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An Interdisciplinary Approach to Developing Renewable Energy Mixes at the Community Scale

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Renewable energy has risen on the global political agenda due to concerns over climate change and energy security. The European Union (EU) currently has a target of 20% renewable energy by the year 2020 and there is increasing focus on the ways in which these targets can be achieved. Here we focus on the UK context which could be considered to be lagging behind other EU countries in terms of targets and implementation. The UK has a lower overall target of 15% renewable energy by 2020 and in 2011 reached only 3.8 % (DUKES, 2012), one of the lowest progressions compared to other EU Member States (European Commission, 2012). The reticence of the UK to reach such targets could in part be due to their dependence on their current energy mix and a highly centralised electricity grid system, which does not lend itself easily to the adoption of renewable technologies. Additionally, increasing levels of demand and the need to raise energy awareness are key concerns in terms of achieving energy security in the UK. There is also growing concern from the public about increasing fuel and energy bills. One possible solution to some of these problems could be through the adoption of small-scale distributed renewable schemes implemented at the community-scale with local ownership or involvement, for example, through energy co-operatives. The notion of the energy co-operative is well understood elsewhere in Europe but unfamiliar to many UK residents due to its centralised approach to energy provision. There are many benefits associated with engaging in distributed renewable energy systems. In addition to financial benefits, participation may raise energy awareness and can lead to positive responses towards renewable technologies.

Here we briefly explore how a mix of small-scale renewables, including wind, hydro-power and solar PV, have been implemented and managed by a small island community in the Scottish Hebrides to achieve over 90% of their electricity needs from renewable resources (Yadoo et al., 2011), before considering how similar mixes could be developed for rural on-grid communities in the mainland UK. We adopt an interdisciplinary approach that combines quantitative methods (spatial analysis and calculated energy outputs) with secondary data sources to assess resource potential at the regional scale (resolution 1km2) to highlight areas with significant local resources for a mix of renewable energy technologies (Gormally et al., 2012). We then focus at the community-level and use a combination of primary qualitative data (questionnaires and interviews on community acceptance to technologies) and primary quantitative data (primary resource data to assess how renewable mixes may vary throughout the year eg. hourly, daily, monthly) to produce a portfolio of energy scenarios. The scenarios assess different 'supply side' options, including different scales and mixes of technology, 'demand side' options including business as usual and reduced demand, and resilience to change, for example extreme events (droughts, floods). Here we present a methodology and outputs for a case study community in the UK but will highlight how the approach may be adopted for use in other communities across Europe.

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