a "Product-Driven" to a more "Solution-Driven" approach) in designing EE large scale interventions should be considered;
6. Regional businesses recommended more user-friendly and uniform pre-qualification schemes that can better take into account regional businesses' needs and their specific skills and competencies. Where a main contractor engages sub-contractors, the sub-contractors (often the smaller regional firms) should not be disadvantaged in the contract terms, specifically payment terms. Payment terms (prompt payment) are particularly important for smaller firms dealing in the newer renewable technologies because these are more capital-intensive, imposing greater demands upon working-capital for the small contractor.

*Supply Chain issues*

In order to deal with the fragmentation of the regional supply chain, and to cope with cost of suppliers, the following solutions could be beneficial for regional businesses:

7. The creation of a regional IT system and some administrative support for allowing regional businesses to aggregate their purchasing. Basically, this system could serve as a "matching tool" for regional firms purchasing requirements. By pairing or bringing them together, it could help firms in achieving scale returns on their purchases. (We understand that such ventures already exist within the Region and could be tailored to this sector)

*Information and visibility*

In order to allow regional businesses being informed about funding schemes and work opportunities, the following measures could be helpful:

8. The creation of a central point for regional work opportunities, like an online database or a dedicated website; (it was commented that although such systems exists it is not fully utilized)
9. Utilizing a database of regional companies for creating a list in order to promptly inform firms when new opportunities arise.

*Education and Training*

Regarding Training and Education issues, firms highlighted that there is a need for them to be better funded in relation to EE, and that there needs to be a better universal strategy. In particular, firms recommended the following key points:

10. Education to energy efficiency awareness and consciousness should be provided starting from the primary school level, with children educated at a young age on energy efficiency and related areas;
11. Foundation Degrees would help improve supply chain capability, and need to be funded;
12. Promoting Energy Efficiency-oriented degree programs or projects could also help;
13. Regional businesses could be brought into training, qualification and apprenticeship schemes. At the moment mostly the larger companies gain funding for such initiatives.

### 1.4 Recommendations Summary

| Problem | Intervention Proposal | Body/Institution to be involved |
|---|---|---|
| **Difficulty in bidding and participating in publicly funded Energy Efficiency large-scale projects.** | Creating a Database of Regional Businesses operating in the Energy Efficiency sector. | Regional Development Agency |
| **Energy Efficiency publicly funded projects' size prevents local businesses to get involved due to capacity constraints.** | Smaller work packages could be managed by local and regional resource, possibly to a better standard and at a lower cost. | Local Authorities |
| **The most of the work related to publicly funded projects goes to large contractors out of the regions with their own sub-contractor lists.** | In framework contracts, Local Authorities should seek that a quota of sub-contracts has to be awarded to regional businesses. | Local Authorities |
| **Main national contractors winning large projects are acting as a 'middle man': this adds costs and squeezes margins for sub-contractors. Quality is not assured.** | An assessment of the quality of the work delivered by contractors and sub-contractors should be provided. | Local Authorities by promoting independent bodies |
| **Lack of Education and Knowledge on Energy Efficiency products and services, even in the Local Authorities.** | Moving from a "Product-Driven" to a "Solution-Driven" approach in designing EE large scale interventions | Local Authorities and Regional Development Agency |
| **Pre-Qualification schemes are a major problem for regional businesses** | Moving to more "local-friendly" pre-qualification schemes | Local Authorities |
| **Cost of Suppliers**<br>**Delivery Punctuality**<br>**Critical Components shipped from overseas** | Better use of a centralized purchasing system, based on a IT platform, where firms can aggregate their purchases. | Regional Development Agency |
| **Lack of awareness of funding schemes** | Better use of a central point for funding schemes, like an online-database or a dedicated website | Regional Development Agency/Local Authorities |
| **Lack of information about arising work opportunities** | Utilizing a database of regional companies for creating a mailing-list in order to promptly inform firms when new opportunities arise | Regional Development Agency/Local Authorities |
| **Lack of energy-efficient consciousness** | Education should stem from school up, with children educated at a young age on energy efficiency and related areas | Regional Development Agency/Local Authorities/Education Departments |
| **Lack of Supply Chain capability and skills** | Funding Foundation Degrees | Central Government |
| | Promoting Energy Efficiency-oriented degree programs or projects | Universities |
| | Participation of sub-contractors into training, qualification and apprenticeship schemes | Regional Development Agency |

**Table A: Recommendations Summary**

## 2. Introduction

Recent reports produced by several institutions give estimates for the UK Energy Efficiency (EE) market at around £2bn in 2010 (DTI/DEFRA, 2006; Shell Springboard, 2006). Despite these figures, research into the Energy Efficiency sector in the UK has historically been limited. In addition, the knowledge of the sector in the Yorkshire-Humberside region is scarce. Therefore, the overall aim of this study is to create a more robust comprehension of the Energy Efficiency sector consisting of an understanding of:

- A map of the firms operating in the region providing Energy Efficiency measures;
- The services offered by the firms operating in the region;
- A map of the Supply Chain of the sector;
- Analysis about opportunities and barriers for its development driven by the approval of large-scale government and community projects oriented at the installation of Energy Efficiency measures.

The preliminary stage of this project was creation of a Database of Companies which are thought to be active in the EE sector. This database has been obtained by accessing data sources (existing industry databases, directories, etc.) and complemented with further refinements to the listing.

This list of companies provided the population for a market research study that has been designed to clarify the following aspects:

- Which energy-efficiency measures organisations are involved in delivering;
- What supply chain development opportunities and barriers exist;
- What measures or support could promote energy efficiency supply chain development in the region
- What mechanisms stemming from Energy Efficiency Retrofitting could facilitate employment opportunities for local communities
- What impact could improved Energy Efficiency Supply Chain understanding have on the regional economy

The findings of the research are described in the present report that is structured in the following sections:

- A section clarifying the research scope;
- A section clarifying the methodological framework;
- A section illustrating the development process of the database of the regional businesses operating in the Energy Efficiency sector within Yorkshire and Humberside region;
- Some sections showing the entire market research results;
- A section drawing conclusions and providing recommendations.

## 3. Research Scope

Coherently with Yorkshire Forward's indications, in order to define the boundaries of the Energy Efficiency sector, measures reported in Table B (and partitioned into four main categories) have been identified as being directly related to Energy Efficiency Retrofitting in Social Housing.
For the development of the database and for the subsequent market research, companies to be included in the study have been defined as all organisations involved in the supply, installation and support of these measures with a presence in the Yorkshire and Humberside region.

| Category | Measure |
|---|---|
| | Cavity Wall Insulation |
| | Loft Insulation |
| | Solid Wall Insulation external |
| | Solid Wall Insulation internal |
| | HEA Underfloor Insulation |
| **Insulation** | Flat Roof Insulation |
| | Glazing/Windows |
| **Traditional Windows/Doors** | Draught Proofing |
| | Fuel Switching |
| | Heating Controls |
| | CHP Wood Pellet Boiler |
| | Air Source Heat Pump |
| | Boiler Replacement |
| **Heating Systems** | Ground Source Heat Pumps |
| | Solar Water Heater |
| | Domestic Wind Turbines |
| **Renewables** | Solar Power Photovoltaic Panels |

**Table B: Energy Efficiency measures list provided by Yorkshire Forward**

## 4. Methodological Framework

The database of regional companies has provided the population for a market research study that has been designed in order to clarify the following aspects:

- *The areas of activity and technologies in which businesses in the Yorkshire-Humberside are operating*. To this aim, businesses have been asked to clarify the services they offer among the previously illustrated list. Moreover, they have been asked to state the role of the contacted site, in order to understand if it is a branch or headquarters and to clarify the age of the business.

- *The level of employment in the Energy Efficiency sector in the Yorkshire-Humberside region.* Businesses have been asked to quantify their overall number of staff employed across all sectors and services, expressed as full time equivalents employees (FTEs). This allows understanding the structure and size of the firms, classifying them into different categories (micro, small, medium and large enterprises).

- *The opportunities and barriers for the Energy Efficiency supply chain development.* Firms have been asked to indicate the location of their purchases between suppliers located in the Yorkshire-Humberside region, the rest of the UK, and overseas, in order to map the Supply Chain of the sector, identifying opportunities and barriers for its development. To complete this analysis, as well as supplier and income linkages, geographical pattern of sales from businesses have been analysed, for providing an evaluation of the linkage between the production and the consumption of the products and assessing the presence of the firms on the national and international market.

- *The business support requirements of Energy Efficiency Supply Chain firms.* Firms have been asked whether they will need external support (consultants, cooperation with research institutions, support from financial institutions) to achieve their desired outcomes.

- *Mechanisms that could facilitate employment opportunities for local communitie.* Businesses have been asked to provide simple data about the composition of their workforce to analyse the pattern

of employment across different occupational categories. This allows understanding growth potential and critical areas in terms of knowledge needs. In addition, businesses have also provided information on their level of employment three years ago. This allows an assessment of the extent to which sector growth is driven by the growth of individual businesses, or new business starts up.

- *Attitudes and barriers to business growth, also in terms of job creation.* Businesses have been asked whether they forecast the engagement in activities such as training, recruitment, development of new products and expansion to other markets in the next three years.

- *The economic contribution of the Energy Efficiency sectors to the economy of the region.* Collected data will allow quantifying the level of economic activity within the sample businesses, and scale this up to estimate the overall contribution of the sector in the region, in terms of employment, revenues and turnover.

Mainly, three different methodologies have been employed to collect primary data related to these areas:

- A Web Based Questionnaire;
- Telephone Interviews;
- Focus Groups.

The overall methodological framework is illustrated in Figure 1. The Database of regional companies has provided the basis for the overall market research; subsequently, firms in the database have been targeted, submitting them an online questionnaire. Respondents have been asked to further involve in the research, proposing them to take part in short and structured phone interviews.

At the same time, in order to investigate also the "demand" side of the Energy Efficiency Supply Chain, Local Authorities from the Region have been contacted for some phone interviews. This process has been designed to further understand the mechanisms underlying the approval and management of large scale Energy Efficiency projects.

Then, Local Authorities and Regional Businesses have been invited to join a focus group for identifying effective interventions for promoting the growth of the regional Energy Efficiency Supply Chain. From this stage, and from the previous ones, some recommendations have been derived.

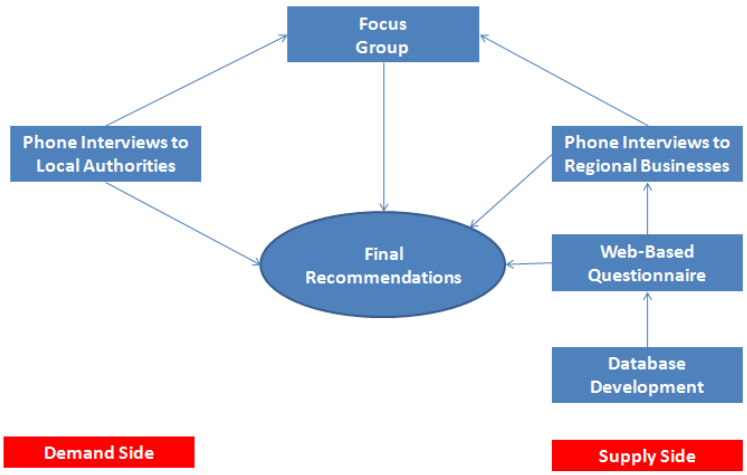



**Figure 1: Methodological Framework**

Further details regarding the employed methodology can be derived from the Interim Report (EI/262/001, issued on 26 March 2010) concerning this study that has been already delivered to Yorkshire Forward.

## 5. Organisations Database Development

### 5.1 Data Sources

In order to identify those organisations involved in the supply, installation and support of Energy Efficiency measures in Social Housing, a vast number of secondary data sources have been used.

*Trade Associations and Accrediting Bodies*
Most reputable organisations operating within the Energy Efficiency retrofitting sector are affiliated to Trade Associations, namely bodies that represent their specific service stream. Trade Associations generally have databases of organisations affiliated to them, and a significant proportion of these databases are available online for members of the public to search.

Government-endorsed bodies set benchmark standards in product and/or service delivery that organisations have to achieve. In this way, such organisations become accredited suppliers or service providers. Such bodies maintain records of the organisations that have achieved the standards demanded by them, and as such provide a valuable data source.

Some of the Trade Associations that have been used as part of the Data Collection stage are reported in Table 1, also specifying the related specialisation field of each association and its website.

| Field | Association | Website |
|---|---|---|
| **General** | Renewable Energy Association | www.r-e-a.net |
| | RenewableUK | www.bwea.com |
| **Insulation** | National Insulation Association | www.nationalinsulationassociation.org.uk |
| | National Federation of Roofing Contractors | www.nfrc.co.uk |
| | Thermal Insulation Contractors Association | www.tica-acad.co.uk |
| **Heating, Boilers, Pumps** | Heating and Ventilating Contractors Association | www.hvca.org.uk |
| | Corgi | www.trustcorgi.com |
| | Micro Generation Scheme | www.microgenerationcertification.org |
| **Windows and Doors** | Glazing and Glass Federation | www.ggf.org.uk |
| | FENSA (Standard for Windows and Doors) | www.fensa.org.uk |
| **Draught Proofing** | Draught Proofing Advisory Association Limited | www.dpaa-association.org.uk |
| **Domestic Solar** | Solar Trade Association | www.solar-trade.org.uk |

**Table 1: Trade Associations utilised in the data collection process**

*Search Directories*
Several existing general purpose directory services provide databases of organisations that operate in Energy Efficiency-related sectors. The directories that have been used during this research are reported in Table 2.

| Directory | Website |
|---|---|
| **The Yellow Pages** | www.yell.com |
| **The Phone Book** | www.bt.com |
| **Thomson Local** | www.thomsonlocal.com |
| **192** | www.192.com |

**Table 2: Directories utilised in the data collection process**

*Product Information Resources*

A number of online resources offer information relating to suppliers and service providers in the construction sector. Most have databases of product details and specifications, as well as details on some of the organisations authorised to supply and install them. As Energy Efficiency measures can be also seen as components for the construction industry, these resources have provided valuable information. The online resources that have been used during this research are reported in Table 3.

**Table 3: Online product information resources utilised in the data collection process**

| Resource | Website |
|---|---|
| **ASC** | www.ascinfo.co.uk |
| **Construction Products Association** | www.constructionproducts.org.uk |
| **National Building Specification** | www.thenbs.com |

*Government Agencies and Bodies*

A number of government agencies and departments have offered useful information, advice and support in the collection of organisational data. The public sources used are reported in Table 4.

| Government Agency/Body | Website |
|---|---|
| **British Chamber of Commerce** | www.britishchambers.org.uk |
| **Sheffield Chamber of Commerce** | www.scci.org.uk |
| **Hull and Humber Chamber of Commerce** | www.hull-humber-chamber.co.uk |
| **Leeds, York and North Yorkshire Chamber of Commerce** | www.yourchamber.org.uk |
| **Doncaster Chamber of Commerce** | www.doncaster-chamber.co.uk |
| **Barnsley & Rotherham Chamber of Commerce** | www.brchamber.co.uk |
| **Mid Yorkshire Chamber of Commerce** | www.mycci.co.uk |
| **Energy Savings Trust** | www.energysavingtrust.org.uk |
| **Local Government of Yorkshire and Humber** | www.lgyh.gov.uk |
| **Department of Energy and Climate Change** | www.decc.gov.uk |

**Table 4: Government Agencies/Bodies information utilised in the data collection process**

*Trade Publications*

Some of the trade publications have been useful in providing background context and helping to clarify the different applications of Energy Efficiency measures. Some examples of the public sources referred to include:

- BRE Magazine
- Renewable Energy Focus
- Energy and Environmental Management
- Building
- Green Building Press

### 5.2 Search Criteria

By using these various sources of information, it has been possible to develop a comprehensive database of organisations thought to be operating in the Energy Efficiency Sector within the Yorkshire and Humberside Region. Some search criteria have been defined in order to extract relevant organisation for each indicated Energy Efficiency measure from each specified data source.

Table 5 reports the keywords utilised for each specific measure. These keywords have been searched within company names and descriptions within the above indicated sources.

| Measure | Keywords |
|---|---|
| **Cavity Wall Insulation** | Wall Insulation, Cavity Wall insulation, Insulation, Insulation Services |
| **Loft Insulation** | Insulation, Loft Insulation, Insulation Services |
| **Solid Wall Insulation external** | Insulation, External Wall insulation, Solid Wall Insulation, Insulation Services |
| **Solid Wall Insulation internal** | Insulation, Internal Wall insulation, Solid Wall Insulation, Insulation Services |
| **Fuel Switching** | Biofuel, Fuel Switching, Efficient Domestic Fuel, Heating services Heating |
| **Heating Controls** | Heating systems, Heating Control Systems, Domestic Heating controls, Heating Controls, Heating Services |
| **CHP Wood Pellet Boiler** | Boilers, CHP Boilers, CHP Wood Pellet Boilers |
| **Solar Water Heater** | Solar Power Water Heater, Solar Heaters, Solar Water Heaters, Solar Heating Services |
| **Air Source Heat Pump** | Heat Pump, Heating Suppliers, Air Source Heat Pumps, Air Source Heating, Heating Services |
| **Ground Source Heat Pumps** | Heat Pump, Heating Suppliers, Ground Source Heat Pumps, Ground Source Heating, Heating Services |
| **Domestic Wind Turbines** | Wind Turbine, Domestic Wind Turbines, Micro Wind, Domestic Wind Power |
| **Boiler Replacement** | Boiler, Boiler Replacement Services |
| **Solar Power Photovoltaic Panels** | Domestic Solar Power, Solar Panel Supply, Photovoltaic Panel Supply, Photovoltaic Panel, Solar Power Services |
| **HEA Underfloor Insulation** | Insulation, Floor Insulation, Underfloor Insulation, Insulation Services |
| **Glazing/Windows** | Double glazing, Windows, Glazing, Glazing services |
| **Flat Roof Insulation** | Insulation, Roof Insulation, Flat Roof Insulation, Insulation Services |
| **Draught Proofing** | Draught Proofing, Draughtproofing, Insulation Services |

**Table 5: Search criteria for database development**

### 5.3 Database Structure

The collected information has been organised into a MS Access Database. The Database is made up of a single table with the following fields:

- Company Name
- Address 1
- Address 2
- Address 3
- Town/City
- Telephone
- Fax
- E-Mail Address
- Web Address
- Company Size
- Company Core Business
- Company Sector
- Notes

Where possible, the fields Company Size, Company Core Business and Company Sector have already been populated. Otherwise, they will be populated during the following stage of the research project (Market Research).

Three further provisional fields (that will be deleted from the final version) have been added in the Database, with the aim of administering the questionnaire:

- Sent
- Received
- Entered

These three fields are aimed at keeping track, respectively:

- The invitation of the related company to the questionnaire;
- The receipt of the company response;
- The incorporation of company responses in the database.

Figure 2 shows a screenshot of the Database. Almost 1000 businesses have been included in the Database; half of them are endowed with full contact details (phone number, e-mail, web address).

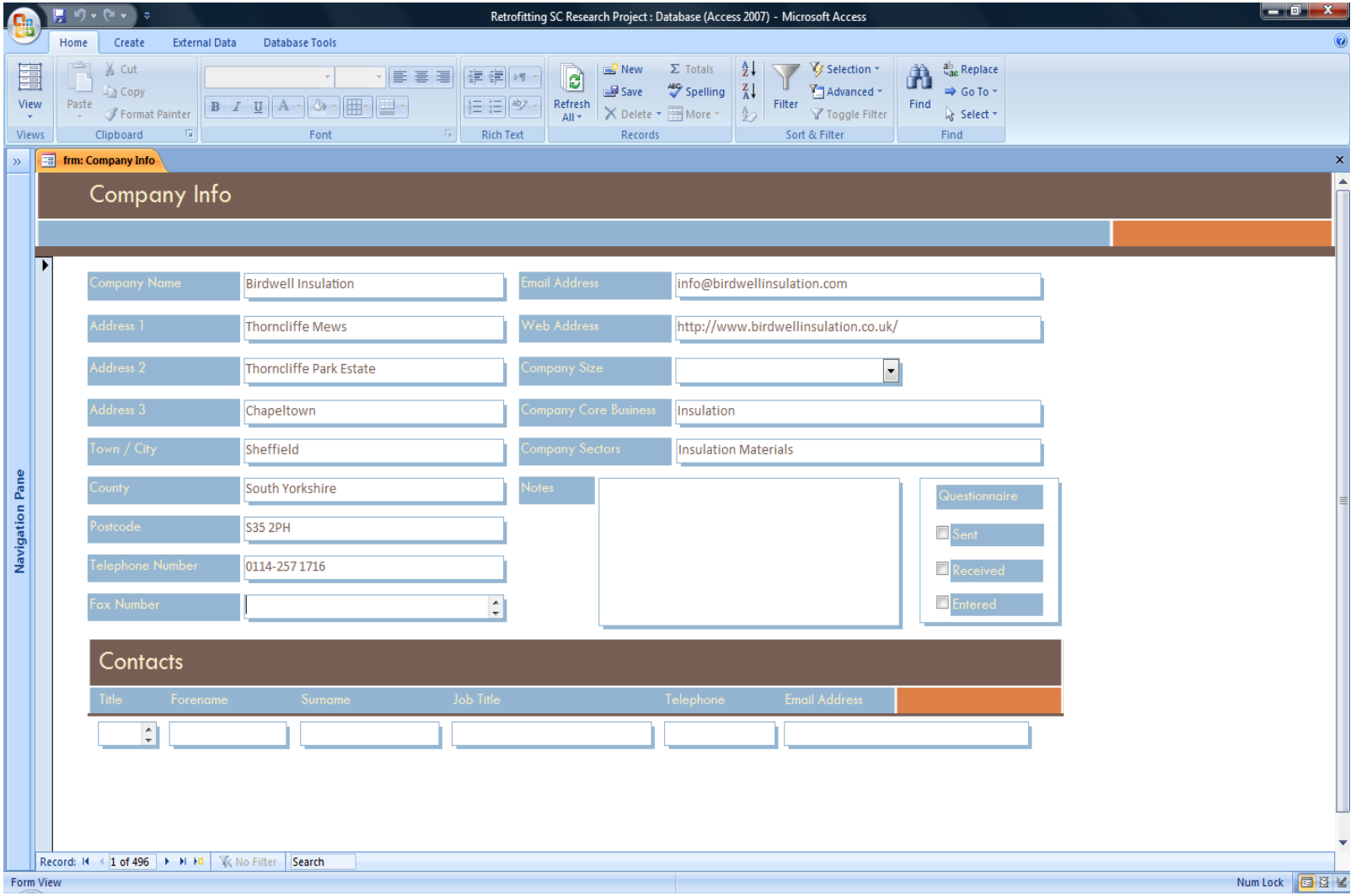



**Figure 2: MS Access Database Screenshot**

## 6. Web-Based Questionnaire

Organisations identified in the Database have been invited to complete an online questionnaire, focused on the identification of the above-mentioned aspects. The questionnaire has been implemented through the web-based tool *SurveyMonkey*, and it is available online at the address www.surveymonkey.com/s/EEYF. Further invitations to the questionnaire have been sent through government agencies and bodies (i.e. Chambers).

As a standard practice, the questionnaire has been published on the basis of preserving the anonymity of the respondents. This has the advantage of increasing the response rate and honest responses to the important commercially-sensitive questions. At the same time, the respondents were invited to provide company name. This allowed the generation of two databases from the questionnaire: one capturing the company name and contact details and a separate database capturing the answers to the questions.
Questions have been structured in order to enable both quantitative and qualitative data analysis. The questionnaire has been partitioned into six sections:

- *Demographics*, mainly concerned with obtaining company contact details, workforce and turnover overall figures;
- *Skills and Delivered Measures*, devoted to assess the core business and the expertise of the company and at understanding the product portfolio of the company in the Energy Efficiency sector;
- *Drivers and Barriers*, aiming at clarifying the feeling of the company about market dynamics and its own perspectives for the near future;
- *Supply Chain Assessment*, oriented to discover sourcing and sales patterns of the company and to get a rough idea of its supply network;

The web-based questionnaire has been launched on March 18th; responses have been collected till April 4th. 546 companies have been targeted; 151 companies (27.6% of the total sample) have accessed the questionnaire, providing relevant information about their experience in the sector and the energy efficiency measures they provide; 105 companies (19.2% of the total sample) have completed the questionnaire without skipping any question. The following sections present the results of the questionnaire survey in detail.

### 6.1 Demographics

This section was mainly concerned with obtaining company contact details, workforce and turnover overall figures. As shown in table 6, the most of the targeted companies (75.5% of the total respondents) have a single site, located in Yorkshire and Humberside region.

**Table 6: Businesses classification by nature of the Yorkshire and Humberside location**

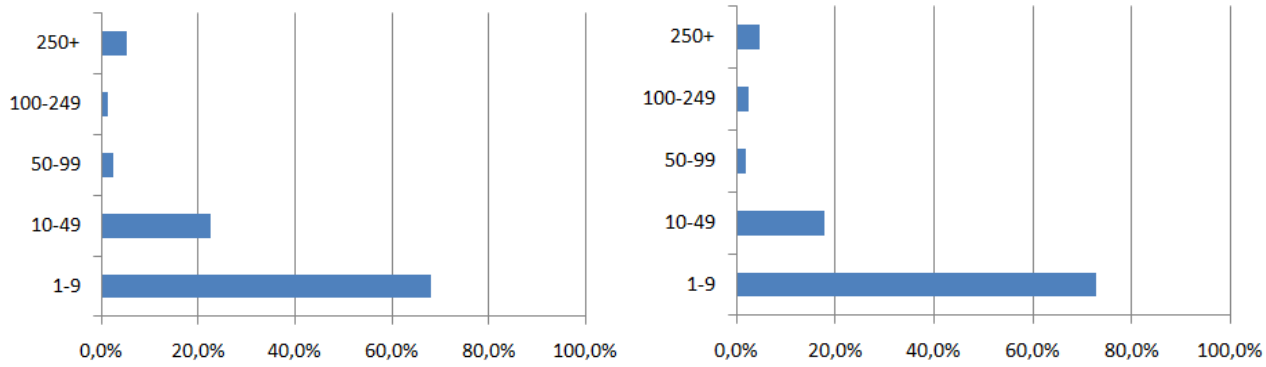
| Please, specify if the company based in Yorkshire and Humberside location is: | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Branch/Subsidiary with Headquarters elsewhere | 10.6% | 16 |
| Headquarters with Branches elsewhere | 13.9% | 21 |
| The only site | 75.5% | 114 |
| **Answering Companies** | | **151** |

Only a small proportion of the companies is represented by subsidiaries/branches of larger businesses with headquarters in other UK regions (10.6% of the total respondents), whilst another small portion (13.9%) is made up of firms headquartered in Yorkshire and Humberside with branches in other UK regions.

This result is consistent with the business classification based on employees number (Figure 3a and 3b). Indeed, the most of the Energy Efficiency firms (68.2%) are micro-businesses, just employing 1 to 9 people; just the 5.3% of the firms responding the survey are employing more than 250 employees, while still a significant proportion of firms (22.5%) are employing 10 to 49 people.

Looking at the historical pattern of businesses classification based on employed workforce, it can be derived that the sector has been experiencing a slow, but significant, growth: indeed, in 2007, the portion of micro businesses was even higher (72.8%), while companies employing 10 to 49 people were only the 17.9% of the total. On an aggregate base, the sector has grown at a 5% rate from 2007 to 2010.

The composition of the businesses in terms of employees strongly influences the companies' turnover. Of the 103 businesses classified in the first tier (1-9 employees), the vast majority (73 companies, corresponding to the 70.9%) falls in the first tier (£0 - £250k) also for the classification based on the yearly turnover; interestingly, 12 of these "micro" companies report significantly higher results, scoring a yearly turnover falling in the £500k - £1m banding. Looking at the whole companies' population, 13 firms score a £5m or higher turnover: the most of them (7) are businesses employing more than 250 people, while 4 of them declare employing between 100 and 249 people. Therefore, size and turnover seem to be quite interrelated factors. Table 7 provides an overall classification of respondents based on yearly turnover.




**Figures 3a and 3b: Business classification based on employees number in 2010 (left) and in 2007 (right)**

| What is the yearly turnover of your company? | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| £0 - £250k | 48.3% | 73 |
| £250k - £500k | 13.9% | 21 |
| £500k - £1m | 11.9% | 18 |
| £1m - £5m | 17.2% | 26 |
| £5m+ | 8.6% | 13 |
| **Answering Companies** | | **151** |

**Table 7: Businesses classification based on yearly turnover**

Based on these figures, an estimate can be provided about the global size of the regional Energy Efficiency sector, employing around 5000 people and generating a yearly turnover of approximately £200m (corresponding, approximately, to the 10% of the total UK Energy Efficiency market).

Further interesting insights can be derived looking at businesses establishment dates (Table 8). A relevant quota of firms (59, corresponding to the 39.1% of the respondents to the question) have been established in the last 5 years (2005 onwards), testifying the growth of the Energy Efficiency sector. However, all these

businesses (the 100% of the 59) are just employing 1 to 9 people. This seems to reveal a quite slow "growth speed" for regional start-up businesses in the sector. On the other hand, 13 businesses (8.6% of the respondents to the question) have been established prior to 1970, having been on the market for at least 40 years. It is worth to note that 10 out of these businesses have a yearly turnover equal at least to £1m.

| Business Establishment Date | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Pre 1970 | 8.6% | 13 |
| 1970-1979 | 4.0% | 6 |
| 1980-1989 | 7.3% | 11 |
| 1990-1999 | 17.2% | 26 |
| 2000-2005 | 23.8% | 36 |
| 2005 onwards | 39.1% | 59 |
| **Answering Companies** | | **151** |

**Table 8: Businesses classification based on establishment dates**

All these data reveal some first considerations about the Energy Efficiency sector in the Yorkshire and Humberside region: there is a strong prevalence of regional-based micro-businesses, employing a limited number of people, working on small turnovers and basically concentrated on the regional market.

This evidence is confirmed by the geographical distribution of the employees of the firms (Figure 4). The 82.9% of the respondents state that their workforce is concentrated in the Yorkshire and Humberside region within a 95%-100% interval. Companies employing a significant quota of their workforce operating in other regions represent a negligible portion of the sample.

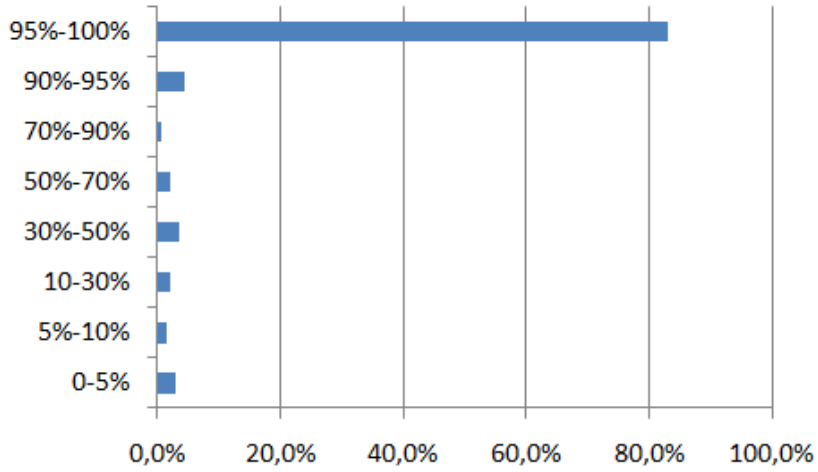



**Figure 4: Workforce geographical distribution**

### 6.2 Skills

This section of the survey questionnaire was mainly devoted to assess the expertise of the companies and the services and products they are able to provide within the Energy Efficiency market. Companies were first asked to clarify the nature of their core business. Firms were provided with three basic options (Energy Efficiency Measures, Renewable Energy Solutions and Construction) and with the possibility of indicating extra core activities not included in the list, being free of choosing more than one option.

Results show that out of 140 companies answering to the question, the 43.6% indicated Energy Efficiency Measures as their core activity; 35.7% indicated Renewable Energy solutions while a significant 25.7% is made up of firms operating in the construction business that are also providing Energy Efficiency solutions. A significant quota of firms (mostly made up of micro-businesses) identified their core business in just one specific Energy Efficiency solution, as, for instance, insulation or heating controls.

| Organizations core area of business | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Energy Efficiency Measures | 43.6% | 61 |
| Renewable Energy Solutions | 35.7% | 50 |
| Construction | 25.7% | 36 |
| Other | 41.4% | 58 |
| **Companies providing at least one answer** | | **140** |

**Table 9: Companies core businesses**

Looking at companies competencies, it has been possible identifying the spectrum of Energy Efficiency solutions provided by each firm. Some 133 firms have provided answers about their product portfolio. Interestingly, the Yorkshire and Humberside Energy Efficiency sector seems to be providing a quite skewed and unequal coverage of the wide range of available measures. If there seems to be quite a lot of businesses operating in heating-related Energy Efficiency Measures (for instance, Heating Controls and Boiler Replacement), the situation seems to be worse looking at more innovative measures: only 16 out of 133 businesses are providing Domestic Wind Turbines for micro-generation purposes. 41 out of 133 businesses are providing Solar Power Photovoltaic Panels, but the most of them specify that they are just competent for the installation of these measures. Surprisingly, looking at more traditional Energy Efficiency solutions, like Insulation measures (Cavity Wall Insulation, Loft Insulation, Solid Wall Insulation Internal and External, Flat Roof Insulation) very limited numbers of firms belonging to the sample are providing them. Complete data are available in Table 10.

| Delivered Measures | | |
|---|---|---|
| **Answer Options** | **Providers (Percentage)** | **Providers** |
| Cavity Wall Insulation | 12,0% | 16 |
| Loft Insulation | 20,3% | 27 |
| Solid Wall Insulation external | 10,5% | 14 |
| Solid Wall Insulation internal | 9,8% | 13 |
| Fuel Switching | 22,6% | 30 |
| Heating Controls | 48,9% | 65 |
| CHP Wood Pellet Boiler | 11,3% | 15 |
| Solar Water Heater | 41,4% | 55 |
| Air Source Heat Pump | 34,6% | 46 |
| Ground Source Heat Pumps | 26,3% | 35 |
| Domestic Wind Turbines | 12,0% | 17 |
| Solar Power Photovoltaic Panels | 30,8% | 41 |
| Boiler Replacement | 44,4% | 59 |
| HEA Underfloor Insulation | 14,3% | 19 |
| Glazing/Windows | 20,3% | 27 |
| Flat Roof Insulation | 10,5% | 14 |
| Draught Proofing | 12,0% | 16 |
| Other (please specify) | 31,6% | 42 |
| **Companies Answering** | | **133** |

**Table 10: Energy Efficiency Measures provided by companies**

It is worth to note that several firms indicate (within the “Other” option) they provide lighting controls devices.

Table 11 reports the extent of the contribution of each measure to the overall turnover of each company. Firms were asked to classify it according to a 5-points Likert scale, from "Not at All" to "To a Great Extent".

| Extent of the Contribution of Each Measure to the Overall Turnover of Each Firm | | | | |
|---|---|---|---|---|
| **Answer Options** | **Very Little** | **Somewhat** | **To a Considerable Extent** | **To a Great Extent** |
| Cavity Wall Insulation | 9 | 5 | 3 | 3 |
| Loft Insulation | 18 | 8 | 2 | 2 |
| Solid Wall Insulation external | 10 | 4 | 0 | 1 |
| Solid Wall Insulation internal | 10 | 5 | 2 | 1 |
| Fuel Switching | 14 | 17 | 1 | 4 |
| Heating Controls | 15 | 38 | 13 | 7 |
| CHP Wood Pellet Boiler | 11 | 6 | 3 | 1 |
| Solar Water Heater | 23 | 22 | 5 | 8 |
| Air Source Heat Pump | 16 | 16 | 7 | 6 |
| Ground Source Heat Pumps | 17 | 9 | 6 | 6 |
| Domestic Wind Turbines | 14 | 5 | 2 | 1 |
| Solar Power Photovoltaic Panels | 11 | 14 | 9 | 7 |
| Boiler Replacement | 12 | 16 | 14 | 21 |
| HEA Underfloor Insulation | 14 | 8 | 3 | 3 |
| Glazing/Windows | 6 | 6 | 3 | 14 |
| Flat Roof Insulation | 8 | 6 | 0 | 3 |
| Draught Proofing | 9 | 8 | 0 | 1 |

**Table 11: Energy Efficiency Measures contribution to companies' turnover**

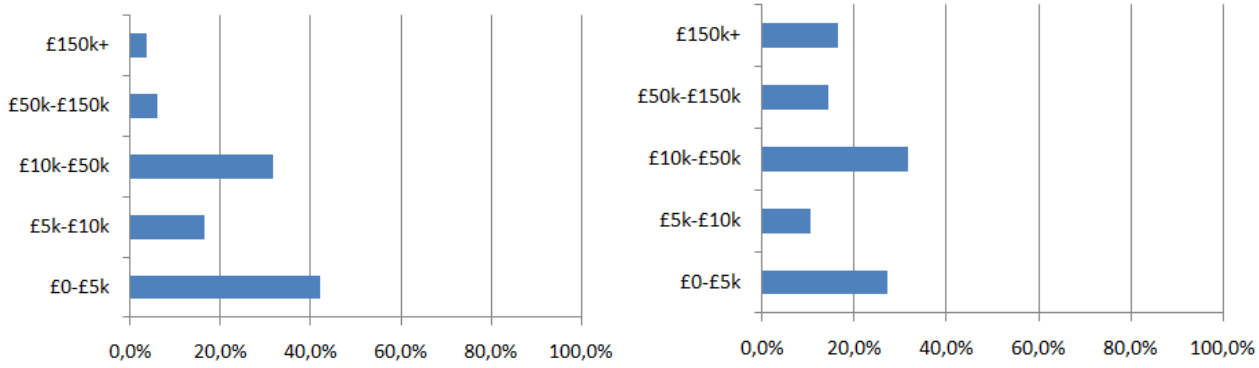
After having understood the scope of the firms operating in the Regional Market, in order to get an idea about the impact of the undertaken projects, businesses were asked to provide an estimate of the monetary value of the typical works they engage in (a sort of "average value") and of the largest project they have ever been engaged in (providing some indications about a sort of "standard deviation" of the project values). This allows drawing a quite precise picture of the regional Energy Efficiency sector. Results are shown in Table 12 and in Figures 5a and 5b.

| Typical and Average Values of Energy Efficiency Projects | | | | |
|---|---|---|---|---|
| | **Typical Value** | | **Largest Value** | |
| **Answer Options** | **Response Percent** | **Response Count** | **Response Percent** | **Response Count** |
| £0-£5k | 42,1% | 56 | 27,1% | 36 |
| £5k-£10k | 16,5% | 22 | 10,5% | 14 |
| £10k-£50k | 31,6% | 42 | 31,6% | 42 |
| £50k-£150k | 6,0% | 8 | 14,3% | 19 |
| £150k+ | 3,8% | 5 | 16,5% | 22 |
| **Answering Companies** | | | | **133** |

**Table 12: Typical and Largest Values of Energy Efficiency projects undertaken by regional businesses**

The results confirm the evidence emerged from the previous section: a quite relevant size of companies (42.1% of the 133 respondents) is used to undertake very small energy efficiency projects, whose value is not higher than £5k. Only 5 firms are accustomed to work on very large projects (£150k+), while a

significant number of businesses (42, corresponding to the 31.6% of the total sample) delivers typical projects whose value is between £10k and £50k. Looking at companies in the first tier (£0-£5k), it can be said that 49 out of these 56 businesses are "micro" firms (1-9 employees); looking at the size of the largest project they have ever undertaken, 27 of them have never undertaken a larger project; 12 of them have undertaken at least a £5-£10k project, 14 of them have undertaken at least a £10-£50k project. A significant quota of these firms is committed to offer Boiler Replacement services (32 out of 56) and Heating Controls services (29 out of 56). However, it is interesting to note that 22 companies (the 16.5% of the total sample) have undertaken at least a project whose value was equal or higher to £150k.




**Figures 5a and 5b: Typical (left) and largest (right) value of undertaken Energy Efficiency projects**

### 6.3 Drivers and Barriers

This section is aimed at clarifying the feeling of the company about market dynamics and its own perspectives for the near future. First of all, companies were asked to rate their perception of the competition in the Yorkshire and Humberside Energy Efficiency market (Table 13). The prevalent judgment is that competition within the region is "moderate" (55.6% of 124 companies answering to the question); the 29.9% of the companies indicate that competition is "intense" or "very intense", while just the 14.6% of the companies points out a "weak" or "very weak" competitive environment. If micro-businesses (1-9 employees) are excluded, the judgment about competition doesn't changes significantly: "moderate" (54.3%) is still the dominant judgment; the 20% indicates competition to be "weak or very weak", the 25.7% to be "intense" or "very intense". The next step was asking firms to state their projections about the future market size for Energy Efficiency products and services. It is worth to note that just 3 firms out of 124 (2.4%) are expecting the market size to "decrease significantly" or "gradually decrease". The most of the firms (89.5%) are expecting the market size to grow gradually (41.1%) or to grow significantly (48.4%); the 8.1% of the companies is not forecasting any relevant change in the market size (Table 14).

| **Judgment about competition to win Energy Efficiency business in Yorkshire and Humberside** | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Very Weak | 6.5% | 8 |
| Weak | 8.1% | 10 |
| Moderate | 55.6% | 69 |
| Intense | 22.6% | 28 |
| Very Intense | 7.3% | 9 |
| **Answering Companies** | | **124** |

**Table 13: Judgment about competition to win Energy Efficiency business in Yorkshire and Humberside**

| Projection about future market size for Energy Efficiency products and services | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Decrease significantly | 0,0% | 0 |
| Gradually decrease | 2,4% | 3 |
| Stay about the same | 8,1% | 10 |
| Grow gradually | 41,1% | 51 |
| Grow significantly | 48,4% | 60 |
| **Answering Companies** | | **124** |

**Table 14: Projection about future market size for Energy Efficiency products and services**

Subsequently, firms were asked to identify the main drivers for the growth of the sector. In particular, the respondent to the survey have been asked to rate the importance of a set of drivers, based on a 5-points scale (1 meaning "Unimportant", 5 meaning "very important"). According to firms' opinion, it turned out that firms think that the increase in energy costs, and, therefore, the necessity of implementing measures for increasing energy savings, can result in a growth for Energy Efficiency solution market: the average score for this indirect driver has been 4.27. In addition, government policies funding large improvement programs for Energy Efficiency have been identified as a major factor that can push market growth, scoring an average value of 4.13. The entire list of drivers and their average scores are reported in Figure 6; all the listed drivers, reported average scores higher than 3 (meaning "moderately important"), except for potential growth in international market demand and the decline of other sectors. The first factor is consistent with the regional dimension of the most of the businesses that at this moment have not the right scale and size to cope with international competition. It is worth to note that decline in supplier cost is regarded as an important driver too.

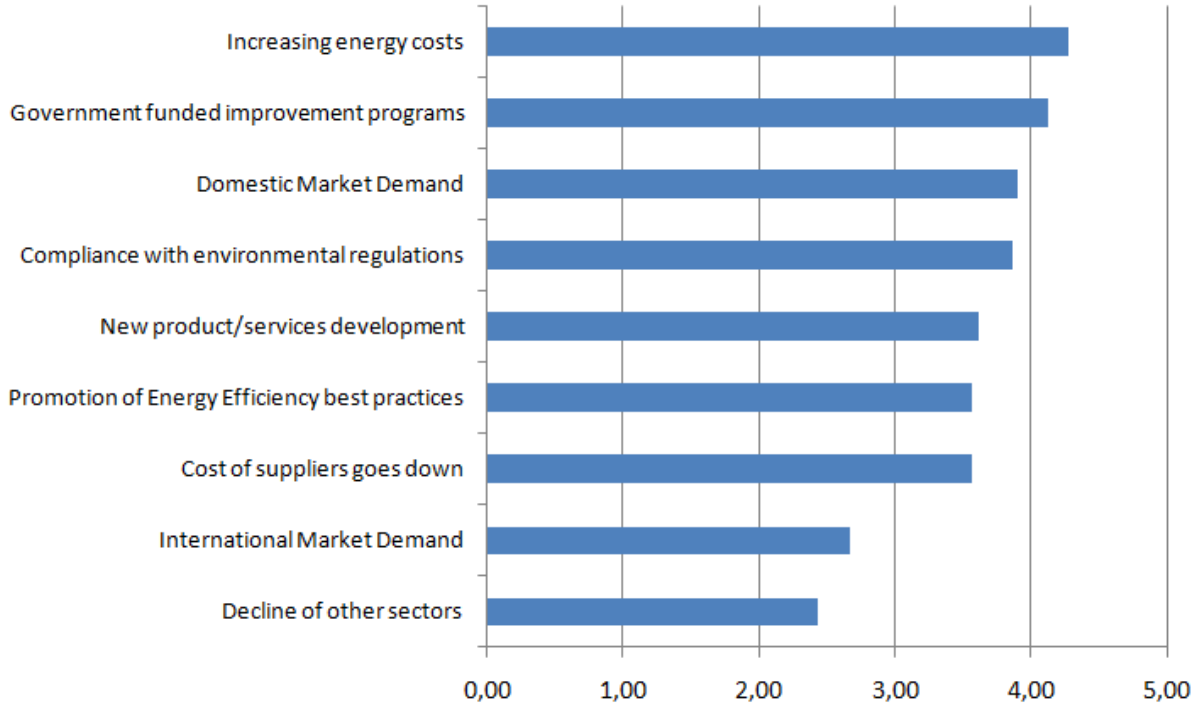



**Figure 6: Drivers for Energy Efficiency Market Growth**

Furthermore, companies were asked in what activities they will most probably engage during the next three years (Figure 7). In particular, the respondents to the survey have been asked to rate the likelihood of a set of actions, based on a 5-points Likert scale (1 meaning "Very Probably Not", 5 meaning "Definitely").

Workforce training (with a 3.87 average score), improvement of supplier relationships (3.60) and of the whole supply chain (3.52) and recruitment (3.41) turned out to be the actions firms will most likely engage in. This evidence supports the growth prospects highlighted by the firms in previous sections of the questionnaire. The fact that the action "Expansion to overseas markets" reported just a 1.88 score (the lowest one) confirms that the firms does not have the right scale and size to cope with international competition; moreover, for the same reasons, even the expansion to other UK regions is considered like a feasible action by a limited number of firms (scoring 2.74).

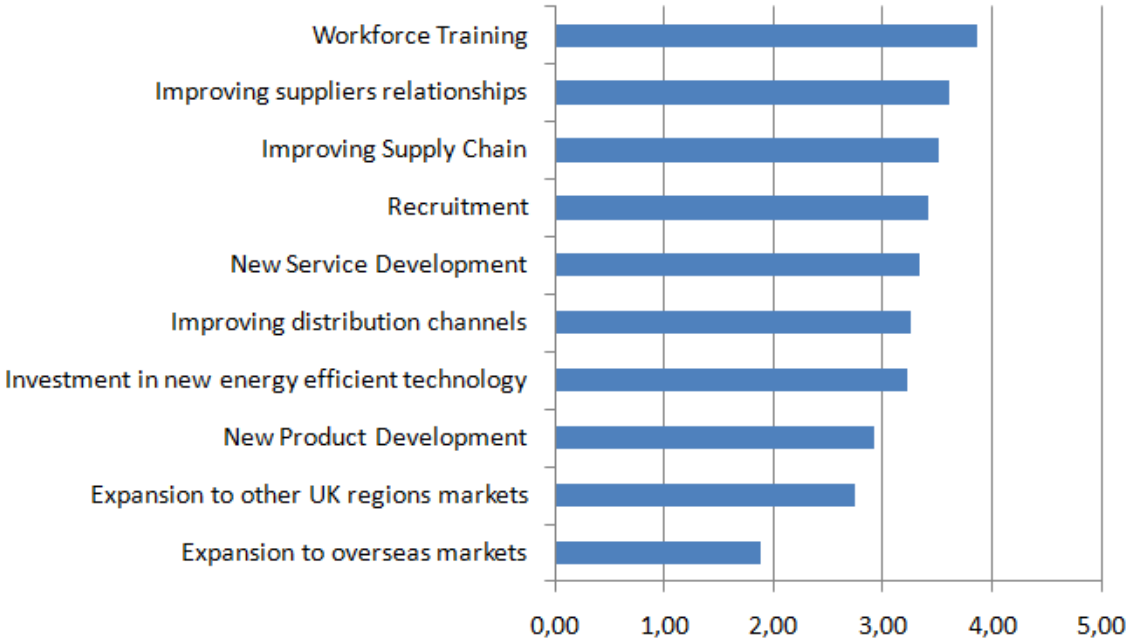



**Figure 7: Possible actions to be undertaken in the next three years and related likelihood**

Consequently, firms were asked what kind of support they need and in what areas for implementing their growth plans and identified actions (Figure 8). Also for this question a 5-points Likert scale was utilised (1 meaning "unimportant", 5 meaning "very important"). Government funding (scoring an average 4.12) turned out to be the most important support area; workforce training (3.84), collaboration with key customers (3.81) and suppliers (3.52) scores are coherent with the importance assigned to these areas for the growth prospect of the firms.

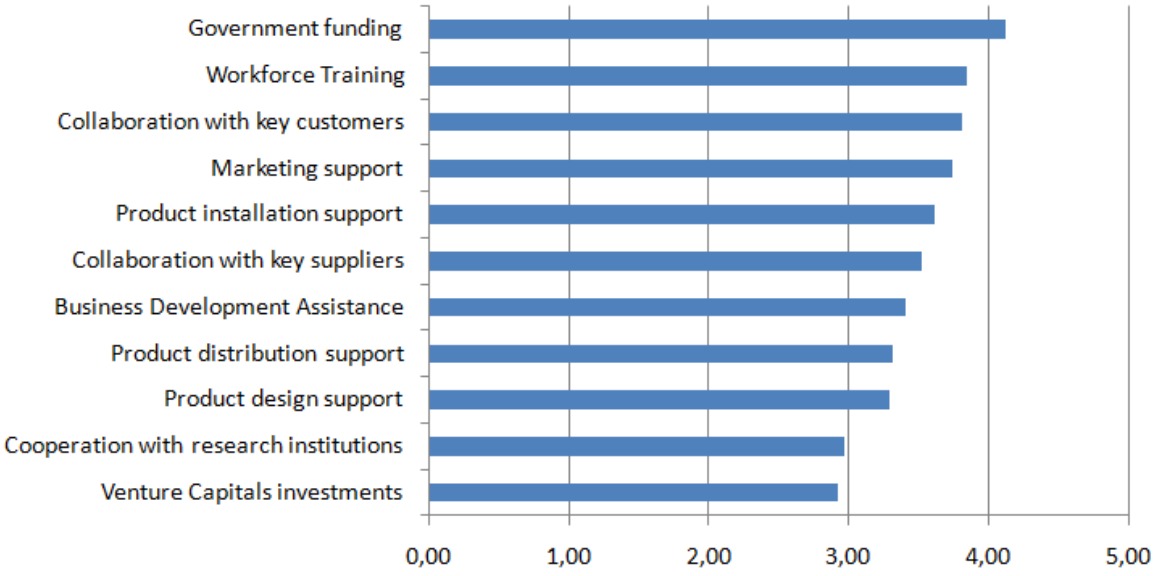



**Figure 8: Importance of External Support in Relevant Areas**

### 6.4 Supply Chain Assessment

This section has been oriented to discover sourcing and sales patterns of the companies and to get a rough idea of their supply networks.

Firstly, companies were asked about the way they utilise in order to secure their work. Also in this case a 5-point Likert scale was utilised (1 meaning "unimportant", 5 meaning "very important") for rating each channel. Client enquiries via website or directories (scoring 3.80), informal relationships (3.76) and presence on approved/preferred supplier list of other organisations have been identified as the three most important factors. Complete scores are shown in Figure 9; the only channel recognised that is not particularly relevant for the companies is the one regarding work outsourced from parent companies.

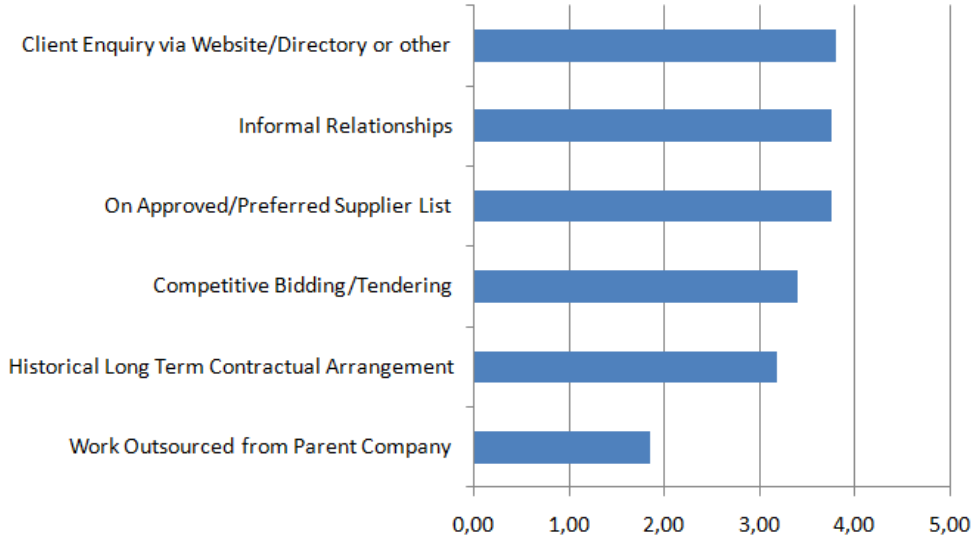



**Figure 9: Importance of Channels for Securing Contracts/Orders in Delivering EE Measures**

In addition (See Figure 10), companies were asked to identify the importance of customer categories from their business, rating them according to a 5-point Likert scale in terms of contribution to their turnover (1 meaning "unimportant", 5 meaning "very important"). Interestingly, the most relevant customer category is constituted by private owners-occupiers (scoring 3.72). Surprisingly, Social Housing Associations (1.87) and Local Authorities (1.97) do not constitute a relevant customer category for Yorkshire and Humberside based Energy Efficiency businesses: this seems to reveal that the local businesses experience some difficulties in being engaged in publicly-funded projects for Energy Efficiency.

This has led to the next area, i.e. asking firms what are the major barriers to engaging in Energy Efficiency projects promoted by Local Authorities (See Figure 11). Companies were provided with a list of potential barriers and asked to rate them according to the usual 5-point Likert scale. The major issues seemed to be the fact that opportunities for Energy Efficiency work promoted by Local Authorities and Housing Associations are not advertised (scoring 3.20) or not enough advertised (3.19).

Other useful insights are offered by analysing the geographical distribution of firms' purchases and sales (See Tables 15 and 16). In particular, companies were asked to clarify which quotas of their purchases are coming, respectively, from the region, from other UK regions and from other countries. Aggregating the different answers (taking also into account some weighting issues for bringing together percentage data related to businesses of different sizes), it turns out that the 43.5% of the purchases is coming from the region; significantly, the 33.3% and the 23.2% are coming respectively from other UK regions and from overseas. These figures do not change significantly across the different market segments. In particular, the 24% of the total firms in the sample has declared to source products and services from overseas.

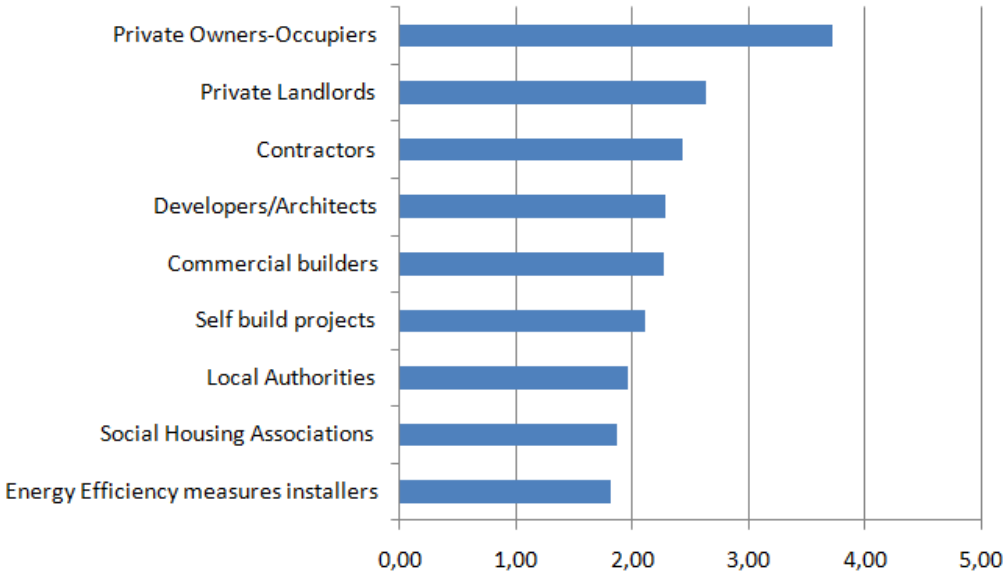



**Figure 10: Relevance of Customer Categories**


**Figure 11: Barriers in bidding for publicly-funded Energy Efficiency projects**

| **Purchasing Sources** | |
|---|---|
| **Answer Options** | **Average** |
| Yorkshire-Humber Region | 43.5% |
| Other UK Regions | 33.3% |
| Overseas | 23.2% |

**Table 15: Purchasing Sources estimate**

However, looking at sales distribution (Table 16), Yorkshire and Humberside companies are selling their services and projects mainly in the UK (for the 64.8% in the region; for the 31.9% in other regions): only a 3.3% of the sales total come from overseas. In particular, just the 7.6% of the total firms in the sample declared to be active in the export field.

| Sales Distribution | |
|---|---|
| **Answer Options** | **Average** |
| Yorkshire-Humber Region | 64.8% |
| Other UK Regions | 32.9% |
| Overseas | 3.3% |

**Table 16: Sales Geographical Distribution**

More questions were asked to the companies about their judgment of their suppliers' performances (See tables 17 and 18). Interestingly, the average result suggests that the supplier performance is better on quality than that on delivery punctuality. This could be due to the insufficient capacity of regional suppliers. However, the most of the firms do not utilise any formalised method for the evaluation of the Supply Chain and for the selection/monitoring of their suppliers (Tables 19 and 20); the implementation of these tools could help in improving the global performance. Only a few companies hold relevant quality and environmental certifications (Table 21), while a significant number of them are competent for releasing certifications of Energy Efficiency systems in accordance to Yorkshire and Humberside standards (Table 22).

| Suppliers' performance: Quality of Provided Goods/Services | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Extremely Poor | 0.0% | 0 |
| Below the Average | 1.9% | 2 |
| Average | 28.6% | 30 |
| Above the average | 45.7% | 48 |
| Excellent | 23.8% | 25 |
| **Answering Companies** | | **105** |

**Table 17: Suppliers' performance on Quality**

| Suppliers' performance: Delivery Punctuality | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Extremely Poor | 0,0% | 0 |
| Below the Average | 2.9% | 3 |
| Average | 43.8% | 46 |
| Above the average | 38.1% | 40 |
| Excellent | 15.2% | 16 |
| **Answering Companies** | | **105** |

**Table 18: Suppliers' performance on delivery punctuality**

| Utilise of Supply Chain performance evaluation systems | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Yes | 21,9% | 23 |
| No | 78,1% | 82 |
| **Answering Companies** | | **105** |

**Table 19: Utilise of Supply Chain performance evaluation systems**

| Utilise of formalised Supplier Selection systems | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Yes | 20,0% | 21 |
| No | 80,0% | 84 |
| **Answering Companies** | | **105** |

**Table 20: Utilise of formalized Supplier Selection systems**

| Relevant Certifications | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Investor in People | 11,4% | 12 |
| ISO 9001 | 15,2% | 16 |
| ISO 14001 | 2,9% | 3 |
| **Answering Companies** | | **105** |

**Table 21: Certifications**

| Competence to certify installations on completion in accordance with Yorkshire and Humber Local authority guidelines and standards | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Yes | 67,6% | 71 |
| No | 32,4% | 34 |
| **Answering Companies** | | **105** |

**Table 22: Competence to certify installations**

### 6.5 Key Findings

The main findings deriving from the web-based questionnaire survey can be summarised as follows:

1. There is a strong prevalence of regional-based micro-businesses, employing a limited number of people, working on small turnovers and basically concentrated on the regional market;
2. A large quota of businesses operating in the Energy Efficiency sector also provide services and products connected to Renewable Energy or Construction sectors;
3. Regional businesses provide a skewed and unequal coverage of the wide range of available measures. Even traditional Energy Efficiency measures (like insulation-related measures) see a very limited number of firms active in the region;

4. The small scale of the regional Supply Chain can be translated into a small capacity: the most of the firms are just involved in small-value projects;
5. Regional businesses are optimistic about the growth prospect of the sector in the region;
6. This last evidence is further testified by their willingness to involve in activities like workforce training, improvement of supplier relationship and of the whole supply chain, recruitment;
7. On the other hand, firms do not seem to be likely to expand to other UK regional markets or to overseas market: this supports the evidence of a regional supply chain made up of micro-businesses;
8. The analysis of the sourcing pattern of regional firms reveals that a relevant quota of the firms' purchases is provided by out-of-region (and, in some cases, overseas) suppliers;
9. The analysis of the sales pattern reveals that the most of the sales of the regional businesses are concentrated within the region;
10. The analysis of the customers portfolio of regional businesses reveals that regional companies sell their products/services mainly to private owners-occupiers; Local Authorities and Housing Associations just contribute to a small quota of the sales;
11. Regional businesses find difficult bidding and participating to publicly funded Energy Efficiency large-scale projects.

On the basis of these key findings, the following research steps have been designed and executed.

**6.6 Comparison of Yorkshire and Humberside Sector with other Regions**

Results from business demographics obtained from the questionnaire survey have been compared to other available findings from other regions. In particular, a direct comparison to the South-West region can be run, due to the availability of a similar report (DTZ and Regen SW, 2008).

It can be noted that the prevalence of micro-businesses is a peculiarity of the Yorkshire and Humberside region, as in the South-West firms employing 1 to 9 people just represent the 30% of the total; indeed, in this region, the median employment for firms active in the sector is 25 people. Consistently, a lower percentage of South-Western firms (just the 64% compared with the 75% from Yorkshire and Humberside) are based on only-site structures.

The sizes of the two sectors (Yorkshire and Humberside and South-West) are perfectly comparable (both account for around 5000 employees), also thanks to the similar populations figures of the two regions.

However, South-Western firms seem to have a higher propensity to export their products and services: almost the 30% of them declared to be active in the export field, against the 7.6% of Yorkshire and Humberside. This seems to be consistent with the different structure of the sector in the two regions.

## 7. Companies Telephone Interviews

Upon completion of the web-based questionnaire survey, some organisations within the database have been contacted and invited to take part in a short, structured telephone interview, selected as part of a random sample to have a supplementary round where more open questions could be asked.

Some 15 phone interviews have been carried out. Thanks to the presence, in the web-based questionnaire, of a specific question about the possibility of involvement in phone interviews, sample organisations have been selected within a population of firms surely available to participate; the 48% of the respondents to the questionnaire stated their availability to participate in this further step.

Sampling criteria have been inspired by following the diagram shown in Figure 12. Organisations available to be interviewed have been classified according to two dimensions, Size and Scope (namely, the width of their Energy Efficiency Product portfolio). The width of the "bubbles" reported in the plot represents the relative number of firms belonging to each category within the original population. Obviously, as the most of the firms are small firms offering a limited service and product portfolio, the most of the firms are in the bottom left bubble.

In order to get a representative sample, organisations corresponding to all the different Size/Scope combination have been included in the sample, aiming to preserve the proportions of the original population.

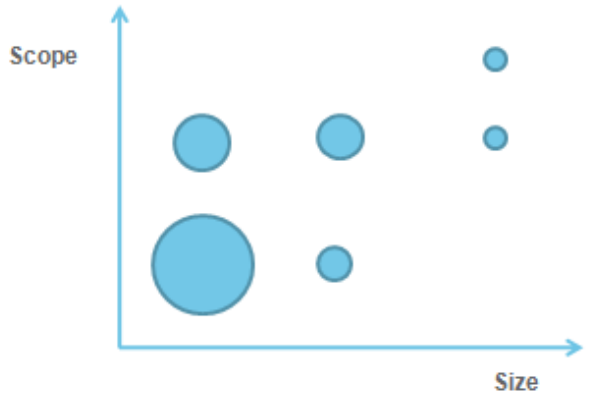



**Figure 12: Company Classification Framework for Sampling Strategy**

During the interview, some areas (already covered within the questionnaire) have been explored in the form of open questions, as reported below.

### 7.1 Drivers and Barriers

A significant quota of regional businesses, in the web-based questionnaire, has been optimistic about the future of the Energy Efficiency sector. The questionnaire has identified that the regional businesses are planning to hire and further train workforce in the next years. Therefore, firms were asked to point out what interventions and support are required to enable the Regional supply chain to meet the growing demand. Some interesting points were discovered, including:

- Development of regional funding streams (e.g., there exist some in connection with the Carbon Reduction commitment);
- Financial support, as cash-flow issues are seriously inhibiting companies opportunities for growth. Lack of access to finance prevents them from taking on work, even where demand exists. Financial support is also needed for training and development;

- Help with accreditations, as many companies have found securing MCS accreditation particularly onerous;
- Simplifying the tender processes.

Then, firms were asked what mechanisms could facilitate employment opportunities for local communities. Firms highlighted what follows:

- Development of funding streams could have a knock on effect on employment opportunities.
- Finance would allow them to access more work and increase employment opportunities.
- Increased financing opportunities from banks and other funding sources.
- Greater workload, and a smoother flow of workload, from client organizations, as many companies have the right capacity to be involved in large scale projects, but in order to use it would require more regular and increased workload. Greater workload from regional clients would be a big driver for employing more staff.

The majority of the interviewed firms agreed on stating that promoting large scale Energy Efficiency projects could have a positive impact on the economy of the region, in terms of:

- Job creation;
- Reduced Carbon footprints;
- Improved Energy Costs that leads to increased funds in the local economy (as people have more money to spend);
- Improved Sustainability.

However, in order to maximise such an impact, some actions should be undertaken, including:

- The most of the work seems to go to large contractors out of the region;
- These businesses have their own sub-contractor lists, that very often does not include local businesses;
- Local Authorities sometimes are not aware of these opportunities.

Moreover, at the moment some barriers do exist for the development of the Energy Efficiency sector in the region, like:

- Implementation, verification, accreditation and commercialization of new technology are often too onerous, and requires an intense use of capitals, not always available to the regional micro-businesses.
- The supply chain is fractured and critical components are often shipped from overseas. Thus, the development of domestic manufacturing would help.
- Very often, main national contractors winning large projects are acting as a 'middle man': as this adds costs;
- Publicly funded projects tend to be quite large; local businesses lack the capacity to get involved presently. Opportunities for collaborative tendering might help improve the situation.
- Lowering of Specifications has made market more competitive, but reduced quality available;
- Lack of Education and Knowledge on Energy Efficiency products/services, even in the Local Authorities.

Thus, there is a general agreement about the presence of strong barriers in dealing with bidding and participating in Energy Efficiency projects led by local authorities. Moreover, as emerged from the web-based questionnaire, a significant quota of regional businesses does not know where to look for these opportunities; secondly the regional business felt that the opportunities are not well advertised. These aspects have been further discussed during the phone interviews, specifically asking to companies whether

they feel that local authorities do enough to engage with regional service providers when outsourcing Energy Efficiency related opportunities. In particular, firms stated that:

- Said plans to involve local businesses often go “out of the window” once past the initial consultative phase;
- Some firms tried to get foot in the door for three years and gone to great lengths to secure accreditations like ISO 9001, but then, despite entering many tenders, they are not seeing the work come through. Thus, these processes did not pay out in terms of involvement in projects; they've not received any enquiries or invitations to tender from public authorities
- It seems that often “local authorities will pay lip service to open tendering but carry on working with incumbent contractors”;
- There is quite an absence of centralised and shared information resources about available projects.

**7.2 Procurement Methodologies**

There is evidence that for several of the contracts for energy efficiency work on local authority dwellings the appointment of the primary contractor is undertaken by a national body such as a power generation company or a national energy efficiency agency, and these will appoint a contractor from their pre-qualified list. Regional firms are strongly aware of this process, and they think it is a very strong barrier to the development of the sector in the region, as they think that:

- National bodies will utilise their own suppliers;
- National bodies do nothing in order to be more transparent in the process of appointing sub-contractors;
- Pre-qualification schemes are complex and cost-intensive;
- Profit-margins are squeezed by utilising large sub-contractors;
- Sub-Contracts tend to be awarded to the companies that they have the best informal relationships with, or those who are the cheapest, rather than those capable of offering the best overall service.
- The amount of sub-contracts awarded is not sufficient to warrant the amount of time and effort invested in becoming a preferred supplier.

Therefore, most of the firms agreed on the fact that a change in the approach by Local Authorities in the way they source products and services through one main contractor would be beneficial to regional businesses. Regional suppliers would be able to offer clients a much better service if they had a direct link to the client organisation, and didn't have to work under main contractors. Having direct access to clients would enable regional firms to demonstrate the value they can offer, in terms of quality, cost, and added value. Regional businesses think that actors like Local Authorities, Housing Associations, the Regional Development Organisation, can play a decisive role in this process by:

- Promoting policy changes, like monitoring of framework agreements once they've been put in place to make sure regional companies are actually being appointed;
- Promoting a more holistic tender process could help the situation, like working with companies that are engaging more locally. They would, for example, be happy to take on local apprentices to work on specific local projects. It would probably make a difference if local authorities made sure the work stayed local;
- Disseminating information, schemes and initiatives and contacting regional companies when opportunities arrive that they might be suitable for and trying to distribute them across companies in the region;
- Better advertisement of requirements (like MCS certification); not having it and not really knowing they needed it prevented many businesses from getting involved in these projects;
- Allowing regional businesses to approach them directly, rather than appoint large organisations to manage large contracts and simply assume that the work gets through;
- Promoting some sort of central authority having a hand in the business development side of things.

### 7.3 Supply Chain Issues

Talking about the supply side, firms in the Yorkshire and Humberside region are aware of the need for improving the performance of their supply chain, in order to overcome the fragmentation and the problems due to their small capacity. Most of the interviewed firms pointed out that they have strong and long term relationships with their key suppliers. Actually, cost of suppliers is an issue, especially for the low volumes of the orders.

However, most of the companies contacted in the survey are not utilising formalised methods for supplier selection and performance monitoring of their own supply chain. Interviewed companies think that the following factors are to be taken into account for evaluating suppliers:

- Cost;
- Delivery Punctuality;
- Availability of Technical Support;
- Distance;
- Accreditations;
- Quality (e.g., Defect Rates);
- Brand Recognition.

## 8. Local Authorities Phone Interviews

Drawing on the key findings from the survey and the phone interviews with the companies, further interviews have been undertaken with the Local Authorities. This was necessary in order to understand further in-depth the key issues and attempt to get a rich picture for the purpose of validation.

In particular, three metropolitan boroughs local authorities have been selected: North East Lincolnshire, Rotherham and Sheffield. These three local authorities are endowed with different scales, size and characteristics, as it can be derived from Table 23.

| | Population | Area (sq mi) | Total Dwellings | LA Owned |
|---|---|---|---|---|
| NE Lincolnshire | 157500 | 74.1 | 70700 | 10100 |
| Rotherham | 253200 | 110.6 | 126000 | 21000 |
| Sheffield | 534500 | 142.1 | 230000 | 40000 |

**Table 23: Metropolitan Borough Local Authorities involved in the interviews**

The first purpose of the phone interviews with local authorities has been assessing the state of Energy Efficiency measures implementation in the different context. Results of this assessment process are reported in Table 24. In particular, for each measure, local authorities have been asked to clarify whether they had ever run any project concerning them or at least they are planning to implement them. It emerges that Yorkshire and Humberside local authorities have a good awareness of the wide spectrum of Energy Efficiency measures available, and have actually implemented a lot of them. A lot of interventions have been carried out utilising the Decent Homes program.

However, the decision process for initiating energy efficiency measures implementation projects for social housing is very complex. For example, in the case of North East Lincolnshire, the Local Authority Housing Stock ownership and management have been transferred to a partner. In other cases (for example, Sheffield), Local Authorities utilise ALMOs for managing the Housing Stock. ALMOs usually rely upon Local Authority for setting the agenda but ALMOs are active participants in the discussion.

ALMOs have the responsibility for managing the procurement process for assigning Energy Efficiency projects and works; however, it has emerged as a common practice that ALMOs deal with these processes (often outsourcing the procurement operations to consulting companies or big national energy providers, like N-Power) by utilizing a competitive tendering approach oriented to award the whole work to a big national contractor. Then, these contractors will have the responsibility for subcontracting portions of the project. This can turn out in a relevant barrier for regional businesses, as, very often, these big players have their own sub-contractors list and are not interested in promoting local firms. Moreover, Local Authorities seem to have no word about sub-contracting processes. Thus, it is a common perception that it's tricky for small contractors to get involved with council contracts. This is consistent with the findings of the web-based questionnaire that highlighted that local authorities' contracts do not constitute a big quota of regional businesses turnover. Interviewed local authorities are aware of the problem and have experimented it, as they realized that in several projects local businesses where just involved at sub-contracting level. It has to be clarified that the different Energy Efficiency measures correspond to different Supply Chain. For example, local authorities agreed on stating that for Cavity wall and loft insulation regional supply chains can provide good materials and services. For Heating Systems and Renewable measures, waiting times tend to be longer, and more work has been awarded to out-of-region contractors.
Interviewed local authorities stated that, at this stage, their role should be twofold: they are both a major customer of the Energy Efficiency supply chain and an actor that can help shape and support the regional EE supply chain. Currently role is primarily as a customer, but there is a common agreement about the fact that they are learning how the local authority may also support the development of the supply chain. Mentioned interventions include:

- Changes to procurement methodologies, to encourage local businesses;

- Modifying pre-qualification processes in order to help local businesses;
- Land use planning, for making land available for energy efficiency infrastructure;
- Operating large scale energy efficiency schemes.
- Making companies aware on how to access the funding;
- Providing training to local businesses.

| | NEE Lincolnshire | | Rotheram | | Sheffield | |
|---|---|---|---|---|---|---|
| Measure | **Implemented** | **Planned** | **Implemented** | **Planned** | **Implemented** | **Planned** |
| **Cavity Wall Insulation** | YES | | YES | | | |
| **Loft Insulation** | YES | | YES | | | |
| **Solid Wall Insulation external** | | YES | YES | | YES | |
| **Solid Wall Insulation internal** | | | | | YES | |
| **Fuel Switching** | | YES | YES | | YES | |
| **Heating Controls** | YES | | YES | | YES | |
| **CHP Wood Pellet Boiler** | YES | | YES | | YES | |
| **Solar Water Heater** | | | YES | | YES | |
| **Air Source Heat Pump** | | | | YES | | |
| **Ground Source Heat Pumps** | | | YES | | YES | |
| **Domestic Wind Turbines** | YES | | | | | |
| **Solar Power PV Panels** | YES | | YES | | YES | |
| **Boiler Replacement** | YES | | YES | | YES | |
| **HEA Underfloor Insulation** | YES | | | | | |
| **Glazing/Windows** | YES | | YES | | YES | |
| **Flat Roof Insulation** | | YES | | | YES | |
| **Draught Proofing** | YES | | YES | | YES | |

**Table 24: Interventions implemented and planned by Local Authorities**

### 8.1 Key Findings

The interview process involving local authorities allowed for fully understanding mechanisms underlying the approval and the management of large scale Energy Efficiency projects by Local Authorities.

The complexity of this process involves many actors and significantly modifies the Supply Chain Formation for the sector, as illustrated in Figure 13. Indeed, the existence of several levels (ALMOs, National Energy Providers, First Level Contractor) between regional businesses and the Local Authorities that is promoting the project makes the participation of local firms to Energy Efficiency large scale programs quite difficult.

It has also emerged in the previous stage of the research that regional businesses are involved in this Supply Chain Formation mainly as sub-contractors.

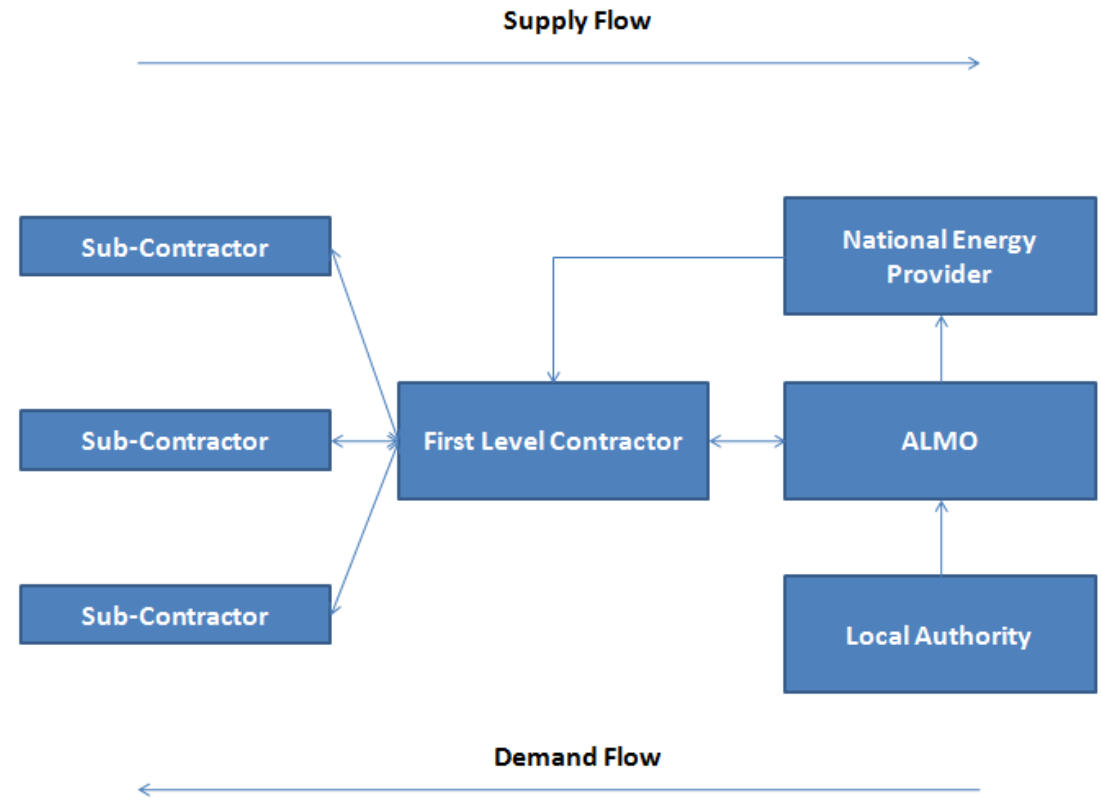



**Figure 13: Energy Efficiency Supply Chain Formation Example 1 (Large Scale Projects)**

Small firms are more likely to be involved in small-scale Energy Efficiency projects; in this case, the formation of the Supply Chain is simpler (illustrated in Figure 14), as there are no middle-players between suppliers (regional Energy Efficiency micro-businesses) and customers (private owners/occupiers).

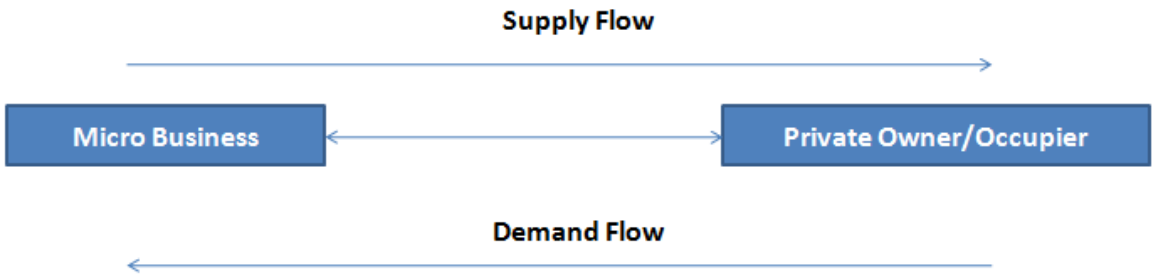



**Figure 14: Energy Efficiency Supply Chain Formation Example 2 (Small Scale Projects – Type 1)**

This Supply Chain Formation can be slightly mutated where Local Authorities act as middle-players between private owners and occupiers and the local businesses. Indeed, in some cases, Local Authorities are offering incentives to private owners and occupiers to install Energy Efficiency measures in their own houses, by totally or partially refunding the cost of the installation (a similar project has been implemented in Sheffield for Insulation measures) provided by a local firm belonging to a pre-qualification list. This situation is illustrated in Figure 15.

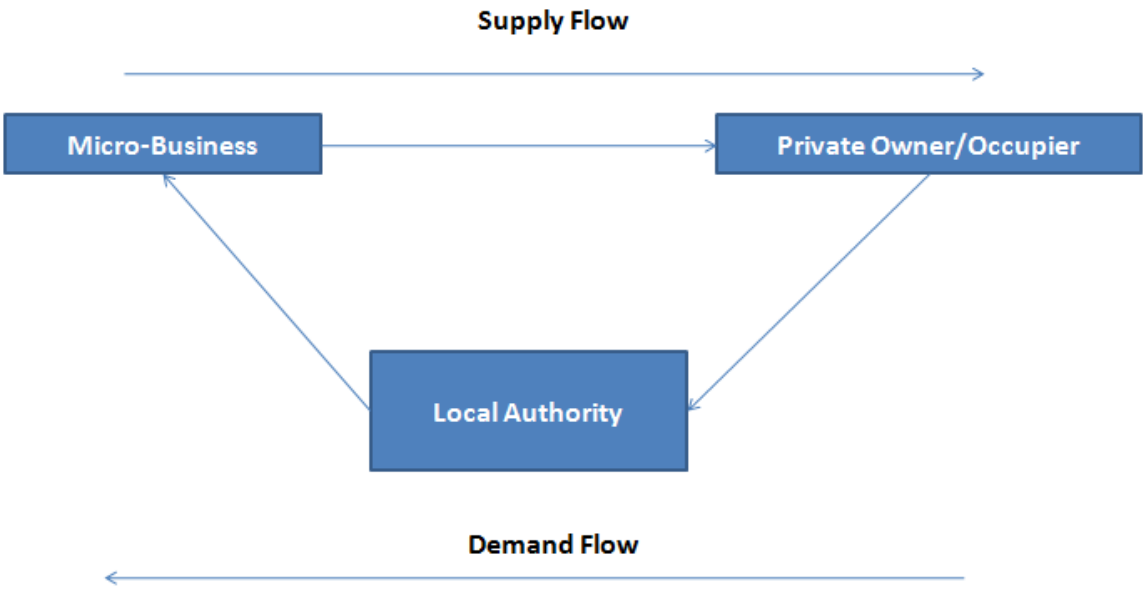



**Figure 15: Energy Efficiency Supply Chain Formation Example 3 (Small Scale Projects – Type 2)**

## 9. Focus Groups

During the Online Questionnaire and Telephone Interviews, some organisations have demonstrated a more significant interest in the research project, stating their availability to be involved in a focus group. Actually, almost 50% of respondents would have liked to participate in such an initiative. Therefore, representatives from some sample organisations have been invited to further elaborate on their previous responses, provide additional information and try to formulate specific intervention proposals.

Organisations requested to take part in the Workshop were specifically selected so that group participants represented a cross-section of the Yorkshire and Humberside Energy Efficiency Supply Chain, in terms of service type and organisation size. In particular, a sampling criterion similar to the one utilised for phone interviews has been employed. Some 20 organisations were invited, together with 5 Local Authorities representatives, in order to better test some intervention proposals for strengthening the regional Energy Efficiency Supply Chain.

During the focus- group, several different possible interventions areas were proposed. Participants to the focus group analysed in detail the main problems connected to each area, and formulated their own proposals.

### 9.1 Procurement Methodologies

A large part of the Focus Group was then devoted to discuss about current procurement and supplier selection methodologies employed by Local Authorities in Energy Efficiency projects. Indeed, the previous stages of the research have pointed out that regional businesses have difficulties in being awarded projects also because of the fact that procurement methodologies tend to award contracts to big national players. In particular, firms pointed out that:

- Very often framework contracts are utilized for dealing with Energy Efficiency projects; these contracts make price being the dominant factor, not quality. Thus, there is no premium for local companies;
- Inconsistent procurement approaches are used by different public sector clients;
- The utilize of framework contracts make difficult even bidding for small players;
- Very often framework contracts do not include any specification about sub-contracting issues: the big contractor being awarded the whole project can then select its own suppliers;
- Framework contracts do not specify anything about payment terms to sub-contractors. Thus, very often, main contractors tend to pay sub-contractors (and then, regional businesses) after they have received the money from Local Authorities: this adds more difficulties for local businesses, as they can experience serious cash-flow problems;
- Very often, procurement and supplier selection schemes do not take into account any historical record of firms' performance. Thus, contractors and sub-contractors are not assessed on the quality of the work they have provided in previous projects.

Thus, several recommendations and interventions have been provided by local businesses. The most relevant are reported as follows:

- In framework contracts, Local Authorities should specify that a quota of sub-contracts has to be awarded to regional businesses (there are already some significant examples in place, like in Doncaster);
- To this aim, a database of regional companies could be set up, as a source for local firms to be involved in Energy Efficiency projects;
- Procurement strategies should be uniform/standard approaches adopted, that are transparent and widely understood;

- Framework contracts should specify payment terms for sub-contracts, in order to prevent cash-flow problems for sub-contractors;
- An assessment of the quality of the work delivered by contractors and sub-contractors should be provided. In particular, it could be based on a league-table system (there are already some significant examples in the region, like in Doncaster). An Independent body could be set collaboratively by a number of clients to help in this monitoring task;
- Not all work should be packaged up and let as a large contract: smaller work packages could be managed by local and regional resource, possibly to a better standard and at lower costs, given the fewer overheads local firms can offer.

Another issue that is connected to procurement and supplier selection is constituted by Pre-Qualification schemes. About Pre-Qualification schemes, there was a generally negative response about the current situation. In general, it was felt that they existing schemes are weighted against smaller companies. In particular, companies pointed out the following issues:

- Current pre-qualification schemes are always not user friendly (very often electronic forms do not work well) and not uniform (the same info is often required, in different manners, by different pre-qualification schemes) therefore requiring extensive effort;
- Current pre-qualification schemes are often very costly for small firms;
- Current pre-qualification schemes tend to be in favor of larger organisations significantly (both due the resources needed to complete them, because of their rigorous requirements and because of the geographical scale required);
- Current pre-qualification schemes do not take into account specialism and ask for general/standard accreditations and qualifications, which can often mean that companies are not able to demonstrate their competitive advantage;
- Current pre-qualification schemes tend to ask for redundant assessment about some issues like Health and Safety.

Thus, regional businesses recommended more user-friendly and uniform pre-qualification schemes that can better take into account regional businesses needs and their specific skills and competencies. Moreover, regional businesses feel that, on some issues, pre-qualification schemes could just rely upon information provided by existing certifications and accreditations.

Firms have also highlighted that there is a frequent “misunderstanding” in Energy Efficiency call for initiatives. Indeed, very often the focus of publicly funded projects is more on the delivery of products than on the delivery of effective solutions to housing stock problems. Thus, firms recommended the following points:

- The use of performance specifications would be a significant move forward, involving a movement away from ‘product’ driven arrangements and would allow companies to demonstrate capability during ‘trials’;
- This approach could ensure that appropriate/necessary work is carried out, rather than work that has been sought but may not be the best solution;
- Potential contractors could be asked to advise how best they would tackle EE issues in example house/houses. Alternately, Clients could allocate small ‘batches’ of housing, and ask different contractors to demonstrate capability (as a trial);
- Performance specification requires a rigorous monitoring and policing strategy that is appropriately implemented;
- Engaging with the end users more would be of benefit here, so that contractors have a better chance of understanding what is required.

### 9.2 Supply Chain Issues

As discussed in the previous stages of the research many regional businesses identified the cost of suppliers as a relevant issue, firms were proposed to discuss the opportunity of creating a Regional Centre for supplying materials and services to local firms operating in the EE sector. Regarding this opportunity, firms pointed out these issues:

- Centralised purchasing was seen as unrealistic;
- A centralised 'marketplace' was not seen as wholly appropriate because it is a 'product-led' mechanism, when the whole sector should be led by 'energy efficiency performance' (i.e. rather than specifying products, should be specifying requirements/standards and asking industry how best to achieve them).

However, firms still recognised the suppliers cost as a problem. Thus, they have recommended the creation of a regional IT system and some administrative support for allowing regional businesses to aggregate their purchasing. Basically, this system could provide a "matching" of regional firms purchasing requirements, and, by putting them together, it could help firms in achieving economic of scale on their purchases.

In addition, firms have also stated it would be helpful for them to implement formalised systems and methods for monitoring their own supply chain.

### 9.3 Information and Communication

Another relevant issue that firms highlighted during the previous stages of the research was about the insufficient advertising of Energy Efficiency projects and opportunities. This evidence was strongly confirmed in the Focus Group. Local firms feel that some opportunities could be better advertised/made known and many contracts are let without the market being informed of them. Thus, they recommended the following actions to overcome the current situation:

- Creation of a central point for regional work opportunities, like an online-database or a dedicated website;
- Utilizing a database of regional companies for creating a mailing-list in order to promptly inform firms when new opportunities arise.

### 9.4 Education and Training

About Training and Education issues, firms highlighted that there is a need for them with regards to EE to be better funded, and also there needs to be a better universal strategy. This is because firms mainly recognised the existence of two problems:

- Lack of Energy Efficiency consciousness and awareness in the society;
- Lack of knowledge, skills and capabilities within the supply chain.

In particular, firms recommended the following key points:

- Education should stem from school up, with children educated at a young age on energy efficiency and related areas;
- Foundation Degrees would help improve supply chain capability, but need to be funded;
- Developing Energy Efficiency-oriented degree programs or projects, in order to educate professionals that can improve the sector skills;
- Developing wider awareness of schemes as Knowledge Transfer Partnership;
- Providing support for implementing Supply Chain performance evaluation systems;

- Encouraging regional businesses acting as sub-contractors to join training, qualification and apprenticeship schemes, as generally it is the larger companies that gain funding for such initiatives.

## 10. Two empirical examples of priority energy efficiency measures identified

In this section, the results of this Scoping Study are particularized with reference to two specific Energy Efficiency Measures: Solar Power Photovoltaic Panels and Solid Wall External Insulation. Findings arising from the web-based questionnaire and other research stages about Market and Supply Chain structures will be presented, highlighting the peculiarities of each specific market segment.

### 10.1 Solar Power Photovoltaic Panels

As regards firms delivering Solar Power Photovoltaic Panels (SPPP), a total number of 42 companies responded to the web-based questionnaire. Looking at the geographical distribution of their workforce (Table 25) there are no significant differences with the one observed for the whole set of firms.

| Please, specify if the company based in Yorkshire and Humberside location is: | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Branch/Subsidiary with Headquarters elsewhere | 14.3% | 6 |
| Headquarters with Branches elsewhere | 14.3% | 6 |
| The only site | 71.4% | 30 |
| **Answering Companies** | | **42** |

**Table 25: SPPP Businesses classification by nature of the Yorkshire and Humberside location**

Again, only a small proportion of the companies are represented by subsidiaries/branches of larger businesses with headquarters in other UK regions whilst another small portion is made up of firms headquartered in Yorkshire and Humberside with branches in other UK regions.

This result is consistent with the business classification based on employees number (Table 26). The most of the Energy Efficiency firms (61.9%) are micro-businesses, just employing 1 to 9 people; just the 7.1% of the firms responding the survey are employing more than 250 employees. The 42.9% of the companies reports a yearly turnover not larger than £250k.

| Total number of employees in the company | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| 1-9 | 61,9% | 26 |
| 10-49 | 26,2% | 11 |
| 50-99 | 0,0% | 0 |
| 100-249 | 4,8% | 2 |
| 250+ | 7,1% | 3 |
| **Answering Companies** | | **42** |

**Table 26: SPPP Business classification based on employees number in 2010**

Further interesting insights can be derived looking at businesses establishment dates (Table 27). A relevant quota of firms (the 47.6% of the respondents to the question) have been established in the last 5 years (2005 onwards), testifying the growing interest for this kind of measure. As in the general case, all these businesses are just employing 1 to 9 people.

| Business Establishment Date | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Pre 1970 | 7.1% | 3 |
| 1970-1979 | 4.8% | 2 |
| 1980-1989 | 2.4% | 1 |
| 1990-1999 | 11.9% | 5 |
| 2000-2005 | 26.2% | 11 |
| 2005 onwards | 47.6% | 20 |
| **Answering Companies** | | **151** |

**Table 27: SPPP Businesses classification based on establishment dates**

Looking at firms' core businesses, the 71.4% of the respondents state that their prevalent area is related to Renewable Energy Solutions. Their focus on this particular market segment is confirmed looking at the entire spectrum of Energy Efficiency Measures they deliver. Indeed, in addition to solar panels, the 81% of the firms is capable of delivering also solar water heaters, while the 40.5% of them are also competent for installing domestic wind turbines. Just a smaller proportion of firms (around 25%) are capable of delivering insulation measures.

However, delivering Solar Power Photovoltaic Panels seems to be a very capital intensive activity if compared to the other Energy Efficiency measures. This is confirmed looking at the distribution of the typical projects undertaken by firms (Table 28). Indeed, the 42.9% of the firms are used to undertake projects whose value is between £10k and £50k; the 23.8% of the firms usually undertake projects larger than £150k. These figures are significantly larger from the ones obtained looking at the whole population of firms.

As regards the growth prospects, the 71.1% of the firms involved in the SPPP business state that the market size for the Energy Efficiency sector will grow significantly and the rest of them that it will at least grow gradually.

As regards the most significant drivers mentioned by firms for the growth of the sector, it is worth noting that increasing energy costs, government policies and necessities of ensuring compliance with tighter environmental regulations are expected to play a major role.

Regarding the actions that firms are planning to implement, besides recruitment and workforce training, that still play a major role, companies are pointing out the necessity of improving their supplier relationships.

| Typical undertaken SPPP project/contract | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| £0-£5k | 11,9% | 5 |
| £5k-£10k | 2,4% | 1 |
| £10k-£50k | 42,9% | 18 |
| £50k-£150k | 19,0% | 8 |
| £150k+ | 23,8% | 10 |
| **Answered Question** | | **42** |

**Table 28: SPPP Businesses classification based on typical undertaken project/contract**

This last evidence is probably due to the fact that the suppliers' base is more disperse than in the general case, as reported in Table 29. Indeed, just the 32.1% of the purchasing is coming from the region, with a significant 29.0% coming from overseas. This is probably one of the most critical factors for the development of the market segment.

| Purchasing Sources | |
|---|---|
| **Answer Options** | **Average** |
| Yorkshire-Humber Region | 32.1% |
| Other UK Regions | 38.9% |
| Overseas | 29.0% |

**Table 29: SPPP Businesses purchasing sources**

Sales pattern (very much concentrated within the region, with no exports overseas), barriers and other considerations do not differ from the ones observed within the more general market research.
As a conclusion, it can be said that a large proportion (almost the 50%) of firms supplying solar power photovoltaic panels are young (formed within the last 5 years) and small (less than 9 persons). This explains the generally observed problem of obtaining clear information on this market segment (the current study has provided this clarity). It confirms that this is a new and rapidly growing market. It is recommended that this would be a key area of future supply-chain research, given that the change and growth is so rapid. Table 30 provides a geographical map of the distribution of the respondents to the survey across Yorkshire and Humberside counties.

| Geographical distribution | |
|---|---|
| **County** | **Companies** |
| South Yorkshire | 18 |
| West Yorkshire | 16 |
| East Riding of Yorkshire | 4 |
| North Yorkshire | 2 |
| North East Lincolnshire | 2 |

**Table 30: SPPP Businesses location**

### 10.2 External Solid Wall Insulation

As regards firms delivering External Solid Wall Insulation (ESWI), a total number of 14 companies responded to the web-based questionnaire. Looking at the geographical distribution of their workforce (Table 31) there are some differences with the one observed for the whole set of firms, as a smaller proportion of firms is based on an “only site” structure (57.1%). However, the small number of total companies (14) does not allow for further considerations.

| Please, specify if the company based in Yorkshire and Humberside location is: | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Branch/Subsidiary with Headquarters elsewhere | 14.3% | 2 |
| Headquarters with Branches elsewhere | 28.6% | 4 |
| The only site | 57.1% | 8 |
| **Answering Companies** | | **14** |

**Table 31: ESWI Businesses classification by nature of the Yorkshire and Humberside location**

Also in this market segment, the most of the firms (50.0%) are micro-businesses, just employing 1 to 9 people (Table 32); just one firm responding the survey is employing more than 250 employees. Similarly, the 50.0% of the companies reports a yearly turnover not larger than £250k. As regards business establishment date (Table 33), as in the general case, a relevant quota of firms (the 42.9% of the respondents to the question) has been established in the last 5 years (2005 onwards). As in the general case, all these businesses are just employing 1 to 9 people.

| **Total number of employees in the company** | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| 1-9 | 0.0% | 7 |
| 10-49 | 21.4% | 3 |
| 50-99 | 0,0% | 0 |
| 100-249 | 21.4% | 3 |
| 250+ | 7,1% | 1 |
| **Answering Companies** | | **14** |

**Table 32: ESWI Business classification based on employees number in 2010**

| **Business Establishment Date** | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| Pre 1970 | 0.0% | 0 |
| 1970-1979 | 7.1% | 1 |
| 1980-1989 | 14.3% | 2 |
| 1990-1999 | 7.1% | 1 |
| 2000-2005 | 28.6% | 4 |
| 2005 onwards | 42.9% | 6 |
| **Answering Companies** | | **14** |

**Table 33: ESWI Businesses classification based on establishment dates**

Looking at firms' core businesses, the 71.4% of the respondents state that their prevalent area is related to Energy Efficiency Measures. Their focus on this particular market segment is confirmed looking at the entire spectrum of Energy Efficiency Measures they deliver. Indeed, in addition to External Solid Wall Insulation, the 92.9% of the firms is capable of delivering also Cavity Wall and Loft Insulation, the 78.6% is capable of installing Internal Solid Wall Insulations, while the 71.4% is also competent for under-floor insulation. Interestingly, 11 out of 14 firms (78.6%) deliver solar panels and solar water heaters as well.

Looking at the distribution of the typical projects undertaken by firms (Table 34), there is the co-existence, within the same sample, of several firms' categories. Indeed, the 35.7% of the firms is used to undertake very small projects whose value is between £0k and £5k; the 28.6% of the firms usually undertake projects whose value is between £10k and £50k; 3 firms out of 14 undertake very large projects. Also in this case, these figures are significantly larger if compared to the ones obtained looking at the whole population of firms.

As regards the growth prospects, the 72.7% of the firms involved in the ESWI business state that the market size for the Energy Efficiency sector will grow significantly and the rest of them that it will at least grow gradually.

As in the solar panels case, as regards the most significant drivers mentioned by firms for the growth of the sector, it is worth to note that increasing energy costs, government policies and necessities of ensuring compliance with tighter environmental regulations are expected to play a major role.

Also in this case, companies are pointing out the necessity of improving their supplier relationships.

| Typical undertaken SPPP project/contract | | |
|---|---|---|
| **Answer Options** | **Response Percent** | **Response Count** |
| £0-£5k | 35.7% | 5 |
| £5k-£10k | 7.1% | 1 |
| £10k-£50k | 28.6% | 4 |
| £50k-£150k | 7.1% | 1 |
| £150k+ | 21.4% | 3 |
| **Answered Question** | | **14** |

**Table 34: ESWI Businesses classification based on typical undertaken project/contract**

As stated for the solar panels case, this last evidence is probably due to the fact that the suppliers' base is more disperse than in the general case, as reported in Table 35. Indeed, just the 35.1% of the purchasing is coming from the region, with a significant 27.9% coming from overseas and the 38% coming from other UK regions. Interestingly, the rating of the suppliers (about both quality and punctuality measures) is significantly lower if compared to the results of the general market research (being "average" the median score). This factor should be taken into account for further developing the sector.

| Purchasing Sources | |
|---|---|
| **Answer Options** | **Average** |
| Yorkshire-Humber Region | 35.1% |
| Other UK Regions | 38.0% |
| Overseas | 27.9% |

**Table 35: ESWI Businesses purchasing sources**

Interestingly, sales pattern seem to reveal a quite different situation compared to the ones emerged from the general market research. Indeed, for firms working in this specific market segment, private owners and occupiers do not seem to be the only main customer categories; the relevance rating for this category (2.90) is not that different from the ones of Local Authorities and Social Housing Associations (2.70). Despite the low number of companies taking part into the survey, this could reveal a better involvement capability of these firms in public funded Energy Efficiency projects. This is coherent to the findings from focus groups and phone interviews: indeed, Local Authorities stated that regional companies providing insulation related measures are able to provide good services.
Barriers and other considerations do not differ from the ones observed within the more general market research.
Table 36 provides a geographical map of the distribution of the respondents to the survey across Yorkshire and Humberside counties.

| Geographical distribution | |
|---|---|
| **County** | **Companies** |
| West Yorkshire | 6 |
| South Yorkshire | 5 |
| North Yorkshire | 1 |
| North Lincolnshire | 1 |
| North East Lincolnshire | 1 |

**Table 36: ESWI Businesses purchasing sources**

## 11. Conclusions

*A summary of the Conclusions is provided in the Executive Summary (Section 1)*

Recent reports by several institutions give estimates for the UK Energy Efficiency (EE) market at around £2bn in 2010 (DTI/DEFRA, 2006; Shell Springboard, 2006). However, despite these figures, research into the Energy Efficiency sector in the UK has historically been limited. Furthermore, the knowledge of the sector in the Yorkshire-Humberside region is scarce.

Therefore, the overall aim of this study has been the creation of a more robust comprehension of the Energy Efficiency sector consisting of an understanding of:

- A map of the firms operating in the region providing Energy Efficiency measures;
- The services offered by the firms operating in the region;
- A map of the Supply Chain of the sector;
- Analysis about opportunities and barriers for its development driven by the approval of large-scale government and community projects oriented at the installation of Energy Efficiency measures.

The preliminary stage of this project has been creation of a Database of Companies which are thought to be active in the EE sector. This database has been obtained by accessing data sources (existing industry databases, directories, etc.) and complemented with further refinements to the listing. Then, firms within the database have been involved in a market research (composed by a web-based questionnaire, phone interviews and focus groups), aimed at clarifying the abovementioned points.

First of all, firms in the database have been targeted, submitting them an online questionnaire. Respondents have been asked to further involve in the research, proposing them to take part in short and structured phone interviews. At the same time, in order to investigate also the "demand" side of the Energy Efficiency Supply Chain, Local Authorities from the Region have been contacted for some phone interviews. This process has been aimed at understanding mechanisms underlying the approval and management of large scale Energy Efficiency projects.

Then, Local Authorities and Regional Businesses have been invited to join a focus group for identifying effective interventions for promoting the growth of the regional Energy Efficiency Supply Chain. From this stage, and from the previous ones, some recommendations have been derived.

The questionnaire survey and the phone interviews have allowed drawing of some of these conclusions about market structure and services provided by businesses operating in the region. It can be stated that:

- The regional Energy Efficiency sector sees a strong prevalence of regional-based micro-businesses, employing a limited number of people, working on small turnovers and basically concentrated on the regional market;
- A large quota of businesses operating in the Energy Efficiency sector also provide services and products connected to Renewable Energy or Construction sectors;
- Regional businesses provide a skewed and unequal coverage of the wide range of available measures. Even traditional Energy Efficiency measures (like insulation-related measures) see a very limited number of firms active in the region.

Regarding the structure of the Supply Chain, it has been observed that:

- The small scale of the regional Supply Chain results a small capacity: the most of the firms are just involved in small-value projects;

- The analysis of the sourcing pattern of regional firms reveals that a relevant quota of the firms' purchases is provided by out-of-region (and, in some cases, overseas) suppliers; the supply chain is fractured and critical components are often shipped from overseas;
- The analysis of the sales pattern reveals that the most of the sales of the regional businesses are concentrated within the region;
- The analysis of the customers' portfolio of regional businesses reveals that regional companies sell their products/services mainly to private owners-occupiers; Local Authorities and Housing Associations just contribute to a small quota of the sales.

Concerning opportunities, it can be concluded that:

- Regional businesses are optimistic about the growth prospect of the sector in the region;
- This vast evidence is further testified by their willingness to involve in activities like workforce training, improvement of supplier relationship and of the whole supply chain, recruitment;
- On the other hand, firms do not seem to be likely to expand to other UK regional markets or to overseas market: this supports the evidence of a regional supply chain made up of micro-businesses.

Through Focus Groups and Phone Interviews, drawing on these preliminary findings, several barriers and problems affecting the sector have been identified. For each of them, recommendations for interventions have been proposed.

One of the main problems pointed out by firms was the difficulty in involving in publicly funded Energy Efficiency projects. Table 25 summarizes specific problems pointed out by firms and possible intervention areas.

| Problem | Intervention Proposal | Body/Institution to be involved |
|---|---|---|
| **Difficulty in bidding and participating to publicly funded Energy Efficiency large-scale projects.** | Creating a Database of Regional Businesses operating in the Energy Efficiency sector. | Regional Development Agency |
| **Energy Efficiency publicly funded projects size prevents local businesses to get involved presently for a matter of capacity.** | Smaller work packages could be managed by local and regional resource, possibly to a better standard and at lower costs. | Local Authorities |
| **The most of the work related to publicly funded projects goes to large contractors out of the region; these businesses have their own sub-contractor lists.** | In framework contracts, Local Authorities should specify that a quota of sub-contracts has to be awarded to regional businesses. | Local Authorities |
| **Main national contractors winning large projects are acting as a 'middle man': this adds costs and squeezes margins for sub-contractors. Quality is not assured.** | An assessment of the quality of the work delivered by contractors and sub-contractors should be provided. | Local Authorities by promoting independent bodies |
| **Lack of Education and Knowledge on Energy Efficiency products and services, even in the Local Authorities.** | Moving from a "Product-Driven" to a "Solution-Driven" approach in designing EE large scale interventions | Local Authorities and Regional Development Agency |
| **Pre-Qualification schemes are a major problem for regional businesses** | Moving to more "local-friendly" pre-qualification schemes | Local Authorities |

**Table 25: Problems and Proposed Interventions – Procurement and Involvement in Publicly Funded EE projects**

Another significant problem that emerged has been the strong fragmentation of the Supply Chain. Cost of suppliers and delivery punctuality can be an issue (also because of the small size of the orders) and critical components are often shipped from overseas. Thus, several recommendations have been proposed, as reported in Table 26.

| Problem | Intervention Proposal | Body/Institution to be involved |
|---|---|---|
| **Cost of Suppliers** | Creation of a centralized purchasing system, based on an IT platform, where firms can aggregate their purchases. | Regional Development Agency |
| **Delivery Punctuality** | | |
| **Critical Components shipped from overseas** | | |

**Table 26: Problems and Proposed Interventions – Supply Chain**

Regional businesses also highlighted that awareness of funding schemes and work opportunities for Energy Efficiency is a crucial point. Thus, more has to be done to improve the information provided to firms, as reported in Table 27.

| Problem | Intervention Proposal | Body/Institution to be involved |
|---|---|---|
| **Lack of awareness of funding schemes** | Creation of a central point for funding schemes, like an online-database or a dedicated website | Regional Development Agency/Local Authorities |
| **Lack of information about arising work opportunities** | Utilizing a database of regional companies for creating a mailing-list in order to promptly inform firms when new opportunities arise | Regional Development Agency/Local Authorities |

**Table 27: Problems and Proposed Interventions – Information and Communication**

Eventually, firms highlighted that there is a lack of education and training activities related to Energy Efficiency. Firms stated that there is a need for them with regards to EE to be better funded; however, they also think that a universal strategy could be beneficial. Table 28 reports some proposed interventions.

| Problem | Intervention Proposal | Body/Institution to be involved |
|---|---|---|
| **Lack of energy efficiency consciousness** | Education should stem from school up, with children educated at a young age on energy efficiency and related areas | Regional Development Agency/Local Authorities/Education Departments |
| **Lack of Supply Chain capability and skills** | Funding Foundation Degrees | Central Government |
| | Promoting Energy Efficiency-oriented degree programs or projects | Universities |
| | Participation of sub-contractors into training, qualification and apprenticeship schemes | Regional Development Agency |

**Table 27: Problems and Proposed Interventions – Training and Education**

Figure 16 highlights the degree of intensity required within each subsector of the Energy Efficiency market for each of the proposed interventions. In the matrix, three different intervention levels are specified. Specifically, interventions are classified on the basis of the intensity level (low, moderate and high) with which they can be applied to each specific measure.
As it can be derived from the matrix, almost all the proposed interventions can be applied to the whole Energy Efficiency sector with a high intensity level. Some noticeable exceptions are reported, and they can be explained as follows:

- Dividing the work related to large Energy Efficiency projects into smaller packages does not apply well to Heating Controls and even more to Renewable Energy Solutions, as these measures are quite capital intensive and require, for their exploitation, the achievement of significant scale returns;
- Favoring local sub-contracting can be a problem if applied to Renewable Energy Solutions, given the dependence on out-of-region suppliers for these measures (as highlighted, for example, for solar

panels). Thus, in parallel, local manufacturing of components for Renewable Energy solutions should be encouraged;

- Applying a "solution" approach can result easier for traditional measures (insulation and doors), that have a more established know-how; in the Renewable Energy and Heating Controls field, knowledge is still in progress, and solutions are still quite standardized;
- Payment terms issues are even more critical for firms operating in Heating Systems and Renewable Energy sectors, given the intensity of capital usage required in these sectors;
- The promotion of aggregated purchasing schemes can result even more advantageous for Heating Systems and Renewable Solutions firms, as these firms depend more strongly on out-of-region suppliers;
- Skills and training interventions can have a greater impact on Renewable Energy solutions and Heating Systems, as in these fields knowledge and practical know-how are still in progress; moreover, a large proportion (almost 50%) of firms supplying renewable energy measures are young (formed within the last 5 years) and small (employing less than 9 persons). This confirms that this is a new and rapidly growing market that will need training and skills support.

| Area | Intervention | Insulation | Traditional Windows and Doors | Heating Systems | Renewables |
|---|---|---|---|---|---|
| Procurement | Creation of DB of Regional Companies | | | | |
| | Allowing for Smaller Work Packages | | | | |
| | Favouring Local Sub-Contracting | | | | |
| | Assessing Contractors Quality | | | | |
| | From "Product" to "Solution" approach | | | | |
| | Uniformity of Pre-Qualification Schemes | | | | |
| | Better Regulation of Payment Terms | | | | |
| Supply Chain | Aggregated Purchasing for Regional Firms | | | | |
| Information | Central DB for Funding Schemes | | | | |
| | Mailing List for Advertising | | | | |
| Skills and Training | Creating EE awareness and consciousness | | | | |
| | Funding Fundation Degrees | | | | |
| | Promoting EE oriented degrees-programs | | | | |
| | Training and Apprenticeship Schemes | | | | |

Low Intensity  Moderate Intensity  High Intensity

**Figure 16: Intensity of the proposed interventions within each Energy Efficiency subsector**

## 12. Recommended Further Research

Based on the evidence of this scoping study, further research would be recommended in order to further evaluate the Energy Efficiency Supply Chain of the Yorkshire and Humberside region and to start implementing some of the proposed recommendations.

This further research phase would be oriented to provide the following insights:

- Providing a further and more refined assessment of the global capacity of the Energy Efficiency sector in the region, in order to understand the feasibility of large scale retrofitting initiatives;
- Identifying Supply Networks and key suppliers within the sector, trying to design possible alternative sourcing strategies;
- Designing Supply Chain coordination strategies, in order to improve the collaboration among Energy Efficiency firms and suppliers within sector;
- Providing support to Energy Efficiency firms in implementing Supply Chain Performance Measurement Systems and Suppliers' Evaluation Systems;
- Providing support to Social Housing Associations and Local Authorities for designing procurement strategies for selecting Energy Efficiency retrofitting contractors.

These activities will be based on the findings of this Scoping Study. Moreover, further data collection methodologies will be developed. In particular:

- A web-based survey will be implemented in order to provide the assessment of the global capacity of the Energy Efficiency Sector in the region;
- Focus groups and face-to-face interviews will be employed in order to understand actions to be undertaken by firms in order to improve their supply chains;
- Supply chain modeling of various scenarios of interventions and impact prediction.

Consultancy support could be ensured to firms and local authorities willing to improve their supply chains. This further research could be particularly focused on the renewable-energy measures supply chain, as this segment presents the characteristics of a very rapidly growing and changing market.

## Appendix I – Research Team

**Project Lead and Principal Investigator**
Professor Lenny Koh, Director of Logistics and Supply Chain Management (LSCM) Research Centre

**Advisory Group**
Professor Lenny Koh, Director of Logistics and Supply Chain Management (LSCM) Research Centre
Professor Steve Banwart, Cross Cutting Director of Research for Energy & Environment
Professor Steve Sharples, Professor of Environmental Design and Sustainability
Neil Cameron, Director of Estates
George Rees, Business Development Director, Kroto Research Institute

**Project Manager and Consultant**
Dr Andrea Genovese, Consultant and Project Manager, Post Doctoral Research Associate in LSCM

**Private Sector Market Research Consultancy**
Liam Keane, Consultant, Stradia Ltd

## Appendix II – Questionnaire Cover Letter

**Energy Efficiency Retrofitting Market Analysis**
**Questionnaire for Yorkshire and Humber Companies**

Dear Sir/Madam,
The Regional Development Agency Yorkshire Forward and the University of Sheffield are jointly undertaking a survey questionnaire about the market for Energy Efficiency services and products in the Yorkshire and Humber region. Yorkshire Forward has identified retrofitting as an area of high potential in terms of job creation, reduction of CO2 and as a way of tackling fuel poverty. This survey is oriented to providing a better understanding of the Energy Efficiency sector in the Yorkshire and Humber region before the launch of a large scale project that will be looking at installing the energy efficiency measures for retrofitting in "hard to treat" social housing. In particular, the research is aimed at:

- Identifying existing regional businesses delivering Energy Efficiency measures, in order to include them in a Database of potential contractors for future projects;
- Understanding companies' views about opportunities, barriers, need of support and potential for job creation in the Energy Efficiency market, in order to design specific interventions.

The survey is being circulated to companies providing Energy Efficiency-related services in Yorkshire and Humberside. It would be appreciated if you could participate in our research and share with us your valuable experience of operating in the sector by filling in the following survey by 26th March 2010. Should you want to provide us with further insights, there is also the opportunity to take part in phone interviews and focus groups at a later date. On the completion of the project, a full copy of the final report will be sent to you, and your organisation will also be cited in the report acknowledgments.

In addition to increased exposure for your organisation and a greater potential for engagement in future Energy Efficiency retrofitting opportunities, a prize draw will be held among survey participants, with the winner getting a £50 voucher. As the survey is open to all organisations in the region operating within Energy Efficiency Retrofitting, it would be greatly appreciated if you could forward the survey link (www.surveymonkey.com/s/EEYF) onto organisations within your supply network, so that they too can provide their perspectives and help Yorkshire Forward gain a more thorough and informed view of the market.

All information given will be treated with the highest level of confidentiality. In the report stage it will be used as data that will not be identified with you and your company. Yorkshire Forward will not receive any more detailed information than what is contained in the final report. For your information, the University of Sheffield has commissioned Stradia Ltd to assist in the development of the database, as well as the administration of the survey. For any further information, you can refer to the contacts listed below – all will be happy to assist you. Thank you in advance for the precious time you will devote us.

Sincerely,
Dr. Andrea Genovese - University of Sheffield

Contacts:
Liam Keane – Stradia Ltd
Email: Liam.keane@stradia.com
Phone: 0114 243 0900 / 07765 231 952

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## Appendix III – Web-Based Questionnaire

### Demographics

**1. Please, provide your company contact details**

- Company Name
- Address 1:
- Address 2:
- Address 3:
- City/Town:
- County
- Post Code:
- Phone Number:
- Company E-Mail
- Address:
- Company Web Address:

**2. Please, specify if the company based in Yorkshire and Humberside location is:**

- Branch/Subsidiary with Headquarters elsewhere
- Headquarters with branches elsewhere
- The only site

**3. When was your business established?**

- Pre 1970
- 1970-1979
- 1980-1989
- 1990-1999
- 2000-2005
- 2005 onwards

**4. What is the total number of employees in the company?**

- 1-9
- 10-49
- 50-99
- 100-249
- 250+

**5. What was the total number of employees in the company three years ago?**

- 1-9
- 10-49
- 50-99
- 100-249
- 250+

**6. What is the yearly turnover of your company?**

- £0 - £250k
- £250k - £500k
- £500k - £1m
- £1m - £5m

- £5m+

**Skills**

**7. Approximately what percentage of your employees are based in the Yorkshire and Humberside region?**

- 0-5%
- 5%-10%
- 10-30%
- 30%-50%
- 50%-70%
- 70%-90%
- 90%-95%
- 95%-100%

**8. What percentage of your Yorkshire and Humberside workforce falls within each of the following categories?**

| | 0-5% | 5%-10% | 10-30% | 30%50% | 50%70% | 70%-90% | 90%-95% | 95%-100% |
|---|---|---|---|---|---|---|---|---|
| Unskilled Workforce | | | | | | | | |
| Skilled Workforce and Machine Operatives | | | | | | | | |
| Administrative and Clerical | | | | | | | | |
| Sales and Customer Service | | | | | | | | |
| Professional and Technical | | | | | | | | |
| Managers and Senior Officials | | | | | | | | |
| Research and Development | | | | | | | | |

**9. What is your organization's core area of business (Please select any applicable)?**

- Energy Efficiency Measures
- Renewable Energy Solutions
- Construction
- Other (please specify)

**10. Has your company had any experience in delivering Energy Efficiency Retrofitting measures?**

- Yes
- No

**11. Which of the following Energy Efficiency measures are you delivering (select any applicable)?**

- Cavity Wall Insulation
- Loft Insulation
- Solid Wall Insulation external
- Solid Wall Insulation internal
- Fuel Switching
- Heating Controls
- CHP Wood Pellet Boiler
- Solar Water Heater
- Air Source Heat Pump
- Ground Source Heat Pumps

- Domestic Wind Turbines
- Solar Power Photovoltaic Panels
- Boiler Replacement
- HEA Underfloor Insulation
- Glazing/Windows
- Flat Roof Insulation
- Draught Proofing
- Other (please specify)

**12. To what extent are the following Energy Efficiency measures contributing to your turnover?**

| | Not at All | Very Little | Somewhat | To a Considerable Extent | To a Great Extent |
|---|---|---|---|---|---|
| Cavity Wall Insulation | | | | | |
| Loft Insulation | | | | | |
| Solid Wall Insulation external | | | | | |
| Solid Wall Insulation internal | | | | | |
| Fuel Switching | | | | | |
| Heating Controls | | | | | |
| CHP Wood Pellet Boiler | | | | | |
| Solar Water Heater | | | | | |
| Air Source Heat Pump | | | | | |
| Ground Source Heat Pumps | | | | | |
| Domestic Wind Turbines | | | | | |
| Solar Power Photovoltaic Panels | | | | | |
| Boiler Replacement | | | | | |
| HEA Underfloor Insulation | | | | | |
| Glazing/Windows | | | | | |
| Flat Roof Insulation | | | | | |
| Draught Proofing | | | | | |
| Other (please specify) | | | | | |

**13. What is the typical value (£) of the Energy Efficiency projects/contracts your company undertakes?**

- £0-£5k
- £5k-£10k
- £10k-£50k
- £50k-£150k

- £150k+

**14. What is the value (£) of the largest Energy Efficiency project/contract you have undertaken?**

- £0-£5k
- £5k-£10k
- £10k-£50k
- £50k-£150k
- £150k+

## Drivers and Barriers

**15. Based on your company experience, how intense is the competition to win Energy Efficiency business in Yorkshire and Humberside?**

- Very Weak
- Weak
- Moderate
- Intense
- Very Intense

**16. What is your projection about future market size for Energy Efficiency products and services?**

- Decrease significantly
- Gradually decrease
- Stay about the same
- Grow gradually
- Grow significantly

**17. In your opinion, how important are the following factors for driving the growth of the Energy Efficiency industry?**

| | Unimportant | Of Little Importance | Moderately Important | Important | Very Important |
|---|---|---|---|---|---|
| Decline of other sectors | | | | | |
| Increasing energy costs | | | | | |
| Government policies funding high scale improvement programs | | | | | |
| Necessity of ensuring compliance with tighter environmental regulations | | | | | |
| Cost of suppliers goes down | | | | | |
| Media promotion and dissemination of Energy Efficiency-related best practices | | | | | |
| New product/services development | | | | | |
| Domestic Market Demand | | | | | |
| International Market Demand | | | | | |
| Other (please specify) | | | | | |

**18. Over the next three years, how likely will your organisation engage in the following activities, with regard to your Energy Efficiency products/services?**

| | Unimportant | Of Little Importance | Moderately Important | Important | Very Important |
|---|---|---|---|---|---|
| Workforce Training | | | | | |
| Recruitment | | | | | |
| New Product Development | | | | | |
| New Service Development | | | | | |
| Expansion to other UK regions markets | | | | | |
| Expansion to overseas markets | | | | | |
| Investment in new energy efficient technology | | | | | |
| Improving your Supply Chain | | | | | |
| Improving your suppliers relationships | | | | | |
| Improving your distribution channels | | | | | |
| Other (Please Specify) | | | | | |

**19. How important is the need for external support in any of the following areas in order to achieve your desired outcomes related to the Energy Efficiency activities?**

| | Unimportant | Of Little Importance | Moderately Important | Important | Very Important |
|---|---|---|---|---|---|
| Cooperation with research institutions | | | | | |
| Business Development Assistance | | | | | |
| Workforce Training | | | | | |
| Government funding | | | | | |
| Venture Capitals investments | | | | | |
| Collaboration with key suppliers | | | | | |
| Collaboration with key customers | | | | | |
| Product design support | | | | | |
| Product installation support | | | | | |
| Product distribution support | | | | | |
| Marketing support | | | | | |
| Other (Please Specify) | | | | | |

**20. To what extent is your company facing the following barriers in identifying/bidding for work opportunities in Energy Efficiency Retrofitting?**

| | Not at All | Very Little | Somewhat | To a Considerable Extent | To a Great Extent |
|---|---|---|---|---|---|
| Do not know where to look for opportunities | | | | | |
| Do not know how to bid | | | | | |
| Opportunities are not advertised | | | | | |
| Opportunities advertising is insufficient | | | | | |
| Costs of bidding opportunities are too high | | | | | |
| Not trained or skilled in bid production | | | | | |
| Lack of Support/Assistance | | | | | |
| Politics/Historical difficulties with clients in this area | | | | | |
| Financial appraisals when bidding are too Rigorous | | | | | |
| Corporate Social Responsibility Issues | | | | | |
| Health and safety record issues | | | | | |
| Other (Please specify) | | | | | |

**Supply Chain Assessment**

**21. How important are the following channels for securing your contracts/orders in delivering Energy Efficiency measures?**

| | Unimportant | Of Little Importance | Moderately Important | Important | Very Important |
|---|---|---|---|---|---|
| Competitive Tendering/Biding in response to Advertisements/Calls | | | | | |
| Client Enquiry via Website/Directory or other | | | | | |
| Historical Long Term Contractual Arrangement | | | | | |
| On Approved/Preferred Supplier List | | | | | |
| Work Outsourced from Parent Company | | | | | |
| Informal Relationships | | | | | |
| Other (Please Specify) | | | | | |

**22. In percentage terms, where do your Energy Efficiency-related purchases (i.e. materials, goods and services sourced by yourselves in order to deliver your Energy Efficiency Output) come from? (Please ensure the total adds up to 100%)**

- Yorkshire-Humber Region Percentage: _____
- Other UK Regions Percentage: _____
- Overseas Percentage: _____

**23. In percentage terms, where do your Energy Efficiency-related sales come from? (Please ensure the total adds up to 100%)**

- Yorkshire-Humber Region Percentage: _____
- Other UK Regions Percentage: _____
- Overseas Percentage: _____

**24. To what extent are the following customers' categories contributing to your turnover?**

| | Not at All | Very Little | Somewhat | To a Considerable Extent | To a Great Extent |
|---|---|---|---|---|---|
| Private Owners-Occupiers | | | | | |
| Private Landlords | | | | | |
| Social Housing Associations | | | | | |
| Local Authorities | | | | | |
| Energy Efficiency measures installation businesses | | | | | |
| Commercial builders | | | | | |
| Contractors | | | | | |
| Developers/Architects | | | | | |
| Self build projects | | | | | |
| Other (Please specify) | | | | | |

**25. How would you rate your existing suppliers' performance in terms of the quality of goods/components/services provided?**

- Extremely Poor
- Below the Average
- Average
- Above the average
- Excellent

**26. How would you rate your suppliers' performance in terms of delivery punctuality?**

- Extremely Poor
- Below the Average
- Average
- Above the average
- Excellent

**27. Does your company utilise any Supply Chain performance evaluation system?**

- Yes
- No

**28. Does your company utilise any formalised Supplier Selection system?**

- Yes
- No

**29. Has your company any relevant certification or accreditation?**

- Investor in People
- ISO 9001
- ISO 14001
- Other (please specify)

**30. Is your company competent to certify installations on completion in accordance with Yorkshire and Humber Local authority guidelines and standards?**

- Yes
- No

**31. Please list at most three key supply chain partners, specifying company name, supplied materials/services, location, a contact name, phone number and e-mail address.**

- Company Name
- Company Supplied Materials/Services
- Company City/Town
- Company Country
- Company Post Code
- Company Contact Person
- Company Phone Number
- Company E-Mail

## Follow-Up

**32. Would you like to receive a copy of the final report of this study?**

- Yes
- No

**33. Would you like to be cited in the acknowledgments of the final report of this study?**

- Yes
- No

**34. Would you like to participate in subsequent phone interviews related to this study?**

- Yes
- No

**35. Would you like to participate in subsequent focus groups related to this study?**

- Yes
- No

**36. In order to ensure future correspondence from Yorkshire Forward relating to Energy Efficiency Retrofitting in Yorkshire and Humberside reaches the correct members of your organisation, it would be appreciated if you could provide appropriate contact information for them.**

- Contact Person 1 - Name
- Contact Person 1 - Position
- Contact Person 1 - Telephone
- Contact Person 1 - Email
- Contact Person 2 - Name
- Contact Person 2 - Position
- Contact Person 2 - Telephone
- Contact Person 2 – Email

## Appendix IV - Interview Questions for Energy Efficiency Companies

**Thank you for agreeing to participate in this project as an interviewee. This project is funded by our Regional Development Agency, Yorkshire Forward.**

**We value your opinion and input in this project in order to ensure representation of our results and recommendations from various stakeholders' perspectives. We have completed administering an on-line questionnaire survey to regional businesses and supply chains operating to improve energy efficiency in housing. Drawing on the key findings from the survey, we are running this interview to understand further in-depth the key issues and attempt to get a rich picture for validation purposes.**

**Your responses will be kept anonymous.**

1) A significant quota of regional businesses, in a recent survey conducted by University of Sheffield, is optimistic about the future of the Energy Efficiency sector. The study has identified that the regional businesses are planning to hire and further train workforce in the next years. Based upon your experience in this sector:
    a. What interventions and support are required to enable the Regional supply chain to grow to meet the growing demand?
    b. What mechanisms could facilitate employment opportunities for local communities?
    c. What impact would large scale Energy Efficiency projects have on the regional economy?
2) Based on your experience, what do you feel are the opportunities and barriers for supply chain development in relation to Energy Efficiency Retrofitting?
3) A significant quota of regional businesses, in a recent survey conducted by University of Sheffield, has identified the following barriers experienced by regional businesses in dealing with bidding and participating in Energy Efficiency projects led by local authorities. Firstly, the regional businesses do not know where to look for opportunities; secondly the regional business felt that the opportunities are not well advertised.
    a. Do you feel that local authorities do enough to engage with regional service providers when outsourcing Energy Efficiency related opportunities?
    b. How do you think local authorities should help regional businesses to overcome this barrier?
4) For several of the contracts for energy efficiency work on local authority dwellings the appointment of the primary contractor is undertaken by a national body such as a power generation company or a national energy efficiency agency. These national agencies will appoint a contractor from their pre-qualified list.
    a. To what extent are you aware of this process of appointing contractors for this work?
    b. To what extent have you tried to become a pre-qualified contractor of these national bodies? If so, what has your experience been of the pre-qualification process? What assistance did you receive or would you like?
    c. If you are on the pre-qualification list, what is your experience of receiving specific contracts?

5) What intervention would significantly enhance the ability of your organisation to take advantage of Energy Efficiency related opportunities in the Region? Who do you think are best placed in the region to provide these interventions and support? (e.g. for training needs it may be the Regional technical colleges, for finance needs it may be the banks, etc).
6) A significant quota of regional businesses operating in the Energy Efficiency sector, in a recent survey conducted by University of Sheffield, has stated the intention of improving their supplier relationships and cooperating with key suppliers. In your specific case, what actions are you planning to undertake to achieve this objective?
7) A significant quota of regional businesses operating in the Energy Efficiency sector, in a recent survey conducted by University of Sheffield, has identified the cost of suppliers as a relevant barrier to the development of the sector. Are you experiencing this issue? What alternative sourcing strategies are you considering?
8) The most of the companies targeted by the University of Sheffield survey doesn't utilize formalised methods for supplier selection and form monitoring the performance of their own supply chain. Are you utilizing any of these? If yes, what criteria are you utilizing to rate your suppliers and your supply chain performance? If no, what is preventing you from adopting them?

Thank you very much for your time and valuable input in this project. Do you wish for your name and local authority to be listed in our participant list?

## Appendix V - Interview Questions for Local Authorities

**Thank you for agreeing to participate in this project as an interviewee. This project is funded by our Regional Development Agency, Yorkshire Forward.**

**We value your opinion and input in this project in order to ensure representation of our results and recommendations from various stakeholders' perspectives. We have completed administering an on-line questionnaire survey to regional businesses and supply chains operating to improve energy efficiency in housing. Drawing on the key findings from the survey, we are running this interview to understand further in-depth the key issues and attempt to get a rich picture for validation purposes.**

**Your responses will be kept anonymous.**

9) Have your authority/community undertaken Energy Efficiency retrofitting projects for Social Housing in Deprived Communities? If yes, could you provide us with more information in terms of:
    (i) 'scale' (average value and number of housing units involved in these projects, and value of the largest project ever undertaken)?
    (ii) Type of EE measure (see list below) implemented
    (iii) Principal contractor(s) utilised?
10) Could you please describe the decision process for initiating energy efficiency measures implementation projects for social housing? Who are the key players in this decision?
11) If your local authority decides to implement an Energy Efficiency project, is it managed by the local authority itself or delegated to your ALMO / TMO?
12) What is the procurement process utilised to select contractors?
13) What level of control or influence, if any, do you exercise over the choice of sub-contractors?
14) In the near future, are you planning to launch/participate in large scale Energy Efficiency retrofitting projects for Social Housing in Deprived Communities? If yes, which type of EE measure (see list below) are you going to implement?
15) Regarding your previous Energy Efficiency retrofitting projects for Social Housing, which quota of the related activities has been awarded to regional, i.e. Yorkshire and Humberside based businesses?
16) Do you think the Yorkshire and Humberside businesses and supply chains that are operating to improve energy efficiency in housing is adequate (both in terms of capacity and quality of product and service delivery) to provide support for large scale Energy Efficiency projects? How much competition do you experience from contractors bidding for your work?
17) A significant quota of regional businesses, in a recent survey conducted by University of Sheffield, is optimistic about the future of the Energy Efficiency sector. The study has identified that the regional businesses are planning to hire workforce in the next years.
    (i) Based upon your experience in this sector, what interventions and support are required to enable the Regional supply chain to grow to meet the growing demand?
    (ii) To what extent Do you think you as a local authority will provide support to the development of the Energy Efficiency sector in the region e.g. providing training, business development, funding? (If yes, please specify details.)
    (iii) To what extent do you anticipate job-creation arising from growth in this sector?

18) A significant quota of regional businesses, in a recent survey conducted by University of Sheffield, has identified the following barriers experienced by regional businesses in dealing with bidding and participating in Energy Efficiency projects led by local authorities. Firstly, the regional businesses do not know where to look for opportunities; secondly the regional business felt that the opportunities are not well advertised. Are you aware of this? How could you help regional businesses to overcome this barrier?

Thank you very much for your time and valuable input in this project. Do you wish for your name and local authority to be listed in our participant list?

**Energy Efficiency Measures List**

Cavity Wall Insulation
Loft Insulation
Solid Wall Insulation external
Solid Wall Insulation internal
Fuel Switching
Heating Controls
CHP Wood Pellet Boiler
Solar Water Heater
Air Source Heat Pump
Ground Source Heat Pumps
Domestic Wind Turbines
Solar Power Photovoltaic Panels
Boiler Replacement
HEA Underfloor Insulation
Glazing/Windows
Flat Roof Insulation
Draught Proofing

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