



Is there a case for community-based equity participation in Scottish on-shore wind energy production? Gaps in evidence and research needs[☆]



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ARTICLE INFO

Article history:

Received 26 April 2013

Received in revised form

27 March 2014

Accepted 22 August 2014

Available online 18 September 2014

Keywords:

Rural

Community

Renewable

Ownership

Targets

Environmental citizenship

Equity participation

ABSTRACT

This paper considers the potential rural development benefits of community ownership or co-ownership (or equity participation) of on-shore wind energy developments and argues for further research to assess the case for enhanced policy support for such ownership structures. Previous authors have argued that if communities are given a stake in renewables enterprises this will support the Scottish Government's community empowerment agenda, increase economic activity in rural Scotland and provide substantial benefits to rural communities. Others have argued that community ownership schemes may decrease community resistance to on-shore wind developments, and set beneficiary communities on a low-carbon development pathway through stimulating 'energy citizenship'. However, empirical evidence to support all of these claims remains limited. Focussing on Scotland, where the growth of on-shore wind has been strong in recent years, the paper reviews the current policy environment and governance context before reviewing evidence in relation to the various arguments for community ownership or shared equity in the case of on-shore wind energy. It identifies several areas where further research is urgently required to guide policy makers, so as to ensure that both rural development objectives and renewable energy targets are met.

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[☆]I would like to thank Nick Gubbins of Community Energy Scotland and Deb Roberts, Simon Heslop and Sue Morris of the James Hutton Institute for useful comments. This work was partly supported by the RESAS research programme Theme 2 Strong and Resilient Sources and Supply Chains for Water and Renewable Energy, but connects also to Theme 8 Vibrant Rural Communities.

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1. Introduction

This paper reviews the case for community-based equity participation in wind energy development with particular reference to Scotland. Nine years ago, Hain et al. [21] gathered primary and

secondary evidence to show that rural communities in Scotland were ready to embrace renewable energy projects, and asserted that community-owned renewable energy schemes had great potential as stable revenue generating projects. Notwithstanding a growing number of successful community-initiated on-shore wind energy projects in Scotland, large-scale externally owned (to rural areas) commercial wind energy generation dominates. This means, as Phimister and Roberts [31] argue, that although regional GDP is enhanced by new externally-owned wind turbines, almost none of the economic benefit filters down to local households.

Scottish Development International [33], a Scottish Government website, reports that Scotland has about 25% of Europe's on-shore wind production capacity. Given this level of technical capacity, it is hardly surprising that the growth of installed renewable energy capacity should have focused on the wind sector, although policy changes signalled in late 2013 and planning constraints may limit future on-shore developments in the UK. Scotland is advantaged in UK terms because of the windiness of its climate, where wind turbines operate at a higher level of capacity than in many parts of Europe.

The role of large-scale energy producers in developing the wind industry is widely recognised. They are responsible for most of the current installed capacity. With significant government support, the industrial provision of renewable wind energy has furthered the progress of decarbonised energy production, a process initiated in Scotland by small private hydro-electric schemes in the early 20th century and much augmented by the contribution of the North of Scotland Hydro-Electric Board in the post second world war period [53]. However, the structure of both present and future ownership of renewable production capacity can influence the magnitude and nature of rural development outcomes. In particular, some authors have argued that locally owned, collective or community ownership models may enhance the retention and recirculation of benefits in rural areas [29,31] and contribute very significantly to rural development.

The metaphor of leaky buckets has been used to describe many local economies [49] indicating the outward flow of spending from many rural areas. Rather than local economies being sustained by direct and indirect benefits arising from the circular flow of money, many local economies 'leak' their benefits rapidly to the wider economy. This is especially true of many rural areas which often have a narrow economic base, a problem that is exacerbated where processing of primary products takes place further afield. In the case of on-shore wind, post-construction phase, the requirements for intermediate inputs and labour are limited and thus the key issue is how the income from energy generation is spent. In this respect, externally-owned on-shore wind energy developments are argued to give rise to particularly large "leaks" with few benefits retained in the areas where the developments are located. This arises largely because local wages comprise only a very small proportion of costs per MW of output. Indeed local households will, like all households, face higher energy bills because of the embodied support for renewables developments, which reduces their disposable income and increases the risk of fuel poverty. Greater local capture of benefits can arise if local households are shareholders in the enterprise, but local economic benefits are also dependent on where the enhanced incomes are spent: locally or in the wider economy [31]. In addition to the economic/rural development arguments for community ownership, community ownership may also reduce opposition to developments [20], and possibly stimulate behaviour change towards lower carbon use. These benefits have been asserted but not widely tested.

There is, however, a need for caution about the rhetoric of community. The pursuit of community initiatives must be framed

by consideration of the meanings attached to the term 'community' and recognition that communities of place are often divided by different interests and values. Renewable energy proposals often divide communities, resulting in opposing interest factions. In particular, on-shore wind turbine developments have often been opposed by some people because they are seen by some elements of rural communities as industrialising a traditional rural landscape, in which, by comparison, the presence of farming or forestry are seen as legitimate land uses. The success of community-based, on-shore wind energy initiatives is thus likely to be both contingent on place specificities (the type of residents, the landscape character, and whether the project explicitly sets out to address local needs) and dependent on high levels of trust existing between different actors [48]. However, Aitken [2] points out that trust is unlikely to be achieved by adversarial behaviour within communities by proponents claiming that opposition to wind turbines comprises, in some way, deviant behaviour.

After reviewing the Scottish policy context, this paper reviews the alternative forms of community-based ownership of on-shore wind developments, including both outright community ownership and co-ownership of renewable energy production in Scotland, and identifies areas where further research is needed. In this way, it explores whether policy support for community equity participation in on-shore wind could simultaneously both support rural communities and achieve the aim of promoting increased renewables production and associated greenhouse gas emissions reduction.

2. The Scottish context

The desire for collective ownership of property can be premised on both moral and material claims: first, that collective ownership is fairer; second, that it offers distinct material benefits to the collective owners, in comparison to other (usually private property) arrangements [7]. New forms of collective ownership of resources have received substantial support in Scotland both prior to and since the Land Reform (Scotland) Act 2003, which signified strong public support for community land purchase. Since then, new arrangements for local governance (including community ownership) of public forests have been agreed in the National Forest Land Scheme [17].

Similarly to the wider land reform debate, it is evident that claims about social injustice often lie behind opposition to commercial wind farms, rather than simply 'nimbysism' [52,13]. Indeed, Cowell et al. ([13]: 552) argue that 'the conventional view of community benefits is more likely to work – and can only really be conceptualised as working in the way assumed – where the institutional context has some characteristics of a property rule, i.e. the affected community actually has scope to control the development process, including the right to veto the development unless the benefits are perceived to outweigh the costs'. Haggett [20], for example, has noted the likelihood of reduced opposition to on-shore wind energy development where community ownership or co-ownership is on offer. Owens and Drifill [30] noted the key importance of public attitudes. From a social justice and equity perspective, the authors argue that adversely affected parties should first be properly consulted and second, if adversely affected, compensated, although these processes are not without significant computational challenges and transaction costs.

The pursuit of a decarbonised energy production system in Scotland is driven by the Climate Change (Scotland) Act 2009 and the major emissions reductions targets (of 42% on 1990 levels of energy emissions by 2020 and 80% on 1990 levels by 2050). This, in turn, is driven by the Scottish Government's desire to take a leading and exemplary role in addressing the adverse effects of

climate change, which has demonstrably high social costs [43]. Arguably, the energy production sector is amongst the easiest to decarbonise on technical grounds [26], as known technologies can deliver the required outcomes, albeit at financial cost.¹ The political rejection of the nuclear energy option in Scotland creates the necessity to better understand current renewables technologies and their financial and environmental costs. On-shore wind energy is currently the most important source of renewable energy in Scotland (see Table 1), recognised as the least-cost renewable energy option in the short-term [28] and has high technical potential for expansion. However, energy policy remains only partially devolved and thus susceptible to changes in policy at UK level. The UK has recently signalled changes in the level of support to on-shore wind in the Chancellor's Autumn Statement of December 2013 [9]. The replacement of current support for renewables with Contracts for Difference signalled in the Energy White Paper of 2012 [15] may make it more difficult for community groups to develop projects [45].

The case for focusing this paper on on-shore wind is built on the premise that on technical and financial grounds, on-shore wind has had a central role in the Scottish and UK energy mix [26] with the Scottish Government ([34]: 77) seeing a need for 'continued expansion of portfolio of on-shore wind farms to help meet renewables target'. However, it is widely recognised that the cumulative impact, predominantly relating to the intrusiveness of turbines of on-shore wind installations, is causing increased concern, and that community opposition has grown in recent years [8]. Even where developers have focussed their attention on sites with appropriate physical conditions and where adverse environmental impacts are relatively small, significant opposition can be anticipated.

Scotland has high technical potential for wind power compared to many European countries (see Table 2). This high potential in the UK is reiterated by the European Environment Agency in a major report on on- and off-shore wind [16].

3. The Scottish Government commitment to community engagement

One of the prominent features of the Scottish pursuit of sustainable economic growth has been recognition of the need for strong partnership between government and people, coupled with a political desire to empower communities to a much greater degree to shape their own destinies. In this section, the focus is on how community empowerment and renewable energy issues could intersect by more effectively joining up different strands of Scottish policy. Table 3 summarises the range of policies supporting community engagement in Scotland with relevance to energy. Some climate change-related policies directly support community ownership of energy supplies (e.g. the CARES Scheme (see below)) and the second Report on Policies and Proposals ([40,41]: 68) reiterates a target of 500 MW of installed capacity held by communities or local ownership. Other policies, such as the Climate Challenge Fund, encourage energy demand reduction or substitution of high energy-embodied products with low energy-embodied products (e.g. local food replacing air-freighted food). Both areas of policy have strong potential for community engagement; and both can help in achieving Climate Change (Scotland) Act targets.

Community Energy Scotland (the successor charitable body to a company originally established under the umbrella of Highlands and Islands Enterprise) has supported community energy projects for a

Table 1

Installed renewable electricity production Scotland 2012.

Source: Scottish Renewables Website [42]: <http://www.scottishrenewables.com/scottish-renewable-energy-statistics-glance/e/>.

Technology	MW output	%
On-shore wind	3808	65
Off-shore wind	190	3
Wave/tidal	4	0
Sewage sludge digestion	8	0
Solar photo-voltaics	108	2
Hydro	1500	24.5
Municipal solid waste combustion	18	0
Animal biomass	13	0
Plant biomass	115	2
Landfill gas	113	2
Anaerobic digestion	7	0
Total	5883	98.5

Note: % does not equal 100 because of rounding.

Table 2

Technical potential of different European countries for on-shore wind energy.

Source: Toke [44] for technical potential, and author's own calculations.

	TWha per year wind electricity production potential	Population in millions (2001/12)	TWha per million people
Denmark	26	5.7	4.56
Spain	86	47.27	1.82
Germany	24	81.8	0.44
Scotland	54	5.295	10.20
The Netherlands	7	16.69	0.42
England and Wales	52	56.074	0.93

number of years. Many of their supported projects in the initial years were in community buildings, such as village halls, and were modest in scale. However, Community Energy Scotland (and its predecessor) has also been instrumental in supporting a number of communities to develop substantial renewable energy installations, predominantly on-shore wind energy developments. In particular, more than 25 MW of such developments are now installed and a further 150 MW are in development (Gubbins, pers. comm.). The majority of established schemes are in the Highlands and Islands of Scotland, but there has been a tendency to locate some larger schemes closer to built up areas, especially in central Scotland. The Scottish Government has recently launched a Community and Renewable Energy Scheme (CARES) which provides loans to 'help to meet the cost of investigating whether (an) idea for a renewable energy project – which plans to generate cash for (a) community or rural business – is viable' [12]. The contract to run the CARES scheme has recently been transferred from Community Energy Scotland to a wider consortium of Scottish energy-related NGOs. The scheme helps communities overcome the risk of refusal in an on-shore wind energy proposal. It supports co-ownership by requiring community (or local) ownership to exceed 20% of the total value of the project. In addition, a Lottery-funded scheme on growing community assets has supported a number of communities in developing renewable energy installations, and the EU Leader programme (part of the Rural Development Programme for Scotland) has supported community-based renewable energy projects in Shetland, Ayrshire and the Western Isles. The Rural Development Programme for Scotland also supports individual land-based renewable energy projects, but its contribution has been effectively superseded as the main support policy by the more advantageous revenue streams on offer from the UK-wide Feed-in-Tariff system launched in 2010, or on larger schemes under the Renewables Obligation, which obligates UK electricity suppliers to

¹ How these costs are distributed between consumers, governments and producers is a contentious issue in itself, beyond the scope of this paper.

Table 3
Policies supporting community engagement in renewables production in Scotland.

Policy	Main aims	Impact on renewables
Land Reform Scotland Act 2003	Give communities the right to buy	Creates scope for community energy ventures
Forest Community Land Scheme	Create scope for community lease of public forests	May allow access to renewables sites
Forestry Commission policy on renewables	Creates scope for community equity in large corporate schemes	Should not slow down commercial developments. The Forestry Commission have many developments on their land
CARES scheme	Provide bridging capital and loan finance to overcome transaction costs of scheme development	The main scheme financing renewables development costs. Loans repayable where planning is successful, but not where schemes fail to get through planning
Rural Development Programme for Scotland	To support sustainable rural development	Grants available to support community energy schemes under LEADER

source an increasing proportion of the electricity they supply from renewable sources.

Community ownership of land resources has been actively promoted in Scotland both prior to and since the Land Reform (Scotland) Act 2003. Community ownership of other resources, such as renewable energy installations on land, is also supported by current policy statements. Pledge No. 1 of the Climate Change Delivery Plan ([35]:8) asserts: 'We will support and accelerate the implementation of renewable energy, through our Renewable Energy Action Plan, in a way which promotes large-scale, community based, decentralised and sustainable generation'. Part of the vision of the Renewables Action Plan ([34–36]:48) is 'to maximise the benefits for rural communities from renewable energy, not only in terms of access to locally produced low carbon energy but in terms of social cohesion and economic development.' This has been updated by the Scottish Government's Routemap for Renewable Energy Development [38], which states that 'we wish to maximise the benefits for communities from renewables and to transform the level of opportunity for local ownership of energy. Our ambition is for all Scottish communities to share in the rich rewards of our next energy revolution'. This policy is reiterated in the Electricity Generation Policy Statement of 2012 and in the Scottish Government's Report on Policies and Proposals 2 (2013: para 4.2.1).

The Land Use Strategy, [39] which was a requirement established in the Climate Change (Scotland) Act 2009, also makes explicit mention of the need for community engagement. One of its ten principles is that: 'People should have opportunities to contribute to debates and decisions about land use and management decisions which affect their lives and their future (p4)'. Another of the principles states that: 'Opportunities to broaden our understanding of the links between land use and daily living should be encouraged' (p4). Both of these principles play into a community engagement agenda in energy production and carbon emissions reduction behaviour supported by the Climate Challenge Fund or other means. More recently, the Community Empowerment Bill Consultation ([40,41]:1) asserts that: 'community empowerment is about communities taking their own decisions about their futures. It's about communities choosing to grow and become stronger, and to improve things for their families, friends and neighbours in ways that make sense to them. It is a means for communities to take their own actions with access to all the resources available to them to develop their local economies, environments and cultures'.

As renewables developments have been actively promoted, the global financial crisis since 2009 has led to a reduction of public expenditure at national and local levels. At both UK and Scottish level, political rhetoric has advanced community engagement and empowerment: in England through the Big Society agenda; and in Scotland through a more generalised appeal for community empowerment with a new law imminent. To a degree, this assertion of the need for community engagement and community

shareholding can be interpreted as appealing to communities to plug the gaps left by the withdrawal of state funding. Indeed, funds from community-owned or shared equity renewables investments are at a level which could provide a significant platform for local socio-economic development for a significant number of relatively disadvantaged rural communities where existing public sector funding is threatened. However, there remain unexplored issues and uncertainty about the ability of communities to allocate funds of this magnitude, and the extent to which those allocating funds will allocate support to disadvantaged groups.

In summary, the Scottish Government is:

- Supportive of rural development;
- supportive of increased renewable energy production;
- supportive of community engagement with energy production and emissions reduction issues; and
- facing very tight budgets and limiting local authority spending on services.

This combination of principles, policies, and the financial context ought to provide a strong platform for community engagement, including the scope for community ownership or shared equity.

Below the level of the Scottish Government, Scottish local authorities recognise the triple challenges of climate change, renewable energy production, and rural community development. For example, Aberdeenshire Council is committed to supporting rural areas that are committed to accommodating renewable energy developments in the right place. In their vision statement, the the Aberdeen City and Shire Plan ([1]:7) states a commitment 'to further develop a robust and resilient economy and to lead the way towards development being sustainable, including dealing with climate change and creating a more inclusive society'. Such sentiments are widespread in the public sector.

The Scottish planning system, whether at local or national level, seeks to secure sustainable development. Paragraph 50 of the National Planning Framework for Scotland 2 ([36]:17) asserts that: 'More local decision making will strengthen the ability of communities to respond to challenges, such as the local implications of climate change'.

Paragraph 38 of Scottish Planning Policy ([37]: 12) on the location of new development (generally) indicates that decisions should:

1. promote regeneration and the re-use of previously developed land,
2. reduce the need to travel and prioritise sustainable travel and transport opportunities,
3. promote the development of mixed communities,
4. take account of the capacity of existing infrastructure,
5. *promote rural development and regeneration*, (my emphasis) and

6. prevent further development which would be at risk from flooding or coastal erosion.

In summary, the case for joined up government has been made often in Scotland and elsewhere. However, it does not seem to be happening sufficiently fast with respect to linking the rhetorical commitment to community renewables with the planning process, and with a raft of existing rural and community development policies in an explicit way. The original 500 MW target of community-owned renewables has been modified to include landowner developments and is still rather distant. Planners have to a large degree neglected consideration of local economy in renewables decision making, even though Scottish Planning Policy guidelines explicitly promote rural development and regeneration.

4. How on-shore wind energy developments can be owned

There are four main ownership models of wind energy production in the UK. All of these have associated social and environmental issues and economic flows, which have been partially documented [31,4]. The models include normal commercial ownership by energy companies; rural land manager ownership; community ownership, including shared equity; and co-operative ownership. Only the last two are strictly community ownership models, although the Scottish Government also includes landowner schemes in its definition of community ownership. TLT Solicitors [46] reviewed the community options for the UK government and suggested two models which correspond to the community equity and co-operative models reviewed below. Each is considered in turn. Their relative merits are summarised in Table 4.

4.1. Commercial ownership

The commercial external ownership of wind energy is associated with mainstream energy industry developers, which, in the UK, includes the major UK energy suppliers and a raft of other UK and international companies. Within this sector, firm size varies greatly with some very large multifaceted energy companies, including UK-owned firms, non-UK energy suppliers such as the Swedish-owned Vattenfall, and some specialist smaller wholly 'green' energy suppliers, such as Ecotricity. Under this 'corporate' model, landowners, sometimes not locally resident, will receive a ground rent, and the energy companies and their shareholders receive the profits of the wind energy enterprise, with adjacent communities normally receiving relatively small contributions in the form of a per MW community fund. Such funds have to date been treated as 'planning gain', a technical term that means that the local administration is able to persuade developers to deliver public good investments as part of their project.

Private commercial ownership was estimated in 2010 to generate an average community benefit fund of £1700 per MW of installed capacity on developments in the preceding three years [37]. In late 2011, UK Renewables established a 'protocol' which established a minimum community benefit of £1000 per installed MW per annum. Several Scottish councils have been pushing for higher community benefit rates per MW. The Scottish Government has set a level of benefit for any developments on Forestry Commission land at £5000 per MW ([18]), although it will be some years before any development is completed and any benefit paid out. This figure is now being more widely promoted in Scotland under a current (2013–14) consultation [40,41]. However, current benefit payments in general constitute less than 1% of the gross annual income of a wind energy development [22]. After the construction phase, there is little or no other economic benefit to a community, unlike most financially equivalent infrastructure and industrial developments such as a harbour improvement or a major new sawmill.

4.2. Ownership by rural land managers

Many often relatively small wind energy developments are owned by rural land managers (which are often also supported under the Scottish Government's CARES programme (see above, p5); and by the Scottish Rural Development Programme). Here the land owner is usually the primary developer and beneficiary (often using an agent or consultant) and the average turbine size is often but not always smaller than the typical commercially-owned wind farm model. The majority of turbines have operating capacities of less than 100 kW though there are now some larger farmer investors with between 5 and 10 MW of installed capacity. The landowner usually finances the development (often with borrowing) and receives the profits (including Feed-in-tariffs or equivalent), some of which may be re-invested locally or ploughed back into a land-based business activity. This approach to development has, to a degree, resulted in the appearance of a 'scattergun' approach to wind turbines, as increasing numbers of landowners undertake such developments, creating a potential problem of 'cumulative impact' in the landscape. Turbines are often of different sizes and may be located at technically sub-optimal locations. Such developments rarely pay a share of profits into a community fund and remain an income stream for land managers alone (for CARES-supported projects there is, however, an obligation to pay into a community fund). Where such turbines are located in major commuting zones, the non land-based population gains nothing, and local opponents to developments often complain of the intrusion of 'industrial' installations in traditional rural landscapes and their living space [50].

Table 4
Advantages and disadvantages associated with different ownership models of on-shore wind energy.

Ownership model	Advantages	Disadvantages
Commercial corporate	Specialised companies with long track records in renewables developments.	Incurs opposition from local residents and more widely from anti-wind lobby. Economic benefits to production area very limited
Commercial land managers	Fewer issues over accessing land and increasing experience among land managers in renewables development.	May produce sporadic pattern of development at technically sub-optimal sites with very different turbine styles and sizes.
Co-operative	Allows collective membership of geographical and other communities of interest.	Creates "insiders" and "outsiders" in local community because of members and non-members of co-ops.
Community	Allows, under various institutional forms, geographical focus of ownership and benefits; creates scope for wider climate change engagement.	High transaction costs. Limited skills in many communities. Uptake depends on community capacity rather than where community need or technical potential is greatest.

Evidence collected by author.

4.3. Community ownership

Communities can own or co-own developments. Their ownership can take a variety of forms [47]. On Gigha, an island off the Kintyre peninsula, on six islands in Orkney, including the island of Westray, at Udney in Aberdeenshire and on South Uist there are established wholly community-owned on-shore wind energy developments. A community co-ownership model exists in places such as Fintry in Stirlingshire, and the proposed Viking Energy development in Shetland dramatically up-scales the level of community involvement, in this case in a proposed wind farm of over 100 turbines with an estimated output of 370 MW (with the 'community' owned share c 50%), but in this case with local council co-ownership with Scottish and Southern Energy rather than the community as co-owners. Municipalities are also major owners of German and Danish renewable capacity, but the extent to which this constitutes community ownership is debatable. The largest wholly community-owned proposal at the planning stage is at Rosneath in Argyll, with the largest installed being the Stora Uibhist project at Loch Carnan, South Uist at over 7 MW. These developments can still be controversial on environmental grounds but by keeping a substantial proportion of the profit in local communities, they are likely to meet less local resistance and have far more positive impacts on local development. For example, the Udney Aberdeenshire community wind turbine proposal attracted minimal letters of objection, but the application was preceded by a great deal of active community engagement.

The co-ownership or shared equity model is operating in a number of places in Scotland. It is largely risk-free for community groups as far as pre-planning costs are concerned if they are unable or choose not to invest at the pre-consent stage, since if the development does not go ahead, nothing is owed to the developer. If the development does go ahead, then all costs, including pre-planning costs, are shared with the developer in proportion to the share of the returns – although the return to the community will be less than if they had shared some of the pre-consent risk. In some cases, the developer arranges finance at commercial market rates to be repaid by the community over the agreed term; in others the community has to source their share of the cost. Using this model in a recent Aberdeenshire case, the developer originally offered £3 k per MW which would have amounted to £67 k per annum community benefit. Following discussions with a local development trust, an agreement was made that the trust, on behalf of the community, would take 10% of equity in the wind energy development. Whilst the original community benefit would have amounted to £1.67 million over 25 years, the shared equity agreement would produce nearly £7 million of income direct to the community. In this case, the community must share the same risks as the operating company, but the increase in reward is seen to be worth the comparatively low risk level. A further variant on the co-ownership theme is where a Housing Association becomes a partner in a community energy development and uses its share of the proceeds to provide an income stream to support housing developments. This is currently being actively pursued by Grampian Housing in Aberdeenshire; with the first UK project of this type now consented in Berwickshire (a joint venture between Berwickshire Housing Association and Community Energy Scotland), although turbines and housing are unlikely to be co-located.

4.4. Co-operative ownership

A fourth model of community generation exists in co-operative ownership, where members of the public buy into a scheme as collective owners or part-owners, to whom a share of the income is distributed. This model has a long history in Scandinavia, especially

Denmark, and is also found in Germany [19]. This has been put into practice in a number of parts of the UK and has been championed by a not-for profit organisation, Energy4All, which developed the Baywind project in Cumbria. This model is operationalised in Scotland in the Boyndie wind farm in North Aberdeenshire, amongst others. These examples do not entail actual ownership of physical assets but involve the owners in a royalty agreement providing a share of the income from a commercially-owned wind farm. Mackie [27] has proposed a similar hybrid model of co-operative ownership with communities and land owners as joint shareholders, which can be seen as a variant of the community ownership co-operative ownership category. He has argued that there is 'huge potential to revolutionise rural economies by encouraging local rural businesses, surrounding communities and public sector bodies to secure ownership of that potential', although this is conceived of in terms of co-operative membership of local land managers, not whole community membership (2012:1). A number of other smaller schemes which favour local ownership are in the planning stage or have been recently approved, for example at Dingwall and Gartly. Perhaps the best example of this form of endeavour in Europe can be seen in the Samsø community's offshore wind farm in Denmark, which was built with private, public and community shareholdings [5]. In this case, in a disadvantaged part of Denmark, a collaborative venture between central government, municipality and local people encountered resistance at the outset but this has since been replaced by active investment from local people. Harnmeijer et al. [23] reported that the Scottish preference appears to be for a place-based development trust model (i.e. community ownership – where the whole community is the recipient of benefits) rather than the co-operative approach, but this could be a function of Community Energy Scotland's preferences for such an ownership structure, rather than it being better suited to community engagement in renewables ownership.

5. The case for community ownership or co-ownership

There are at least seven reasons why a policy shift towards greater community empowerment with respect to renewable energy, for example, by full or co-ownership of production assets, might be desirable, although, as discussed further below, in each case, there is a need for more evidence to support the arguments.

First, it is possible that co-ownership would reduce the opposition of some people within the recipient community to on-shore wind. If this is the case, it would help the Scottish Government meet its statutory targets. Full or co-ownership is unlikely to appeal to those critics fuelled by an almost visceral opposition to wind power. However, where there is clear evidence of the very positive income streams entering rural communities and also evidence of potential reinvestment of these in energy-saving measures, local amenity and community capacity building, it is likely that at least some people who are 'sitting on the fence' may be persuaded of the merits of on-shore wind [20].

Second, the economic benefits of community shareholdings in renewable energy to the rural economy are potentially very significant compared to that which can be derived from commercial developments [4]. Sawin [32] argues that 'local investment also provides an opportunity to strengthen and diversify local economies, particularly in rural areas, and can lead to new projects through the sharing of information and relevant experiences'. These benefits can be explored in terms of direct financial returns or in terms of wider economic benefits including multiplier effects. Co-ownership or shared equity has been initiated in a number of places in Scotland. Economic modelling work by Strathclyde University's Fraser of Allander Institute on Shetland has shown how co-ownership of

a major on-shore wind farm would have significant beneficial effects on the local economy, whereas external ownership would leach most of the benefits out of the rural community [4]. Their findings are supported by recent studies in rural Wales which report very modest beneficial impacts on rural economies of large-scale externally owned wind farms due to the size and nature of community benefits received and how these are being utilised [29]. The impact on local incomes can be very significantly enhanced by co-ownership, but the aggregate effect of enhanced local incomes depends both on what any income is spent on, and where it is spent [31].

Third, the people most adversely affected by the amenity intrusion of an on-shore wind development are the adjacent local communities. In environmental planning, there has long been the principle of an environmentally compensating project, such that, for example, if a by-pass destroys some ancient woodland, the developer agrees to new native woodland planting somewhere else locally. Cowell et al. [14] argue that 'providing benefits to communities affected by wind-farm development is a matter of justice: a means of redressing the impacts on communities adversely affected by wind farms'. Where the adversely affected party is the local community, the enhancement of village amenities and greenspace through enhanced local spending comprises a *de facto* community-compensating project for the visual intrusion of wind energy installations. One energy company offers reduced bills to households adjacent to developments. However, there is a tension between communities feeling that they are 'bribed' to accept wind energy developments and a strong feeling that local people should benefit from such developments [10]. It is, however, apparent that the income streams arising through ownership or co-ownership are up to tenfold over what commercial developers are currently offering in contributions to community funds.

Fourthly, a community that is empowered (literally) by co-ownership of an on-shore wind (or other renewable energy technology) may engage more fully with the need to reduce other emissions and to keep Scotland as a leader in the struggle against the adverse global impacts of human-induced climate change. Further research is needed on whether communities that are engaged on energy issues and have built capacity to collaborate are likely to be at the forefront of post-carbon communities. The transition towns movement [24] provides an illustration of multifaceted responses to climate change, though robust analysis may still be lacking.

Fifth, full or partial community ownership provides communities with funds which can be redeployed to address energy or other social and economic issues in local communities. To date, there have been no attempts to formally hypothecate revenue streams to deal with, for example, fuel poverty. However, there are examples of strategic expenditure by some community energy projects to address fuel poverty, for example in the investments in insulation and home improvements on Gigha, an island off the west coast of Scotland where the community has invested significantly in on-shore wind energy.

Sixthly, as a result of the very tight financial situation globally, the Scottish Government has found it necessary to reduce local authority budgets. The result is that services have been cut. If significant income is made available to communities through outright ownership or equity in renewables installations, such funds can help to plug the gap arising from reduced public expenditure. It is thus clearly in the government's interest to nurture the development of alternative funding streams for local projects. This availability of funding provides a platform for the actions of empowered communities, which also resonates strongly with Scottish Government policies.

Finally, Harnmeijer et al. [23] also argue that local ownership delivers greater resilience and that communities can be a source of investment capital, though the latter is more likely under co-operative models rather than the community development trust model. Many rural economies are relatively undiversified economies

and collaborative effort in energy production can strengthen community resilience and economic resilience simultaneously.

6. The challenges of community ownership

The principal challenges to community ownership are the power of the existing major providers, the institutional architecture which does not adequately promote local ownership (compared say to Denmark), the capacity of communities to manage projects, and the growth of the anti-on-shore wind lobby. Each is considered briefly.

The major providers of on-shore wind energy constitute a powerful industry lobby. Community energy production 'is often at odds with the dominant culture, structure and practices of the current energy system' [6]. Two of the major providers, Scottish Power and Scottish and Southern Energy, also provide grid connexion and the roll-out of an appropriate grid is a major barrier to all on- and off-shore wind development and is seen as a particular barrier in community energy developments. An enhanced grid will be needed to take power from remote areas to points of demand. de Alegría et al. [3] and Walker [47] recognise this as a growing problem as the production of renewable energy increases. Smaller private and community producers in Scotland are deeply frustrated at the pace of development of grid improvements.

Community ownership of wind energy developments creates a challenge for planning authorities (or on appeal, the reporter). If development proposals can be considered around a relatively narrow range of largely environmental criteria, it is possible to adjudge an application more easily. Community ownership places a greater challenge on planning authorities, forcing them to make trade-offs between community social and economic development and the environment. In this respect, wind energy developments are like any other industrial development proposal, where local jobs and income must be traded off against any environmental costs. To date it would appear that local economic and social development has been treated with a very light touch, both in Environmental Assessment by developers and by planning committees.

Community ownership is clearly not in the interest of powerful energy companies who would rather derive the benefits themselves, unless of course community shareholdings reduce significantly the backlash against on-shore wind developments across Scotland. However, Danish law requires local communities in the form of local municipal and private investors to be offered up to 20% of the equity capital in Danish wind energy developments. This legal obligation is a major lever supporting active community investment. Similar leverage could be promoted in the UK.

There may be limited capacity in some communities to manage large scale projects. Where multi-million pound investments are required, local associations or not-for-profit groups may lack expertise to negotiate with developers and financiers.

A final challenge is that as the anti-on-shore wind lobby strengthens, so the community owned (or co-owned) developments may get caught up in the 'fall-out' of public resistance to industrial scale commercial wind developments, even though this does not seem to be a major issue in, say, Germany.

Notwithstanding these challenges, the general thrust of much rural policy in Scotland towards community action, coupled with energy-specific support mechanisms for community projects has created a trajectory of increased community engagement in on-shore wind energy production.

7. The Scottish planning context

Currently a planning proposal for any wind energy development in Scotland is subjected to detailed scrutiny with respect to

its impact on the natural environment (including any threats to carbon stored in peat), but the impact on local society and economy is considered primarily with respect to visual amenity, noise and traffic. The obligatory considerations in planning are termed 'material considerations'. These are defined by reference to government guidelines on planning policy and local development plans. Social and economic developments arising from any development are normally regarded as material considerations. Ownership is not and, arguably, should not be a material consideration. It is the social and economic impacts of different ownership structures which should perhaps be material considerations that are given greater attention. Developers of on-shore wind energy almost always undertake consultations with impacted communities but the consultation revolves almost exclusively around environmental considerations and mostly avoids local social and economic impacts, issues which are likely to be of great concern to local communities and local planners.

Accordingly, where two very similar applications are put forward in the same area, one with shared equity and substantial benefit to the adjacent community and one with exclusive ownership by a non-UK based multinational, apart from the visual intrusion, road access and noise, the planning system to date has treated any beneficial local socio-economic impacts as largely irrelevant. So a system which is ostensibly about ensuring that development occurs in the right place and with appropriate consequential benefits to society ignores consideration of the injection of very substantial potential socio-economic benefit to adjacent areas. This omission is of greater importance when it is realised that the areas in which developments take place are quite often relatively disadvantaged, not least because this is where the developers may be likely to encounter least opposition. Many applicants do include some modest consideration of economic impact in their proposals, which represents a tacit recognition of the relevance of this issue, but beyond a narrowly specified range of impacts, it is given very limited formal attention by developers and planning committees.

At the time of writing, planning policy in Scotland is under review. At present, it could be argued that although the social and economic development of an area should be a material consideration in planning decisions, it is largely ignored in commercial wind farm applications, not least because the biggest socio-economic impact arises from the offer of money in the form of a per MW payment to a community trust that cannot be considered by the planning committee because it could be construed as a 'sweetener' and, therefore, must be considered as planning gain independently of the planning decision. The use of community benefit funds thus appears to have made it more difficult for planning committees to consider other social and economic impacts arising from the development, when, if they did consider such aspects, it would become immediately clear that outright community ownership or shared equity offers much more scope for rural social and economic benefit than alternative models (with the exception of locally owned co-operatives), even where community funds were supported. In essence, externally owned wind farms produce so little employment per MW of output that almost the only scope for locally retained benefit arises through trust funds or modest benefits from ground rent. An indication to planning committees that they should consider social and economic development issues relating to any proposal, and be prepared to reject proposals where rural social and economic benefits are small, would favour community ownership projects and incentivise community shareholding in renewables developments and, at the same time, drive developers to specify and quantify particular local socio-economic development measures. Indeed, Forestry Commission Scotland is now obligating large-scale commercial developers to consider shared equity with registered community groups, though no cases

to date have been followed to completion. Further, the latest English guidance on on-shore wind advances the case for community ownership to be an active consideration in planning in stating: 'Local planning authorities may wish to establish policies which give positive weight to renewable and low carbon energy initiatives which have clear evidence of local community involvement and leadership' (DCLG, 2013: Para 17.). Avelino et al. [6] concluded that 'the main recommendation for government officials is to approach the challenges of community energy as an opportunity for dialogue about and co-creation of new and improved regulation'.

Many non-energy components of Scottish rural policy use the rhetoric of community empowerment as the preferred way to engage communities in consideration of their futures and in the building of more resilient and sustainable communities. However, in the case of community engagement with renewable energy applications by externally owned energy companies, this appears to be largely ignored. It is currently legitimate to question a planning application or environmental statement with respect to the estimated impact of the development on, say, breeding birds, but not its omission of any consideration of the opportunities for local social and economic development that would have arisen under an alternative ownership structure.

8. Future research needs

There are a number of research needs specific to community-owned on-shore wind developments which merit attention to help underpin the future development of community renewables.

- The relative economic merits of the different models of co-ownership could beneficially be explored more fully, especially in different locations. Some work has been conducted in this field (e.g. [4,31]) but the case can be made for further studies particularly in relation to the relative benefits of the different ownership models and the potential for beneficial impacts on remoter and island communities, where scope for mitigation of adverse effects of remoteness might be greater. The relative effects of community versus land manager equity and how to strengthen the relationships between land managers and communities (in the form of, for example, co-ownership) might also be explored.
- The estimation of local socio-economic impacts arising should be considered in longitudinal studies so that there is a clear and unambiguous evidence base to underpin policy. There should be a separate analysis of community-owned (or shared equity) projects and locally owned projects to assess whether the two models generate similar levels of local benefit. This would enable reliance on larger, more reliable approaches than case studies.
- The scope for sharpening understanding of the regulatory changes needed to make community co-ownership more easily achievable through planning policy should be explored, given that employment creation and local economic impact are already factors in many planning decisions, but have been largely neglected to date in wind energy decisions. It remains a moot point whether community benefit payments should be a consideration in renewable energy planning decisions. At present they are not but some have argued that they should be.
- The institutional and other possible reasons behind the much higher level of community engagement in Nordic countries, especially Denmark and Germany, as compared to Scotland, should be further examined. These are explored briefly by Toke et al. [44] and touched on by Munday et al. ([29]: 4) who note

that 'places like Denmark and Germany have in the past at least worked to encourage significant financial participation from farmers and local citizens, thus channelling greater economic benefits back into the affected rural areas'. However, Warren and McFadyen [51] caution against the simplistic export of a successful Danish community ownership model to Scotland.

- The existing stock of community on-shore wind energy developments form a unique data set in the UK to enable exploration of success factors, in particular the impact of local social capital. Such a study could include analysis of whether community ownership encourages pro-environmental behaviour.
- The nature of "communities" and the extent to which there is a geography of community-related on-shore wind projects merits further attention. What social, economic and geographical processes have led to the current patterns of on-shore wind installations in which communities have equity shareholdings?
- The capacity for co-ownership to reduce local opposition should be assessed, both in ex-ante situations and ex-post, after the revenue benefits to a community are evident. Several studies have shown growing acceptance of wind energy installations after construction, but community ownership or shared equity might increase acceptance before the development and reduce transaction costs in the development process.
- The evidence for the capacity of revenues from community ownership to be managed effectively and directly targeted at resolving rural disadvantage should be examined (see [13] for a discussion of this topic). This requires better understanding and specification of the structures of governance of community-owned projects to promote inclusion and address social and economic disadvantage in rural areas. It requires an understanding of community organisations' capacity to handle the challenging deliberative processes. It requires scrutiny of how decisions are made and whether they are inclusive or more self-interested. The scope for consensus building over the use of the revenue streams made available should be considered. The capacity of local people to manage deliberative processes over the destination of potentially large amounts of money and in particular the scope for disagreement needs further exploration.

9. Conclusions

As early as 2005, the the Centre for Sustainable Energy (CSE) and Garrad Hassan argued ([11]: 97) that there was a need for community benefit 'to move "out of the shadows" of the planning process into a more explicit consideration with recognition that community benefits are a legitimate part of a wind power project which should be considered as material to planning decisions'. An alternative model of community wholly or co-owned on-shore wind energy is possible, and indeed is to a large degree proven, in places such as Udney, Aberdeenshire or Westray in Orkney. The development at Fintry, near Stirling and the new development at Neilston (Neilston Development Trust and Carbon Free Developments, a wind energy developer), offer perhaps the best examples of co-ownership in Scotland at the moment, and the Viking development on Shetland (should the project overcome current planning hurdles) is a good example of another form of ownership model where large local benefits are anticipated.

Alternative funding models have been explored and banks are now offering reasonable terms to community energy projects. New regulatory structures and a major crisis have led the Co-operative Bank, to date the biggest lender, to limit its investments in community-owned renewables. Other lending bodies (e.g. multi-lateral lending agencies) have not been involved, but the Scottish Government has designed a new lending scheme to overcome this

problem, which is currently heavily oversubscribed. The potentially massive gains in community wellbeing resulting from community owned and the co-ownership/equity participation model are clear:

- There is a significant injection of revenue into local economies; a more engaged local citizenry is obligated to make decisions about what to spend additional revenues on, potentially building social capital in the process;
- The 'leaky bucket' model of development is overcome challenged by a greater retention of benefits, although this depends on how the new revenues are spent;
- Some aspects of rural disadvantage can potentially be addressed and have been by community development trusts producing wind energy;
- Wider benefits in behaviour change may be engendered by co-ownership and stronger appreciation of the challenge of climate change.

A community equity approach achieves energy and rural development objectives simultaneously and creates a necessity for community empowerment, both literally through the production of power and metaphorically through the need to consider local investment options. This approach generates significant resources to enable the pursuit of sustainable rural development by local communities operating through community enterprises. Regrettably, however, policy is currently insufficiently joined up to make this a reality in more than a few places, where strong social capital, negotiating expertise and (often) a willing partner wind energy company coexist. Shared equity would almost certainly not make commercial developers withdraw from the field (German companies operating in the UK embrace it) and it may well speed up the planning process and be in the mutual interest of developer, community and government, particularly as, due to cumulative landscape impacts, the number of wind turbine developments in parts of Scotland approaches saturation. Community equity thus has the capacity to satisfy renewable energy policy, rural development policy and commercial interests simultaneously.

Community engagement with renewable energy developments (including outright or co-ownership offers an unparalleled opportunity to deliver on many fronts to the Scottish Government's overarching aim of sustainable economic growth and the National Performance Framework. It can build community capacity and enhance social capital and empower communities; it could be used to address fuel poverty by targeting revenues towards disadvantaged groups; and it can recycle some of the income generated within rural locations, rather than leaching money out of rural economies. Some early evidence of what the existing community funds can achieve has been assembled by MacIntosh [25]. The financial yield is certainly sufficient to much enhance local funding but will not necessarily enable communities to begin to address major structural challenges in remote and relatively disadvantaged local economies. However, there remains an issue of creating appropriate community structures, including people with the skills to manage and distribute substantial sums of money, and herein lies potential scope for community disagreement in the absence of appropriate governance regimes.

With respect to on-shore wind, the opportunities for community-owned developments to stimulate rural Scotland may be lost as a result of a lack of evidence to support policy and planning changes. The existing institutional architecture, whilst supportive of community developments, still allows large energy companies to dominate the supply of renewable electricity. This lack of support is arguably a function of a failure to recognise the particular benefits of community or local ownership to local development and give them due weight in the planning system. Indeed, Carrington [9] reports that the reduction in on-shore wind incentives intimated in the Autumn Financial Statement of the UK Government in late 2013 could mean cuts in

community energy developments. Given the importance of on-shore wind in the Scottish energy mix and its low cost as an energy source, getting the institutional architecture right to deliver multiple policy outcomes remains a major challenge. The case for deeper enquiry into the capacity of community equity to be a stronger component of that mix merits further and urgent attention.

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