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Understanding 'local' opposition to wind development in the UK: How big is a backyard?[†]

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Abstract

In recognition of the environmental and economic threats posed by climate change; decisive steps are now being taken to stabilise greenhouse gas emissions. One sector receiving particular attention within the UK is that of electricity generation. As such, the government has introduced ambitious targets for increasing renewable generating capacity within the country. Wind turbines are expected to play a significant role in meeting these targets; however, despite high levels of support for the technology in principle, specific projects are often delayed or rejected on account of local opposition. This study aimed to establish how attitudes towards development might vary with respect to increasing distance from the identified sites. Participants were required to register their opinion towards development at a number of on and offshore locations in the UK. The results indicated that participants were most favourable to offshore development and least favourable to development at the identified sites. Attitudes to onshore development indicated that so long as a proposed location was anticipated to be 'out of sight' it was considered in relatively general terms. The results are discussed with reference to site visibility and landscape concerns and clearly support calls for a shift towards community-focussed development strategies.

Running Title: How big is a backyard?

Keywords: NIMBY; wind farm; attitudes

1. Introduction

In 2007, the Intergovernmental Panel on Climate Change (IPCC) published a report, stating robustly that global warming and associated climate change is now "unequivocal" (p.50) and that "[m]ost of the global average warming over the past 50 years is *very likely* due to anthropogenic GHG [Greenhouse Gas] increases" (p.50, italics in original).[1] Climate change is now accepted by many as a very real and present danger which, if left unmitigated, threatens to "…exceed the capacity of natural, managed and human systems to adapt" (ibid, p.51).

In recognition of the global threat that climate change poses to both environmental ecosystems and world economy (see Stern, 2007); decisive steps are now being taken to stabilise global emissions of GHGs (principally carbon dioxide). One of the sectors receiving particular attention is electricity generation and supply. Within the UK alone, carbon emissions resulting directly from this sector currently account for around a third of total emissions (see Prime et al., 2009) and so 'cleaning up' this sector is considered key to mitigating the threats posed by climate change (see DECC, 2009a).

Alongside efforts to reduce demand and increase distribution efficiency; shifts from carbon-intensive fuel sources (particularly coal) are considered integral to reducing emissions from the electricity-supply sector (see IPCC, 2007). Within a UK context, appreciable carbon savings have been made in recent years by fuel-switching from coal to natural gas (Prime et al., 2009); however, an increasing reliance upon gas for electricity and heating within the UK has come with its own problems. For example, since 2004, the UK has become a net importer of gas

(BERR, 2008a). This increased reliance upon import has had serious implications for energy security by, for example, increasing susceptibility to interrupted supply resulting from political instability in major gas-producing nations. This is not to mention the potential fluctuations in price that are likely to occur as projected demand for gas increases whilst reserves of gas continue to diminish (see Institute of Physics, 2004).

The dual challenges of mitigating climate change and addressing issues of energy security were recognised by the UK government in a report on energy published in 2007 (see DTI, 2007). Within this paper, the government outlined in detail their policies for stimulating and facilitating progression towards a sustainable and secure energy future. This paper proved not only to be a springboard for re-opening discussions over the future of nuclear power within the UK, but also outlined - amongst other things - the government's commitment to significantly expanding domestic renewable electricity-generating capacity. This commitment has been recently reaffirmed in the publication of 'The UK Low Carbon Transition Plan' (DECC, 2009a). Within this paper, the government pledges to meet around 30% of electricity from renewable sources by 2020, which will require around a five-fold increase in renewable generating capacity.

In 2008, renewable energy technologies (RETs) accounted for just 5.5% of electricity generated in the UK (DECC, 2009b).[1] Whilst this does represent a small increase in renewable generating capacity in comparison with previous years, it is recognised that there needs to be more considerable and more rapid

[1] 4.2% from wind, wave, solar and biomass; 1.3% hydroelectric (DECC, 2009b).

deployment of renewable capacity if the ambitious electricity-generation targets are to be achieved. As such, the UK government has sought to introduce and strengthen legislation aimed at increasing the share of renewables within the country's energy-mix (e.g. Renewables Obligation Order, 2009; Climate Change Act, 2008; Energy Act, 2008; see also http://www.decc.gov.uk)

The relatively slow deployment of RETs in the UK is surprising considering the apparently high and consistent levels of general support (i.e. 83%-85%) for renewable energy initiatives (BERR, 2008). Importantly, these delays cannot necessarily be attributed to the technological immaturity of some of the newer RETs (e.g. tidal stream, ocean current and wave). Whilst it is fair that some of these newer RETs require substantial further investment and testing to increase their commercial viability; more mature technologies like wind turbines *could* and perhaps *should* be making a much greater contribution to current UK energy demand (see also Dale et al., 2004).[2] Indeed, a report on renewable electricity-generating technologies prepared by a UK parliamentary select committee (i.e. the Innovation, Universities, Science and Skills Committee [IUSSC], 2008) indicated that mature renewable technologies (e.g. on- and off-shore wind) alone would be capable of meeting the national 2020 targets if deployed in sufficient numbers.

In short, within the UK there exists a discrepancy between the public's apparent desire for RETs and the relatively slow rate at which new generating capacity is commissioned. These delays are problematic in that they could threaten the pursuit of the UK's broader renewable electricity targets, which are an important part of the Government's policy on cutting the UK's GHG emissions (see DECC, 2009a). Whilst appreciating that the rate of renewable deployment is likely to be influenced by a number of technical and economic factors (e.g. supply chain issues, transmission constraints, power purchase agreements, etc.), the present research aims to establish more about the *social* roots of this discrepancy; with a specific focus on some of the factors influencing wind development in the UK.[3]

1.1 Wind farm planning in the UK

Despite having arguably the best wind resources in Europe (Sustainable Development Commission, 2005), wind deployment within the UK is somewhat meagre in comparison to other less-windy European nations (Toke et al., 2008). Indeed, in 2008 wind power supplied a little under 2% of the UK's electricity (DECC, 2009b) compared with around 20% in Denmark, 12% in Spain and 7% in Germany (EWEA, 2009)

One of the principal reasons thought to be behind this paradox is the relative inefficiency of the UK planning system, particularly with regard to onshore development (e.g. Toke, 2005). Indeed, in the latest 'state of the industry' report, the British Wind Energy Association (BWEA, 2009) highlight the "…pressing need for a more effective and efficient planning system for onshore projects" (p.7) within the UK, noting that at present the industry is failing to see the required growth in either "…the number or capacity of consents coming through the planning system" (ibid, p.7). Indeed, the successes of certain types of application actually appear to be on a worrying downward trend. For example, between 2007 and 2009 approval rates (by scheme) for <50MW onshore applications (i.e. those initially considered by local planning authorities) in England were shown to drop from 57% to just 29% (see BWEA, 2009).

Thankfully, a fair (and ostensibly increasing) number of projects achieve planning permission upon appeal and the BWEA (2009) is confident that the sluggish nature of the UK planning system does not *at present* threaten the pursuit of the broader renewable targets. However, they do note that as the sites for larger schemes ‘dry up’, there will be increased impetus on local authorities and the appeals process to “…operate effectively and efficiently to deliver a growing number of small to medium sized projects” (p.18). As such, identifying and addressing the factors that exert a detrimental (or beneficial) impact upon the planning process is of increasing importance – one such factor is the opinion of those living close to proposed developments.

1.2 Wind farm opinion in the UK

Local opposition to onshore wind development seems to be on the increase. This may be partly due to the fact that wind development is becoming publicly perceived as controversial *per se* (see Khan, 2003) but could also be due to the top-down planning strategies often utilised by developers (see Kahn, 2000; Wolsink, 2000; Walker, 2009; see also Bell et al., 2005). The cause of the opposition notwithstanding, the problem for developers and the government alike is that organised opposition groups have been shown to inhibit the chances and speed with which planning permission is obtained (e.g. McClaren Loring, 2007; Toke, 2005). With this in mind, it is unsurprising that installed generating capacity is falling short of desired levels. What is perhaps more puzzling for developers is the level of local opposition encountered when compared to reported levels of support for wind development within the UK (70-80%; BWEA, 2005; see also Krohn and Damborg, 1999).

Bell et al. (2005) outline three possible explanations for the emergence of this discrepancy: (1) the *democratic deficit* explanation; which suggests that wind power planning decisions tend to be disproportionately influenced by the minority who oppose the project. In essence, project opponents, being typically more motivated to attend and contribute to planning discussions, tend to exert more of an influence on planning decisions resulting in reduced chances of success (see also Toke, 2002); (2) the *qualified support* explanation, which suggests that whilst people might support wind power in principle, they often have qualifications for this support that attitude surveys generally do not register (e.g. wind energy is okay, so long as it does not have a detrimental impact upon humans or the landscape). Thus, in situations of planning controversy when it appears as though opponents are acting inconsistently with their stated attitudes, they are in fact acting entirely consistently with the caveats that they place on their support for wind (see also Wolsink, 2000); (3) the *NIMBY* (Not in my backyard) explanation which suggests that there is an 'individual gap' in peoples' attitudes towards local and more general development of wind turbines, which is *importantly* grounded in a selfish concern for personal-utility.

Traditionally, it is the NIMBY explanation has proved popular as a catchall description of the local opposition encountered during the planning process for wind (and other) developments (e.g. Burningham et al., 2006; Wolsink, 2007) and why more wind power capacity is not commissioned (see Bell et al., 2005). However, substantial evidence now exists to firmly question this assumption, indicating that when defined in the strictest terms, NIMBYism is actually quite rare and is certainly inadequate as a sole explanation for such opposition (e.g. Burningham, 2000; Devine-Wright, 2005a, 2005b; Ek, 2005; Jones and Eiser, 2009; Wolsink, 2000, 2007; see also Burningham et al., 2006). However, whilst the weight of published evidence indicates that it is now safe to discredit the NIMBY hypothesis as a sole (or even primary) explanation for all the local opposition experienced in wind farm controversy; a couple of pertinent questions remain.

1. What, if not a concern for personal utility, is driving the opposition?
2. To what extent is the opposition observed truly ‘local’ (i.e. how far does the opposition extend – how big is a backyard)?

With respect to the first question, research is continuing to highlight the importance of factors such as perceived equity and fairness (e.g. Gross, 2007), place attachment (see Devine-Wright, 2009) and – perhaps most notably – impact on visual amenity (e.g. Gipe, 1990; Johansson and Laike, 2007; Thayer and Freeman, 1987; Toke et al., 2008; Wolsink, 2007) in driving opinion towards local development (see also Jones and Eiser, 2009). Indeed, the literature suggests that it is the aesthetics of wind power that primarily drive both positive and negative public opinion on wind turbines and has established visual impact as one of most problematic issues relating to wind farm siting (e.g. Wolsink, 2000). Importantly, research has also identified key ways in which opposition based upon these factors can be addressed; for example, the early and continued involvement of host communities in the decision and planning process (e.g. Devine-Wright, 2005a; Khan, 2003; Krohn and Damborg, 1999) and employment of technology to illustrate the likely appearance of proposed developments (e.g. Lange and Hehl-Lange, 2005; Peel and Lloyd, 2007; Wolk, 2008; see also Lange and Bishop, 2005).

Things are less clear-cut when it comes to answering the second question, because whilst research has sought to verify the 'physical proximity' hypothesis (i.e. that those living close to wind farms will be most opposed to them), the results of these studies have proved largely unsuccessful and have produced quite variable results (Devine-Wright, 2005b). Moreover, studies conducted in this field have generally focussed on establishing how attitudes towards a specific wind development vary with respondents' distance from the site of that specific development (e.g. Warren et al., 2005: Thayer and Freeman, 1987) and thus say little of the extent to which local opposition formed towards specific projects might generalise to adjacent sites and/or the broader township/region (i.e. the extent of an opponent's backyard).[4]

The present research aimed to tackle this second question, by investigating the extent of opposition formed in response to mooted development within a suburban region of Sheffield (England). Whilst the research was largely exploratory in nature; it was predicted that if the extent of local opposition was determine solely by literal proximity to a proposed site, that there should be a gradual decrease in opposition with increasing distance from the site. However, if opposition were related to some other aspect of the site (e.g. visibility) then development should be equally favourable in all locations other than those considered visible to local respondents. The present article reports new analyses performed on a dataset outlined in a previously published study (i.e. Jones and Eiser, 2009).

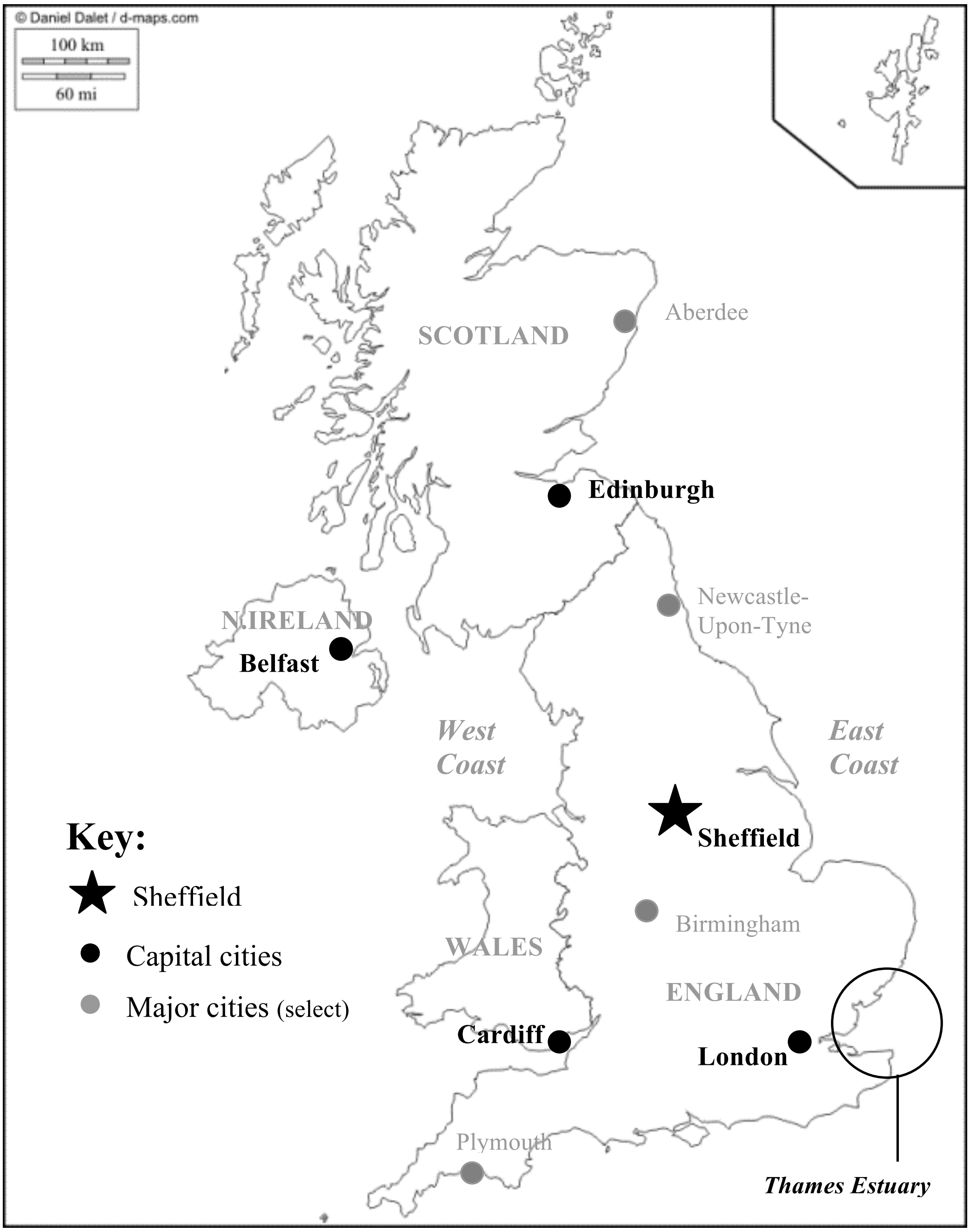

Fig.1) Outline map of the United Kingdom. The map highlights where Sheffield is situated in comparison to some other prominent cities within the UK. The map also identifies the location of the Thames Estuary (East of London). Note: All locations are approximate. The image was downloaded from http://www.d-maps.com/ (15/01/10); use of the image and all modifications were cleared with the copyright-owner before publication.

2. Background to case

Sheffield is a large city located within the county of South Yorkshire in the North of England (see Fig. 1). Sheffield is geographically diverse, as illustrated in the following description of the city provided by the local city council:

> *"The urban area nestles in a natural bowl created by seven hills and the confluence of five rivers: the Don, Sheaf, Rivelin, Loxley and Porter. Much of the city is built on these hillsides, with views into the city centre or out to open countryside. The city's lowest point is just 10 metres (33 feet) above sea level, whilst some parts of the city are at over 500 metres (1,640 feet) above sea level"* (see http://www.sheffield.gov.uk)

In 2006 Sheffield City Council published the findings of a scoping and feasibility study highlighting the sites within the Sheffield region deemed suitable for the installation of renewable energy technologies. Amongst findings relating to the potential for new hydroelectric and solar capacity, the report identified four sites that were considered suitable for the accommodation of large onshore wind turbines:

- **Hesley Wood:** A small site on green belt land suitable for 1 turbine. Near Chapeltown, this site is set amongst the spoil-heaps of a former mine-working.

- **Smithy Wood:** A site with a 2 turbine capacity situated primarily on waste-land to the east of Ecclesfield.
- **Butterthwaite Farm:** Council-owned farmland with the capacity to house around 2 turbines. Situated to the north of Shiregreen and adjacent to the M1 (motorway).
- **Westwood Country Park:** The largest of the sites with the potential for up to 6 turbines. Situated on raised land north of High Green, this council-owned parkland is a popular recreational spot for local people.

Importantly, all four of these locations were confined to a relatively small region to the north of the city (i.e. the Chapeltown/High Green area) (see Fig. 2a).

3. Questionnaire construction and distribution

3.1. The questionnaire

The data for this study were collected through the distribution and collection of questionnaires. The questionnaire utilised within this study gauged respondents' attitudes towards various aspects of wind development at the identified sites, including assessments of the likely benefits and risks that might result from such development (for further details, see Jones and Eiser, 2009). Of specific relevance to this paper was the section of the survey which asked respondents to record their attitudes towards wind development at various locations within the UK. Specifically, in addition to asking participants whether they were in favour of or against building wind turbines on the identified sites and whether they were generally in favour of or against building turbines in the UK, the questionnaire assessed respondents' opinions towards the development of wind turbines in each of the following on- and off-shore locations:

- Elsewhere in Sheffield.
- On land elsewhere in South Yorkshire and the North Midlands (e.g. Nottinghamshire and North Lincolnshire).
- On land in the North of England (e.g. North Yorkshire, Cumbria, Lancashire, Northumberland).
- On land in the South of England (e.g. London, Kent, Sussex, Suffolk, Somerset, Devon).
- On land in Wales, Scotland or Northern Ireland.
- Offshore off the East Coast of England.
- Offshore off the West Coast of England and Wales.
- Offshore off the coasts of Scotland or Northern Ireland.
- Offshore in the Thames Estuary near London.

3.2. Distribution details

One-hundred and twenty questionnaires were distributed to each of five communities situated adjacent to the identified sites (i.e. Thorpe Hesley, Chapeltown, High Green, Shiregreen and Ecclesfield). All respondents were required to be at least 16 years old and resident within the household being sampled. Each of the sampled households was located within approximately 1.5km (~ 1 mile) of at least one of the four identified sites (see Fig. 2b). Distribution took place on a door-to-door basis over a two week period in June/July 2007. Face-to-face contact was made with each respondent, enabling the distributor to explain more about the purpose of the study. Collection of the questionnaires was typically arranged for 2-3 days after distribution. If a respondent had not completed the questionnaire or if they were unavailable at the time of collection, then they were provided with an additional copy of the questionnaire, a Freepost envelope and were provided with instructions of where to return the questionnaire once it was complete (respondents were only required to return one completed questionnaire).

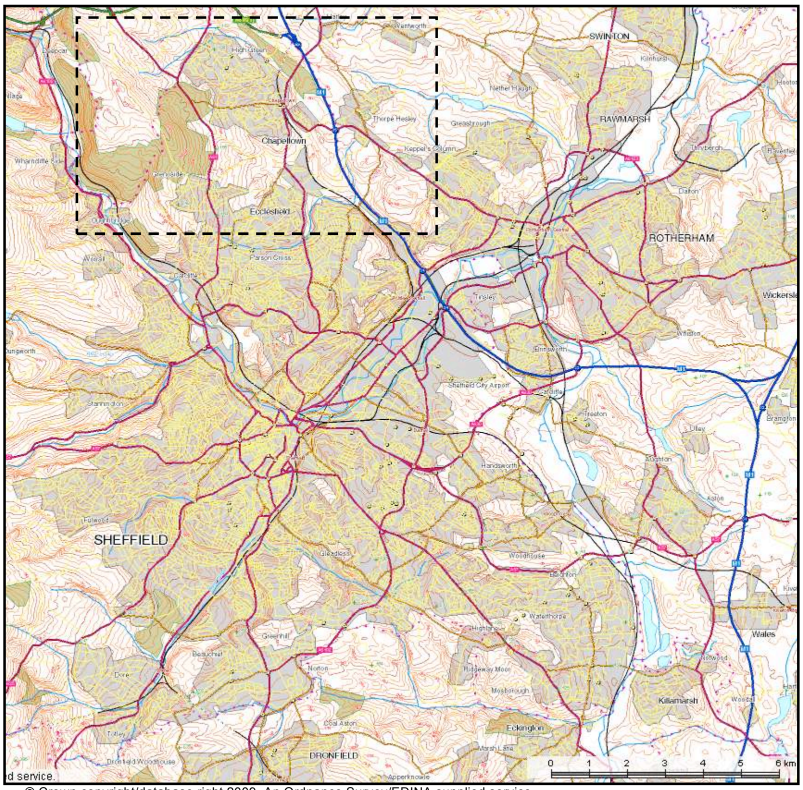

Fig.2a) Topographical map of Sheffield and the surrounding area identifying the region within which the four possible sites for wind development were proposed. Note: The ‘cut-out’ section is magnified in Fig.2b.

3.3. Response rates

Of the 600 questionnaires distributed, a total of 428 were successfully returned. Of these, 11 were rejected on the basis that the respondent had failed to complete large portions of the questionnaire (i.e. < 90 of the 120 response items), leaving 417 viable respondents (i.e. a response rate of 69.5%). Importantly, each of the communities sampled was well represented within this final sample. Shiregreen (n = 70) and Chapeltown (n = 95) were the least and most well-represented communities, comprising 16.8% and 22.8% of the final sample, respectively.

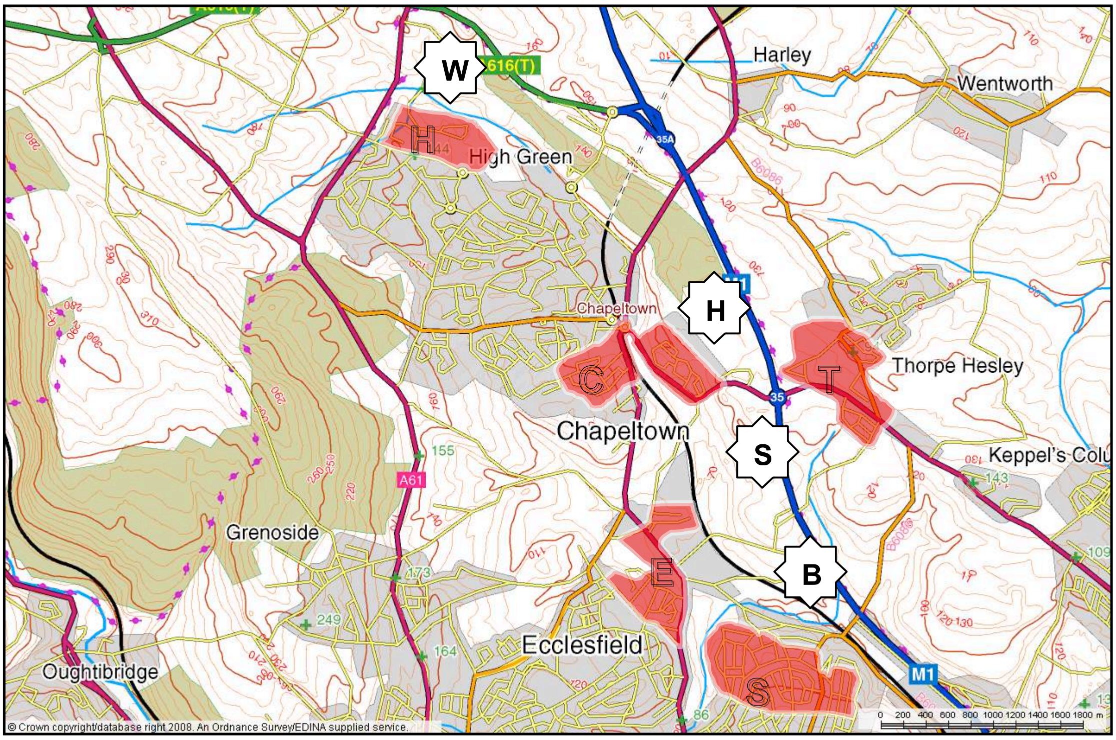

Fig.2b) Topographical map of the region of Sheffield targeted for wind development. The figure highlights the locations of the Westwood Country Park (W); Hesley Wood (H); Smithy Wood (S) and Butterthwaite Farm (B) sites. The figure also highlights the parts of High Green (HG), Chapeltown (CT), Thorpe Hesley (TH), Ecclesfield (EF) and Shiregreen (SG) that were surveyed within the study. Note: Wind farm sites and sample locations have been added to the map; all locations are approximate.

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4. Results

4.1. Participant details

Of the 417 remaining respondents, 50.6% were male and 48.0% were female (1.4% respondents failed to answer this question). Respondents ranged in age from 16 to 89 years old (mean 50.9 years). Length of residency within the sample area ranged from 0 to 81 years (mean 27.3 years). Approximately two-thirds of the sample (i.e. 65.9%) were in some form of employment (i.e. full-time, part-time, self-employment), 25.2% were retired and 6.5% were students, home-keepers or seeking work (2.4% of respondents chose not to answer this question). The majority of the respondents were home-owners (i.e. 88.0%) with 10.1% living in either rented accommodation or stating 'other' housing arrangements (1.9% of respondents chose not to answer this question).

The respondents from each of the five communities were comparable with respect to mean age, F (4, 402) = 1.34, p = .256, and the length of time they had been resident in their respective community, F (4, 409) = 2.34, p = .055.[5] There was a marginally significant difference in the number of male and female respondents in each community, χ^2 (4, 411) = 9.55, p = .048, with a greater proportion of female respondents in the Ecclesfield sample (59.3%) compared with both Thorpe Hesley (40.7%) and High Green (39.7%), $Zs \geq 2.43$, $ps \leq .013$. The proportion of female respondents in Chapeltown (48.4%) and Ecclesfield were comparable (p = .137).

Home-ownership was found to be lower in Shiregreen (58.2%) compared with the other communities (93.8% - 96.8%), $Zs \geq 5.13$, $ps < .001$. Also, the proportion of people in Shiregreen in paid-employment (52.2%) – whilst comparable to Chapeltown (64.1%, p = .133) – was lower than in Ecclesfield (68.5%), Thorpe Hesley (72.5%) and High Green (78.9%), $Zs \geq 5.13$, $ps \leq .038$. These differences were anticipated due to Shiregreen being the least affluent of the five sample communities and comprising a large number of council-owned households (see http://www.upmystreet.com for brief details about the general demographic of the 5 communities).

4.2. Checking for localised opposition

We first examined whether there were any differences in the mean attitude towards wind turbine development in the UK and their attitude towards the proposed local development (i.e. specific attitude). Both general and specific attitudes were measured using 5 point Likert scales (5 = strongly in favour to 1 = strongly opposed). A paired samples *t*-test revealed that on average the respondents were significantly less favourable to local development than they were to development in the UK in general, $t\ (413) = 10.35$, $p < .001$ (see Table 1).

Table 1

The mean general attitude, specific attitude and attitude difference score (n = 414)

General Attitude Score	Specific Attitude Score	Difference Score [a]
3.79 (0.92)	3.30 (1.24)	+ 0.50 (0.98)

[a] The difference score was calculated by subtracting specific from general attitude. Standard deviations are in parenthesis.

With the presence of local opposition confirmed, we then investigated how respondents' opinions towards development varied with respect to proposed location (i.e. how big the respondents considered their 'backyard' to be). This process was achieved at two levels through two discrete sets of analyses; first the respondents' opinions towards development at each of the four separate identified sites were analysed, this was followed by an analysis of their opinions regarding development at each of the on- and off-shore locations outlined above.

4.3. Attitudes towards construction on the identified sites

In order to see if there were consistent preferences between the four Sheffield sites, we examined how many respondents said they would personally accept development on each of the sites selected by Sheffield City Council (Yes/No).[6] For each site it was clear that around two-thirds of respondents supported (i.e. 63.7% - 68.6%) and one-third opposed (i.e. 31.4% - 36.3%) development. A Cochran's Q test revealed that the number of people supporting/oppose to development at each of the identified sites was comparable, Q (3, 373) = 6.80, p = .079; indicating that on average no particular site was favoured for development.

Pearson's chi-squared analysis was then used to investigate whether there was significant variation between the five sampled communities with respect to the proportions of respondents supporting or opposing development at each of the sites. This analysis revealed that whilst the proportions of respondents supporting/opposing development at the Butterthwaite Farm (BF), χ^2 (4, 386) = 4.39, p = .356, Smithy Wood (SW), χ^2 (4, 388) = 7.43, p = .115, and Hesley Wood (HW), χ^2 (4, 388) = 8.52, p = .074, sites were statistically comparable across the five communities, there was significant variation in opinion towards development on the Westwood Country Park (WCP) site, χ^2 (4, 384) = 19.93, p = .001.

Analysis of opinion towards the WCP site revealed that this difference was largely a result of High Green residents showing higher than expected levels of opposition at this site (see Table 2).

Of particular interest in relation to this finding are the respective locations of the four shortlisted sites. Basically, whilst three of the sites (i.e. BF, SW and HW) are in relatively close proximity to one another, the WCP site is comparatively more distant and made more distinct by the topography of the local area (see Fig. 2b). The relative proximity of the BF, SW or HW sites meant that development (and any associated impact upon the landscape) at any of them would be potentially directly visible to members of all communities but High Green. By contrast, development at the WCP site would be likely to impact mainly on the High Green residents. With this in mind, the trends in the data suggested that site visibility and a belief that development would spoil the landscape were influencing opinion.

Table 2

Actual vs. expected acceptance of development on the Westwood Country Park (WCP) site expressed by respondents in each of the five sampled communities.

		Community [a]					Total
Develop		TH	EF	CT	SG	HG	
No	Observed	21	26	30	14	41	132
	Expected	26.5	28.9	30.6	20.6	25.4	
Yes	Observed	56	58	59	46	33	252
	Expected	50.5	55.1	58.4	39.4	48.6	
Total	Count	77	84	89	60	74	384

[a] *Community codes:* Thorpe Hesley [TH]; Ecclesfield [EF]; Chapeltown [CT]; Shiregreen [SG]; High Green [HG].

Note: Dark grey shading denotes higher than expected count.

4.3a. The importance of landscape concerns

As part of the survey, each respondent was required to record the extent to which they felt that wind development at the identified sites would be likely to spoil the landscape (5-point Likert scale: 1 = *very unlikely* to 5 = *very likely*). Of the 416 respondents who answered this question, 5.0% thought it *very unlikely*, 23.3% thought it *unlikely*, 12.2% were *not sure*, 27.1% thought it *likely* and 32.2% *very likely*.

It was reasoned that if landscape concerns were principally responsible for endorsement or rejection of development at WCP, then respondents living in view of the site (i.e. High Green) and holding landscape concerns should be particularly likely to oppose development. In contrast, individuals living in the other communities harbouring such concerns should be expected to show higher than expected levels of endorsement of the site due to its comparatively hidden nature.

Equally, it was reasoned that if residents living in view of the WCP site did not believe that development would damage the landscape that they should be no less likely to reject or endorse development than those living in the other communities sharing similar opinions.

In order to test this hypothesis, the respondents were split into two groups based upon their belief that development would spoil the landscape. Those who felt that local development would be either likely or very likely to spoil the landscape (n =

247) comprised one group (*high concern*), with the remaining respondents (n = 169) comprising the second group (*low concern*).

A chi-square test for independence confirmed that amongst the *low concern* group there was no association between proximity to WCP (HG vs. other communities) and development endorsement (Yes/No), χ^2 = (1, *n* = 156) = .001, *p* = .997. In contrast, respondents in the *high concern* group demonstrated trends consistent with the hypothesis, χ^2 = (1, *n* = 228) = 9.83, *p* = .002 (see Table 3). Taken together, these analyses support the suggestion that anticipated visibility of a potential development, certainly amongst those harbouring landscape concerns, was influential in guiding opinion towards development.

Table 3

Actual vs. expected endorsement of development on the Westwood Country Park (WCP) site expressed in terms of respondents landscape concerns and site visibility. [a]

		Landscape Concern				
		Low Concern		**High Concern**		**Total**
Develop		Visible	Not visible	Visible	Not visible	
No	Observed	1	7	40	84	132
	Expected	1	7	29.9	94.1	
Yes	Observed	18	130	15	89	252
	Expected	18	130	25.1	78.9	
Total	Count	19	137	55	173	384

[a] WCP is considered visible to members of High Green [HG] community and not visible to respondents in other communities.

Note: Dark grey shading denotes higher than expected count.

4.4. Attitudes towards development elsewhere in the UK

Next we considered respondents' opinions towards development at each of the on- and offshore locations (see Fig. 3). First, initial comparisons were made between the mean attitudes towards development at (a) the identified sites (M = 3.29; SD = 1.23), (b) the alternative onshore locations (i.e. excluding the identified sites) (M = 3.65; SD = 0.88), and (c) the offshore locations (M = 4.04; SD = 0.77). These analyses revealed that development in the alternative onshore locations was considered significantly preferable to development at the identified sites, F (1, 405) = 54.52, $p < .001$, and that development in offshore locations was significantly preferable to development on the alternative onshore locations, F (1, 405) = 104.79, $p < .001$.

Subsequently, the respondents' mean attitudes towards development at each of the separate on- and offshore locations were then compared using repeated-measures ANOVA. The locations were entered into the ANOVA in order of mean favourability (least to most favourable, see Fig. 3) and within-subject contrasts were then used to identify where significant changes in attitude existed.

The ANOVA revealed a significant main effect of location, F (9, 397) = 21.95, $p < .001$, indicating that respondents were more favourable to development in some locations compared to others. The within-participant contrasts confirmed the preference for onshore development in alternative locations, with a significant increase in favourability observed between development at the identified sites and development Elsewhere in Sheffield (i.e. least favoured alternative onshore location) (Mean Difference = 0.29, $p < .001$). The within-subjects contrasts also confirmed the preference for offshore development over onshore development, revealing a significant increase in favourability between development in the South of England (i.e. most favoured onshore location) and development in the Thames Estuary (i.e. least favoured offshore location) (Mean Difference = 0.27, $p < .001$).

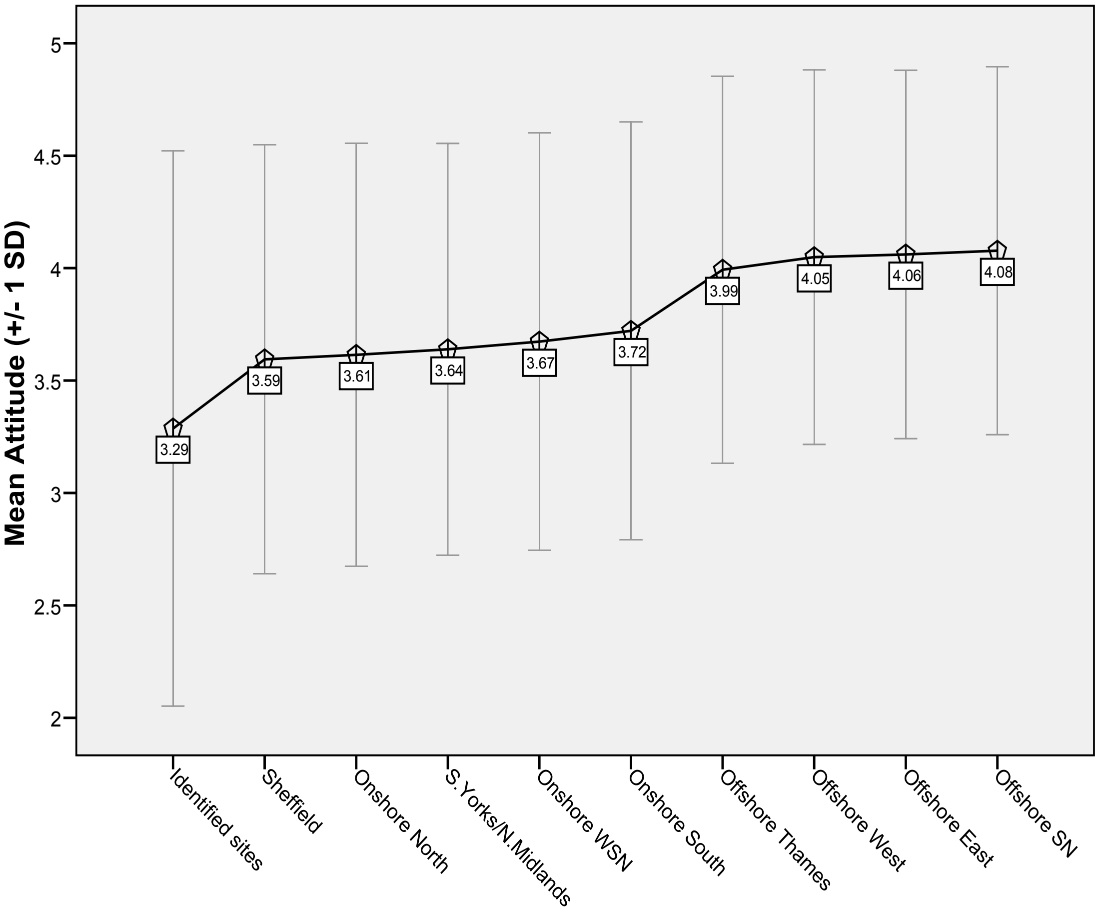

Fig.3) Graph depicting how mean attitudes towards development at each of the specified on- and offshore locations varied with respect to location. All attitudes were recorded on 5point Likert scales (1: Strongly opposed to 5: Strongly in favour). Locations are organised in accordance with mean preference (least to most preferable). **Location Key:** 'Identified sites' (*Identified sites*) **'**Sheffield' (*Elsewhere in Sheffield*); 'Onshore North' (*Onshore in the north of England*); 'S.Yorks/N.Midlands' (*Onshore in S.Yorkshire/North Midlands*); 'Onshore WSN' (*Onshore in Wales, Scotland or N.Ireland*); 'Onshore South' (*Onshore in the south of England*); 'Offshore Thames' (*Offshore in the Thames Estuary*); 'Offshore West' (*Offshore off the west coast of England/Wales*); 'Offshore East' (*Offshore off the east coast of England*); 'Offshore SN' (*Offshore off the coast of Scotland and N.Ireland*).

Importantly, attitudes towards development at each of the four offshore locations were roughly comparable (Mean Differences < 0.09, *ps* $\geq$ .081). The same was largely true for the onshore locations, bar a slight preference for development in the South of England over all other alternative onshore locations (Mean Differences > 0.09, *ps* $\leq$ .016) except WSN (Mean Difference = 0.05, *p* = .817).

In short, the ANOVA revealed that: 1) Respondents generally preferred the idea of offshore development to onshore development, with all potential offshore locations being considered in relatively equal terms; and 2) Development of the alternative onshore locations was preferable to development of the identified sites, with all but one of these alternatives (including development 'Elsewhere in Sheffield') being considered in comparatively equal terms.

4.4a. The importance of landscape concerns

Additional analyses were performed to assess the extent to which landscape concerns might be responsible for the gap in attitudes towards development at the identified sites compared with development 'elsewhere in Sheffield'. The first step in this analysis was to establish the importance of landscape concerns as a predictor of attitudes towards local development.

Of the 13 concerns that respondents were required to comment on within the survey (see Appendix 1), only 5 were deemed on average to be likely results of development. These were *noise* (M = 3.62; SD = 1.13), *spoil the landscape* (M =

3.58; SD = 1.29), *lower house prices* (M = 3.48; SD = 1.20), *take up a lot of space* (M = 3.29; SD = 1.15) and *construction disruption* (M = 3.15; SD = 1.17).[7]

These 5 principal concerns and general attitude were then entered into a stepwise regression in order to establish the extent to which they were predictive of the variance in attitudes towards development at the identified sites. Within the final model (a four factor model explaining 60.7% of the variance); concern that development would spoil the landscape (beta = -.34, $p < .001$) emerged as a particularly strong predictor of attitudes, explaining the same amount of variance as general attitude (beta = .34, $p < .001$) and substantially more variance than the other retained concerns (see Table 4).[8]

Table 4

Stepwise regression analysis of top 5 concerns and general attitude; dependent variable: attitude towards development at identified sites.

Model 4		**R^2 = .61, F (4, 397) = 153.30, $p < .001$**	
Independent Variables	***Beta***	***t***	**Sig.**
General attitude	.34	9.22	$p < .001$
Spoil the landscape	-.34	7.85	$p < .001$
Lower house prices	-.21	4.84	$p <.001$
Construction disruption	-.09	2.28	$p = .023$

Beta: standardised beta coefficient.

Items: Noise, spoil the landscape, take up a lot of space, lower house prices, construction disruption (1 = very unlikely; 5 = very likely); general attitude (1 = strongly opposed; 5 = strongly in favour).

The second step in the analysis was to establish the extent to which landscape concerns might be responsible for the discrepancy in attitudes towards development at the identified sites compared with elsewhere in Sheffield. It was hypothesised that respondents harbouring little or no concern that development would spoil the landscape (i.e. *low concern*) should view development at both the identified sites and elsewhere in Sheffield as roughly comparable. In contrast, those respondents who expressing a concern that development would spoil the landscape (i.e. *high concern*) should show a clear preference for development 'elsewhere in Sheffield' over that on the identified sites.

A 2 (Landscape concern: *high concern* vs. *low concern*) x 2 (Location: *identified sites* vs. *elsewhere in Sheffield*) ANOVA (with repeated measures on the second factor) was performed; two significant main effects (location and concern) and a significant interaction were obtained (see Fig. 4 for interaction plot).

The main-effect of location, F (1, 410) = 29.23, $p < .001$, indicated that on average respondents favoured development elsewhere in Sheffield than on the identified sites. The main-effect of landscape concern, F (1, 410) = 152.55, $p < .001$, indicated that the *high concern* respondents tended to be less favourable to development than the *low concern* respondents. These main effects were qualified by the interaction, F (1, 410) = 52.17, $p < .001$; whilst respondents harbouring landscape concerns showed a clear preference for development 'elsewhere in Sheffield', those harbouring no such concern held comparable attitudes towards development both at the identified sites and 'elsewhere in Sheffield'.

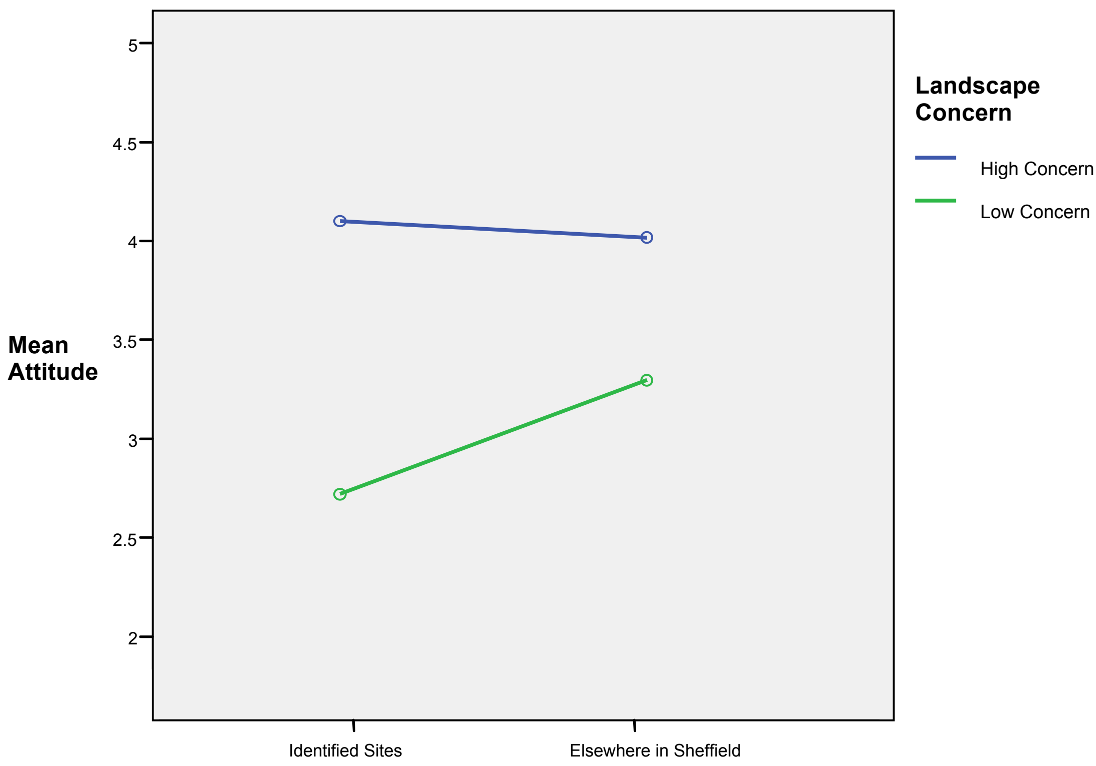

Fig.4) Graph depicting how mean attitudes towards development at the Identified Sites and Elsewhere in Sheffield varied with respect to landscape concerns. Attitudes were recorded on 5point Likert scales (1 = *Strongly opposed* to 5 = *Strongly in favour*).

These analyses, in addition to those outlined in *Section 4.3a* provide compelling evidence that a belief that development would spoil the landscape and the anticipated visibility of development were key drivers of attitudes towards onshore wind-development within this study.

5. Discussion

This exploratory research was performed with the intention of identifying how far opposition formed in response to proposed local wind development would stretch (i.e. to determine the extent of a 'backyard').

The results appear to question the use of a simple spatial proximity heuristic when making predictions about the extent of the resistance that might be faced at a given distance from the site of a proposed wind farm (see Devine-Wright, 2005b). Whilst there was a gradual increase in positive attitudes towards development with increasing distance from the identified sites (in this case 4-sites in the North of Sheffield, see Fig. 2b), it was evident that this increase was not linear in nature; rather there were distinct steps in acceptability indicating that attitudes were determined by more than mere spatial proximity. The rest of the discussion considers the likely causes of the differences in opinion noted towards development at the different identified sites and the rest of the UK.

5.1. Identified sites

Whilst overall no individual site was singled out as being more favoured for development by respondents, analysis of the opinions held by members of each of the five sampled communities did reveal some degree of variation in attitudes towards construction. This variation was most notably centred upon attitudes towards development at the WCP site. Whilst residents of High Green (closest to the site) were clearly least favourable to development, residents in the other sampled communities showed a slightly elevated preference for development at this location.

There are several possibilities why this trend might have occurred. For example, the ‘use value’ associated with the WCP site might have negatively influenced opinion towards development amongst those respondents living closest to it (i.e.

High Green) (see van der Horst, 2007). Alternatively, the recognition that WCP was the site most likely to be developed (by being the largest of the four sites and being on council-owned land) may have elevated levels of resistance within the High Green community.[9] However, whilst both these influences cannot be entirely ruled out, the evidence described in this article indicates that a concern that development would spoil the landscape (and hence an aversion to development on visible sites) might be the more likely reason for differences in levels of acceptance observed.

Principal support for this conclusion comes from a consideration of the topography of the local area and how this interacted with participants' responses to the survey questions (see Fig. 2b). The undulating nature of the region, in addition to the locations of the identified sites, meant that all sites were not equally visible to members of all 5 sample communities. More specifically, whilst development at WCP would predominantly affect the visual amenity of those living in High Green, the relative proximity of the three other sites (i.e. HW, SW and BF) meant that development at any of these locations would stand to affect the visual amenity of respondents in all communities *except* High Green. With this in mind, respondents in High Green should have objected most to development at WCP (but consider development of the other sites in more general terms), whilst members of the other communities should have favoured development at WCP (compared with that at any of the alternative identified sites).

Trends consistent with these hypotheses were found, providing initial evidence that landscape concerns and perceived site visibility were perhaps playing a key role in influencing respondents' attitudes towards wind development within the locale. More compelling evidence for this hypothesis emerged when the respondents were split into groups based upon the extent to which they were concerned development would spoil the landscape. Whilst, those exhibiting *low concern* were equally likely to endorse development at either WCP or the alternative identified sites, those with a *high concern* showed a tendency to favour development on sites that would not exert a direct visual impact on them (e.g. HG residents tended to favour development at the other sites over that at WCP and *vice versa* for those living in other communities).

We appreciate that this hypothesis is tentative at present (especially considering the qualitative differences in the four identified sites; e.g. use value, size, etc.); however, the apparent role of landscape concerns and site visibility identified within these analyses is clearly consistent with existing literature that identifies visual evaluation of wind turbines as an important (if not *the* most important) predictor of attitudes towards wind development (e.g. Gipe, 1990; Johansson and Laike, 2007; Thayer and Freeman, 1987; Wolsink, 2000; 2007). Moreover, of the 5 principal concerns held by respondents within this study, a belief that development would spoil the landscape was clearly the strongest predictor of attitudes towards development of the identified sites (see Fig. 3).

5.2. Onshore locations

The onshore location analyses revealed that development upon the identified sites was clearly the least favoured option amongst participants. What was perhaps more interesting, however, was that the respondents apparently considered development at all alternative onshore locations - *including* 'elsewhere in Sheffield' – in relatively *general* terms. Indeed, there was comparatively little variability in mean opinions towards development at each of these locations, bar a noted tendency to favour development in the South of England over the other onshore locations.[10]

The clear step-increase in endorsement of development between the identified sites and the alternative onshore locations is consistent with the idea that the damage of the visible landscape was largely responsible for guiding opinion towards wind development within our sample. Indeed, the results could be taken to indicate that as long as onshore development was anticipated to be 'out of sight', then it was likely to be considered in comparatively general (onshore) terms and hence deemed to be relatively acceptable.

Compelling support for this conclusion emerges from the assessment of the interaction between landscape concerns and development at the identified sites vs. 'elsewhere in Sheffield'. Reference to Fig. 4 indicates that whilst those respondents harbouring low 'landscape concerns' consider development on both the identified (i.e. most visible) sites and 'elsewhere in Sheffield' as comparable; respondents with high 'landscape concerns' clearly favoured development at other locations within Sheffield.

It is likely that this initial step change again emerged as a result of the topography of Sheffield. Being a hilly city, it is reasonable to assume that wind development occurring within one community will not be directly visible to members of adjacent communities (in spite of those communities being relatively close in terms of literal proximity). This is particularly true for the communities sampled within this study, whose location and orientation meant that the majority of Sheffield was out of direct view.

5.3. Offshore locations

On average, respondents demonstrated a clear preference for offshore development over onshore development. In addition to the obvious implications for the way in which developers and policy makers choose to refer to 'wind development', this finding adds additional weight to the argument that perceived visibility of a site (and a belief that wind development spoils or damages the landscape), is an important factor in guiding opinion towards potential development.

This cannot only be inferred from respondents' clear preference for the sites least likely to impact upon the visual amenity of UK citizens (i.e. the offshore locations) but is also qualified with reference to the written responses made by some respondents after they had registered their opinions about development at each of the on and offshore locations.

More specifically, of the 410 respondents in this study, 89 chose to enter details outlining the reasons as to why they preferred particular sites for development. Of these, approximately half (n = 44) *explicitly* stated holding an offshore preference. Reasons for this preference primarily centred on their being less direct impact on humans and/or the environment (n = 36). The remaining respondents suggested that wind turbines would either be more effective if deployed offshore (with respect to space and potential wind resource), that there would be less opposition to development, or gave no clear reason as to why they held such a preference. Arguments amongst the 45 respondents who outlined reasons for a preference but did not *explicitly* state that this was for offshore locations, largely centred on the fact that the sites selected would limit human or visual impact (n = 34).[11]

In essence, it would appear that the respondents were relatively sensitive to the potential impact that onshore development might have on communities and the landscape and thus favoured development in the offshore environment where these issues would be somewhat reduced. Thus, whilst it was evident that respondents on average favoured alternative sites to those that had been identified by Sheffield City Council, it was not the case that they would indiscriminately endorse other onshore locations. Rather, there was a distinct preference for development in offshore locations, which appeared to be motivated (to some extent) by a desire to limit landscape damage and visual impact in alternative onshore locations.

5.3a. The offshore preference: not an unconditional endorsement.

Whilst the high levels of endorsement for offshore development are certainly encouraging; developers and policy-makers should not consider this finding to represent an unconditional endorsement of *all* offshore development *per se* (see

Bishop and Miller, 2007; Haggett, 2008). Indeed, recent research has begun to demonstrate that 'backyards' may not necessarily terminate at the shoreline and thus even development in offshore locations can be greeted with opposition from some quarters (e.g. Ladenburg, 2008, 2009; Devine-Wright, 2009).

Moreover, there are limitations with our sample that should be recognised. Specifically, it should be remembered that Sheffield is a land-locked city positioned centrally within the UK. As such, it is possible that the opinions of the respondents within this study might differ somewhat from those living in more coastal regions (i.e. where offshore development would occur and where it would have more impact).

5.4. Policy Implications

We would suggest that the results of this research highlight and emphasise two important things, with respect to wind-development planning policy.

First, the variation in attitudes towards development at different locations clearly illustrates that a reliance on 'general opinion' to guide development decisions is ill-advised. Indeed, consistent with Bell et al.'s (2005) 'qualified support' explanation for the discrepancy in the high levels of support registered for wind development and the comparative low levels of planning success for specific developments; we would suggest that there is a real need to develop sensitive survey-measures that more accurately register the caveats that members of the general public place upon their support for wind development. Identifying the qualifications that people place upon their general support for wind, should help developers not only select more appropriate (i.e. less controversial) sites but also generate more appropriate community benefit packages that readily address the actual (as opposed to the perceived) concerns of host communities.

Second, the results clearly outline the key importance of considered and sensitive siting of wind projects in order to address the potential for opposition and help facilitate progression towards the ambitious but necessary increases in operational renewable energy capacity within the UK.

Whilst we appreciate peoples' grounds for the opposition of wind developments are certainly varied (e.g. Devine-Wright, 2005b; Jobert et al., 2007; Wolsink, 2007; see also Jones and Eiser, 2009), our results point to the important role that the anticipated visibility of development might play in guiding opinion towards potential or proposed wind development. Indeed, site-visibility would appear to be of particular importance to those individuals fearing that a local landscape will be spoiled as a result of development.

Whilst it is true that the despoliation potential of wind development is a matter of opinion (e.g. Devine-Wright, 2005a; Krohn and Damborg, 1999) and that attitudes towards established developments tend to become more positive over time (e.g. Warren et al., 2005), it is clear that designing wind-projects and employing community-engagement strategies that stand to limit both the *anticipated* and *actual* visual intrusion resulting from a proposal is essential.[12]

From an applied perspective, our research supports practices that attempt to limit the potential for visual impact from proposed wind development (e.g. development of brown-field sites, increasing focus on offshore development) and that aim to illustrate to host communities what a local development might look like (e.g. Artist's impressions, CGI simulations, Zones of Theoretical Visibility [ZTVs], etc.). Not only should such steps help to limit the emergence of opposition based upon issues of inappropriate site selection, but are also integral in limiting the potential for speculation over the visibility and appearance of a proposed development.

However, we would suggest there is a fundamental but often neglected difference between *showing* communities what development *will* take place within their locale (consistent with an autocratic 'decide-announce-defend' planning strategy) compared to allowing communities to *show* developers what kind and scale of development would be acceptable (consistent with more deliberative, bottom-up planning strategies) (see Walker, 2009).

A burgeoning literature now exists to attest to the many benefits of employing more deliberative approaches to project development (e.g. Breukers and Wolsink, 2007; Devine-Wright, 2005a, 2005b; Khan, 2003; Lange and Hehl-Lange, 2005; McClaren Loring, 2007; Graham et al., 2009; Jobert et al., 2007). However, whilst the weight of evidence now firmly points to the importance of early, sustained, and reciprocal interactions between communities; it is still commonplace for some developers to employ prescriptive, 'top down' planning-approaches.[13]

The issue with the employment of such autocratic approaches is not only that they are almost "…guaranteed to generate resistance" (Walker, 2009, p.12; see also Wolsink, 2000), but because they stand to restrict the efficacy of the illustrative methods used to limit opposition grounded in concerns over visual amenity. In short, whilst we certainly endorse and emphasise the importance of efforts to combat and address concerns relating to landscape damage and visual amenity, we would suggest that their efficacy would be optimised within a cooperative, participatory planning strategy (see also Bishop and Miller, 2007; Lange and Hehl-Lange, 2005).

6. Conclusion

This exploratory research aimed to investigate the extent to which localised opposition towards mooted wind development was truly 'local'. This was achieved by gauging respondents' opinions to development towards proposed local development and the possibility of development at a selection of other on and offshore locations in the UK.

From our results it was apparent that opposition within our sample was not solely determined by spatial proximity to a proposed development *per se*; rather it would appear the extent of an individuals' 'backyard' is apparently defined by the extent to which development is anticipated to be directly visible.

The results of this study indicate that the anticipated visibility of development, coupled with a concern that development will spoil the landscape, heavily influence the levels of endorsement received for particular sites. Importantly, the results discussed within this article suggest that as soon as development is anticipated to be ‘out of sight’ it will likely be considered in largely general terms, and hence deemed relatively acceptable (even in comparatively proximal locations).[14] That said, it should be reiterated that the variation in opinion shown towards development at the alternative locations (particularly the discrepancies in on- vs. offshore development) within this study would suggest that caution be exercised when making references to ‘general attitude’.

Substantial evidence now points to the many benefits to be gained through the early, sustained and reciprocal engagement of host communities. Such strategies have been linked with better chances of planning success (e.g. Breukers and Wolsink, 2007; Devine-Wright, 2005a) and offer developers the opportunity to gain the trust of host communities, identify and address their concerns (visually-centred of otherwise) and effectively communicate the potential risks and benefits (see Frewer, 1999; Apt and Fischhoff, 2006; see also Fischhoff, 1995). As such, employment of more deliberative planning strategies would be an obvious first step in combating local opposition grounded in concerns over landscape damage (as well as many other concerns) and reducing the size of peoples’ backyards to allow for the levels of wind development required to meet the UK’s ambitious but necessary renewable energy targets.

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Appendix 1

Respondents were asked to comment on the likelihood that wind development at any of the identified sites could have each of the following negative impacts (Response options = very likely, likely, not sure, unlikely, very unlikely).

a) cause noise

b) spoil the landscape

c) take up a lot of space

d) kill birds

e) lower house prices

f) interfere with TV reception

g) harm the local tourist industry

h) distract motorists and cause accidents

i) interfere with the radar used by aeroplanes, etc.

j) cause major disruption during construction

k) increase local crime levels

l) bring general unwanted change to the community

m) be hazardous to your health.

Endnotes

[1] According to IPCC (2007) terminology; "very likely" means > 90% probability.

[2] We recognise that there are problems regarding the intermittency of wind that might preclude an over-reliance on this technology. However, installed wind capacity would have to be far greater than it is at present (c.20%) before an appreciable impact would be felt (see http://www.bwea.com/energy/rely).

[3] Wind power is at present arguably the most mature and cost-effective renewable technologies (DECC, 2009b) and so is arguably the first choice for energy companies aiming to meet the targets placed upon them by recent Government (e.g. 'Renewables Obligation' legislation, see http://www.decc.gov.uk/).

[4] This article has not been produced with the principal goal of supporting or contradicting the NIMBY hypothesis; our decision to use the term 'backyard' was stylistic and illustrative in nature.

[5] Post-Hoc analysis revealed that respondents in Chapeltown reported a slightly greater mean length of residency than those in High Green (Mean Difference = 9.15, p = .025), this is unsurprising considering that the households sampled in High Green were in a newer housing estate.

[6] Some respondents failed to answer in relation to all of the sites. For example, some respondents only identified which of the four sites they were most or least favourable towards. Missing data points were coded as missing.

[7] All concerns were registered on 5-point scales. Participants were asked to rate the likelihood of each concern occurring as a result of development of the identified sites (5 = very likely to 1 = very unlikely).

[8] In total the regression produced 4 models; in the first model (a one-factor model accounting for 44.6% of the variance in attitudes) only a belief that development would spoil the landscape was retained as a significant predictor (beta = -.67, $p < .001$).

[9] This has actually turned out to be the case. After considering the viability of each of the four potential sites, Sheffield City Council announced their intention to pursue development of the WCP site (February 2008). Importantly, this decision was announced after the survey had been conducted.

[10] The preference for development in the South of England likely reflects either a perceived need for increased electricity generation closer to more populated southern English cities (e.g. London, Birmingham, Bristol, etc.) or a desire to offload the potential disadvantages associated with wind development to the more affluent areas of the UK (e.g. South-East of England).

[11] Other listed reasons included greater efficiency/effectiveness (n = 4); equity of distribution (n = 2); benefit for more populated areas (n = 2); reduced impact on potential tourism (n = 1) and a general concern for careful site selection (n = 1).

[12] It is important to make clear the distinction between *anticipated* and *actual* visual impact. Whilst research by Bishop and colleagues (e.g. Bishop 2002; Bishop and Miller, 2007) indicates that the *actual* threshold of visual impact from wind turbines tends to become minimal at short distances (i.e. 5km – 7km); *anticipated* impact is likely to be less restricted by physical reality and hence

more open to speculation, myth-propagation and social or media amplification (see Pidgeon et al., 2003; see also Braunholtz, 2003).

[13] See Walker and Devine-Wright (2008) for debate on the important differences in the various definitions and levels of *community* and *engagement*.

[14] This is not to suggest that development at all such locations will be readily endorsed by *all* members of a particular host community as the reasons for wind farm opposition are very varied (e.g. Devine-Wright, 2005b; Jobert et al., 2007, Wolsink, 2007; see also Jones and Eiser, 2009).