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The Comparative Costs of Community and Commercial Renewable Energy Projects in Scotland

Executive Summary

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For the full report see Harnmeijer J., Harnmeijer A., Bhopal V., Robinson, S., Phimister E., Roberts D., Msika J. 2015, The Comparative Costs of Community and Commercial Renewable Energy Projects in Scotland, http://www.climatexchange.org.uk/reducing-emissions/comparative-costs-community-and-commercial-renewable-energy-projects-scotland/

Key Points

- Community and commercial renewable energy sectors have evolved separately to some extent and have therefore faced different cost factors.
- This has resulted in costs that are more variable, with some facing significantly higher costs than others.
- Costs have become less variable over time and have decreased over the last decade. In fact the analysis of aggregate data showed that there is no statistical difference in the costs of more recently developed community owned projects.
- While communities spend more in the pre-planning stages, this is not generally reflected in overall costs, pre-planning costs typically make up a minor proportion of total development costs (e.g. 50% of capital costs incurred through technology acquisition.
- Pre-planning barriers represent both costs and risks that may be addressed through policy measures. It is important to note that communities face a much higher risk of failure during this time.

1. Introduction

This report presents the findings of a study undertaken on behalf of the Scottish Government's Centre of Expertise on Climate Change (ClimateXChange). The purpose of this study is to identify any differences in the costs faced by community and commercial renewable energy projects in Scotland.

The Scottish Government has expressed a commitment to support the development of community renewable energy, including a target to establish 500 megawatts of community and locally-owned renewable energy by 2020. Given this aspiration, it is important to understand any cost barriers faced by community projects that are not faced by equivalent commercial projects. This study aims to assist policy makers in considering options to reduce any additional financial barriers faced by future community renewable energy projects in Scotland.

In this report, we compare the costs and cost factors for three different ownership types in the renewable energy sector:

(i) **Commercial** - projects owned and managed by professional private entities;

(ii) **Community** - projects owned and managed by constituted non-profit – distribution organisations established and operating across a geographically defined community.

(iii) **Commercial-community partnerships**

The study considered the costs for wind, hydro and solar PV technologies.

2. Methodology and Findings

This study applied a number of research methods to gain a better understanding of how community projects differ from commercial projects and how this in turn influences costs. This included a literature review, collection and analysis of cost data, and economic valuation modelling. Where possible, we distinguished between generic project breakpoints and periods throughout the lifecycle of energy projects including: 'inception', 'feasibility', 'pre-planning', 'planning', 'financial close', 'commissioning', 'build' and 'decommissioning'. This allowed us to identify the stages during which commercial and community projects are exposed to different cost and risk factors.

2.1 Literature Review

Based on a review of academic and grey literature, we find that the community and commercial renewable energy projects have to some degree developed as independent sectors. They are therefore subject to different external factors that influence cost, such as economies of scale, knowledge and access to markets. As with other fledgling sectors, it can be expected that the cost of services that are unique to the community sector will decrease over time as the sector expands and matures. The community renewables sector is also differentiated from the commercial sector by the influence of particular policy support mechanisms, which have significantly influenced uptake during the last decade.

The literature reveals certain challenges that are common to community projects across technologies and geographies, and have an impact on project costs:

1. **Internal process costs –** Due to their 'bottom-up' organisational structure, community projects are generally responsive to the diverse perspectives of their constituents. This can result in slower decision making, meaning community projects are less responsive to windows of opportunity and exposed to greater development times and costs.
2. **Transaction costs -** Communities commonly lack in-house skills and knowledge and therefore have to engage with the private sector for project development services. This exposes community projects to market costs, which can be exacerbated by a lack of bargaining power and market knowledge.
3. **Legitimacy costs –** As new entrants to markets in which commercial counterparts are already established, community projects can face greater challenges in accessing finance and investment.
4. **Internal diseconomies of scale –** Community organisations are typically significantly smaller than commercial renewable energy organisations. They therefore do not benefit from the same economies of scale in terms of bargaining power, finance and the ability to manage risks.

2.2 Aggregate nominal development cost analysis

In order to assess statistical evidence of differences in project costs between ownership models over time, we collected data from a range of existing databases, as well as through in-depth interviews and surveys. This process allowed us to analyse costs data from a total of 124 Scottish projects; 56 commercial, 60 community and 8 shared ownership projects.

The key findings from the aggregate development cost component of our study are that:

- **The costs of community projects are more variable than commercial projects;**
- **The total costs of community projects have decreased over time, converging with the costs of commercial projects;**
- **Community organisations experience cost advantages when they partner with a commercial developer.**

2.3 - Paired Case studies

Whilst the analysis of aggregate project costs data suggests that the costs of community renewable energy projects are more variable than commercial projects, it cannot definitively confirm whether this observation is due to ownership type or other factors.

We attempted to gain a better understanding of sector specific effects by analysing pairs of community and commercial projects of the same technology, location, size, and construction period. This process was not able to provide rigorous statistical analysis, however it does enable a more detailed analysis of which types of costs differ across ownership models during different project stages.

As shown in Figure 1, our analysis of the paired case studies reveals that:

- **Community projects typically take significantly longer to get to planning.**
- **Communities typically spend more money to get projects to planning.**

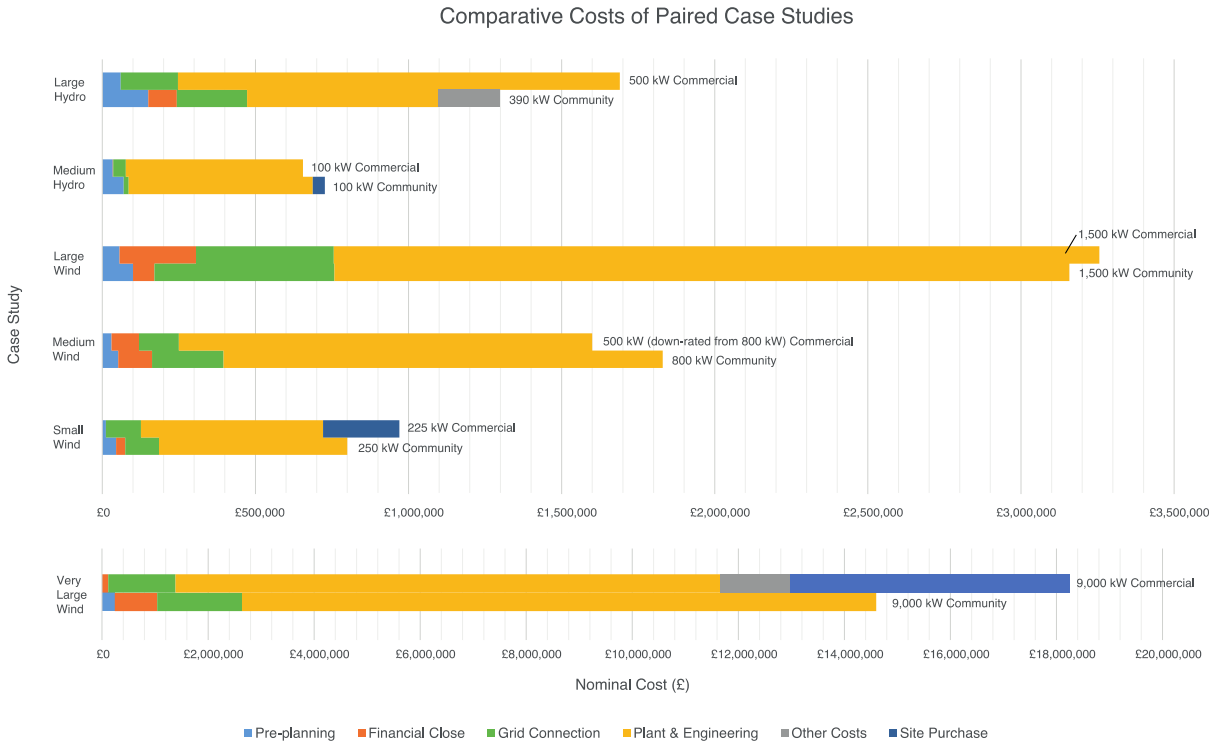

Figure 1: Nominal costs for paired case studies broken down by development stage.

2.4 Economic valuation modelling

As revealed by our literature review and analysis of paired case studies, certain stages of the development process, most clearly the pre-planning stage, tend to take longer for community-owned schemes than commercially owned

schemes. This can be associated with internal processes and transaction costs, which in turn affect the likelihood of the development progressing, as well as expected costs and returns of the project.

We also noted challenges in comparing the relative economic costs beyond simple nominal financial expenditures of community developments because of differences in motivations, attitudes and forgone opportunities of participants, which can result in a valuation of resources used (time, money) that differs from market rates. The greater proportion of volunteer time dedicated to community projects, for example, poses a particular challenge in valuing a project's overall costs and returns in comparison to a commercial project.

We attempted to quantify the implications of these differences in terms of overall project returns or costs by developing an economic valuation model that allows for these aspects.

This model allowed us to:

- Value labour input used in the project feasibility and development phases (whether it is undertaken on a commercial or volunteer basis).
- Account for differences in the time taken to complete each project phase.
- Explicitly allow for differences in the risks associated with various stages of the project and how these differ between commercial and community owned projects.

As shown in Figure 2, the model we developed accounts for the probability of failure at three points in project development: (i) the project does not reach the planning stage after feasibility work is completed; (ii) the project fails to receive planning permission once an application is prepared and submitted; and (iii) the project receives planning permission but fails to reach financial close.

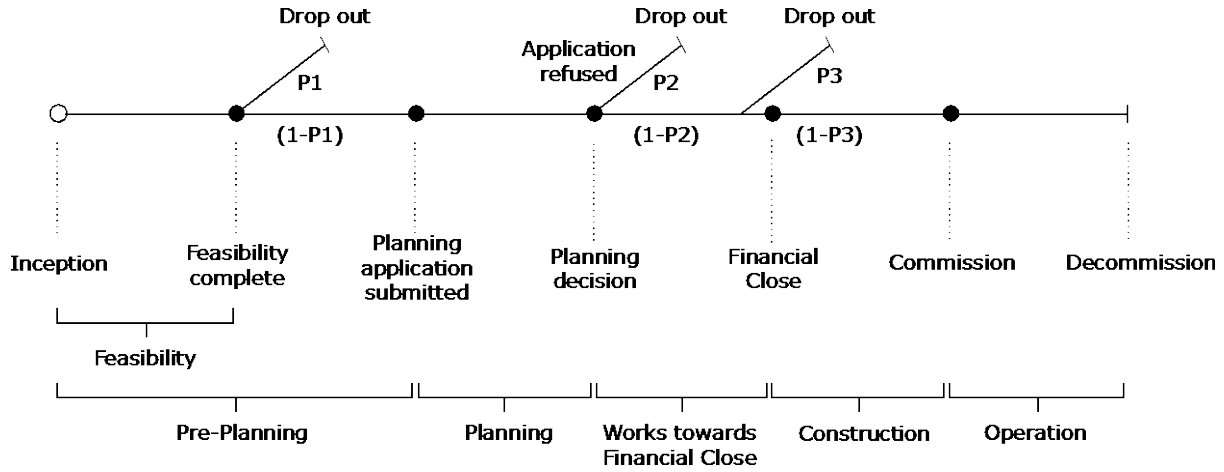

***Figure 2**: Renewable energy generation development decision tree upon which spreadsheet model is based*

The key findings from the valuation component of our study are that:

- **The main difference between community and commercial developer renewable energy costs are associated with the higher risk faced by community groups, particularly in the early stages of development;**
- **Depending on how volunteer time is valued, the overall effects on the Net Present Value (NPV) of community projects need not necessarily be detrimental, despite the fact that these projects take longer to progress through the development process.**

3. Conclusions

Community renewable energy projects are a relatively young phenomenon in Scotland, and trend data suggests that average sectoral costs (in £/MW terms) have declined over the past two decades. However, other than the community project costs being distinctly more variable, we found no statistically significant differences between average total project costs across ownership models for any one given capacity band.

Clearly, understanding the reason(s) for the observed cost decline may hold important lessons for community energy policy. While traditional economies of scale, arising from decreases in average cost-per-unit due to increases in the scale of individual projects or the organisations behind them, play a major role, the results from the literature review, paired case studies and the economic valuation model show that there are additional factors at play. These are likely to include innovations in the way that policy support is provided (through the Community And Renewable Energy Scheme, for example) as well as non-policy drivers such as the increasingly important role of intra-sectoral (that is, inter-community) learning that has occurred as the number of Scottish community renewables projects has grown.

When project costs are disaggregated into different development stages, an important difference emerges that is masked in the aggregate analysis: the cost, time and risk associated with taking community projects to planning are distinctly higher than for commercial analogues. We ascribe this to a combination of higher internal process costs, asymmetric information, and higher transaction costs.