Community-owned renewable energy (CRE): Opportunities for rural Australia

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ABSTRACT

Community-owned renewable energy (CRE) projects are on the rise across the world, including in Australia. This article applies a STEEP (social, technological, environmental, economic, political) analysis to CRE case studies to elucidate the opportunities, benefits and limitations for CRE in the rural Australian context. While CRE is a new sector in Australia, many opportunities exist for it to contribute to addressing climate change, community development and rural economic health. Case studies indicate, however, these benefits will be difficult to realise on a large scale without a supportive state and federal government policy context.

Keywords: community development, community renewable energy, climate change, resilience.

Introduction

Rural Australia is blessed with some of the best renewable energy sources in the world, particularly solar and wind. But how do we make this potential accessible to communities that they may reap the greatest benefits? This article outlines the benefits and limitations of a community approach to renewable energy development in rural Australia.

Currently, climate change is compelling us to reconsider our relationship to energy on a national scale. The climate change discourse is driving new energy policy measures that will significantly affect rural Australia. For example, under the Mandatory Renewable Energy Target the Federal Government has set a national goal of 20% renewable energy by 2020 and rural Australia will be the site for much of this new energy infrastructure. However, as international examples show us, there is also the potential for discourses of community and rural development to drive energy policy to maximise opportunities for rural areas.

What is community renewable energy (CRE)?

Internationally there are hundreds if not thousands of operational 'community' renewable energy projects. In the UK, the Community Carbon Network identifies over 150 CRE projects (Rural Action UK, 2010). In Denmark, community wind guilds are credited as one of the key factors in the rise of Denmark's world-leading wind industry (DWTOA, 2009a, 2009b). In Germany and Austria, citizen wind farms and bio-energy plants are becoming increasingly common, with over 200 bioenergy villages in operation or development in Germany alone (Interviewee G4). In North America, citizens and farmers now own 20% of installed wind turbines in the country (Lantz & Tegen, 2009).

In Australia, there is much interest in CRE, but the sector is still very new. Australia's first wind co-operative, Hepburn Community Wind Park in Victoria, became operational in June 2011; the Denmark Community Windfarm in Western Australia (WA) now has full development approval is selling shares; and several others are in earlier stages throughout the country (for example New England Wind Farm, New South Wales, and Mt Alexander, Victoria). There are also two CRE support organisations, Embark and the Community Power Agency, established to support local groups to see their CRE visions to fruition. Further, there are countless local initiatives responding to the climate change challenge, from small renewable energy businesses to climate action groups, transition towns, Landcare and farmer's associations; 36 of these are actively considering developing CRE projects (Holmes a Court, personal communication, 16 June 2011). The rapid growth in such initiatives tells of the increasing desire by members of general public to take action on climate change (Climate Movement, 2008; Transition Towns, n.d.).

The emergence of the international CRE sector has its roots in the normative activist discourses of the 1960s and 70s (Dunn, 1978; Lovins, 1977 in Walker & Cass, 2007), neo-communitarian discourses of local participation and empowerment (Vertical Project, 2001; Walker & Cass, 2007) and discourses of environmental sustainability (Vertical Project, 2001). Despite or perhaps because of their diverse roots and increasing abundance, the definition of community renewable energy projects is contested. So what does the term community renewable energy mean in this article?

In a review of 12 UK community energy initiatives Walker & Cass (2007) found many different understandings of the term 'community energy'. These understandings fell broadly into four categories:

- Legal – specifying the legal entity or institutional arrangement of the project as being without commercial interests.
- Physical – involving community buildings or spaces.
- Process – involving local people in decision making.
- Economic – local people having a financial stake in the project.

We have also identified a fifth category, technical, relating to the scale of the renewable technology, where the supply is designed to match a given community's energy demand.

Ison (2009) extends Walker & Cass' (2007) work by distilling these five categories into the three meta-benefits of CRE: environmental, technical and socio-political. She defines CRE projects as those which:

- Decarbonise – Use renewable energy and other low carbon technologies (the environmental dimension);
- Decentralise and localize energy supply (the technical dimension); and
- Democratise energy governance through community ownership and/or participation (the socio-political dimension).

This is the definition of CRE used in this article.

Method

This article draws on research undertaken as part of the authors' personal study tours of CRE projects and organisations across Europe and North America in 2010. The tour research included reviews of CRE project literature and media, as well as informal and formal interviews with 55 CRE proponents and stakeholders from 30 different CRE organisations and projects. A list of these organisations and the number of interviews is provided in Appendix A. The content of interviews generally covered the history and structure of the relevant CRE project or organisations, the specific challenges, benefits and motivations. Interviewees included project directors, project managers, public relations personnel, engineers, volunteers, advocates and researchers. They were contacted based on internet research and personal introductions or recommendations from other CRE proponents. All interviewees participated voluntarily, with the knowledge that their stories would be written up. The person(s) interviewed at each organisation or project was dependent on who was available and willing to take time to talk to the authors. To ensure confidentiality, references to interviews are coded by country, for example S1 indicates the first interview conducted with a Scottish CRE proponents. Details of the coding can also be found in Appendix A.

Two CRE case studies – Minwind from Minnesota, US, and Community Energy Scotland, UK – are examined in this article, with supporting evidence from additional case studies where relevant. These case studies were chosen for their experience as well-established CRE organisations and because they represent different, but equally beneficial, approaches to CRE development. We chose not to focus on Australian CRE examples because they are still new.

The opportunities, challenges and benefits of CRE are uncovered through applying a STEEP framework to case study analysis. STEEP is an assessment framework that focuses on the social, technical, economic, environmental and political/policy elements of an area of study. The STEEP framework builds on a triple bottom line assessment, as it considers not only environmental, economic and social factors, but also technical and political factors, which are particularly pertinent to understanding CRE projects. This framework was chosen because it closely matches Ison's (2009) definition of CRE, but expands the single socio-political dimension of democratisation into three – social, political and economic.

Case studies

Two main case studies are drawn on in this article, Community Energy Scotland (CES) and Minwind, Minnesota, USA.

Community Energy Scotland

Community Energy Scotland (CES) is an independent Scottish charity that aims to empower communities by building 'confidence, resilience and wealth at [a] community level in Scotland' (CES, 2011) through 'supporting the development of community-based renewable energy projects' (van der Horst, 2008). CES was initiated in 2002 when employees of the Highlands and Islands Enterprise (a Scottish quasi government agency) identified a need for community development in the Highlands and Islands of Scotland and the potential to meet this through renewable energy projects. Since 2002, CES and its previous incarnations have supported over 300 communities to undertake renewable energy projects (Interviewee S1). While CES works across both urban and rural Scotland, the majority of projects it has supported have been located in sparsely inhabited, remote rural area. In these areas, economic opportunities are limited, transport costs are high and, in some instances, the absence of a gas and/or electricity grid increases people's vulnerability to fuel poverty (van der Horst, 2008).

Minwind Energy

Minwind Energy is a collection of nine separate farmer-owned companies, each owning a 1.65–1.9 MW wind farm. Minwind I–IX wind farms were established between 2002 and 2004 now own 16 MW of wind generating capacity around the township of Luverne. Luverne and the surrounding areas of southwestern Minnesota, USA, have traditionally relied predominantly on farming for income. The idea of farmer-owned wind farms emerged from the hardship of the US farm crisis in the 1980s, as a means of putting more value into agriculture and as a means to diversify income streams in the community (Cudd, 2009). Each of the nine Minwind projects is a separate limited liability company owned 85% by local farmers and 15% by other local community members. The electricity produced is sold to an electricity utility and members get dividends in proportion to their level of investment. Farmers on whose properties the turbines are sited also get land lease payments. The Minwind projects have devised an effective model for CRE to bring benefit to farming families and their communities.

Social benefits and limitations of CRE

Both Minwind and CES demonstrate the ways in which CRE projects can be a successful mechanism for community development through employing an asset-based community development (ABCD) approach. Pioneered by Kretzmann and McKnight (1996), an ABCD approach recognises and mobilises existing capacities in the community in order to realise positive change. For them, successful community development requires local leadership and stresses 'the primacy of local definition, investment, creativity, hope and control' in the process of developing and delivering community projects (Kretzmann & McKnight, 1996, p. 24). CRE projects fit well within an ABCD approach as they are usually initiated by the community as a means of addressing self-identified needs (for example clean, renewable energy, income, etc.).

The socio-political dimension within Ison's (2009) definition of CRE points to the opportunities for community development that exist within CRE projects, through the processes engaged and outcomes generated. Both Ison (2009) and Walker and Devine-Wright (2008) emphasise that within any CRE project the processes and outcomes are key to generating genuine community benefits The *process* dimension refers to who the project is developed and run *by*: who is involved and included in planning and decision-making? Who has power and influence? How open, inclusive and extensive is the consultation process? The *outcomes* dimension refers to who is the project *for*: who benefits from the project socially, economically and/or spatially? The benefits of a CRE project relate very closely to who has a majority ownership in the project, with more local ownership bringing greater community benefit and development.

For example, through the stages of developing the project Minwind organisers chose processes that contributed to the local community (Willers, in Cudd, 2009). The people involved in learnt new skills, such as group organisation, project management and communication. Choosing to contract local businesses and tradesmen Minwind built strong links and networks between people to achieve a common goal (Windustry, n.d.). Working together to deliver a successful project brought feelings of community pride, strength and empowerment, for there is now a visible outcome of community effort present in people's everyday lives (that is, you can see the wind turbines). The process of creating new social networks based on common goals and shared values increases social capital in a community (Kilpatrick, 2007). In this way, the processes engaged by CRE projects help build community capacities to work together and respond to change. In terms of outcomes, Minwind is designed to benefit the maximum number of local residents, particularly farmers, as possible (Windustry, n.d.). This is guaranteed through their chosen legal structure, with each of the 9 companies having a different investor pool, 85% of whom must be local, and with each share holding limited to prevent majority ownership.

Community Energy Scotland (CES) also takes a strong ABCD approach, fostering community development through the types of support they offer. Many interviewees (S7, S13, S20) identified a desire to halt community decline and build community capacity as primary motivations for undertaking a CRE project. CES' philosophy is that with the right support, communities have the ability to establish successful renewable energy projects (S2). Their main approach is not to do things *for* communities. Instead CES:

- Provides one-on-one support and advice to community groups interested in developing

renewable energy projects, through one of their 19 regional development offices;
- Creates information resources such as a Community Energy Toolkit and factsheets about technologies and policies, available in an online library; and
- Creates networking and learning opportunities such as holding the annual National Community Energy Conference and training workshops.

Interviewees S7 and S20 identified peer-to-peer approaches as a key strategy facilitated by CES that had successfully increased the confidence and capacity of project proponents. For example, CES brought together multiple actors from small communities in Orkney who were considering similar projects at a similar time, to learn from and work with each other (S18). These communities, each with limited capacity, were then able to offer each other practical (for example, jointly applying for contracts and grants) and moral support, saving themselves and CES time and resources and building on their sense of shared local efficacy (ibid).

Both the examples of CES and Minwind show that all forms of social capital – bonding, bridging and linking – are required and strengthened in successful CRE projects. Bonding and bridging capital are internal linkages within a community and form the basis of community development (Kilpatrick, 2007). Linking social capital is associated with the links between a community and other communities or external organisations and is also important for community development. The existence of CES itself as an external CRE support organisation is an example of an organisation that builds linking capital. These case studies provide further evidence for Ison's (2010) claim that external organisations, such as renewable engineering firms or dedicated CRE support organisations like CES, are required for a CRE project to be successful.

CRE projects also have a track record of reducing public opposition to wind power (Lantz & Tegen, 2009; Walker & Devine-Wright, 2008; Bolinger, 2001; Sorensen et al, 2002). Negative public perception is a major challenge facing many wind farm developments and in some cases cause projects to be abandoned. Community acceptance of wind farms has been shown to increase when there are clear benefits flowing back to the local community, changing the common objection of 'big business' invading landscapes for profit at local people's expense (Lantz & Tegen, 2009, p. 2; Bolinger, 2001, p. 5). Greater public acceptance can also be attributed to CRE projects generally having extensive and ongoing community consultation processes and greater opportunities for input, both through formal proceedings and informally via project organisers also being community members (Hepburn Wind, 2009; Sorensen et al, 2002). Further, because of their grounding in the community, CRE organisers are often willing to alter plans to address public opinion (Sorensen et al, 2002). Walker and Devine-Wright (2008, p. 499) have found that strong, participatory processes that involve local people in meaningful and substantial ways have 'wider catalytic effects in promoting positive beliefs and actions about renewable energy', thus contributing to broader processes of social change.

This experience can be seen in the UK, where local opposition to commercial wind farms has been strong but CRE projects, such the CES supported project Westray, have often encountered zero opposition (S20). In fact, island residents now consider Westray's 900 kW wind turbine 'totemic' and this sense of affiliation and ownership means that if the turbine stops for more than half an hour the Directors get phone calls from nearby residents wondering what is wrong (ibid).

An ABCD approach to CRE is enabling because it removes barriers that can prevent projects moving forward, instills confidence and increases community capacity. It empowers people as 'participants and protagonists instead of just voters and taxpayers' (Sale 1980 in Griffiths, 2009, p. 41). In Australia, CRE offers a means for community development, which has been a key focus of Australian governments (local, state, national). It also offers a means for us to meet the challenges of climate change in a way that builds local resilience and diversifies rural income streams (see Economic CRE benefits and challenges section).

Technical benefits and limitations of CRE

CRE projects offer technical benefits through creating a more context-appropriate, responsive and innovative energy system (Hoffman & High-Pippert, 2005; Vertical Project, 2001; Canadian Renewable Energy Alliance, 2006; Greenpeace, 2005). The history of CRE development in the European country of Denmark shows that CRE can provide a platform for technological experimentation and innovation, where small to medium scale wind farms owned by community wind guilds provided a testing ground for the emerging technologies that now underpin modern turbines (DWTOA, 2009b).

Decentralising energy production can increase reliability of electricity supply and energy service provision to rural and regional communities on the edges of the grid network (Outhred 2000; Cronan 2000). Further, decentralised energy generation reduces transmission losses by supplying power closer to points of demand (Thompson, 2008; Diesendorf, 2007; Greenpeace, 2005; Hepburn Wind, 2009). A CRE approach can also reduce the load management issues associated with centralised power production, including large-scale renewable energy, and increase the voltage stability of the grid network (Walker, 2008; Hepburn Wind, 2009).

One of the most significant technical benefits is the potential to match the energy supply and demand profiles of a community (Thompson, 2008). This can be done directly by creating a mini-grid that feeds locally produced renewable energy straight to local consumers, thus creating an energy self-sufficient community, or, indirectly by a technology having a daily energy supply profile similar to nearby demand profile. However, matching load profiles is a complex process, requiring skills and resources to manage. Also, where a community has easy access to the existing electricity grid there is little incentive to create a self-sufficient system.

Community Energy Scotland (CES) has supported a number of communities across Scotland to become energy self-sufficient. The Isle of Eigg mini-grid, for example, meets the needs of the islands' 80 inhabitants through solar, wind and hydro. This CRE project has seen the whole island shift from individual households reliant on inefficient diesel generators to 98% renewable energy self-sufficiency. The remaining 2% of electricity generation comes from back-up diesel generators, which are needed during the drier summer months. Supply and demand energy profiles are matched and managed using battery storage and an agreement by all households and businesses on the island to not draw more than 5 kW or 10 kW of energy at any one time; if they exceed this amount they are fined (S12, S13). However, a self-sufficient mini-grid was only possible as the cost of connection to the mainland electricity grid would have been significantly more expensive (£5–6 million) than the establishment of the island mini-grid (£1.6 million) (S12).

Many CRE projects, including the Minwinds and most of those supported by CES, connect and sell their electricity to the grid. In areas with poor grid infrastructure, however, connecting to the grid can be a significant challenge. For example, CES has supported a proposed wind farm in the community of Melness for the past six years. While a wind farm could provide a better quality electricity service to this remote community, the economic viability of the project requires the electricity produced be exported to the grid. The electricity network company, however, is unwilling to upgrade the grid, thus stalling the project. Grid capacity and the cost to upgrade it is a common challenge facing CRE projects and often grid capacities dictate siting to some extent (for example Windshare, Canada; New England Wind, NSW).

While poor quality electricity infrastructure can present a challenge for CRE projects, in some cases, such as the proposed community wind farm in Denmark, WA, it is a key motivation. For decades Denmark has been supplied with electricity via the State electricity grid, generated by coal and gas-fired power stations more than 400 km away. Being near the end of a long transmission line, Denmark continues to experience power quality and reliability issues, including occasional extended blackouts. Population growth and increasing use of appliances (for example air conditioning) means that the need for a more reliable supply has reached a critical level. As such, the proposed community wind farm will feed into the grid, helping to improve its quality and reliability (Denmark Community Windfarm, 2011; Chapelle, personal communication, February 2011).

Australia has a highly centralised electricity supply sector coupled with rising peak power demand, particularly on hot summer days, and a widespread and aging electricity grid. As such, across Australia network businesses are spending more than $45 billion between 2010 and 2015 upgrading network infrastructure (Dunstan, 2011). Additionally, there are many communities who are not connected to the electricity grid and are thus vulnerable to rises in the cost of diesel. CRE projects have the potential to help address these challenges through:

- The development of renewable based remote area power supply systems similar to the Isle of Eigg;
- Increasing installed capacity of electricity generation in areas where peak energy demand is outstripping the ability of networks to deliver electricity (for example installing solar pv in cities), thus reducing the need for expensive electricity grid upgrades and centralised, fossil fuel based power stations; and
- Increasing the quality of energy services at the end of the grid, as in Denmark, WA.

Developing energy projects requires a significant amount of technical knowledge. By developing a series of small, but related projects, Minwind has been able to develop their skills over time and now provide inspiration and technical expertise to others establishing similar ventures, adding evidence to Mulugetta et al's (2010) claim that CRE can be a platform for nurturing and sharing technical skills. This development model also enabled Minwind to capitalise on the economies of scale available to larger projects, by sharing the costs of infrastructure, maintenance, engineering, legal advice and grid connection among the 9 projects. Yet, because each project is under 2 MW and each has its own set of 66 investors, the Minwinds can expand as support and resources allow and also spread the benefits wide in the community.

Environmental benefits and linitations of CRE

The most common benefit of CRE cited in the literature is reducing the environmental footprint of communities (for example Hepburn Wind, n.d.; Denmark, 2011; Community Energy Scotland, 2011). For many CRE proponents, reducing a community's greenhouse emissions and thereby reducing the community's contribution to climate change is a key motivating factor. Both the Minwind and the Isle of Eigg projects have resulted in significant decreases in the community's carbon emissions. It is, however, imporatant to note that CRE projects are generally smaller in size than corporate renewable energy projects and, as such, technically represent a smaller contribution in the shift away from carbon intensive technologies.

The value of CRE projects, however, lies in more than just of the sum of their displaced carbon (Mulugetta, 2010), as they have been shown to also increase the environmental consciousness and pro-environmental behavior of communities (Walker & Devine-Wright, 2008; Hepburn Wind, 2009). For example, the Isle of Eigg CRE project has seen a rise in awareness of environmental issues and an increase in energy efficiency and local food production on the island (S16).

The Canadian Renewable Energy Association (2006) has identified that CRE projects have greater sensitivity to regional conditions and specific environmental context, as their planning and development processes utilise more local knowledge than processes undertaken by organisations external to the community. This results in less severe impacts on wildlife, fewer negative hydrological effects and less erosion, noise and shadow flicker than centralised energy options (CREA, 2006). Further, Minwind and others have found that wind turbines take up very little space on farms and do not interfere with grazing practices, plus farmers get land lease payments for the life of the windfarm (Gipe, 2004).

Australia has some of the highest per capita carbon emissions in the world, primarily a result of our reliance on coal for over 80% of our electricity generation (Australian Coal Association, 2008). To shift towards renewable energy generation, the Federal Government has mandated a 20% renewable energy target by 2020. CRE projects have the potential to increase community support for renewable energy and stronger climate change policy, thereby increasing the likelihood of reaching the renewable energy target. In addition, Hopkins (2008, p. 76) believes that 'successful national and international responses are all the more likely in an environment where community responses [such as CRE projects] are abundant and vibrant'.

Additionally, CRE is a form of ecologically sustainable development as it provides revenue to communities (as discussed in the next section) without detrimentally impacting the environment; indeed they represent a net benefit to the environment due to the shift away from fossil fuel based energy. Interestingly, the authors found that some CRE proponents are climate skeptics who put little emphasis on the environmental benefits of CRE, indicating the many possible motivations for undertaking such projects.

Economic benefits and limitations of CRE

A CRE project brings opportunities for economic and community development by contributing several new sources of income into a community. Further, a study of the wind industry in the US shows us that CRE projects bring greater economic benefits to the local community than corporate projects (Latnz & Tegen, 2009, p. 1). Lants & Tegen (2009) identify three main mechanisms through which CRE achieves this: increased use of local labor, businesses & materials; dividends paid to local shareholders; and servicing of local bank loans.

As a co-founder of Minwind explains, 'there's a difference between local ownership and what it can offer the community, and absentee-ownership where the landowner—the farmer—receives only a royalty' (Willers in Gipe, 2004, web). In states like Minnesota, where wind resources are abundant, farmers are often approached by wind developers to lease their land. Under this model, farmers are signed onto 20–40 year contracts and receive less than 1% of the profits of the wind farms (Willers in Cudd, 2009). Farmers knew there must be a better deal for them in wind development; the answer was in CRE.

Minwind Energy has structured each of its 9 companies to benefit the greatest number of local farmers possible. Each project is owned 85% by local farmers and 15% by other Minnesotan residents. Further, no one person can own more than 15% of shares and each Minwind company has a completely different set of investors. Dividends received by shareholding farmers guarantee a steady source of income for themselves and their families, along side the season ups and downs of farming income (Windustry, n.d.). Their experience over the past 11 years indicates that farming families with other sources of income (such as windfarm shares) are more likely to stay on the land and contribute to increased money flows in local towns, helping to keep rural communities strong and vibrant (Windustry, n.d.). Further, Minwind used local businesses and labor wherever possible, including debt from a local bank. Together the Minwinds created 13 short-term construction and planning jobs and 1.2 ongoing operations jobs (Lantz & Tegen, 2009, p. 12).

Another way CRE projects contribute to the local economy is through establishing 'Community Funds' of 'Trusts' that channel investment back into the broader local community, beyond returns to shareholders. Through such Funds, CRE projects become a source of independent revenue for communities. CRE projects supported by CES are typically owned by local development Trusts, such as Westray Development Trust or the Isle of Eigg Heritage Trust. As such, all the returns from the sale of electricity go back to the Trust, which then invests in projects determined by its membership, the local community. Funded projects resulting from this revenue include community services and sustainability initiatives.

In Australia, Hepburn Wind (n.d.) plans to invest $15,000 per turbine per year into a Community Sustainability Fund that will be democratically administered by an elected board. Over the lifetime of the wind farm, this Fund will distribute over $1 million to community and sustainability initiatives in the local area. Such CRE Funds effectively bring tens of thousands of dollars into a community each year, contributing significantly to the vibrancy of rural communities.

CRE has the potential to contribute significantly to the economic resilience of regional communities in Australia, particularly in the face of fluctuating farming incomes. One challenge limiting rapid uptake of CRE is that almost all capital costs are up-front, when projects have the least membership. Further, because CRE is a new area of investment in Australia, banks and individuals can be hesitant to engage (Mt Barker, 2011; Hepburn, 2009). To date, community banks and credit unions have been actively supportive of the emerging CRE sector. There is, however, a need for policy support mechanisms that can provide capital grants or loans to the nascent CRE sector in Australia to overcome this new market hurdle.

Political benefits and limitations of CRE

CRE projects entail an entirely different approach to energy than has been common over the last 50 years. As such, in many places the regulatory or policy context is not set up to facilitate CRE projects, thus becoming a barrier to their development. However, where a supportive policy environment exists, policy can become a key enabler.

Over the past four years a series of policy measures designed to support the CRE sector has been implemented in the UK, particularly in Scotland. Community Energy Scotland (CES) has been involved in developing and distributing the Scottish government's CRE grant program – CARES (Community and Renewable Energy Scheme). This grant scheme provides technical and capital grants to not-for-profit community organisations to develop renewable energy projects. This approach provides communities with the initial funding to pay a coordinator, undertake community engagement activities and undertake all the technical requirements to get the project through planning and onto construction (Community Energy Scotland, 2011). This grant funding was identified by interviewees (S7, S12, S20) as a key project enabler. Further, the way CES distributes funding, while transparent and accountable to the government's stipulations, is quicker and more flexible than if a government department had to sign off on every one of hundreds of projects. This is a model of service provision common in the welfare sector but rarely used in the environment and energy sectors; the CES experience indicated much room for expansion.

Since 2010, CES projects under 5 MW are eligible for a Feed-in Tariff (FiT). Under the FiT policy, electricity generated by CRE projects is sold to the grid at a guaranteed price for a set number of years. This aids the business case and reduces the financial risk of CRE projects, making them more attractive to investors. It also provides an additional financial mechanism that makes it easier for projects to get bank loans for the capital works. While FiT policies have successfully enabled CRE and large-scale projects across Germany, EU electricity market competition rules make it difficult for projects to secure both FiT payments *and* grant funding. As such, in February 2011, the Scottish Government shifted CARES from a grant scheme to a low interest loan scheme (CES, 2011). CRE projects in Scotland now have the support of two policy mechanisms, which overcome two of the largest barriers to their development – access to up-front development capital and access to an energy price that guarantees a good rate of return on investment.

Minnesota has a similar Feed-in Tariff policy, but only for wind projects under 2 MW. This size limit was developed with the intention of fostering farmer and community-owned wind projects. As such, this policy context influenced the size of each Minwind project (Gipe, 2004).

A country's policy context can be a barrier or enabler for CRE projects, however CRE projects can also become an enabler *for* better renewable energy policy. For example, they 'can provide new political opportunities for active citizen engagement and challenge the dominant discourse in energy' (Mulugetta et al, 2010). Further, CRE projects create stakeholders who can provide governments with a strong mandate to act on climate change (Holmes a Court, personal communication, 16 September 2009; Walker & Devine-Wright, 2008).

While the Australian Renewable Energy Target has effectively initiated the shift to renewable energy, it actually does very little to incentivise CRE projects. Most Australian renewable energy policy to date has been tailored towards projects that are either large scale (100+ MW) or household scale (1–10 kW). It is in this mid-range of 10's kW – 10's MW that CRE projects exist. This gap in policy is a significant oversight, which could be addressed by implementing a comprehensive FiT that covers the full range of renewable energy technology scales. Additionally, the development of a grant or low interest loan program, similar to the Scottish CARES scheme, specifically designed to support CRE projects would ensure the development of a vibrant CRE sector in Australia.

Conclusion

Rural Australia currently faces differentiated challenges; parts are experiencing population growth, while other areas are facing significant depopulation. CRE projects present an opportunity for rural Australia to help meet these challenges. In population growth areas, CRE is one mechanism for meeting increasing electricity demand, as the Denmark WA example shows. In areas of population decline, CRE represents a new source of income, with the potential to seed new enterprises and new jobs to attract people back to the area, as exemplified by Minwind.

CRE can be considered a strategy for fostering resilient communities. Resilient communities must be able to adapt to social, technical, economic, environmental and political disruptions and challenges. This article highlights CRE as a strategy to build capacity, infrastructure and capabilities in communities in order to address interrelated challenges across the STEEP factors as they emerge. The key property of CRE that enables this resilience is the diversity of different types of projects based on technology employed, scale, organisational and ownership structures, processes used and motivations for development and the fact that CRE projects, are by definition, developed to suit the local context and local needs.

CRE projects are viable and in development within the current Australian context. However, there is much that could be done to encourage more widespread and faster uptake of CRE. Specifically, a more supportive policy environment is necessary to achieve the significant contributions CRE can bring to addressing climate change and rural community and economic development in Australia.

References

Australian Coal Association (2008). *Coal and its uses – electricity generation*. Available: www.australiancoal.com.au/coal-and-its-uses_coal-uses-overview_electricity-generation.aspx.

Bolinger, M. (2001). *Community wind power ownership schemes in Europe and their relevance to the United States,* Berkeley, CA: Lawrence Berkeley

National Laboratory. Available: http://eetd.lbl.gov/EA/EMP.

Bulkeley, H. & S. Moser (2007). 'Responding to Climate Change: Governance and social action beyond Kyoto', *Global Environmental Politics*, *7*(2), 1-10.

Climate Movement (2008). *Groups*. Available: www.climatemovement.org.au.

Community Energy Scotland (2011). *Community Energy Scotland.* Available: www.communityenergyscotland.org.uk.

CREA (2006). *Community Power – the Way Forward*, Canadian Renewable Energy Alliance. Available, www.canrea.ca/pdf/CanREACPpaper.pdf.

Cronan, G. (2000). 'Legislative and regulatory barriers faced by co-operatives II' in *Proceedings of the new competitive energy market: how co-operatives and regional Australia can benefit*, Institute for Sustainable Futures, University of Technology, Sydney.

Cudd, S. (2009). *Minwind a farmer-owned concept others can put to work*, National Association of Farm Broadcasting News Service, US Department of Energy. Available http://www.windpoweringamerica.gov/filter_detail.asp?itemid=2151.

Denmark Community Windfarm (2011). *About*. Available: www.dcw.org.au.

Diesendorf, M. (2007). *Greenhouse solutions with sustainable energy*. Sydney: UNSW Press.

Dunn, P. D. (1978). *Appropriate technology: technology with a human face*, London: Macmillan.

Dunstan, C. (2011 May). *Making power affordable and sustainable: lessons from the UK – Options for Australia,* Forum Paper, Institute for Sustainable Futures. Available: http://datasearch.uts.edu.au/isf/news-events/event-detail.cfm?ItemId=26450.

DWTOA (2009a). *Cooperatives: A local and democratic ownership to wind turbines,* Danish Wind Turbine Owners Association. Available: www.dkvind.dk/eng/index.htm.

DWTOA (2009b). *Past and present: Successful developments followed by stalemate*, Danish Wind Turbine Owners Association. Available: www.dkvind.dk/eng/index.htm.

Gipe, P. (2004). *Wind power: renewable energy for home, farm and business,* White River Junction, VT: Chelsea Green.

Greenpeace (2005). *Decentralising power: an energy revolution for the 21st century*, London: Greenpeace.

Griffiths, J. (2009). 'The transition initiative: changing the scale of change', *Orion*, July-August, 40-45.

Hepburn Wind (n.d.). *Frequently asked questions*. Available: www.hepburnwind.com.au.

Hepburn Wind (2009). *Australian community renewable energy*. Available: www.hepburnwind.com.au.

Hoffman, S. & A. High-Pippert (2005). 'Community energy: a social architecture for an alternative energy future', *Bulletin of Science, Technology and Society, 25*(5), 387–401.

Hopkins, R. (2008). *The Transition Town Handbook: From oil dependency to local resilience*, White River Junction, VT: Chelsea Green.

Ison, N. (2009). *Overcoming technical knowledge barriers to community energy projects in Australia* (unpublished Honors dissertation, University of New South Wales, Sydney).

Ison, N. (2010, October). *From command and control to local democracy: the governance of community energy projects.* Paper presented at the Human Dimensions of Environmental Change Conference, Berlin.

Kilpatrick, S. (2007). 'Building social capital in groups: facilitating skill development for national resource management', *Rural Society*, *17*(3), 248-257.

Kretzmann, J. & J. McNight (1996). Asset-based community development', *National Civic Review*, *85*, 23-29.

Lantz, E. & S. Tegen (2009). *Economic development impacts of community wind projects: a review and empirical evaluation*, Golden, National Renewable Energy Laboratory, US Department of Energy.

Lovins, A. (1977). *Soft energy paths.* London: Penguin.

Mulugetta, Y., T. Jackson & D. van der Horst (2010). 'Editorial: Carbon reduction at a community scale', *Energy Policy, 38*, 7541-7545.

Okereke, C., H. Bulkeley & H. Schroeder (2009). 'Conceptualising climate governance beyond the international regime', *Global Environmental Politics*, *9*(1), 58-78.

Outhred, H. (2000). 'Impacts of electricity restructuring on rural and regional Australia', *Proceedings of the new competitive energy market: how co-operatives and regional Australia can benefit*, Institute for Sustainable Futures, University of Technology, Sydney.

Rural Action UK (2010). *Community carbon network: list of community energy projects*. Available: www.ruralaction.org.uk.

Sørenesen, H.C., L.Y. Hansen, & J. Larsen (2002, September). *Middelgrunden 40MW offshore wind farm Denmark – lessons learned*. Paper presented at After Johannesburg, Local Energy and Climate Policy Conference, Munich. Available www.middlegrunden.dk.

Thompson, B. (2008). *Decentralised energy – in the Victorian context*. Melbourne: Moreland Energy Foundation.

Transition Towns (n.d.) *Official initiatives,* Transition Towns Network. Available: http://transition towns.org.

Van der Horst, D. (2008). 'Social enterprise and renewable energy: emerging initiatives and communities of practice', *Social Enterprise Journal, 4*(3), 171-185.

Vertical Project (2001) *Investigate the viability of an urban windfarm energy cooperative,* BSC Environment Program. Available www.uwcc.wisc.edu/ info/i_pages/alternative.html.

Walker, G. & N. Cass (2007). 'Carbon reduction, 'the public' and renewable energy: engaging with socio-technical configurations', *Area*, *39*(4), 458-469.

Walker, G., S. Hunter, P. Devine-Wright, B. Evans & H. Fay (2007). 'Harnessing community energies: explaining and evaluating community-based localism in renewable energy policy in the UK', *Global Environmental Politics, 7*, 64–82.

Walker, G. & P. Devine-Wright (2008) 'Community renewable energy: what should it mean?', *Energy Policy*, *36*, 497-500.

Walker, G. (2008) 'What are the barriers and incentives for community-owned means of energy production and use?'. *Energy Policy, 36*(12), 4401–4405.

Windustry (n.d.) *Minwind III–IX, Luverne, MN: Community wind project*. Available: www.windustry.org/minwind-iii-ix-luverne-mn-community-wind-project.

Appendix A: CRE projects and organisations visited

Organisation	Country	Interview code prefix	Number of interviews
1. Torrs Hydro 2. Baywind 3. Energy 4 All 4. Ham Hydro 5. Halton Lune Hydro	England	E	10
6. Centre for Alternative Technology 7. Bro Dyfi Community Renewables	Wales	W	3
8. Community Energy Scotland 9. Assynt Foundation 10. Findhorn Ecovillage Foundation and Findhorn Wind Park 11. Fort William 12. Black Isles Community Halls Renewables 13. Eigg Electric 14. Rousay Renewables 15. Westray Renewables	Scotland	S	20
16. Middlegrunden 17. Nordic Folkecenter for Renewable Energy	Denmark	D	3
18. Bürgerwindpark/ Dirkshof Group 19. Dardesheim 20. Jühnde Bioenergy Village 21. Elektrizitätswerke Schönau 22. Fesa	Germany	G	9
23. Bioenergy Mureck 24. Güssing	Austria	A	3
25. Windshare Cooperative 26. Toronto Renewable Energy Cooperative 27. Ontario Sustainable Energy Association 28. Pukwis Community Windfam	Canada	C	5
29. Windustry, Minnesota	USA	U	1
30. Vasudha Foundation	India	I	1