



Review

A resource-based view of opportunities to transform Australia's electricity sector



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ABSTRACT

Proponents of low-carbon transformation face an uphill battle to reconfigure incumbent energy systems against powerful interests protecting the status quo. Australia's electricity sector is an example of such a system, wedded to fossil fuels and backed by much of the country's political establishment. This paper addresses the potential for low-carbon transformation in Australia's electricity sector. It explores the complex and uncertain dynamics shaping the sector and outlines how these can be understood through the lens of strategic agency – with an eye for opportunities to drive a shift to renewables. It reviews the dynamics of change and re-stability shaping Australia's electricity sector between 2006 and 2015 and applies a resource-based view of transformative agency to analyse these dynamics. Results show the sector suffers multiple stressors and emphasise disruptive changes 'in the pipeline'. Critically, many of these transformative dynamics stem from factors outside the influence of the electricity sector and its supporters. While results do not point to a clear trajectory or outcome of transformation, they indicate the uptake of small-scale solar photovoltaic (PV) systems by households and small business will play a defining role in the sector's future configuration. Furthermore, the exploration of transformative dynamics affecting the electricity sector through a resource-based lens shows that many opportunities exist for strategic agents to intervene in support of a disruptive shift to renewables. The paper suggests a range of mechanisms that agents could use to undermine the strength of fossil energy in the electricity sector and encourage a shift to renewables.

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1. Introduction

Industrialised countries must transform their energy systems in the next few decades if humanity is to avoid crossing global climate thresholds. Shifting dependence from fossil fuels to renewable energy will be vital to this process. However, despite decades of public support and state-sponsorship for renewable energy, fossil energy still dominates and there remains marked resistance to rapid energy transformation. This paper addresses the potential for low-carbon transformation in Australia's electricity sector. It outlines the complex and uncertain dynamics shaping the sector and explores these from the perspective of transformative agency – with an eye for opportunities to drive a shift to renewables.

Australia exemplifies many of the challenges facing proponents of low-carbon transformation globally. Oil, coal and natural gas meet around 96% of the country's energy demand (Australian-

Government, 2012) embedding fossil energy into virtually every social and economic function creating a powerful inertia to change. Market, regulatory and institutional structures are also protective of the status quo (Martin and Rice, 2012; Schlöpfer, 2009; Simpson and Clifton, 2014b). Adding to the challenge, Australia's top two (Federal and State government) regulatory tiers are influenced by a cabal of powerful political, industry and media actors antagonistic to clean energy reforms. Despite majority public support for renewable energy and greater emissions reduction (The Lowy Institute, 2015) these incumbent actors and institutional conditions have seen the country slide from leader to 'free-rider' in its renewable energy research and support for global emissions reduction (APP, 2015; Bailey et al., 2012). Australia's fossil energy system reflects a socio-technical energy 'regime' (Geels and Schot, 2007) that is powerful and resilient; a self-regulating techno-institutional complex (Unruh, 2000) able to adapt and undermine support for clean energy reform. This environment appears rather unfertile for cultivating a low-carbon economy.

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Intriguingly, despite the dominance of fossil energy interests in Australia, the country's electricity sector has been far from static. Recent years have seen volatile policy swings in support for and against clean energy. There has been remarkable adoption of small-scale solar PV systems (SPVs) by households and a new breed of commercial and political proponents of clean energy are entering and becoming influential in the electricity sector. Growing consumer concerns over rising energy prices and widespread acknowledgement of the risk to infrastructure posed by extreme weather also reflect growing instability. At face value, these dynamics threaten the dominance of Australia's fossil fuel based electricity system. However, these signals of impending change are complex and fluid and do not indicate clearly where transformation might arise or how proponents of change should best intervene.

Arguably, for proponents of low-carbon transformation, the complexity and uneven distribution of power that characterises Australia's energy context requires a realpolitik approach to intervention. Consider calls for transformation to be well underway by 2020 (WGBU, 2011), the scale of change required and the time (often decades) it takes for new technologies and business models become mainstream (Jacobsson and Bergek, 2011). There is no time for 'over the horizon' solutions to present themselves. Nor time for an incremental policy-mediated transition. Australia's energy transformation must be 'cobbled-together' from whatever seeds of innovation, opportunities and dynamics of change currently exist. But the idea tomorrow's low-carbon energy system must be founded on today's niche technologies, practices and cultures begs what actions strategic agents should prioritize given the complexity of forces at play in the energy sector and given their limited access to traditional (institutional) mechanisms for change. This paper contributes to answering these questions by identifying potential leverage points for enabling low-carbon transformation among the dynamics of change and stability shaping the Australian electricity sector.

1.1. Aims and contribution

This paper seeks to understand the conditions through which a rapid transformation of Australia's electricity sector might occur and the role for change agents in this process. More specifically, the aim is to identify where and how transformative agents may best intervene to drive a reconfiguration of Australia's electricity sector from fossil energy to renewable energy dependence.

This paper contributes to two fields of enquiry. In the first instance, it offers a system-wide analysis of the dynamics shaping Australia's electricity sector and an agnostic exploration of potential mechanisms of change. Both perspectives are rare in the Australian energy literature. Despite the significant research done on the dominance of fossil energy and the challenge of driving renewable energy development in Australia, there is little exploration of dynamics of change with an eye for how systemic transformation might arise (for an exception see Quezada et al., 2014). Much of the research (academic and industry) is narrow and segmented, focussing singularly on technical, market or institutional barriers (Effendi and Courvisanos, 2012; Kuwahata and Monroy, 2011; Szatow et al., 2012). Furthermore, while state support for fossil energy is routinely noted, proposed 'solutions' to the country's fossil energy 'malaise' rely overwhelmingly on government (state and federal) actors (Byrnes et al., 2013; Effendi and Courvisanos, 2012). Policy is seen as the 'engine room' for renewable energy development (Martin and Rice, 2012). The emphasis on rational state actors and well-designed policy mechanisms to drive low-carbon innovation is particularly unhelpful in the Australian

context (Szatow et al., 2012) where policy formation is more responsive to opportunism, power and interest group pressure than rigorous evidence (Adams, 2005; Howard, 2005; Jones, 2010) and state actors work as a functional extension of fossil energy systems. To take a different perspective, this paper steps back from focussing on any one 'likely' driver of change or preferred actor and instead asks - what dynamics support renewable energy or the status quo, and who can influence them?

The paper's second contribution is to the young field of transformative agency and specifically to understanding the link between strategic actions at the actor level and societal-system change. Here I follow Westley et al. (2013) in framing transformative agency as a dimension of agency specific to the reconfiguration of societal systems: socio-ecological, -technical, -economic, etc. Despite a growing interest in the role of change agents in societal transformation, there are few analyses that successfully articulate how change triggered by actors can translate through to transforming societal systems, or at least contribute to a meaningful reconfiguration (Ferguson et al., 2013; Westley et al., 2013, 2014). Clarifying this process would potentially help change agents identify where, when and how they can intervene with systemic impact. This paper seeks to add clarity by applying a resource-based view of transformative agency as its lens of analysis (Biggs, in preparation). The framework was developed to understand the role of transformative agents in reconfiguring powerful societal structures resistant to change. It is therefore suited to exploring opportunities for transformative agency in Australia's electricity sector.

2. Analytical lens and method

The following discussion outlines the key terms and concepts from the resource-based view of transformative agency (Biggs, in preparation). The framework integrates and extrapolates from Fligstein and McAdam's (2011) Strategic Action Fields perspective (SAF) and de Haan and Rotmans' (2011) Multi-Pattern Approach (MPA) using insights from the Resource Based View of organisational strategy (Barney, 1991; Maurer et al., 2011; Wernerfelt, 1984). Because the MPA and SAF perspective themselves derive from innovation and complex systems theories and social movement and organisational theories respectively, key terms reflect this lineage.

The resource-based view (RBV) of transformative agency employs the Niche, Regime, Landscape heuristic consistent with multi-level theory (Geels and Schot, 2007) (and MPA). However by integrating MPA and SAF, additional structural elements are also explored. Society is understood as nested domains – or *functional fields* – of temporary stability. *Functional fields* (or *fields*) are complex adaptive societal systems whose configuration is oriented around providing a societal function (after de Haan and Rotmans, 2011). Australia's electricity system is the *functional field* in the focus of this analysis. The configuration (structure, technologies practices and cultures etc.) of a *functional field* derives from *actors* (both individuals and organisations) in the field and the *constellations* these actors form through their shared practices, structures etc. Constellations in a field adhere to that field's overall function but offer differentiated modes of provision. In highly stable fields, the predominant model of provision is determined by a *regime* constellation. Regimes arise through the aligned activity of powerful *incumbent actors* and are critical in dictating the formal and informal 'rules' by which field actors and constellations must operate. Less influential *niche* constellations (including more established

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