



Cheshire & Warrington Renewable Energy Technologies Cluster Project

Energy Projects Plus

July 2009

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1. Executive Summary

It is now a scientific certainty that the planet is warming and the cause of this climatic change is anthropogenic. If the rise in global temperatures is to be prevented from exceeding a global average increase of 2°C pre-industrial levels the way energy is generated needs to change from using non-renewable fossil fuels to using renewable energy sources. If this is to happen in the timeframe necessary then the incorporation of renewable energy technologies in all sectors needs to undergo a step change, with such technologies being the norm and first choice rather than the exception.

The achievement of a low carbon economy in Cheshire and Warrington includes the need for a substantial reduction in energy demand across all sectors and the need to meet demand through centralised and de-centralised (localised) renewable energy supplies.

Historically, renewable energy installations appear to have taken place out of particular interest by the developer and have little or no influence on the majority of the population due to their ad hoc installation and location. However, an alternative approach is to identify strategic sites that are visible and accessible to the population where the installation of renewable technologies could raise the profile of renewable energy.

By developing the approach of installations on strategic sites a relatively small number of installations can have a much larger impact than is currently the case.

In 2009 a new funding stream, through the European Regional Development Fund (ERDF), has emerged, and as part of this study we have endeavoured to identify sites and/or companies interested in exploring the opportunities offered by this funding.

Through the delivery of the feasibility study a number of considerations were assessed in order to determine whether there is sufficient knowledge, awareness or access to renewable energy technologies across Cheshire and Warrington. These include:

- Awareness of companies, organisations and individuals of the types and benefits of renewable technologies
- Awareness of existing installations
- Location of existing installations
- Potential sites for location of installations offering high OUVIT (opportunity for uninterrupted visual interaction with the technology)

The geographic information system (GIS) representation of the location of renewables in relation to OUVIT has demonstrated a shortfall in suitably located installations. It has also highlighted potential areas for locating new installations.

The survey responses have highlighted a mediocre level of awareness of the types and benefits of renewable technologies among both the business and community sectors,

together with a low knowledge, and therefore experience, of renewable installations in the area.

It is therefore suggested that in order to reach the next level of awareness, knowledge and a resulting commitment to take up of renewable energy a greater profile of, and access to, local renewable energy installations is important.

The active identification and development of potential sites and sector exemplars offering high OUVIT is seen as an effective approach to achieve this.

A number of organisations potentially suitable for ERDF funding, determined through proactive targeting, have been identified through this feasibility study and this approach should be continued, particularly in relation to strategic sites.

It is considered that the original premise of the importance of the location of renewable technologies sited on accessible high profile sites is valid in contributing to a greater knowledge, awareness and therefore acceptance of the potential for renewable energy technologies.

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Report commissioned by Cheshire & Warrington Economic Alliance (www.cwea.org.uk) and funded by the Northwest Regional Development Agency (www.nwda.co.uk).

2. Context

As the world progresses through the early part of the 21st century it is now a scientific certainty that the planet is warming and this is due to the accumulation of greenhouse gases in the near atmosphere. The cause of this climatic change is anthropogenic, due mainly to the combustion of fossil fuels releasing into the atmosphere the greenhouse gas carbon dioxide (CO₂) and water. The fossil fuels are oil, coal and natural gas.

The Intergovernmental Panel on Climate Change 4th Assessment Report (4AR) <http://www.ipcc.ch/> was published in 2007. The overall message from 4AR was that, if possible, the rise in global temperatures needs to be prevented from exceeding a global average increase of 2°C pre-industrial levels. To do this atmospheric CO₂ levels must be stabilised and then decreased by at least 80-90% (over 1990 levels) by 2050.

Currently, in the United Kingdom, the energy that is used in all sectors (business/ industry, domestic, transportation) is produced predominantly by the combustion of fossil fuels.

If the legally binding targets for reductions in CO₂ emissions of the Climate Change Act (2008) http://www.uk-legislation.hmso.gov.uk/acts/acts2008/ukpga_20080027_en_1 and the Kyoto Protocol http://unfccc.int/kyoto_protocol/items/2830.php are to be met then the way energy is generated needs to change from using non-renewable fossil fuels to using renewable energy sources, such as solar radiation, wind, geo-thermal and gravity water flow.

The pressure for this change will increase as the international negotiations to achieve agreement on the targets that developed and developing nations will need to adhere to after the Kyoto Protocol has run its course in 2012. These negotiations will culminate in a meeting of world leaders in Copenhagen in December 2009.

If this essential change in the way electricity and heat energy are generated is to happen in the timeframe necessary then the incorporation of renewable energy technologies in all sectors (community, business and domestic) needs to undergo a step change, with such technologies being the norm and first choice rather than the exception. They must be an intrinsic part of the low carbon economy that needs to be created at all levels of society in both developed and developing nations.

3. Background

The achievement of a low carbon economy in Cheshire and Warrington includes the need for a substantial reduction in energy demand across all sectors and the need to meet demand through centralised and de-centralised (localised) renewable energy supplies.

To achieve this will require a population (business, community and domestic) that not only is aware of the opportunities that renewable energy provides but also has a positive first hand experience of its use thereby overcoming one of the barriers to the take up of renewable technologies.

Across Cheshire and Warrington there are a small number of high profile renewable energy installations together with an uncalculated number of individual installations across community, domestic, and business sectors.

Historically, these installations appear to have taken place out of particular interest by the developer (through their own discretion or resulting from a sales campaign/grant scheme) and have little or no influence on the majority of the population due to their ad hoc installation and location.

Third party grant funding (in addition to developer contribution) exists to support installations including the Low Carbon Buildings Programme <http://www.lowcarbonbuildings.org.uk/home/> , Local Authority grants [for information call Energy Saving Trust Act on CO₂ advice line 0800512 012], North West Climate Fund <http://www.nwda.co.uk/working-with-us/supplying-nwda/current-tenders/north-west-climate-fund.aspx>

Previously, open bidding rounds have been announced for these funding streams and applications made meeting certain criteria and preset deadlines. Funding bodies and grant providers then assess proposals received and support or reject proposals according to the assessment criteria. The location and type of supported schemes are dependent on the applications received.

However, an alternative approach is to identify strategic sites (which can be individual plots or multi occupancy sites) that are visible and accessible to the population where the installation of renewable technologies could take place to raise the profile of renewable energy and significantly increase the contact the population has with it.

Cheshire and Warrington cover over 2,200km² a significant proportion of which is rural. Areas of population are concentrated in 14 urban locations. Business locations are predominately in the urban locations with community organisations giving a more even geographical spread.

By developing the approach of installations on strategic sites a relatively small number of installations can have a much larger impact than is currently the case; moving renewable energy technologies to the default or norm position rather than the unusual and notable as they currently are.

In the past capital costs have been identified as being a barrier to the take up of renewable measures as well as a lack of knowledge of renewable technologies. In 2009 a new funding stream, through the European Regional Development Fund (ERDF), has emerged, and as part of this study we have endeavoured to identify sites and/or companies interested in exploring the opportunities offered by this funding.

4. Aims

- To define a strategically important location for the siting of renewable energy technologies.
- To survey small to medium sized businesses/enterprises (SME) to attempt to gain an understanding of awareness and acceptability of renewable energy technologies.
- To repeat this process with community based organisations (although these are not specifically eligible for ERDF funding it is important that the process is replicable).
- To consider a range of potential sites across Cheshire and Warrington that relate to the locations of the respondents to the questionnaire.
- To identify strategically important locations for the siting of renewable energy technologies. At this initial stage some larger, more prominent sites would be identified and described as examples.
- To identify up to six sites that could be suitable for ERDF funding.
- To suggest how this approach could be taken forward.

5. Methodology

In order to address the aims:

- The rationale and criteria for the definition of a strategically important site was set out and discussed.
- The survey undertaken with SME across Cheshire and Warrington was carried out in the form of a covering letter (appendix 1) and a mailed questionnaire (see appendix 2). And those who responded were followed up via email and phone. An electronic version of this questionnaire was sent to Groundwork Cheshire for distribution by them to contacts currently or previously supported by the Enworks Programme and that they assessed to be relevant to the project.
- The survey of community organisations was carried out as an electronic questionnaire (appendix 3). This was appropriately adapted from the SME questionnaire for use with community organisations.
- Maps generated by a geographic information system (GIS) were used to identify the areas of population and traffic flow and relate this information to the location of the respondents.

- Locations across Cheshire and Warrington were visited to visually investigate the potential for strategically important sites.
- Conclusions about the project were discussed in relation to known existing sites in development, sites that could be eligible for ERDF funding and how the approach could be developed.

6. Definition of Strategic Sites

It was decided that if a potential location for the siting of a renewable energy technology was going to achieve the aim of increasing awareness and normalisation of the technology it would have to meet certain criteria. These criteria were divided into 2 categories, required and desirable.

Required criteria:

- Geographic location; as the funding for the project came from the Cheshire and Warrington Economic Alliance it was essential that any potential sites fell within the county boundaries.
- High “opportunity for uninterrupted visual interaction with the technology” (OUVIT). This means that the technology would be readily visible from a public place and that the place would have either high footfall (for example, a retail/business park, tourist attraction, a community building or council premises) or be visible from a busy transportation corridor (for example, intercity railway route or road intersection with traffic lights where vehicles may have to wait).
- If the technology was of a type that was not readily visible from a public place then there was appropriate signage to publicise and make the public aware of it.

Desirable criteria:

- More than one technology installed on the site or close by. Thus increasing the exposure and normalisation.
- Technologies being used in an innovative way, for example excess hot water from one site being used at other or waste CO₂ being used to increase plant growth.
- Possible sectoral cluster of technologies, for example adjoining farms using renewable technologies or more than one business on a particular site. In these cases non-public visitors to the sites may be working within the same or similar enterprise area and see the potential for their own situation.

- Enthusiastic site occupants. This would be desirable as they would be able to act as ambassadors for the technologies and be a potential exemplar showcase site.

7. Business Questionnaire Report

7.1 Questionnaire Approach

The covering letter and questionnaire were mailed to 445 SMEs in Cheshire and Warrington. Of these 445, 300 were sourced from a register of SMEs provided by the local council economic development unit. The additional 145 companies came as a result of researching business parks in the region.

To maximise response rates each organisation that returned a completed questionnaire would receive a free eco-stapler and be entered into a prize draw to win a wind-up radio. Freepost return envelopes were also included with questionnaire.

The questionnaire was set out containing both open and closed questions. The first section of the questionnaire established details of the organisation and whether the company was considered to be an SME (employing less than 250 people and with an annual turnover of less than £22.8m). This gave a profile of the organisation.

The next question (Question 3) was aimed at evaluating how aware companies were of the different types of renewable technology. This was set out with check boxes containing five categories ranging from unaware to very aware (Figure 7.1).

	Unaware	Vaguely aware	Basic understanding	More than familiar with the basics	Very aware of its benefits and how it works
Wind turbines feeding electricity into the National Grid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind turbines (medium/mini) supplying local users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solar panels to heat water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solar panels to generate electricity (photovoltaics)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Micro-hydroelectricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ground source heat pumps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Air source heat pumps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anaerobic digesters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biomass (wood pellets/chips, miscanthus) or other plant matter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 7.1 Awareness level of each technology (Question 3 in questionnaire)

The next three questions were set out as 'yes/no' check boxes with an option to add further detail (Figure 7.2). These questions queried whether the companies had ever considered installing renewable technology, whether the companies had evaluated the potential benefits of renewable technology and whether they had personally seen any examples of renewable technology used in a business context in Cheshire and Warrington.

4. Has your organisation evaluated the potential benefits of any renewable energy technologies?

No Yes

If yes, **which** renewable energy technologies and **what** were the results of your organisation's evaluation?

Figure 7.2 Question to establish whether companies had ever evaluated the benefits of renewable technology (Question 4)

The next question (Question 7) was aimed at establishing how strongly companies viewed the benefits of installing renewable technology to have on their business with a score of 1 representing 'strongly agree' and 5 'strongly disagree' (Figure 7.3).

Benefit	1	2	3	4	5
Reduced energy bills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced carbon dioxide (CO ₂) emissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conservation of fossil fuels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced reliance on nuclear power	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved company profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No benefits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other benefits (please state)	<input type="text"/>				

Figure 7.3 Perceived benefit of renewable technology to organisations (Question 7 in questionnaire)

The next question (Question 8) was an open question where companies could state the perceived disadvantages of using renewable technology (Figure 7.4).

8. What disadvantages do you perceive with the use of renewable energy technologies for organisations like your organisation?

Community leadership, Financial

Figure 7.4 Perceived disadvantages of using renewable technology (Question 8)

Leading on from Question 8 (perceived disadvantages of using renewable technology) the questionnaire next tried to evaluate how strongly individual factors were influencing their decision to invest in renewable technology. A score of 1 represented 'strongly agree' and a score of 5 'strongly disagree' (Figure 7.5).

Factor	1	2	3	4	5
Reducing running/maintenance costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disruption	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Initial capital investment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Client procurement policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health & Safety Issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 7.5 Key factors involved when considering the installation of renewable technology (Question 9)

Following this, companies were asked whether they would like more information on renewable technology grants for businesses. They were also offered the chance to list any further observations they had made regarding renewable technology.

The results from the questionnaires were then entered onto a database. The responses from questions regarding the awareness level of each technology, the perceived benefits of renewable technology and the key factors (Figures 7.1, 7.3, 7.5) were quantified by giving a score of 1 to 5 for each response depending on the positivity of the answer, 5 being the most positive and 1 being the least.

The scores were then totalled and averaged for both the individual companies and the question subject. Qualitative answers from open questions were noted to support the statistical analysis.

7.2 Analysis

In total 445 SMEs were targeted with 18 (4%) of these responding with fully completed questionnaires. While lower than desired this was considered to be an adequate response since it is approximately in line with the typical cold call questionnaire response rate. There were no responses from companies supported by the Enworks programme (contacted separately through the electronic mailing by Groundwork).

It was assumed that respondents had some interest in renewable technologies for them to return the form. However, the results from Question 4 (whether the company had ever considered installing renewable technology) show that only 7 (39%) companies had considered the installation of renewable technology in the past. Of these seven companies all had only considered the installation of either wind or solar technology and only two (29%) had gone on to evaluate the benefits of renewables.

However, there is still a large perceived benefit to be gained from installing renewable technology even in companies who are not fully aware of the complete range of technologies available to them. Figure 7.6 shows that respondents generally consider the installation of renewable technology to be beneficial and this does not change depending on how aware they are of the technology. There is no correlation between the awareness of renewable technology and the perceived benefits of its installation.

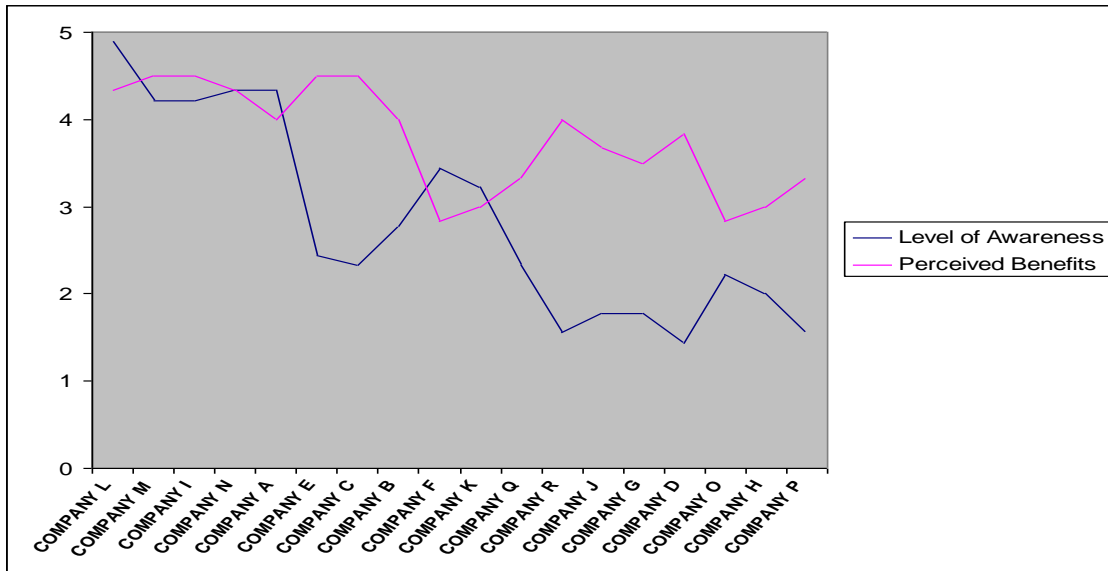


Figure 7.6 Average company awareness of different renewable technologies against perceived benefits of installation

The questionnaire then went on to try and ascertain how aware each company was of each technology (Figure 7.7).

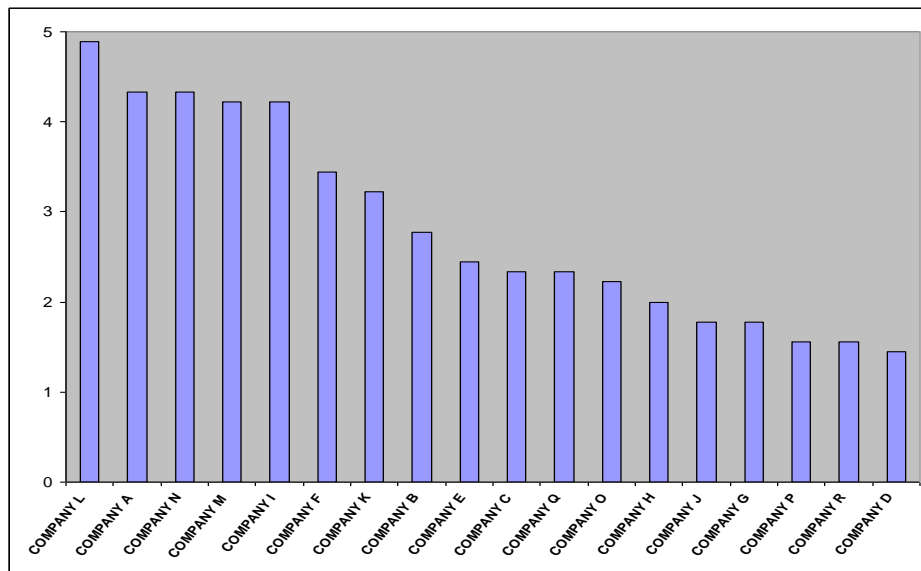


Figure 7.7 Average company awareness score of all technologies

Figure 7.7 shows the average awareness of all technologies by company. It shows that Company L considered themselves to be the most aware of all technologies with 6 other companies being more aware than the overall mean of 2.83. There is a considerable range (3.45 from 5) in awareness between companies.

The results of Question 6 (observed examples of renewable technology in the region) show that only 17% of companies had ever seen examples of renewable technology being used in a business context in Cheshire and Warrington.

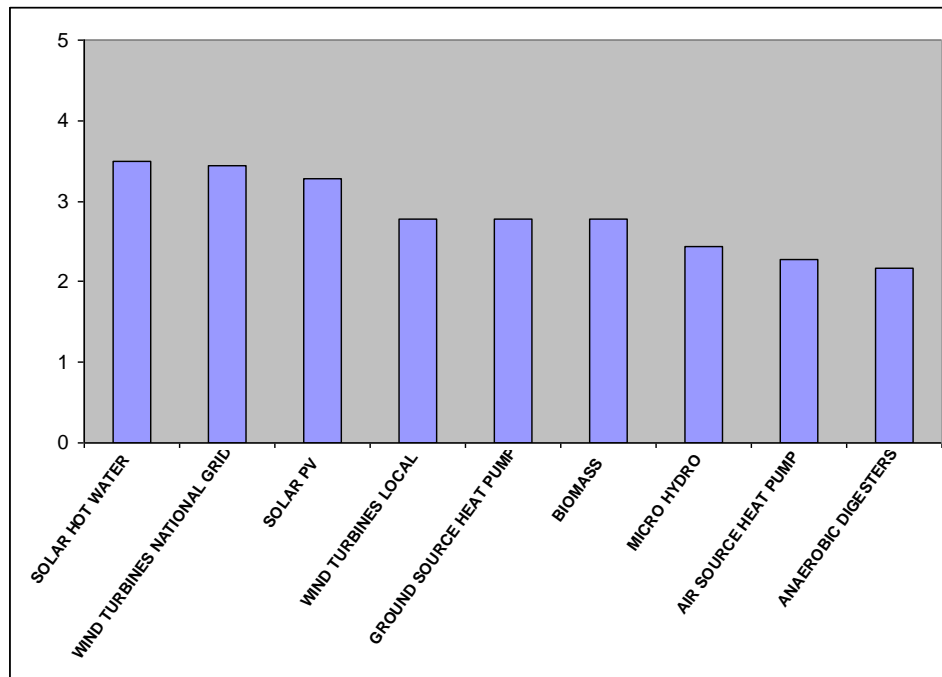


Figure 7.8 Average company awareness of each technology

Figure 7.8 shows how aware, on average, all companies were of each technology. As previously mentioned most companies were most aware of wind and solar power although a range of just 1.3 indicates that there was no considerable difference in awareness between the individual technologies.

The questionnaire next tried to establish how beneficial companies perceive renewable technology to be to their business.

As previously mentioned companies perceive the potential installation of renewable technology to be highly beneficial with a total mean of 3.78 (Figure 7.9). There were 10 sample companies that considered installation of renewable technology to be more beneficial than the mean.

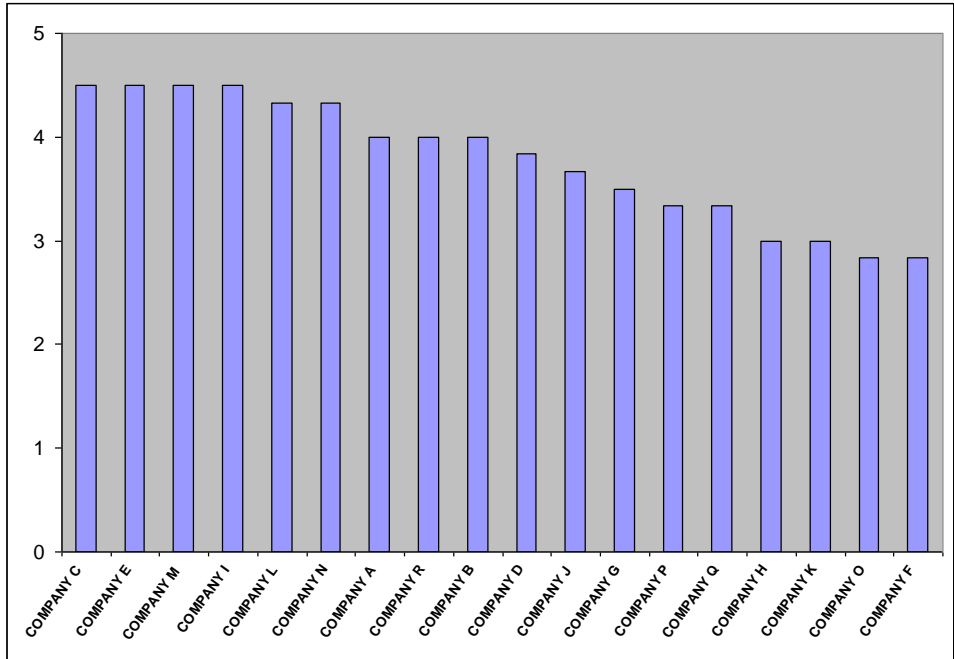


Figure 7.9 Average perceived company benefits for the installation of renewable technologies

Figure 7.10 shows how strongly companies view each benefit. It is noted that the three most valued benefits concern environmental factors (pollution, carbon dioxide, fossil fuels) rather than business factors (energy bills, company profile).

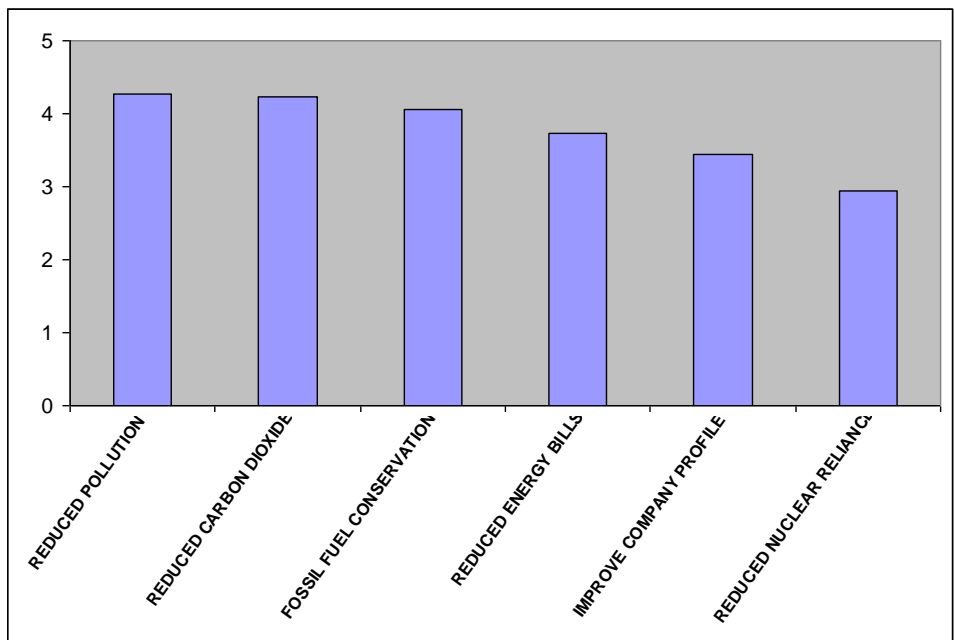


Figure 7.10 Average perceived benefits of renewable technologies

The sample companies were then asked what they considered the key factors to be when evaluating the installation of renewable technology (Figure 7.11).

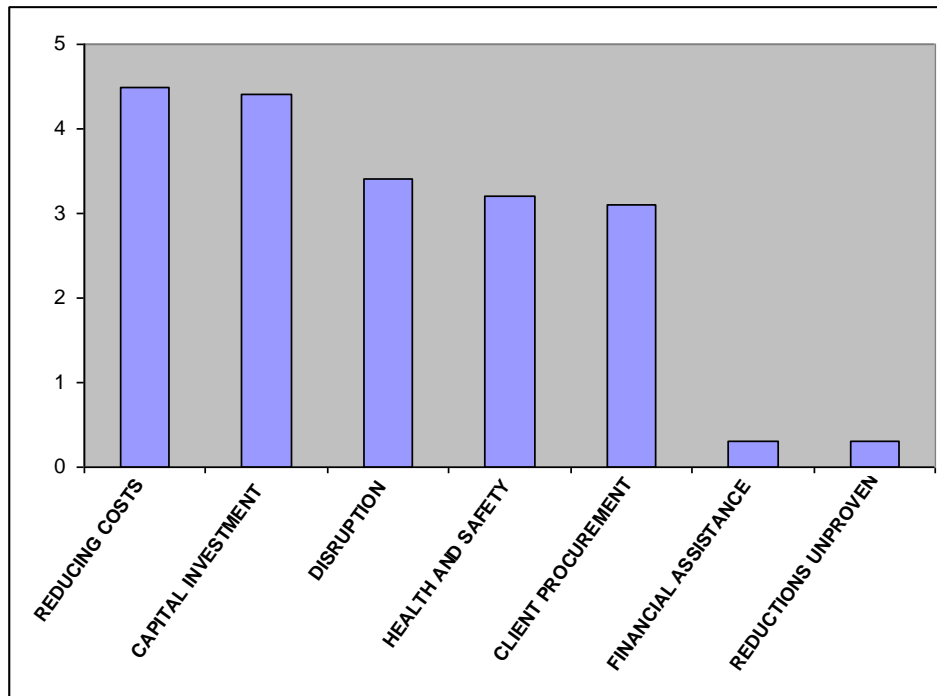


Figure 7.11 Average key factors to the take up of renewable technologies

Figure 7.11 shows that cost is the biggest factor when considering the installation of renewable technology with 'reducing running costs' and 'initial capital investment' heading the list. This is supported by the results of question 8 (disadvantages in using renewable technology) in which 50% of respondents listed initial cost as a disadvantage associated with the use of renewable technology with a further 11% listing the long pay back time as a disadvantage.

There were also two additional factors added by companies regarding a lack of financial assistance after the initial installation and there was doubt as to the actual savings renewable technology could make.

There were other single factors identified in Question 11 (any further observations regarding renewable technologies). These factors included planning issues, shared offices and a lack of advice and information. Some companies also considered renewable technology to be high risk as maintenance and repair could be costly and hard to acquire.

7.3 Summary of Questionnaire Analysis

Of the sampled SMEs it is generally perceived that the potential installation of renewable technologies would have a beneficial impact. This is consistent across all sampled businesses. The awareness of the different technologies is not as consistent and ranges from company to company (Figure 7.6).

Figure 7.12 shows the combined mean of each company's perceived benefits and awareness of renewable technology. This, potentially, gives an indication of how positively each company would view the installation of renewable energy technology.

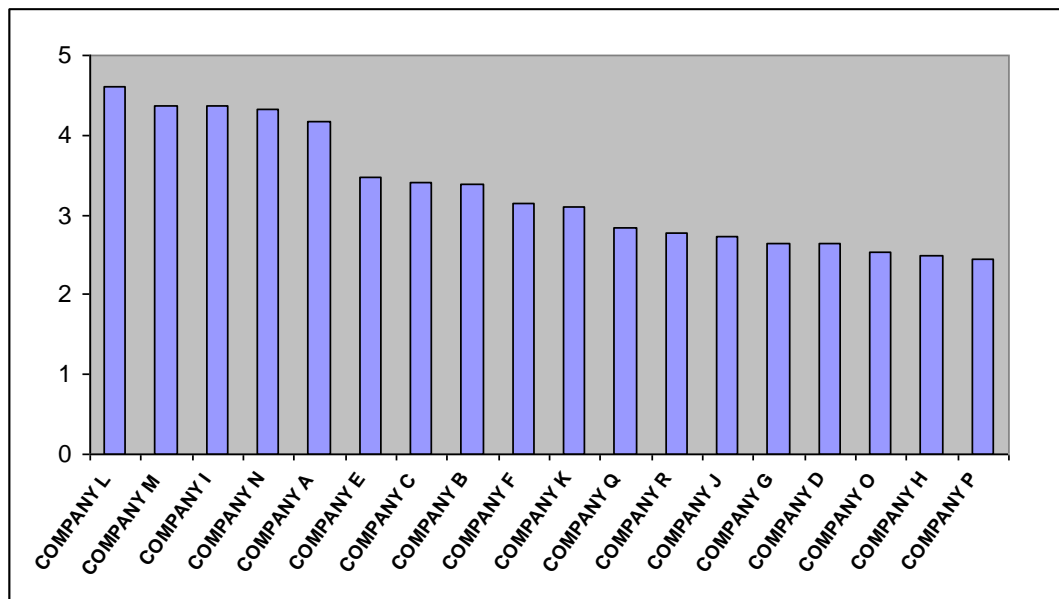


Figure 7.12 Combined average awareness and perceived benefits

Despite this interest, a lack of confidence in installing the technology may have had an impact on the number of SMEs (11%) considering the benefits in more detail. This lack of confidence is due to the financial factors such as high initial investment, long payback time and a lack of support and advice.

It could also be affected by the lack of exemplars in the region. The results from Question 6 show that only 17% of sample SMEs have seen examples of renewable technology used in a business context in Cheshire and Warrington.

7.4 Questionnaire Follow-up

After the study had been made of the responses provided on the questionnaires, considerable effort was made to contact those companies who had indicated they would be interested in receiving further information either via email or telephone. The purpose of this contact was to try and discuss which renewable energy technology maybe suitable for the particular business and if there was the possibility of taking it further.

It was felt that telephone would be a more productive medium to be able to gauge the level of enthusiasm of the respondents and their willingness to engage in the process.

For those who indicated in the questionnaire that they would prefer email contact, a message was sent to them seeking their permission for a telephone call. Of this group one person responded, but was not available until after the completion of the project and is therefore not included.

Considerable effort was placed in contacting respondents by telephone, however work commitments or holidays of key contacts in the companies meant that discussion was not possible. The person with whom contact was successful is the managing director of a pipework fabrication and installation company.

The information gained was as follows:

- The company needs only low grade heat for space heating in the factory
- The company needs ventilation mechanisms installed in the factory building
- That the factory building is an old converted building that is poor in energy efficiency
- There is no gas mains available at the factory building
- The company would be happy to explore funding opportunities when and where it exists in order to help it to install renewable energy technology to provide heating and ventilation to the building
- The company is not currently planning to carry out an upgrade programme that will improve the energy efficiency of the building.
- And that the company does not foresee any barrier to the installation of renewable technology other than the installation cost

The information illustrates that the energy demand and potential issues of companies are individual and therefore need individual assessment and support. This approach would be consistent with the proposal of the identification of strategic sites or exemplars within business sectors for renewable installations being identified and targeted support provided to maximise OUVIT.

8. Community questionnaire report

8.1 Questionnaire Approach

The questionnaire sent to community organisations (appendix 3) was an amended version of the one sent to SMEs. The main change was the omission of the question about verifying that the company was an SME. This version was changed to an electronic format and was distributed by email through Energy Projects Plus contacts and circulated through emailing lists, for example town & parish council contacts, community voluntary organisations, people responsible for community buildings & village halls, Cheshire Community Action and Vale Royal Environment Network. This questionnaire was also sent to the 3 local authorities (Cheshire West & Chester, Cheshire East and Warrington Borough Council)

These organisations were also offered free eco-staplers in return of completed questionnaires and entered into the prize draw. The results were analysed in the same way as the business questionnaire report.

8.2 Analysis

There is no measure of the number of community organisations that received a questionnaire due to the indirect way in which it was distributed. There were 14 respondents; all of which are environmental organisations, climate change/sustainability officers in councils or have had experience of using renewable technology.

Of these respondents 43% said that they had considered installing renewable technology with only half of these respondents going on to evaluate the potential benefits. 50% of all respondents listed cost as a disadvantage of installing renewable technology and only 43% said that they had actually seen examples of renewable technology sites in Cheshire and Warrington.

Figure 8.1 (below) shows that non-SME respondents consider themselves to be only slightly more aware of renewable technologies than SMEs with an overall mean of 3 compared to 2.83. It could be expected that the community sector would have a greater understanding of renewable technology as all the respondents are from an environmental background or have had experience of the technology.

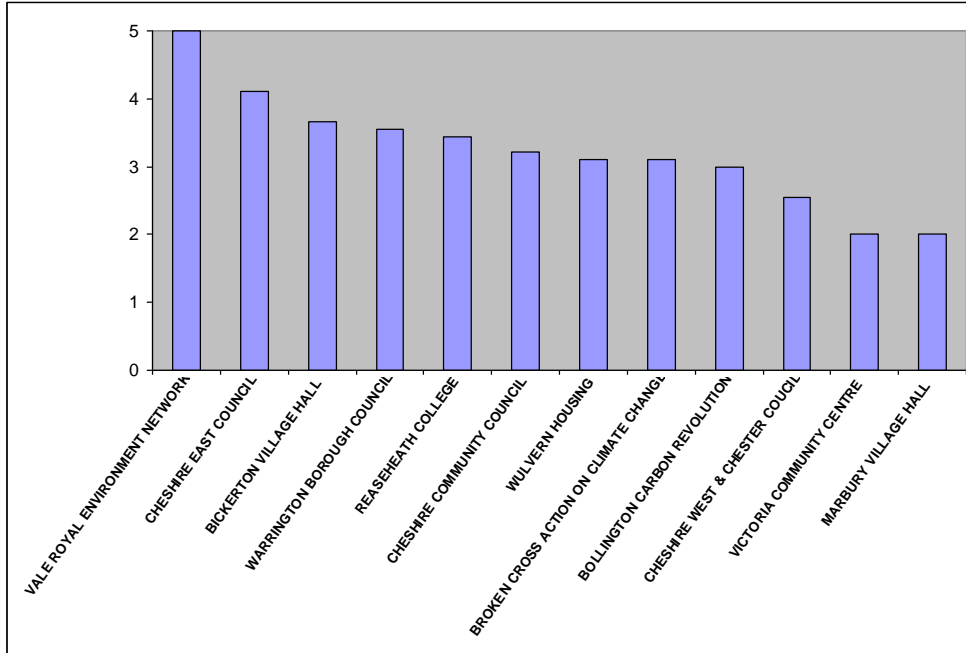


Figure 8.1 Average organisation awareness of all technologies

Figure 8.2 shows that the sampled community organisations have a fuller understanding of solar technologies over other technologies although with a range of 1.2 there is no considerable difference in awareness between technologies

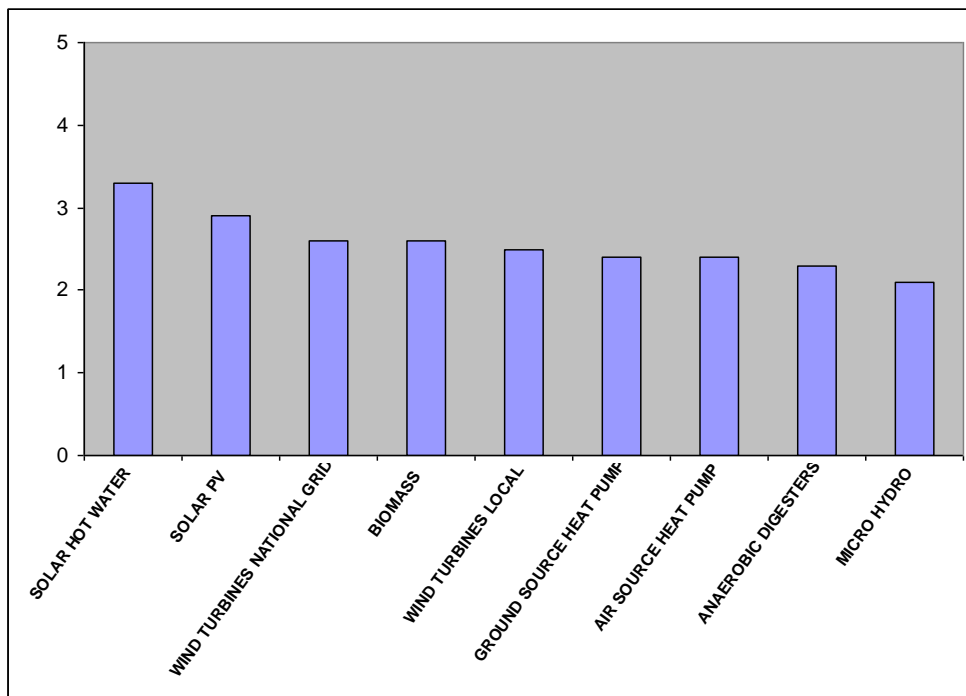


Figure 8.2 Average organisation awareness of each technology

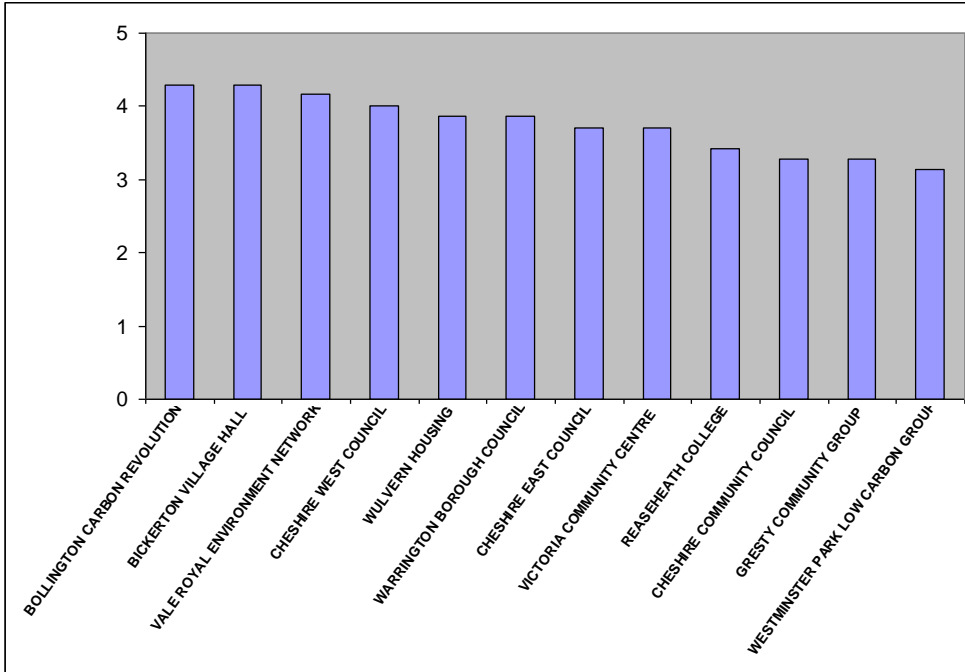


Figure 8.3 Average perceived organisation benefits for the installation of renewable technologies

Figure 8.3 shows that there is a high perceived benefit associated with the potential installation of renewable technology with an overall mean of 3.65.

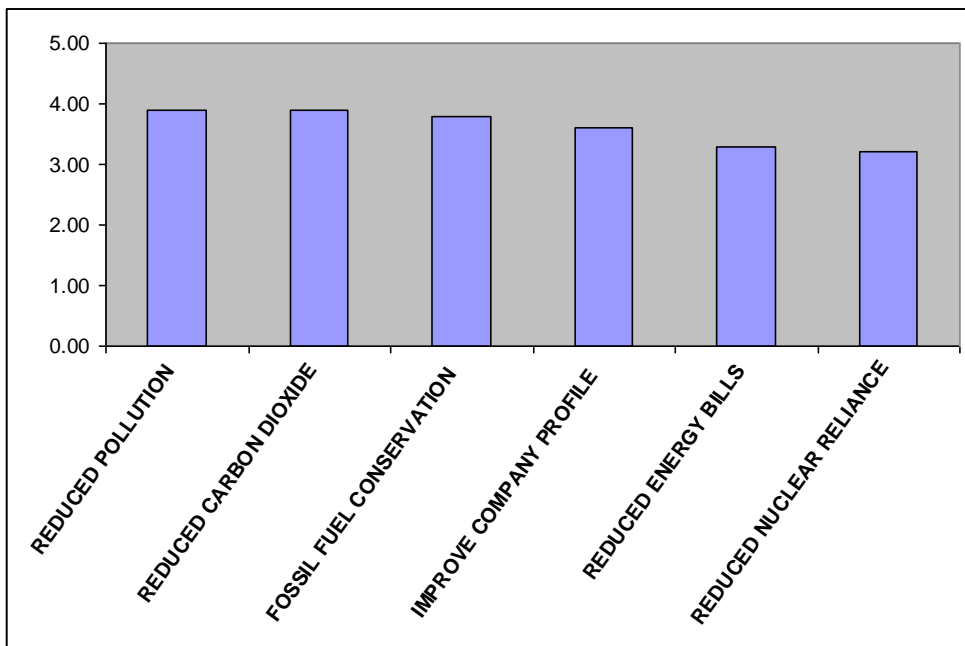


Figure 8.4 Average perceived benefits of renewable technologies

There is little difference in perceived benefit between the different technologies with a range of 0.7 although, similarly to the SMEs, the three highest ranked perceived benefits were considered to be environmental factors (Figure 7.4).

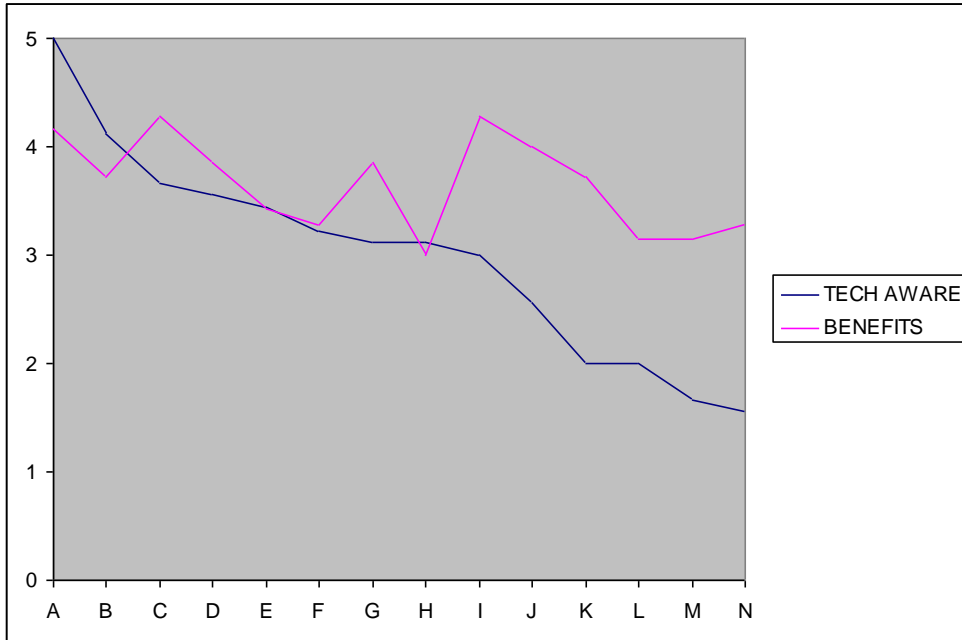


Figure 8.5 Average organisation awareness of different renewable technologies against perceived benefits of installation

Figure 8.5 shows, as it did with SMEs, that there is no correlation between awareness of the technology and perceived benefits. Organisations that consider themselves to be less familiar with the technology still perceive the benefit of installation to be considerable.

Community organisations also consider financial factors to be the most influential in their decision to install renewable technology with initial capital investment being the major factor (Figure 8.6).

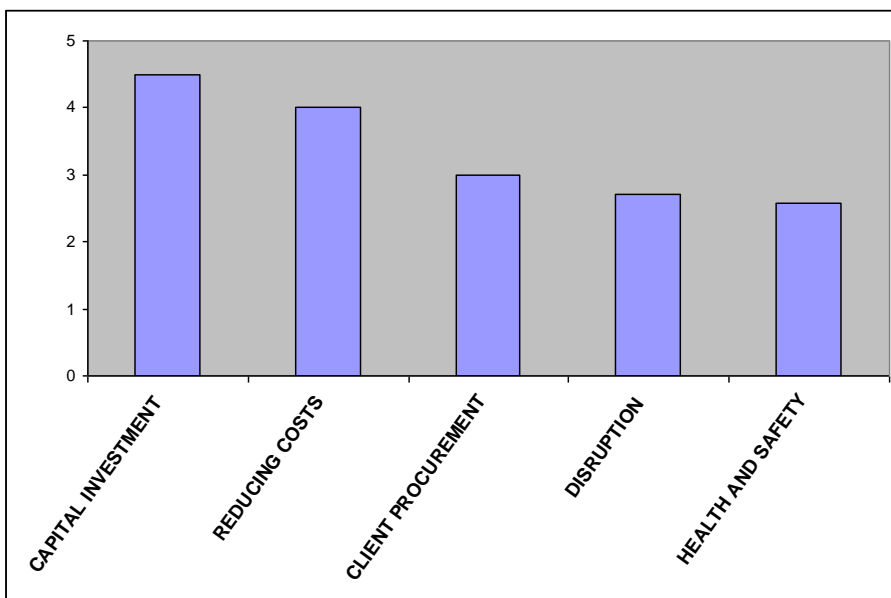


Figure 8.6 Average key factors to the take up of renewable technology

8.3 Summary of Questionnaire Analysis

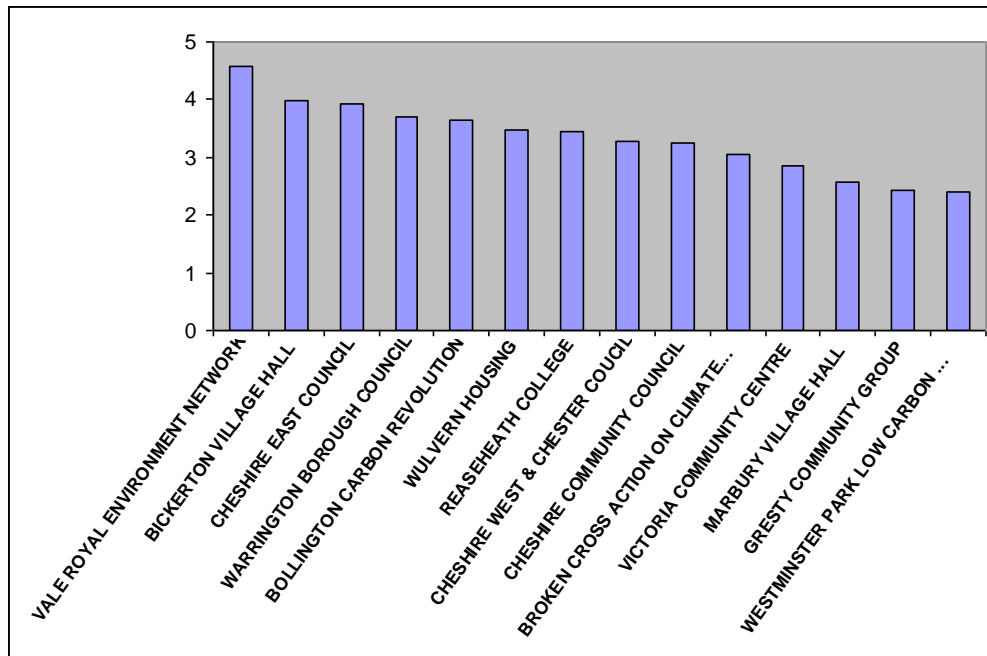


Figure 8.7 Combined average awareness and perceived benefits

As with the SME samples any benefit gained from renewable technology installation is seen to be an environmental rather than an economic one. That said the overall perceived benefit is relatively high.

The potential of a high initial capital investment is the main factor in the consideration of installing renewable technology. The second highest factor considered is the positive impact renewable technology would make in reducing energy costs which is only 0.5 lower which goes some way to balancing out the initial capital investment.

Figure 8.7 provides an indication as to which organisations would be most likely to invest in renewable technology. Those that are most familiar with the technology and perceive its benefit to be large are probably organisations that already have an interest and would be most willing to take this interest to the next stage. There are 9 organisations that demonstrate a combined average awareness and perceived benefit score above the mean of 3.33.

It may be more difficult to encourage the installation of renewable technologies through cost-benefit techniques in community organisations as they are not driven by the same economic considerations as SMEs e.g. profits. However, as many of these community organisations are from the environmental sector, there would already be an active interest and a willness to endorse the technology after installation.

9. Site Identification

9.1 Survey Approach

In addition to the mailing of questionnaires to individual organisations, a visual survey (for additional detail refer to section 10. Visual Site Identification and appendix 4) and local knowledge were used to inform the identification of potential strategic sites.

These covered the whole of Cheshire and Warrington and identified existing examples of renewable technology and potential sites (with high OUVIT) for future installations. This survey incorporated site visits to existing examples of renewable technology and taking photographic evidence of existing examples and potential sites (details in section 10 and appendix 4).

This data was then collated with existing data such as the Office of National Statistics (ONS) Census Data, the Department for Transport's (DfT) 'GB National Road Traffic Survey' and the questionnaires. All data was then imported into a geographic information system (GIS) for spatial analysis resulting in six maps.

A base map was created on which all following maps and analysis were based. This was made up of two main layers consisting of Cheshire and Warrington split into wards and a layer containing roads.

For the wards layer population density data from ONS was assigned to each ward and then symbolised with graduating colours. This gave an indication of the areas more likely to have OUVIT factor as a more densely populated area would increase the chance of OUVIT.

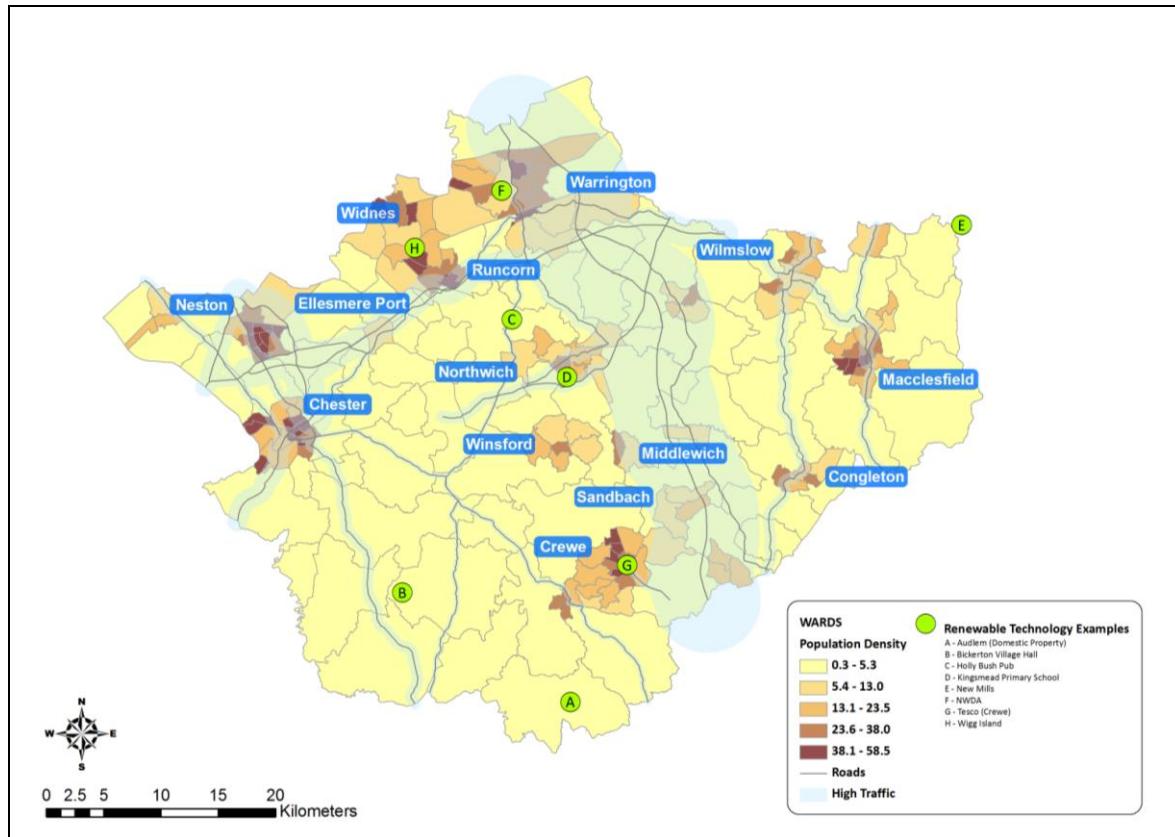
Roads were added as line feature classes and were attributed data from the DfT's road traffic survey. This data was represented as traffic survey points (TSP) at intervals along major roads in the region and provides figures on the average number of vehicles that pass through each TSP on a daily basis.

As could be expected, there is variance in traffic flow between TSPs on each road. For the purpose of this project all TSPs along each road were averaged out to provide each road with an overall traffic flow figure. A buffer zone was then created around each road depending on how many vehicles, on average, travelled along it each day. The buffer zone is intended to recognise not simply which technologies are visible from these roads but which sites will benefit from the through flow of traffic both whilst on and when leaving the roads. Only roads which had an average of over 500 vehicles per day were added to the maps.

On top of the two base layers point data was added to represent respondents from the questionnaires as well as sites recognised through the visual survey and other commercial and community properties in the region.

9.2 Results of Geographical Analysis

(Larger versions of the maps are located in appendix 5 of the paper version of this document).



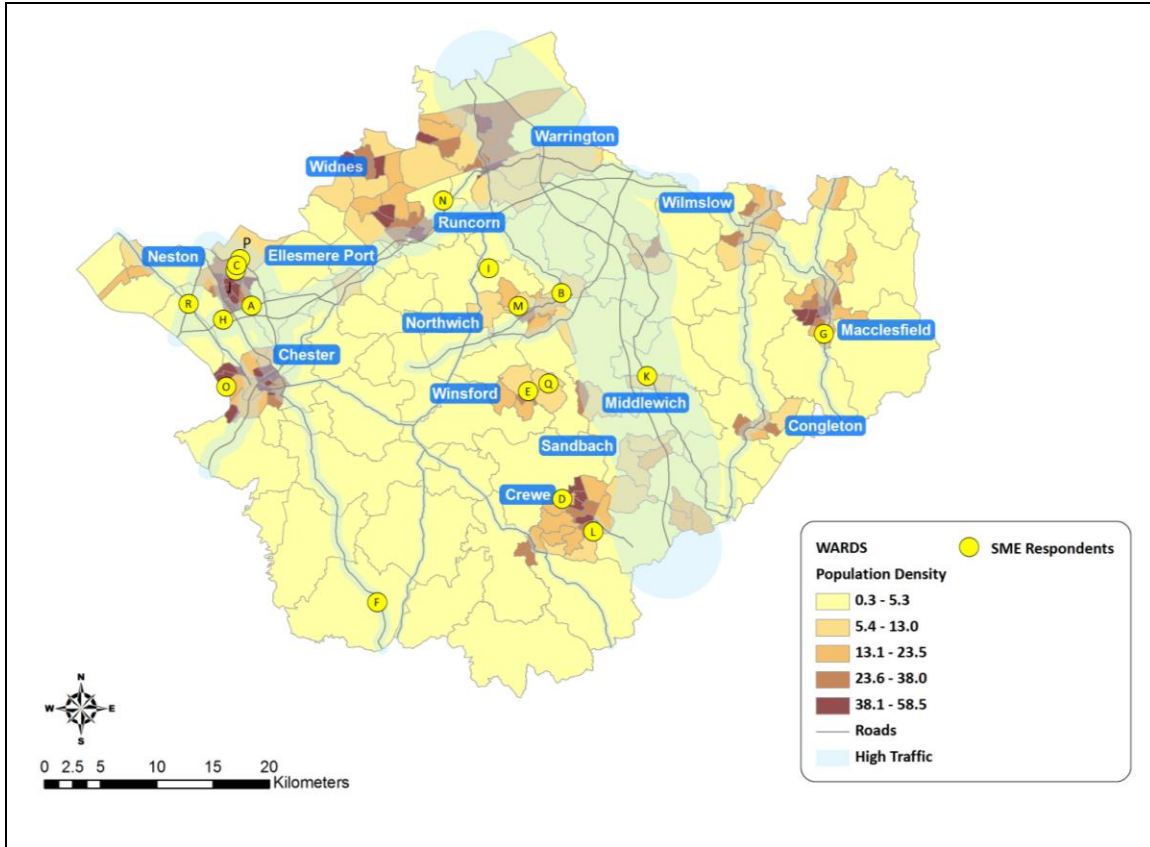
Map A. Location of existing examples of renewable technology in Cheshire and Warrington in relation to areas of high population density and high traffic flow

Map A shows the results of the visual survey which identified existing examples of renewable technology. Analysis of this information found that only one of these sites fell within the high traffic buffer zone. Of the eight examples 50% of them were located in wards with a population density greater than 5 people per hectare.

Existing examples of renewable technology are distributed evenly in latitude but are mainly located down the spine of the county. There is also only one example of renewable technology located on business premises (Tesco) which is not an SME.

These results represented in Map A are a result of a visual survey in the area and there may be other examples that were not identified here. However, as the survey was exhaustive and carried out over a period of about 2 weeks, it illustrates that there are not enough visible examples in the region.

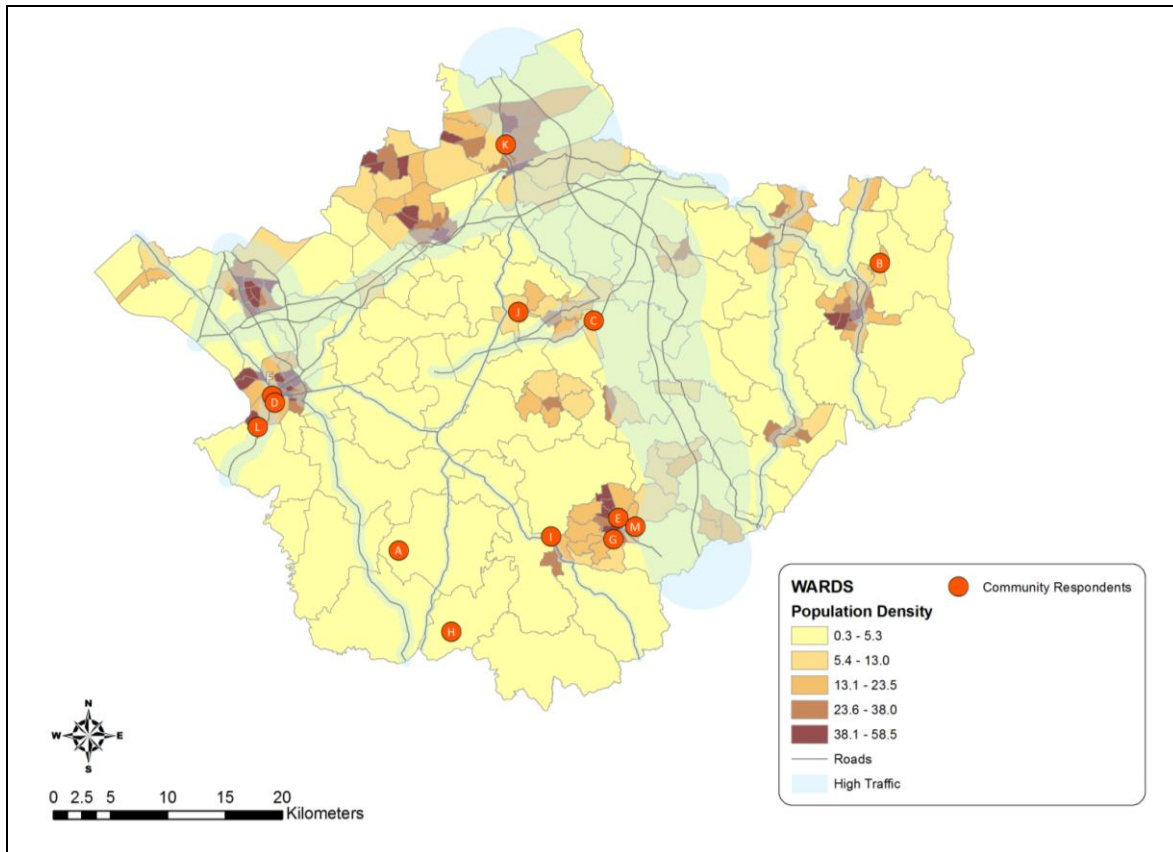
Photographs of these sites can be found in section 10.



Map B. Location of SME questionnaire respondents in relation to population density and high traffic flow

Map B shows that, as could be expected amongst businesses, most of the sample SMEs were located in or close to centres of population. The map also shows companies were located close to major roads with 10 organisations falling within the high traffic buffer zone.

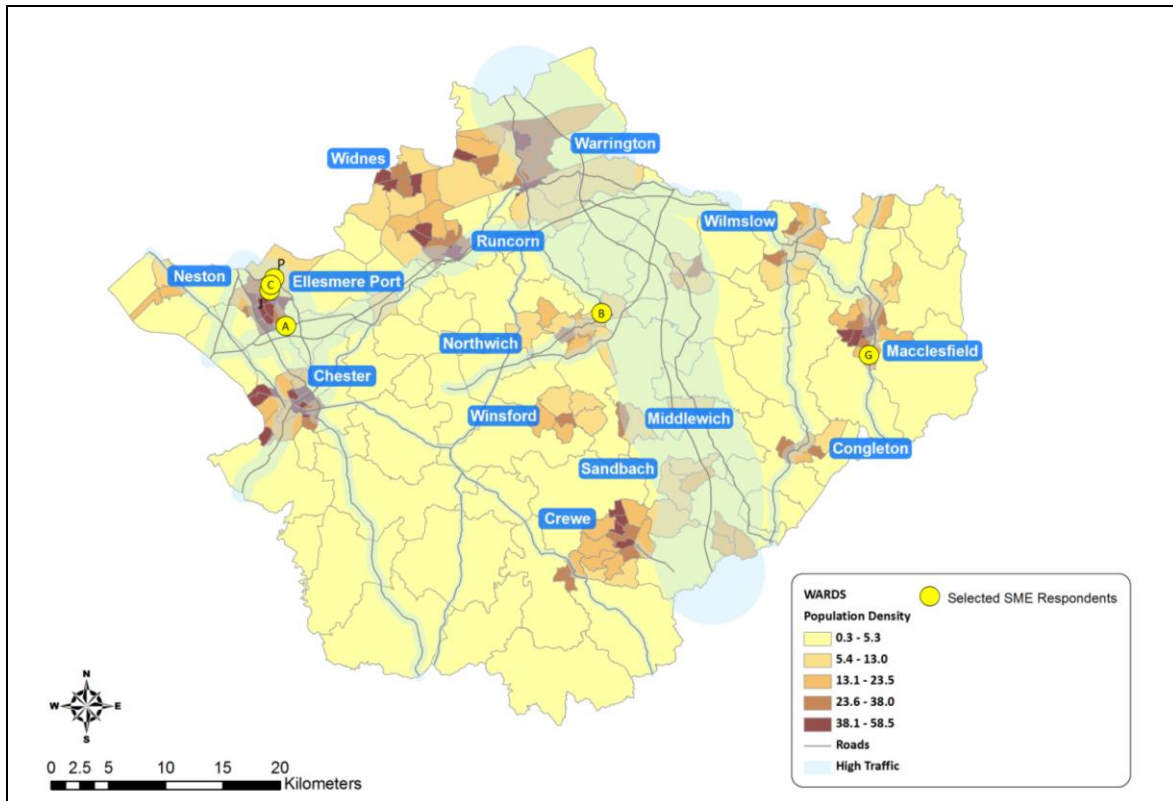
There is quite an even spread although there is a cluster of six sites in the north west of the map in Ellesmere Port. This could be viewed as a strategic area due to its busy road network, high population density and willing recipients (questionnaire respondents).



Map C. Location of community organisation questionnaire respondents in relation to population density and high traffic flow

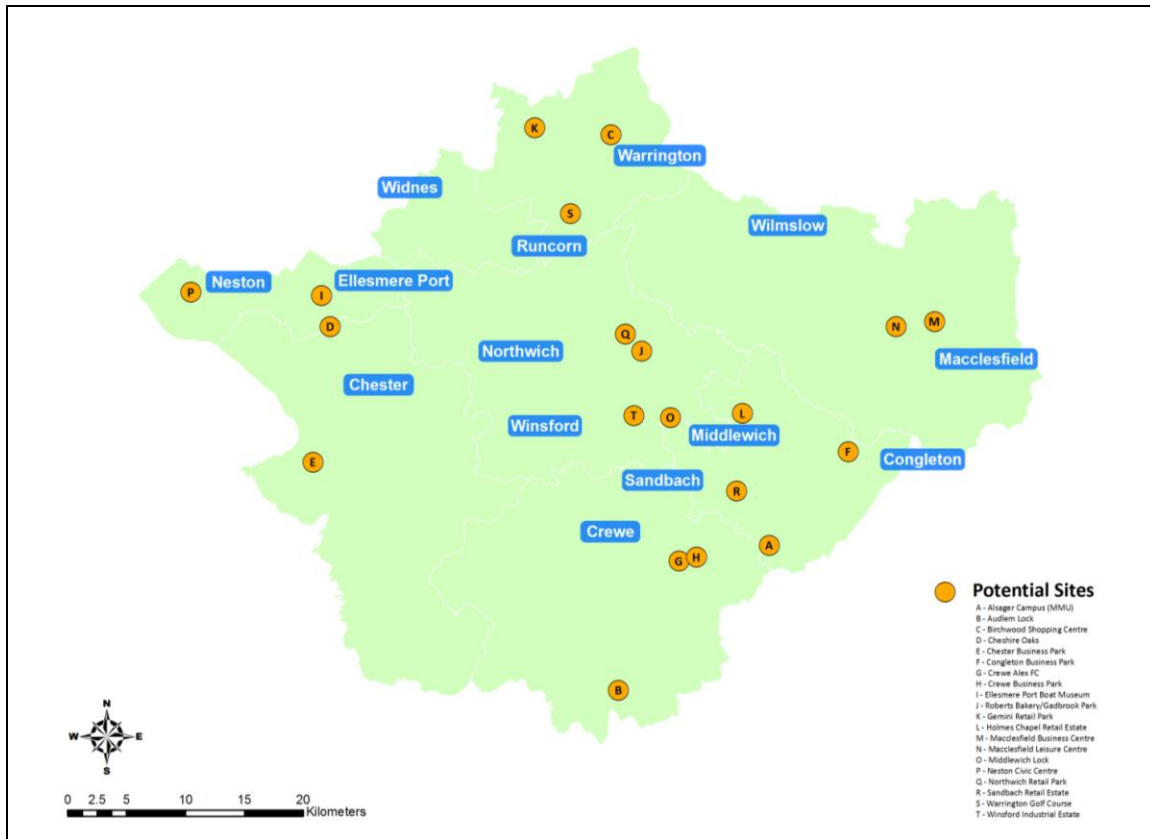
Map C shows that the sample community organisations are spread evenly with 2 clusters in Chester and Crewe. Of the sample community organisations 5 fell within the high traffic buffer zone and 79% were situated in wards with a population density of more than 5 people per hectare.

It should be noted that some of the sampled community organisations use residential properties as their headquarters rather than being a community building with renewable installation potential.



Map D. *SME questionnaire respondents that fall within the high traffic buffer zone and are in wards with a population density >5 people per hectare*

Map D identifies SMEs that fall within the high traffic buffer zone and are in wards with a population density of more than 5 people per hectare. Of the 18 respondents only six companies met these criteria. Of these 6 companies, 4 were located to the North West in Ellesmere Port.

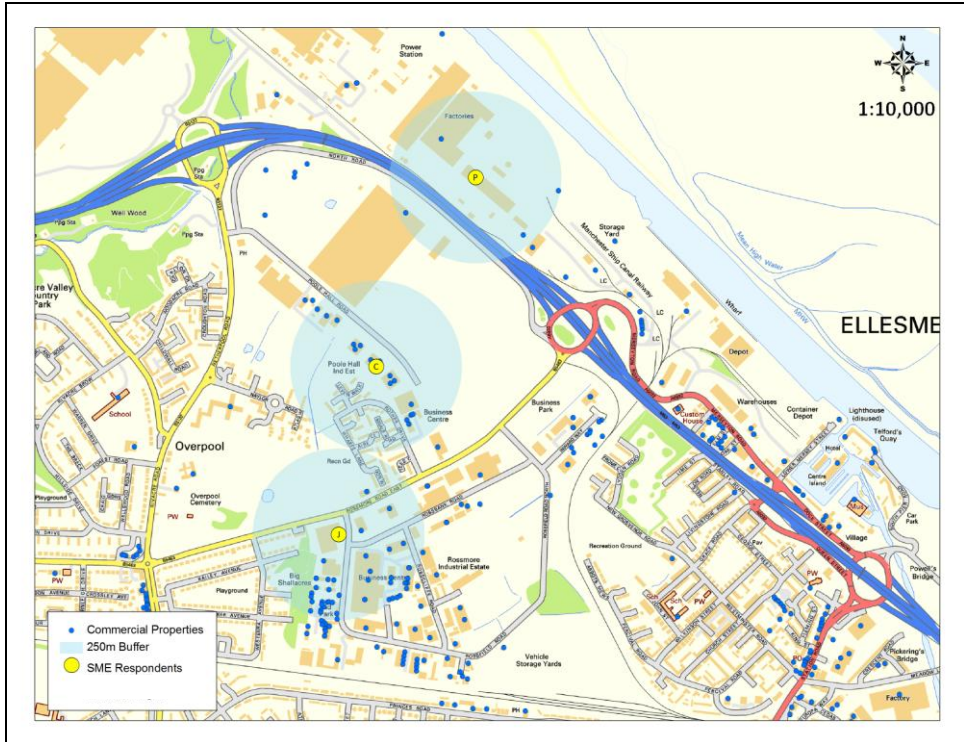


Map E. Potential sites for renewable technology identified through visual survey

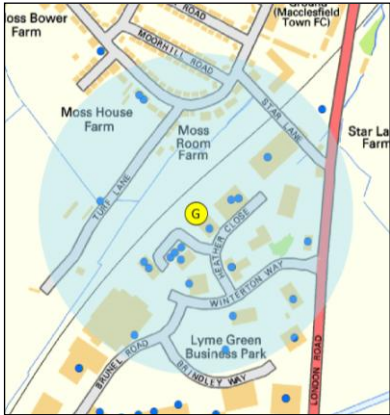
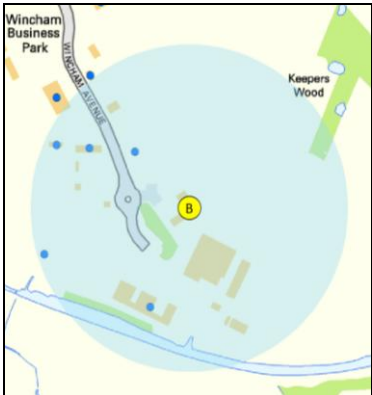
Map E identifies sites that would potentially make good locations for the installation of renewable technology through their OUVIT factor. These sites were identified through a random visual survey which supports the theory that these sites could be stumbled on unintentionally.

The survey spanned across the whole county and recognised areas which had high OUVIT (i.e. high passing traffic/footfall, high visibility and access/good transport links). The survey also identified sites where technology could be installed such as Point B which is a lock in Audlem which could be utilised through micro-hydro technology. The photographs of these sites can be found in appendix 5.

The visual survey also recognised business and industrial parks as potential sites. The advantage of using business parks is that there is a concentration of businesses in a certain area and any installation could act as an exemplar to other businesses. There could also be potential for the shared use of a central renewable hub. Indeed, one of the SME respondents (Company B) queried the feasibility for a small wind turbine to provide electricity to several businesses on an industrial estate.



Map F. Selected SMEs in relation to other commercial properties within a 250m buffer zone



Maps G, H and I (Clockwise). Selected SMEs in relation to other commercial properties within a 250m buffer. Please note; Many businesses may be represented by one point as a result of scale and companies sharing office buildings.

Map F shows a cluster of three of the selected SMEs each with a 250m buffer zone around them to identify other business and community buildings that are in close proximity to each of them.

Maps G, H and I show the remaining three SMEs that fall within the high traffic buffer zone and wards with a population density greater than 5 people per hectare. The results of the buffer zone analysis are detailed in Table 9.1.

Company	Neighbouring Companies
A	9
B	6
C	18
G	41
J	85
P	10

Table 9.1 *Number of neighbours within a 250m buffer zone of selected SMEs*

10.3 Summary of Geographical Analysis

From the results of the GIS analysis it is apparent that existing examples of renewable technology in the region do not have a high OUVIT factor with only one example falling within the high traffic buffer zone. This is supported by results of the questionnaires which state that only 43% of community organisations could think of examples of renewable technology in the region and from a business perspective only 17% of SMEs had seen examples of renewable technology being used in a business context. Clearly there is a lack of visible, accessible exemplars in the region.

GIS analysis also shows that of the 18 SME respondents there were 6 that would make potentially good sites in terms of OUVIT factor. In terms of being an exemplar to other SMEs, companies located within close proximity of other business premises would be advantageous. As Table 9.1 shows that all companies are in close proximity to other businesses, notably Companies G and J. Companies C, J and P are also located in close proximity to each other which could potential to a cluster of willing exemplars.

10. Visual Site Identification

Referring to Map A:

Existing examples of renewable energy technologies in Cheshire and Warrington.



A – Audlem (Domestic Property)



B – Bickerton Village Hall



C – Holly Bush Pub



D – Kingsmead Primary School



E – New Mills



F – North West Development Agency



G – Tesco (Crewe)



H – Wigg Island

Referring to Map E:

The photographs of the potential sites for renewable energy technologies identified by the visual survey as having high OUVIT can be located in appendix 4.

11. Identification of Potential Sites for Renewable Energy Installations

1.1 Reaseheath College

Reaseheath College is an agricultural college and mixed working farm on the North side of the market town, Nantwich in South Cheshire. It has a well-known equine unit, runs multiple courses of varying length (for example, in floristry, painting, City & Guilds courses) and provides support for small local businesses, especially those connected with food and farm diversification.

The College is currently developing its newly set up Enterprise Delivery Hub. This will invest in food testing and innovation units that can then be hired to local businesses with a start-up idea but not the capital to invest. Using these units the business will be able to test out not only the product, but also its business model and taking advantage of the Hub's facilities and expertise will be able to make an assessment as to with or not to proceed. It is hoped that about 135 new employment opportunities year⁻¹ will be created as a result of its activities.

As part of its innovative approach and desire to be seen as an exemplar site it is investing in anaerobic fermentation technology. This will be used to process the slurry created by the dairy herd on the farm, the waste water will in term be used in the dairy sheds for cleaning and the digestate will be put onto the land. This will enable the farm to comply with recent nitrate legislation. The energy produced, in the form of heat, will be used in College buildings.

At the time of writing Reaseheath is in the process of applying for ERDF funding for an anaerobic digestion unit.

Another idea that they have at the developmental stage is a hydroponicum. This is the equipment that uses CO₂ produced in either combustion or fermentation processes for enhancing growth of plants in greenhouses. This has been successfully done with tomato growing and this is the plan at Reaseheath.

11.2 Blacon

Blacon is a discrete urban community on the North West side of Chester in Cheshire. It is made up of mixed tenure property, including owner occupier, private rented and social housing, of varying ages, with a population of about 15,000 people.

Blacon community Trust is a local organisation that is committed to generating a model urban community;

- Engaging the community
- Creating a sustainable local economy for all
- Enhancing the local environment and quality of life.

The areas of focus are:

- Space – regenerating the old railway station site and putting in place greenway sculptures
- Transport – cycling training & maintenance schemes and bike loan
- Social Enterprises – Energy Services Company and pedicabs
- Energy

In the context of this project it is the energy area that is most relevant. Blacon Parade is a mixed use site with shops, housing, small business units and community facilities. It is proposed to develop a micro-grid on this site with biomass heating. Part of this project is hoping to attract money from the ERDF.

At Dee Point Community Centre there are plans to refurbish the building to produce an exemplar model for a public use building. A thermal imaging camera has been used to assess the energy efficiency of this building.

There are longer term plans to erect wind turbines to generate electricity for parts of the community.

11.3 Energy Projects Plus

Energy Projects Plus is an environmental charity focusing on energy efficiency and renewable energy technologies, hosting the Energy Saving Trust advice line for Cheshire & Merseyside, carrying out numerous low carbon and health through warmth projects and delivering cashback schemes for insulation measures for local councils.

The organisation is based in 2 offices, one in Winsford in Cheshire and the other in Wallasey on the Wirral.

The office in Winsford has been occupied for a number of years and is situated next to a busy road junction close to the shopping centre. Hot water is currently heated by an older (10 years +) gas boiler. Solar hot water panels would be more efficient, especially in the summer months when the sole reason for switching on the boiler is for hot water as it is not needed for space heating.

11.4 Dairy Farmers in Malpas

An approach was made by two dairy farmers to a member of staff of Cheshire & Merseyside Energy Saving Trust advice centre at an event in Bickerton, Cheshire. They both have farms near Malpas, a village in South West Cheshire. They explained that they are both in off-gas areas and interested in installing solar thermal systems and one of them may consider photovoltaic panels.

This is a recent development and efforts to make contact with them again are proving to be challenging due to their commitments. However, they were sufficiently interested in the technologies to provide all their contact details in the anticipation of being contacted.

11.5 Pipework Fabrication & Installation Company

This is the company who responded to the questionnaire 7.4.

11.6 Summary

All of the above 5 organisations are potentially suitable for renewable energy technology installations and although not all will be eligible for ERDF funding they may be eligible for alternative funding.

In addition they could be considered to be strategic sites according to the criteria set out in section 6.

With regard to required criteria:

- All are in Cheshire
- All have high OUVIT potential.
- 1. Reaseheath College is a large educational establishment with many resident students and staff. In addition local day students and visitors are numerous. The College also holds events (for example lambing days, open days and conferences) that attract a range of local and non-local visitors. It is also served by multiple business and service suppliers.
- 2. Blacon is a large community in its own right that will also have day visitors (for example, students for the schools, family & friends of residents, people who work in the community). Blacon also has aspirations to develop exemplar sites, as mentioned with the Dee Point community building. This will bring visitors to the area to observe and learn from their example. There are plans to hold seminars and events showcasing their achievements.
- 3. The situation of the Winsford office of Energy Projects Plus at a busy junction provides high OUVIT for residents and visitors alike. Not only is it busy in terms of vehicular traffic, there are also a large number of pedestrians.
- 4. The dairy farmers are an example of sectoral OUVIT. Farmers will be visited by their suppliers (who will visit other farmers) and other people in the industry. This provides the potential for cross-fertilisation of ideas.
- 5. The Pipework Fabrication and Installation Company will be visited by suppliers and customers, as well as being seen by passing traffic.

With regard to the desired criteria for the Renewables Cluster:

- Reaseheath College may have more than one technology installed, with possible innovative applications. They are also highly likely to be enthusiastic about showcasing their installations
- Blacon may also have more than one technology installed. And will be enthusiastic about being an exemplar site.
- Energy Projects Plus is already promoting renewable energy technologies and would be keen to showcase any installation.
- The two farms have the potential for a sectoral cluster of installations.

12. Conclusions

Through the delivery of the feasibility study a number of considerations were assessed in order to determine whether there is sufficient knowledge, awareness or access to renewable energy technologies across Cheshire and Warrington. These include:

- Awareness of companies, organisations and individuals of the types and benefits of renewable technologies
- Awareness of existing installations
- Location of existing installations
- Potential sites for location of installations offering high OUVIT

The GIS representation of the location of renewables in relation to OUVIT has demonstrated a shortfall in suitably located installations. It has also highlighted potential areas for locating new installations.

The survey responses have highlighted a mediocre level of awareness of the types and benefits of renewable technologies among both the SME and community sectors, together with a low knowledge, and therefore experience, of renewable installations in the area.

There exists a significant provision of general resource efficiency business support and a high profile of climate change issues across the media, which may account for the levels of awareness and knowledge currently reached.

It is therefore suggested that in order to reach the next level of awareness, knowledge and a resulting commitment to take up of renewable energy a greater profile of, and access to, local renewable energy installations is important.

The active identification and development of potential sites and sector exemplars offering high OUVIT is seen as an effective approach to achieve this.

A number of SMEs that are potentially suitable beneficiaries of ERDF funding, determined through proactive targeting, have been identified through this feasibility study. This approach should be continued, particularly in relation to strategic sites where the installation of renewable technologies will have an impact well beyond the individual benefits to the host organisation in relation to CO₂ emissions, financial benefits and business ethic.

It is also noted that a number of companies have emerged in the latter stages of the study who have expressed intent to proceed, with the right support, and it is anticipated that this could increase with continued delivery of this approach.

It is considered that the original premise of the importance of the location of renewable technologies sited on accessible high profile sites is valid in contributing to a greater knowledge, awareness and therefore acceptance of the potential for renewable energy.

13. Next steps

The feasibility study has identified SMEs potentially suitable for support through the ERDF programme. The potential for an ERDF bid that will support these businesses will now be considered since it is recognised that the complexities of the application process and the criteria, including eligibility and required size of project, may deter companies from applying unaided.

The feasibility study has validated the principle of strategic sites and identified a number of sites that will require further investigation and targeting to identify individual need and commitment of occupants. The development of the strategic sites will be an ongoing process, which should be linked into new development plans (and local planning requirements for “Merton Rule“ renewable energy installations).

More detailed local engagement, particularly with the public sector, will be necessary in identifying new sites since this study considered Cheshire and Warrington as a whole and was time limited in its ability to drill down to locally significant sites.

The identification of current and future installations of renewable technologies presented through the GIS system provides the opportunity to promote their presence more widely. This introduces the potential for developing a “renewable energy trail”, a concept developed in the North East of England, which identifies locations accessible for visiting (both small and large scale) and links into the tourist economy of Cheshire and Warrington.