From tip to toes: Mapping community energy models in Canada and New Zealand

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ABSTRACT

Community energy is associated with a wide range of benefits, for example, providing new social mechanisms for learning, facilitating economic development, and in engaging local populations in energy policy implementation. However, empirical research continues to uncover many differences in the specific forms, functions and policy settings that relate to community initiatives across jurisdictions. This paper examines community energy projects in Canada and New Zealand, two understudied countries with high per-capita greenhouse gas emissions, distinct practices of community energy, and Indigenous community participation. This comparison reveals a range of striking differences in what communities do and how community energy projects are structured. We use institutional theories to highlight the role of incumbent resources, actors, and political context to explain the variations of forms and functions of community energy. We provide a re-conceptualization of community energy practice as a much broader in both energy activity and ownership structure than presented in much of the current literature. The distinct national practices of community energy found are explained predominantly by the policy settings: less privatization and more new renewable energy support in some Canadian provinces, with more uniform liberalization and legal support for trusts in New Zealand.

1. Introduction

Despite increasing global awareness of the significant impacts of climate change, greenhouse gas (GHG) emissions continue to increase, with the 400 ppm threshold surpassed in 2013 for the first time. As heat records continue to fall, sea-levels rise, and national leadership on climate policy in countries like the US underwhelms, researcher focus is turning to the role of state and sub-state actors in both adaptation and mitigation activities. Non-traditional actors at local levels can provide be an appealing alternative route to policy change and they are increasingly committed to leading necessary energy transformations. There is much to identify about appropriate institutional mechanisms that can realize benefits for both emissions reduction and reliable, accessible energy service provision. This movement has taken many forms over the past three decades, from International Council for Local Environmental Initiatives (ICLEI) to the C40 climate leadership group of megacities to the US based Climate Alliance of governors committed to climate policy action. Bottom up climate action has also increasingly manifested, amongst other activities, in the emergence of of local 'community energy' systems in diverse resource and political contexts.

Community interventions spurred by public policies have long held promise for addressing the climate crisis. These include reducing opposition to new green infrastructure, providing social mechanisms for learning, literacy, and facilitating local economic development (Walker et al., 2007; Haggett and Aitken, 2015; van der Schoor and Scholtens, 2015). Some energy projects based in local community partnerships have been highly successful in engaging large segments of the population (Kennedy et al., 2001; Berry, 2010; Hoicka et al., 2014), but this benefit is by no means certain. As a result, researchers have begun to call for more systematic and comparative empirical research into the specific activities, forms and contributions of the umbrella term 'community energy' (Walker, 2011; Seyfang et al., 2013; Berka and Creamer, 2018). Empirical research continues to uncover many differences in the specific forms, functions and policy settings that relate to community initiatives across and within jurisdictions.

This research is timely, as the literature and profile of the community renewable sector has developed significantly over the past two decades, from early emergence in Germany and Denmark to a wide range of other national contexts, including Canada and New Zealand (Musall and Kuik, 2011; Bauwens, 2016; MacArthur, 2018; MacArthur

et al., 2018b). Prior to this there is also a long history of rural electrification and community energy ownership (Doiron, 2008; Yadoo and Cruikshank, 2010; Talosaga and Howell, 2012; MacArthur, 2016). The recent literature has tended to focus on the role of co-operative and social enterprise actors in power generation, with a particular focus on wind and solar installations. While relevant for CO_2 mitigation, this focus has obscured the full range of actual and potential initiatives, for example, demand management, retail and other energy services, or distribution. Although there is recognition of local energy innovations in generation, conservation, system management and education as a distinct arena of activity by policy makers and energy networks such as REN21, we lack empirical data and national maps of projects and activities outside all but a few European jurisdictions.

This paper contributes to the empirical literature by examining the forms (ownership) and functions (activities) of community energy projects in Canada and New Zealand. These countries have the third and sixth highest per capita GHG emissions in the OECD (2017b), despite the technical and financial ability to make significant reductions. They contain within them distinct practices of 'community energy' in the form of Indigenous[1] people's participation, community geothermal capacity and, in parts of Canada, strong public ownership, but both countries are understudied in the international literature on the subject. Both are market-liberal states who have, unevenly in Canada and more radically in New Zealand, undergone significant restructuring and privatization in the power sector since the 1990s (Cohen, 2001; Electricity Authority, 2011). As a reflection of these distinct practices and the literature, community energy, though conceptually contested, is defined here as *functions* that include the provision of energy supply, demand management, distribution and system management and retailer services by locally rooted actors, defined here as *forms,* such as co-operatives, non-profit societies, trusts or municipalities.[2] We provide a maximalist definition of activities and ownership structures, including the public sector: from tip to toes. Prior to this research there were no maximalist national maps of the community energy sector in either jurisdiction, which we seek to remedy here.

Policymakers and commentators often rely on assumed benefits, case-study information and definitions either much narrower or much broader than the comparable literature in other states (Walker, 2011; Hicks and Ison, 2018; Berka and Creamer, 2018). Important questions have also been raised about the ability of community energy to provide services and engage with communities broadly, or if they are likely to concentrate on upper-middle class and particularly well resourced ones. This paper considers the questions: what models of community energy have emerged in Canada and New Zealand as of 2017? How have institutions and policy choices shaped these differences? What significance does this hold for the sector in other jurisdictions? We begin with a review of recent literature on the nature and functions of community energy, before providing empirical profiles of the sector in Canada and New Zealand which can be used for future in-depth case study and comparative research. We then compare the findings from these two new datasets and outline a program of future research to better understand the contribution of these actors to energy sector transitions and climate change action.

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[1] A note on the terms "Indigenous" and "Aboriginal" as used in this paper is in order. In Canada, there has recently been a shift in terminology from "Aboriginal" to "Indigenous". This shift is seen in academic literature, government departments, and reports. In this paper, we use terminology used in the cited sources, some of which use the older term, but otherwise are consistent with the current terminology of "Indigenous". In New Zealand it is more common to refer simply to Māori, as New Zealand's Indigenous Polynesian peoples. However for purposes of comparison we use the generic term to refer to the first people's in both countries.

[2] In New Zealand, municipalities are referred to as local authorities, but for simplicity we use the term municipality for both jurisdictions here.

2. Background and literature review

2.1. Explaining energy system forms and functions

Systemic features of the energy system have important impacts for the playing field for community actors. They mediate the nature and shape of community energy across national contexts. While earlier emphases on socio technical transitions literature located community energy practices within a multi-level framework of energy regimes, landscapes, and niche innovations, these approaches focused heavily on the importance of technical innovations and their relation to scaled social practices (Rotmans et al., 2001; Geels, 2014; Smith et al., 2016). Politics and political institutions, while they have certainly been addressed in this literature, have played a relatively understudied role (Kuzemko et al., 2016). More recently, institutionalist theories that explain the character and development of national energy systems have filled this gap, providing comparative accounts of energy systems across national contexts (Kooij et al., 2018). Niche innovation and technological changes are important drivers of community energy developments, while the institutional and political explanations integrate the insights long developed by political science and policy scholars about the importance of institutional structure, veto actors, political cultures and ownership forms to the shape and function of energy systems (Kuzemko et al., 2017; Lockwood et al., 2017).

2.2. A material - institutionalist view of energy systems

The varied forms and functions of community energy are a product of path dependent political characteristics together with incumbent energy resources of a given society. Public policy choices are crucial for sectoral developments, but conditioned by ideas, actor interests and socio-political institutions (Hall, 1997). Kuzemko et al. argue that it is not enough to argue that 'institutions' matter, because "different configurations of political institutions and energy resources will tend to influence types of governance choices made and, therefore also, the nature of changes that take place in energy systems" (Kuzemko et al., 2016, p. 97). Recent work by Kooij et al. on community and local energy innovation from a comparative and systemic perspective helps fill the gap in specifying key drivers. They identify three dimensions of structural influence on the development and shape of national community energy sectors: 1) *material-economic* (biophysical conditions, economic structure, energy market), 2) *actor-institutional* (governance traditions, access to policymaking, regulations) & and 3) *discursive* (openness to alternative ideas and practices) (Kooij et al., 2018). Each 'leg' of their institutional framework provides a useful element for our analysis and reveals a number of unique features of the New Zealand and Canadian cases, and due to the stage of research in which we focus on identifying and comparing forms and functions, we focus most directly on 1) and 2).

The actor-institutional setting and material-economic setting shape the composition of actors engaged in energy policy processes, the design of energy markets, corporate law, as well as energy and land use policy (Kooij et al., 2018). The international literature on grass-roots community organizations illustrates that they do not typically exist on a level playing field with incumbent actors and that policy settings are crucial to their development (Peters et al., 2010a; Miller et al., 2015; Burke and Stephens, 2017; Kuzemko et al., 2017). They face a range of constraints that results in variable capacity to engage in and lead complex renewable energy projects and their ability to interface with broader socio-technical regimes (Kuzemko et al., 2016). This is because powerful incumbent interests in nuclear and fossil fuels sectors can result in closed policy networks to new entrants. For community energy projects, institutional and sectoral policy contexts shape the human, financial, physical and ideational resources available for project development (Hargreaves et al., 2013; Smith et al., 2016; Kooij et al., 2018). As Kooij et al. argue, 'without institutional space, [grassroots