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Wind farms in rural areas: How far do community benefits from wind farms represent a local economic development opportunity?

Max Munday [a,b,*], Gill Bristow [b,c], Richard Cowell [b,c]

[a] Cardiff Business School, Colum Drive, Cardiff, CF10 3EU, UK
[b] ESRC Centre for Business Relationships, Sustainability and Society, 55 Park Place, Cardiff University, Cardiff, UK
[c] School of City and Regional Planning, Cardiff University, Glamorgan Building, King Edward VII Avenue, Cardiff, CF10 3WA, UK

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A B S T R A C T

Although the large-scale deployment of renewable technologies can bring significant, localised economic and environmental changes, there has been remarkably little empirical investigation of the rural development implications. This paper seeks to redress this through an analysis of the economic development opportunities surrounding wind energy development in rural Wales. The paper concludes that the economic development outcomes to rural areas from wind generation projects to date have been questionable. Increasing the flow of conventional economic benefits to rural economies in terms of incomes and jobs is shown to be difficult because of the nature of the local supply side in remote areas. Partially as a consequence of this, developers of wind farms have come to routinely provide diverse forms of community benefits to 'affected communities', but these have yet to evolve into significant tools of economic development. In any case, the flows of revenues from community benefits are dwarfed, in quantitative terms, by the revenue streams that might be channelled to rural areas through a broader community ownership of wind energy projects. However, although a few local successes have been achieved, the scope for realising the returns from community ownership remains low in the Welsh case, with a series of impediments considered. We close the paper by suggesting means through which economic outputs might be improved.

1. Introduction

The large-scale deployment of renewable technologies can bring significant, localised economic and environmental changes. While the expansion of renewable energy in the UK is predicated substantially on its contribution to reducing CO_2 emissions and the amelioration of climate change (BERR, 2008), there remains a need to consider localised economic and environmental trade-offs associated with such projects. This paper focuses on the rural economic development opportunities surrounding wind energy development.

Although wind energy has been a dominant feature of renewable energy expansion in many European countries (Szarka 2007) – dominant in terms of both the volume of capacity installed and in the level of academic attention – there has been limited empirical investigation into the economic consequences of wind power in rural locations. This is intuitively surprising, given that the burgeoning analyses of wind power planning conflicts in the countryside often reveal immense public sensitivity about the uneven distribution of economic costs and benefits (Devine-Wright, 2005; Woods, 2003; Wolsink, 2007). However much of this work is concerned with perceptions of (dis)benefits rather than actual income streams. Certainly, there is a well-developed body of research on the economic impacts of more conventional fossil fuel and nuclear energy facilities. However applying this to the renewable energy sector is difficult, to the extent that each energy technology presents different trade-offs for recipient localities.

Wind power schemes tend to have some common generic characteristics (compared to large-scale fossil and nuclear facilities). Schemes are typically smaller in terms of electricity output, dependent on locations with adequate wind energy resources and often placed in more sparsely populated areas with smaller communities (Hanley and Nevin, 1999). In many instances, therefore, contemporary wind developments occur in rural areas with specific economic development challenges, not least if one understands improvements in rural development in terms of increased gross value added and productivity, and increasing convergence (however, see Pike et al., 2007 for alternatives).

* Corresponding author. Cardiff Business School, Colum Drive, Cardiff, CF10 3EU, UK. Tel.: +44 29 20875089.
E-mail address: mundaymc@cf.ac.uk (M. Munday).

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This geographical coincidence between wind energy and rurality has brought with it attractive policy narratives – that renewable energy in general, and wind energy in particular, represents an opportunity for sustainable rural development (see, for example, Hain et al., 2005; Huttunen, 2009; Stevenson and Richardson 2003 for analysis of this policy discourse in Wales). However, the extent to which this goal can be realized in practice has the potential to illuminate wider theoretical debates about rural development. On the one hand, exploiting renewable energy appears to allow rural communities to re-embed their economies in 'clean', locally available resources – to create new 'eco-economies', as Kitchen and Marsden (2005) describe them – which might be more economically and environmentally sustainable than current, subsidy-dependent agricultural systems. Such opportunities also chime with calls for greater community engagement in rural economic development (Day, 1998; Edwards, 1998). On the other hand, questions arise about the capacities of (different) rural communities to 'plug into' the complex, supra-local technical systems of energy provision, governed by corporate actors and policy arrangements that operate at broader spatial scales (Marvin and Guy, 1997; 2001), and capture economic benefits for local areas.

This paper examines how far wind energy development represents an additional local economic development opportunity for rural areas through the case of wind farm development in rural Wales. This is considered a particularly useful lens through which to investigate these issues for the following reasons.

First, the Welsh countryside potentially represents amongst the most efficient sites for wind scheme development in terms of available resources, meaning that rural Wales has featured strongly in the UK push towards renewable energy targets.[1] Moreover, new wind capacity is expected to grow rapidly in Wales in the coming decades. Welsh Assembly Government (WAG) policies have sought to encourage 800 MW of additional on-shore wind capacity by 2010, with higher renewable energy targets in prospect for 2020, and an expectation that much of this too will be on-shore wind (Welsh Assembly Government (WAG), 2005a, 2005b). To deliver on its targets WAG planning guidance identified seven Strategic Search Areas (see Fig. 1) suitable for large-scale wind energy development, amounting to a significant concentration of development potential on specific, remote areas of rural Wales.

Second, the expected increase in new wind capacity in Wales, and its spatial concentration, is bringing the issue of economic benefits to affected communities higher up the policy agenda. While developers and WAG have regularly emphasised the economic opportunities for the rural economy arising from this expansion (see for example WAG, 2008: para 2.15), it raises a number of questions. Existing and proposed wind power infrastructure in Wales is often adjacent to smaller rural communities that are characterised by persistent economic disadvantage yet, at the same time, wind farm developments have been connected to a series of environmental externalities for these communities, not least in terms of a reduction of landscape quality (Woods, 2003). Issues have arisen about the extent to which these externalities may be offset by economic impacts considered in more conventional terms (e.g. new employment opportunities).

We consider the extent of these economic impacts later in the paper, but the sense that they are likely to be limited is a further factor driving developers to provide various forms of 'community benefits' for those close to wind energy sites. The desire to increase and improve the provision of such community benefits has attracted significant attention in Wales, as in the rest of the UK, from local government (Powys County Council, 2009) and national (WAG, 2005a,b; 2008), as well as key public agencies. For example, the Forestry Commission, whose estate overlaps significantly with the Strategic Search Areas identified for major wind energy development, specifically asked potential developers to address community benefits in its programme to allocate the development rights (Forestry Commission Wales, 2009). In our analysis we give particular attention to the form and scale of these community benefits, and consider whether they represent an additional local economic development opportunity.

The remainder of the paper is structured as follows. Section 3 describes the research undertaken to inform this paper. Section 4 examines the pattern of local economic benefits deriving from current wind farm developments in rural Wales. Section 5 analyses the community benefits that have been offered to date in Wales, and considers the extent to which community benefits provisions can genuinely enhance local economic development prospects in rural areas where new wind farm infrastructure is being developed. The discussion in Section 6 considers two issues arising from the case: How far might the flow of economic benefits to rural economies in more conventional terms be improved? How far can wind generation projects become a real developmental opportunity for local communities? This latter includes a discussion of whether community ownership of wind generation has the potential to lever greater development opportunities. Next though, we examine the various factors shaping and rationalising the provision of community benefits in conjunction with new wind power capacity.

2. Evolution of community benefits schemes

Attempts to define 'community benefits' in the context of wind energy development immediately fall foul of the complex and contested nature of 'community' (see for example Walker and Devine-Wright, 2008). Research conducted for the UK government identified the 'community' concerned as 'communities of locality' – i.e. areas close to, and affected by, wind turbines – rather than 'communities of interest', while recognising that the spatial extent of such localities has no clear boundary (DTI, 2005). Nevertheless, 'community' might differ according to the nature of the benefit under discussion – with people accepting that 'local' employment benefits from wind energy component manufacturing may accrue to factories in the wider region, whereas other benefit streams should be directed to communities close to the wind farm site (CSE et al., 2007a). In further defining the 'community' which might benefit, one needs to recognise distinctions between benefits which accrue directly to just a few individuals located within a geographical community (such as farmers), and those which accrue to many or all individuals.

This multiplicity of definitions of community is matched by the array of 'benefits' that have been provided. Reviews of community benefit provisions across the UK (Cass et al., in press; Community Viewfinders, 2007; CSE et al., 2007a,b; RegenSW, 2004) reveal a wide diversity of initiatives, most of which have been led by the wind developer in liaison to varying degrees with local community members. Table 1 summarises the types of community benefits that have come forward, including more conventional economic benefits of investment spend and jobs.

There is no general statutory necessity for energy-related projects to have community benefit provisions. However, in the case of wind energy developments in the UK, community benefits schemes have become a common adjunct. Why might this be the case?

At one level the present array of community benefits programmes may be a by-product of a particular UK wind development

[1] Renewable energy provided 5.5% of the UK's electricity in 2008, a third of which came from on-shore wind, some way short of the target of supplying 10% of electricity from renewables by 2010 (DECC, 2009).

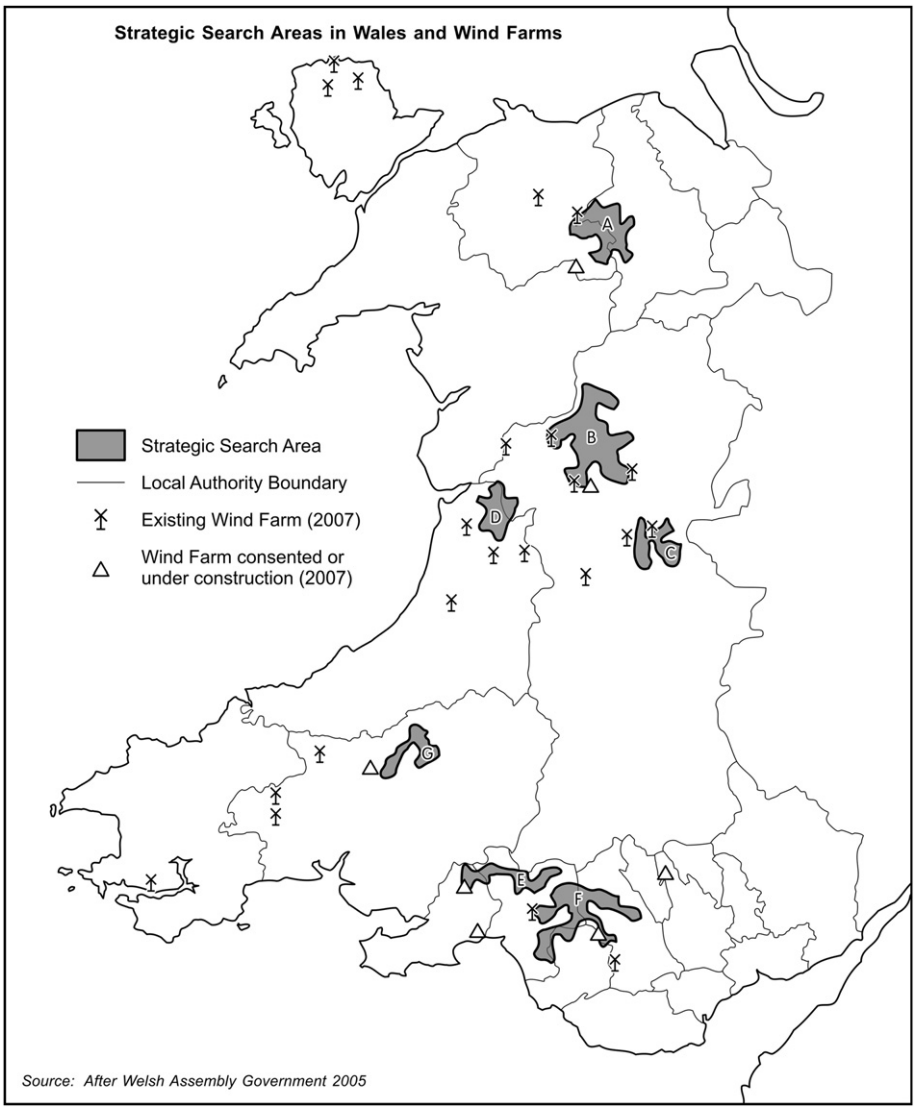

Fig. 1. Strategic search areas in Wales and wind schemes at 2005. A Clocaenog Forest, Conwy, Denbighshire; B Carno North, Powys; C Newtown South, Powys; D Nant-y-Moch, Ceredigion, Powys; E Pontardawe, Neath Port Talbot, Swansea; F Coed Morgannwg, Bridgend, Neath Port Talbot, Rhondda-Cynon-Taff; G Brechfa Forest, Carmarthenshire.

Table 1
Categories of 'community benefit'.

1. Conventional economic benefits:
- the use of locally manufactured content, and local contractors for construction, operation and maintenance
- land rental income to landowners and any royalties
- local business rates and/or taxes
2. Flows of financial benefits to local communities:
- some form of ownership/investment in the project among local people, either as equity or a form of profit share
- some form of community fund, with lump sum and/or annual payments, either focused on specific purposes (such as energy efficiency) or more open-ended
- cheaper electricity
- sponsorship of local events
3. Contributions in kind to local assets and facilities:
- to landscape and ecological enhancement measures, perhaps that mitigate or compensate for any environmental costs caused by the wind farm.
- to tourism/visitor facilities
4. Provision of other local services:
- educational visits or other educational programmes
5. Involvement in the development process
- various forms of liaison activity

Source: based on Community Viewfinder, 2007; DTI, 2005.

path, distinctive from that found in most other EU states. Cross-national comparative studies, show that the policy arrangements and financial institutions in places like Denmark and Germany have, in the past at least, worked to encourage significant financial participation and co-ownership from farmers and local citizens, thus channelling greater economic benefits directly into affected rural areas (Breukers and Wolsink, 2007; Szarka and Bluhdorn 2006; Szarka, 2007; Toke, 2005b). One important element is the use of feed-in tariffs to support renewable energy, setting long-term minimum guaranteed prices for the electricity which, in turn, support the more ready availability of loans and lower entry costs. Moreover, the rapid expansion of capacity attendant on this diversified ownership resulted in additional manufacturing capacity and expertise development in the sector.

In the UK, policies providing financial support to renewable energy – first the Non-Fossil Fuel Obligation then, since 2002, the Renewables Obligation – have been more market-oriented, thus creating greater uncertainty and higher up-front costs for potential investors (see discussion in Szarka and Bluhdorn, 2006). This in turn has encouraged larger wind developers and utilities, with a lower cost base and easier access to finance and contracts. As a consequence, wind power development has been led by larger companies and their subsidiaries, with very little local ownership of facilities (see Szarka, 2007; Warren and McFayden, 2009), while the push to import lowest cost components stymied the longer term development of turbine manufacturing in the UK. This pattern of development, with limited local (and indeed national) multiplier effects from wind scheme investments is an important contextual factor driving an interest in alternative ways of channelling benefits to local communities (for corroborating qualitative research evidence, see Cass et al., in press; Cowell et al., in press).

This relative lack of direct economic benefits for local, rural publics is widely cited as a factor contributing to planning conflicts surrounding wind farm development in the UK (see for example, Toke et al., 2007 p.17). As a corollary, the evolution of community benefit provisions in regions such as Wales has been seen as an 'antidote' to a big business presence in rural areas, a means for fostering local support and, potentially therefore, as a way of expediting planning consents. Evidence that such benefits actually do improve social acceptability and foster positive planning outcomes is more questionable (see discussion in Cowell et al., in press); nevertheless it is argued that:

> "developers could do a lot more in both presentational and material terms in improving the image of the economic impact of wind power schemes" (Toke, 2005b p.1539).

Possibly then community benefits schemes are a means of adding to the 'material' and altering opinion, particularly in rural areas where the more conventional economic multiplier consequences of wind schemes are very limited, as we discuss below.

Finally there is an issue of whether community benefits flows constitute a compensation device for affected communities. Wind developers obviously hesitate to acknowledge this as a basis for any benefits they might provide, since providing 'compensation' implies causing some harm (Cowell et al., in press). Additionally, placing a determinate value on the loss of, say, visual amenity is difficult although a series of studies have attempted to estimate the welfare gains and losses associated with wind energy projects, with mixed results. Glasgow Caledonian (2008) studied four Scottish wind farms and their economic impacts, concluding that negative tourism impacts could be significant (see also Aitchison, 2004; Campey, 2003; Halcrow Group, 2009; Hinton, 2006; NFO System 3, 2003), though this is not a consensus view (Hanley and Nevin, 1999; Moran and Sherrington, 2007; MORI, 2002; Warren and McFayden, 2009). Nevertheless, the requirement that developers might make reparation for environmental harms is well established for impacts on biodiversity (see below), and comes with policy backing (for example, WAG, 2009). The logic of requiring wind farm developers to make good any net loss of 'countryside capital' (Garrod et al., 2006) that their project may cause provides a further rationale for community benefits.

Having briefly outlined the context for community benefits and wind farm development in the UK, we now outline the methods by which we researched community benefit practices in rural Wales.

3. Research methods

The research on which this paper is based was conducted between October 2006 and September 2007, with the key aim of examining the factors shaping the provision of community benefits from wind energy in Wales, and then seeking to explore how the local economic and community benefits attendant on wind farm development could be evaluated. While there is an emerging evidence base on community benefits and wind farms in the UK, much of it is based on relatively small numbers of cases, or focuses on 'community-owned' renewables[2] rather than benefits that might flow from the commercial wind sector (though see Cass et al., in press). To redress this, a key aim of this research was to gather information on community benefits from every major wind energy project then operating in Wales.

Our methodology had several strands. To compile our list of major wind energy projects we started with the British Wind Energy Association (BWEA) database, which gives basic details (such as location, developer, output, and date of planning application, consent and operation) for every wind farm scheme in the UK.[3] Our definition of 'major' projects included schemes involving turbine capacities over 50kw that are connected to the grid (see DECC, 2009 for a review of differences between small scale and large-scale developments). This generated a sample of 22 extant on-shore wind farms (with multi-phase developments treated as one 'farm'). Our analysis also included 7 wind farms consented since 2005 and either under construction, or with imminent prospects of starting construction (as of August 2007). While the research also considered community benefit provisions from offshore wind developments we have not incorporated them within the analysis presented here. Thus this paper is based on a total data set of 29 on-shore wind farm schemes.

For each of the 29 schemes, a range of information sources were used to identify whether any community benefits had been provided and the form they had taken. This included structured internet searches, analysis of documents from the planning process (planning committee reports, environmental statements, inspector's reports), and a telephone survey conducted with the developer for seven of the schemes. Together these different sources could provide a degree of triangulation for our analysis. A summary of the sample wind farms in terms of their size, ownership, and the nature of any community benefits provided is included as an Appendix.

As well as compiling this data set, our methodology went wider and deeper. Fourteen semi-structured interviews were undertaken with senior figures in the public and private sector who were able to provide informed insights on the wider economic context of wind farm development in Wales and the rationales for community benefit provisions. We conducted interviews with two Welsh

[2] See the work on Community Energy Initiatives at http://geography.lancs.ac.uk/cei/communityenergyproject.htm, accessed 13th July 2010.

[3] The BWEA is now known as 'RenewableUK', but their statistical database can be found at http://www.bwea.com/ukwed/ (last accessed 13th July 2010).

Assembly Government officials, five officers from local authorities, the Forestry Commission, four electricity companies and two other organisations. Local authority planning officers and developer interviewees were also able to provide further insights into the community benefit provisions attached to a number of Welsh wind farms, further corroborating the survey information described above.

We also undertook three case studies to investigate in more depth the level and nature of community benefits being delivered, the process through which those benefits were determined, and the factors shaping outcomes, including the institutional context. The three wind farms projects chosen were: Bro Dyfi Community Renewables Ltd – a project developed and owned by local community members; Carno – a site receiving a succession of medium size wind farms, the first stages (30 MW) involving a commercial developer offering a community fund and resources for habitat management and energy efficiency, followed by a more recent, farmer-led extension (15 MW) with additional community benefit provision; and Cefn Croes – a large (58 MW) locally controversial wind farm proposal with a sizeable annual contribution to habitat management and community benefit funds. In each of these cases we undertook an analysis of the full planning file, and a round of semi-structured interviews with the developer/operator, the local planning authority, a representative of the local community or community council, other intermediary bodies, and the landowner/farmer involved where appropriate.

By adopting a multi-method approach, our study delivers a reasonably accurate picture of the community benefits associated with wind farms in Wales, but we acknowledge a number of possible shortcomings. Information on community benefit provisions is always at risk of being incomplete, especially for less formalised arrangements. The wind farms that appeared between 1992 and 1998 often allowed site managers to spend small amounts of money to assist local communities but, as this was on an unplanned and ad hoc basis, it leaves little documentary evidence. Moreover, in the research design the focus was on explaining the *provision* of benefits and *economic* development interconnections, with less attention being given to the beneficiaries of community benefits. This inevitably meant that less attention was given to the social effects that could arise from these provisions, for example, roles in strengthening community cohesion and deepening social networks. Research on these subtle social effects would undoubtedly be valuable.

As we discuss later in the paper, community benefit provisions have become increasingly routine accompaniments to wind farm development in Wales, but these need viewing against the backcloth of constraints to the more conventional economic benefits that these projects deliver to rural communities. In the next section we draw on our research to analyse these constraints in more detail.

4. Wind farms in Wales: local economic impacts

In comparison to large-scale fossil fuel and nuclear electricity generation, wind farms have quite different development cost and general operational profiles. This is largely linked to the free nature of the key input. Consequently, a relatively high proportion of the life cycle costs of wind power schemes come 'up-front'. A key driver of a scheme's financial importance is the 'load factor', defined as the time during which the available turbine generating capacity is being utilised and which is connected to average wind speeds. Wales enjoys relatively high average wind speeds which potentially makes wind power schemes in the region relatively more profitable. However, in the Welsh case, the high annual average wind speeds of upland areas are combined with relatively higher construction costs, and issues of grid connection and reinforcement of what are often poorly developed elements of the electricity network.

Wind power projects are subject to major scale economies. One aspect is that electricity generated is related to the area swept by the turbine blades, meaning that larger turbines can deliver significantly greater returns. Larger turbines, however, require higher towers, with the potential for more significant landscape impacts, and with the related construction and maintenance issues which lead to more complex infrastructure requirements at sites.

Scale economies are not limited to the energy generation potential of larger turbines. Larger wind schemes also offer other economies: higher energy outputs from developed turbines allow a more even spread of the costs connected to planning, feasibility work, road access, and grid connection. CSE et al. (2007a, 10), for example, reveal that surveys, environmental impact analyses and public consultations connected to a typical wind power scheme can result in costs of £150,000–£300,000, and with an extra £150,000–£200,000 needed should a scheme go to a public inquiry. Herein lies some indication of the financial incentive for companies to offer community benefits that might reduce opposition, and thus the likelihood of public inquiry. There are also maintenance and managerial economies connected to larger wind schemes. Indeed CSE et al. (2007a, 13) demonstrate how the lost opportunities of reduced scale affect the amount of revenue that smaller schemes have available to finance community benefit provisions.

The financial performance of wind schemes is also a function of the prices offered for renewable energy, which in turn reflects the 'political markets' constructed by governments to encourage renewable energy output. The price of power generated by wind is thus a complex function of the costs of energy generation, the alternatives, the wholesale electricity price, specific climate change levy exemptions, and the value placed on Renewables Obligations Certificates. Under the Renewables Obligation, generators gain a certificate for electricity provided from renewables. The certificate is sold on to suppliers and redeemed against their renewables obligation.

The above point to uncertainties affecting the financial performance of wind generation schemes. In the context of the topic of this paper, monies invested in community benefits provisions will directly impact the profit performance of wind farms, particularly where these provisions are based on fixed annual payments and not tied to scheme performance (see later). For example, CSE et al. (2007a, 18) reveal that a 20 MW (installed capacity) wind scheme having 11.8% baseline profit per annum would see this fall to 10.7% per annum with a £5000 per MW per annum community benefit flow.

What are the expected local rural economy impacts deriving from wind farms in the Welsh case? In the short term there is a potential boost to construction activity resulting from the on-site development, turbine installation and employment of specialist services and sub-contractors. For a rural economy there is also the prospect of spending connected with incoming workers. For example, contractors may be on-site for many months and use local accommodation. However, it is suggested that in the case of Wales local economic effects are constrained by the physical location of extant and projected wind energy sites (see Fig. 1). The Strategic Search Areas which are to take the bulk of Welsh wind energy expansion in the short- to medium-term were selected in part because they contained few dwellings and they are, with the exception of the areas of Pontardawe and Coed Morgannwg, distant from centres of population.

Our research findings from rural Wales revealed a limited *local* supply side. The current reality is that wind energy projects in rural Wales rely on imports of goods and construction labour from more

populous parts of Wales, and often from other parts of the UK or from overseas. In what follows we consider the potential for local economic effects through the life cycle of a typical wind energy development.

Prior research indicates that developing a commercial wind energy scheme involves a capital investment of between £600,000 and £1 million per MW installed (see RegenSW, 2004, 50; Community Viewfinder, 2007, 10; CSE et al., 2007a). Our own research confirmed this range. Development unit costs (per MW installed) comprise wind turbine installation, grid connection, infrastructure development (including new access roads), feasibility studies and planning. The development unit costs vary between projects but, in general, there was a downward trend in real terms over time until 2005, when increasing demands for new wind capacity across the EU created inflationary pressure on the turbine manufacture supply side.

There are very limited opportunities for genuine local purchasing of goods and services in local authority areas surrounding wind energy sites. This is because of the types of goods and services used during the development phase (see Fig. 2). The turbine itself makes up the largest proportion of the capital cost. Turbines used in Welsh wind energy schemes are manufactured in Europe and imported to the UK (see earlier discussion). On-site installation services are also normally provided by the turbine manufacturers themselves. This activity together with the process of making grid connections typically involves specialist teams. In these respects, the Welsh wind energy sector exhibits the limited local linkages typical of 'foreign' inward investment (Phelps, 1997), with the turbine manufacturers' regional presence normally limited to a representative office.

Civil engineering work normally comprises one fifth of the capital investment and these inputs are often sourced from the region. Sums involved with civil engineering work can nonetheless be substantial. At the Carno Extension wind farm near Newtown, a Welsh company won a £3 million construction contract. Other development costs including those connected with feasibility and planning may involve regional consultants, but with business services typically purchased through the headquarters of whoever the developer is, and this is usually a multinational firm headquartered outside of Wales.

The Forestry Commission in its tendering programme for wind farm developments on the national forest estate specifically asked prospective developers for outline plans for local purchasing and estimates of contribution to the regional and local economy in terms of gross value added generation and employment (Forestry Commission Wales, 2009). This may have been some recognition of the limited opportunities for local and regional firms connected with extant wind farm schemes in the rural Welsh economy. However, the high sunk costs connected to turbine manufacture combined with the experience and specific skills developed by foreign manufacturers mean that it is unlikely that significant capacity will be developed in Wales to produce turbines.

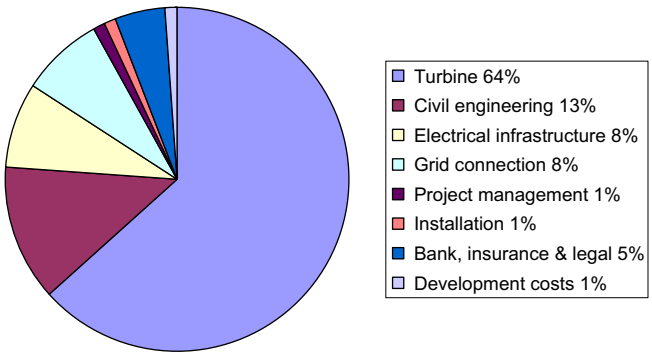

Fig. 2. Capital cost distribution of a 5 MW wind farm. Source: BWEA.

Moving through the wind energy scheme life cycle, CSE et al. (2007a) have estimated operating and maintenance costs of wind energy schemes of around £8000–£10,000 per MW per annum (CSE et al., 2007a). Operating costs comprise staffing, maintenance expenditure, rents, business rates; spending on community benefits provisions is also normally classed as operational. Elements of this spending on operations and maintenance will be on local/regional goods and services, and these lever additional local spending. However, the nature of the up-front costs of wind scheme development result in operational costs being a relatively low percentage of total project costs even given the average project life span of 25 years. For example, at the first Carno wind energy developments near Newtown, operating costs were estimated at £450,000pa for 33 MW, and at Trysglwyn, operating costs were an estimated £150,000 pa for 5.6 MW[4]. The 58 MW Cefn Croes project near Aberystwyth – the largest wind farm in Wales at the time of our research – needed just 4 local on-site technicians, and with the turbine manufacturer having set up a small office in the town.

One corollary of the above is that the significant new investment expected as a result of the development of new, large-scale wind capacity in the Strategic Search Areas (see earlier Fig. 1) would be unlikely to create significant additional employment as a result of operations and maintenance activity, perhaps less than 150 direct jobs across Wales as a whole. The nature of modern wind generation militates against major rural job opportunities in other ways, too. For example, warranty conditions mean that turbine makers tend to use their own staff for on-site maintenance and, with turbine management being largely automated, inspection needs are infrequent. While in some more sparsely populated areas the few employment opportunities created in the operation of a wind scheme will have value, the schemes are unlikely to be an avenue for significant additional job creation in the rural economy of Wales.

An additional local effect relates to the payment of rates (Uniform Business Rate) on wind power schemes. This is normally based on the power output of installed turbines, and the British Wind Energy Association (BWEA) estimates the business rates due on new schemes at about £2000 per MW per annum. The BWEA analysis *on-shore Wind: Powering Ahead* (BWEA, 2006) highlighted that the economic benefits in Wales of on-shore wind energy, including expected new development to 2010, were around £278 m of which a little under 10% was related to the payment of rates. However, unlike the cases of selected European countries where CSE et al. (2007a,b, 7) show that local benefits are closely linked into the fabric of schemes in the form of local tax payments, business rates are not returned directly to local authorities in the Welsh case.

Finally, many wind scheme developers in Wales (over half in our research) claimed that rents and/or revenues from their schemes added to the sustainability of rural communities. The greater presence of local farming families in Welsh rural economies (in comparison to absentee landowners in the Scottish case) means that where rents are paid to local farmers this might be viewed as a local economic benefit (see also DTI, 2005, 37). During the research, wind farm developers revealed rental returns to local landowners of around £10,000 per turbine, with rents trending upwards with larger new developments and greater competition for sites. However, in the context of Welsh wind farms (both extant and planned), any development that falls within Forestry Commission property pays an annual royalty fee to the state.

[4] www.npower-renewables.com/trysglwyn/benefits.asp accessed 22nd August 2006.

The above discussion indicates that the potential for levering economic benefits from wind generation for rural areas in the more conventional terms of investment, employment and taxation is fairly limited. Later in the paper we suggest some means through which the local economic development impacts might be improved.

5. Community benefit funds: an analysis

Set against the limited local economic benefits connected to the development and the operation of wind energy facilities in Wales is an evolving system of community benefits. In most cases, it is the developer that initiates these provisions, but with a great deal of discussion and learning within and between wind farm projects and rural communities. Building on the classification provided in Table 1, above, Table 2 classifies the characteristics of community benefit provisions from existing and consented on-shore wind farms in Wales, that is, beyond economic returns in the form of employment, profits, rents and royalties (Category 1 in Table 1). Table 3 highlights crude temporal changes, by disaggregating community benefits provided by wind farms commissioned from 1992 to 1998, from those commissioned or expected to be commissioned after 1999.

Our data show that the majority of on-shore wind developments report community benefit provisions (21 of the 29 developments reviewed), with such provisions becoming more commonplace over time. A common format is where the wind scheme developer provides a fund to support activities in nearby local communities. Contributions in kind are relatively rare, being restricted to the kind of measures that the developer can add to their construction contract, and deliver within the operational area of their site. Typical examples have been improvements to visitor-facing facilities, by installing interpretation boards, car-parking near the wind farm site, and enhancing footpaths around the project.

The amounts committed to community benefits funds vary, but are usually based on a fixed amount related to the installed capacity as opposed to actual generation capacity achieved. However, we found two instances where the community benefit funding was linked to overall scheme revenues, and some additional cases where sums were effectively index linked. Levels of funding vary significantly between developments, with £1000/MW per annum of installed capacity being the norm, but we note a strong tendency for the amounts offered to increase since 2002–3. Wind farm 17 in the Appendix offered a range of benefit funds equivalent in total to around £4000/MW per annum; wind farms 15 and 25 offered £2000/MW per annum, and the fund from wind farm 27 was expected to exceed £2300/MW per annum. The highest amount in the schemes surveyed was an estimated £5000/MW per annum at wind farm 29, although this was still in development at the time of our research.

Funds are typically managed through a local institution in some cases set up specifically to manage funds (as in the case of the Cefn Croes Wind Farm Community Trust). Funds are also managed through local partnerships, parish and town councils, and in some cases by special committees – commonly with participation of local authorities and wind scheme developer representatives.

Eligibility for funding is usually restricted in a number of respects. Most have spatial restrictions, to residents or eligible groups within designated community council areas containing, or having close visibility of, the reference wind energy scheme. Some funds are divided between more than one community council area, based on an assessment of proximity or exposure to the wind farm and its associated infrastructure including power lines and access roads. In terms of the commitment of fund monies, in the majority of cases they are reactive with applications for assistance and grants solicited and then judged against common criteria. The charitable status of the funds means that direct beneficiaries are rarely individuals or businesses. This inevitably restricts the extent to which funds can explicitly be used for economic development purposes (but see later discussion). Beneficiaries in the community have included sports clubs, churches, play and primary schools, community facilities (halls), local shows and events organisations. Some funds emphasise particular community objectives. Education and training is a recurring theme. In the case of wind farms at Carno and wind farm 3, bursaries are provided for local students going on to further and higher education, while at wind farm 6 a £100,000 trust fund is dedicated to educating and training.

A second and increasingly prominent theme is that funds direct resources to sustainable energy projects, especially energy conservation measures: eight out of fourteen community benefit funds tabled since 1999 made such provision. For developers, such a focus plays to their expertise in the energy field, and provides an overall green energy narrative for their development (Cowell et al., in press). Practically, such provisions typically involve schemes to encourage awareness of inefficient energy use, and the take-up of energy efficiency measures such as low energy light bulbs (including their free provision). The Community Energy Fund supported by revenue from the Bro Dyfi Community Renewables turbine has achieved social and environmental synergies by being used in combination with other energy conservation advice schemes, and targeted to ensure low income households are covered. With the second phase of the wind farm 17, £15,000 per annum was offered to two local community councils, but with £50,000 per annum directed to energy efficiency measures in the whole of the Upper Conwy Valley.

The other key community benefit category is environmental enhancement. Such provisions differ from the benefits outlined above in a number of respects. As discussed earlier in the paper, physical enhancement of wind farm sites is usually predicated on a need to offset, mitigate or compensate for the wildlife impacts of

Table 2
Community benefits schemes from Welsh wind farms.

Category of community benefit	Frequency ($n = 29$)
Community benefit fund	
Number	21
Sums provided (£1000 per MW per annum)	0.5–5.0
No. channelling funds towards sustainable energy purposes	9
Community ownership	3
In-kind benefits	7
Environmental mitigation/enhancement	12
No apparent wider community benefits	5

Table 3
Changing community benefit provisions over time.

Category of community benefit	Frequency 1992–1998 ($n = 14$)	Frequency 1999+ ($n = 17$)
Community ownership	0	3
Community benefit fund		
Number	7	14
Sums provided (£1000 per MW per annum)	0.5–1.5	0.6–5.0
No. channelling funds towards sustainable energy purposes	1 of 7	8 of 14
In-kind benefits	3	4
Environmental mitigation/enhancement	3	9
No apparent wider community benefits	5	0

Note: for Table 3 phases of development are split between pre- and post-1998 phases, hence the 'n' totals 31 rather than 29.

the wind farm. Habitat management plans are offered for the whole operational site and, typically, propose measures to restore habitat features and introduce less intensive land management, often additionally supported by the Welsh Assembly Government's Tir Gofal scheme. There were few cases where surveyed wind scheme sites directly affected designated wildlife sites (such as Sites of Special Scientific Interest), although risks to species of recognised conservation value, especially birds, did provide a reference point. These measures also differed institutionally from other forms of community benefit, in that they could be material to the planning decision, and were often secured by planning condition or planning agreement, whereas community benefit funds have to be treated separately from the process of determining planning consent. The different status accorded to habitat enhancement measures also persists in implementation. With relatively few exceptions[5], the delivery of biodiversity enhancement measures tends to be overseen by state conservation bodies and planning authorities, detached from the process of disbursing community benefit funds.

More rarely did wind energy projects channel funding towards measures that supported more directly rural tourism; at wind farm 22 funding has supported the development of mountain-biking trails, but this was something of an exception.

Tables 2 and 3 reveal that in the Welsh case that community ownership in wind schemes is rare. Two projects identified were very small in terms of energy output: Bro Dyfi Community Renewables, and wind farm 23, developed by a local non-profit company in Swansea docks. The third scheme, wind farm 17 in Conwy, was developed initially as a local farmers' cooperative development, but made scheme equity available to Conwy District residents in the second phase.

Several issues arise from the above analysis. In the first place, elements of the community benefits could be translated into economic benefits and may work to improve the limited supply side in affected communities. In many instances, wind energy projects are contributing to various forms of 'countryside capital' (Garrod et al., 2006) which might have economic ramifications; most demonstrably so with the mountain-biking trails example. However, our analysis suggests that the precise economic needs of affected communities/localities are difficult to consider in the development of community benefit provisions, even where developers specifically consult on what 'the local community' wants. In particular, the research here suggests strict limitations on what can, and cannot be funded, and in some case very strict criteria on the space through which benefits can occur i.e. within the area of the community council containing the wind farm. There was little evidence of scheme monies being employed in a joined up fashion with other developmental funds available at wider spatial scales. The Bro Dyfi Community Renewables turbine is something of an exception, because here the management of community benefit funds could make use of existing energy-environment-regeneration networks in the form of Eco-Dyfi -a partnership established in 1998 to foster the sustainable development of the Dyfi Valley as a whole. Furthermore, there was very little evidence of the evaluation of funds and their economic outcomes.

6. Discussion: wind schemes and community socio-economic opportunities

These shortcomings with community benefits leads us to question whether other means of enhancing the local economic development opportunities from wind energy might not be more effective. First, how far might the flow of economic benefits to rural economies in more conventional terms be improved upon? Second, what is the scope for increasing the diversity of ownership of wind energy projects?

Within more rural parts of the Welsh economy, current procurement laws limit the extent to which local and regional sourcing during wind farm development and operation can be increased. While it is likely that the Forestry Commission tender for wind farm development in the forestry estate might have concentrated developers' minds on spending at both regional and local level, there is limited room for manoeuvre on this issue. Any direct prescription on local sourcing issues might also affect wind scheme project economics (see also CSE et al., 2007a).

Potential options could entail wind scheme developers ensuring that relevant information is made available to local contractors such that they have an early indication of project requirements, or stating 'a preference, for sustainable development reasons, to source labour and materials locally' (CSE et al., 2007a, 32). There is evidence from Wales that this happens in a limited number of cases, with developers seeking actively to reach out to, contact and meet local contractors to discuss their likely needs. Furthermore, developers could also consider the sub-division of selected contracts such that smaller local rural firms have the opportunity to compete; this type of sub-division has been suggested at other key developmental sites in Wales (Jones and Munday, 2006), and has been used by conservation bodies (National Trust, 2005).

Other proactive means of increasing the economic benefits might include getting contractors on-site to recruit and train locally, with local authorities and economic development agencies working to identify and encourage potentially qualified local contractors. The Assembly Government could also act to give developers better information about regional supply capabilities, and act as an intermediary. Several variants of rural local sourcing programmes already operate in Wales. Inevitably even were steps to be taken in these directions it is expected that benefits would be felt at a regional as opposed to genuinely local level.

In the context of the limited economic opportunities available in parts of rural Wales there is the possibility of steering resources to training to improve the community supply side. For example, taking steps to ensure that operating and maintenance technicians are available in proximity to the wind power stations, through skills development, and encouraging further and higher education institutions to run appropriate training. Indeed, utilising some of the community benefit stream to fund skills development, through training schemes or scholarships (see Community Viewfinder, 2007) has been considered by Highland Council in Scotland. Moreover, as the scale of wind farms and related community benefit funds increases, there is emerging evidence that such funds are being used in more innovative ways to support these types of aims. For example, at the 456 MW Clyde Wind Farm being developed in Southern Scotland, initial discussions on a community benefits fund suggested a £1 m per annum sum being focused on long-term education and skills. In addition, the developer was also considering with local authority partners a specific Development Fund. This would be focused on local economic development objectives, potentially including projects to assist the development of businesses that could be sub-contractors to the wind energy industry and that would develop training for people wanting a career in the sector.[6]

[5] For example, at Cefn Croes, the Trust Fund (disbursing community benefits) had worked *with* the Environmental Management Committee (which was charged with restoring upland habitats).

[6] http://www.airtricity.com/ireland/media_center/documents_forms/wind_farm_docs/Clyde%20brochure.pdf accessed 23rd June 2009.

Turning back to issues considered in the initial literature review it is useful to consider how far greater community ownership of wind farm facilities is a practical means of levering economic benefits for affected communities, as many commentators have suggested. First, how large might the financial benefits be?

The profit performance of individual wind energy sites is difficult to tease out partly because of commercial confidentiality but also because profits vary in line with a large number of factors. Research in Community Viewfinder (2007, 10) revealed that wind energy could generate average net profits of over £60,000 per MW of installed capacity per annum. Looking at data on profit performance from smaller community-owned wind farms, a three turbine project generating 0.675 MW on the island of Gigha, Scotland, provided revenue of £80,000 per annum (Warren and McFadyen, 2007). At Fintry wind farm, also in Scotland, the community owns a single 2 MW turbine in a larger project, which was expected to gain revenues of £50–100,000 per annum, rising to £400–500,000 per annum once the capital is paid off, and full ownership was passed to the community (CSE et al., 2007a; see also Hanley and Nevin, 1999).

These figures on profits may not be fully representative of the sector, but, even as a crude benchmark they greatly exceed the sums of £1000–£5000 per MW per annum being offered by commercial wind farms through community benefit funds. Potentially at least, the greater returns gained as a result of ownership diversity could improve the capacity for wind energy schemes to meet long-term economic welfare priorities in rural economies of Wales. Basing local incomes on the use of renewable local resources would seem to chime with agendas of sustainable rural development that we discussed above. Furthermore the earlier review revealed that diverse ownership may have wider benefits: higher levels of social acceptance of wind energy; social capital cultivated by the interaction and cooperation necessary to develop projects; further social and technical innovation; and the development of new local knowledge and skills (Leaney, 2004; Walker et al., 2007).

If the *potential* benefits have long been well known, the scope for realising them in practice in the UK has been much more limited, as the ostensibly 'local' nature of community renewable energy inevitably involves negotiating with and coordinating complex networks of regulatory institutions and actors at wider spatial scales. One of just three community-owned wind farms operating in Wales at the time of our research was the Bro Dyfi Community Renewables Limited, with two single turbine schemes, each developed and owned wholly by the Dyfi Valley community (Kitchen and Marsden, 2005). The development of this small scale project benefited from a stable end-user contract and good rates of return (with the supportive Centre for Alternative Technology near Machynlleth), and proponents were able to draw upon existing community knowledge of green energy, and possessed the skills to access EU aid. EU money proved vital in funding the capital costs of both turbines, first under ERDF Objective 5b then under Objective 2.

While community ownership may bring economic benefits to affected communities there is the downside of risks to the reference community and to investors should the wind farm not perform as expected, or as electricity prices change. For small rural communities, raising monies for all but micro-generation schemes can be practically difficult. Financial institutions are less willing to lend to smaller wind projects than in the cases of Denmark and Germany (see earlier), with this unwillingness predicated on the uncertain returns in the UK's electricity market. This leaves UK community-based developers relatively more dependent on grant aid for a proportion of capital costs, which can prove difficult and time-consuming to obtain: as at the Power Factory project in the Rhondda (WAG, 2005a,b; wind farm 26 in our Appendix), delayed for several years seeking EU Structural Funds money. The financing structure of wind projects and financial regulations also make community involvement in ownership complex and costly to organise (DTI, 2005, 94). Smaller projects also face diseconomies in terms of the planning and feasibility work connected with schemes which fall heavily on small, community-led developments, as well as operational difficulties in getting smaller wind projects connected to the grid network (for more detail see Leaney, 2004; Leaney et al., 2001; DTI, 2005; Toke, 2005a; Szarka and Bluhdorn, 2006; Walker et al.,, 2007).

Overall, the factors which have supported the deployment of community-owned wind power in countries such as Germany and Denmark have been largely absent in Wales or other UK regions to date,[7] making community renewables a riskier, more complex process, and thus much rarer outcome. Highly supportive local circumstances have been required to overcome these challenges, like those of the Dyfi Valley, but these are not widely available or easily transferable, showing that community-owned renewable energy is as dependent on the uneven availability of 'an integrated, communitarian solidarity' (Edwards, 1998, 66) and 'situated knowledge of a few key actors' (Edwards, 1998, 74) as any other form of locally-driven rural development. Even in propitious circumstances, progress with Bro Dyfi's second turbine was dogged by grid connection problems.

Furthermore wind farm developments in Wales whether owned by communities or multinational firms, have faced opposition from sections of the public. Community-led or owned schemes have had to wrestle with this situation alongside the largest commercial wind energy projects, albeit often with greater difficulty in funding the necessary advice and support. New planning guidance for Wales now recognises the merits of community-owned renewable energy but, while seeking to concentrate large-scale wind power development (schemes of 25 MW and above) within the Strategic Search Areas, it also aims to protect the Welsh countryside from significant wind energy development outside these areas. No dispensation from this protective policy is given to community-owned projects. The net effect may be to restrict communities or groups wishing to develop wind energy schemes to sites in urban areas or to developing smaller scale facilities (under 5 MW) (Cowell, 2007).

7. Conclusions

This analysis of community benefits provisions in Wales highlights an evolving system of practices, with an increasing expectation – by developers, communities and government, both regional and local – that new wind energy schemes will include provisions for community benefit in addition to any local employment or environmental enhancements. In most instances, the power to shape the form and volume of community benefit provisions lies with the developer, with some devolution of detailed spending decisions to local organisations. The community covered by the majority of schemes is predominantly very local, with benefits channelled to those closest to development sites. Thus we suggest, following Toke (2005b), that the evolution of community benefits schemes in Wales, as has happened elsewhere in the UK, reveals firms working to improve the 'material' and 'presentational' aspects of wind energy developments.

[7] Note that a system of feed-in tariffs was introduced in Great Britain in April 2010 for renewable energy generation projects of 5 MW or less (the Clean Energy Cashback scheme).

The analysis also suggests that the underlying economic needs of affected communities were difficult to consider in the development of community benefit provisions, even where developers specifically consult on what 'the local community' wants. Community benefits schemes have majored on community social infrastructure, education and learning, as well as green energy measures, but with limited evidence of linkages to wider rural development initiatives at local authority or regional level, or of scheme monies being employed in a joined up fashion with other development funds. The directions of spending were often limited by the charitable nature of trusts created to disburse benefits, and we found limited evidence of the evaluation of funds and their economic outcomes. It seems that although community benefits are now routine, rarely has their use been thought about in a strategic way.

More generally it is concluded that the economic development outcomes from rural wind generation projects as a whole are relatively limited. Increasing the flow of economic benefits to rural economies in more conventional terms is difficult with, for example, a series of impediments to increasing levels of local sourcing of goods and services to support wind projects. In this respect, much wind energy investment exhibits the detachment from existing economic relations that have characterised previous strategies for economic diversification (Day, 1998). However, the paper reveals scope for developers to increase awareness for local firms of areas where they can contribute and with the possibility of interventions to steer resources to training to improve the community supply side.

Clearly increasing the diversity of ownership of wind energy projects might improve the level and quality of economic development outcomes in rural economies of Wales, with the specific nature of the link between local ownership and rural economic benefits warranting further research. We suggest that amounts placed in community benefit funds are fairly low when compared to the potential returns associated with community-owned schemes. Diverse ownership may also lead to economic and social benefits with community social capital and skills developed by the activity necessary to promote projects. While there may be tangible rewards to local ownership of small scale facilities this must be set against a number of constraints on the successful evolution of these types of schemes in many rural contexts. However, the prospect of energy-based sustainable community development remains attractive, with WAG setting up a new scheme in 2010 to support social enterprises in installing their own renewable energy electricity generation, using money from the EU European Regional Development Fund (Energy Saving Trust Wales, 2010).

Looking ahead, the strong likelihood is that it will be the conventional, commercial wind power sector that will expand most significantly, in output terms. Moreover, the Welsh Assembly Government's spatial strategy will see a concentration of development opportunities into further large-scale projects in relatively sparsely populated rural areas. Such trends are likely to bring with them ever-larger community benefit funds which, we suggest, should focus attention on how community benefits programmes can be deployed to lever long term welfare improvements for affected localities. While a growing raft of guidance on community benefits has helped to legitimise community benefit practices, and disseminate ideas (CSE et al., 2007a,b; Community Viewfinders, 2007; RegenSW, 2004; WAG, 2005a,b) such guidance does not of itself address what are rather enduring questions in rural development: do all local communities have adequate capacity to best invest these resources? and are institutional arrangements in place to help coordinate the larger sums involved to greatest, long-term effect? Nor does guidance help to challenge the conventions through which such schemes have been organised to date, with their emphasis on money being spent in local affected communities, and channelled towards the voluntary and community sector.

While our focus in this paper has been wind generation, different renewable energy technologies may have rather distinctive implications for rural economies. For example, certain forms of biomass may offer a very different array of potential economic benefits, especially when considering heat as well as electricity – but our research still shows the need to look carefully at claims for the rural regeneration potential of renewable energy *per se*. While we have seen a discursive and spatial convergence between renewable energy and rural economies, ensuring that the latter benefits from the former requires specific attention to the technological and economic relations between them.

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Appendix. : Summary details of wind energy projects and community benefits

Arranged in chronological order, by date commissioned (for functioning projects) then date of planning application for other categories.

Location and date of development	Installed capacity; cost (where known)	Community benefits	Developer/operator
1. Anglesey (Nov 1992)	7.2 MW; cost £8.5 m	No obvious additional community benefits.	Commercial company
2. Powys (Oct 1992 – Jan 1993)	30.9 MW Capital cost £33.4 m.	No obvious additional community benefits.	Commercial company
3. Powys (January 1993) Repowered (March 2002)	7.2 MW, costing £6.5 m. Then one of only three wind farms in UK with UK made & designed turbines. Subsequently repowered: 15.3 MW	Community fund	Commercial company
4. Ceredigion (March 1993); subsequently repowered (Feb 2004)	9.35 MW	No information on community benefits.	Commercial company
5. Rhondda Cynon Taff, (August 1993)	9.0 MW	Community fund	Commercial company
6. Powys (July 1994)	9.9 MW	Community fund, environmental compensation/ local economic benefits	Commercial company

(*continued*)

Location and date of development	Installed capacity; cost (where known)	Community benefits	Developer/operator
7. Carmarthenshire (Dec 1994, June 2006)	5.5 MW	No obvious additional community benefits.	Commercial company
8. Anglesey (July 1996)	5.6 MW; cost £6 m; on working farmland.	Community fund, environmental compensation	Commercial company
9. Powys (October 1996)	33.6 MW. Cost £26 m.	Community fund, environmental compensation/ community energy fund/minor tourism facility.	Commercial company
10. Ceredigion (Jan 1997)	2.4 MW. Cost £3 m to build.	No obvious additional community benefits.	Commercial company
11. Powys, Phase 1 (April 1997), Phase 2 (2004) Phase 3 (yet to be commissioned)	1 × 0.6 MW turbine (decommissioned by 2004, replaced by 2nd BDCR turbine); 1 × 0.075 MW turbine (£83,000); 1 × 05 MW turbine (£350,000)	No community benefits for 1997 phase; for phases two and three, local collective ownership/community energy fund/local construction and operational spend/minor tourist provision.	1st turbine was developed by local environment centre, phases 2nd & 3rd turbines were community-led and community-owned.
12. Anglesey (October 1997)	20.4 MW. Total investment £17 m.	Community fund	Commercial company
13. Ceredigion Commissioned April 1998.	10.2 MW	Community fund, mitigatory action, farm support	Cooperative venture between commercial companies
14. Conwy Phase 1 (September 1998) Phase 2 (Dec 2002) Phase 3 (Jan 2006)	Phase 1: 0.6 MW (1 turbine). Phase 2: 1.7 MW. Phase 3: 0.85 MW (1 turbine). Phase 2 cost £200,000 Total capital cost for all 3 phases £2.5 m.	Phase 1 (1998) refers to farm support; phases 2 and 3 (post-1998) to community energy fund, habitat mitigation.	Commercial company
15. Carmarthenshire, (Feb 2001) Extension (Conditional approval July 2007)	3.6 MW, cost £3.5 m. Ext'n: 7.8 MW – at least £5.4 m capital cost.	Phase 1 – none but extension has community fund (with environmental compensation/ recreation facility.	Initially farmer-developed, now commercial company
16. Carmarthenshire (commissioned July 2002) Extension (Application March 2005)	3.9 MW. Extension: 3.9 MW. Capital costs £2.5 m	Community fund and farm support.	Commercial company
17. Conwy, Phase 1 (Dec 2002); Phase 2 (Jan 2003); Phase 3 (consented Nov 04)	3.9 MW (2 × 1.3 MW turbines, then one more 1.3 MW turbine – 16b). Phase 2: 11.7 MW, cost £2.6 m.	Community fund/ownership/ energy, environmental compensation.	Farmers' cooperative, a commercial company, scope for local share ownership in phase 3
18. Pembrokeshire Phase 1 (Sept 2004) Phase 2 (approved Dec 2005)	0.5 MW (one turbine) Capital cost £200 k 2nd turbine (200 m away from 1st)	Billed as a 'community wind turbine'	Farmer/commercial company
19. Ceredigion (June 2005)	58.5 MW	Community fund, environmental compensation; energy efficiency	Commercial company
20. Denbighshire, (October 2005)	21.25 MW Cost £15 m to build; as an asset, bought for £21.6 m	Community fund/ environmental compensation/ local employment	Commercial company
21. Powys (April 2006)	14.45 MW Cited as '£11 m project'.	Community fund, infrastructural benefits	Commercial company
22. Neath-Port Talbot (July 2006)	32 MW. (Part) of construction contract cost £4.75 million.	Community fund/ environmental compensation	Commercial company
23. Swansea, Under construction, June 2006.	1 × 0.25 MW turbine (second hand) Project cost projected to be £230 k	Community ownership - revenues used to support energy saving measures in community	Non-profit company/ partnership.
24. Gwynedd (Consent Sep 04)	4.5 MW	Community (energy) fund/ environmental compensation	Commercial company
25. Powys (Consent Feb 2007)	15.6 MW Capital cost estimated at £20 m.	Community fund, environmental compensation/ community energy fund/minor tourism facility	Farmer owned/ commercial company
26. Rhondda (consent April 05)	10.4 MW. Estimated start up cost of £10 m.	Community part-ownership	Joint venture between commercial company and a community-owned development trust.
27. Carmarthenshire, Consent Mar 2007; in pre-construction August 2007.	30 MW. Estimated construction cost close to £30 m	Community fund (possible energy focus), environmental mitigation, tourist provision.	Commercial company
28. Caerphilly (Consented October 2006)	1.7 MW	Community fund	Commercial company
29. Carmarthenshire, Consent June 2007	36.8 MW £27 m (20 for the turbines and 7 for the civil engineering)	Community fund/ environmental mitigation	Commercial company

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