SCENE CONNECT

A Report on Community Renewable Energy in Scotland

SCENE Connect Report

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Introduction

The Sustainable Community Energy Network (SCENE) is a new organisation, with the goal of facilitating the spread of community-led renewable energy across the globe. Towards this purpose, our team brings a rich blend of skills and experience to the table, covering the gamut from training and brokerage services to sophisticated web development and high-quality research. SCENE also has a wealth of advisors and collaborators to draw on, ranging from legal and financial experts to community development officers.

This report is the first of two emerging from a project, supported by the Edinburgh Centre for Carbon Innovation (ECCI) and the UK Energy Research Centre (UKERC), entitled *SCENE Connect*. SCENE Connect aims to increase transparency of renewable energy development throughout the UK and continental Europe and to facilitate information access and informed choice for local communities. We would like to thank Elizabeth Bomberg, Rebecca Reeve and Stanislav Manilov for their contribution to this work.

This report is separated into three sections. In Section I, we outline the benefits of community-led renewable energy in broad terms. Section II summarises the main findings of our first survey, which focused on Scotland. Section III concludes the report with a brief outlook on the road ahead for Scottish community renewable energy.

I. The case for community renewable energy

There are many good reasons to support community-led renewable energy projects – what we call 'community renewables'. We identify five main benefits that community-led renewables can deliver:

(1) **Dispersal = Resilience.** By their very nature, renewable resources tend to be dispersed and remote. Furthermore, many renewable technologies suffer from so-called 'intermittency' problems. Putting energy production into the hands of local communities helps to circumvent these challenges, creating islands of security during grid outages and contributing to voltage stability - thereby boosting the resilience of our future energy supply[1,2,3];

(2) **Financial and other benefits.** Community renewable energy projects provide economic, environmental and social opportunities[4,5];

(3) **Heightened energy efficiency and consciousness.** Ownership over renewable energy generation helps to promote greater energy efficiency and awareness of energy use[6];

(4) **Ownership = Support.** Local community project ownership helps overcome public opposition facing renewable energy development such as wind-farms, thus advancing its uptake[7,4];

(5) **Market access and sectoral synergy**. Communities present an important potential source of investment, and revenue from community-led renewables projects is often recycled back into the renewables sector.

II. The state of Scottish community renewable energy

Overview

From December to March 2012, SCENE, in association with the UKERC-funded project, *EnGAGE Scotland*[*], undertook a Scotland-wide survey of over 300 community organisations involved in renewable energy projects. In addition to desk-based research, we conducted an on-line and telephone survey to garner more detailed information on 97 projects in the total sample, selected to cover the broad diversity of community engagement in Scottish renewable energy. We are extremely grateful to all community survey participants who made this study possible. Thanks to their participation, we now have one of the most comprehensive and in-depth datasets ever collected on Scottish community renewables. We look forward to continuing to extend our work to the rest of the UK and beyond.

The key criteria for inclusion of projects in our study were the involvement of a place-based social enterprise, together with evidence for both actual participation (*process*) and collective benefits (*outcome*) (c.f. Walker & Devine-Wright, 2008)[8]. In the case of non-charitable organisations, or where non-profit rationale was otherwise in doubt, the constitutional documents of organizations were used to assess the presence of a motivation to generate collective benefits over and beyond company profit. Where the main business activity was based on an alternative economic activity, such as housing, charitable status was a prerequisite for inclusion. For-profit housing associations with independent charitable arms espousing a social/environmental mandate, for instance, were also included. We included community councils in our definition of 'community', but not local authorities.

[*] The EnGAGE Scotland project, led by Elizabeth Bomberg and Nicola McEwen examined community energy and energy governance in Scotland. For more information, see: http://www.institute-of-governance.org/major_projects/ukerc_-_engage_scotland

The operational community-owned capacity of the total sample was 20.2 MW, closely matching recent estimates by the Energy Saving Trust[9], suggesting our sample broadly reflects the total community renewable energy sector in Scotland today. Our study confirms that community ownership is gaining ground, with an estimated 180 MW currently at various stages of the planning process. We estimate that, since 2004, about £35m has been invested into Scottish community-owned renewables, including £7m by communities themselves in the form of either community shares or capital reserves.

Geographical Distribution and Technology Types

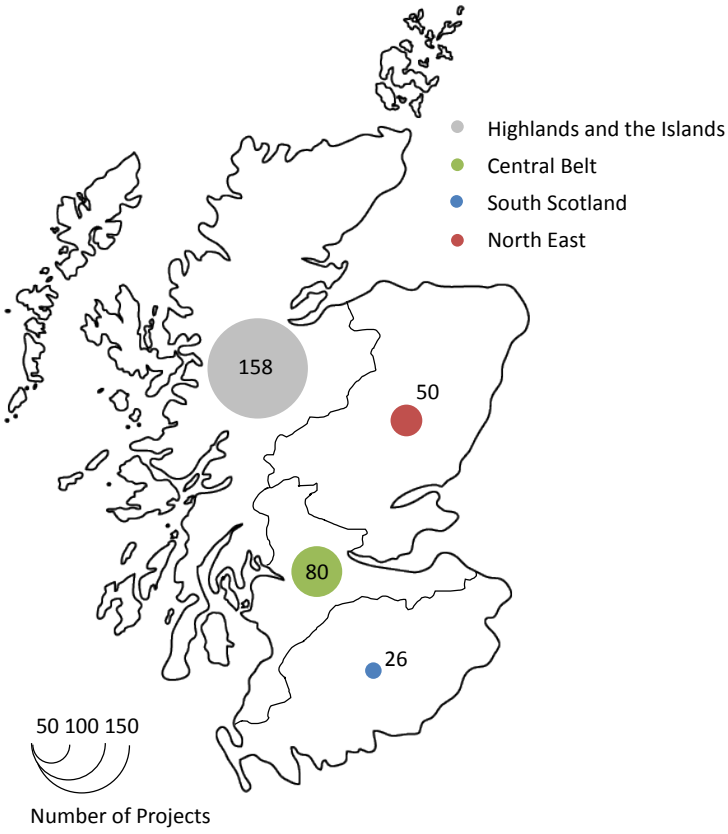

Fig. 1: *Distribution of Scottish community projects (by number).*

Community renewables deployment continues to be centred in northwest Scotland[10] (**Fig. 1**), and is dominated by wind and hydro-electric installations (**Fig. 2**). Integrated installations are dominated by solar photovoltaic, ground source heat pump, or micro-wind installations in combination with solar thermal panels in community 'facility' projects (9 projects). Less common integrated installations included wind-hydrogen fuel cell systems (1 project) and integrated grid systems such as the island grid developed by Eigg Electric. Biomass installations consisted exclusively of wood-fuel boilers based on logs or pellets.

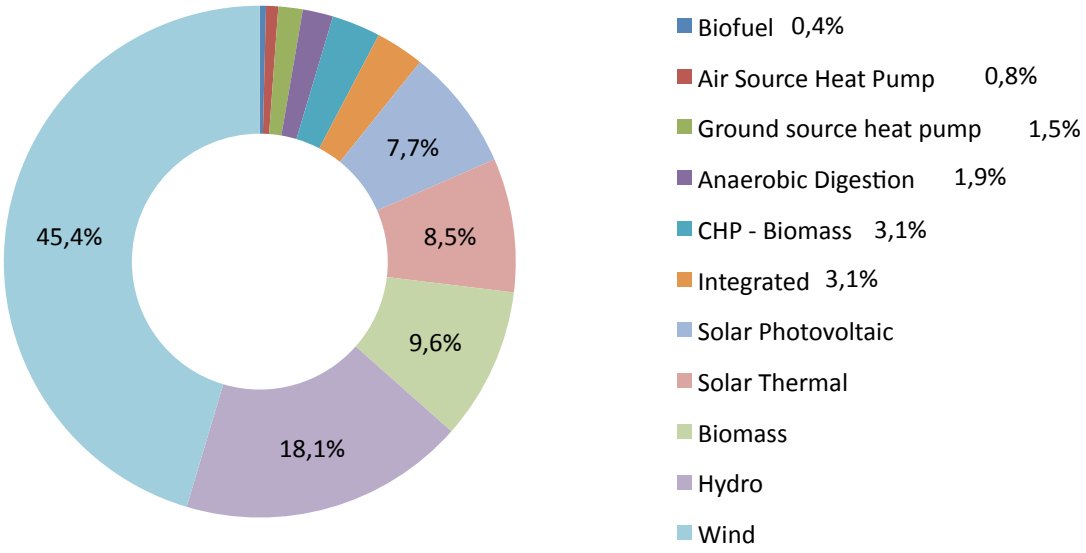

Fig. 2: *Renewable technology types deployed in community projects, by number.*

Business Models and Ownership

A wide diversity of Scottish communities own or are looking to own renewable energy generation infrastructure, and a variety of business and ownership models are employed towards this end (**Fig. 3**). Community-led ventures comprise 87% of all projects, and have

been enabled through support from Community Energy Scotland and the Scottish Government.

Community-led ventures are generally relatively small, with an average capacity of 65 kW, currently accounting for a total of 9.4 MW of generation capacity. A smaller fraction of projects (9.5%, currently delivering 10.8 MW of community-owned capacity) consist of joint ventures between place-based social enterprises and commercial parties. These can be divided into two types, on the basis of investment and ownership. One type sees community ownership in the form of co-operative shares (2.5% of projects, with an average community-owned capacity of 502 kW), while the other type involves various forms of equity investment (7% of projects, with an average community-owned capacity of 463 kW).

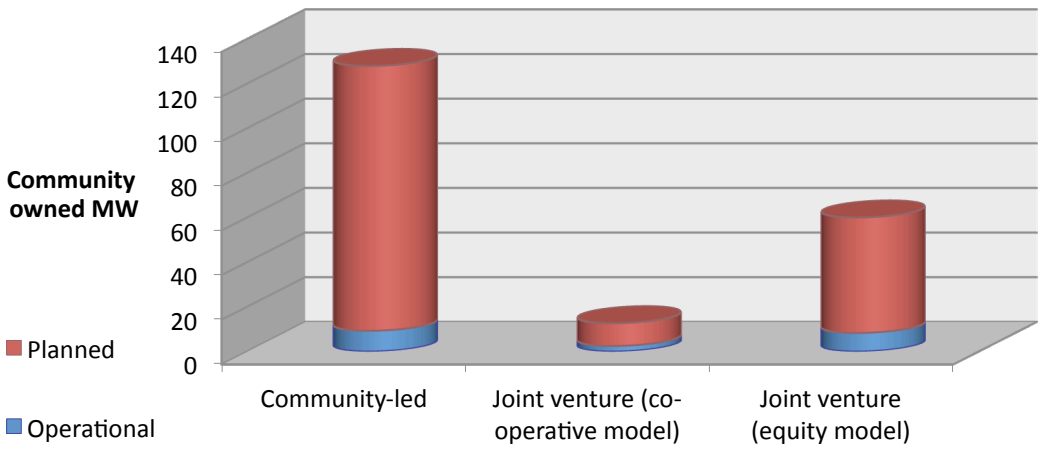

Fig. 3: *Planned and operational community energy held by different business model types.*

For all three ownership models, there are a number of significantly larger projects in development. If realised, these would raise average community-owned capacity to 1011 kW, 3165 kW, and 2541 kW for community-led, community shares and equity-based models respectively. The joint ventures currently under negotiation or in development are therefore

significantly larger than most community-led ventures. Joint ventures under consideration include a number of large (total capacity > 50 MW) commercial wind farms on Forestry Commission (FC) land, driven by obligatory offers of sizable (up to 49%) community stakes. Examples are projects involving Tweed Green and the Kirknewton Development Trust. However, no agreements, contracts or finance have yet been secured for a community stake in any of these projects.

Community-led ventures under development also boast a growing number of significantly larger outliers, exemplified by projects led by the Catrine Community Trust, Selkirk Regeneration Company, *Stòras* Uibhuist, Point and Sandwick Development Trust, Kirkmichael and Tomintoul Community Association Ltd, and the Rosneath Pensinsula West Community Development Trust.

In contrast to England, Denmark and Germany, the co-operative model is not central to Scottish community energy, representing only 12% (2.5 MW) of current community capacity. Despite their reputation elsewhere, existing community energy co-operatives in Scotland are almost exclusively joint ventures in large commercial developments that currently provide community organisations with lower ownership (ranging from 0.3% - 6% ownership, with an average of 2.1%) than equity partnership arrangements (which range from to 8% - 80% ownership with an average of 41%). The Energy4all model has suffered from a lack of commercial projects willing to make provisions for community ownership[11]. Our interviews suggested that the choice between sourcing finance from community share investors versus seeking commercial or public finance on behalf of an organisation representing the community is determined primarily by knowledge and advice frameworks available to grassroots organisations in Scotland. This supports other findings, such as those of Bolinger (2004) and Birchall (2009), which suggest that Danish and Finnish citizens are unusually

predisposed towards co-operative ownership of energy generation infrastructure and other utilities for historical reasons[12,13]. Other factors affecting this choice are perceptions about the availability of local finance, and views on who should control and benefit from project revenues.

Organisational Types and Motivation

The Scottish community energy sector is dominated by charitable companies with a mandate for local development and regeneration. Other organisations engaged in the community energy sector include village hall committees, energy co-operatives, environmental organisations with a local focus, charitable (local or regional) housing associations - and partnerships between organisations such as these (**Fig. 4**).

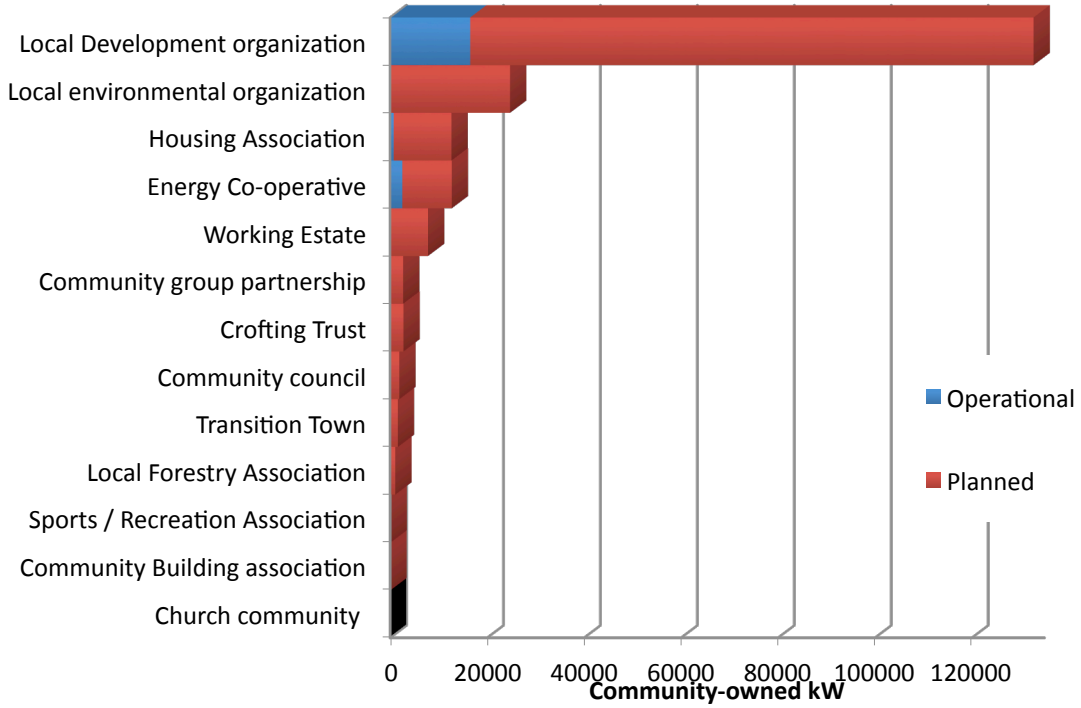

Fig. 4: *Planned and operational community energy held by different organisational types.*

Communities engage in renewable energy for a diverse number of reasons. The most common primary motivation for engaging in renewable energy that we encountered was 'to generate local income and strengthen the local economy'. A wide range of other motivations were also encountered, reflecting the diversity of organisations in this sector (**Fig. 5**). As expected, off-grid communities are motivated primarily by increasing their access to reliable electricity provision (92%), while community building projects are pursued primarily to generate local income (30%) and lower the cost of energy (27%). Interestingly, even on-grid communities with stand-alone installations are sometimes motivated primarily by lower energy costs (16%), even though electricity generated is unlikely to contribute directly to alleviating household energy expenditure.

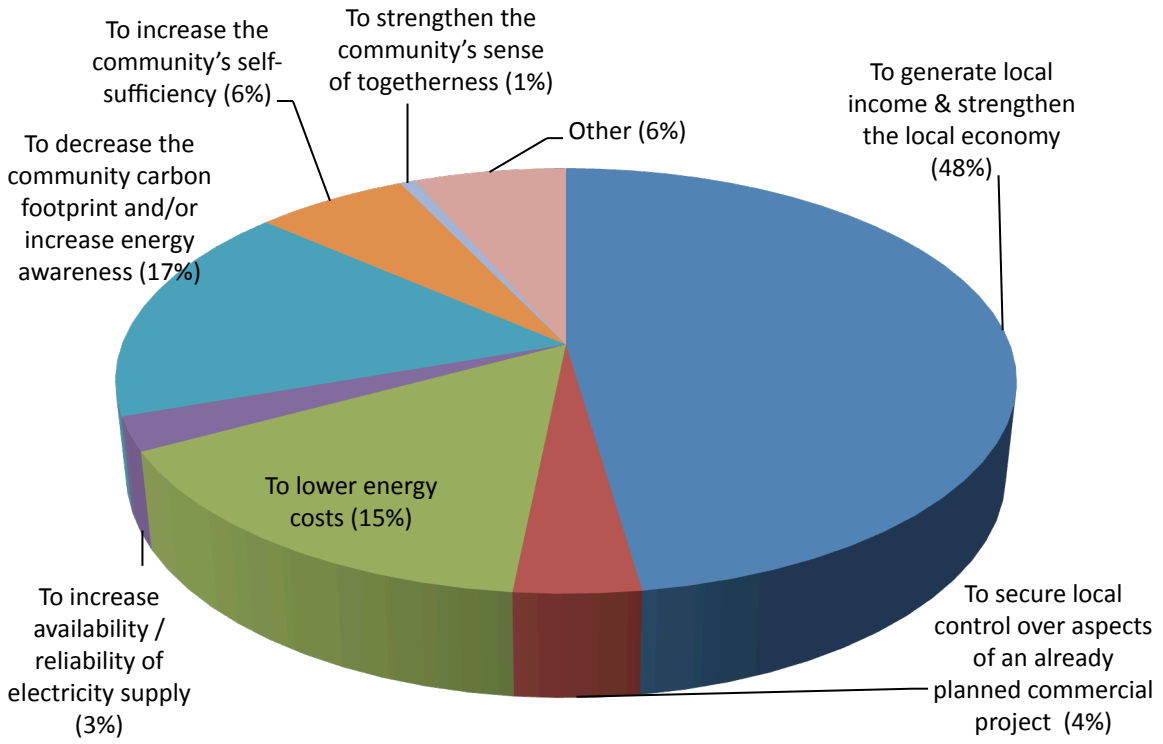

Fig. 5: *Primary reasons Scottish communities give for engaging in renewable energy.*

Environmental grass-roots organisations were motivated primarily 'to decrease the community carbon footprint and/or increase energy awareness' (50%), followed by the need 'to increase the community's self-sufficiency' (17%). Joint ventures through community shares are pursued exclusively with the aim of 'securing local control over aspects of an already planned commercial project (such as partial ownership, siting, scale or orientation of wind turbines)', while joint ventures through equity shares are pursued primarily 'to generate local income and strengthen the local economy' (57%). Outside of the motivations shown in **Fig. 5**, other reasons given included tips from external parties regarding resource availability or project opportunities, local regulations with regards to consideration of

renewables in planning developments, the need for more effective heating installations, the availability of waste heat and the desire to raise revenues for community land buy-outs.

Organisational Capacity

Organisations varied in size, ranging from 0 to 1500 members. 26% of community organisations engaging in renewable energy projects do not have any full or part-time staff, relying fully on volunteers, while 33% of projects rely on temporary programme-funded staff. The remaining 40% have at least one or more part- or full-time permanent staff (**Fig. 6**).

One third of organisations did not carry out regular financial risk assessments and reports finances to members, and 65% did not have a policy for accumulating appropriate levels of reserves on the balance sheet. However, most organisations reported having adequate facilities to meet and organize activities (81%). 53% stated that they had effective monitoring and evaluation systems in place for reviewing and improving performance in relation to organization objectives.

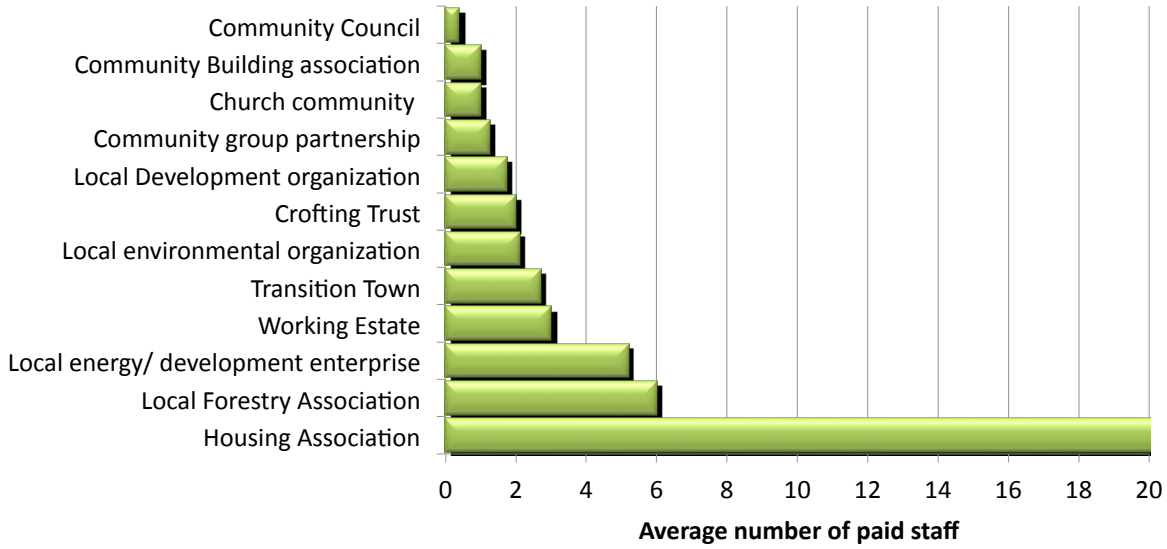

Fig. 6: *Average number of paid staff across organisational types.*

The major areas of expertise lacking in community organisations were legal expertise (absent in 74% of projects) and project management experience (absent in 33% of projects). On a more positive note, only 26% of respondents stated that their organisation lacked individuals with professional experience in accounting, financial planning, and/or managing cash-flows. 72% of organisations had access to members, volunteers or staff who were engineers, electricians or other technical experts.

Key Constraints and Reasons for Failure

Our study included 21 projects that had been discontinued. Of the stalled projects in our sample, the most common reason for discontinuation was a lack of capital and/or lack of project financial viability (6 projects), followed closely by planning rejection (5 projects). For at least one project, financial non-viability was attributed to planning restrictions and grid

connection costs. Three projects were discontinued as a result of being turned down for grant funding. Remaining reasons for discontinuation included lack of time/human resource capacity, land site issues and delays, downgrading of project importance, disputes/lack of consensus within the community, lack of natural resource availability, as well as the dismantling of implementing organisations.

Across our sub-sample of 97 projects, 34% of organizations reported to have had difficulties, disputes or delays in negotiating the land lease. Projects overwhelmingly received local support, with two thirds of projects facing 'no objections from within their communities'.

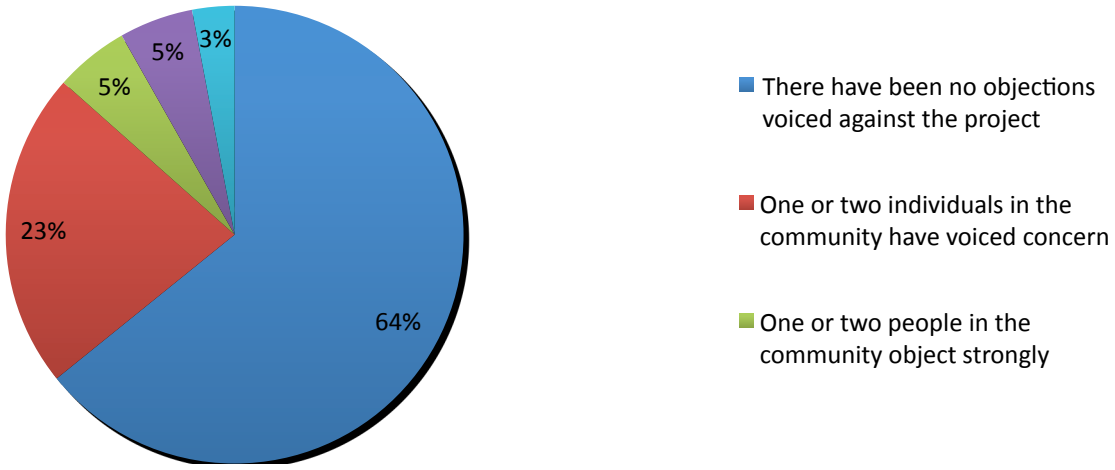

Fig. 7: *Opposition encountered to community renewable energy projects.*

Financing

Initial estimates of unit costs (total cost per kW) suggest community-led wind costs on average £4609/kW as compared to £2466/kW for joint ventures. This disparity is likely to reflect economies of scale, as well as factors such as the increased cost of debt finance and lengthier periods of project development faced by community organisations. The time-scale

from conception to completion of community-led ventures exceeding 50 kW ranged from 1 to 8 years, averaging at just slightly over 4 years.

As expected, projects that are currently operational have been heavily dependent on grant funding, which has contributed an average of 33% of total project costs. However, there is a prominent shift away from charitable funding, with projects currently at early feasibility stages turning to CARES loans and/or community shares to source seed capital. This follows a reduction in the availability of grant funding and new regulations prohibiting the simultaneous use of Feed-in Tariffs (FiTs) and other public funding.

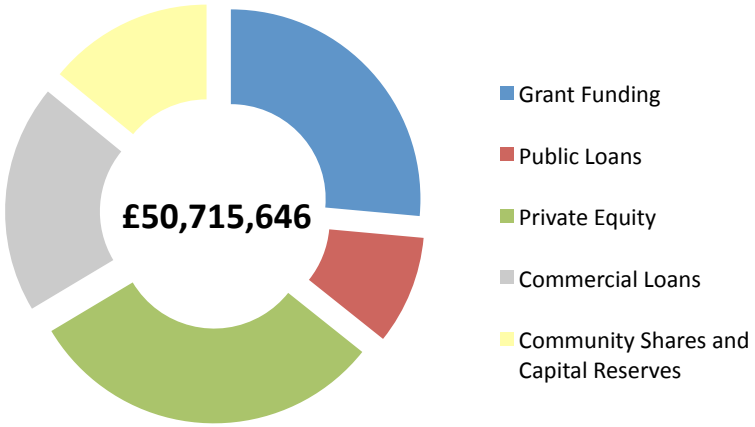

Fig. 8: *Sources of finance for community stakes.*

Commercial loans were provided by the Co-operative Bank, Triodos Bank, the Royal Bank of Scotland, Social Investment Scotland, and commercial wind developers themselves. Commercial loans average £760,000. At least two wind and three hydro projects were identified as being on hold after securing planning consent due to the inability to secure commercial loans, the latter awaiting release of FIT reviews. The potential for asset-based loans was variable; the stated value of assets owned by respondent organisations ranged

from £0 to £54m, where 58% of respondent organisations stated they did not own any assets. However, a large proportion of organizations own land which they may be unwilling to put up as collateral for debt finance (**Fig. 9**).

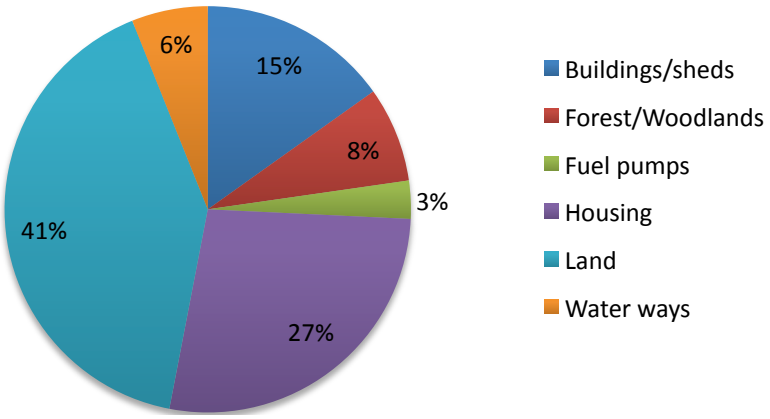

Fig. 9: *Types of assets owned by community organizations.*

Our study identified 33 operational or on-going joint ventures. Within this subsample, equity partners currently engaging with community organisations range from developers (13 projects, see **Table 2**), housing associations (3 projects), Community Energy Scotland (1 project), landowners (5 projects), NGOs (2 projects), councils (2 projects) and local businesses (2 projects). Of these 33 projects, community organisations hope to finance equity shares predominantly through one or more of community shares (45%), followed by commercial loans (27%), community benefit funds (18%) or other capital reserves (16%) - and in a single occasion from revenues of an existing wind turbine.

Table 1: *Recent (on-going) joint ventures between commercial wind developers and community organisations in Scotland.*

Developer	**Community Organisation(s)**
Falck Renewables	Kilbraur Wind Energy Co-operative Boyndie Wind Farm Co-operative Great Glen Energy Co-operative Isle of Skye Renewables Co-operative Clyde Valley Energy Co-operative Dunbeath Community Wind Co-operative Fintry Development Trust (Fintry Renewable Energy Enterprise)
West Coast Energy	Huntly Development Trust
Lomond Energy	Kilmaronock Community Development Trust
European Forest Resources Group (Louis Dreyfrus Group)	Kirknewton Community Development Trust (Kirknewton Community Renewables)
Future Spectrum	Torrance Farm Community Wind Co-operative
Partnerships for Renewables	Tweed Green
Carbon Free Developments	Neilston Development Trust (Neilston Community Wind Farm)

Relative to commercial projects, the distribution of costs on community-led wind projects are slightly skewed towards grid connection and pre-planning expenses (**Table 2**). This is likely to reflect the difficulties faced by community organisations to secure debt or equity investment at pre-planning stages, and bears testimony to a disadvantage that communities face relative to commercial developers.

Table 2: *Cost distribution for community-led wind projects as compared to BWEA figures for commercial 5 MW wind farm.*

Wind	*% cost feasibility*	*% cost planning*	*% cost grid connection*	*% cost electrical infrastructure*	*% cost technology*	*% cost preinstallation*
Community-led ventures	1.3	3.7	12.0	5.6	57.4	16.8
BWEA figures for typical 5 MW wind farm	1	2	8	8	61	14

III. Conclusion: the Road Ahead

The European Context

There is little doubt that community energy has made significant progress in recent years, in part as a result of the investment and priorities of government. However, the extent of community energy in Scotland pales in comparison to some other European countries with similar ambitions for a transition to renewable energy. The situation is starkly illustrated for on- and offshore wind-energy in Figure 10 below. In Denmark and Germany, about 86% and 50% of wind energy generation is locally owned, respectively. In Scotland, which has better renewable resources than either of these countries, that figure is just over 3% (**Fig. 10**).

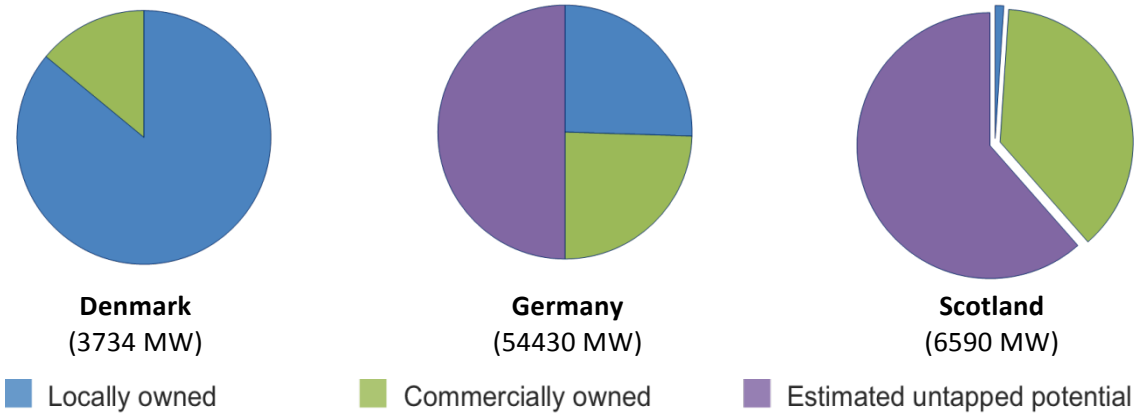

Fig. 10: *Estimates of Danish, German and Scottish ownership of wind energy.*

The reasons for this stark disparity with the Scottish and wider UK situation are manifold, and worth highlighting in general terms. Danish and German communities have had access to a stable and profitable wind market for a substantially longer period, buttressed by the benefits of Feed-In-Tariffs since 1996 and 2000, respectively. Danish geographic ownership

restrictions, meanwhile, have been a key driver for local ownership, which has been declining since their elimination in May 2000[†14].

Local ownership in Germany and Denmark has also benefitted from the presence of a wind manufacturing industry. Danish turbine manufacturers, in particular, have helped to instigate wind partnerships and cooperatives, not least by providing resource assessments, financial projections and other support services[15]. Community-owned projects in Germany and Denmark also benefit from a wide and varied range of tax advantages, in the form of tax-free generation, refunds of energy or CO_2 taxes, and favourable depreciation rules[12].

Regulations and procedures surrounding spatial planning and grid connection have also had an important role to play in enabling local ownership in Germany and Denmark. Community mapping to identify suitable areas for wind turbine placement provides an upfront process between regulators and residents, before developers are involved[16]. Since 1979, the Danish government has required distribution utilities to share the cost of interconnection and grid reinforcement, effectively transferring this cost to other consumers[17]. Generators are solely responsible for paying the cost of connection to the nearest feasible substation and are able to accurately estimate connection costs in advance[12].

[†] The Danish Government still has an 'option-to-purchase' scheme in place in which erectors of wind turbines with a total height of at least 25 metres, including offshore wind turbines erected without a governmental tender, shall offer for sale at least 20% of the wind turbine project to the local population. See Danish Energy Agency (2009).

The Scottish Opportunity

Our results suggest that despite often daunting complexity of medium scale renewable energy projects, Scottish community renewable energy action is impressive and continuing to grow. However, the largest proportion of projects has yet to be completed (62%), and 36% of projects are at very early feasibility stages.

When viewed from a broader international perspective, most Scottish communities are still missing out on the full benefits that renewable energy has to offer. A tremendous opportunity still exists, however. In terms of the onshore wind resource alone, about 4.5 GW remains undeveloped – or roughly 1 kW per Scottish inhabitant. The allocation of this world-class resource is deeply uncertain, and will be the decisive factor in determining the future of Scottish community renewables. Like the 180 MW of community projects currently awaiting financing and planning permission – roughly enough to power Aberdeen- , there are two scenarios. In one scenario, Scottish communities and businesses receive the space and support they need to work together effectively, with benefits flowing to both. In the other, Scottish communities and businesses continue to forego the opportunity for local and regional revenue generation – with growing opposition to renewables development.

There is also the question of who the ultimate beneficiaries stand to be. Although the Scottish Government's modest target of 500 MW of locally owned renewable energy generation by 2020 is likely to be realised, it remains to be seen whether most of this 'local ownership' (and benefits flowing there from) will fall to communities, or to private interests (**Fig. 11**).

In light of these considerations and findings, we plan to provide specific policy recommendations in our forthcoming *Roadmap for Scottish Community Renewable Energy*.

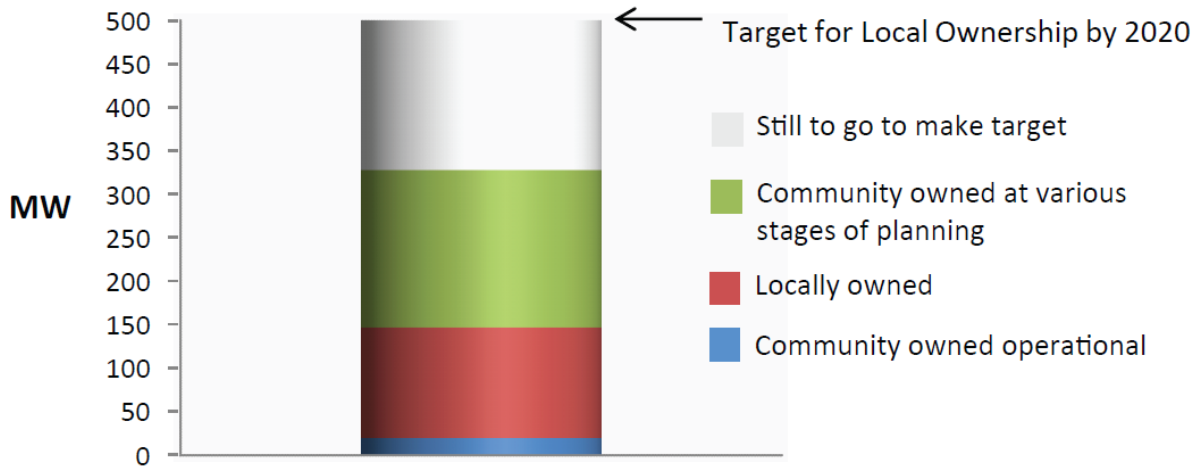

Fig. 11: *The present state of Scottish renewables.*

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