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journal homepage: www.elsevier.com/locate/enpolEnergy saving behaviours: Development of a practice-based model[☆]Jillian C. Sweeney, Johannes Kresling^{*}, Dave Webb, Geoffrey N. Soutar, Tim Mazzarol

University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia

HIGHLIGHTS

- We obtained consumers views about energy saving motivations, barriers and support.
- Attitudes towards energy saving are not sufficient to change behaviours.
- A practice-based approach to understanding energy saving behaviours is applied.
- A practice-based energy-cultures framework (PBECF) is developed.
- Barriers and support factors are identified that can be conceptualised within a PBECF.

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ABSTRACT

Financial pressure and concern for the environment has meant many consumers are aware of the need to reduce their consumption of many resources, including energy, which is the focus of the present study. While potential energy use deterrents in the form of access constraints and price increases are forms of extrinsic control, it is not clear how effective these are at reducing consumption and, indeed, it is not clear if such measures are consistent with people's underlying energy saving motivations. Beyond behavioural motivations, people's desires to reduce energy can be thwarted (barriers) and/or supported by a variety of factors, some within their control, while others are perhaps less so. Using a practice-based framework and a qualitative focus group approach, this study presents an exploratory study of these issues. Policy suggestions for overcoming barriers, as well suggestions as to how energy saving behaviours can be supported are offered.

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1. Introduction

Society's dependence on non-renewable energy sources and its impact on the planet's climate is a threat to global biodiversity and ultimately the quality of all life. Leading climate scientists have pointed to this danger (Climate change is real, 2011) and called on politicians to take action (Brown, 2011). However, the demand for energy continues to grow (IEA, 2010), leading to the need for a reassessment of how energy saving is addressed at a policy level (Perreels et al., 2006).

The scientific literature is rich in research on energy, energy consumption and energy conservation, to the point where it is difficult to locate scientific consensus. What adds to the complexity is that research has been conducted across a broad variety of disciplines (Stephenson et al., 2010), with many models being used to explain consumers' behaviour (see Kollmuss and Agyeman (2002) and Jackson (2005) for discussions).

In much of the literature it is suggested consumers act rationally when provided with information and choice. Increased exposure to information is expected to increase awareness and knowledge, resulting in a reduction in consumption (Jackson, 2005). However, such approaches have lacked explanatory power; with Hargreaves et al. (2010), Lutzenhiser (2008) and Shove (2010) recently suggesting this may be due to their failure to consider the broader social and cultural factors that influence people's energy use and shape their practices.

Stephenson et al. (2010, p. 6125) suggested differences in the way energy is used can be understood through the social system and culture in which people are located; leading them to suggest energy consumption behaviour results from "interactions between cognitive norms, material culture and energy practices." Indeed, their 'Energy Cultures' framework is persuasive in its simplicity and ability to provide a detailed understanding of energy consumption. Moreover, they argue the three components assist in understanding energy use and the key barriers to behavioural change. Their 'Energy Cultures' framework is a useful starting point from which to develop a more inclusive energy saving model that includes recognised core determinants of energy saving (i.e. motivations, barriers and potential avenues for support). Indeed, the importance of support, particularly in respect

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^{*} Corresponding author. Tel.: +61 8 6488 5906; fax: +61 8 6488 1004.
E-mail address: j.kresling@gmail.com (J. Kresling).

to autonomy, has been highlighted as an important agent for engagement in environmental behaviour in the Self-Determination Theory literature (Gagné, 2003; Osbaldiston and Sheldon, 2003). Therefore the objectives of the present study are to (1) explore how social and cultural factors, such as knowledge, norms and technologies, and situational factors interact with motivations, barriers and support to influence energy saving behaviours: and (2) empirically assess this framework through qualitative research.

While these issues are global in nature, the present study's context is Western Australia. Due to its recent resources boom, Australia's geographically largest state has experienced high economic and population growth. It is expected primary energy demand in Western Australia will continue to grow by more than 2% a year; having already doubled since 1988 (Office of Energy (OOE), 2011). On the back of economic growth, the average small consumer's use of energy has increased by 40% since 1994 and peak energy demand is expected to increase by 90% over the next 20 years (OOE, 2011). Consequently, the reduction of household energy demand is seen as a primary challenge for energy management (OOE, 2011).

2. Advancing the framework

2.1. Behavioural models predicting energy saving behaviours

For the purposes of this study, energy saving behaviours may be defined as the behaviours through which people try to reduce overall energy (electricity) use. Such behaviours may include *curtailment behaviours*, which save energy through reduced use; *efficiency behaviours*, which save energy by buying more efficient appliances (Gardner and Stern, 2002) or *maintenance behaviours*, which save energy by better maintaining appliances so as to improve their performance and efficiency (Ölander and Thøgersen, 1995). Efficiency behaviours can be categorised as either low (e.g. replacing incandescent lamps with compact fluorescent lamps) or high (e.g. installing insulation) investment intensive measures (Nair et al., 2010).

A number of models have been used to predict energy saving behaviours (Jackson, 2005) and, thus far, policy makers have generally tried to foster sustainable behaviour through information-intensive public education campaigns (McKenzie-Mohr, 2000), because they are usually inexpensive and relatively easy to implement (Schultz, 2002). Policy makers have also strived to foster sustainable energy saving behaviour through economic initiatives (e.g. low interest loans for energy efficient renovations, such as roof insulation) and on enforcing behavioural changes through regulation (e.g. the ban on the sale of incandescent light bulbs in Australia (Turnbull, 2007)). Although the ultimate objective of these approaches might be similar, the mechanisms are fundamentally different. For example education campaigns try to foster behavioural shift through voluntary changes, whereas regulatory changes mandate behaviour. The drawbacks of forcing a behaviour upon the consumer will be briefly touched on in Section 5.3.

Most of the information-intensive public education campaigns are based on the 'information deficit' model (Owens and Driffill, 2008), which suggests increasing knowledge and awareness alters consumers' attitudes towards the behaviour, which in turn translates to behavioural change (Eden, 1996; Jackson, 2005; Schultz, 2002). However, the relationship between increased knowledge, attitude change and subsequently altered behaviour has been shown to be weak and short-lived at best, if found at all; especially when non-personalised, general information, rather than tailored information, is provided (McKenzie-Mohr et al., 1995; McKenzie-Mohr, 2000; Kollmuss and Agyeman, 2002). This suggests increases in knowledge, attitude and awareness do not necessarily translate into behavioural change, because knowledge is not a motivator for engagement in a

desired behaviour. However, a lack of knowledge might be a barrier (Schultz, 2002). Schultz (2002) argues the knowledge-deficit model performs poorly due a lack of recognition of the motivations or barriers associated with the behaviour. The general lack of support for the 'information deficit model' has led to consideration of the gap between knowledge, values and attitudes and action (Blake, 1999; Kollmuss and Agyeman, 2002; Mahapatra and Gustavsson, 2010; Miroso et al., 2013; Nye and Hargreaves, 2009), termed the 'value-action' or 'attitude-behaviour' gap. In line with this recognition, a line of research on pro-environmental behaviour, including energy saving, has focussed on the motivations and barriers to such behaviours and, in association with this, the mechanisms that may support energy saving behaviours. For example, Blake (1999), Kollmuss and Agyeman (2002), Huddart-Kennedy et al. (2009) and Steg and Vlek (2009) noted how different motivations and barriers enable or inhibit pro-environmental behaviours. For example, Blake (1999) found barriers to pro-environmental behaviours can be categorised into individuality, responsibility and practicality themes. Barriers to engaging in energy saving might originate from a lack of time, money or support from other household members (Huddart-Kennedy et al., 2009), a narrow locus of control (Hines et al., 1987), the *invisibility* of energy (Marechal, 2009) or other immediate personal and situational factors, such as personal comfort (Kollmuss and Agyeman, 2002), existing technologies and appliance characteristics (Pierce et al., 2010), the weather and building characteristics (Lutzenhiser, 1993; Strengers, 2010), psychological factors (Abrahamse and Steg, 2009), as well as the economic and political climate (Press and Arnould, 2009).

A review of more recent energy behaviour literature, including research grounded in practice theory, suggests the importance of recognising the social context, (i.e. people's social and cultural practices) (e.g. Hargreaves et al., 2010; Nye and Hargreaves, 2009; Shove, 2010; Stephenson et al., 2010). Shove's (2010) seminal work in theories of social change in the context of climate change emphasises how a transition to sustainable behaviours occurs when the status quo is brought into question "and in which more sustainable regimes of technologies, routines, forms of know-how, conventions, markets and expectations take hold across several domains of daily life" (Shove, 2010, p. 1278). Shove (2010) further emphasises that understanding social change requires an understanding of how practices evolve. This is the fundamental premise of Stephenson et al.'s (2010) Energy Cultures framework, which takes a practice-based view of the world and was a critical element of the present study.

From a practice-based theory point of view, people's energy saving behaviours occur within social systems and people have the potential to learn, adapt and make choices based on their perceptions of their socially constructed world. Reckwitz (2002, pp. 249–250) explains that a practice is:

"A routinized type of behaviour which consists of several elements interconnected to one another: forms of bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge. A practice... forms, so to speak a 'block' whose existence necessarily depends on the existence and specific interconnectedness of these elements".

Schatzki (2001) argues practices are embodied, materially enabled activity sets organised around shared practical understandings. Thus, the practice of energy saving extends well beyond the individual to society as a whole. The concept of habitus is central to practice theory. Habitus is the set of socially learned dispositions, skills and ways of acting that are often taken for granted and which are acquired through the activities and experiences of everyday life (Osborn, 1917; Bourdieu, 1986). In essence, elements such as behaviour, thought and feeling reflect a

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