Community energy and integrated community energy systems: Modelling new energy systems from community and policy perspectives

A shift to renewable energy sources is fundamental to decarbonisation and climate change mitigation. The question today is not whether this shift will occur but how best and when?

New approaches to energy generation and transmission will be required in the near future. At present, many approaches represent adaptations to existing and increasingly anachronistic systems, as opposed to fullscale innovations.

Community energy—projects which involve a community working together to develop, invest in and share in an asset under some legal structure—is predicted to play an important role in this transition and future energy mix. Global studies indicate a 'recent surge of interest in local communities generating and supplying energy' alongside parallel developments in smart grids (Koirala et al, 2016). Broader innovations, including the rise of a sharing economy (e.g. Air BnB, Uber), suggest that a fundamental shift in consumer-market relationships is underway and signal the rise of a 'prosumer' (producers/consumers). Recent developments in the energy arena suggest that 'integrated community energy systems' (ICES) may be a critical path forward. ICES combine community energy systems with micro-grids, peer-to-peer energy and the notion of sustainable energy communities.

The aim of this project is to generate a model for community energy systems and governance. The project will articulate a comprehensive, integrated approach to community control of local energy systems while weighing up various integration options and trade-offs, especially from community and government perspectives. In so doing, the project will draw upon comparative cases from select countries to suggest a framework for best practice in community energy. This novel framework will deliver scholarly, policy and practical contributions to inform a broader academic and policy literature on community-level responses to climate change adaptation, among other literatures. Guiding research questions include:

How will the predicted shift from consumer to 'prosumer' influence the next generation energy market?

What are the social drivers behind adoption of community energy projects, and to what extent do communities understand and articulate social, environmental, economic and governance motivations? For example, to what extent do individual beliefs about climate change play a role? Decreasing trust in government? Individual financial incentives?

What is the role of regulation in community energy, and how can bottom-up energy solutions be best integrated into more traditional, top-down energy systems and markets? To what extent are community energy models 'local' and to what extent might 'best practice' models be replicable and scale-able?

The project will benefit from co-location in the Melbourne Energy Institute and Melbourne School of Government, drawing on the complementary expertise of supervisors in energy systems/markets and public participation in policy and governance. The project will be steeped in deep experience in understanding the social and policy impacts of major projects on local communities, policy decision-maker, stakeholder network analyses and modelling via in-depth case studies. Project outcomes are

intended to inform current and future ICES projects and to inform government decision-making, with the potential for considerable future research in this and related energy areas.