

The potential for community ownership of wind turbines in Ceredigion

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wi mawchin out di ole towards di new centri
arm wid di new teknalagy
wi getting more an more producktivity
some seh tings lookin-up fi prasperity
but if evrywan goin get a share dis time
ole mentality mus get lef behine

Extract from 'More Time' Linton Kwesi Johnson
Taken from *Mi Revalueshanary Fren: Selected Poems*
Penguin, London 2002

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Common Acronyms

BWEA	British Wind Energy Association
CAT	Centre for Alternative Technology
CPRW	Campaign for the Protection of Rural Wales
DETR	Department of the Environment, Transport and the Regions
DTI	Department of Trade and Industry
EA	Environmental Assessment
EMAS	(European) Eco-Management & Audit Scheme
ETSU	Energy Technology Support Unit
EU	European Union
IPCC	Intergovernmental Panel on Climate Change
GIS	Geographical Information Systems
MAWS	Mean Annual Wind Speed
NOABL	Department of Trade and Industry wind speed database

Abstract

Fossil fuels are disappearing, and nuclear power is a source of great controversy. To date conventional power supply has relied on both, however, this is beginning to change. The Government of the UK, encouraged by international bodies, seems to be recognising the need to plan for a future to include renewable energy. Press release throughout 2003 has indicated a gathering pace as the wind energy industry moves from periphery to mainstream.

The European public supports research in renewable technology and the current concentration of wind energy installations is supported in UK opinion surveys. There seem few complications to the industry expansion. However, whilst the UK has the 'best wind resource in Europe', it also has a comparatively small land area for the size of population.

The planned expansion in the renewables field must be made with caution. Currently, there is support for wind energy. However, as the concentration of installations increases it may negatively affect this opinion. This project aims to anticipate any shift in public opinion. It considers an alternative strategy as a means to retain the current support, and aims to present a potential future for wind energy in a specific case study, Ceredigion in mid Wales.

Community owned wind turbines are relatively common in Scandinavia. Whilst the technology is appropriate for small scale application to be absorbed into a community and bring direct benefit to those who invest, there are few examples in this country. Assessment of settlements considered suitable to support a co-operatively owned wind turbine project in this study area was made through a questionnaire based survey.

The results suggest that the management principles applied in existing co-operative wind projects could also be applied to communities of similar size to those targeted. The sample taken from Ceredigion is receptive to the principles described by the survey and presents possible suitable areas for site appraisal. The greatest barrier the results indicated was found to be infighting caused by internal politics. Careful management from experienced advisors could help to alleviate this problem.

The survey indicates a potential market opening for a dedicated wind developer to exclusively support projects of this nature, providing the expertise and benefiting through part ownership. The development of projects on this scale would strengthen the market through adding diversity, retain public support for wind energy amongst massive expansion, and act as an educational tool to increase awareness of climate change issues.

Introduction

Chapter summary: The history of renewable energy in both the UK and Europe is described, to introduce the present status of wind energy and its imminent expansion in the UK. The scope of the project is given to explain the investigation into interest and acceptance of community wind power as an alternative means of ownership. The aims of this project are stated at the end of the chapter.

1.1 The Climate today

If we believe what we read, the world is getting warmer. Some suggest a rise in the Earth's temperature is linked to man's activities and production of greenhouse gases. Certainly there are good historical records to indicate that atmospheric concentrations of greenhouse gases and their rate of change have risen dramatically since the industrial revolution (Intergovernmental Panel on Climate Change [IPCC], 2001). If the connection is to be believed, then a shift in attitude must be achieved if problems which a global temperature rise would bring are to be avoided. It becomes the responsibility of every nation to address their contribution to a cross-cultural and cross-boundary problem.

The IPCC was created in 1988 to assess published literature on climate change, consolidate information, and provide advice to the world community. This advice has most controversially taken the form of the framework and targets set out in the Kyoto protocol for reducing carbon dioxide emissions. Each country agreeing to ratify the terms of the protocol took on specific targets achievable by a certain date. The UK Climate Change Programme was set up to establish means to implement the Kyoto targets. In February 2003 the UK government reviewed its energy policy for achieving those targets. By emphasising energy efficiency and generation from renewable sources it has set out to achieve the EU directive target of 10% of all electricity generated by renewable means by 2010 (DTI, 2003a).

1.2 History of Renewable Energy

Renewable energy has been an emerging techn

1.3 UK Government support

Following the white paper's release in February 2003, the UK Government has taken the first steps to meet the targets. In the month following its release, planning was granted for turbines whose total generating capacity is greater than all those built during the 1990's. This announcement includes 450 onshore turbines (BWEA, 2003). The sheer scale of onshore expansion is unprecedented, and yet the doubling of potential capacity will still only total half of the output of a conventional coal-fired power station. The number of turbines to be built onshore to replace today's generating methods will have considerable impact if the UK's wind potential is to be fulfilled.

In mid July 2003 the UK Government announced that licenses had been granted for a massive expansion of offshore wind installations. Such news adds substance to the Government's developing policy. However, while projected expansion is expected to move offshore, there may well be a backlash to the scale of industry development. Although there is general public support today in favour of wind energy (approximately 70% [Hill, 2001]), ambitious projections by the wind industry and Government targets should be read with caution. There should be consideration given to a turn in the tide of public opinion. It is unlikely that the true long term targets will be met by onshore wind installations at present or even as part of the projected expansion. It is suggested large scale energy generation must be met by other means, and a diversity of generating methods. This project considers a means to retain the public support as part of a step replacement of conventional methods for power generation.

Alternatives should be considered to the wholesale backing of one form of expansion, and should consider expansion on different scales and the advantages of each. Small scale onshore installations have a number of such advantages, and would continue to raise the public profile of wind as a generating source. Expansion on the small scale may even encourage moves towards domestic supply and integrated energy planning in any new housing developments. Even given the planning grants for the large scale offshore proposals (which will contribute to the replacement of conventional power

stations), in the transitional period between technologies, there will be problems which require public support to overcome. There is bound to be objection to expansion on the scale which press release throughout 2003 has indicated. Research and development into other forms of renewable energy, particularly biomass, tidal turbines, and offshore wind needs the retention of the current wide scale public support for investment of public money. The decision makers must be aware of objections and need to make provisions for them.

There may well be a majority in favour of wind as an energy source but the scale of expansion may trigger a negative shift in opinion. However, if those living near to the turbines can gain directly from them, the proposal will be more readily accepted by the community. Small scale community owned power projects could become a way of balancing any potential future ill-feeling towards the expansion of onshore wind turbines.

The benefits to the community of small scale stake holder-ship include the direct financial income. The project then forms a powerful means for education regarding the profile of renewable energy. The public support for the technology and retention of interest in wind energy as suggested is an important status to secure during the transition from conventional power generation to renewable energy. The Scandinavian success of community wind energy is illustrated well by the Danish power supply, of which three quarters of the 900 megawatts of wind power capacity is privately owned (Tranæs, 2002). Half of the ownership is by individuals and half by wind energy co-operatives. The benefits of this ownership structure also include the diversity of power generation which in turn strengthens the market and creates a security of energy supply. Community power also has the potential for regeneration of an area, as direct and immediate income is brought back into the community. There is such a proposal in the Amman Valley of South Wales which used to be a coal mining area but has now slipped into decline. As a means to harness resources, the project aims to generate funding for a programme of rejuvenation. A further indirect benefit is the provision of a focus for the community to encourage inclusion and participation in other community matters.

A small number of community owned power projects exist in the UK with others proposed and in the project planning phase. The market town of Machynlleth in Powys possesses a turbine which was connected to the grid in April, 2003. A consortium of 50 investors from the town benefits from a community owned scheme (the Dyfi Valley project). This is not the first community owned wind scheme in the UK; the first was proposed in the mid 1990's in Cumbria and has been successfully operating since 1997.

1.4 Objective for this study

This research investigates if the principles of the Dyfi Valley turbine at Machynlleth can be transplanted elsewhere. Although only a single, small turbine of 65 kilowatts, the project was a test piece for mid Wales and stands in successful operation, with returns paid back to shareholders from sale of electricity to the grid. However, the community of Machynlleth is unique, having attracted and absorbed the 'green' values from the Centre for Alternative Technology (CAT) as it has grown on the outskirts of the town over the last 30 years. The local engineering company Dulas is also very active in nurturing the underlying principles and is heading a programme (the Renewable Energy Investment Club) to raise awareness of the possibilities of community based schemes. The test is whether the principles of the Dyfi Valley project can be spread to non 'green' areas.

The first UK community based wind farm was led by a Danish developer keen to expand the principles to this country. So what benefit does the developer see to a project owned by the community? Guidance must be supplied by experience; therefore the developing consultant will have a part-stake, thereby benefiting from electricity sales. Aside from consulting and management of the project, operation and maintenance, one of the greatest achievements is public relations. Gaining public support improves the profile of the company. It creates a healthy transparency to gain acceptance amongst a public who increasingly demand benchmarks such as accreditation to the ISO 14001 environmental management system or the European Eco-Management & Audit Scheme (EMAS) as a standard of judgement.

1.4.1 Scope (levers, barriers)

Community scale wind projects are relatively common in Scandinavia, and although examples exist in this country, there are very few. The history of wind energy is more established in several Northern European nations and the culture of community benefit in projects (as observed in experiments such as the Christiana community in Copenhagen) is claimed to have contributed to their proliferation.

The community benefits of projects at this scale are clear (as noted above), thus opposition to its expansion in the UK is investigated by this project. Previous examples of community based wind projects and previous attitude surveys have indicated a number of difficulties with development of projects on this scale. This research includes investigation of three barriers identified by the Dyfi Valley project which include finance of the project and access to information and knowledge for implementation.

The scope of the project excluded investigation of further socio-economic factors of targeted communities, having made the assumption that a market for the generated electricity was assured (the final barrier identified by the Dyfi Valley project).

Certain other Economic factors such as investigation into costings of the project, affected by levers such as the Renewables Obligation Certificate, creating the current expense of renewable energy over conventional power were not included in the scope of the project. It was felt not necessary to include these parameters, as such features would not affect those polled in the survey. These are areas which would affect the successful development of any project and must be considered as part of the initial feasibility study, alongside such factors as regional requirements for renewable supply. These are important factors as the current reticence for banks to support the unproven technology of offshore turbines shows (Reuters, 2003).

Although not included in the scope of the project, developers must also account for the fluctuations in areas such as grant support. There is current grant funding available

for community based projects, however if the scale proves successful, other means of funding must be made available through a review of the energy budget.

A lever which could be applied to encourage the development of wind turbines at this scale is the same which has been applied to ensure the development of affordable housing (section 106 of the Town and Country Planning Act, 1990). Agreements are entered into between a local planning authority and developer to ensure that a proportion of units of the development are 'affordable'. The same principles could be applied to demand that a wind farm development benefits the receiving community. Once again the legal requirements of planning have been excluded from this project, but would gain importance if the scale is seen to prove successful.

1.5 Justification for this study

There is a requirement for expansion of renewables, and announcements have been made of the forthcoming expansion. The proposed expansion, particularly given the projected rate, will not be without problems. There are benefits of community owned power generation both direct and indirect, and there are benefits at a local as well as larger scale. It is therefore proposed that community co-operative wind projects could provide a means to diversify and retain the current level of support as the expansion unfolds.

One of the greatest challenges to the wind industry in Britain is the limited land available. The onshore wind industry will face a test in the future if it continues to expand at the present rate, and this must be considered. However, alternative strategies exist, and community scale electricity generation is beginning to raise its profile. In early 2003, budgets were allocated to issue grants to suitable projects both in Scotland (the Scottish Community Renewables Initiative) and England and Wales (the Clear Skies Programme). Each has funds of £10 million. The government promotes the programme in England and Wales through the Countryside Agency. Community scale energy generation could become the means to raise awareness of renewable energy, engender support for the technology, and thereby avoid the

backlash of the massive expansion both onshore announced in March 2003 (DTI, 2003b), and offshore announced in July 2003 (DTI, 2003c).

Twenty miles to the south of the Dyfi Valley project in Machynlleth is the Cefn Croes plateau on which planning permission was granted for 39 turbines in May, 2002. There was considerable vocal opposition to the proposal in comparison to the project at Machynlleth. A website (Better-Wales.com, 2003) summarising the Cefn Croes proposal revealed an interesting illustration of an important theme common amongst the opposition to wind turbines - distrust and suspicion of large developers, which forms a major area of investigation of this study. Such distrust underlies an article on the website which summarises the proposal and highlights the developer as being financially supported by an American company who will profit from the development. Although the introduction of the internet has increased the ease for broadcasting unedited comment, it has created an arena for unedited comment, circulating what some observers believe to be a biased view. It is suggested that the opportunities for press release make the opposition seem more apparent than the reality.

The other area of concern amongst the opposition which this project investigates is the fear of change. This is closely allied with distrust and bound up in two of the barriers to community co-operative expansion identified by the Dyfi Valley project (Leaney and Heslop 2002):

Access to information- availability of sources to indicate the scope of what is possible. Such information is likely to only come via a developer. This generates suspicion of ulterior motives unless the developer is seen to have successfully completed similar projects. Alternatively, an information programme could be championed regarding community installations alongside the provision made for government grant support of such projects.

Access to knowledge- means for putting a scheme into practice. Any successful project must be directed through experience. Any developer must then take a cut (part-ownership) for it to be worthwhile, which then feeds suspicion for motives. However, if the developer is seen to be a developer of community projects some of this suspicion can be alleviated. Both information of project possibilities and the knowledge for implementation need to be passed on from experience. Unfortunately

when that experience comes from outside the community, it leads to distrust, feeding the fear of change.

Previous work investigating general public opinion reveals overall support for wind energy (Hill, 2001). Given such a background, this research investigates the specific scale of the project, identifying the opposition and testing the theory, that those in opposition might change their opinion given incentive. The research asks who is in opposition, and why? If groups of the community can be identified based on their opinion, recommendations can be made to encourage acceptance of projects on this scale.

Community based wind power pre-empts any shift from support in public attitude by using a smaller scale as a means for education in renewable energy. As an industry in its early years, the UK renewables field will undoubtedly encounter problems. This project proposes a means to alleviate potential saturation. The alternative proposed aims to avoid the associated problems that a single vision and lack of diversity may bring.

Danish examples (Wright, 2002) have suggested community involvement appeases opposition and alleviates distrust and fear of change. It seems that community ownership also creates a feeling of pride and self reliance amongst the investors. The foundations have been laid and the first projects are operating. Even the earliest work in the UK suggested a tentative interest in not only wind power but investment in the installed project (Varley, et al., 1989). This study investigates a little deeper, to understand if the principles of community power can be spread further, using the Welsh case study of Ceredigion, challenging the suggestions that they are more readily received by the Scandinavian culture (Draisey pers comm., 2003).

The time is appropriate to call for community inclusion, to embrace the principles of community scale power generation and encourage its growth. We have had the conception and birth of wind energy in the UK. Following the 12 yr childhood, in 2003 we are entering the adolescence- a turbulent time of change, as the industry stands on the verge of its greatest expansion to date. The current and recent movements in the energy supply market are the first steps of renewable energy

becoming a mainstream concept. Interestingly, the expansion of wind energy in the UK is co-inciding with the increasing Government interest in the development of sustainable communities (Office of the Deputy Prime Minister, [ODPM] 2003). The themes of this initiative are broad but lean toward self reliance, an increase in ‘quality of life and the regeneration of communities. Community wind power forms an ideal example to support these principles.

1.6 Aims of this study

By reviewing currently successful share-owned wind projects, this survey assesses several barriers identified by them. Three aims exist.

- 1 To consider the evolution of the renewable energy market.
- 2 To investigate people’s attitude toward the ideals of a community owned wind installation.
- 3 To identify major causes of opposition to community scale wind power.

Hypothesis: The principles seen in the Dyfi Valley project at Machynlleth could be applied elsewhere in Ceredigion, in appropriately sized communities, given the basic requirements for suitability of site.

Literature Review

Chapter summary: Having established the general acceptance of wind power given the existing concentration of installations, this review explains the problems which previous community wind projects have revealed. After presenting the current understanding of public opinion, the chapter indicates the role of the press in connection with opposition to wind power projects.

2.1 Wind power in general

Many attitude surveys have been conducted which have investigated general public opinion towards wind energy, and the latest have been assessments of the surveys. The most recent revealed 74% of respondents in favour of wind energy (IPSOS, 2003). The over-riding theme amongst all the surveys and meta-analysis is the support of wind power as means of generation, at its current level of concentration. The Bishop and Proctor report (1994) indicated the early UK public support alongside the continental attitude towards large wind farms. Krohn and Damborg (1999) reviewed a number of surveys, all of which revealed support for wind amongst approximately 80% of the sample. Simon (1996) produced an earlier survey of the surveys on attitude, which supports these figures. The most recent work by Hill (2001) in assessing emergent trends, (conducted on behalf of the British Wind Energy Association) indicated widespread general support following the earlier slightly more tentative favour. The latest review from Damborg (2002) also suggests a clear trend of acceptance for the technology.

2.1.1 Current opinion

Attitude towards wind energy currently seems to be in general support, thus this survey investigates the basis of any opposition in considering how long it will be before over concentration turns opinion.

2.1.2 Fear of change

Some important work has surveyed attitudes both before and after a development. This gives an idea of how attitude might change as the concentration of wind farms does. These early studies were conducted on some of the first wind farms to be built and provided indications as to how the development of wind energy could proceed. The assessment of opinion before and after construction of the first turbine at Delabole, Cornwall (ETSU, 1993) indicated that most attitudes were initially favourable, becoming increasingly so post construction. These findings were supported by similar before and after studies of wind farm sites in mid (Esslemont, 1994) and North Wales (CBA, 1994). All three studies were conducted early in the British history of wind energy. In assessing the opinions of those with no experience of turbines, the two Welsh studies consider the importance of the fear of change in the projects. Although evidence from these studies supported the installed farm, the concern about the development was evident in each. Fear of change and the unknown is highlighted as the major concern in these early studies. While the favourable change of opinion would indicate support for the large scale expansion, these studies were conducted on those affected by the first wind turbines to be built in the UK. Studies indicating local public support do not indicate the upper limit of this opinion, and cannot be translated into national support.

2.1.3 Suspicion, distrust and exploitation

The other major barriers to gaining public support in development projects centre on the distrust of major developers and big business, with two thirds of a UK public poll feeling that '*large corporations do not pay enough attention to their social responsibilities*' (MORI, 1999). In analysing previous polls into trust in governance, industry and science Corrado (2001) indicated a continuing trend of distrust directed at big business. These findings were confirmed by recent research (Pidgeon and Poortinga, in press). Wolsink's work (1996) highlighted the area of distrust as the major reason for the projected failure to meet the Dutch energy policy domestic target capacity by 2020. He considered that suspicion generated by local politics would disrupt the progress of the policy. Problems in determining accepted sites at the local

level have become the major impediment to increasing the installed capacity in the Netherlands. He revealed that developers were inexperienced with local politics, which resulted in small private investors not being encouraged.

In his report, Wolsink (1996) highlighted the problem of the planner's fallacy - the assumption that there is a small number of vocal opposition and the silent are in support. This has led to a 'decide-announce-defend' approach, which naturally strengthens any opposition and resistance. Simon (1996) showed, in reviewing previous surveys, that acceptance increases with knowledge. Communication of the nature of the project is therefore essential for winning public support in the planning process. Erp (1997) has suggested that any successful proposal must be found to incorporate the community and avoid distrust.

It is not possible to predict the wind turbine carrying capacity of the British land area, and when public interest and support will turn to objection. However, if wind energy installations are moving offshore, then onshore installations could conceivably be downscaled. This could prove an opportunity for the larger, offshore developers to seize, as supporters of what would then act to them as the 'token' community project, to foster good public relations.

2.2 Community wind power

Ceredigion's neighbouring county of Powys has an active group working to promote community scale renewable energy projects. The Powys Energy Agency resulted from a well-established philosophy due in part to the local engineering company, Dulas Ltd and the Centre for alternative technology (CAT). Collaboration has produced several reports summarising experience in establishing the project at Machynlleth, and offering guidance in producing further projects (REIC, 2002).

In 1992, before any turbines had been seen in Wales, a report assessing the potential for renewable energy in Dyfed quoted opinions expressed by Americans and Scandinavians as a baseline to judge the British response to wind power (CBA, 1992).

With no history or experience of wind power in Britain, there was no comparison to make. In the 11 years since, the British public have been exposed to wind installations, and attitude surveys would indicate a consensus of general support (Hill, 2001).

The first community owned wind farm at Harlock Hill in Cumbria was connected to the grid in 1997. The consortium of investors in the project financially benefit from the electricity sold to the electricity supplier. The project has been used as a reference, and indicates a number of considerations to be made in planning (ETSU, 1997a). Primarily, expertise should be found from a company that has already developed such a project. The project was developed by a group of interested individuals but conceived and led by a Danish developer. As indicated earlier, Danish community wind power is already well established and Anderson *et al.* (1997) have demonstrated that those holding shares in a turbine are significantly more positive about wind power than those with no economic interest.

The Danish study (Anderson *et al.*, 1997) was conducted in Sydthy, a region of Denmark with one of the highest concentrations of community owned wind turbines. It could be interpreted that this result arose from the jealousy of those that had not, over those who had. In the UK, share ownership was highlighted as a complex issue in the Harlock Hill project, requiring careful management. It was suggested that share ownership should be opened as wide as possible, but must maintain a minimum investment to ensure a competitive rate of return, possibly offering different share options to do so. The ownership structure should be made as fair, open and democratic as possible. This was highlighted as a very important point to consider in investigating private investment (ETSU, 1997a).

It seems that a key to the success of the Harlock Hill project was the a close partnership between the expertise the developer offered, and the enthusiasm and finances the community invested (ETSU, 1997a). Machynlleth as a unique community of strong 'green' environmental values (closely linked with CAT) was seen as an ideal opportunity by those with local interest and knowledge to develop a small community wind power project. Fifty four thousand pounds was raised in 3 weeks, and the available shares were oversubscribed.

Mitchell (1994) had previously investigated community involvement, having realised that around 70% of the sample Welsh population were not in opposition to wind energy in principle. He identified many of the problems which projects at Harlock Hill and the Dyfi Valley have formalised. Both projects were led, and directed by the 'Existing Group' with experience of such projects, and this was identified as the key to their success (ETSU, 1997a). The Amman Valley project (still in development) is the test of whether the external expertise can be applied to another project in South Wales without creating suspicion over the developer's motives. The study conducted by ETSU (1997b) found that 'environmental trusts' were appropriate organisations to assist in alleviating this suspicion in community scale projects as they laid emphasis on all elements of the community. The Amman Valley project is currently benefiting from such inclusion acting as mediators between business and the public, whilst also as, established bodies, having the credibility to apply for funding.

The 'Existing Group' scenario makes information available, and knowledge available. Unless that exists within the community (Dyfi Valley project), consultancy expertise and resources providing accounts management, operation and maintenance requires part ownership. Grants are available across the UK (from the Clear Skies funding programme and Scottish Community Renewables Initiative) and EU grants also exist for assisting community scale proposals. For projects under a megawatt, UK connection to the existing grid does not require upgrade of the infrastructure (CBA, 1992). A Swedish case study was analysed by Mitchell (1994), since the scheme generated under a megawatt of power, it did not require rigorous Environmental Impact Assessment (EIA). The UK regulations also do not demand EIA for turbines of hub height under 15 m, or projects of less than 2 turbines (DETR, 2000). The scale of the Swedish case study was suggested resulted in the ease in which planning consent was gained. However, the project also raised an important practical constraint, that to gain genuine interest across a community requires the even distribution of shares, which may even necessitate share targeting and certainly demands conscientious management.

Leaney and Heslop (2002) formalised many such practical problems in identifying four areas creating principle barriers to the development of a community wind project. These include access to information about what is possible, access to knowledge of

how to go about planning the project, access to finance and access to markets for the generated electricity (electricity utilities to buy and supply generated power to the grid). Assumptions were made in this project that access to supporting grants and a market for the product were secure, and only the first two barriers - access to information and access to knowledge along with an assessment of investment interest are addressed in this survey questionnaire.

Some have suggested that British interest in community based projects faces a cultural barrier (Tranæs, 2002, Draisey pers comm., 2003). Perhaps so, but what are the issues? Visual 'Nimby-ism' (Not In My Back Yard) has been dismissed by Wolsink (2000) as a myth. He dismissed the 'Nimby' theory from his subject samples arguing that those with 'Nimby' feelings were not in favour of wind power at all. He argues that people calculate personal costs and benefits when they develop their opinions and his earlier work on facility siting revealed a suspicion of electricity utilities, once again supporting the theory that distrust of developers is a significant hurdle to overcome. Is the solution to distrust to incorporate the community into the project? Following the twelve year period of introduction to wind turbines, the receiving communities could potentially be incorporated into the project. The principles can be encouraged with levers such as the 'planning gain' advantage to assist in overcoming any cultural obstacle. The motivation can often be encouraged through incentive, which share ownership describes.

2.3 The opposition and media coverage

Reports are made of 'public opinion' in the media. While media reports are not subject to any scientific peer review, the media has a far greater readership and is a much more current and effective manipulator of opinion than the scientific press. Although there is some positive reporting, the greater trend in media reporting conflicts with scientific reporting which states a general support for wind energy. A review of media coverage by Bishop and Proctor (1994) suggested that media reporting was divisive. Recent work reviewing the media coverage of wind farms has also revealed some interesting trends. A review of press complaints by the British

Wind Energy Association (BWEA, the industry representative), indicated that almost a third of 1000 letters of complaint published in the press between 2001 and 2002 were written by 12 people (BWEA, 2003b). Obviously, care must be taken in using industry sources, although in this case, the review is based on previous independent surveys. The greatest objection by a vocal few suggests that media reporting is not representative.

The internet has caused a media revolution as an unedited outlet. It is easy to make a small voice heard, but a noisy voice then will drown others out. The wind industry claims that media reports are under representative. An article in the Guardian newspaper illustrating the divisions felt over the Cefn Croes development in 2002 demonstrates very well the claimed inaccuracy (Vidal, 2002). All the usual campaign groups are mentioned in opposition, whilst the only groups mentioned in support were the developers set to profit from the scheme.

Opposition seems dominant amongst some leisure groups particularly supported by organisations such as Campaign for the Protection of Rural Wales (CPRW), the most visible opposition to wind power in Wales. Not only do such groups object on a domestic level, but suggested wind turbines to be potentially damaging to tourism. However, tourist surveys seem to suggest otherwise, with visitors objecting less and less (MORI, 2002a). Such speculation towards tourist reaction touches on one of the issues - the fear of change, investigated by this study.

Amongst those in opposition reported in the press, one of the most common themes is a feeling of exploitation leading to distrust. This was highlighted by the Cefn Croes development, and is another of the themes this report assesses.

The press is in a position to fuel anti wind feeling. Until recently, few positive messages have been communicated about the industry in the press. If the tide of opinion does start to alter, the press will be the outlet for that feeling.

Research Methodology

Chapter Summary: The purpose of the study is to establish the level of acceptance and interest amongst a telephone survey for a community owned wind installation. Accepted survey methods were investigated for suitability, and the telephone survey technique employed due to time and resource constraints of this study. The chapter explains the considerations made before arriving at the methods described.

3.1 Introduction

The proposal on the Cefn Croes plateau produced fairly vocal opposition. Although common thought suggests this reaction came from a minority, there was a force which became apparent whose drive is one of the objects of this investigation. The intention of this study is to consider if the opposition is continuous to the alternative of community based wind energy, and what barriers exist to its local expansion.

A random sample questionnaire survey technique was employed to gauge people's opinion regarding the application of wind technology on a community scale. The social survey is in effect a form of market research to determine if interest and acceptance lies within those communities targeted. This is defined as a readiness to overcome several of the barriers identified by the Dyfi Valley project. The opinions are investigated further to understand whether the concern is based primarily on the distrust of large developers and the perceived exploitation associated with them.

In investigating opinions towards community scale wind projects, the work tests the theory that any opposition to wind power can be broadly categorised as those concerned about change (those taking one branch of the survey questionnaire) and those suspicious of exploitation by large developers (those taking another branch of the survey questionnaire). This survey work, in assessing opinions, makes assumptions that aspects contributing in two barriers identified in the Dyfi Valley project have been accounted for (access to supporting finances and a market for generated electricity). Other assumptions beyond the scope of this project include the specific physical requirements and precise location of the installation.

3.2 The Study Area

The county of Ceredigion in mid Wales is a poor county. Gross disposable income per household accounts for regional variation in cost of living, and can be used as an indicator of poverty. The figure for the 'West Wales and Valleys' region (which incorporates Ceredigion) in 1999 was just over £16 million compared with £31 million for Surrey, East and West Sussex (National Statistics, 2001). There is little economic wealth in the county but it does benefit from its environmental resource which includes wind. Most income is generated by tourism. The opposition to wind energy claim that turbines will threaten tourism, although at the current levels of concentration tourism is not adversely affected, with less than one in ten tourists surveyed stating wind turbines as negatively impacting their visit (MORI, 2002a).

3.2.1 Geographic Information Systems (GIS)

GIS was originally intended to be used as a tool to identify communities for survey to include the physical layers outlined in work conducted in Germany (Therivel and Partidario, 1996) and in another study produced by Baban and Parry (2001). The layers would have included physical features such as proximity to settlement and woodland to then be overlain with social features such as income and unemployment.

The scope and restrictions of the current report prevented the use of GIS. Attempts to use GIS revealed the problems of determining layers to use, and obtaining the necessary data to create them. Data from the Meteorological office data set available from the British Atmospheric Data Centre in Milton Keynes gave point source measurements in considerable detail (up to hourly readings in some cases) from which a mean annual wind speed (MAWS) was derived.

The Department of Trade and Industry's NOABL wind speed data set was developed from Meteorological office data. The system is still widely used today to assist in area location for suitable sites. The model provides wind resource estimation at a resolution of 1 km², however, this scale was not considered fine enough to be useful

in developing a GIS map to identify sites through overlapping other layers. The scale is not small enough to account for the microclimatic effects of structures causing deflection which would affect any wind resource at site and must be assessed by any developer. There can be a large variation in readings seen from spot data measurements (Meteorological office anemometers) and the corresponding spot data from the NOABL model. It was considered that the many factors such as topography (elevation), local physical features (terrain) would result in great inaccuracy in a map purely based on NOABL data with out being supported by anemometer measurement.

The NOABL modelling is complex and already incorporates error adjustment for surface roughness, micro topography, and hub height. The model is good for making regional site identification but not small scale under a kilometre resolution. Although built from primary weather station data, there are great differences between wind speed taken from the NOABL model and spot data measurement of mean annual wind speed. Local features can have a huge effect. For example, two weather stations on either side of Milford Haven produce very different measurements. The Milford Haven C.B. data station (altitude 44 metres) had an average annual wind speed between 1997 and 2000 of 10.9 knots whilst less than 10 miles away at an altitude of 33 metres the Dale weather station recorded an average of 217.6 knots between 1994 and 2000 (data from the British Atmospheric Data centre).

The use of GIS would have allowed triangulation of methods, considered ideal in any project design (Patton, 1990) to achieve specific identification of potential sites. However, the time and resources determined that the project had to focus on the social survey. Rather than a market research study identifying particular villages suited to the incorporation of such a project, the focus of the project turned much more to surveying opinion.

3.2.2 Assumptions of the study methods

Existing maps were used to give an idea of wind speed in the area, which indicate a general high figure throughout the region (AEA Technology, 2000 and CBA, 1992). Given the technological capacities of existing grid infrastructure described above, and

the physical complexities, a sufficient MAWS for the area was considered acceptable with detailed and specific site study a later stage of assessment. This project is an assessment of perception not of resource, the object of the questionnaire survey was to gauge opinion, interest and acceptance to the level of proposal.

The smaller scale of the hypothetical proposal based on the Dyfi Valley turbine also incorporates a degree of flexibility in locating projects of up to one megawatt, and places less importance in establishing the precise site. This also avoids the cumulative effect problems which are amplified by large proposals. The proposed size outlined by the questionnaire of this study also makes for easier passage through planning. Some smaller installations of less than 2 turbines, or hub heights of less than 15 m, do not require full Environmental Assessment (EA) under the current EA guidelines outlined by the Department of the Environment, Transport and the Regions (DETR, 2000).

Baban and Parry (2001) highlighted a number of characteristics as important in developing a site for a wind farm. These had been identified by local authorities and private consultancies and included for example proximity to settlement or forest, the wind resource and broad features which can be divided up under headings of resource, planning and site use characteristics. For the purposes of this investigation, each target community was assumed suitable for receiving a wind installation.

The aim of the questionnaire survey is to achieve an assessment of opinion regarding the scale of wind energy described. Therefore a number of other factors were considered to carry more importance in forming the questionnaire over the physical features of the site. Today's technology can support lower annual wind speeds on site, although opinion is divided over the MAWS which provides economic viability. Some suggest minimum wind speeds of 6.5 m/s (AEA Technology, 2000), although some wind farms in Germany are found in areas with >4 m/s MAWS (Partidário and Théritel, 1996). Issues of grid connection are overcome by the scale of proposed project; turbines whose rated output is less than one megawatt can be connected directly to the existing domestic grid without peripheral grid overload, therefore avoiding the requirement for upgrade (CBA Associates, 1992). This fact actually bypasses the economies of scale argument, and calculations demonstrate due to the

lack of upgrade requirement that there is no great economic advantage in installing a 1 MW over an 8 MW system (CBA Associates, 1992).

Certain practical assumptions were made to enable survey by questionnaire for the outlined proposal. As each target community was considered potentially able to accept a project on the scale proposed, access to supporting grants was assumed, as was a market for the electricity produced. Both these issues had formed part of barriers identified by Leaney and Hislop (2000).

3.3.3 Elimination and self selection of targets

Communities were defined as corresponding to the boundaries of the lowest level of government. Each of the communities selected had their own town council. The three target communities were chosen for their similar size to the town of Machynlleth, on whose successful community turbine installation this project is based. The communities were also chosen because of their location, and relative distance from the Dyfi Valley project and existing farms.

The first selection criteria was population size, considered an important feature in determining support for this type of project. The population of Machynlleth is around 2000 (PCC, 2003). Six such population centres exist in Ceredigion: Aberaeron, Aberporth, Borth, Lampeter, Llandysul, Tregaron (Ceredigion CC figures, 1996). Population estimates for the three targeted communities are given in table 3.1.

Table 3.1 Population estimates for target communities (Ceredigion County Council, small area population statistics 1996). Figures given ‘out of town’ are still within the district council.

Community	Location	Population Estimate	House Estimate
Aberporth	Town	1090	580
	Out of Town	470	220
	Total	1560	800
Llandysul	Town	1400	510
	Out of Town	900	500
	Total	2300	1010
Tregaron	Town	940	460
	Out of Town	360	160
	Total	1300	620

The second selection criterion was geographical location. Machynnleth markets itself as a centre for ‘green tourism’ (PCC, 2003) and the Centre for Alternative Technology (established 1973) is located just outside the town. It was considered very important to assess communities beyond such a ‘green’ influence, so the three furthest from Machynnleth were chosen for survey. Aberporth is approximately 50 miles, Llandysul is also approximately 50 miles, and Tregaron approximately 36 miles from Machynnleth (Distances are given as shortest road distance from the web based RAC route planner <http://rp.rac.co.uk/routeplanner>).

The third selection criterion, distance to existing wind farms, determined the three communities chosen for survey. Only one town from the target sample has proximate experience of wind turbines. There is a small group of three at Blaen Bowi which were constructed in 2002 about 5 miles from Aberporth on the road to Newcastle Emlyn, south east of the town. However, there has been a 10 year history of wind farms in the area, developed since the study by CBA (1992), with the larger local farms of Llangwryfon, Rheidol and Mynydd Gorddu, to the east of Aberystwyth and Dyffryn Brodyn and Parc Cynog to the south of Cardigan (Figure 3.1). General

exposure to wind farms is a regional experience although none of the towns has an actual farm within 10 miles, and the cluster outside Aberporth is not visible from the town so was not considered a complication to the sample.

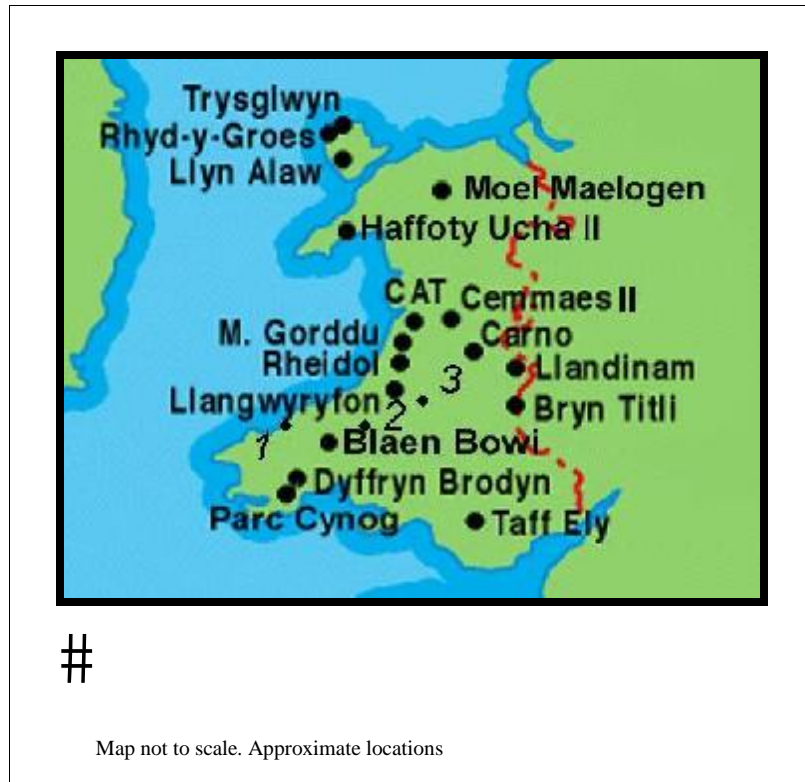


Figure 3.1 Welsh Wind Farms operating in August 2003 showing relative locations of communities targeted for survey Aberporth (1), Llandysul (2) and Tregaron (3) [Map copyright to BWEA, reproduced by kind permission].

3.2.4 Description of target communities

Aberporth Coastal location. Originally an agricultural community, with some fishing, today’s economy is mainly dependant on seasonal tourism and the beach. There is an RAF base on the edge of town employing about 300, but most of the community is retired.

Llandysul A dispersed community of the town and surrounding villages, located in the south of the county in the Teifi valley. Tourism is the main source of income, with the town marketing itself on its history and attractive surroundings.

Tregaron Commands a strategic location between Lampeter and Aberystwyth, which has generated a community benefiting from both visitors and commuters alike. Its situation inland on the edge of higher ground also attracts tourists as a base for walking, fishing and outdoor pursuits. In addition, there is a small food factory employer.

3.3 Questionnaire Survey Justification

A telephone survey to canvas opinion was adopted to maximise coverage and minimise time. Bernard (2000) lists a number of advantages and disadvantages of using this technique but a primary advantage is that the method produces rapid results. It is relatively inexpensive to conduct such a survey and has a relatively high response rate. Swetnam (2000) suggests a successful return of over 60% with personally collected questionnaires compared to a 2 to greater than 10% success rate to postal surveys. If answers are taken directly from the interviewee they can be considered to have a greater validity. The telephone survey technique also offers a degree of control over the question ordering. Without the opportunity to view all the questions and return to others the structure can allow information to be revealed incrementally.

Disadvantages of the technique include reaching only that part of the community that has a phone. Cold calling is also intrusive, and calling at an inappropriate time may cause rejection or perhaps affect responses. Although phone surveys remove any feelings of inadequacy the interviewee may have in facing the questioner (Bernard, 2000), they bring their own problems of interpretation and without being able to review a printed question less confident phone users could produce non-genuine responses.

The accent of the interviewer and introduction of the survey by the interviewer may affect the reception of questions, willingness to talk and even agreement to participate in the survey. Delivery and presentation of questions may also affect interviewee response. Patton (1990) raises the point that the interview technique must be very careful not to influence the opinion and therefore response through delivery. Patton further indicates the problem that when using dichotomous questions, the interviewer can almost subconsciously 'guide' the interviewee through the questions. The interviewer must offer very non committal, minimal input to not probe or sway opinion.

Rejections are more frequent on the phone, which a field approach may have avoided. Although time consuming, field questioning gives a sense of personal contact which is absent on the phone. This benefit was lost in favour of the time savings achieved and considered appropriate given the yes/ no questioning approach adopted.

Whilst the questionnaire is considered an acceptable method, questions need always to be constructed from the perspective of the respondent, and this creates a requirement to simplify any complex language (Swetnam, 2000). Although those approached in the sample were given the option to take part, questions should be simple enough to appeal to those with indifferent opinion, to ensure the nature of the survey does not put some people off.

Problems specific to the study area and the questionnaire method adopted are highlighted in the methodology critique, section 5.1 of chapter five.

3.4 The Questionnaire (Appendix II)

The questionnaire content was shaped around previous work formalised by Leaney and Hislop (2002) in describing the most recent community based project to be grid connected (Dyfi Valley). As a social survey of attitude, several assumptions on the physical characteristics of the site have been made in selecting the target communities (see section 3.2.2 'assumptions of study methods'). The scope of the project allowed

only two of the barriers identified by Leaney and Hislop (2002) to be assessed (access to information and access to knowledge). The focus of the questions addressed the fear of change (CBA 1992, ETSU 1993 and Esslemont 1994) and the distrust of developers in exploiting the community, (Draisey pers comm 2003, Pidgeon in press, Mitchel 1994, ETSU 1997b and Wolsink 2000) to establish the level of interest, acceptance and the potential for expansion of projects from the mould (size and nature) of the Dyfi Valley project.

Following the contact details, the next section contained questions whose content suggested the social position of the respondent. The section included questions on how long the interviewee had lived in the community of survey and also asked the distance travelled to work. By assessing the period of residence and working contribution, both questions were considered to provide an indication to the structure and cohesion of the community.

The third section assessed the interviewee's values regarding climate change to ensure that the sample did not hold excessively 'green' opinions. The latter sections of the questionnaire contained questions assessing opinion on wind power in general, and the opinion of large developers to explore the theme of exploitation and distrust. The sections also contained questions to specifically consider the opinion of the community owned project in assessing opinions over issues relating to barriers identified in the Dyfi Valley project, for example the raising of project finances and opinion of grant support.

Some questionnaires employ graded scales for answers. The graded method was considered inappropriate as the immediate response was the desired reaction looked for. Therefore, yes/ no closed questions were used, which directed the interviewer through the questionnaire by the answers given to specific questions, and revealed more than a graded response would.

An example of a closed question used was Question 5.2 in the Pilot (see Appendix I)

5.2 Are you aware of any information or organisations to assist in establishing a community wind project?

Yes No

A simple question like this needed no further qualification and allowed for ease of analysis. Open questions were avoided except to elaborate particular opinions of interest for example the issue of management, addressed in question 6.3 of the Pilot survey and its accompanying question, 6.3.1.

6.3 Do you consider the project should be managed externally?

Yes *No*

6.3.1 If no, why not?

The responses to open questions are more difficult to analyse and present as emerging trends, however certain themes commonly occur if the subject area is narrowed by any relating questions.

The questions were ordered to prevent topics raised in earlier questions influencing opinions to later questions. The interviewee's true opinion was looked for. For example, Question 5.1 of the true survey (see Appendix II) is the first introduction of the small scale concept having established the interviewee's reaction to wind farms and the large developer in the questions of earlier sections.

5.1 Would you support or oppose a proposal for a single or small group of turbines share owned by members of the community?

Support *Oppose*

The ordering of the questions gives credibility to the analysed results, which as Patton (1990) confirms is the objective of any research strategy. The survey's short length was ensured to keep attention and maintain interest, whilst making best use of time and resources available.

3.5 The Sample

The electoral register was first used to generate a random list of names which were then looked up in the phone book. Unfortunately, the use of the electoral register immediately introduced a bias against those not registered. However, it was considered that unregistered people are more likely to be of lower income and perhaps less education. Thus the method favours registered members of the community with a

phone. This category would immediately include those who would be more likely to invest. Whilst those in the former category should not be ignored, the category was assumed to be less likely to contribute to community activity. For the purposes of creating a sample, they were excluded from this survey.

However, the technique proved unsuccessful. Many listed in the electoral register were not in the phone book. This highlighted a further problem of using a phone survey, in not reaching those without a phone, thus not creating a completely random sample of the population. Even if a house has a phone, there is no obligation to be listed in the phone book. The method was adjusted to just scanning the phone book on randomly generated pages for inhabitants of each of the three communities. Although generating a sample, this method was found to be very time consuming.

The community sizes indicated in Table 3.1 suggest that a sample size of at least 40 (2%) from each community had to be achieved to give the opportunity to draw inferences from the survey results with any sense of confidence.

The phone code for Llandysul covered an area with radius approximately ten miles from the town, thus the sample incorporated a more dispersed population from the Llandysul town and area. This was unavoidable in creating the sample. The population figures in Table 3.1 include the out of town population and demonstrate it does not vary greatly between communities. Although surveys were made of the town populations of Aberporth and Tregaron, the more dispersed sample was considered less of a problem after the methods were revised to not include assessments of specific locations which GIS would have indicated. Few samples are fully random as these complications for sample generation indicate, however, the object of a survey method is to minimise complications which would seriously bias the results obtained. The results should then be viewed in the light of biases which are unavoidable given the chosen method.

3.6 The Pilot

A pilot survey was conducted between 2 p.m. and 5 p.m. on Wednesday 7th May. A number of problems were identified from this initial survey and outlined below. Solutions to the approach were made accordingly. The original questionnaire used for this survey can be seen in Appendix I.

Length of survey The survey took too long and it was considered that some questions were causing confusion. The ambiguities were identified and a number of questions simplified.

Length of question Some questions were revealed as unnecessary and removed or combined with similar questions.

Timing of phone call The pilot was conducted at lunchtime and received replies from the retired, farmers, retired farmers and housewives, only those in at that time of day. The survey was adjusted to early evening to catch those at work during the day.

Structure The construction of the original questionnaire had favoured those answering in support of the community proposal. It did not seem to provide suitable options for those in opposition to express their true feelings about the proposal outlined by the questionnaire. This reveals the problem raised by researchers, that surveys are not value free (Patton, 1990). However, it was felt that a degree of neutrality was achieved after restructuring the questionnaire and creating a two stream support or oppose format.

Answers A further category of 'don't know' had to be created to accommodate some of the responses.

The phone conversation was introduced simply with my name, that I was based at the University in Aberystwyth and writing a report on people's opinion. The type of questions and the length of survey were also mentioned.

'... I am calling from the University in Aberystwyth. I am writing a report on people's opinions regarding wind farms. I have a five minute telephone survey, and I wonder if you have the time or interest to take part?'

There was no mention of community scale wind power or share ownership. As little information as possible was provided in the introduction both to avoid swaying opinion and to also cut back on time. Those that were interested in taking part but wanted more reassurance on the nature of the survey usually asked for further clarification themselves.

3.7 Figure analysis

Following the survey, results were collated. The total sample was analysed using a Chi squared test to assess the distribution of responses, and whether trends were seen or the distribution was due to chance alone. The interaction of answers provided to certain questions were also analysed for their distribution in preparation for presentation and comparison. The simple non parametric analysis is the most appropriate for the frequency data from questionnaire survey. The results of this test indicate whether the distribution of survey figures is a result of chance or not.

Results

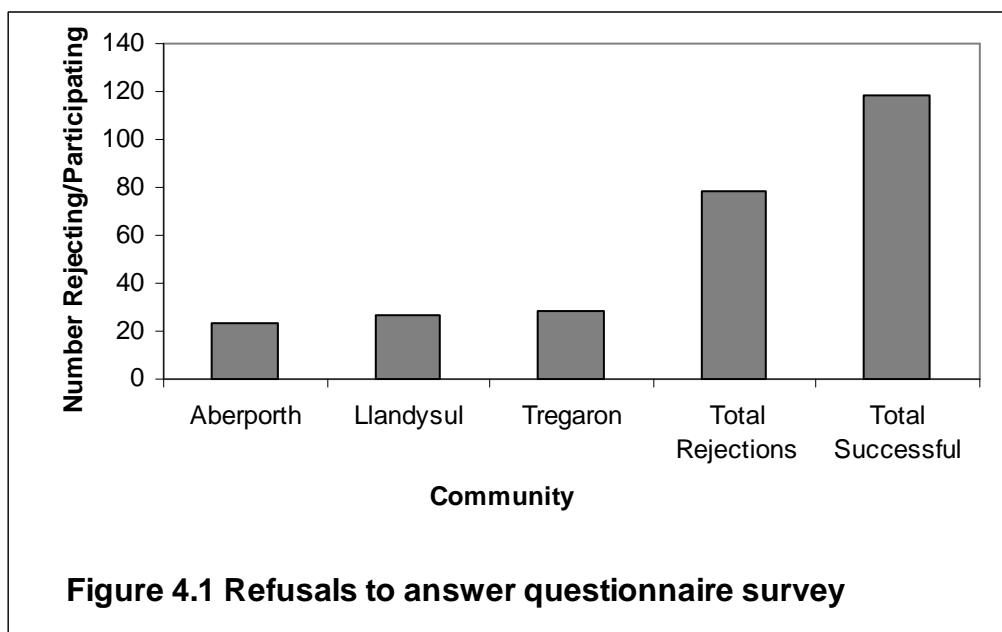
Chapter Summary: Section 4.1 indicates the success rate of the survey, reproduced in graphical form. The survey result from each sample community is totalled for presentation, the reason justified and validated with supporting statistical analysis. In section 4.2 related survey responses are analysed using the Chi squared test to answer specific inferred questions and presented for interpretation. Figures address particular barriers to community wind power projects revealed by literature review.

4.1 Introduction

The sample size was 118 after 8 weekday surveys between 5.30 p.m. and 9.30 p.m. conducted between Monday 9th June and Tuesday 24th June.

88 respondents (74.6%) supported the project proposition of community based power (regardless of opinion of large developers), and took the A stream of questions. 30 respondents (25.4%) opposed the project outline, and answered the B stream of the questionnaire (Appendix II).

The total number of rejections was 78 compared with the 118 successful surveys (Figure 4.1). This figure varied very little between each community targeted.

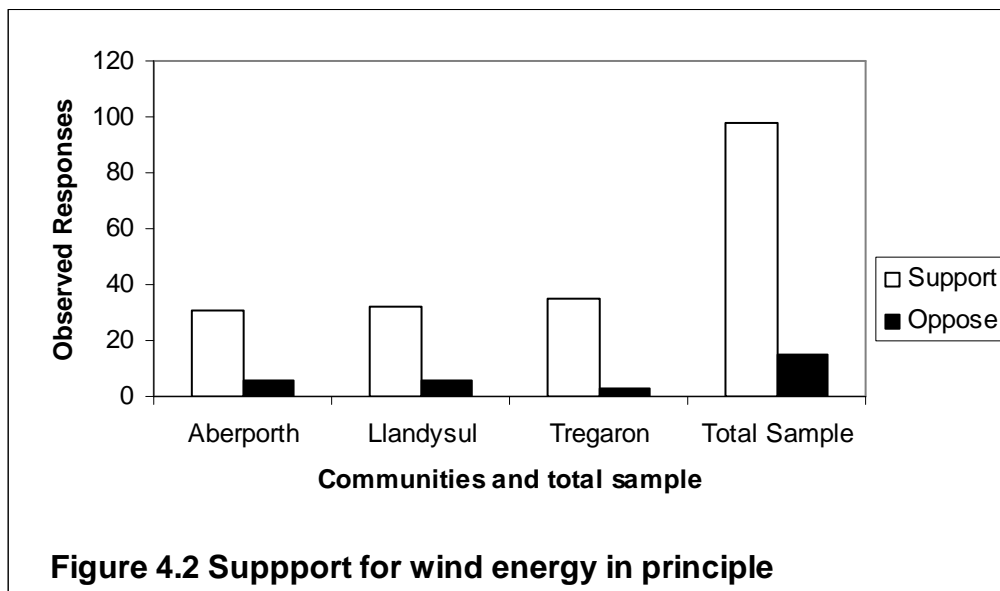


The large number refusing to take part in the survey must be borne in mind when considering the results. It is a large number, and previous work would suggest that some of those will be in opposition to wind farms. However, it is impossible to say how many or if all the refusals are in opposition, as well as the proportion in support.

4.1.1 Analysis of the sample

Histogram of Question 4.2: Do you support wind farms as a means for electricity generation?

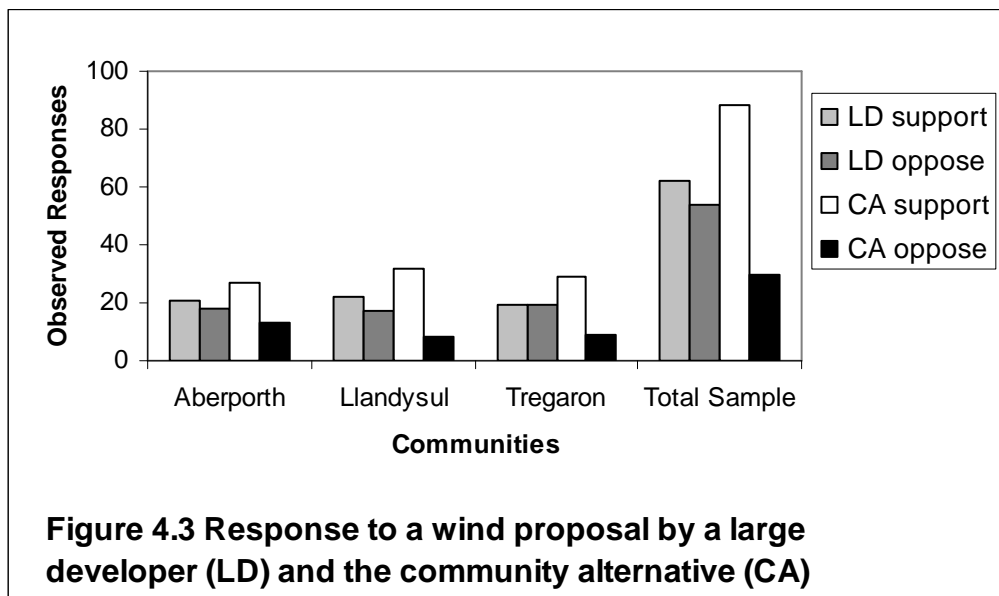
The direct question for support of wind energy as a means for electricity generation produced a strong result in favour of the principle (Figure 4.2). The percentage of this survey in support (83%) strongly agrees with previous work summarised by Hill (2002) of between 70 and 80% in favour.



There was no variation between each community in the number supporting and opposing the means of electricity generation (31 in Aberporth, 32 in Llandysul and 35 in Tregaron supported wind energy as a means of electricity generation).

Histogram of Questions 4.1: ‘Would you support or oppose a wind farm in your vicinity proposed by a large developer’, and 5.1: ‘Would you support or oppose a proposal for a single or small group of turbines share owned by members of the community?’

Figure 4.3 demonstrates the response to a project proposed by a large developer and the alternative owned by the community. Responses to both questions are plotted.



Little variation is seen between communities (allowing the sample to be totalled). The strongest support was directed at the community alternative.

Analysis of the answers given to both questions of response to a large developer and response to the community alternative demonstrated a strong correlation between the answers ($\text{Chi}^2 = 47.86$, $\text{df} = 2$, $p < 0.001$). This allowed the answers to be directly related. Interacted responses from two related questions form the main analysis of areas investigated in the body of the results.

The interacted response seen in Figure 4.3 demonstrates that those in opposition to the community alternative (30 respondents) were in opposition to both proposals.

Histogram of Questions 3.1: ‘Do you consider climate change caused by global warming, a problem which will affect you’, and 3.2: ‘Is a safe long term solution to global warming needed?’

One of the aims of the survey was to target communities of suitable size as far from the established project and green values at Machynlleth as possible. Two questions were asked on attitude to issues of climate change. There seemed to be a general but not unusually excessive interest, as indicated below.

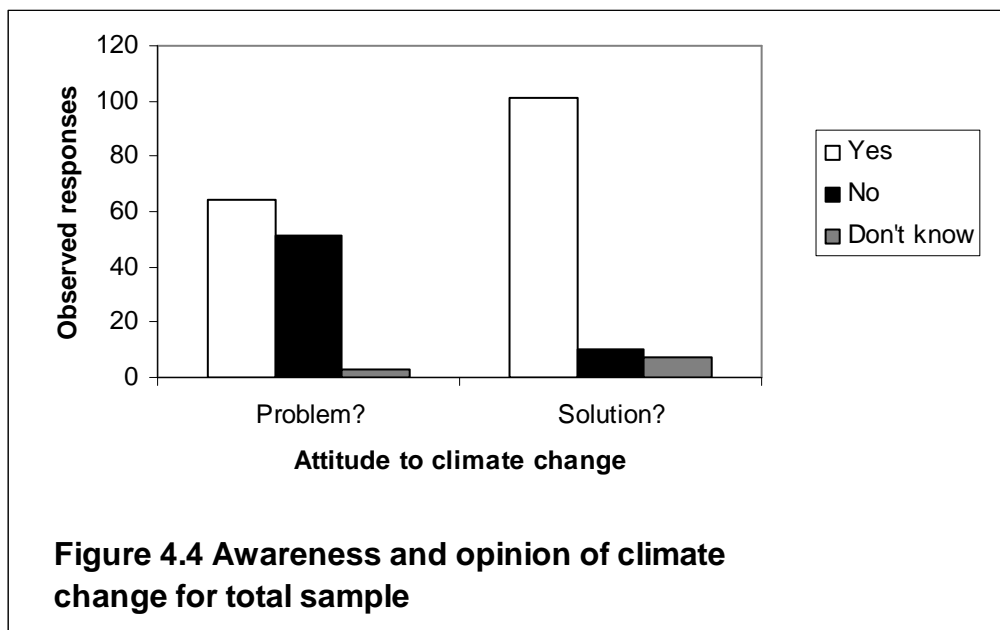


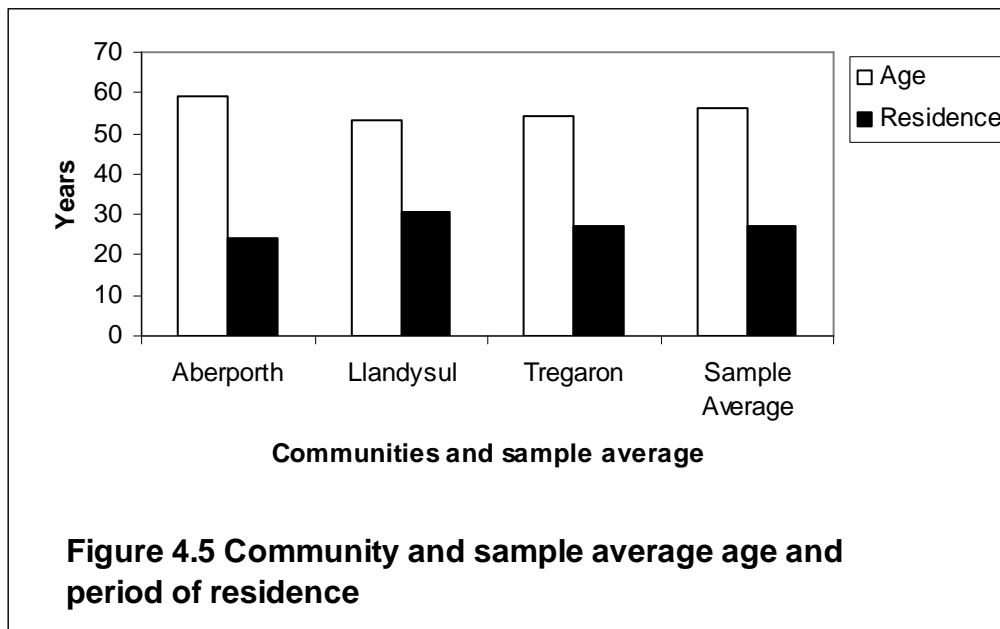
Figure 4.4 suggests that as many people consider themselves to be affected by climate change as do not. The accompanying question qualifies the answer; in supporting a ‘long term solution’ they would seem to be considering the next generation, if not their own.

Histogram of Questions 2.1 and 2.2: Age and period of residence.

The method originally intended to consider each community as distinct and assess its own potential for absorbing a community scheme. This idea was abandoned following the abandonment of the GIS method. It was considered that without contextual data to draw inferences from the data from and assumptions made, there was little advantage

to be gained from community comparison. The methodology critique (section 5.1) of chapter 5 also provides illustration of why the lack of social information and complications encountered with the method used remove any value in direct community comparison. Interestingly, there was no discernable difference in responses given between communities. Figures 4.1 to 4.4 demonstrate a very close match for wind energy support, and opinion of the large developer, and attitudes to climate change between each community. This trend adds support for the decision to total the sample. The figures in the main body of the results further analyse the divided opinions for support or opposition to community power.

As a means to demonstrate the similarity between communities and the decision taken to total the sample, the following figure presents two aspects of the community structure. Figure 4.5 demonstrates a minimal departure from the average figures for age and length of stay for each of the communities targeted.



The greatest average age and shortest length of stay was seen in Aberporth, considered the most likely centre to attract immigrant retired population due to its coastal location. However, the difference from the average value was very small.

4.2 Interaction Analysis

Areas highlighted by the literature review as barriers to the expansion of community scale wind energy projects are presented in the interactions of responses below.

Some of the following analyses compare the interactive responses within the 88 respondents that were in support of the community proposal (marked 'interaction' in the questionnaire column of Table 4.1). It must be remembered that 88 is only 63% of the sample which is just under 2% of the households of the summed communities (see Table 3.1). On occasion this total was further revised as some of the responses gave too small a total for inclusion in analysis (answers for 'don't know'). However, as Patton (1990) suggests, the sample size can be anything if justified and credible.

Table 4.1 Summary of following figures and the questions each related analysis addressed. For questionnaire see appendix II.

BARRIER	FIGURE	LINKED QUESTION INTERACTION	ANALYSIS
Distrust	4.6	Opposition to large developer and support of the community alternative	4.1 and 5.1 INTERACTION
Distrust	4.7	Opposition to large developer and advocate internal management	4.1 and 5.7.1A INTERACTION
Distrust	4.8	Opposition to large developer and community alternative, stating community exploitation	5.1 and 5.3B
Fear of change	4.9	Opposition to community alternative but considering the community strong enough for investment	5.1 and 6.2 INTERACTION
Knowledge	4.10	Knowledge and interest in community proposals	5.2A and 5.3A
Knowledge	4.11	Problems highlighted with the community proposal by those in favour of it	5.8.1A
Finances	4.12	Reasons for non investment from those in support of the community alternative	5.4A volunteered detail
Finances	4.13	Confidence increased by grants backing the community proposal	5.5A
Motivation	4.14	Opposition to large developer but consider investing	4.1 and 5.4A INTERACTION

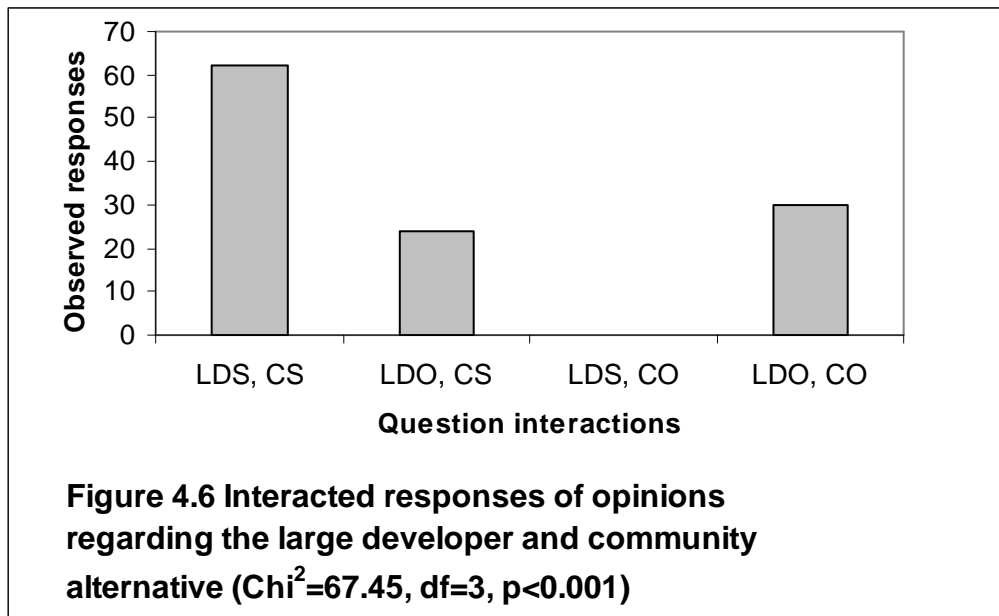
4.2.1 Distrust of the large developer

Contingency table analysis and histogram of Question 4.1: ‘Would you support or oppose a wind farm in your vicinity proposed by a large developer’, and 5.1: ‘Would you support or oppose a proposal for a single or small group of turbines share owned by members of the community?’

In addressing distrust of large developers, the first analysis considered the basic opinions of support or opposition for a proposal by a large developer and the community based alternative

Table 4.2 The Observed and (Expected) figures for the interaction response to a proposal by a large developer and a community alternative (total adjusted for strength of analysis)

		Large Developer		COMMUNITY ALTERNATIVE TOTALS
		Support	Oppose	
Community Alternative	Support	62 (29.0)	24 (29.0)	86
	Oppose	0 (29.0)	30 (29.0)	30
LARGE DEVELOPER TOTALS		62	54	116



LDS = Support for the large developer
 LDO = Opposition to the large developer
 CS = Support for the community alternative
 CO = Opposition to the community alternative

The sample total was adjusted to remove two answers of ‘don’t know’ which would have weakened the test.

The null hypothesis is that there are no differences among the (four) categories, hence the setting of all the expected values as equal to one another. The four categories are the support or opposition to a project proposed by a large developer, and the interacting response to a community scale alternative.

The Chi squared test demonstrated by its low value that the probability of the null hypothesis being true was very small. The Chi squared analysis of the observed figures against the expected calculated figure suggested that the distribution was not a result of chance alone. There is quite clearly difference among the four categories with the greatest deviation from the expected value obtained for the support of both proposals. The figure of zero for the support of a large developer and opposition to a community alternative indicates that the ordering of the questions was important in producing the observed result. Those that were opposed to the community alternative were also opposed to the large developer.

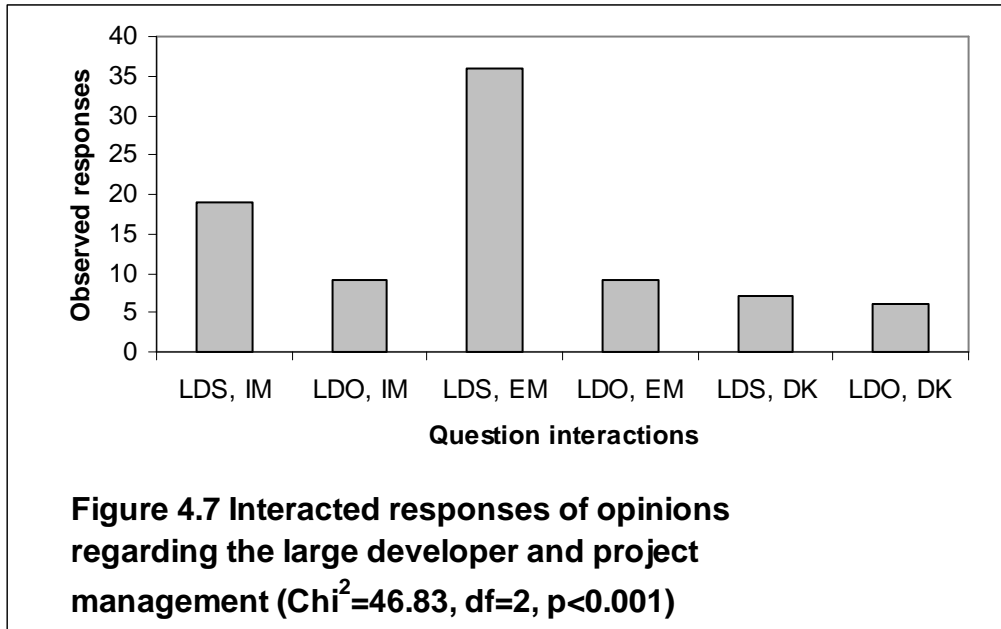
The test validated the trends noted in each of the observed figures. The test indicated that the observed figures are not random and can be perceived as trends running through the community. As the sample was randomly selected from the community the trends seen can be anticipated to run throughout the community surveyed.

Contingency table analysis and histogram of Question 4.1: ‘Would you support or oppose a wind farm in your vicinity proposed by a large developer’, and 5.7.1.A: (5.7A ‘Do you consider any such project should be managed externally?') If no, why not?’

The second test of suspicion of the large developer considered whether there was a trend noted amongst those opposing a large developer (who then expressed support for the community alternative giving a sample of 86) and advocating internal management of the proposed community based alternative.

Table 4.3 The Observed and (Expected) figures for the interaction response to support or opposition for a proposal by a large developer and the management alternatives (total adjusted for strength of analysis)

		Large Developer		MANAGEMENT TOTALS
		Support	Oppose	
Management	Internal	19 (14.34)	9 (14.34)	28
	External	36 (14.34)	9 (14.34)	45
	Don't know	7 (14.34)	6 (14.34)	13
LARGE DEVELOPER TOTALS		62	24	86



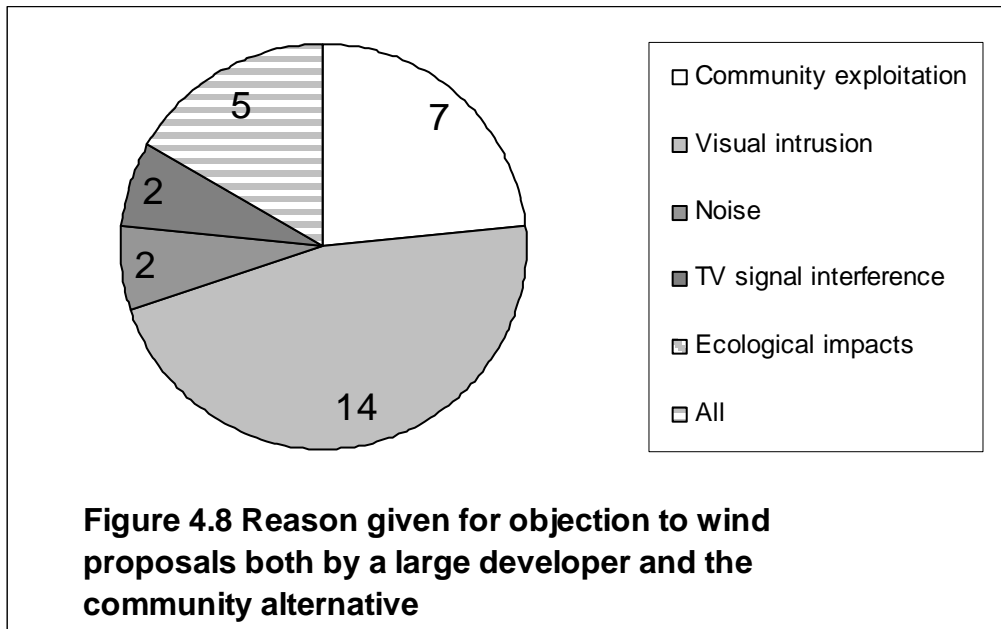
LDS = Support for the large developer
 LDO = Opposition to the large developer
 IM = Support for internal management
 EM = Support for external management
 DK = Don't know

The Chi^2 value indicates that the figures are not simply a random distribution, and the greatest deviation from the expected value is noted amongst those supporting the large developer and external management. The figures would not support the idea that mistrust of large developers was a serious concern in the project proposal. Indeed the figure for opposition to a large developer and support for internal management was not greatly different to the expected value.

Pie chart of response to Question 5.3.B: 'Which of the following impacts of wind farms do you think is most important...', following Question 5.1: 'Would you support or oppose a proposal for a single or small group of turbines share owned by members of the community?'

The direct test of distrust trust assessed whether those opposed to both the community based and large developer proposals stated exploitation by a large developer as their

greatest objection. However, there were only 30/118 opposed to the large developer and community alternative, therefore only 30 reasons given in opposition. This figure is too small to draw any inferences about the total community. Figure 3.8 indicates that there were only a total of 7 from 30 who expressed community exploitation as the greatest objection.



4.2.2 *Fear of change*

The following interaction assessed respondent's distrust of any form of wind development. The analysis tested whether there were a large number amongst those in opposition to community based schemes who would consider that the community was strong enough to support its own independent investment. Would those who reject any wind farms still have an opinion that there was strength in the community to support investment in other matters?

Those in opposition to the community alternative had already expressed opposition to the large developer, and therefore all wind farm development (Figure 4.3). There were none in support of the large developer and opposed to the community alternative. In

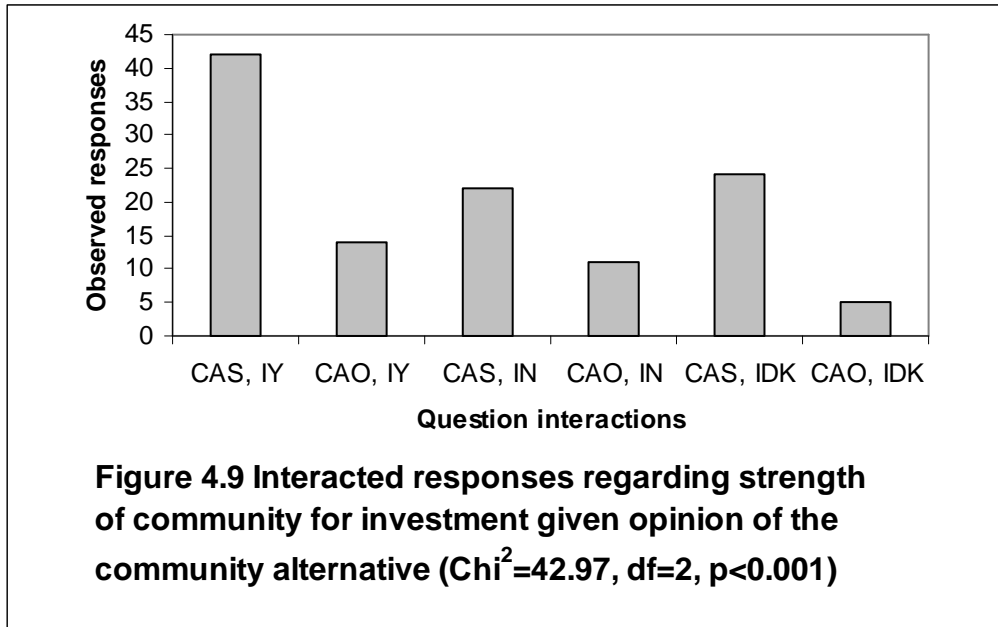
this instance, the total sample of 118 could be used as the total sample answered both questions.

This analysis tests the fear of change as well as the mistrust of large (or small) developers. If the right information was provided about the community alternative, could interest be generated?

Contingency table analysis and histogram of Question 5.1: ‘Would you support or oppose a proposal for a single or small group of turbines share owned by members of the community’, and 6.2: ‘Do you believe the community strong enough to support community investment?’

Table 4.4 The Observed and (Expected) figures for the interaction of responses regarding the strength of community for investment given opinion of the community alternative

		Community Alternative		INVESTMENT TOTALS
		Support	Oppose	
Community Investment?	Yes	42 (19.67)	14 (19.67)	56
	No	22 (19.67)	11 (19.67)	33
	Don't know	24 (19.67)	5 (19.67)	29
COMMUNITY ALTERNATIVE TOTALS		88	30	118



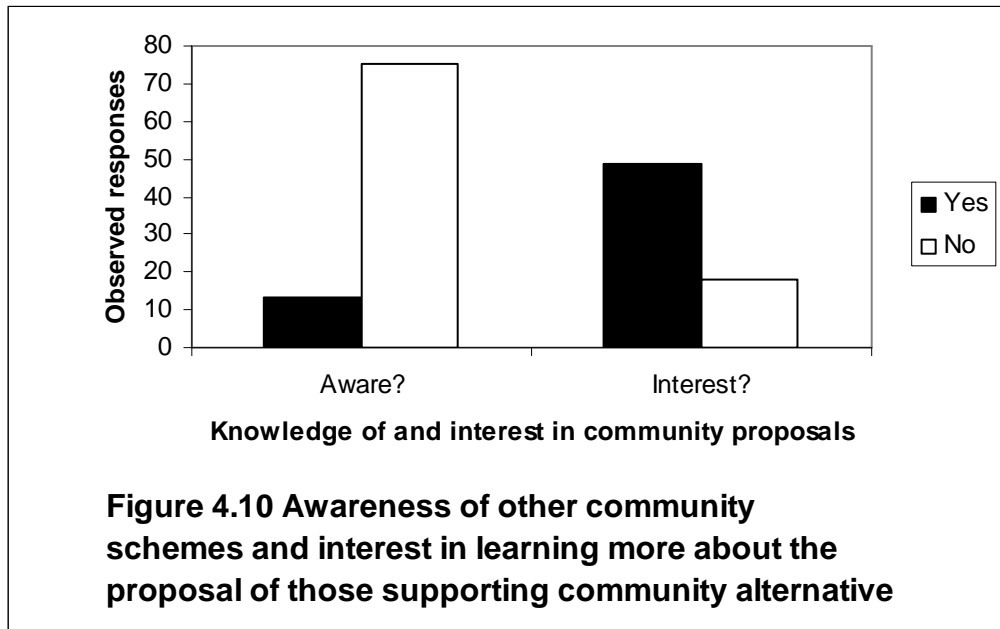
CAS = Support for the community alternative
 CAO = Opposition to the community alternative
 IY = Community is strong enough to support investment
 IN = Community is not strong enough to support investment
 IDK = Don't know if community is strong enough to support investment

Those in opposition to the community alternative were fairly equally split amongst those considering the community spirit was strong and those not. No great difference between expected and observed values was seen amongst the responses, except those in support of the community proposal.

4.2.3 Access to knowledge

Histogram of Question 5.2A: 'Are you aware of any information or organisations to assist in establishing a community wind project', and 5.3A: 'If information and advice was available detailing costs and benefits would you be interested in learning about a community wind project?'

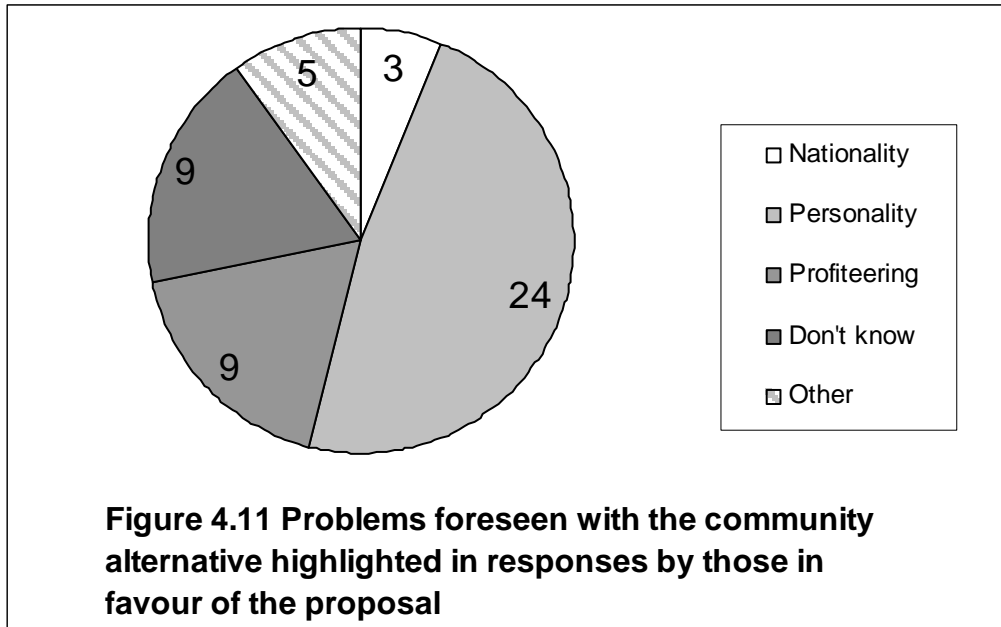
The two questions presented in Figure 4.10 asked directly whether the interviewee was aware of any similar project and their initial interest in learning more about a community based project they could become involved in.



Of those supporting the community proposal very few were aware of any other scheme. The greatest proportion wanted to know more.

Pie Chart of Question 5.8.1A: (5.8A ‘Do you foresee any problems with a scheme which is community led, community owned and profitable to shareholders) If yes, please state what.’

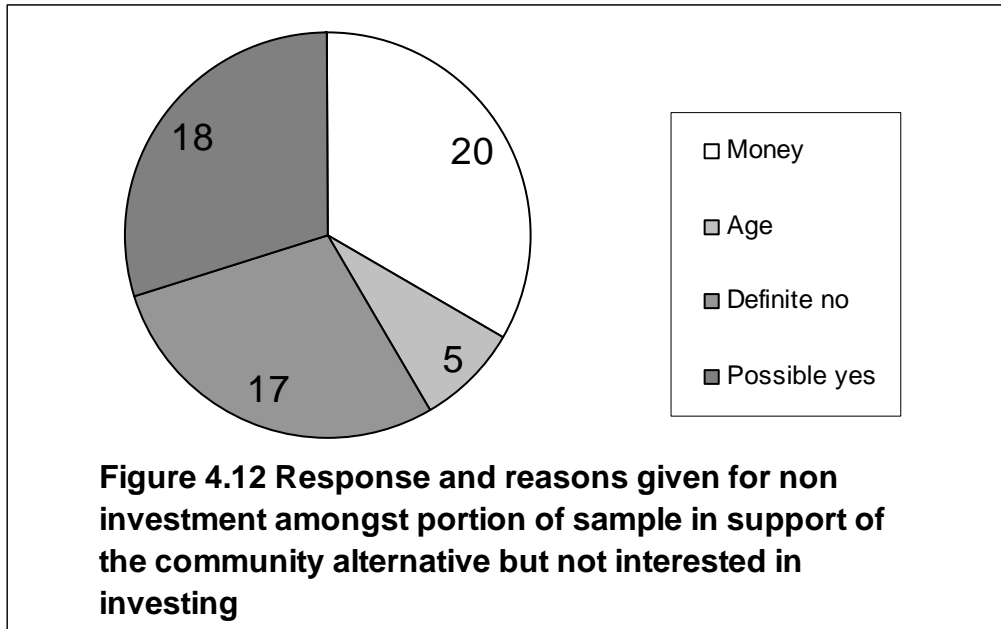
Figure 4.11 illustrates the question directly gauging peoples concerns over problems the community alternative would face.



Only a little over half of those supporting the community proposal expressed doubts and named problems (50/88). The greatest number stated internal politics resulting from personality and nationality differences as the issue. Only 3 actually mentioned the word nationality, but together the figure (27/50) suggests careful management is needed. As question figure 3.7 above suggests, this would be accepted by most.

4.2.4 Access to finances

Pie chart of opinions volunteered in response to Question 5.4.A: 'If a project financially rewarded shareholding investors would you consider investing', following support for Question 5.1: 'Would you support or oppose a proposal for a single or small group of turbines share owned by members of the community?'



The direct question of whether the interviewee would consider investing in a community based project is illustrated above by figure 4.12.

68% of the number amongst those in support of the community alternative would not invest (60/88). 32% of those indicated money as the reason for not investing (20/60). Once again there is not the number to draw any great inferences from the data towards the community, as the total sample indicating non investment is only 60.

Pie Chart of Question 5.5A: ‘Would the incorporation of grants supporting the project increase your confidence in the proposal?’

The direct question as to whether grants would increase the confidence of those supporting the community proposal is presented in figure 4.13.

69 from 88 indicate that grants would increase their confidence in the project proposal. The figure indicates that those uncertain in the success of the project would be given confidence by a project supported by grants. Many of the interviewees answering a ‘possible yes’ to investment would likely be amongst those gaining confidence in the grant supported proposal.

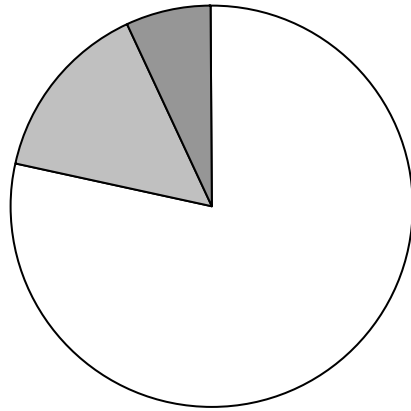
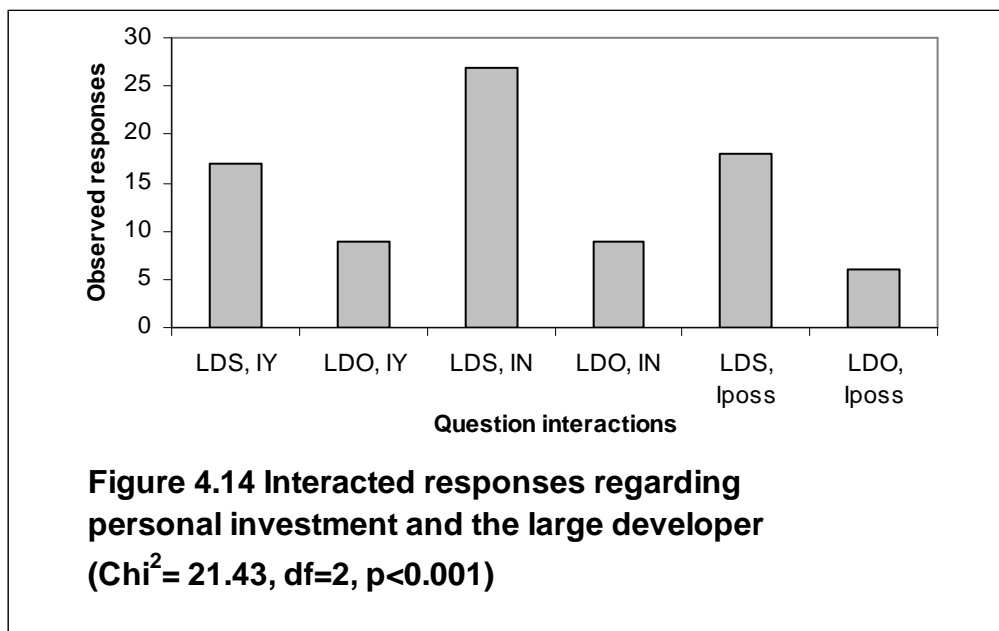


Figure 4.13 Opinion of the sample in support of the community alternative regarding increased confidence from

Table 4.5 The Observed and (Expected) figures for the interaction of responses regarding personal investment and the large developer (total adjusted for strength of analysis)

		Large Developer		INVESTMENT TOTALS
		Support	Oppose	
Individual Investment?	Yes	17 (14.34)	9 (14.34)	26
	No	27 (14.34)	9 (14.34)	36
	Don't know	18 (14.34)	6 (14.34)	24
LARGE DEVELOPMENT TOTALS		62	24	86



LDS = Support for the large developer
LDO = Opposition to the large developer
IY = Would consider investing
IN = Would not consider investing
Iposs = Would possibly consider investing

The analysis of these two questions was rather crude in considering two unrelated questions, but considered the issue of personal gain. The interaction did however touch on the answer of internal political conflict which many highlighted as a problem

of the proposal. This was suggested would arise from pitching the opportunity for one investor with many resources against another with few. All of the responses in this analysis were in support of the community alternative, and had previously expressed their opinion of the large developer.

The greatest deviation from the expected value was those answering no to investing having supported the large developer. There was no large departure from the expected for those interested in investing, but who were also in opposition to the large developer.

Discussion

Chapter Summary: The success and failings of the method chosen are presented in section 5.1. Section 5.2 firstly interprets the findings of the survey questions and goes on to consider some of the comments of respondents which formed common themes of the survey.

5.1 Methodology Critique

The following headings were all identified as influencing the responses given to the questionnaire.

5.1.1 Understanding of questions

The method set out to target 40 persons from each of the three communities. There was a high success rate with the telephone technique adopted. 118 successful surveys were complete in 32 hours. The method not only returned such a good response but also allowed the questioning to be targeted and specific producing the immediate ‘gut reaction’. The streaming of questions also allowed for a progressive shaping of opinion for ease of analysis.

However, several problems were also encountered with the telephone method. Some respondents appeared not to fully understand all the questions, and although the quick response was looked for, it was important to assess true opinion, not a misunderstanding of the question. Some interviewees experienced difficulty in being expected to produce immediate responses; one could ‘*definitely*’ see problems with the proposal but could not say what. One interviewee explained that she would like time to think about the questions, saying that she did not normally answer questionnaires over the phone. The technique was defended by explaining the initial reaction was desired and the questionnaire constructed around this requirement.

This desired immediate ‘gut reaction’ also produced the occasional contradictory response. One interviewee answered without hesitation that Tregaron had a strong community but when asked if she then supported investment, the answer was ‘*not for wind farms.*’ The question had been skewed by the respondent’s opinion and instinctual feeling. Although by nature, no survey of opinion can be objective, questions can be skewed by some participants.

Care must be taken with this kind of survey, based on people’s immediate reaction, as questions at the start of the survey may influence the response to questions at the end. Therefore, any interactive analysis of the questions must be interpreted with caution,

A further problem of misunderstanding and interpretation was highlighted by the reaction given in some interviewee’s answers, suggesting that they had not grasped the important point of the question. For example, question 4.1 addressed support or opposition to the large developer.

4.1 Would you support or oppose a wind farm proposed by a large developer in...?

The critical part of the question was ‘large developer’, which having heard wind farm was seemingly amalgamated in some cases, to produce ‘large wind farm’. On occasion, the reaction was accompanied by verifying comments which confirmed this, and the question had to be clarified. The follow up question (question 4.2) qualified the support or not for wind energy.

4.2 Do you support wind farms as a means for electricity generation?

However, the first question although addressing distrust was interpreted by many as assessing opinion on wind energy. A common answer to the support or opposition to a large developer proposal (question 4.1) was ‘*...depends on where it is to be sited,*’ which addressed wind energy and missed the issue trust. Whilst some interviewees asked for qualification, it was clear that some missed the point about the developer.

One interviewee pointed out that deliberate confusion by ‘spin’ to hide any sources of potential conflict was a general problem for public acceptance of projects, as this led to interpretation and suspicion. People develop attitudes and preconceptions over time which then becomes difficult to affect. People have to see some kind of a reward to accept a proposal for development if they are to accommodate and wholly support a

development. With acceptance, the project can stand as a visible, tangible standard for people to understand. It is easier to grasp a concept if it can be seen and associated with something of personal benefit.

Although the questionnaire survey was introduced by explaining that the study was conducted from the University, there was no direct explanation that the information was not conducted on behalf of a profit maker. One interviewee new to the area expressed concern at what she interpreted to be a threat to her new home, in saying

‘What is this about; you are not planning on putting in a wind farm are you?’

Some areas of the survey could have been expanded further by more specific questioning, and whilst many answers were volunteered, further questioning would have allowed direct and comparable results to be obtained. The issue of project finance was only briefly touched on by the survey. Some carefully structured questions may have revealed particular personal interest in investment or perhaps confidence in the security of such an investment. Although it was considered a sensitive topic for in depth questioning, many who would not invest volunteered the reason why. Figure 4.12 displays the common answers, whose frequency would indicate certain measured questioning would be acceptable.

5.1.2 Structure of the community

A number of questions lost relevance if misunderstood, and not related to preceding or following questions. A number of other questions were revealed to be weak indicators. Although the entire survey was qualitative, some questions had no judgement parameter, for example question 6.1 on ‘strength of community’. The question of whether the community possessed a strong sense of community had no value on which it was judged until qualified by ‘investment’. Even then it reveals the limitations of this type of survey, as the answer is purely a subjective assessment of whether there is enough money and interest to invest amongst the community. Those who are retired will be inclined to say there is a strong sense of community because with more leisure time, they are often active in community. Does that very fact then generate a strong community spirit? The only means to judge this parameter would be

independent and separate investigation of community programmes, clubs and structure.

Some of the reactions illustrate this and other associated complications. Aberporth has a large retired population. Originally a farming population, it now accommodates many English immigrants. Those who have lived there all life, say the community is now very different, and provide as the reason that there would very definitely be no community investment.

The reaction of one individual from the town of Tregaron, although clearly showing a strong affinity for the town for which he had lived in all his life, mentioned £3000 raised in one coffee morning to replace the church window. This measure of strength of community was complimented in the same response that '[in this town] *it doesn't matter if you are English or Welsh.*' However, such a vocal positive reaction was not common and although the illustration suggests that the three towns were not as uniform as first imagined the average figure for length of stay was around 30 years. However, this is not further qualified whether those are 30 retirement years or working years, themselves determining community contribution to some extent.

There was difficulty in targeting the town of Llandysul itself, using the sample generating method. However, the 10 mile radius creates a wider catchment for investors, particularly as in the case of this project, no specific sites were identified for the proposal. Again, there were claims that many people had moved in to Llandysul town, diluting the Welsh community, whilst the surrounding villages were claimed to have retained a good 'sense of community'.

Whilst the target communities were defined by size and location as easily repeated aspects of the model Dyfi Valley project, many complications were acknowledged and assumptions made of some parameters which were more difficult to measure. However, the survey results give an indication to their degree of influence. It was revealed that some factors including background (nationality) and length of stay, as well as the age when moved to the town all have bearing on community spirit. It was initially imagined that other factors would hold greater influence, for example it was originally thought that distance travelled to work would affect strength of community.

As there is only minimal work in the three towns, the distance travelled is widely varying, and seems not to particularly impact the proposal.

5.1.3 Gender

The pilot survey revealed that the timing of survey was important to avoid only speaking to retired and farmers, and so for the actual survey an evening slot was chosen. The actual survey revealed other flaws that the method of survey technique influenced. On several occasions, the female answering the phone passed it over to the male to complete the questions, whom it was claimed would have more interest in taking part. If it was not handed over, the female interviewee on occasion was seen to consult with the male. Other females were witnessed to hand over the phone, considering themselves incapable of answering the questions, preferring to pass over to the male opinion of the house. On one occasion, it seemed the female was even too concerned to answer on her husbands behalf. The rural setting has retained strong traditional beliefs which may have contributed to some of the male/ female dynamics observed. However, in all outlined situations, the male comment would then also likely make the financial decisions in the house and pass decision on whether to invest or not.

5.1.4 Perceived nationality and age

The survey method chosen highlighted the refusals which commonly came from those speaking with a Welsh accent and those sounding elderly (both male and female) as well as the response noted amongst females outlined in section 5.1.3. Bernard (2001) has suggested these observed trends could be a result of the method of survey and phone presentation. He has suggested that accent of the questioner could have an effect on people's willingness to participate regardless of the subject matter. This may have particular importance in Wales, given the strong feelings of nationalism.

However, accent may not be the main reason for refusing to participate, as the observation revealed the same number of refusals to take part in the survey amongst the English accents, particularly found in Aberporth, which attracts retired

immigrants. Refusals also came from those ‘sounding’ elderly, qualified by the reaction, uncertain hesitation and tone of voice, as well as words and phrases used.

5.1.5 Refusals

It is difficult to establish whether the non respondents were put off by the nature (subject) of the survey or the method of survey. The nature of the refusals was not noted until trends started to emerge. The four recurring features observed were gender (female), nationality and age (both inferred) and expressing non interest in the subject. These categories are based on assessment drawn from the accent and sound of interviewees on the phone, and not from direct questioning. The features were only noted after it was observed they were becoming regular themes amongst the non participants, however, they cannot be presented as formal results because the survey was not specifically noting or assessing this feature. This could form the basis for future work.

Thus, the method does miss several sections of the community. Firstly in the means for generating the sample and second in the survey technique both for practical reasons, through those not in possession of a phone and those refusing to take part. There were further exclusions in addition to the non registered and phone-less missed by the sampling technique. The refusals whether due to the nature or subject of survey are added to by those refusing to participate potentially due to influences of gender or perceived nationality and age (as discussed in 5.1.3 and 5.1.4). Thus there are many whose opinion is not reached. It was inferred that some of the refusals would be classed in the lower economic brackets such as the elderly, or the low income (with no phone). Although it was considered that many of these would choose not to invest in a community project, it was noted that their opinion was equally important. If such groups were in opposition to a community proposal, the disagreement would generate divisions amongst the community.

The large number of refusals must be borne in mind when considering the results, and it must cautiously be said that some of the number will be in opposition to wind farms. However, it is impossible to say how many and impossible to say if all would

be in opposition. It is not even possible to extrapolate from the same figures of those who took part in the survey. Any suggestions must be carefully presented as there must be a reason for any rejection. The rejection may be unrelated to the subject matter, equally it may be based on the subject matter. There may even be a combined effect of the subject matter and objection to the survey technique.

In summary, the questionnaire method in practice whilst proving appropriately worded for a large number of the sample posed difficulties of understanding for some. The method was considered the best means to poll the desired sample size whilst missing some inaccessible members of the community. The structure of the communities contributing to the sample generated, further affected the conduct of the survey. Complications were leant such as the dilution of the native community, in fuelling a sense of oppression it influences opinions and creates inflexible attitude. Traditional values held in typical rural communities of this region include the male/female balance of power which will also affect the sample by the proportions participating. Similarly the age profile of the community may also affect the willingness to participate. However, it is difficult to speculate whether the telephone technique and these particular problems have as much influence on participation success as the subject of the survey.

5.2 Questionnaire Findings

The section is split in two, firstly indicating the questionnaire results by interpretation of Figures 4.6 to 4.14 to answer specific questions posed. The second section analyses additional comments made by interviewees in expanding answers to questions.

5.2.1 Survey

Distrust of large developers

Opposition to large developer and support for community alternative (Figure 4.6)

The first test of distrust of the large developer, in combining responses to question 4.1 and 5.1 (see Appendix II) considered whether there was a significant difference from expected of those who would oppose the large developer but support a community alternative.

There was no great deviation from the expected value (given by statistical analysis) for the interaction of opposition to the large developer and support for the community alternative. The number seen under this category could be the result of the sequence of question ordering. The other greatest deviation from the expected value was the support for the large developer and opposition to the community alternative. There were none in this category. Caution must be used in drawing inferences regarding distrust from this result, as no direct question was asked, '*are you suspicious of the motives of a large developer*'.

The result follows the general support for wind energy which previous work has indicated, and demonstrates a real interest in a '*share owned community project*' (Question 5.1). Both questions 4.1 and 5.1 and the interacted response presented in Figure 4.6 demonstrate support for wind energy. Those in opposition, object to both proposals. This interaction analysis shows no support for the distrust theory.

Opposition to large developer and advocate internal management

(Figure 4.7)

The second test of the trust theory (questions 4.1 and 5.7.1A, see Appendix II) concerned the numbers in opposition to the large developer who in support of the community alternative advocated management by those with direct interest in the project.

The greatest number indicated that the project management should be external offering the guidance and expertise that a group formed by the stakeholders would lack. Once again this interaction analysis does not support the theory of distrust regarding the large developer.

Opposition to both the large developer and community alternative, stating community exploitation

(Figure 4.8)

The final test (questions 5.1 and 5.3B, see Appendix II) of trust looked for the numbers of individuals that were in opposition to both the large developer and community alternative who state that community exploitation was their greatest concern with any proposal. Although there was not a great enough sample to perform any statistical analysis (30), the greatest objection focused on the visual intrusion of any wind installation. Half of that number directly stated the exploitation of the community by the large developer as their greatest concern. The results therefore also fail to support the theory of distrust as a barrier to community wind expansion.

From the questionnaire survey results, it seems that less importance can be given to distrust of large developers. Perhaps this can be explained by the nature of the subject. Indeed, Pidgeon and Poortinga (in press) have shown through survey, that the nature of the business or industry is important, with the Environmental sector emerging as one of the most trusted. The public support for wind power is based on its perception of it as a clean form of energy generation. The overall general public support of wind power is noted in this study (see Figure 3.1). Perhaps a different result would be seen

if the subject under investigation was nuclear power, given the general public opposition (MORI, 2002b).

Fear of change

Opposition to community alternative but considering the community strong enough for investment

(Figure 4.9)

The fear of development is closely connected to issues of distrust. The best means to assess this issue was considered the response to whether the community was strong enough to support investment (questions 6.2), having expressed opposition to the community proposal (question 5.1). Figure 4.9 demonstrates no particular departure from the expected value for this interaction suggested by the Chi squared analysis.

The greatest deviation from the expected value is noted amongst those in support of the community project and answering that the community could support its own investment. The response could have arisen as a result of the ordering of the questions once again. The question as to whether the community was strong enough was the final question asked. By this point those supporting the community alternative had answered all the other questions outlining the themes of the proposal. It is not surprising that they should answer positively to the strength of community.

Care should also be taken with consideration of 'strength of community' as it reveals the limitation of the survey in providing little basis on which to make a subjective judgement (see section 5.1.2).

Access to knowledge

Knowledge and interest in community proposals

(Figure 4.10)

The figure illustrating responses to questions 5.2A and 5.3A demonstrates one of the problems Leaney (2001) identified as one of the greatest barriers to establishing a community based project. Even if there is access to information to explain what is possible with community owned wind power, there is no awareness within the community of how to develop a project. The questionnaire response demonstrates a real lack of awareness of what is possible with community ownership, and yet there seems to be a real desire to learn more of the nature and benefits of the proposal outlined.

Those surveyed seemed to embrace the principles of a community owned project and realised that there is potential to benefit even from the limited information outlined in the questionnaire. The problem of information supply and knowledge base presents a potential problem in having to engage the expertise of the developers with previous experience of such a project.

The previous figures and discussion on distrust would indicate that this would not present too great an obstacle. The greater problem would probably lie in finding a developer prepared to invest time and resources in a project for only partial gain. Many of the large developers would ignore projects on the scale of one megawatt, preferring to profit from the large installations while the economic climate allows. The developer would have to be the exclusive developer of community projects.

Even if one of the large developers did promote a community project to foster good public relations, it would likely raise some suspicion amongst the receiving community, as the large developers are set to benefit from the announcement mid 2003 of imminent offshore expansions.

**Problems highlighted with the community proposal by those in favour of it
(Figure 4.11)**

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therefore lowering the minimum share investment, allowing more of the community to be incorporated.

Confidence increased by grants backing the community proposal

(Figure 4.13)

Figure 4.13 presents the responses to question 5.5A. The survey demonstrates unanimous support to grant funding as a means of increasing confidence in the proposal. This suggests that some of those answering only tentatively that they would invest would be more inclined to do so with sufficient support available, thereby spreading the ownership wider across the community. Together with placing an upper limit on share investment, this would reduce the potential for investment opportunity to be the source of infighting.

Motivation for investment

Opposition to large developer but consider investing

(Figure 4.14)

Figure 4.14 illustrates the interaction of question 4.1 and 5.4A to consider whether an incentive had to be provided for the acceptance of community scale proposals. However, the opposition to a large developer, whilst considering investment was not greatly different from the expected value. As the information provided by Figures 3.12 and 3.13 on finances and the disposable income of Ceredigion supports, there are few with the money to speculate, certainly those prepared to commit on limited information provided in the brief project description of the questionnaire.

In a wealthier part of the country with more disposable income, there may be a greater number who would support the community project purely for the prospect of capital gain. For the currently operating project at Harlock Hill the interest on investment stands at between 7 and 8.2% (Baywind, 2003), which almost doubles the Bank of England base rate of interest of August, 2003.

The formal questionnaire structure indicated several strong trends. Neither distrust of developers nor the fear of change was highlighted as a particular problem of the proposal. Access to knowledge and information could be improved with careful management which the survey also suggests is not an obstacle in principle. However, the success of the project would depend on the experience of the developer whose profile should be as 'user friendly' in terms of openness and transparency as possible. The developer must be seen to have successfully managed previous projects on the community scale.

There seems a real lack of awareness of the opportunities of community ownership. However, this is coupled with an interest in learning more, an important result when combined with the issue of distrust not proving such an obstacle to this proposal. The financial barrier is an important one in the context of raising capital to fund the project. There was unanimous confidence in grants to support the proposal. The area is a poor region and there are a significant number as Figure 4.12 illustrates who stated in the survey that despite supporting the principles, lack of spare money for investment would prevent financial support.

5.2.2 Comments

Some interesting results emerged from the survey amongst the non structured answers, the strongest being the marked division between those supporting wind energy and those not. There were some very vocal opposition and strong opinions raised on both sides in line with previous work (Bishop and Proctor, 1994). It was only an incidental observation, but there seem to be a significant number who have lived in one of the targeted communities all their life and yet still tell you at the outset, from the very start of the interview even before a question has been asked, that they like turbines, and are '*all for them*'. It was not an official measure in the survey, thus cannot be presented as a result, but there also seemed to be a corresponding number of immigrants who did not want their retirement spoilt.

Internal politics and conflict of opinion

Politics was one problem - the major problem highlighted both by the content of survey and as the methodology critique (section 5.1) suggests, was possibly personally experienced in the response to the survey if accent affected response.

Nationality

Nationality (based on accent) was noted as a possible reason for refusals after a few days of survey. An observed trend that no firm conclusions can be drawn from was that most refusals came from the perceived Welsh, Elderly and elderly Welsh. Not much can be said about the reason for refusals, except that care should be taken to avoid the 'planner's fallacy' which assumes the silent are in support (Wolsink, 1996). Likewise, where there was a refusal to take part in the survey, it cannot be assumed that the individuals would either be in support or opposition to a community power scheme.

There were a great number of retired English questioned on the survey who have moved to appreciate an '*unspoilt and slower pace of life*' in Mid Wales, but there was still some support for a community wind scheme. Concurrently there is negative feeling amongst the Welsh community toward what was equated with exploitation by large developers. Several 'off the record' comments which emerged during the questionnaire survey illustrated a suspicion between the English the Welsh. The English are seen to have more available finances and therefore exert the same effect over the Welsh that a large developer would. This could almost be viewed as modern day colonialism. The English with their money control the community. A community proposal in attempting to bring the community together may well have the opposite effect and see exploitation by those that have over those that don't. Unless the investment is managed very carefully to ensure equality such a proposal may well cause rifts in the community.

Some comments common to all communities and coming from both English and Welsh included that the English have more interest in getting things going. This may

also be a source of resentment; it was mentioned in comments that this could become a source of division. *'The English do everything'*, because they have the money to do so and the Welsh observe with resentment. The Welsh seem to be the working population, whilst the English mostly seem to be retired and enjoying their leisure. That is why advocating careful management in an area like this is so important, where an upper limit on investment would be essential. Shareholding allocation could even be targeted and would have to remain anonymous.

Management

The themes the survey has revealed thus far are that management is crucial in ensuring equality, avoiding infighting and politics and that siting is crucial to avoid nationality divisions driving the community apart. These barriers were not revealed by the Dyfi Valley project, both because of its unique location, and the community who seized the idea.

Although no figures were given for minimum investment, one interviewee from Tregaron remarked that there would be a large body in the town who could not afford to be a part. This is an example where careful management and even share targeting could occur. An indication to self interest was given by the number suggesting there should be no upper limit on share investment; however, this emerged as relatively few. One interviewee commented that self interest is more likely to occur at a local level, where there are more tiers of administration. This was supported by other comments remarking on the delicate balance of power in the communities targeted, where families have lived for generations.

Other comments provide examples of previous profiteering and failed attempts to gain power. One particular attempt to install a small wind farm on land acquired was thrown out by those objecting to the personal gain over the community. This is an important issue in a rural and relatively poor location such as Ceredigion where the communities are small and familiar, and people were revealed by their comments to be very cautious about parting with money, without seeing others doing so, an example of the classic 'prisoner's dilemma' model (Kuhn, 2003).

Although earlier evidence suggests opposition is in the minority, there were also some small active factions in the community, such as the Aberporth airfield development opposition, which by virtue of their vocal objections would suggest a higher proportion than they actually comprise. There was even the polar opposite position taken, literally offering land ‘*at the end of the garden*’. However, the minority opinion whilst demonstrating healthy diversity, does in itself create politics. Whilst the landowner may not have been troubled, her neighbour might have been.

Almost ten years ago, the Dutch energy policy was reviewed by Wolsink (1996) who suggested that local politics was the greatest barrier to overcome. The results of this survey tend to agree with his findings.

Culture

Cultural issues in common with community structure have been indicated as a reason for the non expansion of community projects in this country. Denmark is a country with a well established tradition of community living and has embraced community power schemes in common with the ideas behind this survey. However, that is something that will take time to change. Change must be as gradual as possible to be accepted, and smaller scale installations will hasten this process. Suspicion can be tackled by community incorporation through offering part ownership. However, it would be the far sighted government that would support community power over large scale generation. The estimated project planning for the Amman Valley project was 4 years, the average length of any government term. Access to information provided by developers of what is possible in a community based project may bring about a change of opinion for a different approach, driven by a demand from within the community.

Diversity of energy generation

Ceredigion has very little in terms of economic strengths. Relying on tourism for much of its income, it does have the prime asset of the environment, which one interviewee suggests would be wrong to ‘*destroy*’. However, a recent MORI poll

indicated that tourists are not offended by turbines (MORI, 2002a). The interviewee in question was a council member and interested in promoting tourism, but illustrates well the different focus emotive issues can provoke. As well as highlighting the socio-economic problems, he pointed out that wind is an '*easy green energy option*', expressing concern at the current singular approach of adopting wind as the principal generating method. Indeed, although the first wave turbine was commissioned in July 2003 off Lynmouth in Devon, research has not yet investigated fully the wave or tidal methods, which could prove crucial in supplying our future energy demands.

Offshore wind development is expanding. However, a number are urging that caution must be exercised, that other technologies should not be ignored in favour of backing one single path (EDIE, 2003a). Diversity of energy sources should be ensured from the outset, to overcome this period of transition as smoothly as possible into renewable energy. As one comment from an electrical engineer on the survey indicated, the National grid is designed for central power generation, and which is currently unable to run at full capacity to allow for surges and unequally distributed peripheral input from wind turbines.

Planning procedures for wind projects

A review of planning procedures by the BWEA revealed some complications in Wales which having received the bulk of wind farms to date seems to have resulted in a series of objections (BWEA, 2002). The total value of generating capacity granted for planning in Scotland last year was only equalled in Wales after appeals to pass 30 of the 40 megawatts. The BWEA suggest that planning in Scotland is receptive to wind farm proposals. However, it must also be considered that there are proportionally less installations per land area in Scotland, a country prime for expansion (Graham pers comm., 2003 c/o Entec).

Planning for wind energy must be directed from the strategic regional level to not only avoid the politics on the ground that this survey has revealed, but the politics of the planning offices. Conversation with developers revealed problems encountered with planners, including the local authorities preference for one semi large installation

within their boundary as opposed to several smaller (Tindall pers comm., 2003 c/o National Wind Power). Literature directed at Local Authority level from Government departments such as that released in July 2003 (*'Climate change and communities - how prepared are you?'*) will assist in overcoming this obstacle (EDIE, 2003b). Unfortunately, it was revealed through experience that planning permission can be granted or denied on whims of individual councillors, influenced by social standing, personal connections or relations (Milais pers comm., 2003 c/o National Wind Power).

Strategic planning will also affect poverty, one of the greatest problems of rural Wales. The area has one of the lowest disposable income figures in the country, which would make people less likely to speculate on share investment. This could be the opportunity for community income given encouragement and opportunity through Government grants.

However, another problem of project planning is that the developer led proposal for community wind schemes is much cheaper than the community led proposal where time and money has to be invested in bringing the community up to speed to understand the project principles (Scott pers comm., 2003 c/o Future Energy Solutions). What advantage is there for a company to do so, when it is clearly bad for business and unnecessary when the industry is set for expansion? The solution is in a dedicated developer of community scale projects gaining trust in the community, working together with the planners and advisors from a higher strategic level in recognising that there will come a point where pressure on land area will turn the public tide of opinion.

The future energy market

The public throughout the European Union, including those of the UK seem to support renewable research with 69% of those surveyed in favour (EWEA, 2003). However, space is a premium resource in the UK, presenting the problem of education to retain support and allow the expansion of renewable energy. Unless adopted by every suitable community, community scale wind power will not

significantly contribute to meeting national energy targets, but it will raise awareness of renewable resources. Small example projects will act to educate, affecting opinion when people see them in position. As knowledge becomes more widespread, movement is generated which calls for greater renewable supply. Energy security is also achieved through a diversity of market supply including a diversity of ownership. With the diminishing supply of fossil fuels the need for increased energy security will assume greater importance and greater government support.

Research will continue through this transitional phase as we move from conventional power generation to renewable energy. The future energy supply of the UK may even include domestic household turbines (including city sites) supported by grid supply from large scale installations, generating offshore by wind or tidal currents and biomass plants onshore. The replacement of the conventional power station by these means can run parallel with the expansion of community power until domestic turbines, with their storage and dissipation problems are solved. The government programme for 'sustainable communities', a major report on brown-field development for renewable energy (English Partnerships, 2003) and planning consent for a small 45 metre turbine in the central London Borough of Tower Hamlets all indicate innovative application and gathering interest. These policies, research and application are all forming a suitable foundation to expand wind energy at the community scale, in both rural and urban locations.

The UK Government has outlined its plans in the white paper of February 2003, for tackling climate change to include energy conservation as equally important as renewable energy generation (DTI, 2003a). Simple things like 'switching the light off' or 'not leaving a TV on standby' are important in cumulative terms. However, such behavioural changes can only be a result of attitude change, which once again this study advocates as the greatest problem to challenge. Such short-sightedness permeates all levels of government as well as society as indicated by the budget directed at renewable energy in the UK Government white paper forming only a fraction of the contradictory planned budgets for motorway and airport expansion. As one respondent to the survey replied:

'Lack of foresight is a problem of the species. If you see darling, we need to open our eyes'.

Conclusion

The overall result indicated the majority interest in the principles of a community owned wind project as outlined by the questionnaire survey (74.6%). The numbers in general support of wind energy (86.7%) agree with both the latest public opinion poll of 74% (IPSOS, 2003) in support of current wind energy installation concentration and that revealed by previous surveys (Hill, 2001). There seem minimal barriers to the general expansion of wind power turbines amongst the majority sampled in Ceredigion. The apparent ‘success’ of this survey and the major support for the power source should however be considered against the numbers refusing to take part – 78 refusing, compared to 118 successful interviews. It is unknown what the opinion of the refusals is, however it would be a very significant result if the majority were against. This must be considered during planning for wind energy both in the context of today’s concentration and the planned expansion.

The survey tested theme of distrust and community exploitation seemed to assume less importance than the raised issue of conflicts caused by internal politics. The practical issues of access to information and knowledge raised in previous experience of similar projects were encountered. The important issue of finances was also raised and is of particular importance in the comparatively poorer regions of the country such as Ceredigion where the wind resource is greatest. The only opposition raised to the themes of the project were the common objections typical to all wind farm opposition.

The hypothesis was that the principles of the Dyfi Valley project could be applied to develop other similar projects in Ceredigion. The results would indicate this to be possible. There are however, areas in which the project seems to be vulnerable. At present, the ‘community led’ scheme does not seem possible beyond the enthusiasm and knowledge of the people of Machynlleth, and the Centre for Alternative Technology. Any successful project in the survey area of Ceredigion would have to be

‘developer led’, although the results suggest this to be acceptable amongst those surveyed. The result in support of external management would also alleviate the major problem of infighting amongst the community.

A series of community based projects throughout Ceredigion would not significantly affect the Government targets set by the Kyoto protocol. However, as well as creating energy security through diversity, an equally important benefit of such projects would be their value as an educational tool. The scale of project proposed will secure current general support, increase interest and improve attitude, working toward retained support for expansion of large scale energy generation by a diversity of means. This survey has revealed that ignorance (30 miles from the Dyfi Valley project and yet never heard of it) and attitude breed conflict of belief and infighting which was suggested to be the greatest problem for community based projects.

It is likely the success of any future energy supply will be due to its diversity. Community scale energy supply can contribute to the diversity of market supply leading to security of supply and thus present a level which becomes attractive for political backing. The transitional period between power supply from current means to a renewable future will undoubtedly encounter problems. The expansion of a community based power supply in conjunction with larger installations to generate grid ‘base load’ describes the first two parts of a three tiered vision for future energy supply, the third achieves personal domestic supply.

The evolution of the renewable energy market will have to incorporate the themes of diversity of energy supply and a more strategic approach to planning both raised in interviewee comments during the survey to produce a supply profile something like the three tiered vision. The first steps are being made with the expansion offshore, but this must not overshadow development of other technologies.

Recommendations

The strongest theme which emerged from this work is that infighting deriving from nationalities, political beliefs and financial conflicts must be considered in careful targeting of the community for community based energy schemes. Experienced management must be the priority to avoid introducing division within the community, and to achieve the potential unity. Efforts must be made to ensure that English investment using the greater financial position that the Welsh resent is not to the exclusion of the Welsh. Shareholding must be particularly controlled and given the nature of the communities surveyed may have to be targeted.

Ignorance and access to knowledge and information has been highlighted as the second biggest problem. Access to experience is currently limited, as conversation with high ranking partners from large developer's revealed disinterest with the scale of community based power. With the climate so ripe for expansion, repeated commercial concerns were raised over economies of scale and practical planning matters (Tindall pers comm., 2003 c/o NWP, Graham pers comm., 2003 c/o Entec, Paine pers comm., 2003 c/o RES). The results of this survey however suggest such obstacles can be overcome. The attitude encountered also indicates a lack of foresight for the industry beyond the imminent boom period announced in press release throughout 2003. Given the questionnaire response of apparent current absence of distrust for the larger developer, such companies could continue with prospecting for the large scale generation, whilst co-developing interest in the smaller scale.

Education of the potential benefits of a community power scheme to raise interest, and the project capital becomes the role of the developer. However, the problem is identifying a developer willing to take interest in the scale of project when capital benefits are minimal compared to large scale installation. The solution is in a dedicated developer only producing community projects, with part ownership in each,

offering the expertise as well as forming the management solution. The market niche is there, and being recognised by some small (some single-handed) operators.

The third greatest barrier is the financial one. The means for raising enough money for project success can only be done through assistance in regions such as Ceredigion. Government grants exist to support community based power projects. The funds currently available are limited, however if the future sees the expansion of projects at this scale a revision of support for such schemes must be made. Each of the three towns selected for survey depend on tourism for the local income to a greater or lesser extent. If grant supported, a feature could be made of a community based project such as the small museum in the survey community of Tregaron, to enhance tourism, as well as further increasing the educational potential of the project.

The future of renewable energy must be found in its diversity. In planning for that future we must look at the available resources in focussing on the expansion. The fuel mix must be adapted for the site. It is important to consider the renewable resources, besides wind, available in Wales to pre-empt objection to planning decisions. Wales also has many rivers, which on a community scale could potentially be tapped for micro hydro schemes similar to those many remote farms make advantage of. A balanced approach, considering alternatives should be employed to ensure that the planned offshore expansion of wind turbines is the best approach. The turbines will not be that far offshore, and account must be taken of the people complaining that their view has been spoiled, or that shipping lanes have been disrupted or that the ecology of the sea floor or migratory birds has been irreparably damaged. Care must be taken that one planning problem is not simply shifted elsewhere.

This transitional phase of renewable energy gaining mainstream recognition is coinciding with a new form of governance emerging. Westminster power is becoming provincial which lends a sense of power to the community. People are starting to take initiatives to improve their local surroundings particularly in the environmental area, where waste management and particularly composting lend themselves to local involvement. Community scale energy generation with local stake holding is an example where people could gain a real sense of control.

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Appendix I

Pilot Questionnaire

1 Contact details

- 1.1 Name
- 1.2 Phone Number

2 Social position

- 2.1 Age
- 2.2 Sex
- 2.3 Employment
- 2.4 Dependents
- 2.5 How long have you lived in...?
- 2.6 How far do you travel to work?
- 2.7 Does... have a strong sense of community?
Yes ! No !

3 Climate Change

- 3.1 Do you consider climate change caused by global warming, a problem which will affect you?
Yes ! No !
- 3.2 Is some safe long term solution needed?
Yes ! No !

4 Opinion of developers

- 4.1 Do you support wind farms as a means for electricity generation?
Yes ! No !
 - 4.1.1 If no, why not?
Inefficiency (occasional use) ! Unsightly ! Other !
 - 4.1.2 If other, please state
- 4.2 Would you support or oppose a wind farm proposed by a large developer in...
Support ! Oppose !

4.2.1 If oppose, choose one principle reason?

Community exploitation ! Visual intrusion ! Noise !
TV signal interference ! Ecological impacts ! Other !

4.2.2 If other, please state

5 The community alternative

5.1 Would you support or oppose a proposal for a community owned single turbine wind project which would subsidise local electricity?

Support ! Oppose !

5.1.1 If no, why not?

5.2 Are you aware of any information or organisations to assist in establishing a community wind project?

Yes ! No !

5.3 If information and advice was available detailing costs and benefits would you be interested in learning about a community wind project?

Yes ! No !

5.3.1 If no, why not?

5.4 If a project financially rewarded shareholding investors would you invest?

Yes ! No !

5.5 If a proposed project was supported by grant funding would you invest?

Yes ! No !

5.6 If such a grant was provided from a government fund would this inspire confidence for investment?

Yes ! No !

6 Feasibility

6.1 Do you believe the community of.... is strong enough to support community investment?

Yes ! No !

6.2 Do you consider there should be an upper limit on share investment?

Yes ! No !

6.3 Do you consider the project should be managed externally?

Yes ! No !

6.3.1 If no, why not?

6.4 Do you foresee any problems with a scheme which is community led, community owned and profitable?

Yes ! No !

6.4.1 If yes please state what.

Appendix II

Survey Questionnaire

1 Personal details

- 1.1 Name
- 1.2 Phone Number
- 1.3 Gender

2 Social position and Community contribution

- 2.1 What is your age?
- 2.2 How long have you lived in...?
- 2.3 What is your work?
- 2.4 How far do you travel to work?

3 Climate Change

3.1 Do you consider climate change caused by global warming, a problem which will affect you?

Yes ! No ! Don't Know !

3.3 Is a safe long term solution to global warming needed?

Yes ! No ! Don't Know !

4 The large development

4.1 Would you support or oppose a wind farm proposed by a large developer in...
Support ! Oppose !

4.2 Do you support wind farms as a means for electricity generation?

Yes ! No ! Don't Know !

5 The community alternative

5.1 Would you support or oppose a proposal for a single or small group of turbines share owned by members of the community?

Support ! Oppose !

Support

5.2A Are you aware of any information or organisations to assist in establishing a community wind project?

Yes ! No ! Don't Know !

5.3A If information and advice was available detailing costs and benefits would you be interested in learning about a community wind project?

Yes ! No ! Don't Know !

5.4A If a project financially rewarded shareholding investors would you consider investing?

Yes ! No ! Don't Know !

5.5A Would the incorporation of grants supporting the project increase your confidence in the proposal?

Yes ! No ! Don't Know !

5.6A Do you consider there should be an upper limit on share investment in a community based project?

Yes ! No ! Don't Know !

5.7A Do you consider any such project should be managed externally?

Yes ! No ! Don't Know !

5.7.1A If no, why not?

5.8A Do you foresee any problems with a scheme which is community led, community owned and profitable to shareholders?

Yes ! No ! Don't Know !

5.8.1A If yes please state what.

Oppose

5.2B What is your greatest objection to wind farms?

Inefficiency (occasional use) ! Unsightly ! Other !

5.2.1B If other, please state

5.3B Which of the following impacts of wind farms do you think is most important?

Community exploitation by a large developer ! Visual intrusion !
Noise ! TV signal interference ! Ecological impacts !
Other !

5.3.1B If other, please state

5.4B Do the sizes and numbers of turbines affect your opinion?

Yes ! No !

5.4.1B If yes, are smaller less of an intrusion?

6 Feasibility

6.1 Does... have a strong sense of community?

Yes ! No ! Don't Know !

6.2 Do you believe the community of.... is strong enough to support community investment?

Yes ! No ! Don't Know !