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Zero emission housing: Policy development in Australia and comparisons with the EU, UK, USA and California

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ABSTRACT

A change to a zero emission housing future requires significant innovation in both policy and practice, as described by socio-technical transitions theory. This paper examines emerging policies towards zero emission housing standards from the EU, UK, USA, California and Australia to determine alignment with socio-technical transitions criteria. This analysis is then positioned within the Australian context, which is characterised by a lack of policy innovation. The limitations of existing regulatory approaches are identified. The analysis finds that a number of key socio-technical transitions elements are addressed in the case studies, but there are also elements that are absent or inadequately dealt with. Five key transitions elements are identified as being developed only to a limited extent in the Australian context, namely long-term goals, pathways, links to wider policies, financial innovation, and the inclusion of wider social elements. Consideration of these elements in future minimum energy performance standards could facilitate a transition to zero emission housing.

1. Introduction

This paper takes as a starting point the proposition that zero emission housing (ZEH) is a necessary requirement to achieve a low carbon future and that policy will be required to achieve this outcome.

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ZEH is defined for this paper as housing which has the capacity to generate all energy consumed in the dwelling across a calendar year through renewable energy technologies (Marszal et al., 2011). This definition includes *all* emissions producing energy consumed by the household within the property boundary, including energy used for heating, cooling, hot water, lighting, cooking and appliances.

In 2009–2010 there were 8.4 million households living in private accommodation in Australia (ABS, 2012). Of these, 79% live in detached dwellings, followed by 11% in flats/units/apartments and 10% in semi-detached dwellings. The most common residential construction type in Australia is a brick veneer outer wall construction, built on a concrete slab on ground floor assembly (ABS, 2008). The existing detached housing regime in Australia, and other developed countries, is producing relatively large new dwellings which exhibit relatively poor thermal performance (Clune et al., 2012; Horne and Hayles, 2008). A focus on tried and tested technologies, materials, designs and building practices (Smith, 2006) continues to produce a residential sector which has been identified as a significant contributor to greenhouse gas emissions in Australia and internationally (Schultz & Petchey, 2011; Wang et al., 2010).

Policy responses to date (such as minimum energy performance standards) have had some success but exhibit significant limitations (Pickvance, 2009; Wilkenfeld and Associates, 2007). The focus on technical solutions entails a myriad of assumptions about households, and furthermore the focus on heating and cooling energy efficiency typically addresses less than 50% of total energy consumption within dwellings in warm temperate climates like much of Australia (DEWHA, 2008). Such policy measures reflect other attempts since the 1980s to link technology innovation to environmental issues within policy framed by an ecological modernisation approach (Mol et al., 2009). Along the way, ecological modernisation has received significant criticisms regarding its ability to effect long-term environmental protection. The focus on technology providing *the* solution, a limited supply-side focus, continued market failures and the lack of social and demand-side considerations are among a number of concerns with ecological modernisation (Fisher and Freudenburg, 2001; York and Rosa, 2003).

Recent shifts in the literature have meant that wider innovation approaches are being argued for in order to improve environmental outcomes (Newton, 2008; Smith et al., 2010). In this regard, socio-technical transitions (STT) theory is an emerging paradigm which builds upon a requirement for technology innovation from an ecological modernisation framing, but which also advocates moving beyond just a technology focus. This approach also draws upon social, environmental and governance considerations, and aims to generate deep structural change in order to achieve a transition to a low carbon future (Geels, 2002).

Within STT literature, there are both descriptive and prescriptive applications and conceptualisations, the latter being typified in the idea of transition management. The transitions management approach hopes to identify those characteristics which might best allow for a transition to develop (Alkemade et al., 2011; Grin et al., 2010). Key elements include (Kemp and Rotmans, 2009; Rotmans and Loorbach, 2008):

- Long-term thinking, including the setting of visions and goals, which informs short-term policy development.
- Multiple domains, actors and levels, including links to wider national and international policy development such as Kyoto protocol.
- The establishment of a transitions arena for technology and social innovation, programme development and ongoing learning.
- Policy oriented towards system innovation besides system improvement (deep structural changes).
- Reflexive governance (periodic reviews and assessment) throughout the process to ensure that the transition is 'on track' and to avoid a lock-in of technologies and practices; and
- Identification and engagement of societal actors.

The aim of this paper is to interrogate policies towards zero emission housing standards from selected jurisdictions to determine if there is alignment with socio-technical transitions criteria. For this analysis, STT criteria for a ZEH regime are developed using the descriptive transitions concept of the MLP. A review of international literature on the topic ensures that developed STT criteria are based on foremost expert opinion and on recognised theoretical perspectives. This analysis is then