Residential Agent Engagement with Energy Efficiency when Advertising in Melbourne

by

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Submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

Deakin University

29 July, 2019
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Residential Agent Engagement with Energy Efficiency when Advertising in Melbourne

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Acknowledgements

I would like to thank the following people for their immense support throughout this research journey. Without them, the temptation to ‘throw in the towel’ at times may have been too much.

Anita Hurst
Professor Sara Wilkinson
Honorary Associate Professor David Bednall
Associate Professor Andrea Vocino

I would also like to thank Real Estate Institute of Victoria for making available for this research its Victorian residential sales database. Without this database, a comprehensive review such as this research undertook would not have been possible.

‘Research is to see what everybody else has seen, and to think what nobody else has thought.’

Albert Szent-Gyorgyi, 1893-1986
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Chapter 1: Introduction

1.1 Background to the research

Globally, numerous efforts have been made to arrest further environmental damage that scientists have found to be approaching critical levels (Stern 2006; Garnaut 2007). Housing, a basic human requirement, is a significant contributor to environmentally damaging greenhouse gas emissions (Geng et al. 2017). In 2012, the residential sector was believed to be responsible for 25-30% of total energy consumption in OECD countries (Iwafune & Yagita 2016). Therefore, when considering housing research related to environmental issues, it is important to identify and understand potential measures of emission mitigation from the perspective of the numerous actors. As a sector, housing is extensive and multifaceted, and each research effort must be clearly defined and focussed to contribute to the body of knowledge. Specifically, this research investigates residential real estate agent engagement with house energy efficient technologies during the marketing process. As agents play a significant role in the house exchange process, it is argued here their role cannot be ignored in the discourse of housing research.

The need to address change and rethink how the built environment harmonises with society and the environment is a global imperative (Garnaut 2011). Housing represents a significant component of land use and therefore warrants attention. This thesis is grounded in the property discipline. It considers the engagement of real estate agents with house energy efficient technologies through the lens of real estate advertising. The aim of the thesis is to contribute to the discourse of the ongoing environmental impact of housing and associated anthropogenic activities, and it does so from the perspective of market facilitators.

The impact of the urban environs, of which housing is part, upon the environment has been the subject of concern for many years with various governments embracing a range of strategies to address the global warming issue (UN Habitat 2012). Globally, one overarching approach adopted by governments has been to develop and implement building regulations that address new build and, in some cases, renovations or extensions (IEA 2018). Existing houses have remained largely exempt from such regulations (Laustsen 2008). However, in some countries specific programs have been designed to enhance energy efficient performance of existing houses through providing financial subsidies. In the UK for example, a home insulation program was implemented to enhance thermal performance of existing houses (Government...
Grants UK 2019). In a second example, the Australian Federal Government implemented the ‘Lighting phase out’ program to target inefficient lighting technologies such as incandescent and halogen globes with light emitting diodes (LED) lighting (Energy Rating 2016). Both these instances illustrate attempts to enhance the in-use energy performance of housing. Some commentators believe this form of policy adoption is largely ineffectual in influencing market behaviours, with Ben-David (2012, p. 10) describing them as a ‘sprinkling of programmatic peppercorns’. In this, Ben-David (2012) is inferring that policies are dispersed among the landscape of government influence and lack strategic structure and purpose. Similar observations have been made by governments themselves with comments stating policies have been ‘inconsistent and lacking in direction’ (Parliament of Australia 2015, p. 1). The lack of resolute commitment and direction on such an important issue as irreversible climate change is concerning.

One component of the housing sector governments have targeted in their efforts to address the issue of climate change is the sales process. Here too, however, governments worldwide have struggled to encourage house buyers to embrace house energy efficiency during the sales process (Sweeney et al. 2013; Shrubsole et al. 2014). This reluctance has perplexed governments and undoubtedly slowed the infusion of energy efficient technologies into everyday housing (Crabtree & Hes 2009). Although certain technologies that enhance house energy performance are relatively inexpensive, many are not. For example, photovoltaic panels, and double or triple glazed window systems, require considerable capital outlay. To install these technologies the house owner must have confidence in their benefits. The homeowner would want to recover the capital outlay via financial savings from reduced energy bills, and it would be reasonable for them to presume an enhancement of the property’s attractiveness to the market when offered for sale. Thus, it is important to understand how housing markets are engaging with such technologies.

While generic in purpose, to maximise effectiveness the choice and design of house energy efficient technologies must be bespoke to specific climate zones (Yılmaz 2007). Therefore, this discussion now considers the geographic area in which this research was conducted. Melbourne, a major capital city in Australia, has a vast stock of aging housing. Many global cities share similar characteristics. In 2005 the Victorian government introduced mandatory energy efficiency standards for new house construction (Sustainability Victoria 2017). These requirements include house extensions. The research period was from July 2008 through to March 2015. During this research period, 86 percent of Melbourne’s housing stock was
constructed prior to 2005 (Sustainability Victoria 2013). Therefore, when undertaking efforts to minimise environmental damage from housing, existing housing stocks must be considered. Government policies aimed at improving house energy performance of new or substantially renovated housing are useful, insofar as they denote a positive step forward. However, the large proportion of pre-2005 built dwellings suggests it will take many years before tailored energy efficient houses represent the greater proportion of the housing stock. Consequently, enhanced energy standards of existing housing stock must be encouraged as part of the overall strategy to abate the impact of buildings upon the environment. Conventional wisdom posits that this can be achieved directly through intervention policies or indirectly through housing market responses to ‘incentives’ (Amstalden et. al. 2007; Adams 2008; Bardhan et. al. 2014). If effective, the social and environmental benefits of energy efficient housing would be considerable. With regard to increasing energy efficient housing stock, in Australia mandatory house market interventions do not exist. However, building codes for minimum energy performance standards do exist for new houses and houses where the floor area is substantially increased. It is also important to acknowledge here that while this thesis focusses upon real estate agent engagement with house energy efficient technologies, the discourse relating to the built environment, and the value proposition for enhanced energy efficient buildings, is of importance to the broader community (Sayce, Sundberg & Cowling 2009).

As this thesis concerns real estate agent engagement with energy efficient housing, it is necessary to provide a review of this housing type to show the technicalities agents potentially confront when marketing these houses. This discussion first considers two bespoke energy efficient house design styles to demonstrate the aims and principles. and then progresses to provide an overview of the issues confronting more traditional housing stock.

1.2 What is energy efficient housing?

The utopian scenario for housing, and for the built environment more broadly, is for each building to have a zero-carbon footprint. Inherently this would include the activities of its occupants as these also affect carbon emission levels (Gill 2010). Typically, this ideal translates to housing in one of two ways. The first is Zero Energy Housing (ZEH) which can be defined as houses designed to provide thermal comfort to occupants while having no net carbon emissions (Marszal et al. 2011). These houses normally source external energy to function while generating energy to return to the public supply grid. The net result of this configuration
is a zero-energy impact on the environment. Such houses require close monitoring, and therefore some level of expertise, to ensure performance requirements are met.

Historically, energy has been sourced from fossil fuel; for example, oil, gas or coal. To evaluate energy savings, appropriate measures must be applied. Miller and Buys (2012, p. 232) state that the measurement methodologies for ZEH essentially reflect ‘accounting variations’ based on ‘what is being measured (energy, electricity, carbon emissions or currency (e.g. dollars); what energy services and forms are included in the demand (e.g. all electric and gas services) and types and boundaries of the energy supply (e.g. primary or end use energy)’. Such an understanding is useful in that energy is the first consideration (Torcellini & Crawley 2006; Marszal et al. 2011). With housing, onsite generation of electrical energy is the most common fossil fuel replacement (Frankfurt School-UNEP Collaborating Centre 2018). Generating electrical energy via solar, or other means, and feeding this energy back into the grid to offset energy consumed, has the potential to create a zero balance as far as consumption is concerned, but possibly not entirely offsetting all externally sourced energy. It is because of this reality that many so-called zero energy houses are in fact ‘near zero energy houses’ (Li, Yang & Lam 2013), thus explaining the emphasis given by Miller and Buys (2012) to accounting variations. The significance of the nuances and technicalities presented here will be highlighted further in this chapter.

However, depending upon the localised power generation method, carbon gases may still be emitted in generating energy consumed from the grid. The complexity of technologies and systemic applications highlights the need for technical training of those engaged within the housing sector. Not just users, builders and engineers, but also real estate agents. If they are to represent them properly, marketers of houses need to have at least a basic understanding of how systems and measurements of ZEH, and of other energy efficient technologies, function.

Contrasted to zero energy houses are houses totally disconnected from the power grid and which are self-sufficient in terms of power generation. These are known as passive houses (Su 2011). Such houses are designed to exploit the characteristics of the environment in which they exist (Su 2011; Dan et al. 2016). For example, a house located in tropical regions will have a significantly different design to one located in alpine regions. It is the climate that dictates the design. The aim is to provide a level of thermal comfort for occupants that does not require, or has minimal, conditioned air within it. Accordingly, this housing style is usually conceived at the initial stages of design, with retrofitting existing housing stock problematic due to the
necessary characteristics required. However, retrofitting for this purpose is not impossible, just more expensive. In any case, it is essential that design be harmonised with the local climate.

As stated earlier, these energy efficient housing styles require considerable regard for the climate in which they are located (Stephens 2011). A close relationship between house and climate must exist to ensure desired low/no energy outcomes are achieved. Recognising this almost symbiotic relationship, many governments globally have implemented building standards that reflect their unique climate zones (Beerepoot & Beerepoot 2007; Howden-Chapman et al. 2012; Clune, Morrissey & Moore 2012). A ‘one-size fits all’ approach to energy efficiency design does not work in this domain. Builders, developers and homeowners must be able to customise the characteristics of the house to best adapt to, and work with, the climate in which it resides. These customised design characteristics include orientation, suitable selection of materials, window technologies such as double-glazing, and use of modern technologies such as solar devices (Dan et al. 2016). Regarding the selection of materials, built characteristics and internal layout are also considered important if the final design is to minimise the carbon footprint of the house (ibid). It is the combination of design, materials, and harmonisation to the specific climate, that achieves the final outcome of what is referred to as an energy efficient house (Chel & Kaushik 2018).

In reality, most existent housing stock does not exhibit this extent of energy efficient customisation. Rather, most houses considered as energy efficient have some, but often limited, form of energy efficient technology(ies) retrofitted or built-in during construction. In other words, energy efficient technologies appear to be somewhat peripheral, or an ‘addition’ to the existing house, rather than a holistic objective.

In terms of the built environment, houses are unique in that they often reflect the personality of the occupants (Mallett 2004). They are necessary to fulfil the basic needs of human existence and have also long been a social statement. Wealthy citizens in ancient cities would often ensure their wealth was displayed through ostentatious house designs (Duncan 1985, p. 135). The same phenomenon is seen today. Therefore, when researching housing, it is judicious to have regard for the unique place it holds in our social structure. When buyers are making choices regarding a particular house they are typically confronted with a pragmatic and emotional dichotomy. The house must meet the needs of the occupants, and be of a style/design in an area that is favourable to their societal constructs and budget (Christie, Smith & Munro 2008). What importance is given to energy efficiency in this house choice in Australia remains
somewhat unclear, and hence the emphasis agents place on these aspects when selling houses is also unknown. This research contributes to the emerging narrative on this important subject.

As concern about the environment is a relatively recent phenomenon when considering the duration of human existence, it is reasonable to consider that the majority of houses globally were constructed without specific concern given to energy reduction. In the geographic area of this research, the majority of houses were constructed prior to the establishment of Australian energy efficiency standards (Sustainability Victoria 2013). This presents a problem of considerable proportion. Many houses are below current minimum energy performance standards, and as a result consume considerable energy to maintain thermal comfort and living standards for its occupants (ibid). Therefore, the challenge for government is to create a policy framework that encourages existing house owners to engage with environmental behaviours which, in a practical sense, may mean financial expenditure for these owners.

Many and varied policies have been introduced by the Australian government since climate change was recognised as a global concern (Talbergy, Hui & Loynes 2015). These policies have been intensely debated, largely in line with political ideologies (Crowley 2017), with the result the Australian public is potentially confused, and possibly somewhat disconnected, from the issue (Lewis & Woods 2014; Moser 2014). While some of these policies address new housing and extensions to existing housing, there are no germane policies regarding established housing (Talbergy, Hui & Loynes 2015), which is the substantive proportion of Australian housing stock. This means the cost of energy efficient upgrades to existent housing stock is largely borne by the house owner(s), although more recent political discourse appears to be recognising this conundrum (Department of the Environment and Energy 2019).

The notion of capital expenditure for energy efficient upgrades brings forth a dilemma often faced by homeowners. At what point does the economic utility gained exceed the capital outlay for energy efficient technologies? In other words, at what point can the homeowner consider they have not overcapitalised the property and will benefit from their efforts? Such concerns are often seen as a barrier to retrofitting existing housing stock (Friedman, Becker & Erell 2014).

No concern about overcapitalisation would be relevant if houses did not exchange in an open market place. House owners naturally seek to maximise exchange price for their properties and
will utilise every means possible to achieve this, and in Australia this typically involves real estate agents (Wong et al. 2018).

1.3 Housing markets and marketing

House markets are a virtual market in that there is no fixed place of exchange. Geographic dispersion inherently means buyers are exposed to a variety of surroundings, house styles, neighbourhood characteristics and so on. It is the combination of unique characteristics that attracts people to certain areas. The costly nature of housing also means people typically engage with it only a few times in their life, with life stage and age generally determining the location and form of houses sought. This infrequent engagement with house transactions often leads to many house sellers and buyers utilising the services of a real estate agent (Stamsø 2015). Almost exclusively these agents use advertising to promote the property they have been appointed to sell (Perkins, Thorn & Newton 2008; Gillon & Gibbs 2017). The unique role of residential agents as market facilitators provides opportunity to observe and explore social trends through house advertising they produce (Dunning et al. 2018).

Real estate agents are engaged to act on behalf of a party seeking to undertake a property transaction and generally act as an advocate (Cucchiarelli & McGreal 2012). In Australia, the represented party is normally the seller, and in this role, they undertake marketing activities, including the preparation of advertisements. When engaged to sell houses on behalf of clients, agents should be objective and abstain from acting out of any form of self-interest. This is important to maximise benefit to the client. The extent to which agents do this has been the subject of examination (Clauretie & Daneshvary 2008; Lee & Thompson 2011). This is further discussed in Chapter 2- Housing in a changing Environment.

To perform their role, agents interpret market trends to highlight and align specific house characteristics to potential buyers. To achieve this, agents use a range of advertising tools such as hyperbole and contemporary issues or trends, among others, to carefully script text and thus to attract enquiry (Norris 1999; Perkins, Thorns & Newton 2008). It is how agents script these advertisements that can inform the observer of contemporary house buyer attitudes (Katz 1978; Haan & Berkey 2002; Oates & Pryce 2007; Pryce & Oates 2008). Thus, using house advertising provides a unique medium by which to examine social trends and how house buyers are being presented, if at all, with energy efficient housing features.
1.4 The context of this research

With the benefits of energy efficient housing well documented, evidence is suggesting buyer engagement is minimal (Fuerst et al. 2015; Wong et al. 2018) and the failure of the populace to engage with environmentally friendly housing has been somewhat of an enigma (van Rijnsoever & Farla 2014). This research explores; to what extent, and in what ways, are real estate agents engaging with the discourse of energy efficient housing when advertising houses for sale. As a key intermediary in the housing sector, the role of the real estate agent warrants investigation.

As market facilitators, residential agents have the potential to exert considerable influence over house sellers and buyers. Their unique role within the transaction process enables them to observe market and social trends first hand, thus enabling them to best align their services and client house characteristics to achieve positive outcomes. In terms of practice, legislative frameworks are intended to govern how real estate agents perform their tasks (Agboola Ojo & Amidu 2012). Among other codes of practice, regulations typically require agents not make claims that cannot be verified nor exaggerate about the performance capabilities of house characteristics, this is particularly so in Australia (Consumer Affairs Victoria 2018). It is therefore with an element of caution that residential agents are likely to engage with new technologies, particularly one whose performance relies upon the user. This is the case with energy efficient housing technologies as the occupant largely drives performance by their patterns of energy use (Delzendeh et al. 2017).

In an effort to avoid litigation emanating from inaccurate or overzealous claims of house energy efficient performance, it is plausible that agents will remain conservative, even though this may be of detriment the seller (Lee & Thompson 2011). This conservatism is likely to restrain agents from actively promoting energy efficient technologies in ways other than simply documenting their existence within advertisements, rather than highlighting their expected benefits. Agents may also have different agendas to sellers, however. For example, agents may prefer a lower sale price to provide a higher probability of selling in the short term over seeking a higher price but with reduced chances of a quicker sale (Daneshvary & Clauretie 2012). This in turn may affect how agents advertise houses by focussing on aspects they believe will most appeal to the market such as location, stylistic design etc. Diminution or omission of energy efficient features in advertisements has the potential to lessen the benefits of these technologies in the mind of buyers, potentially further exacerbating market acceptance. However, as the
benefits of reduced carbon emissions to both environment and society are well known, one might expect the uptake of measures to reduce these emissions to be well received.

Neo-classical economic theory applied to unrestricted housing markets would suggest the response to an exogenous shock such as increasing energy costs and the need for more energy efficient houses, would lead markets towards favouring more efficient houses. Thus, poor performing houses would be seen as less desirable and the uptake of higher energy efficient performing houses be a rapid one (Crouch 2009). This proposition is based on the belief that people will seek to maximise their utility or personal satisfaction when making economic choices (McFadden 2001). Similarly, real estate agents will seek to maximise their utility through their business activities.

In executing their roles real estate agents navigate through a labyrinth of regulations, externalities affecting house markets such as government environmental policies aimed at impacting house energy performance, buyer ideals, traditional house value drivers such as locational influences and numerous other factors all combining to impact on how real estate agents perform their tasks (Nanda, Clapp & Pancak 2016). When creating advertisements, these factors all converge to compel the agent to prioritise and emphasise house characteristics considered most likely to attract appropriate buyers (Kriese & Scholz 2011; Bevan & Lu 2013). Influencing these decisions is the ultimate objective of securing a successful sale. It follows through evaluating real estate agent house advertisements observations can be made about how agents do this. This is important insofar that without proper exposure of energy efficient technologies and committed engagement from agents during marketing, change is likely to be slow (Bond 2015). Buyers, and more broadly the public, will be less likely to comprehend the importance of such technologies in the reduction of further environmental damage (Moser 2014) and therefore be less likely to factor them into their decision-making process. This in turn may impede the reduction of carbon emissions since owners would be less likely to see a payoff from installing energy efficient technologies. As such it can be seen that agents balance numerous, sometimes competing, imperatives when advertising houses for sale.

The nature of this research requires it to be contextualised. Environmental policies, real estate industry practices, advertising parlances typically drawing from localised events and trends all affect the form of the research design. This is because the laws governing practices, house styles, urban planning policies, public expectations of house ownership etc. are all regional (Jones, Leishman & Watkins 2005). However, this does not preclude the research model from
interstate or international application. It only requires appropriate adaptation. To do this, regard is required for local housing and environmental policies, agency and marketing regulation and the modus operandi of real estate industry practitioners. These are discussed in Chapter 2- Literature Review.

1.4.1 Summary

The aims of this research are now presented.

1.5 Aim and Research questions

1.5.1 Aim

This study aims to contribute to the bourgeoning body of knowledge in the property discipline, particularly in the Australian context. The study investigates the extent of real estate agent engagement with energy efficient housing during the marketing process. This is important to understand because of the slow adoption of energy efficient technologies within the housing sector (Eves & Kippes 2010) and the ability of real estate agents to influence housing choice (Jud 1983; Mantrala & Zabel 1995).

This thesis examines house advertisements, authored by real estate agents, to understand how energy efficient technologies are being promoted. In doing so four theories are drawn upon and applied, in context, in this research. These theories are: 1) property theory, 2) advertising theory, 3) principal/agent theory and 4) primacy/recency theory. The following provides context for the application of each of these theories.

Property theory attempts to explain the interaction of four recognised theoretical drivers of land use and value. These four drivers are Social, Economic, Physical (environmental) and Political (government) variables that interact to create observable house market movement (Reed 2015, p. 38). For example, the desirability of a house is typically the product of the actual location of a house and its characteristics (Physical), the demographic profile of the region it sits within (Social), the prevailing economic conditions that enable people to make purchase decisions (Economic); and, Government policy frameworks such as planning and taxes (Political) are all important when investigating housing markets (ibid).
House advertisements are unique due to the heterogeneous nature of real estate and that the purpose of the advertisement is to generate a one-off sale rather than promote a brand or a repetitive product or service. Agents typically write advertisements with minimal training in advertising as a discipline (Department of Education and Training 2012). Perhaps resulting from this limited training, house advertisements in Australia tend to follow a somewhat homogeneous format. Advertising theory presented to trainee agents is focussed on the maxim of AIDA (Attention, Interest, Desire, Action) and this is presented within the constraints of consumer law (ibid). Thus, the AIDA maxim, applied in similar research (for example, see Wischmeyer 2016), is considered relevant to here and is used to provide a structured means of analysis of advertisements.

In Australia real estate agents are remunerated by success fees thereby creating an element of self-interest in a transaction. The nexus between acting on behalf a principal whose interests must be foremost in the mind of the agent and the reality that the agent’s efforts will be unrewarded if no transaction occurs, can lead to the agent being tempted to make decisions and/or provide recommendations to the principal that are also influenced by the interests of the agent. Therefore, the principal/agency theory, grounded in the management body of knowledge, has relevance to this research in that it considers agency advertising practices (Anglin & Arnott 1991; Lee & Thompson 2011; Daneshvary & Clauretie 2012). It is used here to interpret the order of information appearing in the advertisements and, in conjunction with advertising theory, is applied to further understand meanings embedded within the advertisement.

The fourth and final theory applied to this research is obtained from the psychological body of knowledge. Primacy/recency theory has been applied in advertising research to explain why people are more likely to retain certain components of a message (Ohanian & Cunningham 1987). Information provided early and late in a message is more likely to be remembered and is therefore more useful, than information embedded within the body of the message stream (Ohanian & Cunningham 1987; Li 2010). Advertisements are often in the form of textual strings. When considering house advertisements, vast amounts of information are conveyed to the reader. It is therefore likely the reader will recall those items that are meaningful to them when first reading the advertisement. The real estate agent makes an interpretation of what they believe is important to the market in which they operate (Ohanian & Cunningham 1987; Loginova 2009). Therefore, when scripting advertisements, agents will tend to highlight the features perceived as important. Although the application of primacy/recency theory to
advertising is not part of the agent’s formal training, applying this theory to analysing advertisements will provide insight into which house features are likely to be remembered, or not, by house buyers, as readers of house advertisements.

In this research, house advertisements are defined as meaning the advertisements on the Internet prepared by agents and used in the promotion of residential property to affect a successful transaction. Once a successful sale is undertaken details, including the advertisement are reported by the agent to its peak body the Real Estate Institute of Victoria (REIV). One of the key objectives of this study is to better understand the engagement real estate agents have in the increasingly important discourse of environmentally friendly housing.

The prevalence of words and phrases that refer to energy efficient characteristics within a house advertisement together with the demographic data within the suburb, identified by the postcode, in which they appear are analysed. The analysis is drawn from a unique database of residential property sale advertisements from July 2008 to March 2015 and the associated demographic profiles. The results of this research, being based upon property and demographic information within the Australian state of Victoria, will be germane to many developed regions in countries throughout the world. Furthermore, it will contribute to the existing knowledge concerning the reduction of carbon emissions from anthropogenic activity as it relates to the built environment.

Research questions developed for this research project are discussed in Chapter 3-Framing the Research however for completion of this chapter they are introduced here together with a brief explanation.

1.5.2 Research Questions

Research question One

*RQ1: What determines whether agents use energy efficiency language in housing advertisements?*

To attract reader attention, real estate agents have a conundrum when deciding what to include and prioritise in house advertisements during the sales process as advertisements often have limited space (Robertson & Doig 2010). Therefore, the extent of inclusion, why and how energy efficient language is included in advertisements is important to understand. This question aims to investigate antecedents for this.
Research Question Two

RQ2: Does the extent of inclusion of energy efficient technologies in house advertisements in Melbourne Victoria vary across disparate regions and if so why?

Literature suggests household demographic profile influences the installation of energy efficient technologies into the building (Christie, Donn & Walton 2011; Achtnicht & Madlener 2014). The purpose of this question is to verify if real estate agents’ perceptions about energy efficient housing varies across demographic regions.

Research Question Three

RQ3: Are real estate agents giving prominence to energy efficient characteristics when scripting house advertisements?

Property literature shows that buyers are adhering to traditional priorities in the house search (Bryant and Eves 2011; Bruegge, Carrión-Flores & Pope 2016; Wong et al. 2018), such as location. This question aims to examine how energy efficient technologies are being promoted relative to other, more traditional, features of the house being marketed.

1.6 Overview of the approach

In evaluating property theory, this dissertation will consider social practices expressed through advertising. These practices can inform engagement by an industry sector whose business modus operandi is largely governed by interpretations of social and technological trends. It is the actual practice that is the foci of practice-based approaches, not individuals. In research, practice is thought of as assemblages of heterogeneous segments (Bispo 2015). These segments could be technologies, knowledge and skills, conventional wisdoms, all combined to work together in a manner governed by conventions, legal/ethical frameworks and mechanisms that hold together to form a practice (Judson & Maller 2014). The extent of residential agent engagement with energy efficient technologies is considered with regard to these practices.

The research is located in the greater Melbourne metropolitan region. Aside from the prevailing climate, Melbourne is similar to many Australian and major cities globally. During the data collection period greater Melbourne had a population of approximately 4.17 million (circa 75% of Victoria’s population) (ABS 2011). With approximately 36.7% of residents being born overseas (ibid), a diverse cultural composition has developed numerous economic and social
forms (Forrest & Dunn 2010) resulting in an eclectic housing mix. Founded in 1835, many of Melbourne’s buildings, including residences were constructed before the advent of energy efficiency building standards (Tout-Smith, Coccoli & Stevenson 2011). Being an established city, the findings of this study are locally and internationally relevant with cultural and climatic variances acknowledged. Local climatic conditions influence house design (Wang, Chen & Ren 2010). In the case of Melbourne, the Australian Building Codes Board defines Greater Melbourne as being located within a single climate zone (ABCB 2015). This zone is labelled Climate zone 6- Mild temperate (ibid). Therefore, within the research design, allowances for variation in house design and/or building codes resulting from climate zone differences was not required. If the study was to be repeated in other regions, locally or globally, allowance for the impact of local climatic conditions on building standards may be required.

1.6.1 Sources of data
Secondary data was obtained and utilised in this study. The Real Estate Institute of Victoria (REIV) provided the advertising data and their generosity and support for this research is acknowledged. To the advertising data was added demographic data from the Australian Bureau of Statistics (ABS). This data is publicly available. Finally, in order to prepare the data for analysis postcode data and maps were obtained from the ABS data. Together these provided a large but workable database from which to undertake the analysis. Along with the quantitative data, semi-structured interviews were also undertaken to develop more fully understand residential agent motivations when creating advertising material.

1.6.2 Scope of the research
Melbourne was considered a useful location for study due to its large spatial urban profile and further, as cities are responsible for approximately 70 per cent GHG emissions (Squires 2012, p. 3) understanding real estate agent engagement with house energy efficient technologies in the marketing process is important. Thus, using Melbourne as a focal point for this study enables the findings to be transferable to other major cities. The scope of the research was restricted to detached housing in the geographic region defined by greater Melbourne. The rationale behind choosing only detached housing is that house owners have individual choice in making decisions regarding energy efficient technologies. People dwelling with multi-owner complexes, large or small, do not have individual choice regarding retro-installation of energy
efficient technologies but rather, must comply with the collective agreement of the entity responsible for portions of the building outside the individual title boundary.

Real estate agent, residential agent, estate agent or simply, agent, are all terms used in Australia to describe a person who sells and/or leases houses on behalf of another person. These titles, other than residential agent, also apply to persons acting in a similar role but dealing with commercial or industrial grade real estate. For ease of comprehension, it was considered appropriate to use the term ‘agent’ in the context of this thesis to describe the profession rather than the more onerous expressions of ‘real estate agent’ or ‘residential agent’. Where the expression ‘real estate agent’ does appear, it is for no other reason than the belief it is appropriate to do so within the syntax of the sentence.

A glossary of terms used in this thesis appears in Appendix 1. These terms appear commonly in this field of study and more broadly the real estate industry, and therefore must by necessity appear here.

1.6.3 Thesis structure

The remainder of this thesis is structured as follows. Chapter 2 presents reviews pertinent literature and establishes the research gap, Chapter 3 presents the framework and model developed for this research, Chapter 4 discusses the philosophical assumptions and methodological design developed for the research. Chapter 5- presents the Qualitative results and discussion, Chapter 6- presents descriptive quantitative results and discussion and Chapter 7- deliberates findings and discussions from Chapters 5 and Chapter 6 to form conclusions and recommendations for future research.
1.6.4 Thesis structure Overview

Figure 1.1 Thesis Structure Overview
Chapter 2: Housing in a changing environment

2.1 Introduction

The study of housing may be approached from numerous perspectives drawing upon theories from diverse disciplines to further the body of knowledge. Researchers from disciplines as dissimilar as economics, marketing, psychology and others have all combined to provide a rich tapestry of knowledge about housing which affects all people in various ways throughout their life stages (Andersen 2011). It is the emergence of environmental threats upon our world, created by human activity, which has prompted this research.

In developing and refining the frame of this research it was tempting to move into disciplines mentioned above. However, to ensure housing, and in particular real estate agents, remained the focus it was determined appropriate to consolidate the research within the sphere of property knowledge and draw upon other disciplines to elucidate and inform the inquiry to provide rigour and structure. Occasionally diverting into broader property theory, this literature review focusses upon housing theory relevant to the inquiry and discusses external germane theories borrowed from appropriate fields of knowledge that were relevant to this inquiry. The discussion of each theory is limited to its relevance to this research and within the general confines of real estate agency practice.

The expression ‘housing market’ is a common one and is often understood in economic terms (Boelhouwer 2011). However, housing researchers generally agree that market participants, including house buyers, synthesise a range of factors when making decisions, interpreting them through their individual lens of what is readily known and understood (Ruonavaara 2018). In other words, participants develop their own views through personal experience from information received formally or informally to execute judgements. For example, life stage and personal relationships can influence individual choice. Arguably, individuals construct their own reality to interpret housing markets in a manner that makes sense to them. With these parameters in mind, housing, how house buyers use it, what they expect from it and how they value it within their daily lives can, therefore, be considered a reflection of society and societal trends (Davidson 2010). Some of which include, architectural styles and fashionable design, inclusions of contemporary technologies, historical significance to name a few attributes commonly held. These elements, together with individual demographic and household need such as accommodation and locational requirements, can be seen as constituting the ‘housing
market’, are synthesised by market facilitators, notably real estate agents, to effectively advertise and transact houses in an open market.

Alongside this broader understanding of housing is the basic human need for shelter. This need means that all persons will be involved with the housing market at some time in their life, either as a landlord, tenant or purchaser and/or seller. Thus, people enter the property market with varying aspirations and expectations (Marsh & Gibb 2011) and will come from a spectrum of socio-demographic standings. These expectations will vary and evolve as a result of population trends, economic progression and technological developments to name a few drivers of housing markets. Externalities, such as climate change, also have the potential to influence housing choices and this is an increasingly important consideration (Warren-Myers & Heywood 2018).

This literature review considers the housing market within the context of a changing climate, understood to be the result of anthropic activity, and how this change is likely to impact upon future housing markets, and particular, market facilitators. Regard is given to previous housing literature and market facilitators to provide a greater appreciation of the issues within this developing field. This review therefore considers four disciplines of interest that interplay with each other to form what is commonly understood to be the ‘housing market’. These are;

- Housing theory.
- House market intermediaries, namely real estate agents, their practice and advertising.
- The impact of housing upon the environment.
- The theory of energy efficient housing.

A brief discussion on government and social environs is also offered within the context of the four topics provided. This review includes scientific, industry literature and published information.

This chapter proceeds as follows: Section 2.2 presents extant literature and theories regarding housing markets to position the research in this body of knowledge. Section 2.3 reviews literature regarding market facilitators specifically, specifically real estate agents. Section 2.4 introduces and explains theories and principles regarding energy efficient housing. This discussion commences with an international review and quickly reduces to a localised perspective. The reason for this is the bespoke nature of such housing with regard to climatic location. Section 2.5 provides a review of government perspectives in Australia, particularly Victoria; the research area. As governments globally have constructed unique and individual
approaches to climate change this discussion was considered necessary to provide the local
Australian perspective. Section 2.6 provides a summary and concludes this chapter.

2.2 Housing theory and markets

When studying housing, the nature of land cannot be ignored and can be considered as follows:

Land provides the foundation for the social and economic activities of people. It is both
a tangible physical commodity and a source of wealth. Because land is essential to life
and society, it is important to many disciplines, including law, economics, sociology,
and geography. (Reed 2007, p. 3)

Housing is a multidimensional subject. It represents identity, physical and/or financial security,
a sense of self-worth to name a few perspectives. As Ruonavaara (2018, p. 178) states ‘Housing
is a material object, a good that can be manufactured and demolished, produced and consumed,
perceived and experienced, bought and sold’. Thus, housing can be researched from numerous
perspectives. However, this broad spectrum of possible theory application has, to date,
potentially contributed to the lack of a grand central theory of housing (Aalbers 2018).
Researchers seem to agree that as housing is a multi-facetted discipline it is very difficult to
create a single theory enabling a progression beyond the application of theories external to the
discipline (for example, see Ruonavaara 2018; Clapham 2018), although housing, as a
discipline, has seen at least 40 years of research (for example, see Kohl 2018). Thus, there
appears to be general agreement that a theory of housing has yet to be developed (Ruonavaara
2018). Academics have debated the question whether researchers should focus on questions
related to ‘Theory of housing’ or ‘Theory about housing’ or even ‘Theory from housing’ (ibid).
The diverse connotation of housing to society appears to create and foster the debate of a lack
of specific housing theory, which would explain the observed practice of theory import (ibid).

Evidence of this diversity lies within the fact that researchers have approached housing
research from numerous perspectives such as sociology, economics, planning, architecture to
name but a few and have typically relied upon their home discipline for identification of a
theoretical lens (Aalbers 2018). In his book titled; Housing and Social Theory (1992), Kemeny
argued that in the absence of a single ‘grand’ theory of housing, valuable housing research
would be best achieved through the import of pertinent theory. In developing this view,
Kemeny recognised the diverse nature of housing. This research adopts this view.
As interesting as this debate is to those engaged with research in housing and housing issues, this lack of a singular theoretical lens from which to position any research requires the researcher to acknowledge this reality, and carefully position the research being undertaken within multiple theoretical frames, wherever they may be sourced. This is true here and is the rationale for the approach taken in this research.

Given above paradigms, the perspective applied to this dissertation is through the lens of market facilitators, namely real estate agents. With the obvious aim of attracting suitable buyers, real estate agents interpret local market trends, fashions, buyer demographic and other variables and develop marketing strategies by linking these variables to the characteristics of the house being sold (Dunning et al. 2018). When contemplating the phenomenon of house markets, house prices are also often considered, although these are actually the result of interpretations made of the aforementioned.

### 2.2.1 Understanding the housing market

A general view has emerged among property researchers and professionals that housing markets are influenced by the interaction of social, economic, physical (such as location) characteristics and political (for example, governmental policies) forces (Reed 2007). It is the priorities and weightings that individual households place upon each of these elements that influence choice. For example, in times of high mortgage interest rates, families are curtailed in their borrowing ability potentially resulting in choosing locations and/or house styles they would have otherwise not have selected (Harris 1989; Bhutta & Ringo 2017). Also, neighbourhoods exhibiting stylish and popular architecture would logically attract buyers resulting in increased competition and price outcomes (Lynch & Rasmussen 2004). Desired location has long been a driving force of buyer choice (Reed & Mills 2007). Consequently, buying a house can be considered a social activity that is undertaken within an economic frame (Levy, Murphy & Lee 2008). Buying a house is considered a high involvement decision meaning the consequences of erroneous choices is substantial (Gibler & Nelson 2003). This is one possible reason why house buyers seek professional services when engaging with this market (Zumpano, Elder & Baryla 1996).

House prices are often the first element of thought when discussing house markets and these are typically related to the social status of neighbourhoods (Bramley, Leishman & Watkins
Evidence from anthropology and economic sociology suggests that house markets do not comfortably accord with economic rules (Miller 2002) and principles and house transactions can be difficult to be ‘disentangled from social and cultural beliefs’ (Wallace 2008, p. 256). Arguably, it is the role of a market facilitator to interpret the nuances of such entanglements where sellers and buyers are seeking to transact. To do this it is therefore considered appropriate to review literature from seller and buyer perspectives to provide greater clarity on the agent’s role within the process.

Buying a house is one of the most important decisions people will make in their lifetime. Considerable research into house purchase decision making has been conducted with many efforts being directed towards the development of decision-making models and theories that endeavour to predict decision behaviour (for example, see: Shiller 2007; Hatzvi & Otto 2008; Ratchatakulpat, Miller & Marchant 2009; Shukur, Othman & Nawawi 2016). This field is an area that has seen particular interest from other branches of social science (Wallace 2008; Ruonavaara 2018). Care was exercised by the researcher to ensure this thesis remained focussed on housing markets, not broader issues such as consumer behaviour.

Researching home buyer decision-making Koklič & Vida (2009, p. 30) noted that researchers have not extensively studied the area of ‘big’ or ‘strategic decision’ making in relation to house purchasing and further define strategic decision making as referring to ‘the process of decision making when buying strategically important goods’. The underlying assumption noted by the authors is that the process involves risk. They also state: ‘The following characteristics define the strategic importance of a purchase: high involvement in the process; long-term commitment of resources; truncated budget available for other goods and services’. Buying a house is a major event in a person’s life. The heterogeneous nature of housing makes this even more challenging for home seekers. Buyers are confronted with many choices from high rise city apartments, to inner, middle and outer suburban properties as well as semi-rural environs. Within each of these locational categories exist a variety of designs and styles. All of which, potentially leads to confusion for house buyers. This confusion is often resolved through the setting of goals, discussing/negotiating household needs and interacting with agents, finance sources, market facilitators etc. (Levy, Murphy & Lee 2008). House choices are also ‘culturally and socially constructed’, thereby influencing house markets (Nethercote 2018, p. 14). Ethnicity also contributes to this phenomenon (Zorlu & van Gaalen 2016).

Considering the role of agents Bridge (2001) applied Bourdieu’s (1984) concepts of material
and cultural capital theory in investigating the gentrification of Sydney’s inner suburbs. He noted that buyers appeared to move away from traditional economic concepts as they became more educated and affluent. In other words, as buyers became able to make ‘discretionary’ decisions about housing, embracing social trends and fashions, they were more likely to do so. In this he discussed the role of agents (observing that little research about real estate agents had been conducted) and concluded that agents played a pivotal role in facilitating and, using the ‘tide of trend’ in marketing and promotion, actually influencing such trends.

In a study of housing consumer preferences Kauko (2006, p. 93), argued that quantitative studies into the subject failed to provide sufficient understanding of how buyers progress through their house purchase decisions. Utilising a qualitative approach and behavioural-cultural model, he determined that people were tending to move from traditional technical-functional tangible factors towards socially led factors such as lifestyle and image and location consumption behaviours. Kauko (2006, p. 93), further argued people are changing ‘due to a general shift in western consumer cultures, from a more constrained housing market to the present situation in which factors related to consumer choice and product variety are playing a more substantial role’. Again, this highlights the nature of housing markets as they appear to move from pragmatic need, as a place to live, to a socially constructed identity.

Throughout the world, cities exhibit varying demographic and socio-economic profiles within geographic clusters within the bounds of the city. These regions are typically referred to as sub-markets and these sub-markets characteristically exhibit varying pricing signals. Pricing layers of sub-markets, and sometimes within sub-markets, generally depend upon some type or form of local characteristic(s) such as proximity to major infrastructure or some desirable natural feature. House price in these areas typically align to the economic maxim of supply and demand (Ratchatakulpat et al. 2009; Jim & Chen 2009). Unique and desirable property characteristics invariably attract people of higher socio-economic standing who are willing to pay a greater amount to acquire the legal rights to the property (Rahman 2010; Reed 2013). This humanistic trait will invariably lead to sub-markets displaying distinguishable social and demographic characteristics that influence the way people perceive the region. Thus, a self-perpetuating phenomenon often emerges, viz. that people of similar interests, values, cultural likeness and often socio-economic standing come together and begin to ‘define’ the nature of the sub-market (Perkins et al. 2008, Zinas & Jusan 2012, van Ham 2012). An economic descriptor of this phenomenon is known as the ‘Veblen effect’. Thorstein Veblen identified the concept of status seeking when making consumption choices and first observed this in 1899 (Vatn 2005). In
housing markets, the Veblen effect is ‘the familiar pride of ownership effect associated with having the showcase house in a particular neighbourhood, a pricing effect widely believed by real estate professionals’ (Turnbull, Dombrow & Sirmans 2006, p.441). Thus, agents are likely to factor this belief into house advertising that they produce.

Housing markets are therefore essentially a reflection of a series of social preferences, aspirations and interactions working together and independently, within family and cultural units and across communities. These interactions occur within a frame of economic and financial circumstances and constraints and act in a manner to create competition for desirable location and popular architectural styles. This set of human behaviours interacting in an open and free market that exchanges residential property is used here to define the ‘housing market’. Real estate agents work within this framework to perform their role as market facilitators. The discussion now progresses to examine how agents operate within housing markets and synthesise these market characteristics to achieve successful outcomes.

2.3 House market intermediaries and advertising

2.3.1 Real estate agency practice

Property markets are noted for imperfect information (Jud 1983). House buyers and sellers see intermediaries, such as real estate agents, as a source of pertinent information during the search and transaction process (Bond 2015). As a profession, residential real estate agencies encompass many roles. Real estate agents solicit, list and market properties for sale and/or lease, negotiate contracts, manage relationships throughout contractual periods, and at times offer advice to clients to deal with the relocation process (Fox 2018). Agents are believed to be property professionals who can accomplish these tasks because, to name the more obvious components of their skillset, they understand the built form, have marketing and negotiation expertise, are skilled in communication techniques, and possess paralegal proficiencies about land, contracts, consumer law and ethical matters. Therefore, when studied, researchers can approach this cohort from numerous viewpoints with findings often contingent on the particular perspective adopted by the research (Aalbers 2018). To guide the selection of literature reviewed, it is therefore necessary to articulate the perspective undertaken in this research.

Specifically, this research aimed to investigate the extent of engagement by real estate agents with house energy efficient technologies during the advertising process when selling houses. As suggested, extant literature concerning real estate agency, sometimes known as real estate
brokerage, is diverse. Therefore, emphasis is given to literature that has relevance to house advertising, the operational practices of agents, and their perceptions about energy efficient technologies in the advertising process. In regard to such perceptions, literature is limited. Thus, this research aims, at least in part, to address this dearth.

Real estate agents act as intermediaries in the exchange and leasing of houses. While the exchange processes may vary across countries and jurisdictions, the infrequent interaction of sellers and buyers with property markets, and the work involved with property transactions, often causes people to seek the skills and services of residential agents (Palm 1976; Anglin & Arnott 1991; Stamsø 2015). These intermediaries generally act on behalf of the seller; more recently, however, buyers are also engaging the services of these professionals (Zumpano, Elder & Baryla 1996; Stelk & Zumpano 2017). Dealing with buyers and sellers, agents develop a strong sense of market nuances, prevailing trends and emergent trends (Dunning et al. 2018). Research acknowledges that agents work in complex multilevel environments and need to develop high levels of negotiation skills (Urbanaviciene et al. 2009). This behaviour makes agents useful barometers of changing social patterns as they relate to housing. Real estate agents, as providers of professional services, are capable of shaping the performance of other actors, such as buyers and/or sellers, and their manner of engagement with housing markets (Pow & Kong 2007; Dunning et al. 2018). In this regard agents can also be seen as enablers for promulgating positive and negative messages about energy efficient housing (Bevan & Lu 2013)

From a cultural economic theory viewpoint, service businesses such as real estate agencies mingle economic and non-economic elements to gain competitive benefit (Du Gay & Pryke 2002). From this perspective, agents can be seen as enacting and using social and technological developments to enhance commercial outcomes for their business and clients through interpreting and applying emergent developments. For example, should an agent perceive a certain attribute of a house to be of particular interest to potential buyers, they are very likely to ensure those buyers are made aware of its existence. This in turn has the potential to influence house markets (Haag, Rutherford & Thomson 2000; Bhatia & Jain 2014). Building on previous work in the field of agency research, Dunning et al. (2018, p. 4) showed ‘that housing market professionals are able to construct the market in different ways and in so doing have the potential to alter the future arrangement of home buying activity’. This highlights the ability of agents to adapt their practices and behaviours to changing market characteristics where technological and other externalities may cause disruption to traditional practices.
Wallace (2008) proposed that this adaptive behaviour was the result of social and intuitive reasoning. Therefore, within the context of the research in which Dunning, Wallace and others worked, it is considered reasonable to suggest that adaptability would vary in differing settings and be influenced by the regulatory social frame in which agents operate. This contextual influence necessitates defining the business practices of agents in the context of this research to understand the role and totality of their engagement in housing markets.

In the course of their business, agents undertake numerous tasks, and these are not necessarily sequential. However, efforts have been made by researchers to depict a sequential form of these tasks to facilitate analysis on the adaptive behaviours of house market facilitators (for example, see: Crowson & Wigand 1999; Sunniika & Bragge 2006). A review of these tasks, considered sequentially, has led the researcher to adopt the form advanced by Dunning et al. (2018, p.5). This sequence is: prospecting, appraisal, advertising, facilitation, and closing. Prospecting is the task of seeking houses for sale. This activity may be undertaken through company advertising or individual efforts. In Australia, an Appraisal is the act of providing advice to potential sellers of expected sale price (often referred to as ‘market’ price), possible time on market, and marketing strategies. Here the agent is attempting to secure the confidence and trust of the seller in an effort to secure the listing and act on their behalf for the transaction process. Advertising is the act of designing and writing advertisements to create feelings about a product or service, generally with the view of leading towards a financial exchange (Cramphorn 2006). In this research, advertising is contextualised to mean promoting a house for sale. Facilitation is the process of matching potential buyers to houses, undertaking physical inspections, and communicating between parties, including solicitors, when and where appropriate. Closing is the process of cultivating buyer interest through to contract with the respective seller. After contracts are executed, the agent often has some, but limited, engagement. In Australia this process known as the ‘settlement period’. This is the hiatus between the creation of contracts and the actual transfer of title from the seller to buyer after payment is made. During this time, legal representatives perform various due diligence activities to assure the integrity of the title and affiliated matters. Remuneration for the agent’s services is generally made once settlement has occurred.

2.3.2 Real estate agents as social interpreters

As marketers of housing, real estate agents must be able to understand the particularities of the marketplace in which they work. Agents are very adept at this (Bridge 2001; Levy & Lee 2011).
The socialisation element of their role is that agents engage closely with both sellers and buyers during the sales process. In so doing, agents would be exposed to beliefs and ambitions of clients within the context of their housing choices. Through this process, agents would be able to detect and interpret market changes and developments within their locality. This notion of interpretation is not new. Barresi (1968, p. 59) stated: ‘The estate agent’s role in the housing market places him in a position not only to interpret these attitudes and values, [referring to community attitudes and values about location] but also to substantially contribute to their establishment and perpetuation’. These attributes would be applied to maximise benefit to themselves (Pounds 2011) and real estate advertising can be considered a highly selective process (Gillon & Gibbs 2018). It is an agents’ ‘way of conveying’ conceptions of the house offered for sale. Advertising ‘pairs intangible narratives with tangible property and links the material with the ideological’ (Gillon & Gibbs 2018, p. 1010). For buyers, advertising is a first form of contact when developing a perception of the house. Thus, examining the composition of house advertisements created by real estate agents offers insight into how agents interpret markets.

Perkins et al. (2008, p. 2062) well demonstrated the usefulness of advertisements in this regard when investigating the meaning of intraurban place meaning, stating ‘they [advertisements] are representations of houses and which establish and reinforce recurrent themes’. With reference to marketing the concept of place, Collins and Kearns (2008) highlighted the usefulness of real estate advertisements for interpreting the deployed message in particular ways through creating mental imagery.

2.3.3 Energy efficient housing and real estate advertising
The demonstrated ability of real estate agents to interpret and respond to market nuances suggests that when market disruptions occur, such as the emergence of energy efficient housing, it is expected that agents acquaint themselves with the technologies, benefits and applicability to potential market directions (Dunning et al 2018). This does not seem to be the case; at least not to the extent one might expect. Extant research suggests there is limited understanding of house energy efficient principles among market participants, including agents (for example, see: Bond 2015; Wong et al. 2018) with the lack of suitable and useful information often cited as the reason. Such a dearth is likely to lead to limited engagement with such technologies during the marketing phase of the house sale process. From a legal perspective, Cutting, Cahoon and Hall (2012) noted that in many cases, buyers were left to
independently source house energy efficient information, and make their own judgements. Therefore, the maxim of ‘caveat emptor’ (buyer beware) is being applied in these house purchase decisions. This situation places the onus upon the buyer to source useful information about house energy efficiency performance. In this regard, buyers, and sellers, would benefit if agents were knowledgeable and engaged with energy efficient house principles.

Information begets knowledge and knowledge informs choices. As suggested above, a thorough examination of literature reveals that buyers and real estate agents exchange limited information of energy efficient technologies in the search process. This may lead to minimal levels of engagement with energy efficient technologies by agents when advertising houses for sale. In Singapore, Low, Gao and Teo (2016) noted potential householders appeared more supportive of energy efficient technologies than agents. Although the extent of support was considered moderate compared to other house attributes. This phenomenon was observed by Bevan and Lu (2013) and Wong et al. (2018). Wong et al. (2018) argued that limited information provided by agents and other professionals, such as mortgage lenders, was affecting buyers. Even if information regarding energy efficient technologies is held by agents, it seems of little importance compared to the necessity to secure a sales transaction.

When energy efficient technologies exist within a house, literature suggests there is a tendency to give it lesser, if any, emphasis relative to other house characteristics in the marketing campaign. This was notable in the case of a developer’s own in-house sales team. Bevan and Lu (2103) reported that the internal sales teams tended not to promote energy efficient technologies as they did not want to distract from other characteristics, such as location, in the marketing. Even where formal certification of house energy efficiency exists, which is not the case in Australia, other than the Australian Capital Territory (ACT), confusion over the interpretation seems to be present. Addae-Dapaah and Chieh (2011) reported that market participants were confused by different tiers of certification and that any detected premium for certifications may not be attributable to it. It appears, therefore, with regard to imbue of house energy efficiency, markets are in a state of flux, and by extension so are real estate agents.

Studies on environmental sustainability within advertisements as part of real estate sales processes are limited, and more so when specifically focussing on house energy efficient technologies. Aune (2012) conducted a review of real estate advertisements published in Sweden, Norway and UK. The author found 79% of UK and 39% of Swedish advertisements
raised energy-related issues but these were mostly absent in Norwegian advertisements. The author claimed that in the review an explicit emphasis on environment or sustainability issues, energy saving, or low energy performance, was extremely rare. Further, the author argued that as 14% of British house advertisements provided a description of energy performance standards, with some advertisements indicating the possibility for improvement, a trend of giving energy conservation and environmental issues greater emphasis in real estate sales advertisements was emerging.

Investigating the Finnish housing market, Eerikäinen and Sarasoja (2013, p. 233) found, ‘The environmentally efficient characteristics of the building are not considered to be their major selling arguments […] and thus the green marketing actions of the real estate development company were subtle and quite ineffective’. Using house advertisements as their unit of analysis, Encinas, Aguirre and Marmolejo-Duarte (2018, p. 1) made similar observations in the Chilean housing market where energy certification was non-mandated. In their case, appearances of references to energy efficient technologies was slightly more evident in higher priced houses with authors suggesting a form of consolidation within that market segment. In an interesting observation, the authors noted a decline in emphasis given to these technologies over time with energy efficient technologies ‘ceasing to be considered marks of distinction’, which is concerning for advocates of heightened awareness about more efficient housing.

It appears energy efficient technologies are not appearing extensively in house advertisements. Real estate agents and developers are choosing to focus on more traditional house characteristics when marketing and are reluctant to draw potential buyer attention away from these. However, more tangible benefits such as perceived future energy costs savings could lead to value propositions, and thus, in turn, increased market interest.

How real estate agents respond to this potential increased interest when remunerated via success fees, which is the case in the frame of this research may be influenced by impartial attitudes (Brinkmann 2009; Le & Supphellen 2017). One model that can be used to frame such investigations is the moral dilemma, or Principal-Agent theory.
2.3.4 Principal-Agent Theory

Principal-Agent theory emerged in literature in the late 1980s and has been extensively discussed. Numerous researchers have investigated applicability of this theory within varying contexts (see, for example: Eisenhardt 1989, employer/employee relationships; Bhattacharyya & Lafontaine 1995, contractual framework; Anglin & Arnott 1991, Rutherford, Springer & Yavas 2005, and Daneshvary & Clauretie 2012, real estate agency practice). The theory is considered to have emerged from the economics of organisation literature and highlights the nature of the relationship between an agent and the principal for whom they work (Menz 2015).

This model assumes that an ‘individual’s behaviour is opportunistic, self-serving and motivated by satisfying personal goals’ (Podrug, Filipovic & Milic 2010, p. 1227). The theory has broad application and posits that both parties retain a level of self-interest and asymmetric information within their formal relationship with their actions being influenced by these characteristics. This theory has application to real estate agency practice and is seen by some researchers as inherent to the industry (Munneke et al. 2015). For example, the agent has knowledge of the market that they may or may not fully share with the principal, and the seller may have knowledge of the house condition they choose to withhold from the agent. The agent attempts to augment personal gain by satisfying the principal’s objectives (in this case, selling the house), and the extent of commitment by the agent is a function of the perceived reward for meeting the principal’s objectives. In many countries the relationship between the agent and principal is defined by the contract of engagement (Johnson, Lin & Xie 2015). This is certainly the case in Australia.

Individual house owners and buyers enter the property market infrequently and are therefore largely unfamiliar with market processes (Lovell 2005). In a symmetric market, information is equal, though commonly uncertainty may still exist. However, asymmetry (including a lack of transparency) and uncertainty is characteristic of property markets (Zhu 2005; Dunning et al. 2018). It is this lack of transparency and the nature of self-interest within the Principal-Agent relationship that leads to operationalisation of the model presented in Figure 2.1.

The Principal-Agent relationship exhibits two types of asymmetric information: ‘hidden action or moral hazard’ and ‘hidden type or adverse selection’ (Anglin & Arnott 1991, p. 100). The first type refers to the reality that the principal is unable to observe the actions of the agent acting on their behalf. The second refers to the reality that the principal is unable to judge the actual skills and knowledge of the agent. The important role agents play in the property
transaction process, and the number of people who at some stage in their lives are likely to have contact with an agent, highlights the importance of this study.

Figure 2.1: Principal-Agent Problem. (Source: Adapted from Chelniciue 2019)

This model has been applied to investigate real estate agent behaviour in various scenarios. For example, Clauretie and Daneshvary (2008) found that properties sold by real estate agents sold for less than other properties as the contract between the seller and agent drew close to expiry. This suggests that agents began acting out of self-interest to secure a sale before losing the opportunity to claim a commission. Levitt and Syverson (2008) found that houses owned by agents sold for 3.7% more than those sold by agents on behalf of clients, although the time on market was slightly longer for the agent’s property. Such a finding suggests that agents use their asymmetric knowledge to their advantage. Unique knowledge that can benefit the holder is acquired in all professions and vocations. It is this knowledge that is sought when a principal engages an agent. The real question is whether or not the agent uses all, or part, of that information to maximise benefit to the principal. The extent and type of information offered to either buyer or seller is likely to significantly impact their decisions (Garmaise & Moskowitz 2003). In Australia the relationship between agent and principal is formalised by written agreement (Crowston, Sawyer & Wigand 2001).

To achieve a successful outcome, the agent, representing the seller, must also act responsibly towards the buyer with whom they are negotiating. It can then be argued that the real estate
agent’s role is a dichotomised one (Benjamin, Jud & Sirmans 2000). Agents seek to persuade sellers to entrust them with the marketing and contract negotiation of their house, thereby potentially securing a commission, while presenting themselves to potential buyers as being able to assist in sourcing and securing a new home (Barresi 1968; Arndt et al. 2013). Superficially this arrangement can be seen as a conflict of interest as many professionals, when aiming to perform complex tasks on behalf of another, explicitly act for one party. Lawyers, for example, typically adopt a singular stance representing clients and advocating on their behalf. Conversely, agency work does not typically involve the adversarial context the lawyer faces, but rather one that is commercial in nature: therefore, the parties approach the relationship with a very different mindset. This enables the agent to approach, or be approached, by buyers seeking to acquire a house and this house may be one advertised by the agent.

When considering the sales process, it is possible conceptually to partition the transaction into the listing, search, matching, negotiating, and closing phases (Turnbull & Dombrow 2007), which in some regions are managed by separate parties. However, within the Australian context, these phases are typically performed by a single agent and, in the process thereof, the agent is in a privileged position of power through the possible retention of information (Lee & Thompson 2011; Daneshvary & Clauretie 2012). Reviewing published literature about real estate brokerage (agency), Benjamin, Jud and Sirmans (2000, p. 6) observe, ‘Real estate brokerage firms exist to provide information to sellers and buyers.’ This observation positions real estate agents as key market facilitators who play an important role in promulgating information, not just about specific properties but also broader market trends. This places them in a privileged position regarding information and how it used. One source of information for the buyer is advertising.

2.3.5 Real estate advertising and rhetoric
Advertising is one of the range of duties agents do when engaged by a seller. To attract buyer enquiry, they script and publish advertisements bespoke to the house being sold. In doing so, agents use many strategies to attract buyer attention (Pounds 2011). On the other hand, buyers, when reviewing house advertisements, are being asked to read and interpret considerable information (Robertson & Doig 2010).

Advertising the house for sale is one of the core elements of a real estate marketing campaign with the aim of persuading readers to enquire. Persuasive textual forms are the essence of the
broad genre of promotional discourse of which property advertising is a subset (Beangstrom & Adendorff 2013). Pardo (2001, p. 99) defines persuasion as:

… a linguistic phenomenon (persuasion may be achieved in various ways that do not involve language) […] its communicative function is to try to convince another of something. Like any other language element, it is necessarily linked to power and therefore it always entails some degree of it.

It is through the artful form of persuasive script that the agent begins to influence the reader’s opinion of the property being advertised, with the underlying aim of securing a successful outcome. Real estate agents will develop narrative that best represents the property being offered for sale, and will write the advertisement in a manner that highlights the most significant and relevant characteristics of the property (Collins & Kearns 2008). In Victoria, as throughout Australia, agents are required to undergo accredited training to legally perform their roles as agents (Estate Agents Act 1980 (Vic) s14). The content delivered in this training is mandated by government agencies responsible for the governance of estate agency practice. This training covers legal, ethical and commercial practices, including advertising methods and requirements. Included within the Certificate IV in Property Services (Real Estate) (the advanced training program necessary to acquire a full agents licence enabling agents to own and/or manage an agency business (Estate Agents Act 1980 (Vic) s12), is an introduction of the hierarchy-of-effects (HOE) advertising model referred to as ‘AIDA’ (Attention-Interest-Desire-Action). This model of advertising is a well-established marketing paradigm (Cramphorn 2006). Fully licenced agents are legally responsible for all operational matters, including marketing material, emanating from their business (Estate Agents Act 1980 (Vic) s13a), and as they are trained in using the AIDA model, it is likely they will require employees to apply the principles of the model when scripting advertisements. The AIDA model is largely attributed to E. St. Elmo Lewis (circa 1900) and was originally posited as a sales model, which would seemingly align well with agency practice today. However, more recently this model has come under scrutiny by researchers as a result of advances in neuroscience. The AIDA model is premised upon a stimulus-response concept, and consumers (including house buyers) are rational decision makers (Reed & Ewing 2004). The appropriateness of AIDA as an effective model to stimulate purchase intention has been seriously questioned when applied to high involvement decisions (Cramphorn 2006; Reed & Ewing 2004). Although no formal definition exists, high involvement decision-making can be considered a decision that carries with it a higher risk to buyers if they fail (George & Edward 2009). High involvement decisions
are often complex and expensive, and the consequences of the decision are borne for an extended period of time. A car, a house, an insurance policy, are examples of high involvement decisions. These are items that are not purchased regularly but are important to the buyer. The mental and emotional discomfort often associated with high involvement purchase decisions is likely to cause the decision maker to shift away from the assumed behaviours of the rational person towards heightened emotional levels, which are likely to affect their decision (Christie et al. 2008). In doing so the decision maker is more prone to rely upon preconceived understandings to guide confronting decisions (George & Edward 2009). This potentially presents a challenge for agents when advertising a house for sale that exhibits energy efficient features. The AIDA model suggests the agents highlight the house characteristic(s) perceived as most important to buyers. High involvement decision models suggest people are likely to rely upon past understandings to inform choice. Therefore, unless buyers possess pre-existing personal beliefs about the benefits of emergent technologies, such as house energy efficient features, they are potentially unlikely to heed any mention of words or phrases referring to these technologies within an advertisement, unless they are framed by agents in a manner to draw their attention to them (Jansson et al. 2011). Therefore, from the agent’s perspective, a decision must be made about how energy efficient technologies are to be included in the advertisement, if at all.

In general terms it could be contended that advertising aims to reach our innermost person – emotions associated with where we live, what we feel about relationships, how we socialise and so on, are all objectives for advertisers. House advertising scripted by agents is often aimed to appeal to these elements within us (Williams, Qualls & Grier 1995) and use emotive words to construct mental images of house characteristics in the mind of reader (Pounds 2011). Studies have shown that agents manipulate linguistic patterns to achieve desirable outcomes (Beangstrom & Adendorff 2013; Perkins et al. 2008; Schollmann et al. 2000). For example, Robertson and Doig (2010) observed that agents alter language across market cycles to create a sense of urgency in buoyant markets and downplay negative sentiment in slow markets.

Real estate advertising has been a rich source of material for social scientists and has provided a useful basis from which information about housing can be observed. In many ways real estate advertisements mirror back to the observer subtle, but nonetheless distinctive, changes in society. For example, by examining the textual variances of real estate advertisements over 20 years, Rodriguez and Siret (2009) observed that housing preferences had changed in terms of the use of space and the notion of comfort. They noted, ‘Real estate ads are a compact
description of the characteristics and qualities that dwellers and real estate-agents give to a house in order to make the best sale’ (Rodriguez & Siret 2009, p. 93). Further supporting the claim that real estate advertisements provide useful and creditable information, Collins and Kearns (2008) used New Zealand real estate advertisements not to analyse trends, as in the case of Rodriguez and Siret, but to ‘identify the visual and verbal tropes deployed to sell the private property on the coast’, at a time when ‘the debates about the New Zealand coast are about public interest’ (Collins & Kearns 2008, p. 2930).

Real estate advertisements have also been used to investigate language variances over market cycles in order to appeal to contemporaneous mindset of potential house buyers (Robertson & Doig 2010). Thus, the ability of real estate advertising rhetoric and parlance to provide valuable insights into contemporary society and demonstrate that real estate agents are cognisant of societal trends has become generally acknowledged from numerous research perspectives. The development of this field of research emerged largely in recognition that, ‘Curiously, much of the academic research on housing markets (particularly that carried out by economists) assumes that estate agents are impartial disseminators of information, which of course, lies in stark contrast to their popular characterisation’ (Oates & Price 2007, p. 2). In this, the authors are referring to the common perception that agents are prone to exaggeration through using hyperbole and pathos to create positive emotions. This perception was referred to above when discussing real estate agency practice. Indeed, this practise could arguably be appropriate. After all, houses are ‘seen as an expression of our taste and as an extension of our personality. It’s a sophisticated language, but one we all understand’ (Sweet 1999, p. 15), and agents are paid to attain maximum benefit for sellers. Therefore, extensive use of pathos and hyperbole to appeal to buyers is arguably justifiable.

Aristotle’s seminal work, *Rhetoric*, cited in Rhys-Roberts (1984, p. 2155) explained that rhetoric is divided it into three categories, namely: 1) *ethos*, which relates to the personal appeal or charisma attributed to the speaker; 2) *logos*, which relates to the logic or reason within the message; and 3) *pathos*, which is the appeal based upon emotion. Regarding these categories, it is evident the estate agent can include the language of ‘logos’ (logic) and ‘pathos’ (emotion) within any real estate advertisement promoting a house, and perhaps to some extent, *ethos*. Investigating the extent of *pathos* used within real estate agent advertisements may be of considerable interest. However, what is being examined here is the extent to which *logos* is used, particularly with regard to energy efficient technologies, and how *pathos* may or may not
be used to elucidate the allure of such technologies. Doing so will reveal the extent to which agents are engaged with such technologies during the marketing process.

Effective design of advertisements has been the subject of extensive research, with physical advertisement size having an influence on readers (Pieters & Wedel 2004). Textual advertising has a bounded surface size in which it provides cues to the reader. Real estate advertisements are generally complemented with pictures and, in the case of the internet, with numerous pictures the reader can scroll through. The number of advertisements displayed with each search often generates substantial visual ‘clutter’ for the reader, creating significant competition for the advertiser (Pieters & Wedel 2004). The pictorial component of these advertisements is generally considered to be the chief element in capturing consumers’ attention (Rossiter 1981; Rossiter & Percy 1997; Singh et al. 2000), with the traditional and extensive use of pictures in real estate advertising suggesting this principle is not lost to agents. The textual element is also understood to be crucial in capturing buyer attention with the heading being vital to printed advertisements (Ogilvy 1988; Belch 2003, p. 290). Although early researchers such as Ogilvy could not have envisaged the internet, the format of typical real estate agent advertisements appears to retain the same format as its printed predecessor in that both mediums are a combination of picture, heading, and textual content.

After the picture, the heading and sub-headings have long been considered important in securing the reader’s attention (Lucas & Benson 1930; Taylor & Peterson 1972; Westphal 1997; Rayner et al. 2001). Textual semantics are also considered important with Africa (2008, p. 20) noting, ‘More than 50% of browsers who start reading it [the advertisement] stop reading it after the first two lines [of text]. Pack your knock-out punch in the first two lines’. While Africa (2008) is referring to product marketing generally, it is argued that the same principle applies to residential real estate marketing. Once the reader has been attracted by the picture and headings their interest must be secured for them to continue reading through all the text. Drawing upon this principle, it is contended here that the most important characteristics of the house will be located early within the text string of any advertisement, to provide the advertisement with the ‘knock-out punch’ suggested by Africa, giving it the greatest opportunity of success. Thus, examining how agents arrange house advertisements – that is, whether energy efficient features are located early in the script, thereby adhering to Africa’s assertion – is important to understanding the extent of engagement agents have with energy efficient technologies in the advertising process.
Through the desire of agents to appeal to buyers in a relevant manner and draw attention to the house being sold, their advertisements are useful for gaining insight into social and technological trends (Bridge 2001; Price & Oates 2008; Perkins, Thorns & Newton 2008). Thus, if energy efficient characteristics are being sought by homebuyers, references to such technologies ought to be seen in agent advertisements. Green Gurus (2011) further suggested that agents are a missing link in optimising the flow of information on energy and water efficient homes. As this investigation regards real estate agent engagement with such technologies, it is necessary to review the characteristics of these technologies, and houses that aim to use them. The focus of this discussion now turns to the specific context of this research; namely, the extent of engagement real estate agents have with energy efficient house technologies.

2.4 Energy efficient housing

2.4.1 The impact of housing upon the environment
Scientific evidence is indicating that human activity has had a profound impact upon the environment and the need to arrest further damaging behaviours is essential (Stern 2007; Garnaut 2011). Buildings, which include housing, are major contributors to environmental damage (Chwieduk 2003) and therefore justify investigation about how to best mitigate their effects upon the ecosystem. Since the release of the Bruntland Report (1987), climate change has increasingly become part of public discourse and has challenged all governments to seriously consider long-term housing issues as ‘Development possibilities are particular to each city and must be assessed within the context of its own region’ (Bruntland 1978, p. 170). Thus, when researching human geography and its relationship with energy efficient housing, it is appropriate to consider house characteristics as these will influence how agents will engage with promoting such characteristics.

Throughout the world efforts are being made to develop policy that reduces human impact on the environment, and encourages design and construction of housing capable of reducing environment impact (De Souza et al. 2015; Gibbs & O’Neill 2015; Butler, Parkhill & Luzecka 2018). Potentially housing has long lifecycles, and it is therefore important to consider its environmental impact in a multidimensional manner. A comprehensive assessment of energy consumption in housing must consider the whole building lifecycle, with this typically divided into three phases: pre-use or construction phase (embodied energy), in-use phase (operational or in-use energy) and post-use (demolition phase which may include recycling and reuse)
To create housing that is cost effective, both financially and environmentally, it is essential that design effort be given to all three recognised phases (Huberman & Pearlmutter 2008). Table 2.1 below provides an overview of the main components that must be considered when evaluating each of the three phases presented here.

Table 2.1: Energy factors

<table>
<thead>
<tr>
<th>Phases</th>
<th>Factors of Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embodied energy</td>
<td>Extraction of raw building materials</td>
</tr>
<tr>
<td></td>
<td>Energy expended energy in manufacturing of component</td>
</tr>
<tr>
<td></td>
<td>Transportation throughout processes</td>
</tr>
<tr>
<td></td>
<td>Energy expended in onsite construction</td>
</tr>
<tr>
<td>In-use energy</td>
<td>Heating/cooling</td>
</tr>
<tr>
<td></td>
<td>Lighting</td>
</tr>
<tr>
<td></td>
<td>Operation of appliances</td>
</tr>
<tr>
<td>Post-use</td>
<td>Demolition</td>
</tr>
<tr>
<td></td>
<td>Energy expended in making recovered materials for re-use</td>
</tr>
<tr>
<td></td>
<td>Transportation of waste materials to refuse centres</td>
</tr>
<tr>
<td></td>
<td>Energy expended in physical demolition</td>
</tr>
</tbody>
</table>

Source: Adapted from Huberman and Pearlmutter (2008)

The extent of embodied energy compared to the overall energy consumption of a typical house over its lifecycle is significant, and believed to be around 25% (Pullen 2000). In some cases, this consumption ratio has been quoted as high as 60% (Huberman & Pearlmutter 2008). The point to note here is that these studies have been based upon a typical building life cycle of 50 years. If building life span can be increased, the contributions of the embodied energy to the overall, while static, will reduce comparatively. This implies that efforts ought to be made to investigate ways of retaining and improving existing building stock rather than demolition and creating newer, although more energy efficient, dwellings. One effective means of doing this is retrofitting existing houses with appropriate energy efficient technologies. The technicalities of these principles may not be well understood by agents, and this research in part aims to investigate this.
The most suitable energy efficient technologies to provide maximum benefits to the occupant will largely be governed by the climate in which the property is located (Omar 2008; Kelly 2011) as cold climates provide different challenges to hot arid and humid climates. Therefore, the discussion is now focussed on the issues affecting energy efficient housing in the context of the Australian climate.

2.4.2 Climate and energy efficient housing

Houses are essential for human existence. They provide protection from the elements and a sense of security, and act as a place of social gathering for the occupants; these being the most fundamental of human needs (Maslow 1943). In many societies, housing also provides a place of identity and a display of social status, often becoming a symbol of wealth (Robertson 2013). In many developed countries, the internal area of the house has grown significantly in recent years (Clune et al. 2012). In the last 30 years the average size of the floor area of houses in Australia has increased to 243.6m² (Architecture Australia 2012; Clune, Morrissey & Moore 2012). Coinciding with this phenomenon, is the growth in number of electrical appliances within them (Ma et al. 2018). Like many parts of the world, houses in Australia generally require conditioned air to provide thermal comfort for the occupants.

The objective for designers of sustainable houses is to create a house that produces a thermally comfortable environment which has minimal, if any, reliance on external energy resources. Sustainable housing design is a meld of peoples’ desires and ambitions to create an environment in which to dwell while minimising embodied and ongoing energy consumption, thereby reducing the dwelling’s carbon footprint. One means of achieving this is to create liveable and attractive passive or ‘free running’ houses (Marszal et al. 2011; Schnieders, Feist & Rongen 2015).

Passive homes, in theory, do not draw upon external energy resources to provide a comfortable environment for the occupants (Willrath 1996; Kordjamshidi 2011). However, particularly in cold climates some, albeit minimal, energy is often required for heating. These houses are not to be confused with zero energy houses. As mentioned in Chapter 1, zero energy houses are designed to consume energy from the supply grid and return onsite-generated energy back to the grid, providing net zero consumption. In terms of energy categories these homes are by necessity reliant on electricity as gas generation is not possible in a practical sense (Marszal et al. 2011). Passive homes on the other hand are designed to harmonise with the climate in which
they are built and therefore require specialised knowledge and experience (Mihai et al. 2017). They draw upon natural energy sources such as the sun, and adopt design principles and technologies to minimise or eliminate external energy requirements (ibid). The ultimate objective of creating such designs is to provide a level of thermal comfort for the occupants while satisfying the day-to-day needs of modern living without impacting upon the environment. This is generally achieved through various design techniques such as orientation and internal configuration enhancing cross ventilation, all aimed at providing satisfactory levels of thermal comfort for the occupants (Dan et al. 2016). An elaboration of these technologies is discussed in section 2.4.4 of this chapter.

Since technologies enabling conditioned air has been available, researchers have offered numerous definitions of thermal comfort (for example, see: Fanger 1970; O’Callaghan 1978; Ihad 2002; Chappells & Shove 2004; Karmann, Schiavon & Bauman 2017). However, it is the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) definition that is emerging as the standard for researchers in this field. The ASHRAE definition of thermal comfort is one that addresses satisfaction with the thermal environment (ASHRAE 2009). As simple as it sounds, biological differences and varying metabolic rates lead to differing thermogenesis within humans. These variations cause people to experience the same thermal environment differently. It is therefore largely recognised by designers that these differences will not allow uniform satisfaction among all occupants (Attia & Carlucci 2015).

To create broader acceptance of the definition of thermal comfort, Fanger (1973) proposed a subjective criterion that thermal comfort be defined as the point where the highest possible proportion of a group of people are thermally comfortable. As a result of his research, it is now generally accepted that thermal comfort is a condition where 80-90% of the occupants feel comfortable with their thermal environment (ASHRAE 2009). The optional temperature range for thermal comfort is typically between 20°C in winter and 26°C in summer (O’Neil 2017). In terms of housing, designers use the ASHRAE standard as the guide to develop designs that maintain indoor comfort levels, and use various technologies and techniques such as building fabric and internal layout to do so. Although agents are unlikely to appreciate this technical background, it nonetheless provides a basis for the uniform interpretation of thermal comfort which occupants would invariably seek.

For a passive house to be capable of delivering expected levels of thermal comfort, considerable thought and possible compromises of the desired floor plan may be required (Dan
et al. 2016). In addition, and in recognition of local climatic conditions, potentially expensive materials and expertise and are usually necessary (Su 2011). In many cases desired outcomes are only achieved when designing and building new homes. Some researchers are claiming many designers and builders are not achieving this goal (Watts, Jentsch & James 2011; Dunkski 2009). Instead they are compromising both design and technologies, while meeting local requirements to comply with energy performance regulations, in order to retain market share and profits. In the absence of more stringent regulations this is arguably a probable scenario. It is conceivable that in their efforts to comply with regulations, designers and builders may not give regard to specific influences of the local climate upon their design. Therefore, by inference, designers and builders become reliant upon authorities to consider the effects of climate upon building design and express these effects through regulation.

The Koppen Climate Classification, developed in 1918 and based upon vegetation, classifies Australia into six climatic zones, and these are; Equatorial; Tropical; Subtropical; Desert; Grassland, and Temperate. Melbourne is located within the temperate classification. Australia’s Bureau of Metrology (BOM) has adopted Koppen’s classifications and, using modern technologies, has further refined the six categories into sub-zones, creating 27 sub-zones. For the purposes of creating better building practices the Australian Building Codes Board (ABCB) has created eight synthetic climate zones, which were derived from the Koppen Climate Classification (ABCB 2015c). Figure 2.2 provides an illustration of these climate zones. It is from these zones that Australia’s house thermal performance building codes are derived.
The climate in which the house is being built should influence the design and energy efficiency measures employed (Ren et al. 2011; Saman 2013). For example, a house designed and built in Melbourne, with an average of 10 days annually in excess of 35°C (Australian Bureau of Meteorology 2018), will have a focus on heating rather than cooling. While a house in Brisbane (Climate Zone 2 – Warm humid summer, mild winter) will have ventilation and cooling measures as its emphasis. However, the scientific evidence emerging from climatologists suggests weather patterns are changing (Clinton et al. 2018). As housing stock remains in situ for many years, this raises the issue of designing for weather patterns not yet experienced. How much of this is understood by agents is generally unknown.

The relevance to this research of climate zones, and its relationship with the built form, is discussed in greater detail in Chapter 4, section 4.3.3.2. It is introduced here to demonstrate the complexities that confront agents when marketing such housing.

2.4.3 Existing Housing Stock and Energy Efficiency

Studies investigating retrofitting technological interventions into existent housing generally examine the performance of the intervention and its contribution to energy conservation within the house. Bernier, Fenner and Ainger (2010) conducted an extensive assessment of UK housing stock to examine the merits of retrofitting to meet the UK government’s targeted Green House Gas (GHG) reduction objectives. This examination utilised six housing styles typically
found across the UK using a building energy efficiency rating system. Bernier (2010) claimed that existing star rating systems were not suitable for accurately assessing existing homes. Such inadequacies have the potential to undermine fledgling market confidence in performance and creditability of these technologies, with Bernier noting there was a market failure concerning the introduction of energy efficient measures.

Such barriers have the potential to inhibit housing markets from engaging with important technologies and therefore disincentivise engagement from market facilitators. Similar findings have been found in other independent research (Pilkington, Roach & Perkins 2011; Rehdanz 2006; Thomsen & Flier 2009).

Many global cities have been established for centuries and are therefore likely to have significant housing stock built prior to the concerns of climate change. Melbourne, Victoria’s capital city, had its beginnings in 1835 and was first recognised as Victoria’s capital in 1851 when the new state of Victoria was separated from New South Wales (City of Melbourne 2014). The city is now surrounded by an extensive geographical expanse accommodating a network of suburbs that have been expanding, at times rapidly, since the city’s establishment. At the time of this research, greater Melbourne was home to around 4.17 million people, with approximately 36.7% of these being born overseas, giving it a diverse cultural composition (ABS 2011), and has experienced considerable population growth in recent years. As a result of this growth, the city now has some 2.2 million houses, and around 86% of these were built before 2005 (ABS 2010) when house energy efficient standards were introduced (Environment Victoria 2018). This housing composition makes Melbourne a city that has many similar characteristics to other developed cities around the world.

Demand for housing has caused considerable concern to governments and has led to significant demand for affordable housing (Verrrender 2018). To address affordability issues, infilling established urban environs with micro-houses have been seen in some areas as a possible solution (Armitage, Khanjanasthiti & Chand 2017). Such housing is also particularly energy efficient but requires significant change in the traditional mindset of what constitutes ‘housing’ (ibid). In an effort to meet this demand a series of Victorian state governments have sought to release large tracts of land in Melbourne’s west, and have addressed planning barriers that previously acted to restrict medium rise housing in established suburbs. Figure 2.3 provides detail of Melbourne’s designated expansion of residential boundaries required to accommodate
population growth. The majority of housing inside these boundaries has been built prior to 2005 and not built with any regard to energy efficiency performance standards.

Houses built in Victoria since 2005 are required to have minimum energy efficiency performance standard of 6 stars in order to reduce energy consumption, thereby reducing carbon emissions (VBA 2017). This standard initially commenced with 4 stars and has been progressively increased (ibid). Houses built prior to 2005 typically possess an energy performance rating less than 2 stars (VBA 2018b), and therefore are more likely to use greater amounts of energy for heating and cooling resulting in greater environmental impact due to carbon emissions. In terms of this study, it is these houses that may have been subject to retrofit of energy efficient technologies and which agents are likely to be promoting.

Australian households generate approximately 20% of Australia’s greenhouse gases and this equates to around 18 tonnes of emissions per household per year (EPA 2014). Figure 2.4 provides a breakdown of typical household energy use in Australia. It can be seen from this chart that heating and cooling, together with refrigeration, accounts for around 32% of emissions. Refrigeration is singled out here, as a poorly insulated house will cause domestic refrigerators and freezers to cycle on more regularly on hotter days than a better-insulated house. Poorly located and designed hot water services exhibit similar inefficient performance on colder days. In Victoria, housing is collectively responsible for around 17.5% of greenhouse gas emissions (GWA 2008), and therefore has a significant impact upon the environment. This harmful ecological footprint presents society and government with a significant problem made worse by the fact that Victoria’s major electrical energy source is brown coal. Brown coal is
considered a ‘dirty’ fuel for energy generation but yet it is used to produce 96% of Victoria’s energy supply (ibid). It is these realities that drive this dissertation towards considering how residential real estate markets, and specifically real estate agents, are responding to the need for more environmentally responsive housing. To better appreciate the nuances between conventional and energy efficient housing, it is also necessary to understand how energy efficient housing relates to climates.

Figure 2.4: Australian household greenhouse emissions
(Source: Your Home, 5th Ed, 2013)

2.4.4 Relationship between house design and climate
When discussing house energy efficient technologies, it is also necessary to highlight the importance of the relationship between these technologies and the environment in which they are intended to work. With climate change altering weather patterns across the globe, energy efficient house designs are increasingly important. Investigating the impact of climate change upon design performance and energy consumption of existing Australian houses in differing climate zones, Wang, Chen and Ren (2010) asserted that current energy consumption levels would vary significantly as a result of the changing weather patterns. Climate zones considered ranged from cool temperate to hot humid, which included Hobart and Melbourne through to northern regions like Darwin. Using computer simulations to model predicted temperature increases, and examining houses with energy efficiency ratings from 2 Star through to 7 Stars, Wang, Chen and Ren (2010) determined that heating and cooling energy requirements for existing stock will increase most for houses in warmer climates and current 5-7 Star rated houses are likely to become less efficient as the climate warms. Houses in cooler climates zones such as Melbourne, while changing slightly in terms of efficiency, are less affected. This is due to the fact that heating requirements are more frequent than cooling and as temperatures
increase this will trend towards a net balance. This unique research is one of the few to review existing housing stock and is important to consider here as it is this housing stock that agents will be commissioned to sell at some point. The long, often multi-generational, lifecycle of housing will mean designers will need to consider climate changes more closely in their designs if long-term reductions are to be met, and these designs will have to meet changing societal expectations and trends. This, and the following discussion, is provided here to illustrate the issues relating to energy efficient housing to highlight the understanding real estate agents ought to possess to comprehend the issues surrounding this form of housing. Thus, prevailing agent perceptions and engagement are important to understand.

Designing houses to perform to desired energy efficiency standards is only part of the requirement to gain effective reductions in GHG emissions, the other component being in-use activity. Using the lead author’s own home as a case study, Miller and Buys (2012, p. 232) custom-designed the house, ‘With an overall goal of environmental, social and economic sustainability’, and by using an integrated whole-building approach, ‘four key energy goals were... minimising embodied energy, maximising the thermal performance of the building envelope, minimising energy demand and optimising performance of energy and water supply systems’. Among the numerous observations made, the authors noted the occupants needed to apply a systems approach to realise the houses’ design capabilities. It was suggested that an operations manual is necessary highlighting the complexity of the system integration. There are two aspects of this outcome that are of concern in this research. The first, that the occupants needed to understand how to maximise the technologies within the house to ensure desired energy reductions were achieved. Second, if the property were offered for sale, would the agents understand how to best promote such a home? In Australia current formal training programs do not provide technical training within licencing courses for house energy efficient technologies (Training.gov.au 2011), and it is likely therefore agents would be wary of making performance claims to these to buyers.

How houses perform thermally, the importance of design, the impact of occupant behaviours, and the performance standards of retrofit technologies, all have direct impact on three key market participants. First, for buyers, as these factors are likely to be integrated into the decision process for buyers. Second, for sellers, as they will be expecting economic return for capital invested on technological innovations. Third, for agents, as they will be the intermediaries in the sales process promoting the house to the broader market. As the vast
proportion of housing worldwide and in Australia is considered older stock (Centre for International Economics 2010), the subject of retrofitting must be examined.

2.4.5 Technological options for energy efficient housing
As this research investigated how real estate agents engage with energy efficient technologies, it was necessary to review the literature of the various technologies typically available to house owners. These are initially reviewed generally, then with more specific detail.

Specific technologies available for housing range from simple, inexpensive measures such as weather strips, and draft seals placed around windows and doorways, to elaborate and expensive energy management systems. Choosing which measures are most appropriate for a specific house is often done by trained professionals and generally requires more than one specific technology to be effective (Willrath & Logic 1997; Bernier, Fenner & Ainger 2010; Motuzienë et al. 2016). Table 2.2 below provides a list of the most common technologies readily available that may be either installed during the build phase or retrofitted.

Table 2.2: Common house energy efficient technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Relative cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double/triple glazing</td>
<td>High</td>
</tr>
<tr>
<td>Window thermal film</td>
<td>Low (significant product performance variation)</td>
</tr>
<tr>
<td>Insulation</td>
<td>Medium</td>
</tr>
<tr>
<td>Energy efficient lighting</td>
<td>Low (high capital outlay compared to conventional lighting options)</td>
</tr>
<tr>
<td>Photo Voltaic cells</td>
<td>Relatively high (costs per square metre of panel trending downwards)</td>
</tr>
<tr>
<td>Solar hot water system</td>
<td>Relatively high</td>
</tr>
<tr>
<td>House automation</td>
<td>High</td>
</tr>
<tr>
<td>House orientation</td>
<td>Minimal – allotment must lend itself to such configuration</td>
</tr>
</tbody>
</table>

(Source: Adapted from Your Home, 5th Ed, 2013.)

Selection of appropriate measures to include in a house will often depend on the extent of capital available and the perceived contribution to overall energy savings (Amstalden et al.
2007; Judson & Maller 2014). The time taken to recover the capital outlay is generally not lost on house owners and often becomes a barrier to its installation (Kastner & Stern 2015).

Installed energy efficient measures are aimed at reducing ongoing energy costs. However, studies have varied in terms of expected performance and generally note that occupant behaviour plays a significant role in energy reduction outcomes (for example, see: McLeod & Fay 2010; Pilkington, Roach & Perkins 2011; Morrissey et al. 2013; Akter, Mahmud & Oo 2017). These performance expectations, and the extent of impact of occupant behaviour, are unlikely to be understood by agents and, as mentioned in Section 2.3.3, they are acquired through training and expertise developed in the field. A brief discussion of common technologies sometimes found in Australian housing is now presented.

2.4.6 Environmentally sustainable technologies in the housing sector

Due to the disparate nature of climate zones, Australian housing exhibits a range of house energy efficient technologies and as this research concerns real estate agent perceptions and engagement with such technologies, it is not appropriate to provide extensive technical descriptions. Rather they are mentioned here because it is these technologies that agents may confront in their day-to-day work, and therefore their perceptions are considered important. Technologies encountered by agents may be incorporated into the initial house design whereas others may be retrofitted to existing houses. They include both energy efficiency and water efficient fixtures such as photovoltaic and solar hot water systems, rainwater tanks, grey (shower and laundry) water recycling, green roofs (Crabtree & Hes 2009), window glazing, insulation, and heat pumps (Hee et al 2015). Each is now briefly reviewed to provide context.

2.4.6.1 Green roofs

Among the environmental sustainability technologies implemented in the housing sector in Australia is roof garden technology. Green roofs are generally roofs and podiums with vegetation growing in specifically designated substrate that either fully or partly covers the roof of a building (Williams, Rayner & Raynor 2010; Wilkinson & Dixon 2016). There are two main types: intensive and extensive. Whereas intensive green roofs involve having a deeper substrate layer to allow deeper rooting plants (shrubs and trees), the extensive green roofs have a thin substrate layer with low level planting such as lawns (Castleton et al. 2010).
More recently, green roofs are sometimes made as part of the design of newly constructed apartments in Australia due to the numerous benefits.

There are significant benefits for the environment in implementing green roof technology, both at individual property and community wide levels. This includes increasing the roof life span (Kosareo & Ries 2007; Teemusk & Mander 2009). The increased life span of the roof reduces depletion of the environment that would have otherwise occurred through required materials to replace the roof. Also, green roofs insulate properties and improve energy efficiency via reducing the need for air conditioning for cooling during summer and heating in winter (Sailor 2008). The effect of this is a reduction in energy consumption to reduce the emission of greenhouse gases, leading to a reduction in the carbon footprint on the environment. Moreover, the green roofs also serve as a carbon dioxide sequester by absorbing carbon from the environment (Getter et al. 2009). As a garden, green roofs can enhance the environment by providing a biodiversity habitat for certain living organisms and decrease urban heat island effect via cooling because of increased evapotranspiration and reduction of energy use and carbon dioxide emissions (Alexandri & Jones 2008). Very few, if any, houses in the research frame are expected to exhibit green roofs but are mentioned here for thoroughness as they are a recognised energy efficient technology.

2.4.6.3 Lighting (LED and CFL)

Another environmentally sustainable technique used in the Australian housing sector is energy efficient lighting, in particular LEDs. Using fossil fuel for producing electrical energy is one of the most intensive sources of greenhouse gases (Aries & Newsham 2008). Because of its potential to reduce emissions, the Australian government introduced an initiative to encouraging conversion to LED and CFL bulbs in all homes, phasing out incandescent bulbs (Energy Rating 2016).

2.4.6.4 Solar hot water heating systems

Water heating accounts for about 21% of energy use in Australian homes and it is responsible for about 23% of greenhouse gas emissions (Department of Climate Change and Energy Efficiency 2010). It represents one of the main areas in Australian housing where energy efficiency can be achieved. Changing the energy production systems has significant impact on emission reduction and environmental sustainability.
One technique to achieve this is the use of solar hot water systems using renewable energy sources, thus reducing, or eliminating, reliance on fossil fuels. Currently, there are different types of solar hot water heating systems/heat pumps commercially available, including thermosiphon, direct circulation, indirect circulation, and air water solar thermal systems (Alam & Theos 2008), with most being the conventional flat plate thermosiphon system (Lovegrove & Dennis 2006).

The significance of employing solar hot water systems in Australian the housing sector is argued by Crawford and Treloar (2004) to substantially reduce the need for fossil fuels. Similarly, significant reduction in energy consumption from national grids is achieved through these domestic solar hot water systems (Alam & Theos 2008).

2.4.6.5 Rainwater tanks

Although not generally considered an energy efficient technology, domestic water efficiency is among the sustainability initiatives aimed at protecting the environment and must therefore be considered within the context of this thesis. Australia is a dry continent and water conservation is important. One technique to reduce reliance on public supply is the use of household rainwater tanks to harvest rainwater (Fewkes 2012). Rainwater harvesting using tanks involves collecting rainfall from the roof of a building that is subsequently used for the non-potable applications of water in a household, such as flushing the water closet, watering gardens and laundry (Umapathi, Chong & Sharma 2013). Australia government policy for rebates on rainwater harvesting systems has seen a large number of urban households installing rainwater tanks (Huston et al. 2012). As a result, the number of households using rainwater tanks is on the ascendancy. For example, as at March 2013, 34% of Australian households living in a dwelling suitable for a rainwater tank had a rainwater tank, as compared with 32% in 2010, and in South Australia, the statistics points to a further increase up to 86% of households (Australian Bureau of Statistics 2013).

The significance of implementing rainwater harvesting is based on the concept of ecologically sustainable design where rainwater harvesting plays the role of either serving as a substitute or a complement to the reticulated urban water supply system (Mitchell 2003), thereby reducing demand for water which a saving for the environment. Further, it also reduces the volume of stormwater discharge and reduces peak runoff rates (Coombes et al. 2002). Moreover, rainwater harvesting provides onsite retention of water, bringing the water source closer to the end user (Eroksuz & Rahman 2010). Tam, Tam and Zeng (2010) investigated the cost
effectiveness of using rainwater tanks for Australian residences, using a case study of seven cities. The study found rain harvesting was an economical option for households in Gold Coast, Brisbane and Sydney, less so in Victoria (Tam, Tam & Zeng 2010). The increased prevalence of such technologies in Australian housing means agents will also need to be cognisant of their capabilities and benefits.

2.4.6.6 Solar panels (PV installations)

Solar photovoltaic (PV) panels is a popular environmental technology choice in the housing sector in Australia (Moss, Coram & Blashki 2014). Even though PV technology has seen many applications in different areas, including the large-scale solar projects by electricity companies and commercial entities, the focus in this study is limited to the application of solar PV panels in private residences by households in Australia. PV panels on the roofs of homes capture the sun’s energy to generate electricity cleanly and quietly (Kuwahata & Monroy 2011). Photovoltaic technology has developed quickly and reached a point where it is now possible to produce the total energy needs of a typical house (Branker, Pathak & Pearce 2011), although some system inefficiencies are yet to be resolved (Kabir et al. 2018). Apart from rooftop solar panels, some households have attached PV panels to walls for the same purpose or integrated them into the building design.

In the longer term, solar PV panels used for generating energy for households has many prospects because the majority of existing and new houses can support PV arrays to defray their own energy use with little infrastructure change (Watt, Passey & MacGill 2006). Statistics indicate PV has become increasingly popular in recent years, with 2.4GW installed in Australia by 2012, and 2.3GW of that installed by 10% of households (APVA 2013) Additionally, the market for rooftop systems on private residences has become the number one market segment for PV applications in Australia (Egan & Johnson 2017).

In summary, solar electrical generation is an environmentally friendly source of energy relative to the other sources of energy. Invariably, solar PV panels are central to any serious sustainable environmental development, including housing (Solangi et al. 2011). Onsite energy generation is environmentally friendly, limits the need for electricity transmission lines, and saves the requirement for electrical infrastructure, further reducing demand for raw materials (ibid). Solar battery storage is also gaining popularity (Solar Choice 2018). However, in Australia this technology has not yet reached optimum economic viability (ibid) and this reflected in correspondingly low installation rates. Such technology is very likely to gain prominence over
time. Probably due to the infancy, no research has been undertaken to ascertain real estate agent perceptions of this technology.

2.4.6.7 Passive design
Passive design is a means of achieving environmental sustainability in housing. In designing an environmentally sustainable house, it is important to consider a ‘package of features’ that work optimally together to provide thermal comfort (Chiras 2002). One strategy implemented by governments has been to regulate the thermal performance of the building envelope as a whole, providing thermal comfort to inhabitants as conditioned air typically consumes more energy than any other household service (Miller, Buys & Bell 2012). Space heating and cooling in Australian houses is estimated to account for about 40% of energy consumption in households (Law et al. 2014). Thus, energy efficiency technologies adopted in passive design can reduce energy consumption.

Several passive design techniques are used to achieve environmentally sustainable housing in Australia. This includes designing for climate, building orientation, shading, passive solar heating and cooling, glazing, skylights, and wall and roof insulation (Lyon 2013, p. 87). Peterkin (2009) suggested that winter heating loads are substantially reduced in passive solar designed houses through proper solar orientation, with shading another strategy often used for summer cooling (Lyon 2013, p. 88).

Windows are integral to buildings and can be important to energy consumption depending upon how they are designed and integrated into the house. The main purpose of windows is the transmission of natural light and fresh air into a house. In Australia, up to 40% of a house’s heat energy can be lost, and up to 87% of its heat gained, through windows (Lyon 2013, p. 189). As a result, window glazing, including skylights, represents a critical feature of the building envelope for achieving better thermal performance.

The significance of implementing passive design techniques in houses is that it achieves an overall effect of a consistently pleasant indoor environment and a home with minimal dependence on supplemental energy, air conditioners for cooling, and furnaces for heating (Chiras 2002). Passive houses require effort to understand how they perform and how occupants need to behave within them to maximise their utility (Green et al. 2012), and also represents a potential challenge for agents.
2.4.7 Barriers to energy efficient technology uptake

Within this research existing detached housing stock is considered. Acknowledging much of this stock was built prior to any energy performance regulations, it is appropriate to review barriers to retrofitting houses with energy efficient measures. This is important, because the extent of installation of house energy efficient technologies will clearly influence the promotion of such technologies. These barriers are also discussed in relevance to their broader categories later in this chapter, but are presented here more succinctly as it is useful to have such an appreciation at this point of the discussion.

Pellegrini-Masini et al. (2010) argue the installation of post-construction energy efficient measures must be economically viable for house owners to be encouraged to outlay capital funds. Viability is often measured in terms of house owners’ ability to recover capital expenditure during occupation, so obtaining future benefits through reduced energy bills (Achtnicht & Madlener 2014). However, if house owners anticipate moving, they may be reluctant to outlay capital for such technologies. Households in Australia are relatively mobile with only 27% living in their current home for more than 15 years (Australian Social Trends 2010). This phenomenon is likely to reduce the opportunity to gain an economic advantage from investing in energy efficient measures, thus impeding investment unless there is an expectation of uplift in transfer price if sold. This potential is discussed further in Section 2.5.1. Pellegrini-Masini’s (2010) research cited above, did not specifically consider demographic influences and how these may affect decisions in regard to technological investment. However, other literature has demonstrated wealth and life stage influence attitudes and choices regarding environmental concerns (for example, see: Organ et al. 2013; Ramos et al. 2016; Prete et al. 2017). As households seek financial viability as part of their decision to retrofit houses with energy efficient technologies, it is therefore considered likely that an anticipated relocation would impede the purchase of energy saving technologies.

Distilling the literature shows that older people entering retirement are more inclined to invest in energy saving devices for financial benefits rather than fulfilling altruistic objectives, while for younger people it is the reverse. Irrespective of the motives, the decision to install energy efficient technologies is expected to produce future benefits.

Knowing which measure, or measures, will provide maximum benefit is also important to improving house energy efficiency (Willrath & Logic 1997; Ren et al. 2011). Without professional help, this can be daunting and potentially may cause inaction by owners rather...
than incorrectly allocating funds to ineffective technologies. Some argue government support and education programs could contribute to alleviating this possibility (Mlecnik et al. 2010; Hepburn 2010). The ‘Pink batts’ scheme instigated by the Australian government as a post-Global Financial Crisis measure (ANAO 2010) could be considered an example of Mlecnik’s assertion. Bond (2011) found that indifference or laziness was also a barrier to retrofitting energy efficient technologies, with the author noting time taken to research suitable technologies and ‘busy lifestyles’ were significant in people’s decisions.

A third factor and potential barrier that must be considered in this context is the market facilitator, namely the real estate agent. This cohort must be able to sense a market appetite for energy efficient technologies if they are to promote them in advertisements and the sales process. Energy features are likely to be overshadowed by more traditional house characteristics, such as location, in terms of emphasis given by the agent (Wong et al. 2018). If knowledge of house energy efficient technologies is limited, and if the agent does not understand the benefits to occupants, they may not make appropriate references in advertisements as they are likely to be reticent to make claims they find difficult to substantiate (ibid). Inability or reluctance on the part of agents to positively promote house energy efficient characteristics could act as an impediment to market acceptance of energy efficient technologies due to a lack of information for buyers (Cutting et al. 2012). Such an attitude could result from success fee-based remuneration, which is the case in Australia. Agents will logically be inclined to focus their attention and activities in a manner that leads to successful outcomes (Dunning et al. 2018).

2.4.8 Economic perspectives and market failures

In reviewing real estate agent engagement with energy efficient housing, this thesis critically examines literature focussed on economics and market acceptance of environmental change and innovations. Neo-classical economic theory posits that competition between actors is the invisible potency of market dynamics that, through competitive practices, creates efficiencies between supply and demand, thereby lessening the necessity for direct intervention by governments (Gowdy 2009; Sloman et al. 2010). The role of government is still nonetheless subject to debate in terms of the extent and type of regulation it ought to exert (Hepburn 2010). For example, governments may opt not to regulate energy performance standards in housing but rather choose to create frameworks encouraging innovation in technologies and markets (Geels 2012).
Economic theory aims to understand consumer behaviours and choice while considering rational choice outcomes. Rational choice is ‘a maximisation process’ generally within an environment of limited resource and opportunities (Tversky & Kahneman 1986, p. 251). In other words, it is the process whereby consumers weigh up costs and benefits to maximise outcomes (Vatn 2005). Much of the research relating to this economic theory has been associated with choices concerning traditional goods and services, and in more recent times how consumers are integrating environmental impacts into their selections (Atkinson & Mourato 2008). The inclusion of environmental matters within consumer choices makes the selection process inherently more complex than it has been in the past (Peattie 2001).

How otherwise rational consumers reject, or fail to incorporate, environmental considerations into their decisions is the focus of ongoing research within various disciplines (Jaffe & Stavins 1992; Anthoff & Hahn 2010). Lack of market response to environmental imperatives could be seen as a market failure. Market failure is an economic phenomenon occurring usually as a result of impacting externalities (Gerarden et al. 2015). In the context of the environment, market failure may be defined as existing ‘when resources do not attain their social value’ (Hanely et al. 2013, p. 15). Failure may occur as a result of incomplete information, incorrect or inappropriate government policy, or lack of government policy, any of which often results in wasted opportunity. (Anthoff & Hahn 2010; Dodgson 2011).

The failure of markets to embrace corrective measures to climate change has been described as one of the greatest market failures in modern history (Stern 2007; Garnaut 2008; Cato 2011). This failure has resulted in consumers being unable to place a price upon the environmental and/or social cost of carbon emissions in order to attain structural market change (Morrissey, et al. 2013). Supporting this view, Scorse (2010, p. 10) asserted:

If we lived in a world where prices fully captured environmental costs, our entire economies would look vastly different: we would have different modes of transport, different layouts for our cities and towns, different dietary habits, and consumer goods would likely contain much less toxic material. Prices of environmentally harmful goods would rise and much more R&D would go into alternatives, thereby decreasing their price. In such a world society’s resources would be invested in those things which bring the greatest social value.
Advocates of neo-classical economies consider that markets best deal with market failures and environmental markets are no exception (Scorse 2010; Cato 2011). This paradigm conflicts with environmentalists who advocate that, whatever the cause of the market failure, once acknowledged, government intervention is necessary (Smith, Voß & Grin 2010; van den Bergh et al. 2011). Theories proposing ‘greener’ economic structures are argued to denote more inclusive strategies that would lead to greater environmental outcomes for society and the environment. These theoretical economies would function within the environmental and social boundaries. Figure 2.5 diagrammatically represents such an economy and its relationship to society and the environment.

Figure 2.5: Rethinking the relationship between the economy, the environment, and society (Source: Cato 2011, p. 89).

Real estate agents work within this setting of debate about fundamental change to market structures and how best to understand new market structures.

2.5 Policy framework of energy efficient housing in Australia

2.5.1 The impact of government policies and regulations (environmental) on housing in Australia

Notwithstanding the current view of the Australian government to allow natural market forces to drive change towards energy efficient housing, several policies have been implemented to encourage uptake of energy efficient technologies by house owners. For example, in Victoria, similar to all Australian states, policies for minimum house energy performance standards have
been introduced (VBA 2018a) for new house builds and substantial extensions. These standards are measured using the National House Energy Rating Scheme (NatHERS), which has a 10-Star scale. This scale has been enshrined in the national building codes throughout Australia (NatHERS 2019, p.1). Besides these regulatory build requirements, the Victorian government has also initiated and implemented several funding policies to boost the uptake and diffusion of sustainable technologies to existing houses; for example, solar hot water rebates for qualifying households (Solar Victoria 2019).

However, there is currently no policy, either in Victoria or nationally, mandating retrofitting energy efficient technologies to existing houses, or disclosure of house energy efficient performance at or prior to sale.

2.5.2 Key issues affecting implementation of environmental sustainability policies in housing in Australia

Even though environmental sustainability has become prominent in the building sector, uptake of the techniques and implementation has been challenging. Several factors are considered responsible for the low uptake of environmental sustainability, including the upfront costs associated with incorporating sustainability features in a house (Morrissey & Horne 2011). For example, the cost of installing PV panels in a house can be prohibitive, leading to unaffordability issues for house buyers. This issue is not new. A survey conducted by the ABS in 2006 found that adoption of environmentally friendly behaviours is greatest where it is convenient and does not require large investments of time or money (ABS 2006). More recently, Fielding et al. (2010) also found convenience important in adoption of positive environmental behaviours. Bond (2011) examined the reasons why Australians were not acting on installing certain energy efficiency features in their buildings, such as replacing single flush toilets with water-saving dual systems, double glazing to windows, and others. The prominent reason for inaction was found to be the cost associated with installing environmental sustainability features. Yang and Zou (2013) ranked factors that hinder uptake of environmental sustainability in the housing sector in Australia and found construction cost to be the most important consideration. Thus, cost is an important consideration in environmental sustainability decision making by households, and due to the high upfront cost of installing environmentally sustainable technologies, households are not motivated to take action. There is uncertainty over the nature of these costs. Both capital and operational costs have contributed to the barriers in implementing regulation for higher thermal performance standards for residential building envelopes in Australia (Dalton, Horne & Wakefield 2007). Increased
government subsidies are believed to assist in reducing the effects of such barriers, but development and introduction of such policies in Australia is considered slow by international standards (Berry & Marker 2015).

Furthermore, while there remains scope for upgrading residential building energy efficiency standards, specifically for the thermal performance of new and existing housing stock to reduce energy consumption, the policy debate has been impeded by a lack of empirical investigation and evidence to support the benefits associated with energy efficiency investments (Horne & Hayles 2008; Reed, Wilkinson & Warren-Myers 2011). There is limited data available to justify investments in energy efficiency and its impact (Reed, Wilkinson & Warren-Myers 2011). This makes it very difficult for owners and tenants to adopt energy efficient initiatives in the housing sector, particularly for existing buildings.

There is generally poor knowledge about sustainability and what it entails (Mills & Schleich 2012; Blum et al. 2018), making it difficult for consumers to appreciate the benefits of environmental sustainability. Wu et al. (2016) also argued that energy efficiency is suffering from an information problem and is less understood by consumers. This is especially important at the point of purchasing a property or signing a lease agreement with a landlord. If sustainability features are not communicated, value may not be placed on the derived benefits. Encouraging consumers to be energy efficient requires significant effort in education and training to understand the need for energy efficiency measures and their importance. It is not surprising that without this information and education, uptake of energy efficiency in the housing sector has generally been slow. This view is supported by Bond (2011) who assessed the knowledge of consumers and their willingness to install energy efficiency features in their buildings, stating low uptake is due to the unawareness of consumers/respondents about energy efficiency, even in cases when government rebates (funding) are available for installing environmental sustainability technologies in their homes. This lack of awareness and knowledge is likely to be reflected in real estate agent perceptions of these technologies.

An important objective of environmental sustainability is to have all levels of society interested in increasing energy efficiency of buildings. One of the most significant barriers for implementing energy policies is that the cost of potential energy savings, typically considered the only financial benefit, does not sufficiently motivate investments in environmental sustainability (Vringer, van Middelkoop & Hoogervorst 2016). Alongside owner-occupiers in the housing market are investors whose motives are driven primarily by financial rewards.
The lack of financial incentives encouraging adoption of energy efficiency measures in Australian housing appears to have hampered efforts to do so. Removal or amelioration of financial barriers through targeted policy would perhaps see greater engagement by all stakeholders. Lior (2011) further suggests that environmental sustainability policies would be more effective if the tangible benefits were highlighted using market forces rather than reliance on legislation alone. Adopting this view implies real estate agents can play a significant role in influencing house markets in this regard.

This discussion now proceeds to explore the impact of environmental sustainability features on house prices.

2.6 The relationship between energy efficient technologies and house transfer prices - A closer examination

The relationship between energy performance/efficiency and residential property values in housing markets has been a topic of increasing interest, with numerous researchers providing unique perspectives (for example, see: Fuerst & McAllister 2011; Aroul & Hansz 2012; Cerin, Hassel & Semenova 2014; Ferlan, Bastic & Psunder 2017). Studies examining the relationship between energy efficiency and house prices have generally applied hedonic price modelling. Reviewing hedonic price modelling studies conducted in the US from 1973-2001, Laquatra et al. (2002) revealed empirical studies provided evidence to support the argument that house energy efficiency improvements were capitalised into values to some degree. However, Laquatra et al. noted weaknesses in the reviewed studies making it impossible to draw reliable conclusions about the magnitude of capitalisation in property market environments. Thus, the exact quantum of profit derived from energy efficiency was difficult to determine in order to do a comparative analysis with the marginal cost associated with environmental sustainability in housing. Banfi et al. (2008) also studied the willingness of consumers to pay for environmental sustainability features in Swiss residential dwellings. Using two main environmental sustainability measures of ventilation systems and insulation of windows, the authors found that benefits of the energy-saving attributes of environmental sustainability were significantly valued by consumers. These benefits included individual energy savings, environmental benefits, and comfort benefits (thermal comfort, air quality, and noise protection).

Using hedonic modelling, Brounen and Kok (2011) investigated the impact of energy performance certificates on the price of dwellings. The authors used a sample size of 32,000
houses and found a price premium up to 15 percent in the selling price for energy-efficient homes in the Dutch housing market, suggesting such technologies are valued by buyers. In the UK, Fuerst et al. (2013) investigated the relationship between energy performance and house prices for 325,950 residential property sales. The authors found a positive relationship between energy rating and dwelling price (log price per square metre). Their suggestion was that price difference increases with Energy Performance Certificate (EPC) ratings, and that the price effect of superior energy performance is generally higher for terraced dwellings and flats, as opposed to detached and semi-detached dwellings. Regional variations and relative effects of energy performance on property values were also found by the same authors. However, no mention was provided of agent perspectives about the influence of various house attributes. More recent EU research revealed residential real estate agents perceived a low reliability of EPCs, citing this as a significant barrier for their successful implementation (Pascuas, Paoletti & Lollini 2017). Thus, the role of the market facilitator is increasingly being recognised as important.

With further regard to price impact of house energy efficient technologies, Högberg (2013) used hedonic modelling to examine the impact of energy performance on single-family dwelling sale prices in Sweden. The findings of the study indicated that house energy efficiency potentially has a positive effect on sale prices. The results suggested buyers place a premium on EPCs. A 1 percent decrease in energy consumption resulted in an average selling price increase of 0.044 percent. Another study investigating the relationship between energy performance of houses and sales price was conducted in Belfast, Ireland. Here, Davis et al. (2015) investigated the effects of energy efficiency on house prices using a hedonic modelling approach with 3,797 residential sales transactions. Again, their results suggested a positive relationship between house energy performance and selling prices (Davis et al. 2015). Fuerst et al. (2016) studied the effect of EPC ratings on residential prices in Wales using a sample size of approximately 192,000 sales transactions. They found statistically significant positive price premiums for dwellings in EPC bands A/B (12.8%) and C (3.5%) compared to houses in band D. For dwellings in band E (−3.6%) and F (−6.5%) statistically significant discounts were determined. The A to E coding reflects relative energy performance of the houses with A being a high performing house. The authors further found, after an analysis of the private rental segment, that in contrast to the general market belief, low-EPC rated dwellings were not traded at a significant discount. These aforementioned studies have focused on non-Australian property markets. Most Australian property markets do not require energy performance disclosure.
Studies on relationship between energy performance and sale prices of houses within the Australian context have been scarce. However, Berry, Marker and Chevalier (2008) examined the relationship between the energy efficiency rating and house price using data from the Australian Capital Territory (ACT). The study sought to find if higher energy performance ratings lead to higher sale prices. Since information is important in the decision-making process of buyers when pricing residential buildings, the study examined the knowledge of consumers obtained from disclosure of energy performance of buildings (efficiency rating), and determined how much a buyer was willing to pay for a property compared to alternative assets. The study found a statistically significant relationship between energy efficiency rating and house price, though evidence of a non-linear relationship was detected with the marginal price declining as energy rating increases. Further studies conducted in the ACT by Fuerst & Warren-Myers (2018) also found mandated energy performance disclosure influences sale price. Thus, apart from other usual house factors (such as location, size, view), a house with a higher energy efficiency rating is likely to command a higher price in the market during a transaction. It is reasonable to assume agents would be aware of this. However, as mentioned, Australian states do not mandate energy performance disclosure and therefore the influence of enhanced performance is less clear.

Other researchers have also examined the relationship between house energy performance and rental price of dwellings. Feige, Mcallister and Wallbaum (2013) used a sample size of approximately 2500 residential building units in Switzerland to assess the effects of buildings’ sustainability on their rental prices. The study found that overall there was a positive relationship between the environmental performance of residential buildings and their rental levels. In-depth analysis showed that sustainable building characteristics, especially those which enhanced water efficiency, health and comfort levels, and building safety and security, had significant positive effects on rental price. However, there was an unexpected negative relationship between energy performance and rental price levels. The authors suggested this was because energy costs and rents in Swiss lease structures are bundled together. Similarly, Michelsen and Kholodilin (2015) investigated the residential rental market in Berlin and found that energy efficiency savings are generally capitalised into both prices and rents, and that investors are able to anticipate energy and house price movements. However, the authors noted their findings suggested landlords valued energy efficient housing less so than owner-occupiers, probably due to the direct benefits gained for owner-occupiers. This has implications for this research in that agents engage with both potential investors and owner-occupiers.
Apart from the impact of energy performance on property prices and rent, there is also an impact on demand for energy efficient buildings. Davis et al. (2015) argued obligatory measurement of energy efficiency performance in private dwellings encourages improvement in energy performance, and as such, may be capitalised into property value thereby stimulating demand for energy efficient buildings, though there was no evidence given to suggest that energy efficiency actually stimulates such demand. Using data for houses in Queensland with and without sustainability related features, Wong et al. (2016) analysed listing periods, and compared the time taken for agents to sell these two types of houses. The authors found houses with sustainable features have shorter time on market compared to those without sustainable features, suggesting a higher demand for environmentally friendly properties. A non-academic study conducted in Western Australia asked agents how incorporation of sustainability impacts the demand for properties (Green Gurus 2011). Findings suggested that marketing strategies which highlight the benefits of sustainability concepts, products, and their services, are paramount to increasing demand for sustainability advice during purchase of property.

A common theme from these studies was the presence of EPC. Such certificates are not mandatory in Victoria. While this thesis does not attempt to address price impacts of energy efficient housing, these findings are worth noting as they illustrate the potential importance of these houses to buyers. Energy performance information provided within the EPC appears to be considered by house buyers in their decision process. Therefore, evaluating similar information provided in advertisements, and gathering real estate agent views, is useful in contributing to the body of knowledge about energy efficient housing.
2.7 Summary of literature

Key themes and findings of this literature review are now summarised to provide the reader a succinct overview.

Table 2.3: Summary of literature and key themes

<table>
<thead>
<tr>
<th>Key themes identified in literature</th>
<th>Summary of key findings, gaps and issues</th>
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<tbody>
<tr>
<td>A consensus of theory of housing is yet to be established.</td>
<td>In summary, the literature shows the diverse nature of housing has inhibited advancements in the establishment of a unified theoretical understanding of housing. Published literature argues researchers are seeking to approach housing research from their individual discipline perspectives thus no real consensus of a unified theoretical perspective has yet been reached. In terms of this lack of theoretical agreement, academics appear to be situated in one of two standpoints. The first, that such theory is unnecessary because a single body of theory cannot be reached due to the diverse nature of housing, the second, that all disciplines require a theoretical standpoint from which advancements can be measured. In recognition of these views, this research acknowledges the need to clearly articulate the standpoint adopted and took the perspective of the market facilitator working within the emerging environment of energy efficient housing to guide selection of examined literature.</td>
</tr>
<tr>
<td>Real estate agents work in a complex environment and often adopt pragmatic practices to achieve positive outcomes and therefore can be seen as social interpreters.</td>
<td>Similar to Housing theory, literature regarding real estate agents is diverse. Therefore, the focus was upon agency practice. Agents work in a complex environment often impacted upon by externalities such as prevailing economic conditions to achieve successful outcomes for their clients. Their success-based remuneration framework drives them to adopt pragmatic practices with considerable attention given to how they achieve this within a legal and ethical environment. Observing their practices researchers have noted that agents tend to follow social</td>
</tr>
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</table>
trends to achieve their goals. While no research specifically examining agency practice and engagement with energy efficient housing was found, the theory presented in reviewed articles suggest that agents will engage with such house features if they perceive a market appetite for them. Such a view accords the often-discussed pragmatic practices.

<p>| Minimal emphasis is given to house energy efficient characteristics in advertising with greater references made in more regulated environments. | Researchers have noted that house energy efficient features are being included in various forms of advertising, but minimal emphasis is being given to these features. Rationale provided suggests developers, real estate agents and new home builders believe house buyers still seek traditional house features such as location, accommodation etc. In countries requiring house energy performance disclosure, greater emphasis is being observed. However, in countries that do not mandate disclosure, researchers believe such characteristics are typically embedded within the body of text as a listed feature, rather than a significant attribute of the houses. Many authors advocate that regulation is required to make house energy efficient characteristics in advertisement more prominent. The expectation is that buyers will become more likely to consider such characteristics in the house search. |
| Real estate agents are behaving in the manner described by the Principal-agent theory and will obtain advantage where possible. | Although much of the literature discusses this theory in the context corporate management structures, substantial research examining real estate agent behaviours through the lens of this theory has been published. Key findings conclude that agents are behaving in accord with the theory in that they are acting in a self-serving manner but within the ethical and legal framework prescribed in their region. The success fee structure of agency practice encourages self-serving behaviours where possible. This behaviour is seen by researchers as somewhat pragmatic and therefore expected. |
| Valid social interpretations can be | House advertisements have been examined to determine numerous social trends with researchers illustrating observable |
| Made from real estate advertising | Relationships between the language of interest in the advertisement and societal trends. For example, fields of interest have included housing preferences, changes of language over house market cycles, and how energy efficient characteristics. From these findings, conclusion have been drawn to inform developments in the respective fields. Some, but minimal work with specific regard to real estate agents has been published with these publications largely focussing on how the item of interest is portrayed. This field presents considerable opportunity for future work as no evidence of literature evaluating attitudes of real estate agents when scripting advertisements was found. |
| House energy efficient technologies are readily available; however, their function is not always understood by users. Initial cost of these technologies is often a barrier to instalment. | Research investigating the selection and effectiveness of domestic energy efficient technologies indicate that persons engaging with such technologies require a level of knowledge for both appropriate selection and in-use operation. Less than optimal performance is commonly found due to this lack of appropriate knowledge and this is impeding adoption through negative perceptions. This required understanding extends to relationship between the climate zone in which the building is located and selection of suitable technologies. Such knowledge is required by all stakeholders including real estate agents if these technologies are to be correctly represented in the marketing process. Return on investment of installed technologies is indicating homeowners need to be careful of their selection technologies and once again, this is reported as being a common barrier of uptake. Together these key findings contribute to understanding the extent of engagement by real estate agent with the extent of knowledge of house energy efficient technologies held by real estate agents not yet been the subject of research in this field. |
| Markets are failing to embrace environmental imperatives resulting in an increasing call for |
| Markets are not responding to environmental externalities as consumers fail to incorporate environmental considerations into purchase decisions. In the property context, this means buyers are still primarily seeking to satisfy traditional requirements and giving less emphasis on energy efficient characteristics. This |</p>
<table>
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<tr>
<th>greater government intervention.</th>
<th>further strengthens the argument for change of government policy. In terms of future research, work is required to develop policy framework to effectively influence house buyer attitudes during the search process.</th>
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<tbody>
<tr>
<td>The Australian government is lagging behind international efforts to influence positive environmental change across all housing markets</td>
<td>While efforts are being made to address the energy performance for new or substantially renovated houses in Australia, little is being done to create policy for established houses. Australian researchers are critical of both state and federal government with regard to the lack of consistency and direction which they argue is disenfranchising stakeholders and creating negative attitudes, further exacerbating market failure. Such failures are likely further to overly influence real estate agent perceptions of energy efficient technologies.</td>
</tr>
<tr>
<td>Evidence of higher transfer prices of houses exhibiting greater energy efficient characteristics is emerging, but only markets of performance disclosure.</td>
<td>Key findings show an increasing trend towards a price premium for more energy efficient housing. However, it is very context specific. The emergent research in this field is highlighting green shoots of positive market reaction to enhanced house energy performance in markets where such performance is disclosed at point of sale. However, little research has been conducted in the Australian context outside the Australian Capital Territory (ACT). These are markets where energy performance is not disclosed and, in these markets, the debate of price impact continues.</td>
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### 2.8 Conclusion

This literature review has addressed the broad nature of housing and the emergent phenomena of house energy efficient characteristics from the perspective of real estate agency practice. In doing so, published literature of theories relevant to this research were also presented. To position this research, real estate agency practice regarding house advertising was central to this review and along with this, literature presenting the potential price impact upon houses that exhibit observable energy efficient characteristics.
In addition to the above, the complexities and nuances of energy efficient housing, were also discussed. These are technologies that agents are likely to confront in the course of their business activities and therefore arguably ought to understand to some extent. This resulted in examining literature concerning advertising and how such advertising can be socially interpreted.

This discussion has identified a gap in the literature; namely, the limited understanding of real agent engagement with house energy efficient technologies and the potential of agents, as house market facilitators, to progress market acceptance of environmentally friendly housing.

Chapter 3 now presents and establishes the context of the research, and the frame in which it was performed, together with the research questions posited.
Chapter 3: Research Framework and Theoretical Model

3.1 Introduction

This chapter develops ideas discussed in Chapter 2 to form the research questions and conceptual model developed for this inquiry. In doing so, this chapter discusses the theoretical antecedents, positioning the research within the discipline of property with a specific focus on housing in greater Melbourne.

To elicit a richer understanding of house transactions, particularly transfer price, property research, as it pertains to housing, is often concerned with motivators of buyer choice (Cerutti, Dagher & Dell’Ariccia 2017). To date, limited attention has been given to the market facilitator’s role in this process and much of the existing work has been towards intermediary (agent) involvement rather than agency practice itself, although this body of literature is steadily growing (Benjamin, Jud & Sirmans 2000; Barwick, Pathak & Wong 2017). With the focus upon energy efficient technologies, this research aims to provide greater insight into the extent of engagement of real estate agents when advertising houses for sale. This is important because advertisements written by agents are generally the first point of contact market buyers have when undertaking a house search.

To achieve this objective, a number of theoretical concepts was drawn upon from literature presented in Chapter 2. This chapter therefore presents the conceptual framework for this research and presents the research questions for the study together with their rationale. It discusses the framework of the model, and its relationship to property, agency and advertising theories, to provide a rationale for using real estate agent advertisements as the unit of analysis.

The theoretical lens through which this research is undertaken is Principal-Agent theory, sometimes referred to as agency theory, applied to the property context. Property, being of immense social significance, is difficult to study from a single perspective, as the elements of society can rarely be viewed in isolation (Ruonavaara 2018). In what way(s) real estate agents are engaging with the phenomenon of emerging energy efficient technologies is the object of this study. Knowledge attained from this study will inform agency practice and potentially government policy development. In the context of real estate agency, Principal-Agent theory as applied to this research, suggests that agents will create advertisements to appeal, or at least relate to, observed social and market trends. Thus, if agents believe the phenomenon of emerging energy efficient technologies is gaining interest in the housing market, this theory
posits agents will aim whenever possible to highlight such technologies in advertising, and in doing so provide evidence of a market appetite. The research draws upon four theoretical frames, and adapts and interprets these with a property perspective. The discussion reviews each of the four theories applied in this research, as it relates to the research questions and the conceptual model.

3.2 Theoretical frameworks

3.2.1 Principal-Agency Theory

This theory aims to explain how people engage in their master-servant relationship in the work environment. In this case, the relationship is that of the house seller, the ‘principal’, and the service provider, the ‘agent’ being the real estate agent. The premise of the theory states that agents will generally undertake their duties, roles and responsibilities ethically, and in the best interest of their principal. However, when certain circumstances are present, they will retain an element of self-interest and/or protection in their actions and decisions, which may conflict with the best interests of the principal (Lee & Thompson 2011).

Hence, in the context of this research it is posited that a real estate agent, acting in accord with agency theory, would seek to include existing house energy efficient features within the advertisement if they perceive buyer interest for such features, as doing so potentially leads to a quicker sale. Examining real estate agent house advertisements for the presence of energy efficient language, and understanding why agents include the language, will provide an indication of antecedents for agent engagement and an insight into the emphasis agents are giving to such important features when selling. To understand how agents engage with energy efficient technologies, it is also important to understand the theoretical nature of advertising.

3.2.2 Advertising theory

The aim of advertising is to create interest and/or promote awareness of commercial products and/or services, or in the case of social issues, with the objective of changing behaviours (Reed & Ewing 2004). Advertisements are typically designed to target certain cohorts and are therefore scripted in a manner that best relates to that cohort (Beangstrom & Adendorff 2013). An example of how advertisements are developed to deliver targeted messages to certain social groups can be seen in campaigns aimed to alter smoking habits by highlighting the negative health affects (Wakefield 2003). Advertisements are developed by people trained in the field
of advertising, and are skilled in understanding their target market and how to maximise the effects of the message on this market.

However, house sale advertisements are generally scripted by agents who typically have minimal formal training in advertising but are expert in the field of marketing houses (Allens Consulting Group 2008; Philbrick, Scheu & Blaser 2016). This has the potential to create repetitive behaviours in phrasing of advertisements, their structure and format (Kupke, Rossini & Kershaw 2014).

In Australia, each state requires people seeking to enter the real estate industry to undergo prerequisite training. The governing jurisdiction within each state mandates what competencies (subjects) industry entrants are required to demonstrate. As these competencies are selected from a nationally agreed training package, all competencies are uniform but are contextualised within individual state laws. Generic skills taught and assessed are consistent across the nation and, in this research, the period over which the data were collected. Each state is free to choose competencies to develop the entry level course. As previously mentioned, in Victoria, this training is mandated by the Estate Agents Act 1980, and regulations prescribed by it and overseen by Consumer Affairs Victoria. As part of their initial education, real estate agents undergo some, but minimal, training in scripting advertisements and one of the key principles promoted to agents is the AIDA principle (Department of Education and Training 2016). The AIDA principle of advertising was discussed in Chapter 2, section 2.3.3. Once this initial training is complete there is no further legal requirement for additional training prescribed by legislation (Estate Agents (Education) Regulations 2008 (Vic)), although it is likely that individual companies may require their staff to undertake further training by way of professional development.

The AIDA model suggests agents will fashion the house advertisement in a manner that locates towards the ‘front end’ of the advertisement the characteristics of the subject house perceived as most appealing to the target market. This arrangement signifies the ‘Attention (A)’ of AIDA and is aimed at drawing attention to the advertisement to ensure the reader continues to read the advertisement and not discard it without fully evaluating the content.

In terms of the interest (‘I’ of the model), real estate agents will typically select words and phrases considered ‘fashionable’ and according with contemporary vernacular (Perkins, Thorns & Newton 2008). This is done in an effort to ensure a clear message is communicated
and received by the reader. In the context of this research I (Interest) is defined as words and phrases that refer to energy efficient characteristics. These are of particular interest to this research as they inform the research questions posed.

Having secured the reader’s attention, the agent will then generally aim to create a desire (the ‘D’ of the model) within the reader by using hyperbole that surrounds the characteristics perceived as sought after. Hyperbole, or puffery as it is sometimes referred to (Pryce & Oates 2008), appearing within advertisements is not the subject of this research. Rather, this research aims to consider what accounts for, and the extent of, agent engagement with energy efficient technologies and their use of language within advertisements that reflects that engagement.

Finally, the fourth element of the model, namely A (Action), is intended to motivate the reader to make an enquiry of the agent, thereby commencing the sales process. In real estate parlance, such a call to action is generally framed in terms such as ‘ring now’ or ‘be quick’. This is common practice in advertising, not just real estate advertising (Simon & Dejica-Cartis 2015).

In regard to specific construction of advertisements, the AIDA principle would imply main characteristics of the house best aligning to market appetite and directions would be early in the advertisement (Wijaya 2015). The information provided in the advertisement is limited by available advertising space, which in turn is limited by the advertising budget. In Victoria, it is the seller who typically pays for promotional activities and the agent creates and organises marketing campaigns. This is a commercial practice, not a mandatory one. Thus, the agent’s interpretations (perceptions) of market nuances and trends would likely influence optimal levels of information included in advertisements. In this, agents’ perceptions of the phenomenon of the emergence of energy efficient house technologies should be visible in advertisements and therefore ought to be considered in the model being developed here.

3.2.3 Primacy/recency theory

Primacy/recency theory has long been recognised as relevant to memory retention of information inherent within narratives (for example, Jersild 1929). As advertisements can be considered a form of narrative, this theory has application here (Cunningham 1987). The theory posits that persons reading text or listening to verbal messages are more likely to recall the first and last components of the message being conveyed (Carter 2000) and information embedded within the message is less likely to be remembered (Jansen, Liu & Simon 2013).
It is the textual nature of advertising script that gives this theory relevance to this research. House buyers must read and digest considerable volumes of information in their search, and the competition by real estate agents to make their advertisement ‘memorable’ is intense, and therefore important components of the message are likely to be located where they have most impact (Çinar 2014).

It is unlikely that real estate agents are aware of this theory as it does not form part of their training. However, they are trained through the AIDA principle to give emphasis to most desirable features of the house. This would cause them to position these desirable features close to the beginning of the advertisement and avoid middle parts of the text. Reasons for doing so could be numerous, but following agency theory it is likely to be motivated by agent desire for successful outcomes within the authority period to earn a sales commission (success fee).

Thus, applying this theory to this research will provide insight into the emphasis residential agents are giving energy efficient technologies during the marketing process, and by extension the market appetite for such technologies. In other words, the location of energy efficient language within the advertisement is important to answering the research questions. The final theoretical perspective is now discussed.

3.2.4 Property theory

‘Property is always a contested concept ... [and it] changes over time’ (Radin 1993, p.119). Property, or real estate as it is known in some regions, is as old as the earth itself, and is literally of the earth. It is how we use property and the benefits attained from such use that determines value. The unique position property holds in our society requires it be precisely defined before undertaking any research that embodies it. To this end the following explains how property is viewed for the purposes of this research.

This research considers property in the locus of housing with a focus on housing markets. It examines real estate agent perspectives and beliefs regarding the phenomenon of house energy efficient technologies and, as agents respond to internalities and externalities when developing marketing campaigns, the nature of house markets must be explained.
Property theory posits that housing markets are influenced by four key drivers. These are: Social developments and trends; Economic conditions; Political developments, such as planning codes; and Physical attributes of regions and the specific property (for example, ocean views) (Reed 2015, p. 38). These four key drivers interact to influence market activity and ultimately the price paid for houses when transacted (Bello & Bello 2007). Table 3.1 below provides a summary of elements for each driver. This list is not exhaustive but indicative of the characteristics within each driver. The details within Table 3.1 are a summary of the house value drivers drawn from literature.

### Table 3.1: House market drivers

<table>
<thead>
<tr>
<th>Driver</th>
<th>Explanation</th>
</tr>
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</table>
| Social | Fashions  
Demographic composition  
Family trends/household composition  
Population growth/decline  
Attitudes to external events (e.g., Climate change) |
| Economic | Employment  
Wage levels  
Interest rates and availability of credit  
Construction activity/costs |
| Political | Planning (zoning)  
Infrastructure  
Public policy (e.g., First home buyer subsidies)  
House taxation |
| Physical | Topography  
Climatic conditions (e.g., Rainfall)  
Natural barriers  
Access to infrastructure  
Dwelling size/accommodation  
Locational desirability |

(Source: Reed & Mills 2007; Tumbarello & Wang 2010; Reed 2015, p. 38).

The phenomenon of climate change, and resulting emergence of energy efficient technologies in housing, is arguably in itself a social evolution within housing markets. It is therefore appropriate to study how these technologies are promoted by agents during the marketing
process. Considering markets, in this case housing, are largely driven by supply and demand, if energy efficient technologies are increasingly becoming of importance to buyers, then residential agents will tend to include these technologies in the advertisement to achieve a successful outcome. It is not intended this be measured in monetary terms.

To this end, and as this research is aiming to understand what accounts for the extent to which real estate agents are engaging with energy efficient technologies when advertising houses for sale in Melbourne Australia, it is necessary to adhere to the principles of the theory described above. Social changes and developments will always cause property to remain a contested concept, and accordingly, understanding how market facilitators perceive and view the emergence of change is important.

Property is an inherent component of the social fabric, and at various life stages people have differing requirements of what they expect the property to provide them, and therefore demographics are an important consideration (Kintrea 2007).

3.2.4.1 Demographic characteristics

Extensive review of previous research regarding the uptake of energy efficient technologies by house owners has revealed three primary demographic characteristics impact on choice of engagement with such technologies (Leonidou, Leonidou & Kvasova 2010; Waitt et al. 2012) with Urban & Ščasný (2012) noting medium to high income households are more likely to invest in expensive house retrofit energy efficient technologies. From literature the more notable demographic characteristics therefore are:

- Post-secondary education level.
- Household (family) income.
- Age.

The underlying theme that runs between these three characteristics is awareness and financial ability to engage with energy efficient technologies. In regard to age, a family’s disposable income is usually correlated to life stage (Brounen, Kok & Quigley 2012). As children are born and grow, a typical household is subject to substantial financial commitments and disposable income is limited. As children become independent, more monies become available and can therefore be used to fulfil parents’ personal desires and ambitions, often declining in the final stages of life (Wilkes 1995). Such spending, and the decision to engage with house energy efficient technologies, occurs within a family’s earning capability, whether substantial or
otherwise. Therefore, as income is typically related to age and likely investment in house energy efficient technologies is related to household income, this research considered age less useful in informing the research questions and therefore not considered as a variable to be evaluated. This omission is further justified by the fact it is impossible to know the age of householders for whom the house advertisement was written. The development of the research questions is now discussed.

3.3 Research objectives

The literature is suggesting limited engagement with energy efficient housing by market participants and therefore one could ask, ‘Why aren’t we engaging with energy efficient technologies in housing when the benefits are so obvious?’ This research contributes to the continuing discourse that broadly encompasses such as question. This research examines real estate agents, and in particular what accounts for their engagement with energy efficient technologies when promoting houses for sale.

As the market facilitator, it is important to understand what agents are saying about such technologies and to do this, house advertisements written by real estate agents are examined.

The main research question is; ‘What accounts for the extent to which real estate agents are engaging with energy efficient technologies when advertising houses for sale in Melbourne Australia?’

The research is important because in their role as market facilitators, real estate agents have significant potential to influence buyer choices and decisions.

Acceptance of new ideas and technologies typically require a coordinated approach. However, without a mandated energy performance disclosure for established housing, a structural shift towards energy efficient housing to become the norm will rely greatly upon the attitudes and actions of stakeholders within housing markets, including buyers, sellers and real estate agents.

3.4 Conceptual model development

When scripting advertisements for promoting a house, agents will typically not only write text to describe house characteristics. They do so with regard to the prevailing market conditions and housing trends, to appeal to the buyer group perceived as most likely to purchase. (Collins
& Kearns 2008). These factors meld to influence the choice of the words and phrases used within the advertisement, and will often reflect trends appearing in broader society (Perkins, Thorns & Newton 2008). For example, recently renovated houses may exhibit words that appeal to younger professional buyers, or those located near popular retail activities could promote café lifestyles. Thus, through the perceptions and beliefs of residential agents, house advertisements can provide insight into the market appetite for energy efficient characteristics (Rodriguez & Siret 2009).

Also, house advertisements are often scripted to appeal to the demographics of the particular location in which the house is positioned, as well as highlighting the individual characteristics of the house itself (Dovey 1992; Perkins, Thorns & Newton 2008). Likewise, it is common for agents to appeal in advertisements to buyers seeking to benefit from external factors such as economic conditions (Dabholkar & Overby 2006). The conceptual model for this research was developed with regard to these factors and is now discussed in greater detail.

3.4.1 External environment (Externalities)

External factors are independent of the individual house and influence housing markets either positively or negatively. For example, prevailing economic conditions influence market activity of many sectors, including property markets (Mian, Sufi & Trebbi 2015). Economic influence is characteristically reflected in lending interest rates, unemployment, and consumer confidence levels. The impact of these upon housing markets is typically seen as slowing or increasing of buyer activity levels, sales volumes, and time on market for properties (Burnside, Eichenbaum & Rebello 2016). Other external factors include social trends, design fashions, and government policies, and these can all influence market activity and price outcomes (Glaeser & Gyourko 2018). Real estate agent perceptions of public reaction to prevailing trends is likely to influence how they script advertisements (Beangstrom & Adendorff 2013).

3.4.2 Real estate agent experience

Experience within any vocation is unquestionably important and valuable to the clients with whom they deal (Quiñones, Ford & Teachout 1995), and real estate agents are no exception. It is reasonable to expect the ability of agents to interpret market nuances and trends, and how individual house features can be best portrayed to the market, is a skill that requires practice. Formal education develops this skill in part in that would-be agents are exposed to advertising
principles and have in-class opportunity to practice writing advertisements during their initial training (J Mitchell, Manager, REIV, interview, 10 February 2017). Much of this training however is centred around compliance with local consumer practices and laws (ibid). Further, skill development would most likely come about through experience and being mentored and/or coached by more experienced agents (Hezlett 2016). It is normal practice within agencies for advertisements to be written by lesser-experienced agents, then vetted by more experienced senior sales agents to ensure both commercial and legal risk are minimised (Tuzovic 2009; Brinkmann 2009). Applying agency theory, if agents perceive any market desire for energy efficiency technologies it is reasonable to assume that the experienced agent would seek to include them in the advertisement. This is an underlying premise within the model and is manifested through synthesising external and internal environments and the demographic market to which the agent is appealing.

3.4.3 Market demographics

Wealth and education are relevant when considering social engagement with energy efficient technologies. Agents are cognisant of the demographic characteristics of the area they work within and script advertisements to appeal to such market characteristics (Williams, Qualls & Grier 1995). Thus, these are included within the conceptual model as they would form part of real estate agent consideration when constructing an advertisement.

3.4.4 Internal characteristics (Internalities)

Internal characteristics are unique to the property being offered for sale; for example, the number of bedrooms, allotment size, overall condition. These are considered to be major motivators for buyers in their decision process as they align with both household needs and aspirations. The emphasis placed upon them by agents in advertisements is often seen as a reflection of the agents’ interpretation of market appetites for certain attributes and social trends (Pounds 2011). For example, an outdoor entertainment area that is both attractive and low maintenance may be highlighted to appeal to people who enjoy entertaining but are time poor. Including individual house characteristics in the conceptual model is necessary as it impacts on how the advertisement is written.
3.4.5 Locational attributes

In housing terms, where people buy is as important as what they buy. House buyers choose areas for a variety of reasons ranging from the pragmatic (for example, distance to transport, work, schools), to the emotive (for example, scenic, beachside), with such amenities considered to influence land values (Rauterkus & Miller 2011). It is a trait of agents to use their armoury of skills and expertise to achieve sales by highlighting a region’s attributes through emphasising characteristics in a positive way to convey the message that there is something extraordinary about it (Pryce & Oates 2008). Logically then, when studying residential agent advertising, location is an important consideration for analysis.

In terms of framing the research, it is appropriate to state hyperbole, typically used by agents, is not the subject of this research. It is how agents perceive and respond to the emergence of house energy efficient technologies that is of interest here. This said, words and phrases used in advertisements that do not directly refer to specific technologies but do infer enhanced house energy efficient performance are considered. The context of these are further discussed in Chapter 4.

3.4.6 Published advertisements

The final component of the model is the published advertisement. To evaluate these, AIDA and primacy-recency theories are adopted. These theories provide a useful lens through which to evaluate real estate agent engagement with house energy efficient technologies.

In regard to applying AIDA theory, the first ‘A’ of the AIDA acronym is ‘Attention’ and placing desirable features early in the advertisement allows the buyer to note them quickly. Therefore, examining word location within the advertisement text will provide useful insight as to how agents perceive the importance buyers place upon energy efficient technologies. Primacy-recency theory is used to evaluate where energy efficient language appears within the body of the advertisement.

Figure 3.1 below presents the model developed using the aforementioned theories. With regard to energy efficient lexis, the model draws upon the theories presented by recognising the influence of: demographic profiles and locational effects in house purchase decisions (Property Theory), the influence of externalities (Property Theory), the influence of internalities (Property Theory), engagement by real estate agents when scripting advertisements (Agency Theory),...
Theory), and the location of energy efficient lexis (AIDA; Primacy/recency Theory). The model was developed to examine what explains the extent of observable energy efficient technologies appearing within scripted house advertisements. In other words, if increased public awareness of climate change and energy costs is perceived by agents, and they believe there is a developing market appetite for energy efficient technologies, it is expected agents will consider these technologies to be sufficiently important as to include them in the advertisement. As advertising costs increase with the area occupied by the advertising text, including words and phrases relating to energy efficient technologies would be done to the exclusion of other house characteristics considered of lesser importance, or extra space must be purchased. In doing this the real estate agent is making a rational economic judgement.

Figure 3.1: Conceptual model for creating house advertisements

3.5 Research aims

The aims of this research are presented below, along with each research question, to show how each question is addressed.
RQ1: What determines whether agents use energy efficiency language in housing advertisements?

Aim in addressing RQ1: To ascertain the factors/drivers that determine whether real estate agents use energy efficient language in house advertisements.

A major component of this research was to understand the lexis real estate agents adopt when promoting energy efficient technologies within advertisements, and why they use it. This question aims to understand if agents perceive a market appetite for such technologies, and if so, how they communicate energy efficient technologies to house buyers.

RQ2: Does the extent of inclusion of energy efficient technologies in house advertisements in Melbourne Victoria vary across disparate regions and if so why?

Aim in addressing RQ2: To investigate the extent to which including energy efficient technologies in house advertisements varies across greater Melbourne, and the drivers for any observed variation.

Previous research shows relationships between demographic profiles and uptake of energy efficient behaviours (Scott, Parker & Rowlands 2001, Faiers, Cook & Neame 2007, Pyrko & Barby 2009; Waite et al. 2012). This question seeks to determine if agent perceptions about house energy efficient characteristics vary across regions with differing demographic profiles causing them to include such characteristics in advertisements. While previous studies have investigated demographic influences on adopting energy efficient technologies, this study goes further in examining if agents are similarly influenced when advertising houses for sale.

RQ3: Are real estate agents giving prominence to energy efficient characteristics when scripting house advertisements?

Aim in addressing RQ3: To gain a deeper understanding of the reasons why real estate agents do, or do not, give prominence to house energy efficient characteristics in house advertising.

How real estate agents engage with house characteristics, and the emphasis they give to these characteristics in the marketing process, is critical in their role as market facilitators. To successfully do this, the agent must understand the relationship between the characteristic and its significance (benefits) to the target market. This question examines how energy efficient
technologies are being promoted relative to other, more traditional, features of the house being marketed.

3.6 Conclusion

This chapter has elucidated the conceptual model and presented the research questions for this research. In doing this, the rationale was provided, and the conceptual model illustrated, highlighting the antecedents for creating real estate advertisements and the disruptive emergence of house energy efficient technologies. The methodology used to answer these research questions is presented in Chapter 4 – Methodology.
Chapter 4: Research Methodology

4.1 Introduction

This chapter follows Chapter 3 – Research Framework and Theoretical Model, and provides details of the research design to answer the research questions posited in the preceding chapter. A mixed method design was considered appropriate to examine real estate agent engagement with energy efficient house characteristics when advertising houses for sale. This chapter presents the rationale for the research methodology design, along with the limitations inherent within the approach.

Identifying the philosophical foundations is important in all fields of research (Levy & Henry 2003). To enable an informed understanding of the research design, philosophical assumptions are presented to position the research within the scholarly community it is intended. This study uses a mixed method convergent design (also known as Concurrent Triangulation design) (Doyle, Brady & Byrne 2009). The intent of such an approach is ‘to obtain different but complementary data on the same topic’ (Morse 1991, p. 122). Such mixed method design is characterised by the use of two or more methods to corroborate and/or cross-validate findings where data have been collected concurrently (Creswell & Plano Clark 2018, p. 4), as was the case here. In other words, the researcher is comparing descriptive statistical data with qualitative findings.

The chapter commences by presenting the philosophical assumptions underpinning the research design, then defines the area of study, before proceeding to detailing analytics for real estate advertisement in preparedness for analysis. This is followed by a discussion of the thematic analysis adopted for the interviews.

4.2 Philosophical assumptions

Creswell and Plano Clark (2018, p. 34) argue that all researchers, particularly those who engage with mixed methodologies, must have an awareness of the philosophical assumptions made in the research design. The authors list four broad worldviews to enable researchers to locate their ontology and epistemology within their study. These worldviews are: Post-positivism, Constructivism, Transformative, and Pragmatism, although not all research fits neatly into these categories at all times (Creswell & Plano Clark 2018, p. 36). It is the worldview of
pragmatism that underpins this investigation. This view is common to mixed methods design (Tashakkori & Teddlie 2003). The focus of pragmatism is largely upon the primary importance of the questions asked, and the consequences, rather than the methodology itself (Morgan 2014), and thus, ‘it is pluralistic and orientated to what works and “real world” practice’ (Creswell and Plano Clark 2018, p. 37). In terms of the ontological and epistemological perspectives, Creswell and Plano Clark (2018, p. 38) go on to explain pragmatism can exhibit both singular and multiple realities (ontology), and how knowledge is gained (epistemology) is through ‘what works’. Thus, in adopting a worldview of pragmatism to researching real estate agent engagement with house energy efficient technologies, the development of knowledge is obtained through recognising commercial and regulatory realities in which agents operate.

Tashakkori and Teddlie (2003) linked pragmatism to mixed methods research arguing, among other points, it is ideally suited to practical and applied research philosophy. Also, pragmatism is one of the most common frameworks used for mixed methods research and ‘resists privileging of particular abstractions or universal principles as an approach to determining value’ (Biddle & Schafft 2015, p. 327). Critical realism is a philosophy that further supports important elements of quantitative and qualitative approaches (Halcomb & Hickman 2015; Creswell & Plano-Clark 2018, p. 40). While having some relevance to research of the type presented here, critical realism is not specifically adopted as the lens through which data is analysed. Rather, the existence of its philosophical perspectives are acknowledged for the purposes of completeness of this discussion and that such a perspective may be of future academic interest. The researcher’s extensive working experience within the field of study requires acknowledgement of potential axiological (the nature of ethics and what is valued) issues within the research. Thus, the methodological approach adopted for this inquiry has in part been chosen to address potential validity-threatening biases through triangulating concurrent data.

4.3 Research design

As stated, this study employs a mixed method design. This methodology is a blend of quantitative and qualitative traditions and is considered by some as providing richer detail and findings to research outcomes (Johnson & Onwuegbuzie 2004; Doyle, Brady & Byrne 2009). Teddie & Tashakkori (2009) state there are four types of mixed method research design, and these are: triangulation, embedded, explanatory, and exploratory. The mixed method
triangulation model, which involves concurrent data collection, was considered the most appropriate methodology for this study due to its potential to provide more ‘sophisticated analytical conceptualisation’ (Fielding 2012, p. 125). Further to Fielding’s (2012) view is that of Maxwell (2010, p. 477) who argues the actual distinction is not between numbers and text but rather ‘between thinking of the world in terms of variables and correlations and in terms of events and processes.’ In this instance, as the research concerns the extent to which agents are engaging with energy efficient technologies, it is necessary to understand what is observed through advertisements and what is understood about such technologies by the agents who script the advertisements. In other words, it is clear that both paradigms have relevance and using a mixed methods design enables the two fundamental ways of thinking about social phenomena to create more constructive and useful outcomes (Fielding 2012, p. 125).

Regarding triangulation, Denzin (1978, p.291) defined it as ‘the combination of methodologies in the study of the same phenomenon’, and in doing so posited four types of triangulation. These are: data triangulation (using a variety of sources), theory triangulation (use of various perspectives and theories to interpret results), investigator triangulation (use of numerous researchers), and finally, methodological triangulation (use of multiple methods to study the problem being researched). This research adopted triangulation methodology, and in doing so, concurrent data triangulation, namely of interviews and textual data (advertisements). Typically, concurrent data triangulation requires merging the data during interpretation or analysis (Harrison & Reilly 2011).

This research design began with collecting qualitative data in the form of semi-structured interviews with practicing real estate agents. During the course of the interviews, advertising data for quantitative analysis was made available to the researcher by the Victorian real estate agents’ peak industry body, the Real Estate Institute of Victoria (REIV). The specific order of data collection is not of importance here as the interviews were conducted in 2013 and the advertising data spans from 2008 through to 2015. Thus, the methodology is considered concurrent both in terms of time, because of the interviews being ‘midstream’ of the acquisition of advertising data, and in terms of analysis because no work began on either dataset until all data were acquired.

The research questions posited readily lend themselves to dualistic enquiry. The objective nature of quantitative methodologies allows unbiased observation of what real estate agents are doing in regard to including energy efficient technologies in advertising. However the analysis
may be biased as a result of subjective coding and subsequent interpretation, care needs to be taken in this regard (Sutton & Austin 2015). Qualitative methodology on the other hand provides insight into the rationale and thought processes of residential agents when engaging with the phenomenon of emerging house energy efficient technologies during the marketing process. Understanding what agents do, and the decisions behind including energy efficient technologies, will provide a greater insight to what accounts for the extent of engagement by agents. This approach is not unique when investigating energy efficient housing and reasoning for engagement. Investigating motivations for energy efficient refurbishment by home owners, Organ, Squires and Proverbs (2013) advocated the importance of a dualistic approach to more thoroughly understand findings. In their case, semi-structured interviews with home owners, and physical property inspections, were advocated to compare and contrast interview data with observations. This research is analogous in that semi-structured interview data collected from real estate agents is compared to an extensive database of real estate agent house advertisements. Comparison provides a richer insight into agent motivations, understandings and actions (where ‘actions’ means how they actually script advertisements and include, or otherwise, energy efficient house characteristics).

While significant consideration is given to the quantitative data, due the magnitude of the dataset (which includes 158,112 data items), appropriate consideration was given to the qualitative data. The process of giving emphasis to one category of data over another is often referred to as paradigm emphasis (Johnson & Onwuegbuzie 2004). Where qualitative and quantitative methods are combined in a mixed methods study, one method is usually given priority over another (Östlund et al. 2011). Contrasted with sequential studies where one approach informs the other, concurrent designs that are equally weighted require care, largely due to the combined nature of interpretation or analysis (Östlund et al. 2011). In this research equal weighting is attributed to both qualitative and quantitative methodologies, because each methodology is capable of contributing significantly to each research question posited.

Specifically, this research examined words and phrases in advertisements for houses listed for sale, as well as whether these appearances correlate with demographic profiles suggested by previous research (Crabtree & He 2009; Brounen, Kok & Quigley 2012; Bryant & Eves 2012). In doing this, interpretations of residential agent perceptions towards energy efficient housing were made. Content analysis, sometimes referred to as textual analysis, techniques were applied to the advertisements to transform the data into codes for analysis. This technique has been adopted in previous research when evaluating real estate agent advertisements (Oates &
Further, a thematic analysis of semi-structured interviews was undertaken, and results compared and contrasted in accordance with mixed method triangulation techniques to facilitate better understanding of the context (Organ, Squires & Proverbs 2013). Figure 4.1 shows the design of this research.

**Figure 4.1: Research design.** (Source: Adapted from Creswell & Plato Clark 2018, p. 119)

### 4.3.1 Study design phase

Understanding how real estate agents promote energy efficient technologies when marketing residential property will provide insight into the extent of engagement by agents with, and buyer appetite for, these technologies in the house search process through applying theories presented in Chapter 3.

Essentially, the aim of this research is to examine what accounts for the extent to which real estate agents are engaging with energy efficient technologies when advertising houses for sale in Melbourne, Australia. To answer such a question requires an understanding of what determines the language used by agents and the extent to which they include appropriate lexis within advertisements. Together with this, the prominence given to such technologies against competing house attributes is studied.
All research design has inherent weaknesses and therefore these must be recognised and acknowledged (Onwuegbuzie & Johnson 2006). Past criticisms of methodological rigour have been noted by a number of authors (for example, see: Allen et al. 1986; Paley 1997; Giorgi 2001), and therefore particular attention was given to the relationship between the research questions and the research methodology. In this research, the agent is seen as the intermediary between the house seller and the house buyer. The unique nature of the agent’s role and the success of the desired transaction heavily rely upon the ability of the agent to accurately interpret the nuances and vagaries of the housing market. The perceptions of a market appetite for energy efficient technologies, and the importance placed upon them in the buying decision by house buyers, will be reflected in how the agent promotes a house that exhibits the technologies in question (Collins & Kearns 2008). Therefore, the research method adopted here uses residential real estate advertisements as the unit of analysis. Real estate advertisements have been shown to reflect social attitudes and trends in that they highlight characteristics of the house that best align with, and/or appeal to, contemporary market trends (Perkins, Thorns & Newton 2008; Kariya, Meghe & Bhise 2013).

4.3.2 Mixed Method approach
4.3.2.1 Qualitative phase
The qualitative component of the research design was important to understand agent perceptions and beliefs about energy efficient technologies. It was considered this would be best achieved through semi-structured interviews conducted either within the agent’s office environment or a location of their choice. This approach was taken because it is important to understand the lived experience of agents when developing and scripting advertisements. While such a perspective typically sits within the domain of phenomenological research (Creswell 2011, p. 57), understanding what agents experience when working with sellers whose houses offer energy efficient technologies and how this experience translates into advertising is important to comprehend because it is not clearly visible within the quantitative data.

4.3.2.2 Quantitative phase
This stage of the research was to undertake a content analysis of advertisement text. This methodology is discussed below and is central to the quantifying of advertising textual data for analysis. The framing of ‘keywords’ was essential to this process. These keywords were identified from an extensive search of academic, non-academic and government literature and
how this literature phrased common energy efficient technologies used in housing (for academic examples, see: Saman 2013; Judson & Maller 2014; Encinas, Aguirre & Marmolejo-Duarte 2018; Mosher & McGee 2018). Using literature, a dataset was developed to include demographic profiles that have been shown to be likely drivers of adoption for energy efficient behaviours. For example, people who exhibit certain social preferences are more likely to seek housing that aligns to those values and beliefs (Levy & Lee 2011; Ramos, Labandeira & Löschel 2016). Thus, people who exhibit pro-environmental values would be likely to seek energy efficient technologies within their house choice to align with their values and beliefs (Ozaki 2011). Therefore, with regard to the quantitative data and agency theory, it is expected that keywords appearing in advertisements ought to be observed with varying frequency in areas that exhibit pro-environmental characteristics.

Thus, the research methodology was designed partly upon past studies, and drawing upon pertinent theories to link relationships between the appearance of energy efficient words and phrases, and perceived market appetite for such technologies. The context of the research is now discussed with each component presented separately.

4.3.3 Data collection
4.3.3.1 Defining the geographic area for study
The context of this study is the urban environments of Melbourne with a focus upon the metropolitan suburbs. Melbourne is Victoria’s state capital, the second largest city in Australia and the most southern of the mainland cities. Greater Melbourne has a population of approximately 4.48 million people or 74.6% of the state’s population (ABS 2016f). The city has won international recognition as being the ‘most liveable city’, winning this award for seven consecutive years from 2010-2017 (The Economist 2018). Since 2011, Melbourne has been experiencing significant population growth with annual growth rates approximately 2.5% (ABS 2016f), which has placed considerable stress on housing and infrastructure provision (Infrastructure Victoria 2016).

Melbourne is a multicultural city and has recently seen significant population growth via immigration from Asia and the Middle East that now meld with traditional immigration from Europe (City of Melbourne 2018). Cultural values have been shown to have some, but minimal, influence on attitudes towards environmental issues (Proctor 1998) and, therefore, impact of ethnicity has not been measured in this research. Thus, with specific regard to the literature
presented, it is the variations in demographic profile defined by wealth and education that were selected for analysis as these are believed to be most influential in household engagement with energy efficient technologies (Mills & Schleich 2012; Burns 2012).

This study excludes multi-owner apartment style buildings. This is because individual freehold owners within such buildings do not have the same degree of independence and choice when making decisions about energy efficient technologies in relation to the building’s fabric. Accordingly, this study focuses upon detached housing outside the CBD. The reason for excluding the CBD is that there are no houses in this area that fit within the definition of a detached house. It is in the inner suburbs, such as Carlton, Richmond, Fitzroy and Kensington, where such housing typically begins and progresses away from the CBD.

Allotment sizes vary significantly throughout the study region, with smaller more compact allotments characterising the inner suburbs. As the distance from the CBD increases, allotment sizes typically increase and often exhibits wider street frontages. This pattern continues throughout Melbourne’s suburbs. Post-World War Two, larger allotment sizes tended to be developed with the quarter acre allotment (approximately 1000 sqm) becoming the hallmark of suburban living in the 1950s and 1960s. Building companies such as AV Jennings, a publicly listed company commencing operations in 1932, became an iconic developer and promoter of suburban lifestyles by developing houses designed with open living floor plans targeted to families (Willis 2009). Such housing changed the landscape of building in Australia. However, they were designed and built in a time before energy efficiency was a consideration. Houses of this type represent a significant proportion of the dataset.

The spatially concentric nature of Melbourne’s residential housing market in many aspects mirrors numerous established cities throughout the world, insofar that it has an eclectic mix of housing styles, ages, building fabric and ethnicity (Adams 1970; Sultana & Weber 2014). Recent high immigration levels to Australia have created need for increased development activity to provide housing (Daley, Coates, & Wiltshire 2018). The resulting expansive nature of greater Melbourne has placed urban planning strategies under considerable strain (DELWP 2018). One response to the need for increased housing stock has been to facilitate greater use of medium density housing in areas where it was not previously seen. Such housing has been excluded from the dataset for the reasons stated previously, namely the lack of independent choice in terms of building fabric and other energy efficient attributes.
Another class of residential housing stock available in Melbourne, as in many other cities, is project homes. These are houses built by construction companies and sold via an internal sales force; therefore there is no intermediary in the marketing process. These sales are not included in the data as they are not sold under agency conditions nor reported to the REIV (J Mitchell, Manager, REIV, interview, 10 February 2017). Specific evaluation of how energy efficient technologies are being promoted in new build homes could certainly reveal developing trends that may be later observed in resales, conducted by agents. This field of investigation ought to be done separately as the working environment for internal sales staff is logically somewhat different to that of intermediaries, aka real estate agents. Moreover, internal sales staff of construction firms are not normally responsible for the development of advertising material in the same way as agents are and therefore, in order to ensure research validity, it is necessary to not consider such advertisements in this research. Here, the reader is reminded that the focus of this research is upon licensed real estate agents and how they engage with house energy efficient features when scripting house advertisements.

In addition to the aforementioned reasons for excluding multi-owner property from the dataset, established detached housing represents the substantive proportion of housing in greater Melbourne. Eighty-six percent (86%) of these houses were built prior to the introduction of energy efficiency standards (ABS 2010). It is owners of these houses who are free to make choices regarding which, if any, energy efficient technologies (such as solar panels or water tanks) are suitable for retrofitting into their homes. Retrofitting energy efficient technologies is relatively common practice (Friedman, Becker & Erell 2014; Judson & Maller 2014). House owners are free to do so as they do not have the same restraints that owners of multi-owner properties do. In other words, they do not need to obtain a consensus from other owners prior to arranging purchase and installation of preferred technologies. Focussing on this house classification is argued to provide a more accurate picture of how agents are engaging with house energy efficient technologies. This research uses advertisements composed by residential agents acting in the capacity of an intermediary, and can consequently demonstrate an independent interpretation of market movements and subsequent engagement by agents with such technologies.

When considering energy efficiency in housing, it is necessary to review such technologies within the context of the climate as climatic conditions strongly influence how houses are designed and constructed (Ren, Chen & Wang 2011).
4.3.3.2 Building codes and climate zones

The Australian Building Codes Board (ABCB) is responsible for developing and promulgating the National Construction Code throughout Australia (ABCB 2015a), and controls the design and building process to meet contemporary engineering and social expectations (ABCB 2015b). ABCB also specifies characteristics a house should possess to enhance carbon emission reduction performance.

Within the context of the building code is the recognition that design and building fabric are required to have regard to the prevailing climate if successful abatement of building related carbon emissions is to be achieved (ABCD 2018b). In Australia, the ABCB recognises 8 climate zones (ABCB 2015c). These are an amalgam of numerous climate zones prescribed by the Australian Bureau of Metrology (BOM) and have been combined to ensure efficient use and interpretation of the various building codes within each zone.

The ABCB customises building codes and practices to address the stresses unique climatic conditions place upon the fabric of the house. Greater Melbourne is located within Climate zone 6 with some regions, particularly those in the east, located in Climate zone 7 (See Figure 4.2). Climate zone 6 is considered a mild temperate zone whereas Climate zone 7 is considered a cool (not alpine) zone. A review of the required building standards between Climate zones 6 and 7 showed a slight orientation towards enhanced insulation requirements in zone 7 (Lyons 2013, p. 92; Build 2018). Also noted was the recommendation that buildings have smaller windows; otherwise they are very similar, but this is only a recommendation. As stated, approximately 86% of Melbourne’s housing stock was built prior to introducing energy efficient standards; therefore, discernible differences are likely to be minimal between the zones.

The dataset uses postcodes as the locational identifier and includes records from both Climate zone 6 and Climate zone 7, with a small proportion of houses within Climate zone 7. Close examination of the regions revealed some postcodes overlapped climate zone boundaries in connecting regions. It was decided to ignore this overlapping, with two factors influencing this decision. The first factor was that the difference in building standards between these zones was minimal (ABCB 2017), and the second was that approximately less than 1% of the dataset lay within Climate zone 7. Therefore, all data were considered to lie within Climate zone 6. This background is forwarded as a rationale for disregarding the potential effect of the two climate
zones upon real estate agent house advertisements, and is therefore acknowledged as a limitation of this research.
Figure 4.2: Victorian Climate Zones (Source: Adapted ABCB 2009)
Figure 4.2 provides a map of Victoria detailing the climates zones pertaining to the state. The study is shown in the break out section at the top of the map and some postcodes straddle the cool climate shown by the red arrow.

The following section provides detail regarding the data collection, preparation and analysis process. The process of attaining, preparing and analysing quantitative data using content analysis techniques is discussed first. This is followed by a similar discussion of the qualitative data.

4.4 Quantitative data – Developing advertising analytics

4.4.1 Content analysis

‘Content analysis is a research technique for making replicable and valid inferences from text (or other meaningful matter) to the context of their use’ (Krippendorff 2004, p.18). A further definition is provided by Neuendorf (2017, p. 1) as ‘the systematic, objective, quantitative analysis of message characteristics.’ Thus, content analysis is a systemised approach to analysing verbal, visual and written communication between people, and is a common research methodology for investigating information embedded within these forms. Using recognised methods, data is created through coding information embedded within communication forms and these data can then be used for qualitative or quantitative analysis (Neuendorf 2017, p. 22). As the unit of analysis is textual – that is, real estate agent advertisements – this method has direct application here. The discourse analysis technique was employed and involved understanding the characteristics of manifest language and word use (Sarantakos 1998, p. 283). Manifest language variables are ‘elements that are physically present and countable’ (Gray & Densten 1998, p. 420). Juxtaposed to manifest language is latent content that cannot be measured directly and possesses connotative meaning. The later requires considerable effort to ensure subtle meanings are accounted for within the analysis. Such meanings are not explored in this research and the method applied centred on the actual presence of categorised keywords. Previous studies have shown the effectiveness of employing this technique within the property discipline (for example, see: Williams, Qualls & Grier 1995; Dorwart 2016; Encinas, Aguirre & Marmolejo-Duarte 2018).

Content analysis techniques have been used effectively in numerous applications to evaluate themes and ‘missing’ information in advertisements (for example, see; Carlson, Stephen &
Kangun 1993; Anderson, Dewhirst, & Ling 2006; Alberta, Berry & Levine 2014) and remains a useful technique to analyse large volumes of textual data.

The steps adopted for applying this methodology are those detailed in Sarantakos (1998, p. 280-281) as follows:

*Step 1 – Selection of research topic*
The research topic investigates how real estate agents engage with energy efficient technologies when advertising houses.

*Step 2 – Formulation of the research topic*
This is the process defining, exploring and operationalising the topic, and was discussed in part in chapters 1, 2 and 3.

*Step 3 – Research design*
This step determines a) sample size, and b) methods of recording and analysing data. The sample size is a large database of advertisements generously provided by the REIV. This step identifies categories and code to be used in data collection, analysis process, and methods for checking reliability.

*Step 4 – Collection of data*
The dataset provided by the REIV constitutes advertisements used in marketing residential property. The dataset was cleaned to provide only advertising for detached housing and included house sales from July 2008 through to March 2015. To this dataset ABS demographic data was added at the postcode level. The specifics of this process are provided below in section 4.5.1.4 – Identification of categories and keywords. Preparing data for analysis was initially through categorising keywords into groupings identified through literature. These groupings were: Altruistic, Parsimonious, Technology, and Design. Again, specifics of these, and rationales for their categorisation, are provided in sections following section 4.5.1.4. Data coding then follows.

Coding is the next stage, which involves counting frequencies, location and interpreted meanings of identified keywords (Sarantakos 1998, p. 281). This process provides data for analysis and is explained below. In particular this step:

- Identified whether or not the keywords appear in the advertisement.
• Identified the types of keywords appearing.
• Identified the frequency of the keywords.
• Identified the prominence of the keywords within the advertising script.
• Evaluated the keywords. (In this research evaluate is interpreted to mean whether the keyword is manifest or latent: see below for explanation of these typologies.)
• Examined the intensity of the advertisement. (Here intensity is defined as multiple keywords in the advertisement. This is interpreted as the real estate agent seeking to emphasise the environmental characteristics of the house.)

**Step 5 – Analysis and interpretations**

For this study, analysis and interpretation means the data is to be analysed using quantitative methodologies. The quantitative analysis concerns the manifest, coded data and is both descriptive and categorical, thus providing information concerning frequencies, demographic relationships, and geo-spatial factors. Results were then reported.

**4.4.1.1 Strengths and weaknesses of content analysis**

Every research methodology has weaknesses and limitations (Johnson, Onwuegbuzie & Turner, 2007; Mayoh & Onwuegbuzie, 2015). The aim of the researcher is to select a methodology that is most useful to the integrity and validity of the research. In doing this the inherent limitations must be recognised and minimised as far as possible (Levy 2006). Content analysis methodology is no exception to this principle. Both Sarantakos (1998) and Neuendorf (2017) identify limitations pertinent to this methodology. These limitations are paraphrased here in the context of this research. It should be noted that this list is not exhaustive, and the main characteristics presented are noted in Table 4.1.

**Table 4.1: Content analysis – strengths and weaknesses**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
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<tbody>
<tr>
<td>Content analysis….</td>
<td>Content analysis….</td>
</tr>
<tr>
<td>1. [<em>.</em>] is <em>unobtrusive</em>. The data gathered for this research is secondary data with identifiers removed prior to acceptance.</td>
<td>1. [<em>.</em>] does not have access to background documents. As advertisements are de-identified it is not possible for the researcher to ask agents why they wrote a particular advertisement the way they did. Qualitative data supplements this weakness.</td>
</tr>
</tbody>
</table>
This research and the methodology adopted to complete it have been undertaken with regard given to the factors listed in Table 4.1. Strategies to address the inherent weaknesses of content analysis are now discussed.
4.4.1.2 Validation

Validation refers to the ‘extent a measuring procedure represents the intended- and only the intended-concept’ (Neuendorf 2017, p. 122). As this inquiry investigates the extent of real estate agent engagement with energy efficient technologies and the reasons behind it, it is the initial selection of keywords that constitutes the energy efficient lexis for each category that is important. Adopting a mixed method methodology, analysis was undertaken using SPSS v22, with the keywords manifestly coded; that is, counted if present within the advertisement. Once keywords are determined, manifest coding is valid in that keywords are either present or not and SPSS is reliable in detecting the presence once coded.

In regard to types of validity, Neuendorf (2017, p. 124-128) identifies five categories. These are: internal and external validity, face validity, criterion validity, content validity, and construct validity. Each is now discussed with specific reference to this research.

4.4.1.2.1 Internal and external validity

Internal validity refers to the assurance that what was intended to be measured is being measured (Neuendorf 2017, p. 125), while external validity relates to generalisability in other settings (ibid). To attain valid measures, Neuendorf argues where possible for applying and/or adapting such measures used in previous research. Here internal reliability was attained by an extensive review of energy efficient language used in previous research. Such techniques have been applied when undertaking advertising studies of real estate advertisements (Munday 2004; Hadfield & Hadfield 2006; Munro 2018). Energy efficient lexis used in previous research was recorded and cross-checked with commercial and government websites for validation of keywords. This was done to ensure such lexis would be familiar to readers of house advertisements and therefore agents would be likely to use such language in an effort to communicate to the market.

External validity refers to the generalisability of the results and application to other settings (Neuendorf 2017, p. 125). A common approach in assessing external validity is to consider the representativeness of the sample (ibid). In this research the advertising data evaluated is the population of advertisements written by residential agents during the study period. As such, it is therefore considered generalisable when the same dictionary of keywords is used. The broader implications of the findings to other markets are discussed in the final chapter.
4.4.1.2.2 Face validity
Face validity refers to the extent the measure appears to align to the desired concept (Neuendorf 2017, p. 125). In other words, the researcher steps back and objectively reviews the measures and evaluates if they are in fact measuring the thing intended. Language used by agents to indicate energy efficient technologies is explicit in that it aims to highlight a particular feature and can rarely be confused with another purpose. For example, solar PV cells have an explicit meaning that is broadly understood.

4.4.1.2.3 Criterion validity
Criterion validity is the extent to which a measure uses standards or processes external to the measure (Neuendorf 2017, p. 126); in other words, how the narrative may be created for analysis. This has minimal relevance here as advertisements existed and are the part of the research in themselves, and are not subject to any manipulation prior to analysis. It is the actual appearance of words associated with energy efficiency that is being examined.

4.4.1.2.4 Content validity
Content validity is the extent that the measure is capable of covering the full domain of the concept being examined and measured. (Neuendorf 2017, p. 127). House energy efficient characteristics are relatively narrow in their scope and therefore easily compiled to create a dictionary of technology options.

4.4.1.2.5 Construct validity
Construct validity refers to the relation of a measure to other measures in a way that is consistent with hypothesis derived from theory (Neuendorf 2017, p. 127). Literature, described in Chapter 2 – Literature Review, suggests a convergence of demographic variables and frequency of appearances of energy efficient technologies in house advertisements. In other words, literature is suggesting frequency of observations of keywords within advertisements should relate to demographic characteristics (keywords and keyword categories are discussed below). With regard to construct validity, Neuendorf (2017, p. 128) also noted that ‘all measures need to be thoroughly defined’. This is the next component of this discussion.

In compiling keywords, Short et al. (2010, p. 327) advocate creating dictionaries, ‘using theory or conceptual definition to generate a list of terms’. To this end literature was used to identify themes regarding technologies and individual antecedents for engagement in energy efficient housing by agents. This served dual purposes: first to identify theory to guide keyword
selection, and second to examine construct dimensionality. These themes, hereafter referred to as categories, were used as a guide to identify individual keywords. Such an approach satisfied internal, external and face validation criteria in that it was clear and generalisable and aligned to the desired concepts being examined.

The next step in the process was to develop an exhaustive list of keywords that identify each category. The aim here was to ensure that words selected are those the general population would understand in the context of house energy efficiency. This required the researcher to review alternative advertising of technologies (such as merchants of solar and window technologies), various websites (such as government sites intended to aid the understanding of the benefits of such technologies), and the advertisements themselves. This process also assisted in external, content and construct validity (Roberts, Priest & Traynor 2006).

The final step in the validation process was to verify interpretation and context of the keywords with members of the public. These people were known to the researcher and were adults who have previously purchased a house and had engaged with house advertising. Prior to reading the advertisements the four people were provided an overview of the research and brief explanation of the task. However, care was taken not to lead the participants in interpretation of energy efficient word meanings or categories. The process for this was as follows:

1. Forty-five advertisements containing keywords were selected from the dataset and printed in Excel format for distribution. The period of data was not considered relevant for this task and therefore no regard was given to selecting advertisements across the various time periods. The basis upon which the specific number was chosen was an attempt to balance verification and time taken to complete the task as typical human concentration spans when reading digitised information is considered low (McSpadden 2015).

2. Four participants in this research were then asked to read each of the forty-five advertisements separately. Concurrent reading was not considered necessary and no time limitation was given to this task.

3. After reading the advertisements each person was asked the following questions:
   a. Did you see any words that seem to describe some sort of energy efficient features?
   b. If so, what were these words?
   c. What sort of energy efficient technology did they describe?
d. Did you understand what the agent was trying to describe regarding the energy technology words?

e. Were there any words or phrases where the agents seemed to suggest some energy efficient features without actually naming them?

Once completed, the keywords presented in Table 4.2 were adopted for the research with no further amendment necessary. Human coding of advertisements for analysis was not used in this process. Computer coding was applied and therefore further validation and reliability measures were not necessary.

4.4.1.3 Reliability

Neuendorf (2017, p. 165) defines reliability as ‘the extent to which a measuring procedure yields the same results on repeated trials’. Reliability is particularly important for human coding techniques (ibid). This is to ensure coders interpret data in the manner required by the construct applied to the research being undertaken. However, this research used computer aided methodologies and therefore such reliability concerns are somewhat less relevant here. Keywords are either present in the advertisement or not. Therefore, careful and exhaustive development of the taxonomy was undertaken to ensure accuracy and precision of the analysis, the final two criteria when undertaking content analysis. This process is described below.

4.4.2 Construction of categories and keywords

When undertaking a content analysis, it is first necessary to determine how the data is to be coded. Figure 4.3 provides the Categorisation and Keyword grouping model adopted in this research.
Content analysis seeks to understand messages embedded in communication mediums such as text (Stemler 2001). Adhering to the orthodox practise of content analysis at the highest level, messages can be categorised as Manifest (explicit) or Latent (implied), and must interpreted in context to best understand intended messages. Sarantakos (1998, p. 280-285) provides a useful model for categorising and constructing keywords and this has been applied here.

Group 1 refers to Metalanguage and is the first level of analysis. This is a high-level categorisation of the language used in advertisements. Words and phrases are categorised into either ‘Manifest’ or ‘Latent’ groupings based upon clarity and inference to the reader (Neuendorf 2017, p. 31). Manifest words are language that specifically mentions the energy efficient technology. For example, ‘solar panels’ fall into this grouping. This stage is somewhat intuitive in that words either directly refer to house characteristics and/or technology, or do not. The Latent group embodies lexis that alludes to energy efficient characteristics within the house but fails to state how this is achieved. These are words such as ‘environmental’ or ‘eco-friendly’. These deliver positive inferences about the house most likely to target buyers who hold personal values about environmental behaviours.
Group 2 refers to Categories and is a taxonomic allocation of individual keywords searched within the data. The four category titles reflect tangible keywords such as ‘double-glazed windows’, or intangible keywords such as ‘eco-home’ characteristics, with groups named to reflect the literal or primary meaning of the keywords within them. The four categories are combined at this level to allow for comparison and analysis of keywords and meanings.

In the context of this research the latter, latent words, are considered to be hyperbole or puffery, as they are terms typically used to enhance and/or emphasise the characteristic the agent believes is attractive to the market. It is common advertising practise to heighten factual information with words and phrases that convey positive messages (Pryce & Oates 2008).

The following sections provide further explanation of the four categories within which keywords are allocated. To address the research questions posited, it is first necessary to understand and categorise energy efficient language used in advertisements. Themes, derived from literature, have been used to do this. Each category captures either physical elements of a house with energy efficient characteristics, or intangible references to its ability to provide enhanced energy efficient performance in some manner.

As the aim of this research is to examine what accounts for the extent to which real estate agents are engaging with energy efficient technologies when advertising houses for sale, it is important to thoroughly consider the range of references agents may use when attempting to describe a house with energy efficient characteristics. Therefore, considering both tangible and intangible lexis is appropriate to achieve this.

4.4.2.1 Technology
To create a lexis suite that constitutes a Technology category, it was first necessary to identify suitable keywords that could reliably be interpreted as an attempt by agents to promote energy efficient technologies. It was postulated that real estate agents would use language believed to be familiar to housing market participants. The practice of using familiar language when marketing to specific interests is common (Gross 2015). The first step in the process of categorising this language for analysis was to establish lexis used by merchants of energy efficient technologies when advertising energy efficient technologies. The rationale for this was advertising language used in merchant advertisements would be familiar to the public. Furthermore, and for the same reason, it is reasonable to expect that this is the language agents would use in house advertising. Using manifest coding techniques applied to merchant
advertisements, industry magazines, and other forms of media promotions. Technology keywords were identified and compiled into this category. These are tangible elements of the house; for example, solar hot water.

It is acknowledged some potential technologies have been excluded, such as weather strips or window films. These are low cost items generally installed on or around windows and doorframes to reduce unwanted air leakage. Such retrofitted technologies, while desirable, are not generally mentioned in advertisements. A search within that dataset did not reveal a single mention of this technology. The researcher attributes this to the ‘mundane’ nature of the technology and ease of post-occupancy installation by the buyer. It is therefore considered reasonable to assume this technology is insignificant in the mind of the buyer compared to more expensive and/or complex technologies.

4.4.2.2 Design characteristics
The Design category is language that refers to house characteristics that were intentionally designed into the layout and/or building fabric of the house, and post-construction installation would be either impractical and/or expensive; for example, positioning of interior walls to enhance internal air flow, or roof eave (roof overhang from external walls) width to capture winter sun rays which is enabled because of the sun’s lower angle to the horizon while providing shade during summer. Literature guided the selection of keywords within this category. While potentially not exhaustive, it is considered the compilation of keywords sourced from such literature represents the most frequently discussed design characteristics that enable energy efficient house performance. These characteristics have been categorised on the basis that change, or modification, is typically impractical due to the effort and expense involved, and are therefore considered permanent; for example, double glazed window systems.

4.4.2.3 Altruistic
This category refers to intent of energy efficient house design, rather than the tangible elements of the design. Altruistic lexis compiles words and phrases that have a sense of benevolence. Appeals to emotion are common in advertising and often used in creating societal change (Kadry 2016). In this research these are words and phrases aimed at those seeking to ‘feel good’ about their house choice, and in doing so reduce their carbon footprint, thus doing ‘their bit’ to resolve a global issue (Guy 1988; Steg & Vlek 2009).
The suite of keywords identified was guided by literature that examined antecedents for engagement in environmental housing. This was an iterative process that began with the researcher reading house advertisements within and outside the research timeframe, and words or phrases that could be classified in this category were recorded. Energy technology merchant advertisements were also examined for altruistic language. Websites of various organisations engaged with environmental issues in various forms were also reviewed and relevant terminology noted.

Once these avenues were exhausted, synonyms of identified words were noted and appropriately included in the keyword category. To further validate this keyword selection, suites of keywords were randomly compared to online house sale advertisements appearing at time of keyword creation but outside the data timeframe. This process resulted in no modification to the keyword groups. The final list was reviewed by the researcher for verification, and then provided to two independent persons for review and comment. This independent review did not result in any alterations to the original list.

**4.4.2.4 Parsimonious**

This final category aims to capture textual phrases that appeal to those seeking to acquire potential financial benefits associated with energy efficient housing; that is, cost savings through reduced energy bills. Such benefits are not necessarily obvious. Therefore, a real estate agent may feel compelled to highlight these benefits in an advertisement (Lindén, Carlsson-Kanyama & Eriksson 2006). From the agent’s perspective, this strategy can be dangerous. The danger lies in the reality that claims made in advertising in many countries must be capable of being supported with evidence. Occupant behaviour affects house energy consumption (Gill 2010; Berry et al. 2014), and even the most energy efficient houses will not perform if the occupants disregard the principles of design; for example, opening windows while running heating systems in winter impacts energy consumption.

As stated, the latent meanings of Parsimonious and Altruistic are regarded here as a form of puffery, also referred to as hyperbole (Pryce & Oates 2008). Such language is often used in house advertising and is considered obvious to the reader who is therefore capable of removing it from their interpretation of the thing being advertised (Haan & Berkey 2002; Amyx & Lumpkin 2016). For the reasons mentioned above, no regard was given to non-contextual puffery. That is, words such as ‘exciting’ or ‘fabulous’ were not considered as they may have many non-related meanings within individual advertisements. Rather Parsimonious and
Altruistic lexis are considered as ‘contextualised’ puffery as they make no tangible or measurable claim about the performance of a technology but suggest the house exhibits energy efficient performance in some way. These two categories imply or suggest something environmental about the house being advertised and are therefore used as a measure of the intensity of how strongly the agent is promoting the house’s energy characteristics.

4.4.2.5 Dictionary of keywords
The final step towards preparation for content analysis is to create the dictionary. Here, keywords that have been identified in literature, commercial advertisements, government websites etc., are grouped into their respective categories described above. This process was also driven by previous literature concerning public engagement with energy efficient technologies (for example, see: Dewick & Miozzo 2002; Crabtree & Hes 2009; Lakoff 2010; Frederiks, Stenner & Hobman 2015). It was therefore considered that language used in these publications would be familiar to the public and have become the ‘environmental vocabulary’ (Dahlén, Rasch & Rosengren 2003) and therefore useful for this research. Common themes and vernacular emerging from the textual sources mentioned above were documented, categorised into the four groups and tabulated. These became keywords searched within the advertising data for analysis. Real estate agents tend to use words perceived as being familiar to readers when scripting advertising (Oates & Pryce 2007; Perkins, Thorns & Newton 2008; Collins & Kearns 2008), and therefore this was considered an appropriate strategy to compile the search criterion. To verify this practice for application in this research, a random sample of advertisements, both internal and external to the dataset, was reviewed by the researcher. The outcome of this review supported previous research. Therefore, the assumption of commonality of language in the dataset was considered reasonable.

These words appearing in the dataset, now used as keywords, were clustered together in a manner adopted by previous research (Oates & Pryce 2007; Collins & Kearns 2008), and are listed in Table 4.2. They are presented together with their respective Group 2 categories.

<table>
<thead>
<tr>
<th>Group 2 – Category</th>
<th>Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altruistic</td>
<td>eco (where not one of the below)</td>
</tr>
<tr>
<td>Altruistic</td>
<td>greenTech</td>
</tr>
<tr>
<td>Altruistic</td>
<td>greenBuilder</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoConscious</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoDesign</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoEfficient</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoFeatures</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoFriendly</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoHome</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoTechnologies</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoSustainable</td>
</tr>
<tr>
<td>Altruistic</td>
<td>ecoWaste</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentally (where not one of the below)</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallyConscious</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallyEcomonical</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallyEfficient</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallyFriendly</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallyGreen</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallyMinded</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallyResponsible</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallySensitive</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallySound</td>
</tr>
<tr>
<td>Altruistic</td>
<td>environmentallySustainable</td>
</tr>
<tr>
<td>Altruistic</td>
<td>greenhouseGas</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>eglass</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>smartGlass</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>doubleGlaze</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>miglas</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>greyWater</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>recycledWater</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>insulation</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>northAspect</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>energyRated</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>energyRating</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>energyPassive</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>sustainableEnergy</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>sustainableDesign</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>solarDesign</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>solarHome</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>solarPassive</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>solarPrincipals</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>recycledMaterial</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>hydronic</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>passiveEnergy</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>passiveDesign</td>
</tr>
<tr>
<td>DesignCharacteristics</td>
<td>lowEnergyDesign</td>
</tr>
<tr>
<td>Parsimonious</td>
<td>energyReport</td>
</tr>
<tr>
<td>Parsimonious</td>
<td>energyConscious</td>
</tr>
<tr>
<td>Parsimonious</td>
<td>energyConservation</td>
</tr>
<tr>
<td>Parsimonious</td>
<td>energyConsumption</td>
</tr>
</tbody>
</table>
It is worth noting window technologies are listed within the Design Characteristic group. The rationale for this inclusion is that energy efficient windows, such as double or triple glazing, is relatively expensive in Australia when compared to single glazed windows and provide only marginal benefit in mild climates (McLeod & Fay 2010). Therefore, they are less likely to be retrofitted into houses as a means of reducing energy use and more likely to be considered an important inclusion when designing a house if energy efficiency is an objective (Ma et al. 2012). Research regarding the cost benefits of advanced window technologies in energy reduction has shown that it takes many years, up to decades, for the outlay to be recovered, particularly when retrofitted (Jakob 2006; Friedman, Becker & Erell 2014). As a result of expected slow recovery of capital expenditure, it was considered a rational person would decide against retrofitting windows for the purpose of enhancing energy efficiency. It is possible that one may choose to install double or triple glazed windows to minimise noise pollution (Öhrström et al. 2006). However, understanding the motive for a householder to do so is beyond the scope of this research. It is the physical presence of energy efficient windows, and what estate agents say about these in advertisements, that is important here.

For similar reasons as windows, insulation was allocated to design features as it is generally installed at the point of construction. Water tanks on the other hand are allocated to Technology
keywords as these are generally installed post-construction and are not mandated by any building codes in Victoria (VBA 2019).

Having described the categorisation and construction of the keywords, it is now necessary to discuss the research database and preparation for analysis.

4.4.3 The research database
The following provides a discussion of the quantitative data used in this research.

4.4.3.1 Real estate agent advertisements
The advertising data were obtained from the REIV and combined with publicly available data from the ABS. The REIV agreed to support this research by providing the data acquired from agents as part of the sales reporting process. REIV member agents are required to provide sales data together with the advertisement used to market the property, and this information is provided when the property has been sold. Houses listed for sale but not sold are not reported to the REIV. This is therefore acknowledged as a limitation of this methodology as such house advertisements are not included in the data. While the REIV dataset included missing information, it was nonetheless considered a very large database and included every sale transacted by REIV member real estate agents in Victoria from August 2008 to March 2015. The REIV represents 76% of all agents in Victoria (J Mitchell, Manager REIV, interview 20 June 2014) and therefore the database is considered statistically representative of Victorian residential transactions. During the discussion with Mr Mitchell of the REIV, he indicated the 24% of agents who were not members were either non-residential or non-practicing agents. Therefore, the 76% membership figure quoted for this research is considered to represent 100% of practising residential real estate agents. It is acknowledged during this period houses would have been sold directly by owners, but this is a very limited and unusual practice within Victoria. Such sales would not appear in the REIV data, nor are they detectable via normal channels and importantly this study focuses on the actions of real estate agents and not house sales.

Table 4.3 provides a sample extract of the data acquired from the REIV. The initial database consisted of 322,935 items (advertisements) and included all forms of residential dwellings such as apartments, townhouses and fully detached housing.
Table 4.3: Sample REIV data

<table>
<thead>
<tr>
<th>Record ID</th>
<th>Suburb</th>
<th>Postcode</th>
<th>State</th>
<th>Property Type</th>
<th>Sale Date</th>
<th>Sold Price</th>
<th>No.</th>
<th>Bedrooms</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5289591</td>
<td>YARRA VILLE</td>
<td>3013</td>
<td>VIC</td>
<td>HOUSE</td>
<td>10/08/08</td>
<td>$422,500</td>
<td>1</td>
<td></td>
<td>Situated on a generous allotment this home provides a great opportunity for you to create your dream home (subject to Council approval). Comprising: Four main rooms with hardwood floors- Timber kitchen with gas cooking facilities- Internal amenities- Large westerly facing rear yard- Off street parking. Located a comfortable stroll to popular Cruickshank Park recreational reserves Kingsville Primary School and local bus services.</td>
</tr>
<tr>
<td>5277653</td>
<td>SUNSHINE NORTH</td>
<td>3020</td>
<td>VIC</td>
<td>HOUSE</td>
<td>1/08/08/08</td>
<td>$537,000</td>
<td>4</td>
<td></td>
<td>This brand-new home is designed with a luxurious lifestyle in mind. Boasting formal lounge informal open plan living leading to an alfresco area spacious bedroom (BIR’S) master with a spa ensuite family retreat and remote garage with internal access. Features; Quality flooring ducted heating evaporative cooling alarm and much more. This truly special home is ripe for the picking.</td>
</tr>
<tr>
<td>5296806</td>
<td>SUNSHINE NORTH</td>
<td>3020</td>
<td>VIC</td>
<td>HOUSE</td>
<td>22/08/08</td>
<td>$315,000</td>
<td>3</td>
<td></td>
<td>Rarely does such a warm and inviting home find its way onto the market. Offering formal lounge with northerly aspect, renovated kitchen with adjoining meals area renovated bathroom spacious bedrooms huge sunroom and garage. Features ducted heating air-conditioners alarm security shutters huge shed and much more. All this set on a sizable allotment offering the astute buyer many options.</td>
</tr>
</tbody>
</table>

Of interest to this research is the suburb and postcode, date of sale, and the advertisement. Although initially provided with all residential property types, the dataset was filtered to retain only detached housing. To this REIV data, ABS data was added. REIV record ID was also retained for use in future research.

4.4.3.2 ABS data

Research has shown a relationship between demographic profiles and the likelihood of engagement with environmental behaviours and choices (Berger 1997; Scott, Oates, & Young,
2015). For example, people who exhibit greater wealth characteristics are more likely to acquire energy efficient technologies and engage in environmental behaviours (Christie, Donn & Walton 2011; Lai & To 2011; Waitt et al. 2012), and more educated people are more likely to adopt energy efficient behaviours (Banfi et al. 2008; Mills & Schleich 2012). Therefore, it was necessary to include reliable data about demographic information. All ABS variables were sourced and included in the dataset at the postcode level to align with the REIV data and provide the basis for more detailed analysis. Specifically, the variables added to the REIV dataset at the postcode level were: median age; median family income; monthly mortgage payments; average number of persons per household; transit mode to work; and local government areas (LGAs). All are used by the ABS to analyse data.

To control for Consumer Price Index (CPI) and other external impacts on house prices over time, the House Price Index (HPI), created by the ABS, was applied against the recorded sale prices provided within the REIV dataset. The ABS uses the HPI to identify and monitor real house price movements over time by controlling for economic and consumer price fluctuations (ABS 2009). This index only considers detached dwellings and is therefore useful in this research. This has relevance here when considering family wealth and engagement with energy efficient technologies.

The aim of the research is to understand how real estate agents are engaging with house energy efficient technologies in advertisements and what accounts for that engagement. To this end the theories posited in this thesis were applied to guide the research. ABS data used in this research provided important demographic information for the geographic areas of the research. This was necessary because literature revealed that income, age and, to a lesser extent, education, all influenced engagement with house energy efficient technologies. Thus, ABS data was used to inform spatial mapping. From these maps, and other forms of analysis, information about frequency of energy efficient language could be seen for demographic profiles.

These data (namely, the REIV and ABS) were collated into Excel, and then imported in SPSS v22 for screening and cleaning in preparation for analysis.

**4.4.3.3 Database information required**

Table 4.4 sets out information used in the database together with a brief description. The table shows the physical and demographic data perceived by previous researchers as important to
adopting environmentally positive behaviours. General data (such as time periods, local
government areas (LGAs), clustered regions, and transit mode to work) were included as
adoption data as they relate to the choice buyers make about housing, with time periods
providing a longitudinal frame. Where applicable, the purpose of including the variable is
provided for further clarification. Flags (dummy variables) were created within SPSS for
analysis. Postcodes noted in Table 4.4 are locality identifiers and are used by postal and other
delivery services.

Table 4.4: Property attribute database

<table>
<thead>
<tr>
<th>Name</th>
<th>Description &amp; Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data from ABS at postcode level</td>
<td></td>
</tr>
<tr>
<td>advDip_Dip_pct</td>
<td>Percentage of Diploma, advanced Diploma within population</td>
</tr>
<tr>
<td>Average_household_size</td>
<td>Average number persons per household-ABS variable at the postal code level</td>
</tr>
<tr>
<td>Average_num_psns_per_bedroom</td>
<td>Average number of people per bedroom – ABS variable at the postal code level</td>
</tr>
<tr>
<td>bachDeg_pct</td>
<td>Percentage of UG degree within population at postcode level</td>
</tr>
<tr>
<td>degree_Bach_post_pct</td>
<td>Percentage of PG degree within population at postcode level</td>
</tr>
<tr>
<td>description</td>
<td>Sales advertisement used for keyword search</td>
</tr>
<tr>
<td>HHweeklyIncome000</td>
<td>Median household weekly income – in 000s of dollars.</td>
</tr>
<tr>
<td>hpi</td>
<td>ABS House Price Index</td>
</tr>
<tr>
<td>hpi_base2013Q3</td>
<td>Reference point for ABS House Price Index</td>
</tr>
<tr>
<td>lengthOfDescr</td>
<td>Number of characters of advertisement</td>
</tr>
<tr>
<td>Median_age_persons</td>
<td>Median age – ABS variable at the postal code level</td>
</tr>
<tr>
<td>Median_mortgage_repay_monthly</td>
<td>Median monthly mortgage repayment – ABS variable at the postal code level</td>
</tr>
<tr>
<td>Median_Mort_Repay_monthly000</td>
<td>Median monthly mortgage repayment in 000s of dollars – ABS variable at the postal code level</td>
</tr>
<tr>
<td>Median_rent_weekly</td>
<td>Median weekly rent – ABS variable at the postal code level</td>
</tr>
<tr>
<td>Median_Tot_fam_inc_weekly</td>
<td>Median total family weekly income – ABS variable at the postal code level</td>
</tr>
<tr>
<td>Median_Tot_hhd_inc_weekly</td>
<td>Median total household weekly income – ABS variable at the postal code level</td>
</tr>
<tr>
<td>Median_Tot_prsnl_inc_weekly</td>
<td>Median total personal weekly income – ABS variable at the postal code level</td>
</tr>
<tr>
<td>mortgage000</td>
<td>Average mortgage at the postcode level in 000s of dollars</td>
</tr>
<tr>
<td>Column</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>numBeds</td>
<td>Average number of bedrooms per household at the postcode level</td>
</tr>
<tr>
<td>overlap_postcode</td>
<td>Identification of postcodes appearing in adjoining climate zones</td>
</tr>
<tr>
<td>P_AdvDip_and_Dip_Total</td>
<td>Percentage of people in the postcode that have a diploma or Advanced Diploma</td>
</tr>
<tr>
<td>P_BachDeg_Total</td>
<td>Percentage of people in the postcode that have a bachelor’s degree</td>
</tr>
<tr>
<td>P_GradDip_and_GradCert_Total</td>
<td>Percentage of people in the postcode that have a graduate diploma, a graduate certificate</td>
</tr>
<tr>
<td>P_PGrad_Deg_Total</td>
<td>Percentage of people in the postcode that have a postgraduate degree, a graduate diploma, a graduate certificate</td>
</tr>
<tr>
<td>P_Tot_Total</td>
<td>Percentage of persons with qualifications</td>
</tr>
<tr>
<td>pctDesc_home_features</td>
<td>Percent of the way into the description that the home features keyword is found – not used for principal analysis</td>
</tr>
<tr>
<td>Postcode</td>
<td>Numeric version of the postcode – postcodes are used within Australia to identify uniquely defined geographical regions</td>
</tr>
<tr>
<td>postGradDeg_pct</td>
<td>Percentage of people in the postcode who have a postgraduate degree (Masters or Phd)</td>
</tr>
</tbody>
</table>

*Data from REIV database*

<table>
<thead>
<tr>
<th>recordID</th>
<th>Original record id</th>
</tr>
</thead>
<tbody>
<tr>
<td>region_AllGippsland</td>
<td>Binary flags for the various regions – all regions categorised for analysis but regions outside of greater Melbourne excluded from analysis</td>
</tr>
<tr>
<td>region_BarwonWestern</td>
<td></td>
</tr>
<tr>
<td>region_CentralHighlandsWimmera</td>
<td></td>
</tr>
<tr>
<td>region_GoulburnOvensMurray</td>
<td></td>
</tr>
<tr>
<td>region_InnerEasternMelb</td>
<td></td>
</tr>
<tr>
<td>region_InnerMelb</td>
<td></td>
</tr>
<tr>
<td>region_LoddonMallee</td>
<td></td>
</tr>
<tr>
<td>region_MorningtonPenis</td>
<td></td>
</tr>
<tr>
<td>region_NEMelbourne</td>
<td></td>
</tr>
<tr>
<td>region_NWMelbourne</td>
<td></td>
</tr>
<tr>
<td>region_OuterEMelbourne</td>
<td></td>
</tr>
<tr>
<td>region_OuterWMelbourne</td>
<td></td>
</tr>
<tr>
<td>region_SEMelbourne</td>
<td></td>
</tr>
<tr>
<td>region_Smelbourne</td>
<td></td>
</tr>
<tr>
<td>SaleDate</td>
<td>The date of sale</td>
</tr>
<tr>
<td>saleMonth</td>
<td>Month of sale</td>
</tr>
<tr>
<td>salePrice</td>
<td>The sale price of the house</td>
</tr>
<tr>
<td>saleprice_adj</td>
<td>Sale price adjusted to the HPI using third quarter of 2008 as the base (reference point) – all analysis involving sale price</td>
</tr>
<tr>
<td>saleprice_adj0000</td>
<td>Sale price adjusted to the HPI using third quarter of 2008 as the base in 000s dollars</td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>saleQuarter</td>
<td>The quarter of sale – used to create the saleYearQuarter variable</td>
</tr>
<tr>
<td>SalesDataMergedID</td>
<td></td>
</tr>
<tr>
<td>saleYear</td>
<td>The year of the sale – used to create the saleYearQuarter variable</td>
</tr>
<tr>
<td>saleYearQuarter</td>
<td>The year and quarter of the sale – e.g., 201003 = third quarter of 2010</td>
</tr>
<tr>
<td>Suburb</td>
<td>Suburb</td>
</tr>
<tr>
<td>t0</td>
<td>Time flags for each calendar quarter – indicates which quarter the sale occurred in: T0 is the first quarter of the dataset – 2008 Q3</td>
</tr>
<tr>
<td>t1</td>
<td></td>
</tr>
<tr>
<td>t2</td>
<td></td>
</tr>
<tr>
<td>t3</td>
<td></td>
</tr>
<tr>
<td>t4</td>
<td></td>
</tr>
<tr>
<td>t5</td>
<td></td>
</tr>
<tr>
<td>t6</td>
<td></td>
</tr>
<tr>
<td>t7</td>
<td></td>
</tr>
<tr>
<td>t8</td>
<td></td>
</tr>
<tr>
<td>t9</td>
<td></td>
</tr>
<tr>
<td>t10</td>
<td></td>
</tr>
<tr>
<td>t11</td>
<td></td>
</tr>
<tr>
<td>t12</td>
<td></td>
</tr>
<tr>
<td>t13</td>
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</tr>
<tr>
<td>t14</td>
<td></td>
</tr>
<tr>
<td>t15</td>
<td></td>
</tr>
<tr>
<td>t16</td>
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<td>t17</td>
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<td>t18</td>
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<td>t19</td>
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<td>t20</td>
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</tr>
<tr>
<td>t21</td>
<td></td>
</tr>
<tr>
<td>t22</td>
<td></td>
</tr>
<tr>
<td>t23</td>
<td></td>
</tr>
<tr>
<td>t24</td>
<td></td>
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<tr>
<td>t25</td>
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</tr>
<tr>
<td>t26</td>
<td></td>
</tr>
<tr>
<td>t27</td>
<td></td>
</tr>
<tr>
<td>t28</td>
<td></td>
</tr>
<tr>
<td>index_passiveEnergy</td>
<td>Each of the following ‘index’ variables shows the location of the first target phrase – e.g., the location of the first ‘passive energy’ phrase</td>
</tr>
<tr>
<td>index_passiveDesign</td>
<td></td>
</tr>
<tr>
<td>index_eglass</td>
<td></td>
</tr>
<tr>
<td>index_smartGlass</td>
<td></td>
</tr>
<tr>
<td>index_doubleGlaze</td>
<td></td>
</tr>
<tr>
<td>index_miglas</td>
<td></td>
</tr>
<tr>
<td>index_greyWater</td>
<td></td>
</tr>
<tr>
<td>index_recycledWater</td>
<td></td>
</tr>
<tr>
<td>index_recycledMaterial</td>
<td></td>
</tr>
<tr>
<td>index_insulation</td>
<td></td>
</tr>
<tr>
<td>index_greenTech</td>
<td></td>
</tr>
<tr>
<td>index_greenHouseGas</td>
<td></td>
</tr>
<tr>
<td>index_waterTank</td>
<td></td>
</tr>
</tbody>
</table>
Water tanks are not normally considered an energy efficient technology but is included as the language of sustainability necessarily includes water saving as well as energy efficient technologies.
<table>
<thead>
<tr>
<th>index_solarHotWater</th>
<th>NB: Solar Principles refers to solar design concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>index_solarHWS</td>
<td></td>
</tr>
<tr>
<td>index_solarPassive</td>
<td></td>
</tr>
<tr>
<td>index_solarPower</td>
<td></td>
</tr>
<tr>
<td>index_solarPrinciples</td>
<td></td>
</tr>
<tr>
<td>index_solarSystem</td>
<td></td>
</tr>
<tr>
<td>index_sustainable</td>
<td></td>
</tr>
<tr>
<td>index_photovoltaic</td>
<td></td>
</tr>
<tr>
<td>index_hydronic</td>
<td></td>
</tr>
<tr>
<td>has_lowEnergyDesign</td>
<td>Each of the following ‘has’ variables shows if the advertisement has the target phrase – it is a dichotomous output with 0 for ‘no target’ phrase, 1 for ‘has target’ phrase</td>
</tr>
<tr>
<td>has_passiveEnergy</td>
<td></td>
</tr>
<tr>
<td>has_passiveDesign</td>
<td></td>
</tr>
<tr>
<td>has_eco</td>
<td></td>
</tr>
<tr>
<td>has_eglass</td>
<td></td>
</tr>
<tr>
<td>has_smartGlass</td>
<td></td>
</tr>
<tr>
<td>has_doubleGlaze</td>
<td></td>
</tr>
<tr>
<td>has_miglas</td>
<td>Miglas is a composite metal and timber double glazed window system and marketed under the name ‘miglas’</td>
</tr>
<tr>
<td>has_greyWater</td>
<td></td>
</tr>
<tr>
<td>has_recycledWater</td>
<td></td>
</tr>
<tr>
<td>has_recycledMaterial</td>
<td></td>
</tr>
<tr>
<td>has_insulation</td>
<td></td>
</tr>
<tr>
<td>has_greenTech</td>
<td></td>
</tr>
<tr>
<td>has_waterTank</td>
<td></td>
</tr>
<tr>
<td>has_greenhouseGas</td>
<td></td>
</tr>
<tr>
<td>has_greenBuilder</td>
<td></td>
</tr>
<tr>
<td>has_energyReport</td>
<td></td>
</tr>
<tr>
<td>has_northAspect</td>
<td></td>
</tr>
<tr>
<td>has_ecoConscious</td>
<td></td>
</tr>
<tr>
<td>has_ecoDesign</td>
<td></td>
</tr>
<tr>
<td>has_ecoEfficient</td>
<td></td>
</tr>
<tr>
<td>has_ecoFeatures</td>
<td></td>
</tr>
<tr>
<td>has_ecoFriendly</td>
<td></td>
</tr>
<tr>
<td>has_ecoHome</td>
<td></td>
</tr>
<tr>
<td>has_ecoTechnologies</td>
<td></td>
</tr>
<tr>
<td>has_ecoSustainable</td>
<td></td>
</tr>
<tr>
<td>has_ecoWaste</td>
<td></td>
</tr>
<tr>
<td>has_energyConscious</td>
<td></td>
</tr>
<tr>
<td>has_energyConservation</td>
<td></td>
</tr>
<tr>
<td>has_energyConsumption</td>
<td></td>
</tr>
<tr>
<td>has_energyEfficiency</td>
<td></td>
</tr>
<tr>
<td>has_energyEfficient</td>
<td></td>
</tr>
<tr>
<td>has_energyRated</td>
<td></td>
</tr>
<tr>
<td>has_energyRating</td>
<td></td>
</tr>
<tr>
<td>has_energySave</td>
<td></td>
</tr>
<tr>
<td>has_energyPassive</td>
<td></td>
</tr>
<tr>
<td>has_energySaving</td>
<td></td>
</tr>
<tr>
<td>has_environmental</td>
<td></td>
</tr>
<tr>
<td>has_sustainableEnergy</td>
<td></td>
</tr>
<tr>
<td>has_sustainableDesign</td>
<td></td>
</tr>
<tr>
<td>has_LEDlight</td>
<td></td>
</tr>
<tr>
<td>has_lowVoltLight</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>---</td>
</tr>
<tr>
<td>has_environmentallyConscious</td>
<td></td>
</tr>
<tr>
<td>has_environmentallyEconomical</td>
<td></td>
</tr>
<tr>
<td>has_environmentallyEfficient</td>
<td></td>
</tr>
<tr>
<td>has_environmentallyFriendly</td>
<td></td>
</tr>
<tr>
<td>has_environmentallyGreen</td>
<td></td>
</tr>
<tr>
<td>has_environmentallyMinded</td>
<td></td>
</tr>
<tr>
<td>has_environmentallyResponsible</td>
<td></td>
</tr>
<tr>
<td>has_environmentallySensitive</td>
<td></td>
</tr>
<tr>
<td>has_environmentallySound</td>
<td></td>
</tr>
<tr>
<td>has_environmentallySustainable</td>
<td></td>
</tr>
<tr>
<td>has_solarBoosted</td>
<td></td>
</tr>
<tr>
<td>has_solarPanel</td>
<td></td>
</tr>
<tr>
<td>has_solarDesign</td>
<td></td>
</tr>
<tr>
<td>has_solarElectric</td>
<td></td>
</tr>
<tr>
<td>has_solarEnergy</td>
<td></td>
</tr>
<tr>
<td>has_solarEnhanced</td>
<td></td>
</tr>
<tr>
<td>has_solarHeatedHotWater</td>
<td></td>
</tr>
<tr>
<td>has_solarHeating</td>
<td></td>
</tr>
<tr>
<td>has_solarHome</td>
<td></td>
</tr>
<tr>
<td>has_solarHotWater</td>
<td></td>
</tr>
<tr>
<td>has_solarHWS</td>
<td></td>
</tr>
<tr>
<td>has_solarPassive</td>
<td></td>
</tr>
<tr>
<td>has_solarPower</td>
<td></td>
</tr>
<tr>
<td>has_solarPrinciples</td>
<td></td>
</tr>
<tr>
<td>has_solarSystem</td>
<td></td>
</tr>
<tr>
<td>has_sustainable</td>
<td></td>
</tr>
<tr>
<td>has_solar</td>
<td></td>
</tr>
<tr>
<td>has_photovoltaic</td>
<td></td>
</tr>
<tr>
<td>has_hydronic</td>
<td></td>
</tr>
<tr>
<td>total_eco</td>
<td></td>
</tr>
<tr>
<td>total_solar</td>
<td></td>
</tr>
<tr>
<td>total_environmental</td>
<td></td>
</tr>
<tr>
<td>altruistic_num</td>
<td>Number of phrases in altruistic category dictionary</td>
</tr>
<tr>
<td>designCharacteristics_num</td>
<td>Number of phrases in design category dictionary</td>
</tr>
<tr>
<td>Technology_num</td>
<td>Number of phrases in technology category dictionary</td>
</tr>
<tr>
<td>parsimonious_num</td>
<td>Number of phrases in parsimonious category dictionary</td>
</tr>
<tr>
<td>total_words</td>
<td></td>
</tr>
<tr>
<td>has_altruistic</td>
<td>Each of the following ‘has’ category variables if the advertisement has the target phrase that are existent within the dictionary of words and phrases within the target category – it is a binary output with 0 for ‘no target’ phrase, 1 for ‘has target’ phrase</td>
</tr>
<tr>
<td>has_designCharacteristics</td>
<td></td>
</tr>
<tr>
<td>has_Technology</td>
<td></td>
</tr>
<tr>
<td>has_parsimonious</td>
<td></td>
</tr>
<tr>
<td>index_first_altruistic</td>
<td>The location of the first word or phrase within the altruistic category dictionary</td>
</tr>
<tr>
<td>index_first_design</td>
<td>The location of the first word or phrase within the design category dictionary</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>index_first_parsimonious</td>
<td>The location of the first word or phrase within the parsimonious category dictionary</td>
</tr>
<tr>
<td>index_first_technology</td>
<td>The location of the first word or phrase within the technology category dictionary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>excludePostcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>wordLocation_avg</td>
</tr>
</tbody>
</table>

| has altruistic or tech | Applies to each of the following ‘has’ category variables; if the advertisement has the combination of the target phrases existent within the dictionary of words and phrases within either target category, an output is generated – it is a binary output with 0 for ‘no target’ phrase, 1 for ‘has target’ phrase |
|------------------------|
| has altruistic or design |
| has parsimonious or tech |
| has parsimonious or design |
| has altruistic or parsimonious |
| has altruistic and tech |
| has altruistic and design |
| has parsimonious and tech |
| has parsimonious and design |
| has tech and design |
| has altruistic and parsimonious |

### 4.5. Database preparation

To examine advertisements for house energy efficient characteristics, only detached dwellings were considered in this research due to independence of choice to retrofit energy efficient technologies that multi-owner dwellings do not have. Therefore, as the focus of this research is not upon such dwellings, the data required cleaning and screening to remove unwanted items. To achieve this a ‘waterfall’ technique was adopted (see Pallant 2011, p. 41). This technique is commonly used to filter data in a structured manner to minimise the chance of useful data being removed. This process was undertaken in SPSS v22 with syntax written to remove such items. The first items to be removed were land sales as these are understood to mean vacant allotments. The next items removed were advertisements with invalid descriptions. Advertisements with 50 or more characters were retained as it was considered advertisements must be at least this length to describe a detached house. The next items to be removed were seemingly erroneous or missing sale prices. For example, some sale prices were entered as being $1 and at the other extreme $100,000,000. The next items removed were apartments units as these are multi-owned buildings. After this it was necessary to add-back houses described as ‘dual-occupancy’ as these are detached housing but are part of a shared allotment. Once this...
process was complete, the remaining usable dataset comprised of 230,525 items. Finally, houses located within the research frame, namely Melbourne metropolitan Local Government Areas (LGAs) defined on the basis of postcode, were identified and retained in a separate dataset for analysis. This dataset, comprising 158,112 items, became the primary data for this research. Table 4.6 provides details of the waterfall process.

Table 4.5: Cleaning principal database using waterfall technique

<table>
<thead>
<tr>
<th>Waterfall</th>
<th>Total number removed</th>
<th>Residual number</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original number of properties</td>
<td>322,935</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property Type is ‘HOUSE’</td>
<td>29,942</td>
<td>292,993</td>
<td>Remove land sales</td>
</tr>
<tr>
<td>With a valid description</td>
<td>20,810</td>
<td>272,183</td>
<td>Length of description is at least 50 characters long</td>
</tr>
<tr>
<td>With a missing sale price</td>
<td>7,187</td>
<td>264,996</td>
<td>Recorded sales with missing sale prices</td>
</tr>
<tr>
<td>Number of beds &gt; 0 and salePrice &gt;1</td>
<td>8,632</td>
<td>256,364</td>
<td>Invalid advertisements with missing bedroom and low sale prices</td>
</tr>
<tr>
<td>Take out units and apartments (from descriptions)</td>
<td>31,861</td>
<td>224,503</td>
<td>Removes units and apartment sales with valid description and non-missing sale price (saleprice&gt;1 and numbeds&gt;0)</td>
</tr>
<tr>
<td>Add back extra houses (labelled as units or apartments)</td>
<td>4314</td>
<td>230,525</td>
<td>4314 appeared to be a house; e.g., Dual occupancy</td>
</tr>
<tr>
<td>Properties outside of Melbourne Climate zone 6</td>
<td>72,413</td>
<td>158,112</td>
<td>Objective to ensure no variance due to response to climate conditions</td>
</tr>
<tr>
<td>Total of final selected properties</td>
<td></td>
<td>158,112</td>
<td></td>
</tr>
</tbody>
</table>

4.5.1 Data analysis

With regard to quantitative data, the unique aspect of this research is that it did not sample a portion of housing sales across random geographic localities; rather, by acquiring the REIV data, it adopted a census approach. The data acquired was the population of housing sales, sold by residential agents, in greater Melbourne from 1 August 2008 through to 31 March 2015. Thus, sourced ABS data was applied to the population of data rather than a statistical sample. This unique situation provides opportunity for robust analysis over the timeframe studied. The timeframe selected for the research was determined by the available data and then segmented into calendar quarters over the period; a total of 27 time periods. This longitudinal feature,
combined with the extensive database, provided insight to changes and trends emergent over the study period.

The extensive nature of the dataset required multiple approaches to ensure a thorough interrogation was achieved. Using SPSS v22, various analyses of the data were undertaken, and each is now discussed.

4.5.2 Descriptive analysis
Identification of keywords and keyword categories in advertisements: this information provided descriptive statistics for interpretation and included:

a. Percentage of advertisements including each keyword category and combinations.

b. The location of the first character of the keywords within the advertisement. This information was used to create histograms to inform emphasis being given to keywords (see Primacy/recency discussion below).

c. Generation of GIS maps, at the postcode level, to show geospatial information of location and intensity of keywords. Maps were produced to show correlation, with demographic variables being education, age, and income.

d. Bubble diagrams to enable visualisation of the data and relative relationships between keyword categories.

4.5.3 Primacy/recency analysis
Discussed in Chapter 3 – Research Framework and Theoretical Model, section 3.2.3, the field of psychology finds that receivers of messages that include multiple information elements are more likely to remember information located in the early and later parts of the message, than information located in the middle section. House advertisements are typically scripted to include numerous house characteristics, thus providing detail. It was therefore considered useful to examine where energy efficient words and phrases appeared within the advertisements as this provided further information. The application of the Principal-Agent theory suggests, if the agent believes a market appetite exists for energy efficient housing, they would seek to highlight the existence of the technologies in the advertisement. Thus, to attract the attention of the reader and for buyers to recall such information, primacy-recency theory posits such appearances are best positioned either early or late in the advertisement (Jansen, Ohanian & Cunningham 1987; Kim & Fesenmaier 2008; Liu & Simon 2013). Therefore, it
was believed important to also undertake a textual analysis of the dataset with regard to the
location of keywords. Histograms were considered useful for this purpose. SPSS v22 was used
to count each character within the advertisement, commencing at the beginning, to the point
where the first keyword appears. Here the first letter of the keyword being examined is counted
and the location recorded. Characters are then again counted until the next energy efficient
word is located, and this location is recorded, and so on. For this purpose, SPSS v22 was coded
to count individual letters, spaces between words, commas, full stops, and other characters such
as numerical information. For example, using an extract of the sample advertisement shown
previously the location of an energy efficient characteristic is found at the 100th character into
the advertisement.

Rarely does such a warm and inviting home find its way onto the market. Offering formal
lounge with northerly aspect, renovated kitchen with adjoining meals area renovated
bathroom...........

Location of first character (letter) of the energy efficient word

The location and the frequency of appearances, expressed as a percentage, of keyword flags
was then graphed using Excel software v16.10.

Having reviewed the quantitative analysis, this discussion now progresses to consider the
qualitative method used in this study. Following this, the relation of the analysis to the research
questions is presented.

4.6 Qualitative method – semi-structured interviews

To gain greater understanding of the data, and to assist in interpreting results, semi-structured
interviews were undertaken. These interviews were conducted prior to advertising data being
collected from the REIV, and an initial analysis was performed. It was considered important to
gather insight into what agents believed important when advertising and why they frame the
advertisements as they do. These interviews were intended to enhance the interpretation of the
quantitative findings.
4.6.1 Participants

The participants for the research were experienced real estate agents who had been in the industry for a minimum five years, and were responsible for listing houses for sale and scripting advertisements. Real estate agency businesses were selected on the basis of geographic dispersion around the CBD. This was done in an effort to avoid potential localised biases. Nine residential agents were interviewed. This number is normally considered insufficient for such an inquiry; however, saturation was reached very quickly and therefore considered sufficient (Fusch & Ness 2015).

In collecting qualitative data, saturation is the essential element for research credibility when undertaking interviews. Saturation is the result of seeking information (data) from participants until additional information no longer adds richness or further understanding to the substance of the research (O’Leary 2010). This criterion governed the researcher’s quantity of interviews, and interviews were arranged until saturation was achieved.

4.6.2 Qualitative data collection

Design of the interview instrument was primarily guided by literature and, to a much lesser extent, the researcher’s own experience. It included numerous open-ended questions with a separate question that required the agent to prioritise interventions they believed would assist the imbuement of energy efficient technologies into buyer choice processes. Questions were framed in a manner to open the discussion of the topic, but not so prescriptive to lead the interviewee to a response. Data from these interviews were used to correlate and affirm/disaffirm the quantitative findings, and provide richer insight to enable enhanced interpretation. Table 4.6 provides the list of questions asked in these interviews.

With regard to the qualitative element of this research the data is in the form of a ‘first order narrative’ (Creswell 2007, p. 119). The narrative element is a contribution to a broader discussion; in this case, the discourse about real estate agent attitudes and engagement with house energy efficient characteristics, and ‘first order’ referring to individual stories (ibid).

While piloting interview questions is normally conducted prior to formal data collection in qualitative research, it was not considered necessary in this case. The reason for this was largely a practical one. The researcher had previously spoken with numerous real estate agents during industry association meetings and other informal settings about this and other related topics. In
reality, it was these conversations that led to this research. Through these discussions the researcher developed an understanding of the issue’s agents faced in advertising emergent technologies in a changing environment and this insight formed the scope of the literature search, research design and ultimately the interview questions. Armed with this background it was considered undertaking pilot interviews were unnecessary.
### Table 4.6: Interview questions

<table>
<thead>
<tr>
<th>Underlying questions</th>
<th>Relationship to RQ’s</th>
<th>Prompts</th>
</tr>
</thead>
</table>
| 1: What do agents know about house energy efficiency performance; and, what do they believe they need to know? | RQ1 & RQ3 | - Have you heard about house energy efficiency, if so, where did you hear or learn about it?  
- What do you understand about the term ‘energy efficient housing’?  
- Have you heard people such as buyers or sellers discussing or asking energy efficiency? If so, what sort of ideas or concerns have they talked about?  
- What do you think energy efficiency could offer buyers and sellers and do you think the concept has merit?  
- Is there anything you believe you need to know about energy efficient housing?  
- If you wanted to learn more about energy efficient housing, where would you source the information? |
| 2: How do real estate agents prioritise house features to advertise; and, whether or not to include energy efficient characteristics? | RQ1, RQ2 & RQ3 | - When writing an advertisement for a new listing, how do you decide what the caption should be?  
- How do you decide what should be in the advertisement?  
- If you list a house with energy efficiency features, do you include the details in the ad? If not, why not? If you do include these features why do you include them?  
- In order of priority what would you describe to be the most important features to include in the ad and why? |
<table>
<thead>
<tr>
<th><strong>3: How do real estate agents balance the ethical and legal requirements of acting on behalf of a principle against self-interest when energy efficiency may be a factor in the selling process?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RQ1 &amp; RQ3</strong></td>
</tr>
<tr>
<td><strong>What would you consider to be the top 4 criteria vendors have when selling?</strong></td>
</tr>
<tr>
<td><strong>Are buyers and sellers asking about energy efficiency?</strong></td>
</tr>
<tr>
<td><strong>What do you believe is the buyers top 4 criteria they seek when they talk to you about a house?</strong></td>
</tr>
<tr>
<td><strong>How often do you receive training on industry ethics and/or practice regulations?</strong></td>
</tr>
<tr>
<td><strong>Do you believe it is sufficient or too much?</strong></td>
</tr>
<tr>
<td><strong>When a seller believes their house is worth more than what you believed, what do you do?</strong></td>
</tr>
<tr>
<td><strong>If your vendor insists that a particular feature adds value to the property and you don’t, what do you do?</strong></td>
</tr>
<tr>
<td><strong>In the above scenario how do you represent the property to the buyer?</strong></td>
</tr>
<tr>
<td><strong>Can you please describe a typical approach you would use in attempting to close a sale where there is a significant price and or terms differential?</strong></td>
</tr>
<tr>
<td>4: What do real estate agents believe will cause buyers to seek energy efficient housing?</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>• What do you think needs to happen to create a buyer demand for energy efficient housing?</td>
</tr>
<tr>
<td>• What involvement do you think agents could or should have in the development of a housing market that actively seeks energy efficiency as one of the selection criteria?</td>
</tr>
<tr>
<td>• Do you think energy efficient housing is a worthwhile objective to aim for?</td>
</tr>
<tr>
<td>• From the list below, please number from 1 to 8, with 1 being the most effective policy, the strategies you believe will assist in creating a market demand for energy efficient housing.</td>
</tr>
<tr>
<td>- Description of energy efficient characteristics in advertisements</td>
</tr>
<tr>
<td>- A scaled reduction of stamp duty aligned to energy efficient housing at point of purchase</td>
</tr>
<tr>
<td>- Disclosure of house energy efficiency performance in the Vendor’s Statement (Sec 32)</td>
</tr>
<tr>
<td>- Government awareness campaign</td>
</tr>
<tr>
<td>- Reduction in ongoing council rates scaled towards more energy efficient housing</td>
</tr>
<tr>
<td>- Annual energy billing rebates on a sliding scale for more energy efficient housing</td>
</tr>
<tr>
<td>- Green mortgages where the interest rate is aligned to the energy efficiency performance of the house</td>
</tr>
</tbody>
</table>
- Reduction in income tax for owners of energy efficient houses

• With regard to the above can you please explain why you chose this order?

• What do you think a government policy would need to ‘look like’ for buyers to start factoring energy efficiency or sustainable criteria into their purchase decision?

<table>
<thead>
<tr>
<th>5: What do agents perceive of the willingness for buyers to buy energy efficient housing; and, how does that willingness affect the price they (the buyers) are likely to pay?</th>
<th>RQ2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Do you hear buyers discussing energy efficiency or sustainability in conversations relating to house buying?</td>
<td></td>
</tr>
<tr>
<td>• Have you heard or observed anything that would suggest buyers are willing to consider energy efficiency or sustainability as part of their buying criteria?</td>
<td></td>
</tr>
<tr>
<td>• Have you heard or observed anything that would suggest buyers are willing to buy a house in favour of another similar house because of the energy efficiency or sustainable features in the house?</td>
<td></td>
</tr>
<tr>
<td>• In your opinion, do you think buyers are interested in energy efficiency or sustainable housing? If so, why? If not, why?</td>
<td></td>
</tr>
<tr>
<td>• Do you think that buyers will be in any way willing to pay more for energy efficiency or sustainable housing?</td>
<td></td>
</tr>
<tr>
<td>• What do you think a government policy would need to ‘look like’ for buyers to start factoring energy efficiency or sustainable criteria into their purchase decision?</td>
<td></td>
</tr>
</tbody>
</table>
4.6.3 Interviews

Interviews were held onsite or, at the request of the participant, in a local café. They were one-on-one and recorded. In recognition of the busy working environment, the interviews were designed to be approximately 30 minutes duration (Sarantakos, p. 260) and any extension of this time was a result of the participant’s desire and/or conversational style. Interviews were held during business hours, and although the 30-minute duration was re-iterated, the interviewees wished to continue so in all cases interviews extended to approximately an hour.

4.6.4 Qualitative data analysis

Interviews were professionally transcribed, and data thematically analysed. Numerous software packages exist to assist with analysing large quantities of qualitative data. In this study, the number of interviews ceased when saturation was achieved and was low in number. Therefore, use of software was not considered necessary. Instead transcripts were read and manually coded. Deductive reasoning was applied to uncover themes within the transcript data (O’Leary 2010, p. 261) and these themes were then compared with qualitative data. Deductive reasoning is a process of exploring the data for categories or themes derived from various origins, such as literature, which is the case here. Codes used were the same as the keywords categorised in the quantitative analysis. In this process researcher bias, common to qualitative research (Östlund et al. 2011), was accounted for as much as possible by searching for themes in context of the keywords. This, however, did not exclude other information offered by the participants that had the potential to deepen understanding regarding the study. To ensure all aspects of conversation were considered in the analysis, words, concepts and metaphors were all recorded and evaluated for their meaning within the context of the keyword categories.

Validation of data is an essential component of any research and due to the mixed method approach to this study, validation is now discussed holistically rather than for individual paradigms (Westbrook 1994).

4.7 Data validation

Creswell (2018) provides a succinct summary of validity threats to mixed method research. Table 4.8 provides this summary, together with appropriate strategies for addressing identified threats in the context of this research, with specific reference to Convergent mixed method design.
Table 4.7: Strategies to address validity issues

<table>
<thead>
<tr>
<th>Validity threats</th>
<th>Strategies to minimise threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not using parallel concepts in data collection for both the qualitative and quantitative databases</td>
<td>Literature guided the development of keywords and these were applied to categorise and interpret secondary REIV data. Literature also informed the development of interview questions.</td>
</tr>
<tr>
<td>Having unequal quantitative and qualitative sample sizes</td>
<td>Sample sizes not overly relevant to this inquiry as the population of advertising data was acquired and interviews were conducted until saturation was reached.</td>
</tr>
<tr>
<td>Keeping results from different databases separate.</td>
<td>Convergent data analysis integration strategy was applied where the results were iteratively compared and contrasted within the keyword themes. These were then presented ‘side by side’ in Chapter 7 – Summary and Conclusion.</td>
</tr>
<tr>
<td>Failing to resolve disconfirming results</td>
<td>Results from either dataset that contradict and/or disconfirm would have been subject to further investigation and/or further data acquisition. This was not the case.</td>
</tr>
</tbody>
</table>

(Adapted: Creswell 2018, p. 251)

Using the above strategies, results were considered validated and reliable. The limitations for this methodology are now presented.

4.8 Limitations

All research is conducted within recognised limitations (Price & Murnan 2004), and this research is no different. The analysis of this research is limited by the following:

- The research frame was restricted to postcodes and within one climate zone. In some cases, postcodes partially straddled recognised climate zone boundaries. In all cases where this happened, the affected regions were on the urban fringe, exhibited lower housing density, and were older, more established suburbs. It was believed many of the houses in these areas were built prior to the introduction of energy efficient housing
standards, and therefore are assumed to be homogeneous with regard to climate influences, and climate zone impacts were not considered.

- The researcher’s own industry experience has the potential to introduce bias in interviews and data analysis (Amaratunga et al. 2002). Cognisant of this, the researcher deliberately framed interview research questions to be open-ended to allow participants the opportunity to express their views and opinions. On other hand, this experience enabled the participant to speak more openly using a dialect appropriate to the ‘internal’ workings of the real estate industry (ibid).

- Advertisements, being the unit of analysis, provide information about the agent’s perception of which house characteristics are most likely to attract suitable buyers. Inherent in this is the reality that less experienced agents will also be writing and publishing advertisements. It is plausible such advertisements appear within the dataset. As the researcher has no means of comparing the advertisement to the specific house being promoted, the underlying assumption is the agent was competent in aligning the house advertisement with market appetites and directions. To do otherwise is to assume the scripting real estate agent to be incompetent.

- With further regard to the advertisement data, the analysis of content is limited to information included within it. For purposes of more detailed analysis of the mention, or otherwise, of house energy efficient features, it have been useful if the advertisements included descriptions of house age, floor size and other technical data. Initial interrogation of the data found such inclusions to be rare. Consequently, specific examination of the relationships between age, house size and inclusion keywords was not possible.

- There is the potential that energy efficient technologies exist within the house being advertised and the agent decides not to include the technology in the advertisement. The assumption here is if the technologies exist within the house, they are included in the advertisement. This limitation can only be addressed by physical inspection of the house by the researcher to ascertain the existence, or not, of the technologies. Given the size and nature of the dataset, and REIV’s privacy requirements, this was not possible. In part, the mixed method design used in this research aimed to address this limitation by interviewing agents regarding inclusion practices.
The aim of the research was to examine real estate agent perspectives and engagement with house energy efficient characteristics during the marketing process. While it may be of use to have reviewed extant marketing theory as it relates to advertising in more detail, it was considered appropriate to restrict this work to within the frame of marketing training agents receive when entering the industry. As this training does not include reference to energy efficient technologies, it is the view of the researcher that knowledge about these technologies is born from experience and therefore significantly influenced by personal views, the overall aim of the research was to understand this. Nonetheless, not considering broader marketing theory, of which advertising may be considered an output, is acknowledged as a limitation to the findings contained within this thesis.

4.9 Relation to research questions

Intermediaries must be able to understand their client’s objectives to be able to advise and guide them successfully towards their objectives; in this case, house sales. The theories guiding this research were identified as being useful for understanding how agents do this in the context of house energy efficient technologies. Analysis of the quantitative data enabled the researcher to evaluate the extent that such technologies appear in advertisements, and through this, applying the theories presented to address the research questions of this inquiry. To do this, qualitative analysis is applied to further elucidate attitudes of agents and antecedents for inclusion of energy efficient technologies in advertisements. For convenience, the research questions are restated here.

Primary research question

‘What accounts for the extent to which real estate agents are engaging with energy efficient technologies when advertising houses for sale in Melbourne Australia?’

RQ1: What determines whether agents use energy efficiency language in housing advertisements?

Quantitative evaluation of the data enabled the researcher to identify language used by agents to understand how such language is embedded within advertisements. Along with this, the researcher sought to determine if certain house energy characteristics were more frequently promoted than others, and if such promotion was passive or intentionally persuasive in
appearance. Qualitative analysis provided richer interpretation and understanding of the findings to understand why agents acted in the way that they did.

**RQ2: Why does the extent of inclusion of energy efficient technologies in house advertisements in Melbourne Victoria vary across disparate regions?**

To address this question, quantitative data was used to determine if such language varied in response to market demographics, and if these variances can be explained by extant theories. Variables sourced from the ABS enabled the researcher to geographically represent the research area for evaluation. Quantitative findings were compared to qualitative analysis to offer further interpretations of observations.

**RQ3: Why are real estate agents not giving prominence to energy efficient characteristics when the benefits to house owners and the environment is well recognised?**

Analysis of qualitative data provided insight into agents’ rationale for including and emphasising energy efficient language in advertisements. This analysis was compared to quantitative findings and extant theories offered were applied to propose an explanation to address the question.

**4.10 Conclusion**

A convergent mixed method approach was considered to be the most appropriate strategy to address the research questions posited in Chapter 3 – Research Framework and Theoretical Model. The research design was presented, together with details of the quantitative data used in this study and the context in which it was conducted. Within the applied methodology a detailed discussion of Content Analysis was provided to demonstrate how the advertising data was analysed.

Assembling the database containing a range of demographic attributes identified as being important in acceptance of energy efficient technologies in housing choice, facilitated a quantitative statistical analysis using descriptive techniques, and then comparing, contrasting and integrating findings with qualitative interview data. Characteristics, derived from the literature, contributing to house energy efficiency were used to develop keywords for examining real estate advertisements and coding according to type of characteristic.
Previous research has identified a relationship between demographic profiles and engagement with low carbon behaviours and choices, but had neither used large datasets nor undertaken the analysis from the perspective of market facilitators, thus positioning this research uniquely. Thematic reduction of textual strings enabled closer and more informative analysis of the extent that residential agents are engaging with energy efficient technologies in the study region.

Philosophical foundations were presented, positioning the methodology in the pragmatist paradigm, which allowed the researcher to apply fixed mixed method design. Here, ‘fixed’ means the predetermined and planned use of qualitative and quantitative data at the start of the research process. In the context of this research, these data were the advertising data acquired from the REIV and semi-structured interviews with practicing residential agents. The implications of such a paradigm were discussed in relation to this inquiry. Chapter 5 presents qualitative results together with initial thematic analysis, and Chapter 6 quantitative data analysis. Chapter 7 – Summary and Conclusion, draws together the findings of these two datasets into a detailed discussion to address each research question in turn.
Chapter 5: Qualitative Results

5.1 Introduction

This chapter presents the results from nine in-depth, semi-structured interviews with experienced real estate agents, and is used as part of the process of triangulating results to enhance data generalisability (Silverman 2013, p. 136). A thematic analysis of the interview transcripts was undertaken, and three emergent themes arose. These are presented in Figure 5.1. Thematic analysis is often considered to ‘provide[s] a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex, account of data’ (Braun & Clarke 2006, p. 78). Such a methodological approach to analysing qualitative data accords with the exploratory nature of this research.

This chapter is structured as follows. First, an overview of participant selection is provided, and is then followed by the results of the thematic analysis of the interview data. The three emergent themes are discussed as they apply to each of the three research questions. The reader is warned this may appear as repetition; however, it is not the case. To answer each of the three research questions, appropriate discussion of the three themes for each question is necessary to provide a thorough analysis. The data presented in this chapter is coalesced with the quantitative data presented in Chapter 6 and discussed in Chapter 7 to address the research questions holistically.

5.2 Recruitment of real estate agents

Agents were selected from an internet search and solicited based upon location. Locations were strategically determined to ensure broad coverage around Melbourne; in other words, northern, southern, eastern, and western locations, using Melbourne CBD as the reference point. To overcome initial reservations by potential participants, an explanation that the research was for academic purposes and would not attempt to source or probe any commercial sensitivities was given to potential participants. Interviews were conducted onsite or at a location of the agent’s choice to ensure they were comfortable with their surroundings and, with the exception of one, all interviews were conducted within the agent’s office. Prior to commencing interviews, mandatory disclosure and research ethics documents were presented and explained to participants.
Semi-structured, in-depth interviews were conducted with agents until no new information was forthcoming, and from this it was determined saturation had been reached. Saturation is considered to be the point at which no new information is found (Creswell 2007, p. 240; Silverman 2013, p. 65). After interview 7, responses were repeated and it was determined that saturation had been achieved; however, a further two interviews were completed to ensure this and determine if any possible variations in responses existed. None were found, and at this point no further interviewees were sourced.

At the introduction, it was explained the research required agents with a minimum of five years’ experience. This extent of experience was necessary to ensure responses to questions were experientially founded, and not what the agent ‘thought’ would be the likely perspective (Silverman 2013, p. 288). Details of recruitment process are provided below.

Using Melbourne’s CBD as the central point, geographic locations were chosen on the basis of east, west, southern and northern regions of Melbourne’s metropolitan areas, and agents were chosen from within each region.

Using internet searches, agencies within each region were selected on the basis of number of listings advertised. This was to ensure the agency had significant profile in the local market. Only members of Victoria’s peak industry body, the REIV, were selected. Such membership is typically displayed within the agency’s website. The rationale for this is that the REIV is a leader in industry training and active in contemporary issues as they pertain to the industry.

Agencies typically provide details of staff on their websites for marketing purposes, and from this it was easy to identify the business owner and/or manager. Once a number of potential agencies were identified and names of potential contacts attained, agencies were cold called by the researcher asking to speak with the owner or manager. An explanation of the research and invitation to participate was extended. With the exception of two persons, offers were accepted. Subsequent to the two rejections, alternative agencies within the same area were approached, each with successful outcomes. Table 5.1 provides specific agent details. Further, Table 5.2 provides detail of the demographics in which individual participant agents worked.
Table 5.1: Participant details

<table>
<thead>
<tr>
<th>Real Estate Agent</th>
<th>Location</th>
<th>Approximate age</th>
<th>Gender</th>
<th>Approximate industry experience</th>
<th>Company profile</th>
<th>Region/socio-economic status (High, Middle, Low)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seaford</td>
<td>50</td>
<td>M</td>
<td>25</td>
<td>Independent (2 offices)</td>
<td>Middle south, seaside (Middle)</td>
</tr>
<tr>
<td>2</td>
<td>Camberwell</td>
<td>52</td>
<td>M</td>
<td>23</td>
<td>Independent national network</td>
<td>Middle east (High)</td>
</tr>
<tr>
<td>3</td>
<td>St. Albans</td>
<td>60</td>
<td>M</td>
<td>35</td>
<td>Statewide franchise group</td>
<td>Outer west (Low)</td>
</tr>
<tr>
<td>4</td>
<td>Altona</td>
<td>43</td>
<td>M</td>
<td>15</td>
<td>Statewide franchise group</td>
<td>Inner west (Middle)</td>
</tr>
<tr>
<td>5</td>
<td>Preston</td>
<td>40</td>
<td>F</td>
<td>12</td>
<td>Melbourne Metro franchise group</td>
<td>Middle northeast (Middle)</td>
</tr>
<tr>
<td>6</td>
<td>Ringwood</td>
<td>35</td>
<td>M</td>
<td>5</td>
<td>Independent national network</td>
<td>Middle east (Middle)</td>
</tr>
<tr>
<td>7</td>
<td>Bayswater</td>
<td>58</td>
<td>M</td>
<td>32</td>
<td>Statewide franchise group</td>
<td>Outer east (Low)</td>
</tr>
<tr>
<td>8</td>
<td>Hurstbridge</td>
<td>54</td>
<td>M</td>
<td>25</td>
<td>Small independent</td>
<td>Outer north (Middle)</td>
</tr>
<tr>
<td>9</td>
<td>Whittlesea</td>
<td>63</td>
<td>M</td>
<td>30</td>
<td>Independent (2 offices)</td>
<td>Semi-rural (Middle-High)</td>
</tr>
</tbody>
</table>

Table 5.2: Demographic details of participant market

<table>
<thead>
<tr>
<th>Real Estate Agent No.</th>
<th>Location from central Melbourne &amp; suburb</th>
<th>Median household income- $’s (monthly)</th>
<th>Median house price (June 2013) $’s</th>
<th>Median mortgage repayment- $’s (monthly)</th>
<th>Percentage of earnings to service mortgage</th>
<th>Buyer characteristic as described by agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South – (outer) Seaford</td>
<td>5,776</td>
<td>419,000</td>
<td>1553</td>
<td>26.88</td>
<td>Younger families</td>
</tr>
<tr>
<td>2</td>
<td>East – (middle) Camberwell</td>
<td>11,323</td>
<td>1,381,500</td>
<td>2,500</td>
<td>22.08</td>
<td>Educated high income couples</td>
</tr>
<tr>
<td>3</td>
<td>West – (outer) St. Albans</td>
<td>4,229</td>
<td>350,000</td>
<td>1,365</td>
<td>32.28</td>
<td>Asian ethnicity</td>
</tr>
<tr>
<td>4</td>
<td>West – (inner) Altona</td>
<td>6,777</td>
<td>575,000</td>
<td>1,850</td>
<td>27.30</td>
<td>Middle income families</td>
</tr>
<tr>
<td>7</td>
<td>East – (outer) Bayswater</td>
<td>6,188</td>
<td>458,500</td>
<td>1,657</td>
<td>26.78</td>
<td>Increasing ethnicity from numerous regions</td>
</tr>
<tr>
<td></td>
<td>Location</td>
<td>Population</td>
<td>Median House Price</td>
<td>Households</td>
<td>Percentage</td>
<td>Demographic Group</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------</td>
<td>------------</td>
<td>--------------------</td>
<td>------------</td>
<td>------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>9</td>
<td>North – (semi-rural) Whittlesea</td>
<td>6,422</td>
<td>375,000</td>
<td>1,783</td>
<td>27.76</td>
<td>Lifestyle seekers</td>
</tr>
<tr>
<td>8</td>
<td>North – (east) (urban fringe) Hurstbridge</td>
<td>7,839</td>
<td>482,000</td>
<td>1,760</td>
<td>22.45</td>
<td>Lifestyle seekers</td>
</tr>
<tr>
<td>6</td>
<td>East – (north) Ringwood</td>
<td>7,791</td>
<td>551,000</td>
<td>1,798</td>
<td>23.01</td>
<td>Educated middle income earners</td>
</tr>
<tr>
<td>5</td>
<td>North – (inner) Preston</td>
<td>6,833</td>
<td>632,500</td>
<td>1,954</td>
<td>28.60</td>
<td>Educated middle income earners</td>
</tr>
</tbody>
</table>

(Source: ABS 2016 & Property and Land Titles 2019)

### 5.3 Thematic analysis: Emergent themes

Thematic analysis of interview data was undertaken. The data was first transcribed and then manually coded. Open coding (Creswell 2007, p. 67) was initially adopted to identify categories (themes) of information about agents’ views of house energy efficiency in general and in the marketing process. Within these categories, several sub-categories were identified and these are diagrammatically presented in Figure 5.1: Diagrammatic view of emergent interview themes and sub-themes. To assess the validity of the themes, the theme of the primary category was compared to themes emergent in literature. For example, Dunning et al. (2018) argue that real estate agents will retain focus on business imperatives when considering technological innovations in house transactions. Arndt et al. (2017) consider agents retain a focus on future clients when advertising. Wong et al. (2018) identified information and knowledge important for agents when engaging in house energy efficiency in the transaction process. Each research question was addressed within the frame of the identified themes. These themes are now discussed for each research question.
Figure 5.1: Diagrammatic view of emergent interview themes and sub-themes

5.4 Agent motivation for including energy efficient technology language in house advertisements

This section presents qualitative interview data and identified themes to evaluate real estate agent selection of language used in house advertisements. Research Question 1, restated here, is the first to be discussed.

RQ1: What determines whether agents use energy efficiency language in housing advertisements?

This research question investigates the antecedents for including an energy efficient lexis in advertisements when marketing houses for sale. Care was taken when interviewing agents to ensure conversations could not be interpreted to question their professionalism or integrity. This was necessary to enable the agent to feel free to speak about any matter related to the topic to gain richer, unencumbered responses to questions (Turner 2010). Furthermore, it was important to guide the agent into the conversation to ensure they understood the objective of the questions asked, and part of settling interviewees, which is shown to deliver richer responses and data (Denzin & Lincoln 2005).
5.4.1 Theme 1: Knowledge (awareness) of energy efficient technologies

In determining whether agents engage with energy efficient language when advertising, it was first necessary to assess their knowledge of energy efficiency. This was done by asking open-ended questions. The lead question for this was: ‘What do you understand about the term energy efficient housing?’ The replies here were varied in expression and depth, but in all cases the agent’s understanding of house energy efficient technologies was virtually non-existent or very limited to solar technologies, and this only in the context of monetary savings.

In all but one interview, agents did not connect the range of technologies that can be adapted to reduce in-use energy consumption. Real Estate Agent 2, Camberwell, stated:

Personolly, I don’t know enough about it, but I don’t think it offers that much, ‘cause I’m just a little bit worried about the, what it costs to install certain things, solar heating, solar hot water, whatever it may be? And probably ‘cause of ignorance, I don’t know how much it may save in energy costs. But I personally think that maybe the cost of installation might outweigh the energy efficiency.

In the case of Real Estate Agent 6, Ringwood, who demonstrated some knowledge, his awareness was extensive compared to others and this he admitted came from a personal interest resulting from meeting an environmentally committed seller. This agent stated:

Just it’s more just from homes that we’ve sold. So probably about, I started here about four years ago and one of the first homes I listed was a passive solar home Ringwood north. And when I went out there, the maybe… I said, can you tell me a bit about the home before I come out? And she’d tell me it had this amount of bedrooms and it’s passive solar built, and it’s got a big yard, and by the way it’s passive solar. And there was a real strong emphasis in what she was saying. And I thought, OK, well I’ve got understanding, but I better go do some research because me knowing about this is obviously going to be important to her. And that’s when I sort of learnt a bit about what it was.

In detailing his understanding, he was able to state the purpose of technologies such as solar and water recycling systems and more obscure elements, such as orientation of design. This was the exception, not the rule.
Knowledge is necessary to illustrate understanding, and understanding is necessary to expound benefits to buyers through advertising (Burke et al. 1990); and as stated, the lack of knowledge by agents about house energy efficient design and technologies was a consistent theme that emerged from the data corpus. In most cases, agents paused for some time to think about a suitable answer to the question. Although ‘spontaneity can be the basis for the richness of data collected in some interviews’ (Opdenakker 2006, p.9), this was not the case. This lack of knowledge, and hesitancy in response, suggests energy efficient technology language was neither front of mind, nor a part of common industry dialogue.

The more well-known technology and, in nearly all cases the first mentioned, was solar. This technology has received considerable exposure through merchant advertising and the obsolete Australian government rebate scheme that ran from 2000 to 2009 (MacIntosh & Wilkinson 2010).

When asked where they acquired their knowledge of energy efficient technologies, agent responses varied. In two cases, the agent either had installed the technology in their own home or had a family member do so (these were solar PV cells in both cases). Other technology forms, such as double-glazed windows systems or insulation for example, were mentioned only as an afterthought by six agents or, not at all. Over half of the agents interviewed (five people) admitted they had not paid any attention to house energy efficient technologies until a prospective vendor had made a point of the benefits.

This highlights the reactive nature of agency practice as well as the commercial motivation of agents to demonstrate to prospective clients they are up to date with all matters relating to housing markets (Levitt & Syverson 2008). Movement by agents towards embracing change appears to be driven by the need to meet market trends which are continually evolving. Further, this need for self-directed learning regarding such technological developments highlights a weakness in professional development offered by the REIV to its members.

5.4.1.1 Sub-theme: Market awareness

It is the role of the agent to interpret market trends and highlight house characteristics that most align to the prevailing market (Baryla & Zumpano 1995). This process is essential to securing the best possible outcome for the seller, which is also clearly an important responsibility for the agent (Jud 1983).
When asked if buyers were asking about energy efficient technologies, the following was a typical response from interviewed agents:

No. I mean we source 100 buyers a week and not one of them would ask anything about any energy efficient homes that we've got on the market that they'd be more interested in buying than not. (Real Estate Agent 4, Altona).

Hardly at all. Hardly at all. Not for, I would not have spoken to anyone at all in the last two years about it, never mentioned a word. (Real Estate Agent 2, Camberwell).

From this it appears agents have little or no incentive to include energy efficient technologies in advertisements, although they do. When asked, ‘Do you include energy efficient technology in the advertisement if it exists in the house?’, the response in each case was ‘yes’. However, the motivation was not from an expectation that it would appeal to buyers, but rather to please the seller and potentially highlight a point of difference. This comment was given by Real Estate Agent 3, St. Albans:

**Interviewer:** If you listed a home that had some energy efficient features like solar panels or something, would you include that?

**Respondent:** Oh definitely. Yeah, yeah, for sure.

**Interviewer:** So, to do that, so confidently you must feel that somebody would actually be interested in knowing that? Or is it the fact it’s a point of difference from the mass?

**Respondent:** Honestly, it’s probably to keep the vendor happy.

Having invested in energy efficient technology(ies) it appears sellers are keen to make the fact known, possibly in the hope of quicker sale and/or higher price. Recent research suggests a price premium for house energy efficient technologies in Australia (Fuerst & Warren-Myers 2018); however, with only some buyers asking about energy efficient technologies it is unlikely a price premium will be paid. All agents interviewed agreed achieving higher prices for such technologies was not possible, as highlighted by the following comment:
Because if the vendor’s done it [installed energy efficient technologies], he’s probably got half a brain so he’d be wanting to highlight it. And obviously it’s a benefit to the buyer. But is the buyer going to jump up and down and pay an extra $5,000 because it’s an energy efficient home? No chance. No chance. (Real Estate Agent 3, St. Albans).

In only three cases (Real Estate Agents 5 Preston, 6 Ringwood, and 8 Hurstbridge) was there a sense of enthusiasm for including an energy efficient lexis. In each of these cases it was clarified that they would not do so in favour of other, more traditional, features such as location or lifestyle offerings, with potential energy benefits having to be economically based if any price premium was to be gained by the seller.

I think it comes down to how much they're going to save. They’re going to sit down and do the sums as well and say, ‘OK, well what are the bills going to be, how does this work out?’ I mean could we retrofit this one, if it’s going to cost them less, yeah. (Real Estate Agent 8, Hurstbridge)

As is shown in Chapter 6, section 6.7, energy efficient technologies are listed within the body of the advertisement but not given prominence. Overall, agents did not see energy efficient technologies gaining equal or greater importance to the buyers than more traditional requirements such as location or accommodation.

5.4.1.2 Sub-theme: Need to self-educate

The benefits of energy efficient housing are many (Leech, Raizenne & Gusdorf 2004; Jakob 2006; Wang, Gwilliam & Jones 2009). With proper in-use behaviours such technologies reduce both energy costs for the occupants, and carbon emissions for the environment, a well-publicised objective for the uptake of these technologies (Li & Colombier 2009). All agents were aware of the cost benefits and broader environmental implications, but none were able to expand beyond that simple understanding. If agents were able to explain the importance of orientation, over-hanging eave widths, the capture of winter sun and shade summer sun, they did not do so, even though the discussion was very much about energy efficient design and technologies working together. Rather, the agent’s focus was generally upon government rebates for solar PV and hot water installations. Notions of thermal comfort and use of passive design principles found in the literature (Georges et al. 2012; Dan et al. 2016) were all absent. This can potentially be attributed to lack of formal training and/or continuing professional development.
No formal training in regard to energy efficient housing was available to practicing agents through REIV (J Mitchell, Manager, REIV, interview, 10 February 2017). In reference to how knowledge about energy technologies is attained, Real Estate Agent 1, Seaford, stated: ‘It seems to be we are left a little bit behind, especially with the established house’. When seeking to acquire information, Real Estate Agent 2, Camberwell, stated: ‘I’d probably go to the internet’. In fact, it became evident that those agents who seemed more aware and/or knowledgeable of energy technologies, of which there were four (Real Estate Agents 4 Altona, 5 Preston, 6 Ringwood, 8 Hurstbridge) acquired this knowledge through personal experience or being educated by sellers within the context of their business activity. For example, Real Estate Agent 5, Preston, learned about energy efficient technologies through ‘Mainly my parents. They actually got solar panelling.’ While Real Estate Agent 9, Whittlesea, said, ‘You listen to your vendor, what they’re stating about extras and so forth’. This highlights the reactive nature of agents (Bond 2015; Dunning et al. 2018). This circumstance, therefore, requires agents to be personally motivated to seek and integrate knowledge about house energy efficient systems and how to best promote these attributes into their professional skill set. This is highlighted by Real Estate Agent 6, Ringwood, whose comment (presented above and partially repeated here) was: ‘I better go do some research because me knowing about this is obviously going to be important to her’ [referring to the seller]. Such a comment demonstrates the lack of resources available to agents to acquaint themselves with modern house energy efficient technologies. More pragmatic agents may not be as inclined to make such efforts until the appetite for energy efficient technologies is highly visible in housing markets.

5.4.1.3 Sub-theme: Motivation and real estate agency legislation

Sourcing and interpreting new information independently, and attempting to imbue this information into work matters, can be problematic as it may not be interpreted correctly or appropriately within the context of a particular house (Sykes 1996; O’Sullivan 2003). Incorrect or misleading information given to a prospective buyer can have significant implications for the agent (Consumer Affairs Victoria 2018). The Victorian Estate Agents Act 1980 is framed to ensure full disclosure and factual evidence of assertions made by agents is available. In other words, claims made by agents, including house energy performance, must be capable of being justified. In addition, elements of Victorian consumer law regarding representations made in advertising could potentially include claims made during the house sale process (for example, see Fair Trading Act 1999 (Vic), s12). In the case of stating the presence of a particular technology or technologies, this is generally easy to do. The item is either visible, for example solar panels on a roof, or visible upon closer examination, such as wall insulation. Design
attributes such as orientation are also clearly demonstrable. A lack of knowledge regarding use, limitations and lifecycle of energy efficient technologies is likely to cause caution on the part of the agent, and even potential disengagement from the issue (Reddy & Painuly 2004). Such action may stem from fear of retribution through legal channels if claims of savings, performance etc., were made and, in the view of the buyer, not fulfilled. While not specifically stated in relation to technology performance capabilities, all agents displayed a sound understanding of legal and ethical requirements, with Real Estate Agent 4, Altona, stating: ‘[We receive] corporate training every couple of months from head office, which is pretty good.’

One section of the interview questions inquired about agency ethical practices when scripting advertisements. Each agent demonstrated a sound knowledge of their legal and ethical obligations in this process and expressed reluctance to go beyond the limits with Real Estate Agent 5, Preston saying: ‘Well it’s facts. It’s not my opinion. It’s factual evidence’.

5.4.2 Theme 2: Business reality

Residential agents are in the business of selling houses and, in Victoria, they are paid a fee, known colloquially as commission, that is contingent on a successful outcome. This arrangement is common throughout Australia and many parts of the world (Shy 2012; Stamsø 2015). Such a remuneration arrangement would logically mean considerable focus would be given to ‘what sells’, with disruptions tolerated if mandatory, and possibly discarded if considered unhelpful to a potential deal (Crowston, Sawer & Wigand 2001). Minimal education requirements open the industry to relatively easy entry, and historically high staff churn (Neary 2017). Relative ease of entry, and the opportunity to gain considerable financial rewards, contributes to real estate in Victoria being an intense and competitive industry. The realities of operating within such a competitive industry are likely to mean agents will place considerable attention to ‘what sells’ and less on characteristics not keenly sought after by buyers when advertising a house for sale (Jud & Frew 1986; Fereidouni 2012; Stamsø 2015; Arndt et al. 2017). This message came out very strongly in all interviews in various ways. Comments such as the following highlight this pragmatic view: ‘I mean, our job is to sell the property as best we can with the tools we’ve got and the home we’ve got to sell’ (Real Estate Agent 4, Altona).
5.4.2.1 Sub-theme: Survival

To say business survival is front of mind for real estate agents is somewhat trite. Therefore, when considering behaviours such as what determines whether agents use energy efficient lexis in house advertisements, the answer, in part at least, would appear to rest with the benefit(s) they perceive in doing so (Lee & Thompson 2011). One potential benefit for agents could be quicker sales and higher commissions if they perceived the house buyers sought and valued energy efficient housing. Agents did not believe this to be the case. When asked, ‘Do you hear of buyers seeking energy efficiency as part of their shopping list?’, with two exceptions each agent responded in the negative. In the case of the exceptions, the responses were somewhat mediocre or a little confused. In either case there was nothing mentioned relating to advanced concepts of energy efficient technologies.

I’ve heard about the insulation, obviously insulation you know ‘cause it’s a question that a lot of buyers do ask is it insulated in the roof, is it insulated in the walls and so forth because obviously that helps keep warmth in and so forth so less cost there. (Real Estate Agent 5, Preston).

I think it’s an increasing trend that they look at it and they do talk about how to reduce energy bills. I mean you know what electricity bills are like, it’s becoming – it’s really hitting people. A lot of people locally use wood fires and I think they’re starting to think it's probably not a long-term sustainable thing to do unless you’re on acreage, in which case it doesn’t matter. But for the township here in Hurstbridge, they’re having to turn to electricity or gas. So, they do think about it. (Real Estate Agent 8, Hurstbridge).

Interestingly, both these respondents work in areas that exhibited greater prevalence of energy efficient technologies in advertisements. In the case of Real Estate Agent 5, Preston, the area is very urbanised with ‘typical’ buyers being young, professionally qualified, salaried employees (ABS 2016c). Such a buyer profile accords with literature in terms of people likely to seek environmental attributes in housing options (for example, see: Zhao et al. 2012; Achtnicht & Madlener 2014). In the case of Real Estate Agent 8, Hurstbridge, the suburb is located on the fringe of the metropolitan area and according to the agent, buyers are often seeking a lifestyle ‘tree’ experience stating:
But the benefits here are that you can catch the train to the city, you can commute to the city or you can get over to the airport or whatever quite easily with the Ring Road. And you can live in a rural nice country retreat setting.

House buyers seeking rural ambience while not being too far from the CBD is not an unusual lifestyle objective for families (Ragusa 2010).

Otherwise a more typical response to the question was: ‘Hardly at all. Hardly at all. Not for, I would not have spoken to anyone at all in the last two years about it, never mentioned a word’ (Real Estate Agent 2, Camberwell). Being attuned to market nuances, buyer views such as this are likely to cause agents to focus on other, more sought-after house features, even if the house has energy efficient technologies within it.

The comments of the above participants suggest there appears to be very little market appetite for these technologies’ relative to other, more traditional, requirements such as accommodation and price (Collen & Hoekstra 2001). Working within the domain of such a competitive industry, and driven by the need for income, only attainable through successful sales, it is likely agents will highlight other features more amenable to market trends over energy efficient technologies.

The workings of Principal-Agent theory can be observed through this agent behaviour, with similar behavioural patterns previously reported (Anglin & Arnott 1991; Rutherford, Springer & Yavas 2005). If a house listed for sale exhibits energy efficient technologies, the data corpus suggests the agent will typically include it in the advertisement. However, emphasis is given to features believed to maximise appeal to buyers in order to achieve a timely and successful outcome. This was the case even when the vendor was excited about the environmental nature of the house. With respect to this, Real Estate Agent 5, Preston, stated: ‘So what people are looking for, what’s going to be the main selling feature of the property’. A similar view was also expressed by Real Estate Agent 9, Whittlesea: ‘So he [the seller] said, you know he talked about that [energy efficient features in the seller’s house]. He didn’t ask me to write that in the ad but I wrote that in the ad’.

In this instance, to avoid negative sentiment with the seller, the agent acquiesced to the seller’s belief about the benefits of energy efficient technologies; while the seller did not specifically ask to include such features in advertising, the agent did so. However, within the advertisement
he remained focussed upon the characteristics he believed would lead to a successful outcome. The agent’s view here was one that appeared to be responding to the seller’s views about the significance of these technologies, rather than a belief of a positive contribution to the sale. Understandably, the agents’ aim is to stay in business, and they do this by maintaining positive relationship with their clients, usually sellers, to sell properties and earn a commission. Consequently, personal views and opinions in this regard are likely to be set aside in expectation of future benefit. This objective would include the pragmatic necessity of attracting buyer attention through advertisements. When asked about important points to highlight within an advertisement, Real Estate Agent 9, Whittlesea, went on to say: ‘Yeah, I think price attracts so I’ll always include a price’. This was further demonstrated with Real Estate Agent 8, Hurstbridge, when discussing a specific house advertisement: ‘So that is what I'd focus on for that one, not the energy efficiency, because I think that probably is really the best way to get buyers interested in it’.

While the localities within the research frame of study did not exhibit high aggregates of energy efficient technologies retrofitted to houses, where they do exist, sellers appear keen to ensure the agent is aware of the existence of the technologies. One agent who admitted having limited understanding of energy efficient housing, stated: ‘Where sellers have energy efficient products, they’ll promote it to us to say that we’ve done this can we promote that to buyers because it’s saved us X amount of dollars’ (Real Estate Agent 5, Preston).

Thus, it appears agents are engaging with energy efficient language in advertisements but not necessarily out of a belief it is good for business. It is very improbable that anybody would commence a career in real estate without aiming for it to be long-term and with financial security. Decisions made by agents would undoubtedly have this goal in mind. Therefore, the objective of personal success is very likely to influence agent engagement and behaviours regarding including energy efficient lexis in advertisements.

5.4.2.2 Sub-theme: Market forces

The data revealed agents believe there is minimal demand from house buyers for energy efficient features. When asked if buyers were inquiring about energy efficient technologies, Real Estate Agent 3, St. Albans, emphatically stated ‘Zero!’. Similar responses were received in most other regions. However, three agents reported higher levels of interest in their markets than the other six. These were agents 5 (Preston), 6 (Ringwood), and 8 (Hurstbridge). Two of
these were in the northern sector of the research area and the third in the middle eastern sector. In saying this, it must be remembered this variation is from a low base as all agents stated the majority of buyers do not mention energy efficient ambitions in their search, but in these areas there were sufficient quantities to be noticeable. However, these inquiries appear to be driven by local house characteristics and less by a specific motivation for energy efficient housing.

Real Estate Agent 3, Preston, whose market area is well known for aging housing stock (REA Group 2019), mostly built in an era when insulation use was uncommon, stated buyers regularly ask: ‘Is there insulation in the roof or walls?’ Whereas Real Estate Agent 6, Ringwood, where the median household income is lower than Preston (ABS 2016a) suggested buyers approached the matter different asking, asking: ‘You know, can we see a copy of their water bill or electrical bill? Because they’re trying to compare to see what the usage is like compared to what they’ve currently got now.’

When asked if he would include energy efficient technologies in advertisements and why would he do so, Real Estate Agent 8, Hurstbridge, whose business is located on the urban fringe, an area of semi-rural ambience, responded: ‘I would definitely mention it. But that’s the other thing, I think that solar panels, they are very – there’s a lot locally and people are getting more and more into it’. In this response the agent was noting both house owner and buyer interest in solar systems. This reply was further clarified by the agent with: ‘Well they want to buy it as cheap as possible. They want the biggest house in the best location for as little as possible’ (Real Estate Agent 8, Hurstbridge). Again, the agent was reminding the researcher that while there was notable interest in energy efficient houses, buyers were still seeking to meet their family needs as a priority. In this area, energy efficiency appears to be emerging as a conversation item in house search discussions.

When asking about buyer interests in energy efficient features, Real Estate Agent 2, Camberwell, whose office is located in one of Melbourne’s wealthier suburban areas, said: ‘If it’s the best location, say Glen Iris and Camberwell, it’ll be that. If it’s a huge block of land that’s why they’ll buy it, that’s what’ll go up the top [of the buyer list]’. And further: ‘Well it might sound silly but the more money they seem to have the less they seem to worry about it’ (speaking of energy efficient housing) (Real Estate Agent 2, Camberwell). One aspect being observed here is demographic differences. Demographics are known to influence housing and locational choice (Goodman 1990). In terms of household income, all three localities in which this heightened level of buyer interest in energy efficient characteristics was noted were in the middle band, not high income areas. This somewhat accords with literature in that households
with higher income are generally considered more likely to undertake house energy efficient refurbishment (Organ, Proverbs & Squires 2013; Ramos, Labandeira & Löschel 2016). However, given agents working in the relatively wealthier areas did not exhibit the same level of engagement suggests wealthier buyers may have other priorities.

The interviews revealed, rather strongly, that agents are very much in-tune with buyer sentiment. The relatively low level of buyer interest in energy efficient characteristics previously discussed, is likely to cause agents to include energy efficient lexis in advertisements when existent in the house but not to the extent where such lexis is prominent nor emphasised. The following statement typifies the view that ultimately financial constraints impact on buyer search behaviours and agent responses: ‘it’s good for our environment but realistically most people look at the dollar situation’ (Real Estate Agent 9, Whittlesea).

Property markets are known to be influenced by activity from external and internal forces (API 2007, p. 29). Externalities such as economic climate, including employment levels, interest rates and the availability of money for buyer mortgages all impact on a person’s ability to source and secure loans, usually necessary to complete a purchase (Wood & Ong 2011). At a local level, internal market forces are often nuanced by local features such as beaches, natural landscapes and location to services leading to the popularity of one area over another (Boterman, Karsten & Musterd 2010). These can have a significant impact on buyer decisions. It is one of the roles of agents is to understand market nuances and trends in order to advise their client sellers on how best to promote their house for sale (Stamsø 2015). As previously mentioned, when advertising, they will operationalise these nuances via various means, but one primary strategy is the inclusion of the desired features in advertisements. This will mean if agents sense a market appetite for energy efficient housing, they will aim to exploit that market to its potential. Doing so would fulfil both the seller’s and agent’s ambitions.

5.4.2.3 Sub-theme: Personal Values
At times it is difficult to separate personal values from professional behaviours (Brinkmann 2000). While agents expressed views such as: ‘I’d personally like to be way more involved in it and to be able to talk about it more and talk to buyers about it. Some buyers are really into it. But most aren’t’ (Real Estate Agent 8, Hurstbridge). The general view of respondents was more along the lines of: ‘I don’t think they [estate agents] should be telling people what to do. I think they should be selling what they’ve got’ (Real Estate Agent 2, Camberwell). Although,
somewhat bounded by the demographic profile of the area in which they work, agents typically interact with a broad spectrum of society. In doing so it is reasonable to believe agents would become adept in separating personal views on particular issues from advice given to clients so they may give the client ‘unbiased and professional’ guidance. One purpose in doing so would be to avoid potential and unnecessary conflict leading to deterioration of the relationship. These comments by the agents suggest they are focussed on procuring a successful outcome and are ‘stepping back’ from expressing personal views, even if the opportunity presents itself. Agents did not believe they had a role to play in directing house markets in terms of developing more energy efficient housing. Rather, they see themselves as reactive, not proactive, with such complex issues. The legal framework and professional regulations are very likely to influence their choice of energy efficient language in advertisements, as agents would seek to avoid potentially misleading performance claims about the technologies. The third and final theme for RQ1 to be discussed is Advertising practice.

5.4.3 Theme 3: Advertising practice
Advertising houses for sale is an important activity for residential agents and they perform this task on a weekly basis as each trading weekend approaches. The purpose of advertising, including house advertising, is to highlight and promote key attributes to attract potential buyers (Williams 2000). How this is done in practice was identified as a theme in this research and useful in answering the research questions.

5.4.3.1 Sub-theme: Buyer(s) characteristics and attitudes
Generally in Australia, houses are purchased for one of two reasons: investment or occupation. In either case buyers are seeking to meet a set of personal needs, wants and/or desires (Goodman 1990). For example, a family with two children would be expected to seek a house with a minimum of three bedrooms and often four. They may also seek extra living space within the house and possibly want to be near selected schools. This sub-theme includes demographics. Governments have struggled to encourage house buyers to prioritise energy efficiency in their search (Anthoff & Hahn 2010; Golubchikov & Deda 2012). Arguably, the need to satisfy household requirements should not exclude the imperative of energy efficient housing, but rather, it ought to become part of the suite of requirements, albeit lower in order. Although Real Estate Agent 6, Ringwood, indicated he had a basic but nonetheless reasonable grasp of the technicalities of energy efficient housing including operational elements, when asked if buyers were asking about energy efficient features about houses, he replied: ‘They,
yeah they do. Pretty much every home they’ll ask it in a roundabout way’. This response prompted further inquiry from the researcher. On elaboration he said:

So, they’re not necessarily saying what sort of energy efficient features this home has, but they’ll be asking in roundabout ways in terms of saying what type of heating and cooling has it got, is it electric or gas? You know, can we see a copy of their water bill or electrical bill because they’re trying to compare to see what the usage is like compared to what they’ve currently got now. So, the heating and cooling aspect comes up probably more than anything. (Real Estate Agent 6, Ringwood).

In the context of this research, this statement cannot be interpreted as an inquiry about energy efficient technologies but rather an awareness that houses can perform differently. This performance, although not recognised in this statement, is intricately linked to occupant behaviours (Steg & Vlek 2009; Gill et al. 2010; Zhou & Yang 2016).

As house energy performance is more than just low-cost heating and cooling systems, such an association between this sort of inquiry from a buyer and energy efficient technologies suggests the agent may not have the depth of understanding he believes he has. The agent is not separating house energy efficient technologies from high performing appliances that can be removed from the house. This too has the potential to influence language used by agents when advertising houses.

Aside from this comment, the other eight agent responses concur that buyer interest in house energy efficient technologies very low. One agent stated: ‘I would not have spoken to anyone at all in the last two years [2011-2013] about it, never mentioned a word’ (Real Estate Agent 2, Camberwell).

As agents have stated, they normally do include technologies such as solar in advertisements and buyer interest seems passive, it is therefore likely that agents would probably simply ‘list’ the items and not create voluminous advertisements using hyperbole to highlight these technologies if there is no perceived appetite for them.

All agents referred to the need for brevity when scripting advertisements. This criterion manifested in various ways, but the message was the same. Buyers scan many advertisements in the search process and often become very ‘targeted’ in what they are searching for (Rayner
et al. 2001; Ziming 2005); agents are aware of this. When discussing a particular ‘lengthy’ advertisement, Real Estate Agent 5, Preston, noted: ‘Yes, it’s very comprehensive. It probably could be a bit pointier but, a bit more direct, little bit less fluff just to get the main points’.

When discussing the relevance of including energy efficient technologies in advertisements, implied verbosity was suggested by contemporaries when Real Estate Agent 7, Bayswater, stated: ‘I think it does, for me, it doesn’t seem to be top of their mind, and however, it is a selling feature. I had other agents say why’d you put that crap in there for? So, I think it’s useful information as long as it’s not too verbose in an ad’. While perhaps not intentionally aiming for brevity, he targets specific buyer characteristics: ‘Although I usually hit hard with the bedrooms first and say, there’s four bedrooms, three bedrooms plus study. Or six and a bungalow’ (Real Estate Agent 7, Bayswater). This statement crystallises the view of agents interviewed regarding the inclusion of, but lack of emphasis given to, energy efficient technologies in advertisements, with the focus remaining on aligning specific house characteristics to perceived targeted buyer needs.

5.4.3.2 Sub-theme: Professional training
Real estate agents undergo mandatory training to enter the industry (Consumer Affairs Victoria 2017). This entry level is known as ‘Agent’s Representative’ and these people perform tasks such as sales on behalf of the licensed agent, who often owns the business. To become a fully licensed agent further study is required (ibid). Part of the licensing education program includes a course on marketing property for sale, a portion of which discusses advertising. The substantive component of this course pertains to regulatory obligations to which agents must adhere when making representations about property, in particular housing.

In all interviews, agents acknowledged they did not receive any formal training regarding energy efficient technologies, but rather extensive training on legal and ethical practices. Real Estate Agent 3, St. Albans, stated:

Yeah, you know they’ve got like three or four internal trainers, but they get a lot of external people in. Like we get REIV in, we get the police in, we get lawyers in, we get accountants in. We’re constantly… I’ll get an email every second or third day. I was just checking if there was an email there. But I’d probably get two/three emails a week.
This lack of energy efficient technology training could lead to agent reticence to elaborate or make claims about the benefits of these technologies when including them in advertisements. Doing so could result in legal action against the agent by buyers if the house did not perform as purported. Logically, this lack of training could also explain lack of knowledge held by agents.

When asked if they would like to be able to access formal training regarding energy efficiency, six agents said they would, two said ‘not really’, and one was non-committal. Real Estate Agent 9, Whittlesea, stated: ‘I think we need a lot more education […] because we haven’t learned this through our industry. It’s only what you hear and talking’. This lack of professional training inhibits confidence to make claims about energy technologies and, as stated, potentially impacts upon language used in advertisements.

5.4.3.3 Sub-theme: Legal framework

The real estate industry throughout Australia operates within a regulated framework (Consumer Affairs Victoria 2017). This is considered necessary to ensure agents understand their legal obligations when dealing with the public (Le & Supphellen 2017). Consequently, this would impact language used by agents in advertisements, particularly for emergent technologies such as those discussed here (Perkins, Thorns & Newton 2008). In all cases agents were aware of their obligations and this would be expected as more experienced agents were interviewed for this research.

When discussing advertising practices, comments such as this were typical: ‘I’m sure people are intelligent, they’re going to make their own decisions’ (Real Estate Agent 8, Hurstbridge), and when discussing potential issues arising from advertising: ‘Because I’ve been up front with them it doesn’t really bother me’ (Real Estate Agent 5, Preston), and, ‘No matter what, you have to be trying to make sure that you’re doing the right thing for the owner’ (Real Estate Agent 6, Ringwood). These responses all imply agents will remain conservative when scripting advertisements to ensure claims made are capable of being verified.

5.4.4 Research Question 1: Qualitative summary

*RQ1: What determines whether agents use energy efficiency language in housing advertisements?*
The data corpus has revealed agents have limited understanding about energy efficient technologies and knowledge held is largely self-acquired. Agents are likely to include energy efficient technologies in house advertisements where existent, but lack of knowledge seems to be restraining the use of hyperbole to highlight the benefits to potential buyers. The AIDA principle, taught in formal real estate training, does not seem to be applied by agents when it comes to promoting energy efficient technologies. Including energy efficient lexis in house advertising appears pragmatic as agents are seeking a point of difference rather than promoting it as a benefit to the home buyer. However, due to a lack of market appetite, regulatory requirements, and overall comprehension of these technologies, such engagement appears to be limited to merely itemising the technology within the advertisement rather than enhancing perceptions by supporting the technology with hyperbole.

The implications are that such a practice is likely to downplay the importance of these technologies in the minds of buyers. This in turn means buyers are left to seek their own information about energy efficient technologies and its relevance to their decision. In other words, agents do not see energy efficient technologies as sufficiently important in the minds of buyers, and applying the taught AIDA principle, give prominence to other house characteristics.

The interview data presented here, and the following sections of this chapter, reveal what agents claim they do. The quantitative data presented in Chapter 6, elucidates what agents actually do. For this reason, Chapter 7 coalesces findings in these two chapters to present a more rigorous understanding of agent engagement with energy efficient technologies when advertising. This discussion now progresses to address Research Question 2.

5.5 Advertisements and geographic variance

This topic addresses the observed variation in the appearance of keywords categories across the spatial frame of the research area. Specifically, it addresses the research question restated here for convenience.

RQ2: Does the extent of inclusion of energy efficient technologies in house advertisements in Melbourne Victoria vary across disparate regions and if so why?
Initial scoping for this research project found a variance in including energy efficient terminology appearing across the geographic frame of the research. This was observed in Chapter 6 – Descriptive Statistics. Literature suggests family income and education are causal variables for engagement with energy efficiency technologies (for example, see: Achtnicht & Madlener 2014; Ramos, Labandeira & Löschel 2016). However, education and income are generally correlated with higher levels of education typically leading to higher income (Cullen 2012). The themes found within the data corpus provide greater insight into the rationale for including energy efficient lexis across demographically variant regions, as illustrated in Chapter 5.

5.5.1 Theme 1: Knowledge
No discernible variation in knowledge of energy efficient technologies was observed across the geographical dispersion of agents. All agents interviewed displayed a relatively uniform, but basic level of understanding of the technologies, their use and benefits. Therefore, this theme cannot provide further insight to Research Question 2.

5.5.2 Theme 2: Business Reality
This theme addresses the pragmatic realities of running a real estate agency business in a competitive environment such as Melbourne. Agents in all areas interviewed spoke of the intensely competitive nature of their market and the need to ensure they remain competitive in all they do.

Three sub-themes were identified under Theme 2: Business reality. In essence, these sub-themes were common in how they influenced interviewed agent behaviour. The one possible exception to this may be Sub-theme: Market forces, which is both external and localised. However, as Theme 2 refers to externalities that are common across geographic regions, such as economic trends and interest rates, this could not be offered as an explanation for regional variance of energy efficient language in house advertisements. Local features, such as beaches, typically influence house prices and attract certain types of buyers, but again would be unlikely to influence choices regarding engagement with energy efficient technologies.
Coding of the data did not reveal anything that would contradict this. Therefore Theme 2 is regarded to have little or no influence in spatial variation for including energy efficient language in advertisements.

5.5.3 Theme 3: Advertising practice
Of the three sub-themes categorised within Theme 3, Buyer characteristics was considered to have the most impact on including energy efficient language in advertisements. The other two sub-themes – legal framework, and professional training – are considered common to the industry and therefore would not be capable of explaining observed variations. Through literature, the researcher formed the view that a variation to the extent of including energy efficient lexis would occur as a result of demographic variation across the disparate regions examined. To investigate this, empirical data sourced from the ABS was acquired for the postcode regions of the interviewed agents’ business address. These are presented in Table 5.3. Due to the fact that professional development and training, and the legal environment in which agents work, are not defined by location but are practice based, it is reasonable to conclude that the sub-themes of Professional training, and of Legal framework, are not considered useful in addressing Research Question 2. Therefore, only sub-theme: Buyer characteristics is of interest here.

5.5.3.1 Sub-theme: Buyer characteristics.
To remain successful, agents are very aware of changes and nuances in their local markets (Bridge 2001). If demographic profiles influence people’s choices to engage with energy efficient technologies and environmental issues more generally, agents should calibrate the extent of interest and respond accordingly by promoting such technologies.

Table 5.3 provides detail of median monthly mortgage payments and median family incomes for the nine areas where the residential agents interviewed worked, together with a summary of perceived buyer interest. Included is an indication from the interviewed agents of the extent of inquiry from buyers regarding energy efficient technologies in the house search. The aim of the table is to provide further context for the results presented here.
<table>
<thead>
<tr>
<th>Real Estate Agent No.</th>
<th>Location from central Melbourne &amp; suburb</th>
<th>Median household income – $s (monthly)</th>
<th>Median mortgage repayment – $s (monthly)</th>
<th>Percentage of earnings to service mortgage</th>
<th>Buyer characteristic as described by agent</th>
<th>Level of buyer interest as judged by agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South – (outer) Seaford</td>
<td>5,776</td>
<td>1553</td>
<td>26.88</td>
<td>Younger families</td>
<td>Rarely</td>
</tr>
<tr>
<td>2</td>
<td>East – (middle) Camberwell</td>
<td>11,323</td>
<td>2,500</td>
<td>22.08</td>
<td>Educated high income couples</td>
<td>Rarely</td>
</tr>
<tr>
<td>3</td>
<td>West – (outer) St. Albans</td>
<td>4,229</td>
<td>1,365</td>
<td>32.28</td>
<td>Asian ethnicity</td>
<td>Rarely</td>
</tr>
<tr>
<td>4</td>
<td>East – (inner) Altona</td>
<td>6,188</td>
<td>1,657</td>
<td>26.78</td>
<td>Increasing ethnicity from numerous regions</td>
<td>Occasionally</td>
</tr>
<tr>
<td>5</td>
<td>West – (inner) Preston</td>
<td>6,833</td>
<td>1,954</td>
<td>28.60</td>
<td>Educated middle income earners</td>
<td>Perceptible</td>
</tr>
<tr>
<td>6</td>
<td>East – (north) Ringwood</td>
<td>7,791</td>
<td>1,798</td>
<td>23.01</td>
<td>Educated middle income earners</td>
<td>Perceptible</td>
</tr>
<tr>
<td>7</td>
<td>North – (semi-rural) Whittlesea</td>
<td>6,422</td>
<td>1,783</td>
<td>27.76</td>
<td>Lifestyle seekers</td>
<td>Occasionally</td>
</tr>
<tr>
<td>8</td>
<td>North – (east) (urban fringe) Hurstbridge</td>
<td>7,839</td>
<td>1,760</td>
<td>22.45</td>
<td>Lifestyle seekers</td>
<td>Perceptible</td>
</tr>
<tr>
<td>9</td>
<td>East – (north) Ringwood</td>
<td>7,791</td>
<td>1,798</td>
<td>23.01</td>
<td>Educated middle income earners</td>
<td>Perceptible</td>
</tr>
</tbody>
</table>

**Legend:**
Rarely – Hardly ever hear buyers asking about energy efficient characteristics
Occasionally – Sometimes hear buyer asking about energy efficient characteristics
Perceptible – Reasonably common to hear buyers asking about energy efficient characteristics

**NB:** Income and median mortgage data extracted from ABS dataset presented in Chapter 6.
The first three rows of ‘Rarely’ asked for, are from three very different geographic and demographic characteristics of the research frame and exhibit considerable variation in income and ability to service mortgages. There seems to be an element of ‘need’ and ‘greed’. Camberwell is well known for its wealthy residents, with many being highly trained professionals (ABS 2016b). When asked about buyer interest Real Estate Agent 2, Camberwell, said of typical buyers in this area: ‘Hardly at all. Hardly at all. Not for, I would not have spoken to anyone at all in the last two years about it, never mentioned a word’. Location, in this case meaning suburb name, seems to be of utmost importance for buyers in this area: ‘Well why would they buy it, and you hit the nail on the head like I said before, I mean why would they buy it. If it’s the best location, say Glen Iris and Camberwell, it’ll be that. If it’s a huge block of land that’s why they’ll buy it, that’s what’ll go up the top’ (Real Estate Agent 2, Camberwell). When location is essential to a buyer, individual house characteristics seem to be disregarded, probably because these can be addressed later, post-purchase. Location is generally believed to be a major contributor to value and buyer motivation (Kiel & Zabel 2008).

With regard to the lower socio-economic area of St. Albans, another set of buyer criteria appear, although resulting in the same outcome of low buyer interest. This area has seen an increase in the population of ethnic Asian families resulting in housing sub-markets delineated by ethnicity (ABS 2016d).

Well, you got St Albans West and St Albans East. The bigger blocks are in the east, predominantly all the Asians… 95% of our sales in the east are to the Asians. To the West it’s probably 50%/60%, hence the selling is that Asian factor. Yeah, if it’s potentially development site or areno, they’re the sort of… or anything close to here, you know blue chip location, close to Alfrieda Street, that’s how you determine your tact. (Real Estate Agent 3, St. Albans)

This demographic appears to be focussed on working hard to gather wealth, likely as a means to establish themselves firmly in their chosen country. This is highlighted by the agent’s comment:

And if you drive in Alfrieda Street Saturday or Sunday, it’s as busy as Monday or Friday. Because they’re open 24/7. I think they all trade illegally anyway because you’re not supposed to be open, but council doesn’t care. Because it’s all restaurants,
all you know much of the muchness. So, yeah, the area’s changed because the culture’s changed. And I’ll be honest with you, my parents are from Italian and Croatian background and when they first came out and their parents, you know they worked hard, they worked like dogs for their kids for a better life and these people are doing the same thing. It’s no different at all. (Real Estate Agent 3, St. Albans)

Followed by:

And you attribute that purely to the Asians. And it’s the Asians that are buying everything. So that’s just how much… this is just another Footscray now, they took over Footscray and they’ve taken over Springvale, they’ve taken over St Albans. And they’ll push out, they’ll actually take over… started in Sunshine. It’ll go to Deer Park, it’ll go to Melton, it’ll go to all those areas. (Real Estate Agent 3, St. Albans)

This locality exhibited the highest mortgage to income ratio, suggesting debt (ABS 2011) may be inhibiting buyer interest in energy efficient housing in favour of other basic needs such as accommodation requirements.

Lifestyle seekers and middle income earners on the other hand appear to be somewhat more desirous of energy efficient housing. Agents in these areas spoke about buyer interest in different terms: ‘I think it’s an increasing trend that they look at it and they do talk about how to reduce energy bills’ (Real Estate Agent 8, Hurstbridge), and, ‘They, [buyers] yeah they do’ (sometime asked about house energy efficiency) (Real Estate Agent 6, Ringwood). Here again demographic profile seems to influence buyer interest. With the exception of Camberwell, this demographic typically comprises higher income earners. With reference to Table 5.3, areas where occasional interest is expressed exhibit slightly lower income levels.

5.5.4 Research Question 2: Qualitative summary
Of the three themes examined Theme 3 – Advertising Practices, and in particular sub-theme: Buyer characteristics, appear to be influencing inclusion of energy efficient lexis in advertisements. Household income appears to be shaping buyer priorities in housing choices, and energy efficient technologies do not seem to feature greatly. As a result, decisions by agents regarding energy efficient lexis in advertisements vary somewhat across regions. Obviously, inclusions would be limited by the existence of the technologies in houses within the agent’s
area of business, which is also considered a function of income (Mills & Schleich 2012; Organ et al. 2013). Therefore, it appears regional demographics, particularly income, have some influence on the extent to which agents include energy efficient language in advertisements.

5.6 Emphasis of energy efficient language in house advertisements

This section addresses the third and final research question. It examines the emphasis real estate agents are giving energy efficient house characteristics in advertising. Research Question 3 is restated here.

*RQ3: Are real estate agents giving prominence to energy efficient characteristics when scripting house advertisements?*

Energy efficient housing offers occupants considerable benefits in cost savings and for the environment (Pilkington, Roach & Perkins 2011; Morrissey et al. 2013). Yet it appears minimal emphasis is given to such technologies when marketing houses for sale. Accurate data within the dataset was unavailable for the actual numbers of houses retrofitted with energy efficient technologies. To comply with privacy requirements, REIV data was de-identified, other than postcode, and for the same reason, details of permits required for solar installation were unavailable, and solar is one of the main technologies examined. Thus, there is no way of knowing absolutely how many houses advertised for sale within the dataset actually possessed the technologies, and consequently there is no opportunity to compare those numbers against numbers of advertisements that included energy efficient lexis. Therefore, the view of the real estate agent is important as it provides a ‘temperature’ of market interest and engagement.

For this reason and those previously explained, the Principal-Agent theory is useful for assessing agent engagement in promoting energy efficient technologies in house advertisements. However, the data shows little emphasis is being given when these technologies are included in the advertisement. The purpose of this research question is an attempt to understand this incongruence.

5.6.1 Theme 1: Knowledge

To proficiently promote them, residential agents must have knowledge of the characteristics and benefits of various energy technologies. In all nine cases interviewed, no agent displayed
this capability. Lack of such knowledge would understandably restrict how agents promote these technologies. Without the confidence to highlight benefits and/or performances of energy efficient technologies, it is safer for agents to limit what is said and leave it to the reader to make an inferred judgement. The maxim ‘less is more’ applies here.

5.6.1.1 Sub-theme: Market awareness

Applying the Principal-Agent theory, agents will respond positively if they perceive a market with positive attitudes to energy efficient housing by buyers. Sellers are also likely to want these technologies highlighted in advertisements. As previously mentioned, literature indicates wealthier people are more likely to engage with energy efficient technologies (for example, Gamtessa 2013). This does not seem to be the case when people are seeking to purchase. The attitudes of all agents are best summed up with the agent whose business is located in the most expensive area of those interviewed. When asked about priorities in scripting advertisements, he said: ‘After the headline which hopefully attracts them, ‘cause a major selling feature, the rest is just basically describing the property or the rest of the fluff’ (Real Estate Agent 2, Camberwell). This agent also stated he would include energy efficient technologies, if present, in an advertisement.

Although in one location where the agent claimed house energy efficiency was of some interest to buyers, they also noted it was not more important than other house features. The following highlights this:

Respondent: Oh yeah, so they’re moving to Preston/Reservoir based on affordability. They’re wanting the land component, they’re wanting room to be able to put their vegie patches, their trees, fruit trees, yeah, chooks.

Interviewer: So, in part you’ve already answered the second thing about what you decide should go in the advertisement. There’s plenty of research around, this is just for your own information, I was reading an article a little while ago, 80 percent of people, or 82 percent I think it was, will not read past the first sentence if it doesn’t capture them at that stage.

Respondent: Correct.
Interviewer: So, what you’re basically saying is that the important information that you want to get across built into that first sentence.

Respondent: Correct. So, if it’s a location that is a selling feature than that needs to be promoted in the first line. (Real Estate Agent 5, Preston)

In the mind of the agent this reference to location is suggesting traditional residential attributes continue to hold primary importance to buyers, with energy efficient technologies less so.

Further, previous results show agents are including energy efficient technologies in advertisements when they are fitted into a house listed for sale. but without emphasis To explain the emphasis given to house features when advertising, one agent said:

Yeah, I think regards to features, I believe, and the way we go about it is that more about telling a story about the property than actually mentioning the main facts about the home. Buyers will know that it’s got a kitchen and bedrooms and bathrooms and that sort of stuff so we're really trying to sell, I guess sell the dream of the property itself, the benefits of that particular property more so than actually naming what the home has because we all know what the home has got. It’s more about the benefits and the features and the location and the surroundings of that home is how we go about it. (Real Estate Agent 4, Altona)

This particular agent had an extensive PV system installed in his own home and demonstrated his personal enthusiasm during the interview so it is interesting he would not highlight energy efficiency when ‘telling a story’. In essence this could be a result of the agent continuing to focus on the more traditional features he believes will resonate with the market. This view could be evidenced by: ‘Not one of them would ask anything about any energy efficient homes that we’ve got on the market that they’d be more interested in buying than not’ (Real Estate Agent 4, Altona). Another agent commented: ‘It doesn’t seem to be top of their [buyer] mind, and however, it is a selling feature’ (Real Estate Agent 7, Bayswater).

This view of including energy efficient terminology, but with little emphasis, was a consistent theme in all interviews. When asked about energy technologies other than solar, one agent stated: ‘No, things [orientation, solar hot water service etc.] like that we don’t really promote as much but, yeah’ (Real Estate Agent 5, Preston). On this topic one agent showed a level of
indifference towards giving prominence to energy efficient technologies by nonchalantly stating when referring to a specific area of their market: ‘That perception if visualising the room itself, that it’s nice and light but I suppose you could throw in that as being energy efficiency ‘cause you’re not relying on lights and so forth’ (Real Estate Agent 9, Whittlesea). This potentially also highlights a lack of understanding on the agent’s part, leading to a lack of emphasis on the benefits as the agent did not mention the passive heating effects of well-lit rooms.

One agent exhibited a clear understanding of the ambience of his area, and in writing advertisements he aimed to create emotional connection with the property. An example of this is this extract of a conversation between the researcher and the agent:

Respondent: The obvious thing was we were targeting or trying to remove ourselves from marketing towards the developer, because we knew the developer wasn’t going to be the highest spender in the marketplace and it ended up being that, more a spontaneous buyer than an educated buyer.

Interviewer: Like an emotive, from the heart type purchase?

Respondent: That’s right, very much, passive, going for a drive, thinking it’s a lovely area and that’s it. (Real Estate Agent 1, Seaford).

These comments by agents demonstrate their awareness of house market trends and how to appeal to them when advertising.

5.6.1.2 Sub-theme: Lack of formal training about energy efficient technologies

Lack of training about energy efficient technologies has potential to create conservative attitudes by agents when advertising within a strict legislative environment. In one of the more active areas in terms of frequency of energy efficient technologies appearing in house advertisements, the agent seemed more limited to promoting solar technologies than other important elements.

Respondent: I would definitely mention it. But that's the other thing, I think that solar panels, they are very – there's a lot locally and people are getting more
and more into it. Mind you they don't know I've got solar panels myself and I need more. But yes, I would mention it definitely.

Interviewer: What about other things?

Respondent: Solar hot water service, yeah.

Interviewer: One of the most effective forms of energy reduction is actually the simplest which is putting seals around windows and doorways and stuff like that to reduce airflow, uncontrolled airflow. Is that something that you – I know you may or may not put that in the ad, I shouldn’t pre-empt that, but is that something that you would typically pick up on and mention?

Respondent: No. I mean you’ve come out with it and it's probably quite a valid point, but I haven't done that. (Real Estate Agent 8, Hurstbridge)

The comment regarding the increasing level of interest in solar PV cells, and less so in other technologies, suggests a narrow understanding of the technology options available. This was a notable theme throughout the research.

Insufficient knowledge of energy efficient technologies, much of which was discussed with regard to Research Question 1, would also impact on the prominence given to energy efficient characteristics in advertisements by agents. A potential reason for this is fear that claims made in heightening expectations through using hyperbole could be used as a basis for claims of compensation from agents should the house not perform to buyer expectations. As agents expressed varying, but low, levels of understanding of energy efficient technologies, giving prominence to them might be seen as simply too risky as licensing training instils awareness of the need to be able to validate assertions made. All agents indicated that training for ethics and legal requirements was ongoing and featured regularly in training programs. Real Estate Agent 3, St. Albans, stated: ‘Yeah, we’re full on in that [training]. We send them [sales staff] externally.’ This ongoing exposure to consumer and relevant laws would undoubtedly make agents cautious in their advertising practices.
5.6.1.3 Sub-theme: Motivation and industry legislation

As previously stated, motivation for agents to include energy efficient technologies in advertising, and how they do so, is likely to stem from perceived market appetites and be performed in a manner that is within the law. The extracts previously provided to demonstrate other elements of these results are equally as important here. Further, the issue regarding declining government rebates for installed solar PV systems seems to be causing consternation among buyers, with this being detected by agents. Real Estate Agent 6, Ringwood, made specific reference that in its essence crystallised other agent attitudes:

I think the attitudes of the moment is that a lot of people, especially the young ones coming through are only planning to live in the home for, they may only have a five-year plan and they’re not sure if they’re going to live there beyond that. So, they’re weighting up the cost of putting that stuff in versus whether we’re actually going to get a full return on it. And most people would sooner have, would sooner keep the money in their pocket now, rather than outlaying it to save a little bit over time. I think there’s that mentality at the moment. So, I think in terms of answering your question, I think there has to probably be more confidence from buyers and sellers with our government that they’re going to be able to provide long-term assistance and some benefits for it. But at the moment, they haven’t shown that. They’ve shown that they, that when it was a popular thing a few years ago, we’ll give you a good discount, but we’ll start taking that away quite quickly rather than maintaining it. When really, it will take, it would normally take quite a few years for the momentum for something like solar to build up and for people to talk about it. So really that incentive should be growing, and they should be taking advantage of that.

And as I said, most people now when you have homes with solar, they go, yeah that’s great, but you know, we’re not the couple… their concern is that in another few years’ time, could the government make an announcement that they’re not going to give any incentive for… could it just be taken away like that? And that’s what they’re worried about.

With regard to government incentives, agents appear to lack confidence in consistent policy. Real Estate Agent 6, Ringwood, also noted: ‘I think there has to probably be more confidence from buyers and sellers [concerning financial commitment to energy efficient technologies] with our government that they’re going to be able to provide long-term assistance and some
benefits for it [retrofitting of energy efficient technologies]. Considering Principal-Agent theory, this perception of market uncertainty is likely to lead to disengagement by agents from promoting energy efficient technologies. The above quotes show a reticence to make specific claims about the benefits of energy efficient technologies. This is combined with a lack of in-depth knowledge about technology performance. These circumstances are therefore likely to curtail the motivation of the agent to give prominence to energy efficient technologies when advertising, causing them to simply list them as part of the house’s features.

5.6.2 Theme 2: Business reality
Real estate agents work within a very competitive industry. Competition will ensure agents are focussed upon what works, what sells, and what’s effective when it comes to advertising, as successful sale transactions are clearly the objective of agents and sellers alike.

As previously discussed, advertising is often the first point of contact for potential buyers. Consequently, agents will inevitably aim to highlight the elements of the house perceived to be of most interest to the buyer. Thus, the business case for energy efficient housing must be viable for agents to consider using valuable advertising monies in promoting them.

As a reminder to the reader, the three sub-themes found under this category are:
- Sub-theme: Personal values
- Sub-theme: Survival
- Sub-theme: Market forces

Each sub-theme is now addressed in the context of Research Question 3.

5.6.2.1 Sub-theme: Personal values
Personal values influence many decisions people make in job roles (Hemingway & Maclagan 2004), and real estate agents are no exception. Personal attitudes of agents may influence conversations with clients, but these did not appear to be prominent in interview data. When discussing financial benefits of energy efficient housing and altruistic attitudes held by buyers Real Estate Agent 8, Hurstbridge, commented: ‘I mean, I certainly hold that view [altruistic] but also if you can’t save money by doing it [engaging with energy efficient technologies] by having say, solar panels’. The point being made by the agent was crystallised further in the interview. The agent commented: ‘I think the hip pocket is the first and most important one’ (motivation to engage with energy efficient technologies). Here the agent is very clear in
delineating personal values from monetary benefits. This agent also explained some people held strong positive environmental views and that he would include energy efficient technologies in advertisements. However, he reiterated the focus is towards house attributes that align to buyer need such as location, accommodation, and honesty. By honesty, the agent was referring to the importance of not overstating the house characteristics and being open with clients.

Real Estate Agent 4, Altona, shared similar positive environmental views as Real Estate Agent 8, Hurstbridge, but displayed more emphasis on other benefits. Stating he would ‘definitely’ include energy efficient measures in advertisements but place more emphasis on: ‘… telling a story about the property than actually mentioning the facts about the home.’ In this, he aims to ‘sell the dream’. Real Estate Agent 5, Preston, and Real Estate Agent 6, Ringwood, made similar statements. ‘So, if it’s a location, that is a selling feature than that needs to be promoted in the first line’ (Real Estate Agent 5, Preston), and, ‘If it’s a standout feature about the home that you know is going to have a point of difference over most others, then I find you just don’t overcomplicate it’ (Real Estate Agent 6, Ringwood). In other words, these four agents all stated positive views towards environmental matters but understandably retained a focus on the business of selling houses.

Other agents interviewed did not demonstrate the same level of interest in environment issues. Nonetheless, all alluded to the reality that business needs must be foremost in their business practices. The ability for people to separate personal values from work environments is not unexpected (Finegan 2000), and therefore such a finding is not surprising, particularly in a commission remunerated industry.

Therefore, with regard to Research Question 3, real estate agents appear to be focussed on house attributes they perceive are most sought after by buyers. In this they are not allowing personal views to influence including energy efficient technologies, beyond simply stating their existence.

5.6.2.2 Sub-theme: Survival

Many of the views expressed above in sub-theme 5.6.2.1: Personal values, also apply here. Specifically, agents are focussed on advertising house features perceived to be sought after by buyers. Real Estate Agent 2, Camberwell, exemplified this in saying:
Well, I try to work [out] why anyone would buy it, you know, so [highlight] the major feature. And I try to put that in the top line or two. So, target who’s going to buy it and why they’re going to buy it.

Such a comment highlights the focus on securing successful outcomes. What is also significant is that once the initial thrust of the advertisement is determined, all agents interviewed felt the remainder to be somewhat inconsequential. Again, Real Estate Agent 2, Camberwell, highlighted this view by saying: ‘After the headline, which hopefully attracts them, ‘cause [sic] a major feature, the rest is just basically describing the property or the rest of the fluff.’ The order of priority in the AIDA maxim seemed well understood by agents. This is understandable given this maxim is taught within the prescribed real estate agency course.

Real Estate Agent 5, Preston, stated they give energy efficient technologies some priority in advertising. The reason for this is that the agent noted buyers were generally interested in knowing what energy efficient characteristics existed in the house. Evidenced in Chapter 6, section 6.5.1 – Keyword maps, this area exhibited a relatively high level of appearance of energy efficient technologies in advertising. Thus, it is evident here that agents will promote and emphasise energy efficient technologies where a buyer appetite is detected. Irrespective of this, the same agent noted: ‘It was really trying to highlight the key factors of the property. So what people are looking for, what’s going to be the main feature of the property.’

The business survival view is understandable, and in real estate agency can manifest itself in varying ways. Residential agents aim to sell houses but to do so they must first secure and retain listings to sell. Retaining listings can be at times challenging. Real Estate Agent 3, St. Albans, who demonstrated some personal interest in the technologies, particularly solar, stated they would advertise as a point of difference from other listings, and ‘to keep the vendor happy.’ Such a comment emphasises the agent’s desire to ensure clients are retained and efforts rewarded.

Therefore, and as expected, including energy efficient technologies in advertising is also often motivated by business survival objectives. Inclusion can provide a point of difference, seek to appeal to a perceived buyer appetite (although this observation was limited to one locality), or be just another ‘thing’ to include in the advertisement. With regard to why agents are not giving prominence to energy efficient technologies when advertising, again it seems the technologies do not yet have great appeal to buyers, and agents are staying with more traditional advertising
strategies to appeal to buyers. This view is characterised in the opinion of Real Estate Agent 3, St. Albans. The agent was asked about knowledge required about the technologies for successful advertising: ‘Is there anything you believe you need to know about energy efficient housing?’ The agent replied: ‘To sell a house in St. Albans, all of these areas, western suburbs, no.’ For agents, it is about selling houses to ensure their personal and business careers flourish.

5.6.2.3 Sub-theme: Market forces
In all interviews, the lack of buyer interest in energy efficient technologies seemed to strongly influence how real estate agents scripted advertisements. Much of how agents respond to buyer interests and trends has been discussed above, but the following are responses to the question specifically addressing buyer interest (Question: ‘Do you have buyers asking about energy efficient technologies?’):

Real Estate Agent 1, Seaford: ‘No.’
Real Estate Agent 2, Camberwell: ‘Hardly at all.’
Real Estate Agent 3, St. Albans: ‘Zero.’
Real Estate Agent 4, Altona: ‘No I don’t’
Real Estate Agent 5, Preston: ‘They do, regularly’
Real Estate Agent 6, Ringwood: ‘Sometimes’
Real Estate Agent 7, Bayswater: ‘Buyers sort of take it…as it comes’
Real Estate Agent 8, Hurstbridge: ‘I think it’s an increasing trend’
Real Estate Agent 9, Whittlesea: ‘Not really, no.’

Only in the cases of Real Estate Agent 5, Preston, and Real Estate Agent 8, Hurstbridge, were there indications of buyer interest in house energy efficient technologies during the house search. What is interesting to note from these data is that in those areas where buyer interest appeared notable there is a corresponding increased number of keyword appearances in advertisements (for details, see Chapter 6, section 6.5.1 – Keyword maps). This observation suggests agents are not giving prominence to energy efficient technologies because, among other sub-themes discussed, they are not perceiving a buyer appetite for these technologies. Therefore, they are encouraged to emphasise those features perceived to be of interest to buyers. In the case where positive trends were observed by buyers, agents still tended to avoid emphasising the technologies. It seems the appetite held by buyers is not yet strong enough to elicit more affirmative engagement by agents in advertising.
5.6.3 Theme 3: Advertising practice
Advertising is a major component of real estate agency practice and of interest in this research. Real estate agents have limited exposure to formal training of advertising techniques or theories, with introduction to the AIDA maxim being the full extent of these principles. Therefore, agents rely substantially on policies and practises of the agencies in which they work, and prevailing consumer laws, to guide creation of advertisements. Thus, one would expect to observe variations across the industry about how house advertising is approached: this does not seem to be the case. There seems little variance in how advertising is structured, and views expressed by agents as to how advertising should be written. Consumer laws, lack of formal training regarding advanced advertising theories, and more specifically energy efficient technologies and market attitudes, all seem to be limiting the prominence agents give to these technologies.

Under Theme 3 – Advertising, three sub-themes emerged from the body of data and these are now discussed with regard to RQ3. In discussing these sub-themes, some repetition of analysis may seem apparent. This is result of the same data being used from a different perspective to address the research question. It is the perspective taken that is important.

5.6.3.1 Sub-theme: Professional training
All agents interviewed stated they had not undertaken any formal training regarding energy efficient technologies. This uniform situation appeared to cause limited understanding by agents of how these technologies functioned. Beyond saving money for occupants, agents struggled to express other environmental benefits, such as reduced carbon emission. In this regard, agents stated they had to source their own information about house energy efficient technologies. This was largely driven by personal curiosity, rather than professional need. The two most engaged agents were Real Estate Agent 5, Preston, and Real Estate Agent 8, Hurstbridge, and these locations exhibited greater number of appearances of keywords than other regions examined. In both cases, agents noted their investigations into energy efficient technologies was encouraged as a result of conversations with sellers who espoused the benefits. Also, in both cases it was through personal contacts they sought information. This situation was similar with agents in other regions but to lesser extents.

One observation here is that appearances of keywords seemed to be correlated to the willingness of the agent to undertake personal investigations regarding the available technologies, and this is likely to be driven by market demand. Agent propensity to engage
with ‘as need’ learning is highlighted in comments of Real Estate Agent 2, Camberwell, who was asked: ‘Is there anything you believe you need to know about energy efficient housing?’ The agent responded: ‘Because I don’t get people asking me the question I don’t really, I should know and it probably would be helpful but I’ll probably learn more about it if I have a house for sale that has a lot of energy efficient products.’ Aligning with this view is Real Estate Agent 7, Bayswater, who stated: ‘It’s only out of interest that [you] know much about it.’ The element of personal initiative to acquire even the most basic knowledge was consistent.

The need for more knowledge of energy efficient housing was also highlighted by Real Estate Agent 9, Whittlesea, stating: ‘I think we all, yeah we need a lot more education… because we haven’t learned through our industry. It’s only what you hear and talking to builders and seeing homes.’

It appears that keyword appearances are at least in part influenced by knowledge about these technologies. The lack of formal training seems to be inhibiting development of awareness, and subsequently, possible emphasis of house energy efficient technologies in advertising. The reluctance to emphasise benefits of energy efficient housing may also be in part due to regulatory environment agents work within.

5.6.3.2 Sub-theme: Legal framework

During interviews, agents were not asked specifically about their understanding of consumer laws and its influence on scripting advertisements. It was the aim of the researcher to elicit their understanding through discussion. The rationale for this was to avoid responses that could be misleading as all agents know they are required to be aware of the limits of representations made. In interviews all agents demonstrated a sound understanding of their legal requirements. For example, prior to the introduction of s47A and s47AB of the Estate Agents Act 1980, real estate agents would sometimes inflate the quoted price to the seller in an effort to secure the listing. This practice was deemed unreasonable and legislation introduced to prohibit it. To comply with this requirement, Real Estate Agent 4, Altona, stated: ‘We sit down with our vendors and go through comparable sales and really measure what’s been sold compared to what’s on the market that we’re competing with and hopefully achieve a better result.’ Such a practice openly demonstrates to the seller where their own house is positioned within the market; thus the agent is guiding expectations.
Throughout all interviews, agents showed reservations in making claims about the performance of energy efficient houses. Real Estate Agent 7, Bayswater, stated he would put significant energy technologies, such as solar PV panels, in advertisements but ‘not be too verbose’. This same agent, as did others, acknowledged their limited understanding of the technologies. When discussing energy efficient measures other than solar technologies, Real Estate Agent 5, Preston, stated ‘we don’t really promote as much’. In these comments there is evidence of agent restraint in not overstating the significance of the energy efficient technologies. It is for more well-known technologies, such as solar, that agents are comfortable in providing more information. Real Estate Agent 7, Bayswater, stated: ‘Yes, like the solar heating, solar power, four kilowatt converters or something. I ask them to be specific on that. I get them to write out a list or whatever and then I get the cost… so I think it is useful information’. However, this agent also preferred to list the technologies rather than emphasise them.

As mentioned above, agents inferred a working knowledge of the relevant laws and their ability to work within them. This awareness of accountability for statements and claims made in advertising and moreover in the sales process, is considered to impede the prominence given by agents to energy efficient technologies.

**5.6.3.3 Sub-theme: Buyer(s) characteristic and attitudes**

Throughout all interviews, agents demonstrated their awareness of buyer trends and attitudes. Some agents, not of Asian descent but working in areas that have seen significant proportion of Asian ethnicity, spoke about their unique requirements. Real Estate Agent 7, Bayswater, stated: ‘So, it’s totally changed. But… not fussy, apart from the numbers; the four is still a no no. [referring to the fact that the number 4 is considered nearly homophonous to death in Chinese cultures] But the, certainty of the angle of the light; I would get at least 50% asking which way is north.’ Although north orientation is an element of passive energy efficient design, the agent noted it was for ‘light access … I guess that’s Feng Shui,’ and not solar warmth.

Likewise, Real Estate Agent 3, St. Albans, noted zero interest from buyers but demonstrated his understanding of the market by discussing the emergence of sub-markets in his area. In this case these are areas that are defined by a physical characteristic such as a major road. Noting land size was important, this agent went on to say ‘especially in the east.’ Asked about the significance of the east, he stated that 95% of sales in St. Albans East were Asian. The stated reason being potential development and/or renovation opportunity.
Real Estate Agent 8, Hurstbridge, noted ‘typical’ buyers in his region were families; they were generally price conscious and this impacted on buyer views regarding energy efficient technologies. He stated: ‘I think the hip pocket is the first and most important one’ (when buying). Later, when discussing buyer characteristics, this agent went on to state: ‘Some buyers are really into it [energy efficient housing]. But most aren’t.’

Further evidence of agent ability to understand market (buyer) nuances is the comment made by Real Estate Agent 2, Camberwell: ‘The more money they [buyers] seem to have, the less they seem to worry about it [energy efficient housing].’

In all interviews, agents demonstrated they understood their local market and were making interpretations of the extent to which energy efficient technologies would be emphasised in advertisements. All agents stated they would include these technologies in advertisements but only to the extent of mentioning them. They all refrained from highlighting any benefits and this appears to stem from lack of knowledge, lack of buyer interest, and restrictions imposed by regulation.

5.6.2 Research Question 3: Qualitative summary
The fundamental role of a real estate agent is to sell properties on behalf of the vendor (seller). How they do this is determined by the agent and conducted within the laws and regulations governing the industry. The themes derived from the body of data used to address this question point towards a lack of understanding of the nuanced operations of energy efficient technologies, and a reluctance to move away from traditional features that appeal to emotions and family needs. In addition, there is a low level of perceived buyer interest causing agents to continue to focus on ‘what’ sells. Characteristics such location, accommodation, and more tangible features such local ambience, are retaining the first order of prominence, while energy technologies are consigned to lesser prominence. Therefore, agents are not giving prominence to energy efficient technologies in advertising. They are not considered as important to promote as other house characteristics as the market is not yet seeking such technologies to any extent.

5.7 Chapter summary
This chapter has presented the thematic analysis of the data corpus collected through in-depth semi-structured interviews with real estate agents across the research frame. Where
appropriate, each theme was presented with sub-themes to address the research questions. Preliminary findings for each research question were provided together with a summary of observations. This thesis now progresses to Chapter 7 – Summary and Conclusion, where the results from Chapter 5 and Chapter 6 are drawn together, analysed and discussed in detail to answer the research posed in this thesis.
Chapter 6: Results Using Quantitative Data

6.1 Introduction
This chapter presents the descriptive results from REIV and ABS data. Chapter 7 – Summary and Conclusion, synthesises results presented in chapters 5 and 6 to provide a comprehensive interpretation and analysis.

The following results presented here are used to address each of the research questions:
- Statistical description of the data
- Times series data
- Geographical maps
- Imagery of the dataset
- Locational analysis of keywords within advertisements.

The structure of this chapter is as follows:
- Section 6.2 – Data coding and cleaning for analysis,
- Section 6.3 – Review of analysis techniques
- Section 6.4 – Analysis for Research Question 1
- Section 6.5 – Analysis for Research Question 2
- Section 6.6 – Analysis for Research Question 3
- Section 6.7 – Provides a summary of the initial findings from the descriptive data
- Section 6.8 – Chapter conclusion.

To address all the research questions comprehensively, at times it was necessary to examine the same data from differing perspectives suggesting duplication; however, this is not the case and the results are to be interpreted in the specific context discussed. The discussion starts with data coding and cleaning.

6.2 Data coding and cleaning for analysis
This section provides the detail for preparing the dataset for analysis and is presented here to provide specific context for interpreting results.
Data were obtained with the support of the REIV which provided house sales records spanning from July 2008 until end of March 2015. Specific address details were removed to comply with privacy requirements. The dataset included:

- Item ID
- Postcode of individual house sale
- Suburb of individual house sale
- Sale price
- Sale date
- Advertisement used in marketing the house at time of sale.

The dataset included all property sales within the state of Victoria over the research timeframe. As the research investigates advertising of detached housing, it was first necessary to identify and remove detached house sales from the data. The following items were removed from the dataset:

- Vacant land sales
- Apartment sales
- Unit sales
- Townhouses
- Sales outside the geographic area of interest.

It was observed the data contained incomplete records such as missing sales prices. These records were removed progressively as shown below. The technique adopted was to systematically identify and remove erroneous data, or data that were not useable for the purpose of the research. Part of this process was to identify postcodes within greater Melbourne as this was the geographic frame of the research. This required manual selection of each postcode within the region defined as ‘Greater Melbourne’ (SRO 2017), the frame of this research.

Cleaning of the dataset in preparation for analysis was detailed in Table 4.5: Cleaning principal database using waterfall technique. After this cleaning process, 158,112 individual items were analysed. This dataset represented all house sales conducted by residential agents who are REIV members within the state of Victoria between July 2008 and March 2015. The REIV represent 78% of practising real estate agents within Victoria (J Mitchell, Manager, REIV, interview, 3 August 2015). The 22% who are not members are typically specialist agents whose businesses do not engage in house sales. John Mitchell (J Mitchell, Manager, REIV, interview, 3 August 2015).
3 August 2015) of the REIV estimated less than 1% of real estate agents who sold houses were not REIV members. Given the extensive nature of the dataset, it is therefore considered the dataset represents the population of house sales made by real estate agents over the research period.

Demographic data within the research timeframe at the postcode level was obtained from the Australian Bureau of Statistics (ABS). These demographic data were added to the REIV data. There is general agreement from literature suggesting wealth and education are antecedents of engagement by households with energy efficient technologies (Tan 2012; Miller, Colantuoni & Crago 2014; Yu 2014). As agents work closely with individual households, this agreement in literature suggests a variance of agent engagement with energy efficient technologies in advertising could be observed across postcode regions. In all, there were 251 postcodes within the dataset. Specifically, these data included:

<table>
<thead>
<tr>
<th>ABS Variable</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education (highest level attained)</td>
<td>TAFE or higher education</td>
</tr>
<tr>
<td>Wealth</td>
<td>Household income</td>
</tr>
<tr>
<td>Family size</td>
<td>Number of persons per bedrooms</td>
</tr>
<tr>
<td>Age</td>
<td>Median age</td>
</tr>
<tr>
<td>House Price Index</td>
<td>This was used to account for inflation. After adjustment regressed sale price reflects increases due to actual house price movements</td>
</tr>
</tbody>
</table>

The rationale for this approach was to enable analysis of house sales within postcodes to be undertaken.

Having prepared the data content, analysis techniques were applied. This methodology and its application here are discussed in detail in Chapter 4 – Research Methodology. However, it is considered appropriate to briefly reiterate this methodology here with specific regard to the results presented.

6.3 Review of analysis techniques

As described in Chapter 4, section 4.4.1 – Content analysis, techniques were adopted for this research. Following Berelson’s (1952) work, Carney (1971) expressed the view that content analysis has three uses which are: descriptive, hypothesis testing, and enabling inferences to be made from the data. As advertisements were used to interpret real estate agent engagement
with energy efficient technologies in house markets, this methodology was considered appropriate.

For analysis, the dataset was assembled into 27 time periods, with each period being one calendar quarter; that is, for each of the seven-year periods examined, Q1 – January to March; Q2 – April to June; Q3 – July to September; and Q4 – October to December. The rationale for using calendar quarters is that market and financial reporting is typically conducted quarterly. This provides more sensible and useful information to address inherent housing market inertia. The data records commence in Q3 2008 and are complete through to Q1 2015. The number of sales within each quarter varied and reflected market activity in that time period, with keyword appearances examined.

6.3.1 Real estate agent lexis

The unit of analysis for this research was real estate agent house advertisements. Specifically, advertisements were examined to inform the researcher of agent engagement with energy efficient technologies in the Melbourne housing market. In regard to language examined, some minor technologies have been excluded. These were low cost technologies such as draft barriers around windows and window films. A search within that dataset did not reveal a single mention of these technologies and it was therefore determined that while desirable, they are not considered useful by the agent. The researcher attributes this to the ‘mundane’ nature of the technology and ease of post-occupancy installation by the buyer. It is therefore considered reasonable to assume this technology is insignificant in the mind of the buyer compared to more expensive and/or complex technologies. Also, as this research focuses on detached housing, swimming pools, sometimes found in Australian homes, were excluded from the analysis where ‘solar heated’ was found with ‘pool’ following the term. This was done to ensure the focus remained upon the house.

It is the size of the dataset that made manual coding of data impractical. After screening and cleaning, the data consisted of 158,112 items. Therefore, computer assistance was considered necessary, with SPSS considered a suitable platform for analysis. Such programs have previously been used for quantitative analysis of textual data (Rourke et al. 2001; Lai & To 2015). The appearance ‘1’ and non-appearance of a keyword was recorded as ‘0’. The words and phrases that were the focus of this research were clustered into strings as shown in Chapter 4, Table 4.2: Keyword category and keywords.
For analysis purposes the research timeframe was divided into calendar quarters. Within these time periods, individual counts of identified keywords were compiled and assigned to each of the four Keyword categories. A review of Table 6.1: Appearance of all keywords within advertisements, shows that for the research period Altruistic and Parsimonious keywords were notably low in absolute terms. Therefore, analysis was focussed on categories rather than individual keywords. For further illustration of the findings, graphical representation of individual keywords are presented later in this chapter.

To assess frequencies of appearances of words and phrases of interest, the frequency function, under the Descriptive tab in SPSS, was used. As described above, initial counts of individual keywords were barely discernible and not considered useful for further analysis. This showed that although the dataset is extensive, very few advertisements were promoting energy efficient technologies throughout the research period. This low count of individual keywords necessitated a thematic approach to the analysis discussed previously. Irrespective of the low word count in some categories all counts were recorded.

Victorian consumer law prohibits promotion of non-existent house characteristics and exaggerated claims that cannot be substantiated. It is therefore considered if there is mention of energy efficient characteristics in the house advertisement, the technology does exist and agents include it, although their reason for doing so may vary. This proposition was supported by interviews with residential agents, the results of which are presented in Chapter 5 – Qualitative Results. It is not possible to determine if a house does in fact possess a characteristic sought in this research, but the characteristic was not included in the advertisement. This is recognised as a limitation of this research. Therefore, the non-appearance of keywords within advertisements was interpreted as meaning the characteristics did not exist within the house being advertised. Each of the research questions framed in this research is now addressed.

6.4 Analysis for Research Question 1

RQ1: What determines whether agents use energy efficiency language in housing advertisements?

As facilitators of house sales real estate agents are cognisant of market nuances and buyer trends. Thus, if agents sense a buyer appetite for energy efficient technologies it is expected they will include them in advertisements. To investigate this proposition keywords were
derived and validated, and are believed to be of a form that house buyers would understand and agents would apply if attempting to highlight house energy efficient characteristics.

The theoretical rationale for real estate agents including energy efficient language in advertising lies in the Principal-Agent theory. In the context of this research this theory posits that if the agent believes a market appetite exists for a certain attribute, they are likely to promote it to heighten a successful outcome. Therefore, the appearance of these words can reveal information about housing markets and demographic propensities to seek such house energy efficient attributes. This is important to understand as neo-liberal policies, preferred by successive Australian governments, rely upon market forces to encourage the uptake of energy efficient technologies. What remains now is to examine the dataset to determine if these keywords are being used by residential agents.

6.4.1 SPSS Descriptive Outputs
To address RQ1, keywords were coded within SPSS and keyword outputs of 0 and 1 (counts) were recorded. Table 6.1 presents categorised outputs of keywords appearing in the dataset over the timeframe of the research.
### Table 6.1: Appearance of keywords in all advertisements

<table>
<thead>
<tr>
<th>Sale Year Quarter</th>
<th>Sum of advert with altruistic words</th>
<th>Sum of advert with design characteristic words</th>
<th>Sum of advert with solar technology words</th>
<th>Sum of advert with parsimonious words</th>
<th>Total number advert with any keywords in Qtr</th>
<th>% of advert with altruistic words</th>
<th>% advert with design characteristic words</th>
<th>% of advert with technology words</th>
<th>% of advert with Parsimoniou words</th>
<th>% of all keywords to all advert</th>
</tr>
</thead>
<tbody>
<tr>
<td>200803</td>
<td>10</td>
<td>357</td>
<td>138</td>
<td>15</td>
<td>1947</td>
<td>0.3%</td>
<td>12.1%</td>
<td>4.7%</td>
<td>0.5%</td>
<td>17.65%</td>
</tr>
<tr>
<td>200804</td>
<td>14</td>
<td>473</td>
<td>274</td>
<td>13</td>
<td>4695</td>
<td>0.3%</td>
<td>10.1%</td>
<td>5.8%</td>
<td>0.3%</td>
<td>16.49%</td>
</tr>
<tr>
<td>200901</td>
<td>14</td>
<td>436</td>
<td>312</td>
<td>19</td>
<td>4611</td>
<td>0.3%</td>
<td>9.5%</td>
<td>6.8%</td>
<td>0.4%</td>
<td>16.94%</td>
</tr>
<tr>
<td>200902</td>
<td>18</td>
<td>640</td>
<td>440</td>
<td>17</td>
<td>6612</td>
<td>0.3%</td>
<td>9.6%</td>
<td>7.2%</td>
<td>0.3%</td>
<td>18.24%</td>
</tr>
<tr>
<td>200903</td>
<td>20</td>
<td>564</td>
<td>494</td>
<td>20</td>
<td>6272</td>
<td>0.3%</td>
<td>9.1%</td>
<td>7.9%</td>
<td>0.3%</td>
<td>17.63%</td>
</tr>
<tr>
<td>200904</td>
<td>23</td>
<td>659</td>
<td>585</td>
<td>27</td>
<td>6999</td>
<td>0.3%</td>
<td>9.4%</td>
<td>8.4%</td>
<td>0.4%</td>
<td>18.49%</td>
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<tr>
<td>201001</td>
<td>23</td>
<td>483</td>
<td>437</td>
<td>16</td>
<td>5308</td>
<td>0.4%</td>
<td>9.1%</td>
<td>8.2%</td>
<td>0.3%</td>
<td>18.07%</td>
</tr>
<tr>
<td>201002</td>
<td>20</td>
<td>579</td>
<td>550</td>
<td>22</td>
<td>6226</td>
<td>0.3%</td>
<td>9.3%</td>
<td>8.8%</td>
<td>0.4%</td>
<td>18.81%</td>
</tr>
<tr>
<td>201003</td>
<td>27</td>
<td>488</td>
<td>541</td>
<td>22</td>
<td>6056</td>
<td>0.5%</td>
<td>8.8%</td>
<td>9.7%</td>
<td>0.4%</td>
<td>19.40%</td>
</tr>
<tr>
<td>201004</td>
<td>21</td>
<td>581</td>
<td>583</td>
<td>27</td>
<td>6032</td>
<td>0.3%</td>
<td>9.6%</td>
<td>9.7%</td>
<td>0.4%</td>
<td>20.09%</td>
</tr>
<tr>
<td>201101</td>
<td>23</td>
<td>428</td>
<td>516</td>
<td>26</td>
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<td>0.5%</td>
<td>8.8%</td>
<td>10.7%</td>
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<td>0.3%</td>
<td>9.4%</td>
<td>10.6%</td>
<td>0.5%</td>
<td>20.83%</td>
</tr>
<tr>
<td>201103</td>
<td>17</td>
<td>305</td>
<td>352</td>
<td>19</td>
<td>3630</td>
<td>0.5%</td>
<td>8.4%</td>
<td>9.7%</td>
<td>0.5%</td>
<td>19.05%</td>
</tr>
<tr>
<td>201104</td>
<td>13</td>
<td>395</td>
<td>381</td>
<td>20</td>
<td>3740</td>
<td>0.3%</td>
<td>10.6%</td>
<td>10.2%</td>
<td>0.5%</td>
<td>21.63%</td>
</tr>
<tr>
<td>201201</td>
<td>25</td>
<td>362</td>
<td>386</td>
<td>23</td>
<td>3668</td>
<td>0.7%</td>
<td>9.9%</td>
<td>10.5%</td>
<td>0.6%</td>
<td>21.70%</td>
</tr>
<tr>
<td>201202</td>
<td>17</td>
<td>397</td>
<td>361</td>
<td>11</td>
<td>3811</td>
<td>0.4%</td>
<td>10.4%</td>
<td>9.5%</td>
<td>0.3%</td>
<td>20.62%</td>
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<tr>
<td>201203</td>
<td>21</td>
<td>336</td>
<td>350</td>
<td>20</td>
<td>4658</td>
<td>0.6%</td>
<td>9.2%</td>
<td>9.6%</td>
<td>0.5%</td>
<td>19.87%</td>
</tr>
<tr>
<td>201204</td>
<td>17</td>
<td>410</td>
<td>440</td>
<td>25</td>
<td>4627</td>
<td>0.4%</td>
<td>8.9%</td>
<td>9.5%</td>
<td>0.5%</td>
<td>19.28%</td>
</tr>
<tr>
<td>201301</td>
<td>15</td>
<td>321</td>
<td>430</td>
<td>21</td>
<td>4874</td>
<td>0.4%</td>
<td>8.3%</td>
<td>11.1%</td>
<td>0.5%</td>
<td>20.31%</td>
</tr>
<tr>
<td>201302</td>
<td>12</td>
<td>391</td>
<td>423</td>
<td>22</td>
<td>4199</td>
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<td>9.3%</td>
<td>10.1%</td>
<td>0.5%</td>
<td>20.20%</td>
</tr>
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<td>201303</td>
<td>31</td>
<td>887</td>
<td>1026</td>
<td>44</td>
<td>9164</td>
<td>0.3%</td>
<td>9.7%</td>
<td>11.2%</td>
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<td>21.69%</td>
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<td>30</td>
<td>1141</td>
<td>1209</td>
<td>39</td>
<td>10163</td>
<td>0.3%</td>
<td>11.2%</td>
<td>11.9%</td>
<td>0.4%</td>
<td>23.80%</td>
</tr>
<tr>
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<td>201401</td>
<td>24</td>
<td>768</td>
<td>967</td>
<td>46</td>
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<td>0.3%</td>
<td>10.1%</td>
<td>13.3%</td>
<td>0.6%</td>
<td>24.85%</td>
</tr>
<tr>
<td>201402</td>
<td>44</td>
<td>999</td>
<td>1148</td>
<td>49</td>
<td>8847</td>
<td>0.5%</td>
<td>11.3%</td>
<td>13.0%</td>
<td>0.6%</td>
<td>25.32%</td>
</tr>
<tr>
<td>201403</td>
<td>34</td>
<td>881</td>
<td>982</td>
<td>39</td>
<td>7744</td>
<td>0.4%</td>
<td>11.4%</td>
<td>12.7%</td>
<td>0.5%</td>
<td>25.00%</td>
</tr>
<tr>
<td>201404</td>
<td>25</td>
<td>1290</td>
<td>1413</td>
<td>54</td>
<td>10357</td>
<td>0.2%</td>
<td>12.5%</td>
<td>13.6%</td>
<td>0.5%</td>
<td>26.86%</td>
</tr>
<tr>
<td>201501</td>
<td>23</td>
<td>798</td>
<td>1030</td>
<td>35</td>
<td>7115</td>
<td>0.3%</td>
<td>11.2%</td>
<td>14.5%</td>
<td>0.5%</td>
<td>26.51%</td>
</tr>
<tr>
<td><strong>Total over research period</strong></td>
<td><strong>578</strong></td>
<td><strong>15,540</strong></td>
<td><strong>17,155</strong></td>
<td><strong>724</strong></td>
<td><strong>158,112</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.1 shows that agents are using energy efficient language within their advertisements, albeit to a low extent. Keywords within each of the four categories are observed, with a significant difference between tangible and intangible keywords appearing. Suggested reasons for these differences are discussed in Chapter 7 – Summary and Conclusion.

Referring to Figure 6.1: Technology terms, a plateau occurred around Q3 2010 after a consistent growth period. Growth resumed in Q1 2013. Figure 6.2: Solar Technology Terms, and Figure 6.3: Solar and Water Tank Terms, are now presented to explore this observation further. To avoid potential confusion, it should be noted that Solar Technology Terms is also discussed from a more holistic viewpoint further in this chapter.

![Figure 6.1: Appearance of technology terms over the research period](image)

Looking at the same period in Figure 6.2, which shows only the appearance of solar keywords, it can be seen that the curve exhibits similar characteristics to Figure 6.1: Technology Terms. This suggests that Solar keywords feature prominently in this category relative to other technology keywords. In other words, it appears that Solar keywords are ‘shaping’ the observed curve.
Figure 6.2: Appearance of Solar terms over the research period

Figure 6.3: Appearance of Solar and Water Tank terms over the research period

Figure 6.3: Appearances of Solar and Water Tank keywords, shows the water tank keyword plateaued when the drought officially finished in 2010 (BOM 2015). Agents appeared to place less emphasis on water saving technologies once water availability diminished as a public issue. Solar keywords also plateaued during the same period after a steady increase in appearance frequency. Table 6.3: Solar Installations in Victoria, shows solar panel installations were at a peak during this period. Notwithstanding this, it is reasonable to assume home-owners would not outlay the cost of solar panel installation and shortly after offer the property for sale. Therefore, the increased numbers of households with solar technologies shown in Table 6.3
are unlikely to be reflected in house sale advertisements in this period. The significance of Table 6.3 is discussed in more detail within this chapter.

Interview results presented in Chapter 5 – Qualitative Results, suggest that agent’s include energy efficient technologies in house advertisements when existent in the house being sold. Therefore, the possibility of solar technologies not being included in advertisements to explain the plateau during this period is remote. As there are no known externalities that would cause this observed plateau, such as the cessation of the drought in the case of the Water Tank keyword, it is therefore considered this observation is the result of a period of time where relatively fewer houses with solar technologies were offered for sale. Beyond this period, Q1 2013 onwards represents a time lag between early solar installations and potential house sales. It is plausible house owners believe they have received benefit from the initial capital outlay of solar technologies and were therefore less reluctant to factor such concerns into their decision to sell. No other individual Technology keyword types trended in this manner.

With regard to the disparity between tangible (Technology and Design) keyword count and the intangible (Altruistic and Parsimonious) keywords in Table 6.1, it appears agents are favouring caution. It seems tangible keywords are not being emphasised by either altruistic or parsimonious language. This is further demonstrated in Table 6.2. When considering saturation of advertisements (that is, advertisements that exhibit more than one keyword), the results show agents are not inclined to do so.

<table>
<thead>
<tr>
<th>No. of energy efficient keywords appearing in a single advertisement (all categories)</th>
<th>% of advertisements within data set with one or more keywords appearing in a single advertisement (all categories)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero (no keywords)</td>
<td>81.1%</td>
</tr>
<tr>
<td>1</td>
<td>15.0%</td>
</tr>
<tr>
<td>2</td>
<td>2.8%</td>
</tr>
<tr>
<td>3</td>
<td>0.7%</td>
</tr>
<tr>
<td>4</td>
<td>0.2%</td>
</tr>
<tr>
<td>5</td>
<td>0.1% (128 advertisements in total)</td>
</tr>
<tr>
<td>6</td>
<td>0.00* (32 advertisements in total)</td>
</tr>
<tr>
<td>7</td>
<td>0.00* (10 advertisements in total)</td>
</tr>
<tr>
<td>8</td>
<td>0.00* (3 advertisements in total)</td>
</tr>
</tbody>
</table>

* Beyond the 2 decimal place limit

The majority of advertisements, 81.1%, do not have any energy efficient keywords appearing within them. Of the dataset advertisements, 15% have with a single keyword appearing. This
falls to 2.8% or less for advertisements with two or more keywords appearing within them. This suggests agents are not selling the environmental message with language that highlights the significance of the technologies. With counts of tangible keywords being greater than intangible keywords, and 2.8% or less of all advertisements having two or more keywords, it appears energy efficient characteristics and hyperbole that directly highlight energy efficient characteristics are not being coalesced. Thus, the lack of emphasis given to such characteristics has the potential to dilute the importance of reducing energy consumption in housing and retard market acceptance.

As stated above, the increase in the appearance of technology keywords is noteworthy. This is somewhat understandable with the increasing popularity of solar technologies, which are included within this keyword category. This keyword category includes all forms of solar technologies such as hot water services and photovoltaic panels. Over the research period the aggregated number of installations increased from 80,871 in 2008 to 356,153 in 2015 (Clean Energy Regulator 2016). Table 6.3 provides data of the number of solar PV installations in Victoria from 2008 to 2015. These data are unavailable in quarterly periods. This is recognised as a limitation of this research. However, it is the trend that is contributing to the richness of the research.

Table 6.3- Annual solar panel installations in Victoria, 2008-2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Installation</th>
<th>Aggregated No. of installations in Victoria</th>
<th>% Increase per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2,036</td>
<td>80,971</td>
<td>-</td>
</tr>
<tr>
<td>2009</td>
<td>8,429</td>
<td>89,400</td>
<td>9.43</td>
</tr>
<tr>
<td>2010</td>
<td>35,676</td>
<td>125,076</td>
<td>28.52</td>
</tr>
<tr>
<td>2011</td>
<td>60,214</td>
<td>185,293</td>
<td>32.50</td>
</tr>
<tr>
<td>2012</td>
<td>66,204</td>
<td>251,497</td>
<td>26.32</td>
</tr>
<tr>
<td>2013</td>
<td>33,332</td>
<td>284,829</td>
<td>11.70</td>
</tr>
<tr>
<td>2014</td>
<td>40,061</td>
<td>324,890</td>
<td>12.33</td>
</tr>
<tr>
<td>2015</td>
<td>31,263</td>
<td>356,153</td>
<td>8.78</td>
</tr>
</tbody>
</table>

(Source: Adapted from Clean Energy Regulator 2016)

Table 6.3 shows reported annual installation of solar panel technologies in Victoria throughout the research period. The data reveals that in October 2009, Victoria had a total of 89,400 households with solar panel installations. Applying the rationale presented in Chapter 4, namely the choice to install such technologies is generally more difficult for multi-owned
buildings, it is therefore reasonable to assume the majority of the household data applies to detached dwellings. Deducting the 8,429 installations that occurred during 2009, shows that in October 2008, the commencement of the research timeframe, Victoria had 80,971 solar panel installations. This represented approximately 1% of existing housing stock (APVI 2018, p. 5). Conveniently the time of reporting these installations approximately coincides with REIV advertising data used in this research, as it commenced in September 2008. The error of one calendar quarter is acknowledged and considered insignificant. The rationale for providing this information is discussed below.

There are two important realities that must be recognised in interpreting the results presented in Table 6.3. The first is that it is improbable that a household would outlay the capital expenditure to install a solar PV system and then offer the property for sale soon after. Second, during the research period, new houses were being constructed and these were required to meet minimum energy efficient standards. These standards can be achieved in numerous ways as discussed in Chapter 2 – Literature Review, and installing solar panels is but one option. Therefore, some installations shown in Table 6.3 would have been a result of designer choice when designing the house. Again, it is considered unlikely that a person(s) entering into a contract to build a new house would then shortly after offer it for sale.

Extrapolating data sourced from .id (idcommunity 2017), which uses ABS census data to provide demographic and other information, it was found that on average between 2006 and 2011, two census years in Australia, 19,173 houses per year were constructed in greater Melbourne. This is well below the number of solar PV installations in the 2010 and 2011 period. Therefore, a significant number of installations appear to be retrofitted to existing houses. The average construction volume most likely remained at similar levels beyond 2011 due to labour constraints. It is therefore reasonable to assume that installation of many solar PV systems was to existing dwellings. In either case, it is unlikely a house owner will expend the capital necessary to acquire a solar system and then offer the property for sale shortly after.

It is necessary to qualify the research observations in this way. Increasing frequency in the appearances of technology keywords in advertising, which includes solar lexis, is unlikely to be the exclusive result of new solar installations. It is believed, therefore, there must be a corresponding increase in market interest to incentivise agents to promote the technology. In other words, the observation made here is not just the result of increased numbers of solar technologies, but also, agents seeking to promote a point of difference. It is therefore plausible
the increased inclusion of language relating to technologies such as solar is likely to be a result of buyer interest, albeit at a low level. This interest may be the result of extensive media exposure about climate issues and the debates within the political arena; regardless, however, agents appear to be engaging.

The next keyword examined is Altruistic. Literature suggests people are likely to make housing choices in accordance with their personal values and attitudes (Sirgy, Grzeskowiak & Su 2005; Ramos, Labandeira & Löschel 2016). As personal values are of an intangible nature, when appealing to a particular cohort, agents are likely to use language that reinforce these values in some way. Word selection such as ‘eco’, ‘eco-friendly’, ‘green’, were all searched for in this category. Such words imply a connection with the environment and environmental issues and invite a person to make a conscious choice to ‘act’ green, with people sharing similar values tending to congregate together in sub-communities (Levy & Lee 2011). This phenomenon would potentially influence an agent servicing such an area to include lexis that appeals to those seeking to purchase in the area. Throughout the study period, less than 1% of all advertisements included words with altruistic connotations. This could mean agents are not detecting a selfless motivation by buyers to seek energy efficient housing, and instead are following more pragmatic behaviours. Although low in number, altruistic words and phrases did appear in relatively higher frequency in certain demographic regions within the study area. These are shown in Table 6.4 and discussed more specifically later in this chapter when addressing Research Question 2.
Table 6.4: Appearance of Altruistic keywords

<table>
<thead>
<tr>
<th>Sale Year Quarter</th>
<th>Sum of advert with altruistic words</th>
<th>Total number advert with any keywords in Qtr</th>
<th>% of advert with altruistic words</th>
</tr>
</thead>
<tbody>
<tr>
<td>200803</td>
<td>10</td>
<td>1947</td>
<td>0.3%</td>
</tr>
<tr>
<td>200804</td>
<td>14</td>
<td>4695</td>
<td>0.3%</td>
</tr>
<tr>
<td>200901</td>
<td>14</td>
<td>4611</td>
<td>0.3%</td>
</tr>
<tr>
<td>200902</td>
<td>18</td>
<td>6612</td>
<td>0.3%</td>
</tr>
<tr>
<td>200903</td>
<td>20</td>
<td>6227</td>
<td>0.3%</td>
</tr>
<tr>
<td>200904</td>
<td>23</td>
<td>6999</td>
<td>0.3%</td>
</tr>
<tr>
<td>201001</td>
<td>23</td>
<td>5308</td>
<td>0.4%</td>
</tr>
<tr>
<td>201002</td>
<td>20</td>
<td>6226</td>
<td>0.3%</td>
</tr>
<tr>
<td>201003</td>
<td>27</td>
<td>6056</td>
<td>0.5%</td>
</tr>
<tr>
<td>201004</td>
<td>21</td>
<td>6032</td>
<td>0.3%</td>
</tr>
<tr>
<td>201101</td>
<td>23</td>
<td>4843</td>
<td>0.5%</td>
</tr>
<tr>
<td>201102</td>
<td>15</td>
<td>4355</td>
<td>0.3%</td>
</tr>
<tr>
<td>201103</td>
<td>17</td>
<td>3630</td>
<td>0.5%</td>
</tr>
<tr>
<td>201104</td>
<td>13</td>
<td>3740</td>
<td>0.3%</td>
</tr>
<tr>
<td>201201</td>
<td>25</td>
<td>3668</td>
<td>0.7%</td>
</tr>
<tr>
<td>201202</td>
<td>17</td>
<td>3811</td>
<td>0.4%</td>
</tr>
<tr>
<td>201203</td>
<td>21</td>
<td>4658</td>
<td>0.6%</td>
</tr>
<tr>
<td>201204</td>
<td>17</td>
<td>4627</td>
<td>0.4%</td>
</tr>
<tr>
<td>201301</td>
<td>15</td>
<td>4874</td>
<td>0.4%</td>
</tr>
<tr>
<td>201302</td>
<td>12</td>
<td>4199</td>
<td>0.3%</td>
</tr>
<tr>
<td>201303</td>
<td>31</td>
<td>9164</td>
<td>0.3%</td>
</tr>
<tr>
<td>201304</td>
<td>30</td>
<td>10163</td>
<td>0.3%</td>
</tr>
<tr>
<td>201401</td>
<td>24</td>
<td>7604</td>
<td>0.3%</td>
</tr>
<tr>
<td>201402</td>
<td>44</td>
<td>8847</td>
<td>0.5%</td>
</tr>
<tr>
<td>201403</td>
<td>34</td>
<td>7744</td>
<td>0.4%</td>
</tr>
<tr>
<td>201404</td>
<td>25</td>
<td>10357</td>
<td>0.2%</td>
</tr>
<tr>
<td>201501</td>
<td>23</td>
<td>7115</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Total over research period</strong></td>
<td><strong>578</strong></td>
<td><strong>158,112</strong></td>
<td></td>
</tr>
</tbody>
</table>

The discussion now progresses to Parsimonious keywords. These are words and phrases intended to appeal to buyers seeking to use energy efficient technologies to reduce ongoing financial costs of energy consumed. Table 6.5 shows throughout the study period the appearance of words within this category remained consistently low at less than 1% of all advertisements and were quite stable at this level ranging from 0.3% to 0.6%. This suggests
agents are not highlighting the potential benefits of energy efficient housing in advertising. Scarpa and Willis (2010) found house buyers were generally willing to consider energy efficient technologies within their housing choice decision but did not overly value them. In other words, they were generally not willing to pay for such technologies. Christie, Donn and Walton (2011) found house buyers tended to be risk averse when choosing a house to purchase. The authors noted this behaviour was considered unreasonable as the benefits of energy efficient housing, in terms of the low economic and environmental costs, were apparent. Therefore, if buyers are inclined to be conservative regarding the potential financial benefits of energy efficient housing, it is unlikely they would choose the future potential benefits of an energy efficient house in favour of one perceived to meet their needs. Thus, agents would be less likely to use expensive advertising space to embellish the advertisement to appeal in this way.

### Table 6.5: Appearance of Parsimonious keywords

<table>
<thead>
<tr>
<th>Sale Year Quarter</th>
<th>Sum of advert with parsimonious words</th>
<th>Total number advert with any keywords in Qtr</th>
<th>% of advert with Parsimonious words</th>
</tr>
</thead>
<tbody>
<tr>
<td>200803</td>
<td>15</td>
<td>1947</td>
<td>0.5%</td>
</tr>
<tr>
<td>200804</td>
<td>13</td>
<td>4695</td>
<td>0.3%</td>
</tr>
<tr>
<td>200901</td>
<td>19</td>
<td>4611</td>
<td>0.4%</td>
</tr>
<tr>
<td>200902</td>
<td>17</td>
<td>6612</td>
<td>0.3%</td>
</tr>
<tr>
<td>200903</td>
<td>20</td>
<td>6227</td>
<td>0.3%</td>
</tr>
<tr>
<td>200904</td>
<td>27</td>
<td>6999</td>
<td>0.4%</td>
</tr>
<tr>
<td>201001</td>
<td>16</td>
<td>5308</td>
<td>0.3%</td>
</tr>
<tr>
<td>201002</td>
<td>22</td>
<td>6226</td>
<td>0.4%</td>
</tr>
<tr>
<td>201003</td>
<td>22</td>
<td>6056</td>
<td>0.4%</td>
</tr>
<tr>
<td>201004</td>
<td>27</td>
<td>6032</td>
<td>0.4%</td>
</tr>
<tr>
<td>201101</td>
<td>26</td>
<td>4843</td>
<td>0.5%</td>
</tr>
<tr>
<td>201102</td>
<td>23</td>
<td>4355</td>
<td>0.5%</td>
</tr>
<tr>
<td>201103</td>
<td>19</td>
<td>3630</td>
<td>0.5%</td>
</tr>
<tr>
<td>201104</td>
<td>20</td>
<td>3740</td>
<td>0.5%</td>
</tr>
<tr>
<td>201201</td>
<td>23</td>
<td>3668</td>
<td>0.6%</td>
</tr>
<tr>
<td>201202</td>
<td>11</td>
<td>3811</td>
<td>0.3%</td>
</tr>
<tr>
<td>201203</td>
<td>20</td>
<td>4658</td>
<td>0.5%</td>
</tr>
<tr>
<td>201204</td>
<td>25</td>
<td>4627</td>
<td>0.5%</td>
</tr>
<tr>
<td>201301</td>
<td>21</td>
<td>4874</td>
<td>0.5%</td>
</tr>
<tr>
<td>201302</td>
<td>22</td>
<td>4199</td>
<td>0.5%</td>
</tr>
<tr>
<td>201303</td>
<td>44</td>
<td>9164</td>
<td>0.5%</td>
</tr>
<tr>
<td>201304</td>
<td>39</td>
<td>10163</td>
<td>0.4%</td>
</tr>
<tr>
<td>201401</td>
<td>46</td>
<td>7604</td>
<td>0.6%</td>
</tr>
</tbody>
</table>
Design characteristics are tangible characteristics that are generally integrated into the house during the design and building phase. This category includes words that relate to orientation, insulation, window technologies, etc. During the study period, this category was much higher in frequency of appearances that either Altruistic or Parsimonious. Shown in Table 6.6, appearances of Design keywords within advertisements were 12.1% early in the study period. They remained relatively steady throughout the study period, with the lowest appearance rate being 8.3% in Q1 2013, rising to 11.2% in Q1 2015, and peaking at 12.5% in Q4 2014. The peak to trough difference of 4.2% is considered unimportant as it is the long-term trend that is of interest here. However, it is noteworthy that the periods when the frequency of appearances of Design keywords dipped below 10% were during the tumultuous political period in Australia when the politically left-wing Rudd and Gillard governments were in power (Butler 2017). This period is known for its intense ideological debate about carbon taxation and environmental issues, and resulted in a change of political party leadership on two occasions. It is beyond the scope of this research to probe the relationship between these events and the impact on word choice in advertisements but is noted here as an observation, with the phenomenon of political disruption to be investigated in further research.
Table 6.6: Appearance of Design keywords

<table>
<thead>
<tr>
<th>Sale Year Quarter</th>
<th>Sum of advert with design characteristic words</th>
<th>Total number advert with any keywords in Qtr</th>
<th>% advert with design characteristic words</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008Q3</td>
<td>357</td>
<td>1947</td>
<td>12.1%</td>
</tr>
<tr>
<td>2008Q4</td>
<td>473</td>
<td>4695</td>
<td>10.1%</td>
</tr>
<tr>
<td>2009Q1</td>
<td>436</td>
<td>4611</td>
<td>9.5%</td>
</tr>
<tr>
<td>2009Q2</td>
<td>640</td>
<td>6612</td>
<td>9.6%</td>
</tr>
<tr>
<td>2009Q3</td>
<td>564</td>
<td>6227</td>
<td>9.1%</td>
</tr>
<tr>
<td>2009Q4</td>
<td>659</td>
<td>6999</td>
<td>9.4%</td>
</tr>
<tr>
<td>2010Q1</td>
<td>483</td>
<td>5308</td>
<td>9.1%</td>
</tr>
<tr>
<td>2010Q2</td>
<td>579</td>
<td>6226</td>
<td>9.3%</td>
</tr>
<tr>
<td>2010Q3</td>
<td>488</td>
<td>6056</td>
<td>8.8%</td>
</tr>
<tr>
<td>2010Q4</td>
<td>581</td>
<td>6032</td>
<td>9.6%</td>
</tr>
<tr>
<td>2011Q1</td>
<td>428</td>
<td>4843</td>
<td>8.8%</td>
</tr>
<tr>
<td>2011Q2</td>
<td>408</td>
<td>4355</td>
<td>9.4%</td>
</tr>
<tr>
<td>2011Q3</td>
<td>305</td>
<td>3630</td>
<td>8.4%</td>
</tr>
<tr>
<td>2011Q4</td>
<td>395</td>
<td>3740</td>
<td>10.6%</td>
</tr>
<tr>
<td>2012Q1</td>
<td>362</td>
<td>3668</td>
<td>9.9%</td>
</tr>
<tr>
<td>2012Q2</td>
<td>397</td>
<td>3811</td>
<td>10.4%</td>
</tr>
<tr>
<td>2012Q3</td>
<td>336</td>
<td>4658</td>
<td>9.2%</td>
</tr>
<tr>
<td>2012Q4</td>
<td>410</td>
<td>4627</td>
<td>8.9%</td>
</tr>
<tr>
<td>2013Q1</td>
<td>321</td>
<td>4874</td>
<td>8.3%</td>
</tr>
<tr>
<td>2013Q2</td>
<td>391</td>
<td>4199</td>
<td>9.3%</td>
</tr>
<tr>
<td>2013Q3</td>
<td>887</td>
<td>9164</td>
<td>9.7%</td>
</tr>
<tr>
<td>2013Q4</td>
<td>1141</td>
<td>10163</td>
<td>11.2%</td>
</tr>
<tr>
<td>2014Q1</td>
<td>768</td>
<td>7604</td>
<td>10.1%</td>
</tr>
<tr>
<td>2014Q2</td>
<td>999</td>
<td>8847</td>
<td>11.3%</td>
</tr>
<tr>
<td>2014Q3</td>
<td>881</td>
<td>7744</td>
<td>11.4%</td>
</tr>
<tr>
<td>2014Q4</td>
<td>1290</td>
<td>10357</td>
<td>12.5%</td>
</tr>
<tr>
<td>2015Q1</td>
<td>798</td>
<td>7115</td>
<td>11.2%</td>
</tr>
<tr>
<td><strong>Total over research period</strong></td>
<td><strong>15,540</strong></td>
<td><strong>158,112</strong></td>
<td><strong>n/a</strong></td>
</tr>
</tbody>
</table>

Returning now to the specifics of the Design keyword category, these are words that refer to characteristics considered familiar to house buyers. They do not rely, as Altruistic and Parsimonious words do, upon the house buyer to make the connection between the claim being made and the benefits associated with acquiring the house. For example, energy efficient window technologies such double-glazing are known to many people as being energy efficient, although most people are unlikely to know to what extent they benefit occupants. Arguably,
agents could highlight these house characteristics as they are familiar to buyers and may represent a point of difference. This is juxtaposed to Altruistic and Parsimonious keywords whose purpose is to highlight the environmental benefits as a ‘reason to buy’.

Summarising all keyword data provided in Table 6.1, it appears residential agents are including words from all four categories within advertising. In the case of intangible keywords and phrases, this occurs to a much lower extent. Language referring to tangible house attributes are used more frequently. This suggests a conservative measure by agents of including energy efficient technology lexis within advertising. In the case solar technologies, for example, the rate of installations of solar PV systems has lifted the total number of houses with solar PV systems to about 15% of Melbourne’s housing stock (Donovan 2015). However, many of these are relatively recent additions and therefore unlikely to have been offered for sale in the study period. Thus, with regard to Technology keywords, the steady increase in frequency of appearances of solar words suggests an increasing appetite by buyers for this technology. It is this trend that agents appear to be seeking to exploit when the opportunity presents itself.

With reference to Table 6.1, it is seen that the majority of house advertisements have no mention of energy efficient characteristics. As the majority of houses in Greater Melbourne were built prior to energy efficient standards becoming mandatory, this result shows a relatively low level of retrofit activity within the existing housing stock. What is also notable is the lack of advertisements containing more than one keyword. The above results are now presented in time series to further elucidate the study.

### 6.4.2 Time series of keyword categories

The following is a graphical time series representation of each of the four keyword categories presented in Table 6.1 and previously discussed. Along with each keyword category, retail electricity prices are also presented. Energy costs are likely to influence attitudes to energy conservation (Hong et al. 2016). During the research period, retail electricity prices increased significantly, rising slightly less than 80% over the research period (Essential Services Commission 2016). In response to this increase, reasoning would suggest households would make efforts to adopt more energy efficient behaviours and seek more energy efficient houses when purchasing a house in which to live. If this were so, where possible, agents would be expected to appeal to this mindset when marketing a house for sale. This is the rationale for including electrical energy prices. Each plotted keyword category will now be discussed.
Figure 6.4: Appearance of Altruistic terms over the research period

Figure 6.4 shows energy prices do not appear to influence the inclusion of Altruistic lexis in advertisements by agents. With the exception of Q1 2012, the variation between data periods is low with the range of appearances in all advertisements varying between 0.2% and 0.7%. However, an interesting cycle of variation appears between 2010 and 2012 with calendar quarters Q1 and Q3. These are March and September quarters. These quarters represent seasonal changes from summer to winter (Q1) and winter to summer (Q3). Summer and winter are seasons of significant energy consumption as they require cooling or heating respectively to maintain house thermal comfort. Autumn and spring are less so in terms of energy consumption due to the more temperate climatic conditions. It is suggested agents appear to be marginally more aware of the seasonal effect upon energy consumption and are using words to highlight this. The timing of the peak for this keyword is of interest. As mentioned, the period between 2008 and 2013 was a tumultuous period in Australian political history with considerable debate centred around climate issues. It is plausible the spike observed in Figure 6.4 is a result of the extensive media exposure given to the political debate; in turn, this influenced agents to script advertisements in ways as to ‘tap into’ the intense discourse.

Altruistic terms have a slight positive gradient in frequency of appearances, but is minimal. The discussion now progresses to Figure 6.5: Parsimonious terms.
Figure 6.5: Appearance of Parsimonious terms over the research period

Parsimonious keywords used in the advertisements exhibited similar characteristics to Altruistic keywords, with a minimum of 0.3% of appearances to a maximum of 0.6%. The trend line shows a slight but positive increase in the use of this keyword category. Considering the Principal-Agent theory, this may in part be attributed to increasing energy costs. Albeit at a low-level, agents are likely to be cognisant of increasing energy costs and use parsimonious words to highlight beneficial characteristics of the house. This practice was highlighted in Chapter 5, section 5.4.1.1. However, it is possible performance claims are curtailed by prevailing consumer laws, also discussed in Chapter 5, section 5.6.1.2.

Parsimonious lexis is used to convey messages of reduced energy costs through enhanced energy efficient house performance. Thus, it is likely agents leverage off public concern about increased living costs and highlight the benefits of well-designed energy efficient housing. However, the low count of keyword appearances in advertisements suggests this message is not the case. A significant change can be seen around the tumultuous political period previously discussed. Again, this potentially shows agents leverage off public issues when writing advertisements, which is not an uncommon practice (Granat 1991). Figure 6.6: Design terms, is now discussed.
Design terms refer to in-built characteristics of a house that contribute to the dwelling’s energy efficiency. These characteristics are often expensive and not easily retrofitted. They include double- or triple-glazed windows, orientation, and passive energy principles. The appearance of Design keywords is significantly more frequent than either Altruistic or Parsimonious keywords. Over the research period, appearances of this keyword varied between 8.3% and 12.5%. On average this is approximately 24 times more often than Altruistic or Parsimonious keywords and is possibly a result of the characteristics being tangible and more familiar to house buyers. This familiarity is likely to give agents more confidence the message will be received and understood. Over the research period, the Design keyword trend line does not follow electrical energy pricing and exhibits a low and positive gradient, suggesting only marginal increase in the use of such keywords. However, if one imagines a line of best fit in the final eight quarters of the research period, shown as a shortened dotted line, it appears to show a similar gradient to electrical pricing. This change may be the result of an increased awareness of energy costs in which the agent is attempting to highlight the appropriate house features to address buyer concerns. Such buyer awareness has been reported in literature (Mense 2018).
It appears including energy efficient design features is positively trending, albeit slowly. Figure 6.7 Technology terms, is now discussed.

![Technology Terms Diagram]

**Figure 6.7: Appearance of Technology terms over the research period**

Figure 6.7 shows Technology keywords related to energy efficient technologies are appearing in increasing frequency. This could be interpreted as agents sensing a market appetite for such technologies and responding accordingly. Application of the Principal-Agent theory suggests this to be an expected observation if market interest is rising. Technology terms includes solar and water harvesting/retention technologies, with these selected on the basis of being easily retrofitted to a house. Initial observation of this category shows there has been a significant increase of lexis referring to these technologies over the research period. At the start of the research period the results show a 4.7% inclusion of this keyword, rising to a maximum of 14.5% by the end of the period. Appearance of this keyword is the most prolific of the four-keyword categories, with the trend line similar in gradient to retail electrical prices. It is plausible that agents are highlighting these features, particularly solar technologies, when advertising in an effort to emphasise the potential to offset increased energy costs through acquiring a house.

As previously noted, installation of solar technologies in Australia benefitted from a government rebate scheme. Over the research period, the extent of rebates was reduced causing
the initial capital outlay for households to increase, thus potentially making the decision to purchase this technology more complex (Clean Energy Regulator 2016). This is likely to have impeded the number of installations that may have otherwise been installed. Figure 6.8 is now discussed.

Figure 6.8: All keyword terms over the research period

Figure 6.8 combines all keyword terms for comparison. Appearing low on the Y-axis are Altruistic and Parsimonious language, due to much fewer number of appearances compared to Technology and Design. Manifest (tangible) keywords of Design and Technologies are more frequently used in advertising. Agents are not combining energy related keywords to further promote the characteristics. In other words, if agents were using energy related hyperbole to further highlight the features of the tangible characteristics, then appearances of Altruistic and Parsimonious keywords would be expected to be higher. This does not appear to be the case.

Having acquired an understanding of energy efficient language residential agents use in advertising text and its determinants, it is now appropriate to examine the variation of such language across the disparate characteristics of the research area. The purpose of RQ2 is to address this.
6.5 Analysis for Research Question 2

RQ2: Why does the extent of inclusion of energy efficient technologies in house advertisements in Melbourne Victoria vary across disparate regions?

Literature suggests a relationship between demographic profile and engagement with environmental behaviours exists (for example, see: Zarnikau 2003; Brounen, Kok & Quigley 2012; Prete et al. 2017). For example, wealth is posited as an important antecedent for engagement with energy efficient technologies (Erdal, Nils and Dirk 2017), and personal values is another (Fornara et al. 2016). Thus, if agents perceive an appetite for such technologies within their market region, energy efficient words and phrases within advertising ought to be discernible across geographic boroughs defined by demographic characteristics. Understanding how agents construct advertisements for the demographic of their target market will further explain their ability to contribute to the broader acceptance of such technologies in the house buying process. The following presents results regarding these spatial relationships at the postcode level. Visual presentation of the data was considered best for this purpose and data were extracted from SPSS for use with Geographic Information System (GIS) technologies to produce maps, which are now presented.

6.5.1 Keyword maps
The first two maps presented are spatial distributions of Sales by Postcode, and by Weekly household income. These provide background information for the study region. Figure 6.9 indicates Number of sales activities, with darker colours representing more activity. Figure 6.10 indicates Median household income, again with darker colours representing wealthier regions. In interpreting the subsequent keyword maps, it may be useful to refer to Figures 6.9 and 6.10 as a reminder of the regional characteristics as the amount of data makes it impractical to include on one map.

Figure 6.9: Total number of sales at postcode level, shows number of sales that occurred during the research period within each postcode. This map highlights the spatial distribution of sales activity. Sale numbers recorded are shown in the legend are absolute numbers within each postcode. These are properties that were listed, advertised and reported as sold. It can be seen the concentration of sales occurred is the inner/middle regions of greater Melbourne. It is the actual number of sales that occurred within each postcode that is of interest, not the number of sales per 1000 dwellings, which is often seen when reporting similar data. This understanding of sales activity within the dataset enables a more reliable analysis of how agents are marketing
energy efficient technologies. It does this by associating demographic profiles with advertisements within the postcode, and isolating areas of low sales volume from the analysis as these can potentially distort findings, as is discussed further in this section.

Figure 6.9: Number of sales over the research period at postcode level

Figure 6.10: Median household weekly income at postcode level, provides a visual distribution of weekly household incomes in greater Melbourne. As mentioned, previous research links income to the likelihood of uptake of energy efficient technologies and this map shows the concentration of higher incomes within inner postcodes. This map is contrasted with subsequent maps for analysis.
Figure 6.10: Median household income at the postcode level

Of the four maps presented that relate to energy efficient technologies found in advertising, the first is Figure 6.11: Technology related terms. Maps were created using SPSS and ArcGIS version 10.4 (esri Australia 2019). SPSS was used to create a separate database of all advertisements that included any keywords from any of the four categories. Advertisements without any keywords were omitted. For each keyword category, the percentage of words and phrases within advertisements appearing in each postcode is shown in the legend. These were then allocated a colour and presented spatially. Interpretation of the percentage allocation requires further explanation. To obtain the percentage of keywords appearing in each postcode, the number of advertisements that include the desired keyword category was divided into the total number of advertisements (that had any keywords) within the specific postcode region, then colour coded using ArcGIS and shown in the legend. This approach was necessary due to the low number of occurrences of any keywords relative to the size of the overall dataset. Therefore, caution must be exercised in interpreting the keyword maps.

To illustrate this approach further, consider the following: Postcode 3063, shown in Figure 6.11, has between 1 and 304 sales listings occurring throughout the research period. Figure 6.11 also shows up to 46.15% of advertisements in this postcode had technology keywords, while this postcode had a range of 1 to 304 listings. In fact, 5 recorded sales in the 3063
postcode region were observed over the research period, with two of these exhibiting technology terms. Thus, 40% of advertised sales in this postcode was reported as exhibiting Technology terms. Clearly this is potentially misleading. For this reason, postcodes shown in yellow in Figure 6.9 (that is, those with sales listings between 1 to 304) are excluded from analysis. This exclusion does not extend to Figure 6.10: Median household income, due to the variable being presented. Specific analysis of the maps presented is discussed.

Figure 6.11: Percentage of Technology related terms at the postcode level

Figure 6.11 shows the percentage of advertisements within each postcode that mention Technology language. The first observation to note here is that Melbourne is a city of two halves. The eastern half exhibits a higher prevalence of technologies, with outer rings more likely to have keywords mentioned. Of all advertisements with technology words and phrases, inner/middle eastern postcode regions typically show a range of 6.86%-16.04% of advertisements, compared to 0%-16.04% for Melbourne’s western suburbs. Eastern region postcodes, indicating between 6.86% and 16.04% technology terms, include Melbourne’s more affluent suburbs (see Figure 6.10). This suggests more affluent households engage with retrofitting energy efficient technologies. The outer eastern regions of Melbourne tend to have a greater number of technology keyword appearances, while the outer western regions of Melbourne have a significant, but lesser, extent.
The semi-rural area of postcode 3810 has a median weekly household income of between $1,026 and $1,330. This area has sufficient sales transactions over the period of interest and exhibits technology keywords between 10.6%-16.04%. While this postcode is not in the upper income band, it does show a higher household income than many other postcodes. However, either side of this postcode are postcode regions that have higher median household incomes yet fewer, if any, technology terms. This particular observation cannot be explained in isolation but could be the result of like-minded people clustering together in a sense of community (Hedman, Ham & Manley 2011). Semi-rural areas surrounding Melbourne generally attract people who seek non-urban lifestyles and are prepared for longer commutes for work. As with any community, social interaction will occur with ideas exchanged and values shared, and this could include engaging with environmentally friendly behaviours (Heiskanen et al. 2010). This is offered as an explanation for such observations.

With regard to the western region of Melbourne, two particular areas of interest are postcodes 3029 and 3030. Both these postcode regions have median weekly household income in the range of $1,330 to $1,589. This is the middle of the five income bands provided by the ABS. These postcodes had sales volume in the maximum range of 1732 to 3652 over the research period and are therefore relevant to this research. In these postcodes, 10.6%-16.04% of advertisements included technology keywords. This is a growing region of Melbourne with significant housing development occurring throughout the data collection. This research considered established housing, and as much as possible excluded new house sales as real estate agents in Victoria deal mainly with the established housing market. Therefore, these are sales where the agent has deemed it appropriate to include selected features in an effort to set the house apart from new housing offered within the general vicinity. The observed concomitance of income, and notable levels of technology reference appearances in advertisements, further supports the theory of a relationship between these variables previously referred to in literature.

When comparing Figures 6.9, 6.11, and Table 6.5: Annual solar panel installations, the emergent picture is a concurrence between household weekly income and inclusion of Technology keywords in advertisements. It is the middle and higher-income areas that exhibit a greater volume of technology keyword appearances. This concurrence is also present in postcode regions 3090, 3091, 3095, 3113, 3114, and 3115 (shown in Figure 6.11). These areas predominantly comprise households in the highest and second highest income brackets, and all
feature a notable frequency of Technology keyword appearances. These income levels do also potentially lead to the extensive renovation and/or new home builds. Such activities require the owner to build to prevailing house energy performance standards.

This observation accords with previous research. When researching whole of life costing on energy efficient technologies, Pellegrini-Masini et al. (2010) noted that wealthier households were more likely to adopt such technologies, particularly in established areas. Figure 6.11 shows that advertisements within postcode regions exhibiting higher income households included greater numbers of technology keywords. This suggests a relationship between household wealth and the adoption of energy efficient technologies concurring with Pellegrini-Masini’s findings. Agents appear to be engaging with these technologies in the marketing process. Many of the postcode regions in eastern Melbourne are long established suburbs and therefore, houses in these areas would have to have been retrofitted with technologies for them to appear in the dataset. Additionally, houses in these areas are typically more expensive than houses in the western Melbourne regions. These eastern postcode regions also typically exhibit higher weekly household income.

The next keyword group to be discussed is Altruistic. Figure 6.12 presents spatial detail at the postcode level.

![Figure 6.12: Percentage of Altruistic terms at the postcode level](image-url)
Interpretation of Figure 6.12 is undertaken with regard to Figure 6.9, in that postcodes coloured yellow are excluded from analysis due to low volume of sales transactions, potentially distorting the analysis.

Of all advertisements with any of the keyword groups in this research, Altruistic recorded the lowest number of appearances, with a maximum of 3.69% in nine postcode regions across greater Melbourne. There are 284 postcode regions in total. Altruistic lexis targets people whose personal values align to environmental well-being and are willing to forego individual benefits in order to minimise environmental impacts resulting from human activity.

Aligning postcode regions from Figure 6.12 with Figure 6.10: Median household income, it is observed that only one of the nine regions with the highest appearance levels of Altruistic terms is in the highest weekly income bracket of $1,883 or more. The remaining eight postcode regions have weekly incomes of either $1,330.01-$1,589 or $1589.01-$1,883. Notably, many regions exhibiting income in these brackets do not record any mention of Altruistic language. The relatively even distribution of Altruistic terms across greater Melbourne suggests agents may be idiosyncratic, rather than strategic in their use of this keyword category. One observation that can be made is that seven of the nine most frequent adopters of Altruistic language are towards the outer perimeter of the metropolitan region and, as mentioned, all but one of these have middle to upper level household incomes. There are two possible interpretations. The first is that the clustering of like-minded people discussed above, and the second is the ‘feel good’ factor that can be attributed to people who have choice enabled through financial security (Organ, Proverbs & Squires 2013). Overall it is apparent from this result that agents are not sensing a desire from buyers to engage with environmental issues through altruistic choice. Rather, perhaps more pragmatic concerns are driving house buyers, and agents are targeting this through the use of lexis that appeals to that cohort.

The next keyword group to be discussed is Parsimonious. Figure 6.13 presents spatial detail at the postcode level.
Figure 6.13: Percentage of Parsimonious terms at the postcode level

Again, interpretation of Figure 6.13 is undertaken with regard to postcodes coloured yellow in Figure 6.9: Number of sales being excluded from analysis due to potentially low number of transactions.

The map shown in Figure 6.13 reveals a relatively even distribution of Parsimonious keywords across the study area. However, there appears to be a slight concentration of more frequent appearances towards the outer perimeter. When considering sales volume and removing those postcodes with insufficient data, no postcode region exhibited appearances of Parsimonious terms in the higher bracket of 1.9%-4.17%. Fifteen postcode regions exhibit the next lower scale of 0.87%-1.89%. This is somewhat counter intuitive. In terms of weekly household income 3 regions are in the $1,026.01-$1,330, 7 in the $1,330.01-$1,589, 4 in the $1,589.01-$1,889, and 1 region in the $1,889-$2,352 bracket. It would appear that agents are more likely to include a parsimonious lexis in advertisements likely to appeal to middle income brackets. This could be an attempt by agents to highlight energy saving benefits to house buyers who would typically be purchasing at their financial limit and therefore encumbered with substantial mortgages. However, if this were the case, it would be expected to observe more widespread use of such terminology, which is not observed. Balcombe, Rigby and Azapagic (2013) noted mortgages were likely to pose an additional barrier to retrofitting house micro-generation energy technologies. Logically, therefore, one would expect agents to highlight opportunities
to reduce financial strain in such circumstances if these technologies exist within the house being offered for sale. As this is not the case, another explanation must be considered. An alternative view is that agents may not yet fully understand the financial benefits on energy efficient technologies and how they can aid early mortgage strain. When investigating landlord investment in sustainable and energy efficient measures in rental properties, Gabriel and Watson (2012) noted the importance of agents as market facilitators for energy efficiency was underdeveloped and, in many cases, agents did not fully understand how to appropriately portray the technologies to tenants. The evidence in this research accords with the observation of Gabriel and Watson (2012) in this regard and suggests agents are not conveying the potential of energy savings onto their clients in the sales context either.

The next and final keyword group to be discussed is Design. Figure 6.14 presents spatial detail at the postcode level.

![Figure 6.14: Percentage of Design terms at the postcode level](image)

Once again, interpretation of the map presented in Figure 6.14 is undertaken with regard to postcodes coloured yellow in Figure 6.9: Number of sales, being are excluded from analysis due to low number of transactions.
Design characteristics are house features that relate to energy efficient measures and would have been considered and installed during the design/construction phase. Such features may be retrofitted but due to their costly nature this would not normally be done unless the house has been renovated or the owner specifically requested this be done. These are characteristics such as double-glazed windows, and insulation.

Excluding low sales regions, an examination of Figure 6.14 reveals a distinctive picture for this keyword category. There is a high concentration of this word category appearing in advertisements in high income postcode regions and a notable spread along the northern corridor of the metropolitan region. Interestingly this corridor also exhibits higher income brackets relative to other regions of Greater Melbourne. A cluster of keyword appearances is located within 10km east and north of the CBD and these are areas within the top 2 income brackets.

Like many global cities the inner sectors of the metro region have been long established in terms of housing stock and many areas have undergone various forms of gentrification (Atkinson & Mourato 2008). Along with this phenomenon incoming residents often rebuild, renovate or upgrade their property in some way (Davidson & Lees 2005; Baek & Park 2012). When undertaking such renovations specific design characteristics considered fashionable and desirable are generally sought to enhance the property. Thus, should one of these properties be offered for sale, it is very likely the agent would highlight such features within advertisements.

The design category includes words and phrases that are tangible and intangible in terms of their visualisation and these possibly knowable to potential buyers. In regard to the intangible characteristics, included in this category are words and phrases that identify solar design features such as orientation, insulation, grey or recycled water systems etc. Such technologies are not always obvious; for example, windows tinted or coated with materials to reduce heat re-radiation. These are commonly known e-glass window systems (Vitro 2018). Notably such energy efficient measures can be expensive and would therefore be more likely to be found in areas where the socio-economic profiles permit.

Applying the Principal-Agent theory to this observation, it would seem that agents are observing a market appetite for such features and therefore including them where possible in advertisements. Supporting this proposition is the fact that this category is the second most common in terms of inclusions in advertisements.
The four spatial maps provided thus far suggest evidence to agree with literature in support of the proposition that engagement with energy efficient technologies is related to household income. This is most prominent with the more tangible keyword categories. However, it should be reiterated that the Design keyword includes words that refer to characteristics that are not necessarily visible but can be clearly interpreted as beneficial in a particular way. For example, ‘sustainable design’ or ‘solar design’ invoke mind images of specific criteria about the house that can be seen and/or evaluated. This in turn is likely to give the agent greater confidence to include such characteristics in advertisements as they are demonstrable, juxtaposed to hyperbole about energy performance capabilities of the house. Research question 3 is now discussed.

6.6 Analysis for Research Question 3

RQ3: Are Real estate agents giving prominence to energy efficient characteristics when scripting house advertisements?

The following discussion presents results aimed at addressing RQ3. It does this by presenting GIS maps developed to analyse how agents are combining keywords to highlight house energy efficient characteristics in advertising. Following these maps, histograms are presented and discussed in relation to relevant theories that guide this research.

6.6.1 GIS mapping of Keyword combinations

Keyword combination maps are now discussed. The aim here is to assess how agents combine keywords to convey, even enhance, information about house energy features in the advertising process. This is important because the extent of prominence given to energy efficient technologies by agents in advertising it gives further insight to agent engagement with house energy efficient technologies. Agents using multiple keywords in advertisements potentially suggests stronger engagement with energy technologies than merely listing the features. Particularly if the emotional Altruistic and Parsimonious keywords are combined with the tangible keywords of Technology and Design. This section aims to evaluate this. Once again, these maps must be interpreted with regard to sales volume shown in Figure 6.9-Number of sales. The first grouping to be discussed is Altruistic and Parsimonious categories.
This combination may convey a message to those seeking to reduce occupation energy costs while mitigating the effects of carbon emissions. Reviewing Figure 6.15, it is apparent that these lexes are rarely combined. After removing the postcodes with transactions low sales between 1-304 this combination was found in only 0.28% of all advertisements. Thus, agents do not appear to be highlighting some of the benefits often attributed to engaging with these technologies. This is conundrum. Engaging with efforts to abate carbon emissions while reducing household energy costs would seem attractive and therefore as marketers of housing, residential agents are well placed to highlight this attribute when possible to do so. However, this appears not to be happening to any notable extent. The next keyword combination to be presented is Parsimonious and Design.

Figure 6.15: Percentage of Altruistic and Parsimonious terms at the postcode level
Figure 6.16: Percentage of Parsimonious and Design terms at the postcode level

Figure 6.16 keyword combination is aimed at investigating how agents are highlighting the financial benefits of good energy efficient design and construction strategies. Once again after removing low sales volume regions, only 3 postcode areas exhibit up to 2% of this combination in advertisements. Two of the 3 postcodes have median weekly household income in the range of $1,589.01-$1,889 while the third is in the range $1,889.01-$2,552 placing them in the top two-tier income bracket. The trend towards higher income households being associated with energy efficient design keywords was noted previously. However, highlighting the benefits of this feature appears to be a lost opportunity. With a maximum of 2% of appearances in advertisements agents do not appear to be conjoining the fact that good energy efficient house design can provide financial rewards. This significance consequently remains with the individual house buyer to investigate and it is therefore unlikely to extend beyond those personally interested. The next keyword combination to be presented is Parsimonious and Technology.
Figure 6.17: Percentage of Parsimonious and Technology terms at the postcode level

Similar to Figure 6.16, Figure 6.17 shows the combination of language aimed at highlighting the financial benefits of energy saving features together with specific technologies that can be retro-fitted, such as solar technologies. Once again it appears that agents are not combining words with technology to highlight benefits to potential house buyers. A maximum of 2.1% of all advertisements is seen in 11 postcode regions. Four of these postcode regions have median household income in middle bracket of $1,330.01-$1,589, four at $1,589.01-$1,889 and three at $1,889.01-$2,352. This is the second highest keyword group combination reducing to 1.1% of advertisements. Although there are more postcode regions exhibiting this combination than Parsimonious and Design the overall number of appearances is low. This again suggests agents are not consciously stressing the benefits of technologies to house buyers. The next keyword combination to be presented is Altruistic and Technology.
Figure 6.18: Percentage of Altruistic and Technology terms at the postcode level

Figure 6.18 shows after removal of postcode areas with low reported sales volume, the maximum occurrence of this keyword combination is 0.75% of all advertisements with a reasonably consistent spread across the research area. It may be recalled from Figure 6.11 that Technology keywords were highest in terms of inclusion in advertisements and from that an opportunity exists for agents to create feelings of benevolence towards the environment. However, as with Parsimonious and Technology keyword combination revealed in Figure 6.17, it appears agents are not linking these categories to highlight the potential benefits.

Little else can be concluded from this observation other than to re-iterate that agents do not appear to be ‘selling’ the message of how energy efficient technologies can benefit households. The next keyword combination to be presented is Altruistic and Design.
Figure 6.19: Percentage of Altruistic and Design terms at the postcode level

After removal of postcode areas with low listed sales, Figure 6.19 shows this keyword combination is also low with a maximum of approximately 1% of all advertisements with this combination. The spread is relatively centralised but does show some outer suburban areas recording up to 0.28%. Again, agents do not appear linking the benefits of energy efficient design features with broader environmental issues. The final spatial keyword map to be presented is Technology and Design.
Figure 6.20 shows this combination has the most frequent occurrences of all combined keywords. There is a consistent spread of mentions of this combination throughout the study area but in many cases the frequency of appearances is low. After removing postcode regions with low sales volume, the highest occurrence of this combination is in the 6.8%-14% range and this only appears once. This particular postcode has a median household income in the $1,889.01-$2,352 bracket. The majority of regions that exhibit this combination and are statistically valid appear to be less influenced by income. With reference to Figures 6.11 and 6.14, Technology and Design keywords respectively, it is reminded here that the ‘spread’ of these keywords across the study region was relatively broad. Therefore, observing a ‘flat’ spread of this combination is not unexpected. However, with only one postcode area showing up to 14%, the highest proportion, and this in the highest median household income bracket, it is unexpected that more advertisements within other high income postcode regions do not exhibit the same trait. These are households that are more likely to engage with energy efficient technologies and therefore one would expect these to be included in advertisements. Closer examination of this is warranted.

Within the postcode region where the high occurrence is observed is a township known as Warrandyte. This area has typically attracted families with higher levels of household income (ABS 2016e). Housing in this area is relatively new compared to the inner areas of the study
where high income is generally concentrated. Putting these together, the observed picture is a little clearer. Older housing stock is less likely to have energy efficient design characteristics, as this was not well understood at the time of design and construction. However, as Figure 6.11 shows, there is a notable amount of solar technologies in these areas. Whereas, postcode areas such as Warrandyte are likely to have both due to the combination of newer housing and high incomes. The postcode areas surrounding Warrandyte also exhibit a higher occurrence of these keywords, but in the next bracket down: that is, 3.1%-6.7%. These too are areas with new housing stock but do not enjoy the same household income levels.

Therefore, causes of this observation are likely to be attributed to the need for wealth to engage with energy efficient design at the point building and/or renovation, and the acquisition of technologies post-construction. Household income appears to be playing a significant role in the uptake of energy efficient technologies and agent advertising is reflecting this.

Results of using GIS technologies to examine the data at the postcode level show support for previous research about relationships between income and engagement with energy efficient technologies suggested by some studies (for example, see: Pellegrini-Masini et al. 2010; Ramos, Labandeira & Löschel 2016). Real estate agents appear to be highlighting such technologies in greater proportion in these regions, but are not emphasising them through the use of hyperbole.

Histograms of keywords within the advertising dataset are now reported. These aim to evaluate the location of keywords within advertisements to understand the likelihood of the message being retained by readers.

### 6.6.2 Keyword histograms

Histograms of first keyword location within the advertisements are now presented. These histograms provide information about the emphasis given by agents to keywords when scripting advertisements. The analysis is guided by Primacy-recency theory, and the AIDA principle, discussed in Chapter 3. That is, elements of communication are more likely to be remembered if they appear early or late in the message, in this the advertisement.

The first set of histograms provides information about where the first keyword is located within the body of the advertisement. For these histograms, the X-axis is absolute in terms of
advertisement length with the scale showing character groupings within the advertisement starting at character 0. That is, the scale shows the number of characters ‘into’ the advertisement where the keyword appeared. A character is a letter, space, full stop, comma, etc. The Y-axis shows the count of appearances of that keyword within the location shown on the X-axis. The second set provides information about the location of the first keyword of interest in the advertisement in percentage terms relative to advertisement text size. In terms of axial interpretation, the same as above applies, except that the X-axis is a percentage of advertisement length; that is, the number of text characters within the whole advertisement. The aim of this analysis is to determine the emphasis agents are giving each keyword category. Primacy-recency theory posits that information provided in early and latter parts of a message, whether written or verbal, tends to be retained by the receiver. Readers of advertisements often cease reading and do not complete reading the advertisement if the information is not of interest (Higgins, Leinenger & Rayner 2014). Therefore, it is important to understand how, if at all, agents are emphasising energy efficient characteristics. If important information concerning energy efficient features is embedded within the body of the advertisement then it is likely that information will be overlooked, forgotten, or not read at all by the house buyers scanning advertisements to see which properties might suit them. This in turn would tend to impede the growth of market interest, as buyers continue to focus on more traditional characteristics and household accommodation needs.

6.6.3 Textual location of first keyword
The first to be examined is the Altruistic keyword category. In each histogram, the Y-axis is the number (frequency) of appearances of the keyword category within each location shown on the X-axis.
Within the database examined, 578 Altruistic keywords were found. The histogram exhibited in Figure 6.21 shows a positive skewness with a small number of outliers found towards the end of advertisements. Altruistic language is typically hyperbole in that it does not make specific assertions as to the performance of the energy efficient characteristics.

While low in volume, when used agents appear to be tending to place altruistic expressions towards the beginning of the advertisement. Hyperbole, or puffery as it is often referred to, is used to enhance positive perceptions in the mind of the reader towards the thing being emphasised. Thus, placing these terms near the beginning of the advertisement suggests there is an intention on behalf of the agent to accentuate the values such features offer. While a positive contribution towards the permeation of a pro-environmental discourse into real estate markets, the low volume is unlikely to exert a significant influence. Given that there are significantly more mentions of technologies and design features, as shown in Table 6.1, this is a concern. Real estate agents do not appear to be regularly emphasising the benefits of the energy efficient technologies when they exist. This is also evident in Table 6.5 that lists the percentage of advertisements with one or more words of any keyword category. The next histogram to be discussed is Parsimonious characteristics.
There is a total of 724 Parsimonious keywords in the dataset. It can be seen from Figure 6.22 that Parsimonious keywords, like Altruistic, appear within the advertising text towards the early parts of an advertisement. This may be an effort by agents to highlight the financial benefits of energy efficient houses. While the financial benefits of energy efficient technologies are well documented (for example, see: Banfi et al. 2008; Pellegrini-Masini Bruegge et al. 2010; Carrión-Flores & Pope 2016), the low occurrence rates suggest this is either not an important consideration or not understood when advertising houses. When making large financial decisions one would expect potential cost saving would be front of mind for house buyers, and therefore agents would seek every opportunity to highlight such benefits within an individual house as a point of difference compared to its competition.

The apparent tendency of locating this keyword in the early stages of the advertisement can assist in retaining the cost saving message; it is the low volume that is of concern. The nexus between energy efficient technologies and financial savings is not strongly enunciated. The next histogram to be discussed is Design characteristics.
There is a total of 15,540 Design keywords in the dataset. Design characteristics are house characteristics that have been built into the house. While not always visible, they are generally tangible by nature. As stated previously, the cost of retrofitting Design keywords is generally considered prohibitive, and it is therefore unlikely a homeowner would choose to do so. It is from this perspective this analysis is undertaken.

With reference to Figure 6.23, the distribution of design characteristics has a positive skew and has a relatively ‘normal’ distribution compared to Altruistic and Parsimonious terms in advertisements. Occurrence of these terms is higher than either Altruistic or Parsimonious and less than Technology terms, suggesting agents prefer to rely upon terms that are ‘factual’ rather than infer certain characteristics. This is understandable from two points of view. The first is prevailing consumer law in Victoria and, more broadly, Australia. Persons advertising houses for sale must be able to defend claims made and more tangible terms would meet this criterion. The second perspective, akin to the first, is that energy efficient technologies are emergent and
a review of Victoria’s formal real estate agent training program, administered by Consumer Affairs Victoria reveals no house energy efficient technology content is offered (REIV 2018b). This lack of training noted in agent interviews (see section 5.6.3.1 – Sub-theme: Professional training) would potentially impede the understanding agents have of the functionality and benefits of such technology. This in turn would result in a natural reluctance to make claims about the performance and benefits of energy efficient technologies. These are offered as an explanation of the reliance by agents upon more tangible terminology; however, another perspective is that of the buyer and how agents may interpret that perspective.

House buyers are presented with an array of information when undertaking the search process and this information is often interpreted within the frame of past experiences and understandings, and environmental frames are no different (Leonidou, Leonidou & Kvasova 2010). Understanding this, and having regard to potential claims of misrepresentation of the capabilities of energy efficient features, it is reasonable to believe that agents would attempt to make relevant information explicit. In doing so there is likely to be greater reliance on tangible terms juxtaposed to intangible terms. The logic of this view lies within the Principal-Agent theory. Agents are unlikely to make claims about the performance of house energy efficient technologies when they neither have control over occupant behaviour nor will personally benefit from such claims. The overriding need to comply with consumer regulation is very likely to cause agents to remain conservative about performance claims. The fourth and final keyword to be examined in the first set of histograms is Technology.
There is a total of 17,155 Technology keywords in the dataset. Technology keywords include words and phrases that refer to energy efficient technologies that can be retrofitted to a dwelling post-construction. They include specific solar technologies such as PV cells and hot water systems, low energy lighting, and water efficient systems such as storage tanks. It is these technologies that have received significant public exposure via media and marketing outlets (Aliento 2016) and it is reasonable to assume these technologies would be relatively familiar to house buyers. Figure 6.24 provides information of where the first technology word appears within the advertisement and has the greatest number of data points of the four categories. Although exhibiting a slight positive skew, the data have a relatively normal distribution. Interestingly, technology words appear predominantly about one-third (approximately 700 characters) into the advertisement text. Again, this is concerning when considering primacy-recency theory. The reader has consumed considerable information before reading these terms and, applying the theory, they are likely to be overlooked. With regard to AIDA principle (Attention, Interest, Desire, Action), applied in advertising, the lack of appearances near the beginning of the advertisement suggests agents do not believe energy efficient technology is likely to capture the attention of the house buyer reading the advertisement.
The histograms presented show where agents are locating energy efficient lexis within house advertisements. The two keyword categories that refer to tangible features of the house, which includes words such as double-glazed windows, solar panels etc., are typically located within the body of the advertisement. While the two non-tangible categories, which includes words such as ‘energy efficient house’ and ‘environmentally friendly’, that aim to embellish the ability of the house to perform in an energy efficient manner through the use of puffery, were typically located towards the early section of the advertisement. The reader is reminded, the number appearances of the non-tangible category were very low compared to tangible keywords.

While the histograms presented above provide useful statistical information regarding keyword locations within the text string of an advertisement, they do not provide information about advertisement size. The first keyword identified within the text string of the advertisement may seem to appear early. However, this may also be a result of the advertisement being relatively small in size. Therefore, it is important to now review the relative position of the keyword within the advertisement. The next set of histograms provides details of the location of the first keyword for each category expressed as a percentage of the advertisement size. This is useful as it elucidates more clearly how agents are structuring advertisements when including energy efficient keywords.
6.6.4 Textual location of First keyword as percentage of advertisement size

The first keyword category to be presented is Altruistic.

Figure 6.25: Location of first Altruistic keyword as a percentage of total advertisement

Figure 6.25 illustrates a bi-modal histogram for percentage location of Altruistic keywords. One of the first observations made of this histogram is the distribution when compared to the first location of the word for the same keyword. As stated, Altruistic words are considered hyperbole, as they do not make specific performance claims. For example, phrases such as ‘environmentally friendly’ and ‘environmentally responsible’ are included in this category. Figure 6.25 reveals that when writing advertisements, agents are inclined to place altruistic words towards the early parts and later half of the advertisement. In terms of character location, the bulk of the data points lay within the first 20% of the advertisement string, or after 68%. It is less likely to see Altruistic keywords between these locations within the advertisement.

Applying Primacy-recency theory suggests readers of advertisements, including Altruistic keywords located towards the early part of the text, are more likely to remember the house has
some unique characteristics that will reduce its impact on the environment. It appears in isolated cases; agents are using Altruistic terminology to appeal buyers with positive environmental attitudes. However, those keywords appearing in the second half of the advertisement are less likely to be remembered because they appear deeper into the body of the text, rather than the end. While somewhat progressive, this category is lowest of the four categories in terms of frequency of appearances (less than 1% of all advertisements), and therefore is not likely to dramatically influence perceptions. The next keyword category to be reviewed is Parsimonious.

Figure 6.26: Location of first Parsimonious keyword as a percentage of total advertisement

Similar to Altruistic, Figure 6.25 showing the Parsimonious keyword histogram is also bimodal but not as profound. In this case, it is more likely that this keyword will appear in the latter half of the advertisement. There is a notable occurrence of data points towards the early section of the advertisement. Parsimonious words appeal to buyers seeking to reduce the costs of energy. Once again, these words and phrases are construed as a form of hyperbole. This category includes words such as ‘energy conscious’ and ‘energy saving’, and therefore it can be assumed that the agent is attempting to appeal to frugal house buyers when highlighting this
characteristic. Again, considering Primacy-recency theory, this message is unlikely to be remembered by the reader as the majority of this terminology appears within the body of advertisement, although limited appearances are observed in the very early sections. Like Altruistic words, this category does not reveal specific detail about the technologies but rather relies upon the reader’s interpretation of their meaning and relevance. This bi-modal distribution suggests agents are locating parsimonious lexis in textual locations that is less likely to influence buyer choice. The next keyword category to be reviewed is Design.

Figure 6.27 Location of first Design keyword as a percentage of total advertisement

Figure 6.27 shows the distribution of Design keywords is slightly negatively skewed. The pattern shows a tendency to locate this keyword group towards the centre and latter portion of the advertisement. However, the distribution is not sharply peaked, and therefore a significant number of data points are located in the first half of the advertisement.

This suggests agents may be making the choice of location of Design keywords relative to other characteristics. For example, if the house has a north facing orientation and is otherwise
similar to competing houses for sale, this feature could be located towards the early part of the advertisement to highlight a point of difference, as north facing ‘light and airy’ houses are considered desirable in Australia (Berry et al. 2014). Here the AIDA principle is useful. AIDA (Attention, Interest, Desire, Action) encourages agents to locate the more desirable aspects of the property in the early section of the advertisement. As mentioned previously Primacy-recency theory posits information positioned in the early and latter location of the advertisement is more likely to be remembered. Therefore, it would appear from the Design category distribution that agents are sensing a market appetite for such characteristics and balancing these with other attributes. In this balancing act, the moderate proportion of appearances (less than 12%) suggests there is still a weighting towards highlighting other non-energy efficient characteristics over energy efficient characteristics. The next keyword category to be reviewed is Technology.

![Figure 6.28: Location of first Technology keyword as a percentage of total advertisement](image)

The Technology histogram, Figure 6.28, is displaying a classic negative skew with the majority of Technology keywords being located on the second half of the advertisement. The frequency peak is located around 78% into the advertisement, with a significant volume around 80%.
From this, it is clear that agents are locating Technology keywords in the latter section of the advertisement conceivably to highlight alternative house features more prominently.

The location of Technology keywords in advertisements suggests agents do not see such technologies as overly attractive to buyers. It appears from this that in many cases the agents consider other house features as of more interest to the market.

6.6.5 Histogram summary
In all, eight histograms have been presented. The first group of four provides information about where the first keyword of each category appears within the advertising text string. The second group of four provides information about the where the first keyword is positioned within the advertisement, relative to the advertisement size. The second group is particularly useful. From this group, it can be seen that the majority of tangible house features, such as floor plan, windows technologies, and solar panels, are given less emphasis than other non-energy efficient characteristics, as shown by the distribution of the respective histograms. No keywords can be considered to be located either near the start or the end of the advertisement, and therefore the message is less likely to be retained. This implies agents are sensing a market appetite for such technologies but not sufficient enough to give these features emphasis over non-energy efficient features.

In regard to less tangible categories of Altruistic and Parsimonious, these interestingly show a slightly different picture in that the placement of these words is more evenly distributed throughout the advertisement. As stated, these categories can be considered hyperbole with similar lexis being viewed as common speak in real estate advertising (Beangstrom & Adendorff 2013). Lack of specific training to enhance knowledge of energy efficient technologies could create a practice of relying upon puffery rather than including specific claims of technology performance. As this puffery is inherently broad in meaning, it is reasonable to believe that when writing advertisements, agents will be more practiced in the use of such lexis. In other words, puffery could be used to heighten the overall attractiveness of the house being advertised rather than strategically placed to enhance a specific element of it. This is proposed as an explanation of the histograms’ characteristics.

6.7 Data visualisation
The next and final section of this chapter provides visualisation of the keyword categories. These illustrations further assist in addressing RQ3.
6.7.1 Word Bubbles

Word bubbles are a useful for presenting large textual data sets. The relative size of the bubble compared to others provides a visualisation of the number of data points in the dataset that are captured by the keyword.

With regard to Figure 6.29, the large outer circle represents the entire dataset. The larger shaded circles within the single large circle are the keyword categories with each subset visualised therein. These circles demonstrate the relative variance between the individual words/phrases, word groupings, and keyword categories. The two most prominent word groups are ‘Water Tanks’ and ‘Northerly Aspect’. Water Tanks is resident in Technology keyword group due to its ability to be retrofitted post-construction, and Northerly Aspect is a Design keyword due to the fact it must be done at the planning stage.

With regard to water tanks, this dataset was created during one of Australia’s most severe droughts. This drought led to government implementing water restrictions; in some areas, these were quite severe. This drought period officially started in 2002 and ended in 2010 (Melbourne Water 2017). During this time, many residents purchased and installed water tanks as a means of rain harvesting to maintain gardens. It is therefore likely the relatively high occurrence of this keyword is a result of this climatic event and that agents were attempting leverage off public concern when advertising houses for sale. This observation reinforces the usefulness of examining advertising as a means of undertaking a study of social behaviour and trends. In this, the Principal-Agent theory is supported in that agents detect market nuances and trends and will promote house characteristics that align to their interpretation. The public attention drawn to the impact of the drought would no doubt have caused buyers to consider post-occupancy implications of managing water. Thus, to maximise attention to the house, agents would be likely to mention water tanks as a means of creating a point of difference in a time of public awareness.

Northerly house aspect is a desirable house characteristic in the southern hemisphere when aiming to create energy efficient housing (McLeod & Fay 2010), and homebuyers are increasingly seeking this feature as part of their list of desired attributes (Williams 2014). Real estate agents are likely to be detecting this trend and include this reference where possible. This does not mean it is a specific reference to energy efficiency although it nonetheless has this
attribute, and astute seekers of low energy housing would be aware of this. This is posited as an explanation for its prominence in the dataset.

Due to the significant publicity given to solar technologies, particularly solar panels, it was decided here to separate this keyword category from the dataset for particular attention. Solar words and phrases are shown in Figure 6.30. It can be seen that ‘solar panels’ as a stand-alone phrase, is the most frequently scripted solar reference within advertisements appearing in approximately 14% of all advertisements. Solar hot water technologies are the next most frequent inclusion. The much smaller bubble next to solar technologies is solar words and phrases referring to design characteristics. This category requires more technical understanding on the part of the agent. The agent must be able to synthesise floor plans with passive design principles and less obvious characteristics such as roof eave widths to recognise the energy efficient attributes of the house. This is usually only accomplished with training and/or personal inquiry. The relative number of appearances of Technology solar words compared to Design solar words simply highlights the capability that this technology can be retrofitted, and it appears, where possible, homeowners are doing so. If not, the technology could not be mentioned within the advertisement.
Figure 6.29: Word bubble for all keyword categories
6.7.2 Summary: Word bubbles

Figures 6.29 and 6.30 visually illustrate the emphasis given to keywords. Technology keywords appear in 14.5% of advertisements. If agents were ‘selling’ the benefits of possessing such technologies then one would expect to see a similar percentage rate of advertisements when combined with Altruistic and/or Parsimonious keywords, represented by larger bubbles. This is not the case, with a maximum of 1.3% of Altruistic keywords and 2.1% of Parsimonious keywords being combined with Technology, and even less when combined with Design keywords.

Real estate agents are rarely associating energy efficient measures with words that have the potential to enhance the message of the benefits of such technologies. This is a concern as one of the primary roles of agents when scripting advertising is to highlight the attributes of the house to appeal to potential buyers. It is not expected that more established attributes (such as architectural character and location) will be overlooked, but rather energy efficient attributes will be highlighted as point of difference when so many houses in Melbourne are yet to install them.
Of the four keyword categories presented, only the Technology keyword is notably increasing in frequency of appearances within real estate agent house advertisements. This suggests a market interest in retrofitted energy efficient technologies.

6.8 Summary of initial findings

The findings presented show real estate agents are engaging with promoting energy efficient technologies, but not extensively. When considering the various forms in which this dataset has been presented, it seems agents are making some, but not extensive, effort to emphasise the benefits of energy efficient housing. These results also indicate agents are more engaged with promoting energy efficient technologies in affluent postcode regions, which concurs with previous research.

Findings also show there is a lack of emphasis being given to house energy efficient characteristics in that tangible technologies are not being supported by hyperbole that could enhance perceptions of such technologies. Saturation and concurrence of keywords is minimal indicating that agents are simply ‘listing’ technologies within advertisements when they exist, rather than promoting the potential benefits.

In this, house buyers are required to make their own judgements about the usefulness, and associated environmental and personal attributes, of energy efficient technologies.

6.9 Chapter conclusion

This chapter has presented descriptive and spatial results of this research. In doing this, Research Questions 1, 2 and 3 have been addressed with the rationale for keyword selection and categorisation provided. Descriptive results have been provided in various forms to elucidate the data and enable it to be viewed from various perspectives. Geospatial maps, word bubbles, histograms, and conventional tables and graphs, all combine to create a clear understanding of how real estate agents are engaging with and promoting energy efficient technologies.

The next chapter, Chapter 7 – Summary and Conclusion, coalesces the findings of Chapter 5 – Qualitative Results and Chapter 6 – Quantitative Results, and discusses these in further detail to provide a thorough and complete understanding of the outputs of this research.
7.0 Chapter 7: Summary and Conclusion

7.1 Introduction

Chapter 5 presented the qualitative data corpus, analysis and discussion. Chapter 6 presented quantitative data, analysis and discussion. Both these chapters triangulated findings with extant literature to provide an in-depth examination that addressed the research questions. This chapter discusses these findings in relation to this dissertation and the research questions in terms of their implications for property theory and future research. Limitations of the study are also addressed.

The discussion now addresses each research question in turn. In doing so, it is acknowledged there is an element of repetition. This was necessary as the same data were used to address all three questions, but from the varying perspectives, and in doing so some overlap was inevitable. However, the data were uniquely analysed with respect to each research question.

7.2 RQ1: What determines whether agents use energy efficiency language in housing advertisements?

The use of energy efficiency language by agents is predominantly determined by lack of house buyer interest, limited knowledge of the technologies, and perception of need to gratify sellers.

7.2.1 Agents are including energy efficient lexis in advertisements

Real estate agents are marketers of houses, service marketers, market researchers and sales representatives (Brinkmann 2000). Framed by prevailing market conditions and trends, these responsibilities lead agents to identify and highlight the most appealing features of a house when advertising, as this is important for successful agency outcomes and to sellers (Dabholkar & Overby 2006). The findings presented in chapters 5 and 6 show agents are including energy efficient terminology in house advertisements, albeit to a relatively low extent.

This finding is in line with the researcher’s expectations in that agents would be expected to seek points of difference when marketing houses for sale so that their businesses remain commercially viable (Dunning et al. 2018). Agent interviews found this to be more a pragmatic practice than an altruistic one. While four of the agents interviewed stated positive personal views towards the environment and environmental issues, they all expressed overriding
commercial needs. All agents interviewed expressed the need for business survival, and this is likely to ensure house attributes most sought after by buyers (such as location and accommodation) would remain prominent in advertisements.

However, the actual appearance of house energy efficient language in advertisements has two positive elements. The first is that through the process of repetition, agents themselves would become increasingly aware of the benefits associated with these technologies and become more likely to reiterate them in discussions with buyers. The second positive is buyer awareness. The search process for buyers generally involves reading many advertisements in an effort to identify houses of interest. Including energy efficient language will assist in higher awareness, and this in turn engagement with these technologies (Brounen, Kok & Quigley 2013).

Quantitative results over the research period, July 2008 through to March 2015, show the overall number of advertisements including any keywords and any combination of keywords, increased from 17.65% to 26.51% of all advertisements in the dataset. In this total, 3.7% of all advertisements included two or more keyword categories. Of the keyword categories, Technology and Design, the two manifest categories whose technologies are typically visible and/or demonstrable in some way, were the most frequently used. Technology keywords were likely to appear approximately 23.7 times more frequently than either of the Parsimonious or Altruistic keyword categories. Design category keywords appeared at least 21.5 times more frequently.

The upward trend of Technology keywords was generally consistent throughout the research period and largely driven by increased presence of solar terminology. This increase in house solar technologies has been reported across Australia and globally (Wolske, Stern & Dietz 2017; Akter, Mahmud & Oo 2017), and is believed to be the result of increased electrical energy costs (Ren, Grozev & Higgins 2016). Technology keywords increased throughout the research period. The appearance of Technology keywords followed a similar trend line to that of increased electrical costs (for details, see Figure 6.7 in Chapter 6). Increases in global energy demand through intensified reliance on technologies and population growth is predicted to place an even greater strain in energy production requirements (Chu, Cui & Liu 2016; Khan & Arsalan 2016). Alongside this, previous literature has shown increased electrical energy costs are considered to escalate the installation rate of energy efficient technologies, particularly solar (Branker, Pathak & Pearce 2011; Ellabban, Abu-Rub & Blaabjerg 2014). This trend has potential social inequality. As previously discussed, engagement with house energy efficient
technologies is correlated to household income (Ramos, Labandeira, & Löschel 2016), and the results presented in this research showed appearances of Technology keywords were typically greater in middle and higher income postcode areas. A rational conclusion here is that wealthier households are installing solar technologies, presumably in an effort to offset increasing electrical energy costs, and that they have the means do so. Recommended strategies for addressing the potential effects of this inequality are beyond the scope of this research but is noted as an opportunity for further research.

Revealed in interviews, energy efficient language is being included in advertisements where such technologies are present in the house. Increasing numbers of house solar installations, and the practice of energy efficient terminology inclusion in advertisements, would explain the observation of this upward trend. However, the low extent of non-tangible keywords that do not specifically describe a technology but rather allude to house energy performance, interpreted as energy efficient hyperbole, shows the benefits of these technologies are not being highlighted by Melbourne agents in their advertising.

A significant preference by agents to focus upon tangible house characteristics rather than highlighting benefits is evident in this research. However, the benefits of energy efficient technologies are not being highlighted through the use of appropriate language in advertisements. While including energy efficient technologies in advertisements, interviews with agents demonstrated a lack of knowledge about these technologies. The motivation to include energy efficient lexis emanated from a belief it would provide a point of difference from other houses on the market and/or appease the seller. This lack of knowledge on behalf of agents is, in part, likely to be a result perceived lack of buyer interest.

If home buyers are not actively seeking these technologies in the house search, agents are not incentivised to acquire detailed knowledge about them. In a New Zealand study, Eves and Kippes (2010) found buyers had limited interest in energy efficient housing when purchasing, and considered traditional factors such as location and price to be of most importance. Limited buyer interest was also found in Queensland, Australia, when mandatory house energy disclosure certificates were provided to buyers prior to sale (Bryant & Eves 2012). These were certificates that provided information to buyers regarding the house’s energy performance capabilities. House energy performance standards do not appear to rank highly with buyers. In interviews agents noted that they would typically give preference to accommodation and location over other house characteristics in advertisements, including energy efficient
technologies. These house characteristics are seen as consistently important to buyers by property researchers (Reed & Mills 2007; Levy & Lee 2011). This alignment between academic research and agency practice demonstrates that agents are very much ‘in-synch’ with buyer attitudes and trends and will promote houses accordingly.

As stated above, agents are including energy efficient technologies in advertisements with the motivation to do so emanating from agents seeking points of difference and to please sellers. Inherent with the observation of increased frequency of appearances of energy keywords, however, is a danger that observers of property markets may develop the misguided belief that house markets are developing an appetite for such technologies and agents are promoting them to this end. As residential real estate agent behaviour is generally reflective of house market trends (Levy & Lee 2011), nothing in the data corpus sourced for this research suggests buyers of residential property are embracing environmental concerns when seeking housing.

7.2.2 Agents are being pragmatic when scripting advertisements
Real estate agents are in business to make money, which is not unique, nor to be viewed negatively. Real estate agency is a highly competitive industry which is well documented by researchers (Marsh & Zumpano 1988; Mantrala & Zabel 1995; Agbool, Ojo & Amidu 2012). It follows, therefore, that agents act in a manner that leads to successful outcomes for themselves, the client, and their company. In such a competitive industry, with competition existing within, and outside, the individual agent’s company, it was posited in Chapter 3, Section 3.2.1, that Principal-Agent theory had relevance to this research. The findings suggest it does. During interviews, some agents explicitly stated they would include energy efficient lexis in advertising to please the vendor. This was to avoid conflict and the potential of losing the listing to another agent, even though they did not believe it would aid the sale process. In other cases, where not explicitly stated, comments were made highlighting the importance of selling houses and their efforts were focussed in that regard.

Interpreting the data through the lens of Principal-Agent theory, it is expected that agents adopt a pragmatic attitude to their business. This appears to be the case in this study. Anglin and Arnott (1991) found commission-based contracts, such as those used in Victoria, favoured the agent. In a simulated experiment, Lee and Thompson (2011) found agents often were motivated to reach a deal and this deal would not always favour their client, the seller. This situation further explains why agents highlight house attributes understood to be desirable to house
buyers in favour of energy efficient technologies. Real estate agents are focussing on outcomes that benefit them, their business and, arguably the client in the sense of shorter time on market. This was evident in interviews where the agents highlighted that the focus was on selling houses. With location, accommodation and price foremost in buyers’ minds (Reed & Mills 2007; Levy & Lee 2011; Eves & Bryant 2012), it is expected that these be at the forefront of agent thinking when scripting advertisements. The lack of knowledge about energy efficient technologies, revealed in interviews, is likely to cause agents to opt for language that neither commits nor elaborates about the house technologies. Simply listing what is demonstrable, and avoiding the use of hyperbole or puffery, could achieve this. With regard to Principal-Agent theory, agents are appearing to avoid opportunities to highlight energy efficient technologies. Doing so could attract environmentally disposed buyers (Nair, Gustavsson & Mahapatra 2010) and so create a possibility of being accountable for the performance of such technologies. While agents seem comfortable with including explicit energy efficient language in advertisements, interviews suggest a reluctance to emphasise the technologies with hyperbole. This practice appears to avoid legal ramifications and protect agent reputation. Some agents interviewed specifically stated they would not put themselves in a position of making performance claims as they could not be responsible for post-occupancy behaviours. This practice could also be influenced by formal agent training concerning representations made.

With such a strong emphasis on consumer laws embedded within formal training, agents are very aware that claims made about the performance of energy efficient technologies require substantiation if challenged (J Mitchell, Manager, REIV, interview, 10 February 2017). However, research has revealed that energy efficient house performance is contingent upon occupant behaviour and therefore quite variable (Gill et al. 2010; Pilkington, Roach & Perkins 2011; Martinaitis et al. 2015; Delzendeh, et al. 2017). Occupants need to engage with house energy efficient technologies as intended and/or designed to derive their maximum performance benefits. It is reasonable to believe agents are aware they have no control over post-occupancy behaviours of buyers. Therefore, a reluctance to make performance claims that potentially lead to retribution from disgruntled buyers would be understandable. Such a finding is also in line with expected observations when considering Principal-Agent theory. Applying this theory, agents would be expected to act in a way that increases the likelihood of a sale, but not to the extent it has potential adverse consequences. Use of hyperbole or puffery in house advertising has this potential for negative outcomes. They see their role as selling houses, not to provide stewardship over environmental issues.
In this regard interview data was very clear: agents’ focus was on the successful sales, and advertising script was organised to achieve this. For agents to enter into discussions concerning post-occupancy behaviours, the role of the agent would essentially move from sales to consultancy. Such a shift in focus would not be remunerated under commission arrangements and potentially incur ramifications regarding performance expectations noted above. Therefore, there is no incentive for agents to attempt to emphasise technology energy performance; rather, real estate agency law and regulations encourages agents to curtail representations to buyers (Estate Agents (Professional Conduct) Regulations 2018 (Vic) s13). This would explain their reluctance to go beyond indicating the technology exists.

7.2.3 Summary and final deliberations for Research Question 1
RQ1: What determines whether agents use energy efficiency language in housing advertisements?

The energy efficient language agents include in house advertisements is mainly limited to tangible technologies. Language that implies performance benefits, or highlights the technologies in some way, is minimal. The finding concurs with literature regarding house buyers. Research shows house buyers have limited interest in energy efficient house technologies during the search process (Eves & Bryant 2012; Bruegge, Carrión-Flores & Pope 2016). Literature investigating this field has largely focussed on market behaviour and price effects rather than the agent perspective (for example, see: Brounen & Kok 2011; Fuerst et al. 2015; Encinas, Aguirre & Marmolejo-Duarte 2018). This limited buyer interest, reported through agent interviews, would do little to encourage agents to go beyond itemising energy efficient technologies in advertisements.

The lack of knowledge of energy efficient technologies appears to be another contributor to the impediment of agent engagement beyond simply itemising the technology. This is evidenced through minimal use of Parsimonious and Altruistic keywords that can be used to highlight the benefits of these technologies, and through agent interviews. In turn, this has the potential to further disengage buyers, or at least not encourage buyers to consider energy efficient technologies in their house search. As explained, both Principal-Agent and Property theories are being applied in the residential market here.

Principal-Agent theory posits an individual, in this case the agent, acts legally and ethically towards their employer, in this case the seller, but will retain actions of self-interest when
circumstances permit (Anglin & Arnott 1991; Rutherford, Springer & Yavas 2005). Here, the agent is not promoting the benefits of the energy efficient technologies within the house through the use of hyperbole. Such promotion nevertheless has the potential to attract buyers whose values align with environmental issues. Rather, agents prefer to avoid making technology performance claims, thereby retaining an element of self-interest. Conceivably, the motivation for this rests in avoiding legal challenge.

From the Property theory perspective, traditional house features, such as promoting location, neighbourhood aesthetics and so on, continues to receive significant attention through the use of hyperbole to enhance their appeal to the buyers. Real estate agents typically accentuate these characteristics through using phrases such as ‘short walk to local cafés’, ‘serene neighbourhood’, or ‘a stroll to the station’, often creating mental images. Corroborating with the aforementioned literature, this shows the importance agents place upon such characteristics, no doubt in the belief they will appeal to buyers thus prompting them to enquire. The evidence of this study suggests agents are not perceiving energy efficient technologies as overly attractive to house buyers and therefore choosing language that simply states their existence within the house being advertised. However, the use of hyperbole, typically used in various forms of advertising (Pryce & Oates 2008; Barbu-Kleitsch 2015), would be more likely to attract interest from buyers as it aids attention to and emphasis of the benefits associated with the promoted item; in this case, energy efficient technologies.

This research indicates that agents prefer to use simple language that itemises the existent technology. Lack of knowledge, lack of perceived buyer interest, lack of perceived benefit to successful outcomes combine to make agents conservative with claims made about energy efficient technologies. This explains why manifest technologies that are visible and/or demonstrable in some way are more prominent in advertisements. Claims that may be subject to occupant performance, seen here as hyperbole, are much less used.

Research question RQ2 is now discussed.
7.3 RQ2: Does the extent of inclusion of energy efficient technologies in house advertisements in Melbourne, Victoria vary across disparate regions and if so why?

Including energy efficient technologies in advertisements was found to be related to household income, and household income is variant across greater Melbourne. Perceived buyer attitudes also influenced including energy efficient technologies.

7.3.1 Income matters

Greater Melbourne, the spatial region examined in this research, exhibits like many cities a broad social-economic spectrum. Household income is found to have significant correlation to engagement with house energy efficient technologies (Kastner & Stern 2015; Fuerst et al. 2015). Further, Achtnicht and Madlener (2014) found across 16 German federal states affordability, profitability (meaning yielding financial returns), and favourable opportunity, were all important for householders to engage with house energy efficient technologies. Other demographic profiles (such as life stage, children’s presence and age, and time of ownership) have also been shown to be important in household decisions to install energy efficient technologies (Mortensen, Heiselberg & Knudstrup 2016). Such information is unavailable in the data acquired for this research and is therefore acknowledged as a limitation. The ability to retrofit dwellings with energy efficient technologies would logically depend on the household’s financial capabilities and, in part, whether government incentives are available. The exception to this would be incentives that cover 100% of the associated costs, which is not the case in Victoria.

Maps representing ABS household income and keywords are presented in Chapter 6. Figure 6.12: Median household income at the postcode level, shows the distribution of household incomes across the region. Figure 6.12 also shows a relatively consistent pattern of higher income households clustered around the CBD area and inner rings. A broad, somewhat linear pattern extends outward towards the northern portion of the metropolitan region. Agents interviewed in these regions suggested ‘money status’ was important in their local market (Chapter 5, section 5.4.2.2). These spatial income patterns were used to assess incidence of appearances of each keyword category in advertising.

Agent interviews stated conclusively that energy efficient technologies were included in advertising when present, but not emphasised. This in itself, therefore, cannot explain the
observed variation and therefore must be a result of other influences. Comparing and contrasting the maps presented in Chapter 6 with Figure 6.12: Median household income, showed that areas exhibiting higher incomes tended to have higher incidence of Technology and Design keywords. This supports the literature (see Chapter 2, section 2.4.7). Closer examination reveals patterns of behaviour by agents when advertising energy efficient housing. For Technology keywords, a greater occurrence of appearances is seen in middle income households. Areas of high income were notably lower, and low income areas were very low, and this was commented upon by agents. Agents working in middle income areas seemed more ‘in tune’ with energy efficient housing and noted that buyers were, at times, conscious of environmental issues. However, they said buyers would not make decisions to factor such technologies in their housing choice. Juxtaposed to this, agents working in the contrasting social-economic areas, that is the high and low income areas, both noted minimal interest by buyers. These areas showed lower incidence of Technology keywords.

From this it appears that middle income earners are more likely to install energy efficient technologies, evidenced by the fact agents will include them in advertisements if existent in the house. Specific investigation of the demographic profiles of house owners and their attitudes installing such technologies would need to be undertaken explore this observation further. With the focus on residential agents, this perspective is beyond the scope of this study and considered to a research limitation.

Based upon the analysis undertaken, it appears that income influences engagement with house energy efficient technologies to a certain point, agreeing with previous research (for example, see: Kastner & Stern 2015; Fuerst et al. 2015; Hamilton et al. 2016). However, it is plausible that people who have sufficient funds to ignore household energy costs do so, and thereby do not consider retrofitting house energy technologies important. In contrast, those at the other end of the financial scale cannot fund the initial capital outlay although they would financially benefit from such upgrades through reduced energy cost savings (Morrissey et al. 2013; Bruegge, Carrión-Flores & Pope 2016).

Agents interviewed understood buyer expectations in their local markets, and this was expected (Yinger 1981; Jud 1983; Arndt 2017). While including Technology and Design keywords was almost ‘automatic’ if present, agents were under no misapprehension that buyers were actively seeking the technologies. Accordingly, the observed variation appears to be a consequence of
household income rather than agent belief in marketing benefits. Combining this discussion with Design keywords adds further to this finding.

Using the same household income map to position the interpretation of Design keywords, there is a clearer picture of the relationship between these variables. Keeping in mind that the majority of the regions examined are well established suburban areas, Design keyword energy efficient technologies require planning and retrofitting with house renovations. Regions that exhibited higher household incomes were notably more likely to include Design keywords. The actual number in the dataset was similar to Technology keywords; it was the concentration and distribution along the wealth ‘belt’ that differed, which implies many of these houses have been renovated in some way (see Chapter 6, section 6.5.1 for details). Under the Victorian Building Codes, house extensions are required to be built to current energy efficient standards (Victorian Building Authority 2018a, para. 1), and in cases where the floor area of the extension is 50% or greater than the floor area of the original dwelling, the whole building must be brought to current standards (Victorian Building Authority 2018b, p. 14).

Therefore, considering the appearance of Design keywords is greater in frequency in older areas (and from this is the inference that renovations have occurred and these are in keeping with prevailing regulations), it appears agents have more energy efficient technologies to include in house advertisements and are inclined to do so. Agent interviews, however, confirmed this was not to specifically promote the house as energy efficient, but rather as being modern and renovated, again highlighting a point of difference. In other words, renovated houses in part, or entirely, exhibit some form of energy efficient technology and agents list these features. It is the higher income households that can afford to renovate, explaining the observed Design keyword appearances in wealthier areas. Simply listing these energy efficient characteristics suggests agents appeal to buyers by emphasising other features such as the newness of building and the attraction of modern features. Buyer attitudes play a significant role in how agents script advertisements (Beangstrom & Adendorff 2013), and thus this finding suggests that agents are using the appeal of completed renovations as a stand out feature in older areas, and energy efficient attributes are secondary.

7.3.2 House buyer attitudes
Altruistic and Parsimonious keywords did not exhibit any notable patterns of appearances in advertisements across the regions examined. Altruistic terms seemed relatively evenly spread
across Greater Melbourne, and Parsimonious keywords had a slight tendency to appear in fringe areas. However, it must be remembered these observations were relatively low compared to Technology and Design keywords. Since agents understand their local markets, the limited data suggests buyers are not being overly sympathetic towards the environment in the house search. If agents sensed a market appetite for energy efficient technologies, they would highlight these features in advertisements. In this regard, literature notes that people who demonstrate environmentally altruistic tendencies are in the minority (Frederiks, Stenner & Hobman 2015), with people more likely to respond out of self-centred motivations and seek monetary savings (Banfi et al 2008). The low, but discernible, number of appearances of Parsimonious keywords around urban fringe and mid-level income areas suggests some awareness by agents that energy efficient technologies have financial benefits. All agents interviewed demonstrated some, but varying depths of, understanding of the benefits that can be gained through reduced household energy bills.

With Technology and Design keywords appearing around 22 times more frequently than either Altruistic or Parsimonious keywords, and agents having some understanding of potential energy savings and environmental benefits, it appears these potential savings are not of significant interest to the market. Otherwise, Altruistic and Parsimonious keywords would be expected to appear together with Technology and Design keywords more often. Increasing energy costs may, however, alter this situation with agents attempting to emphasise the benefits of house energy efficient measures by highlighting reduced energy consumption. This raises the potential for further studies in this field. Another possibility is that agents do not have confidence to highlight potential savings because of post-occupancy behavioural issues previously mentioned.

7.3.3 Summary and final deliberations for Research Question 2
Agents were found to include an energy efficient technology lexis in advertisements where possible, particularly tangible (manifest) technologies. The appearance of energy efficient terminology varied with household income across the dataset. Postcode areas exhibiting middle to higher household income showed more frequent energy efficient keyword appearances in advertisements, but notably only tangible technologies. Literature presented in Chapter 2 showed that income, education and personal values are motivators to engage with environmental issues, of which energy efficient housing is a subset. Higher income often results from further education (Dougherty 2017). However, as the focus of this research was
upon real estate agent engagement with energy efficient technologies when advertising, not antecedents for technology installation by home owners, household education and its relationship to household income was in itself not considered useful to explain agent behaviour. Future research is required to explore this possibility and the propensity for householders to engage with environmental housing.

Notwithstanding the aforementioned, appearances of energy efficient technology keywords within real estate agent house advertisements were observed in greater frequency in areas of wealthier households. It is suggested that households with higher incomes are more likely to have undertaken renovations (Mills & Schleich 2012) requiring conformance to building regulations, and in doing so have installed energy efficient technologies such as double-glazed windows and/or solar panels. As these technologies are tangible and agents stated they would include them if present in the house, this would account for greater number of appearances in relatively middle to higher income areas. This evidence accords with literature (Judson & Maller 2014) in that these households are seeking monetary savings through reduced energy bills. Again however, the benefits of financial savings are not being highlighted in advertisements.

Emotive keywords (Altruistic and Parsimonious) did not display the same distribution as tangible keywords (Technology and Design). These keywords categories showed a relatively consistent distribution with a slight orientation towards fringe areas. In some cases, these areas are known for their ‘greenness’. Thus, this too suggest agents respond to market nuances, but the very low extent of keyword appearances in advertisements must be kept in mind when interpreting this result.

Finally, literature also suggests the majority of home buyers will first satisfy household needs over other criteria (Reed & Mills 2007), and this includes considering energy efficient technologies (Eves & Kripps 2010). Agents appear cognisant of this and are structuring the advertisements accordingly and what buyers are seeking will vary across locations (Bridge 2001; Levy & Lee 2011). This would explain the overall low level of energy efficient terminology in all areas. The third and final research question is now considered.
7.4 RQ3: Are real estate agents giving prominence to energy efficient characteristics when scripting house advertisements?

Lack of buyer interest, legal constraints and, to some extent, lack of knowledge, limit the degree to which agents include energy efficient characteristics in advertising.

7.4.1 Agents’ limited knowledge impacting language choice

The role of the estate agent is to market the subject property in a manner that best emphasises the qualities of the house, so to attain the best possible outcome for their client (Bridge 2001). Of course, in doing so they themselves benefit financially through receiving sales commissions. One strategy for successful outcomes is that agents must contextualise and emphasise how house characteristics benefit the buyer in order to achieve a positive outcome (Pryce & Oates 2008; Robertson & Doig 2010). To achieve this, agents must understand buyer aspirations. Agent interviews revealed they are not perceiving buyer demand for energy efficient technologies. To maximise service benefits to the client, persons working in knowledge-based service industries develop expertise to inform their clients of market expectations and nuances (Pina & Tether 2016). Therefore, with reference to house energy efficient technologies, agents should understand the theoretical and practical implications of these technologies to confidently make claims about their potential benefits. Here, the data shows this understanding seems to be lacking. This is interpreted to be one reason behind the choice of terminology used by agents in advertisements regarding energy efficient technologies. In other words, lack of knowledge concerning particulars of energy efficient technologies is likely to cause agents to be conservative and refrain from making claims that potentially exceed the capability of the technology in question. Such behaviour is expected, as agents typically value their reputation as a means for further business (Brinkmann 2009; Le & Supphellen 2017). Agents are conscious of their reputations and failure to act within legal and ethical expectations has potential legal ramifications (CAV 2018). Consequently, with regard to claims concerning energy efficient technologies, it is believed agents are more likely to make decisions that avoid embellishment but, in doing so, may adversely affect the seller (Lee & Thompson 2011).

REIV, the peak industry body, does not offer formal training concerning house energy efficient technologies (REIV 2018a). Therefore, learning about these technologies must be personally motivated and this motivation would derive from either professional need or personal interest. Agents stated they typically gained knowledge about energy efficient technologies through client interaction. In some cases, this led to developing a personal interest resulting in further
research. Moreover though, agents, even those who said they had some form of interest in environmental issues, acted pragmatically towards gaining understanding of energy efficient technologies. Again, such pragmatic behaviour is common in commission-based industries (Tajudeen 2011; Mossaz & Coghlan 2017). This behaviour was evident in interviews where agents highlighted their job was to sell houses, and therefore, their focus is on the house attributes and characteristics that best achieved this.

While potentially well remunerated, it is incongruous to argue agents are singularly motivated by monetary reward as flexibility, autonomy and personal relationships with clients is also highly valued by agents (Wharton 1996). They do however work within a very competitive industry. This necessitates a focus toward activities that produce maximum benefit for themselves, the company, and their client (usually the seller). Thus, their perceptions of ‘what works’ is likely to arise from these commercial pressures, thereby conditioning, perhaps even preconditioning, agent attitudes and responses to emergent innovations, including house energy efficient technologies. This perspective came out very strongly from the agent interviews.

When advertising a house with energy efficient technologies, such a pragmatic approach to potentially complex and integrated technologies is unlikely to cause the agent to embellish the technologies. Rather, itemising them is more likely, as the agent could be held accountable for the claims made and unfulfilled. Agent interviews confirmed this approach. It is believed this accounts for the imbalance between latent and manifest keywords found in advertisements. As previously noted, all agents interviewed stated they include energy efficient technologies in advertisements when they exist. A common reason for this was to please the seller, rather than a belief these technologies will enhance sale prospects; a behaviour that can be explained by Principal-Agent theory (Rutherford, Springer & Yavas 2005; Lee & Thompson 2011).

### 7.4.2 The energy efficient message is being lost

Primacy-recency theory posits that information provided early, or in the later part of a message, is more likely to be retained by the receiver (Petronko & Perin 1970; Jansen, Liu & Simon 2013). The examination of keyword location within advertisements was therefore considered important. Histograms presented in Chapter 6 revealed that manifest keywords were negatively skewed, meaning they were located towards the latter half of the advertisement and generally well before the end. Latent keywords, referred to here as hyperbole, on the other hand exhibited
a bi-modal distribution. Such a distribution is more desirable when considering this theory. However, it is the lack of frequency of appearances is the concern here.

In interviews, agents did not express a deliberate intent to highlight energy efficient technologies; only to include them. This is perhaps a result of agent training. The AIDA principle, introduced to agents in their entry level training course, encourages agents to script advertisements with words that capture the reader’s attention (Cramphorn 2006). When using Content analysis techniques, words that infer a characteristic or feature of the item studied without explicitly stating it, are known as ‘Latent’ words. As the latent keyword dictionary created for this research is a compilation of environmental and energy efficient emotive language (such ‘eco-friendly’ and ‘environmentally-friendly’), it would seem agents are performing as trained. In other words, when considered appropriate, agents are often locating hyperbole in places within the advertisement that could be considered somewhat effective. The low frequency of appearances means their use by agents is limited, perhaps for reasons discussed in section 7.4.3 of this chapter.

Manifest (tangible) keywords are consistently appearing towards the mid to latter part of the advertisement. This means the technology language included within the message, is likely to be forgotten, and lost within the overall message of the advertisement. Together with lack of buyer interest, lack of knowledge about energy efficient technologies is also offered as a reason for not incentivising agents to give prominence to these technologies. The lack of buyer interest in, and agent lack of knowledge about, energy efficient technologies is considered the reason for this observation. Agents will tend to give prominence to more desirable features. Other potential reasons for not giving prominence to energy efficient technologies in advertisements are the legal and regulatory frameworks.

7.4.3 The impact of industry laws and regulations when advertising energy efficient technologies

Latent keywords are words and phrases that imply benefits from adopting energy efficient technologies. For example, phrases like ‘eco-friendly house’ were included in this keyword dictionary. Manifest keywords are words that explicitly identify the technology; for example, double-glazed windows.

Due to the imprecise, often emotive nature of latent words, they can be considered as a form of hyperbole. They are interpreted as an attempt by the agent to highlight the benefits of energy
efficient technological enhancements. Such practices, while normal in real estate and other product and services advertising (Bruthiaux 2000; Collins & Kearns 2008), were not observed to any significant extent in this research. Manifest keywords appeared approximately 22 times more than latent keywords. This missing embellishment means agents are not selling the benefits associated with energy efficient technologies when advertising the property for sale. As a consequence, the positive message associated with these technologies is not being reinforced to buyers. In part, this could explain why buyers often are not considering energy efficient technologies nor are they willing to pay for these technologies in their house search, as stated in agent interviews. Previous research has observed this phenomenon (Berrens et al. 2003; Brounen & Kok 2011; Bruegge, Carrió-Flores & Pope 2016). Juxtaposed to this view, some research has found a positive correlation between energy efficient housing and a willingness of buyers to pay for such housing, particularly where buyers have positive attitudes to the environment (Mandell & Wilhelmsson 2011; Prete 2017). In these international cases, however, disclosure of house energy performance to buyers prior to sale was mandated. Such disclosure is not the case in the frame of this research. These conflicting outcomes suggest public policy requiring disclosure of a house’s energy efficient capabilities prior to sale would assist in increasing awareness. Such a policy would inherently require agents to disclose the energy performance, and in doing so would likely become a point of conversation during the sales process, thus raising awareness. A possible cause for agents not giving prominence to energy efficient technologies when advertising is the strict regulatory environment in which they work.

Real estate agents in Victoria work within regulatory framework that prescribes and precludes certain practices, based on legislated advertising standards. For example, the Estate Agents Act 1980 (Vic) is explicit in regulating agent behaviour and incorporates references to Prescribed Regulations that further elaborate specific elements of behaviours when dealing with the public. Within in this legislation is a requirement that agents be able to substantiate claims made within advertisements. This is illustrated in the following extract from section 42(4) of the Estate Agents Act 1980 (Vic):

Any estate agent who publishes or permits or authorises to be published as part of any advertisement any false or misleading statement or representation concerning any property or business which is or is stated or represented to be for sale shall be guilty of an offence. (Estate Agents Act 1980 (Vic) Sec 42(4))
Alongside this legislation is more generalised commercial legislation regulating advertising practices. The *Australian Competition and Consumer Act 2010* s30 makes specific reference to representations made when selling land, which includes improvements to land such as houses. As hyperbole is intended to enhance perceptions of goods or services being advertised (Pryce & Oates 2008; Arndt et al. 2013; Torto 2015), agents may use such language cautiously. Agent interviews established that agents have limited knowledge of energy efficient technologies and are not receiving formal training. Therefore, without this underpinning knowledge of how these technologies work, it is probable agents will refrain from embellishing energy efficient technology performance for fear of legal claims. It is understandably an unnecessary risk on their behalf, and an explanation for the low number of appearances of latent keywords in house advertisements.

### 7.4.4 Summary and final deliberations for Research Question 3

Research Question 3 aimed to understand if agents were giving prominence to energy efficient technologies, and agent interviews were useful in addressing this question. This research has shown that for advertisements that did mention energy efficient technologies, emphasis on the technologies was not given.

Real estate agents sell property on a fee for success basis. This inherently means business efforts will focus on outcomes. Agents are perceptive and respond to market changes and directions in an effort to ensure ongoing business success (Bridge 2001). Therefore, agents are continually interpreting market signals against the property being sold and aligning the house characteristics to the appetite of the market. Low buyer interest in energy efficient technologies, prevailing consumer laws, and limited knowledge about these technologies, understandably seems to cause agents to restrict the prominence given to these technologies to matters of fact about their existence. Combined, these factors are seen to influence agent advertising behaviours.

### 7.5 Further application of the research

This thesis now considers further research arising out of the study. There are four recognised areas considered worthy of attention. The first is education and training.
This research highlighted the limited knowledge real estate agents have in regard to house energy efficient technologies. Such limited understanding is one element affecting industry engagement when advertising. Further research is necessary for better understanding about how government agencies can work more closely with the real estate industry to develop effective professional development programs that give agents greater confidence to further highlight benefits of house energy efficient technologies.

Second, this study focusses on greater Melbourne. At the time of writing, Victoria does not have mandatory house energy performance reporting requirements when selling. Globally, many countries do. For example, the European Commission has developed a suite of policies aimed at enhancing house energy performance, including reporting during the sales process (European Commission 2018, p. 1). This raises the opportunity to study these markets, with methodologies similar to those used here, to determine the extent of engagement by the local real estate industry practitioners with the aim of understanding the effectiveness of such disclosure in the sales process. Such findings could inform Australian governments about how to determine best practice reporting standards.

The third area is the real estate industry itself. During the course of this study the REIV, the industries state peak body, has both supported the study and expressed interest in its findings. The REIV expressed interest in exploring research opportunities that lead towards better outcomes for the environment, sellers and buyers, and agents themselves. This study has set the platform to undertake this work. Specifically, the REIV has expressed interest in developing training programs to enhance agent knowledge of house energy efficient technologies and their benefits, a gap in knowledge that was identified in this research. Moreover, the REIV is seeking to further enhance its public image and sees the findings of this research as a potential means of achieving this.

The fourth area is public policy. This research contributes to the debate of government influence in enhancing low carbon housing. It appears that in foreseeable future market force alone will be insufficient to change structural elements of traditional house markets. Therefore, research is required to further investigate the most efficient government strategies for encouraging effective and positive policy that accelerates such change. These strategies could include, for example, mandated house energy performance disclosure through advertising and certificates. Such research is occurring (for example, see: Bryant & Eves 2012; Clune, Morrissey & Moore 2012; Fuerst et al. 2015), and this research highlights the need for it to continue.
7.6 Final deliberations

Efforts to avoid further environmental damage are required by all sectors of society and industry, and in many cases such efforts are less effective when undertaken in isolation. The real estate industry is a significant employer with operatives being given privileged and unique opportunity to work literally where people live. In doing so residential agents therefore have the potential to influence members of the public as they facilitate the buying and selling of houses (Tran 2012). This research suggests they have significant potential to influence market acceptance of consideration of energy efficient technologies in the house search.

This research has shown there is limited, but nonetheless some, engagement by agents when selling houses that possess energy efficient technologies. Efforts to solicit the support of the real estate industry ought to be made by government and appropriate authorities to open a dialogue and commence to develop strategies to achieve this.

The commission-based remuneration structure will continue to cause agents to remain focussed upon business needs and sales volume. This is both a barrier and facilitator towards creating greater market interest in energy efficient technologies. It is a barrier in that agents will emphasise those house characteristics most likely to attract suitable buyers, and in the current framework this is indeed appropriate. However, by creating greater awareness through industry and public education, house buyers and agents alike are more likely to factor important energy performance information into the search process and post-occupancy behaviours. In the case of international house owners and buyers, this has already been shown to be effective when attempting to diffuse energy efficient attitudes into household considerations (Geller 2005; Nair, Gustavsson & Mahapatra 2010; Bhati, Hansen & Chan 2017). Therefore, this same commission-based remuneration structure can become a facilitator as buyer interest in energy efficient technologies reaches a critical mass. Working closely with industry peak bodies, such as the REIV, will potentially enhance this process.

7.7 The circle of blame

The findings of this research suggest that agents are adopting a somewhat laissez-faire approach when marketing houses with energy efficient technologies. In other words, they are approaching the issue in an unstructured manner that generally ignores the benefits of energy
efficient housing and are driven by the traditional imperatives of ‘what works’ to sell the house in the shortest time possible. A useful way to demonstrate how this behaviour appears to be influenced by housing market is through adapting Cadman’s (2000) vicious circle of blame, shown in Figure 7.1. Literature, discussed in Chapters 2, 5 and 6, has been drawn upon and reflected in this study to further triangulate the analysis. Essentially, the housing market is requiring a stimulus to induce agent engagement when advertising houses for sale that include energy efficient technologies. Governments internationally have provided this stimulus by way of energy performance certificates, and/or subsidies to install the required technologies. Neither the Australian federal government nor Victorian state government has thus far introduced mandatory house energy efficient reporting for disclosure during sale or leasing. Instead they have relied on subsidies for solar technology installation (Dept. of Environment and Energy 2018), and more recently Victoria introduced a voluntary residential efficiency scorecard scheme which can be reported at the time of sale (DELWP 2018). Evidenced by agent interviews, markets are not responding in a way that suggests a developing appetite for energy efficient housing. Therefore, this research makes a case for further intervention by Australian federal and state governments to disrupt the market and drive towards this desired change.

Figure 7.1: Circle of blame (Adapted from Cadman 2000)
In conclusion, this study aimed to investigate a field of knowledge that has been significantly researched; that is, the infusion of house energy efficiency into housing markets. However, this research was undertaken from a unique and original perspective; that of the real estate agent. In doing so, what has been revealed is an innate interest of agents to understand these technologies and the role they play in environmental issues. The industry can make a significant contribution in developing positive attitudes, and the diffusion and growth of energy efficient housing, into the minds of households. Climate change affects everyone, and all sectors of the community must engage for positive change.

7.8 Implications for further research

This research highlights limited engagement of agents with energy efficient technologies when advertising houses for sale. Further the research found that agents have limited knowledge of such technologies and they are accordingly reluctant to promote such technologies in a regulatory framework that holds them accountable for claims made. It is important that market facilitators, who are able to influence sellers and buyers during the search and sale process through advertising the benefits of energy efficient technologies, are enabled to address house energy efficiency questions and provide information to enable buyers to better understand the benefits of such technologies and design elements. Therefore, this presents an ideal opportunity for further research. Work is needed to investigate approaches and frameworks that skill and enable real estate agents to discuss energy efficient technologies in the house being considered. This obviously will need to be done in the context of existing consumer law. In addition, applying the principles of this research into house markets that already use mandatory energy performance certificates at point of sale, such as the UK, may produce interesting results on how to best promote such housing.

In addition to the above, this research has not addressed the agent’s role in other advertising media, such as billboards, print media, the role of pictures, and internet use, in search criteria. Different media may be processed by buyers differently. Such areas provide opportunity for exploring buyer responses when considering house energy efficient characteristics. This too provides considerable scope for further research. It is the view of the researcher that a thorough qualitative approach to understand agent antecedents the creation such advertisements could inform future professional training programs to enhance agent capabilities in this regard.
Therefore, alongside this work lies the opportunity to reinvigorate the call for mandatory house energy performance disclosure during the sale and leasing process, and through further research to validate, or otherwise, its effectiveness. Such an approach lies within the domain of public policy. The research highlights the need for greater commitment by the Australian and state governments to more directly influence established housing markets. Energy performance disclosure is one option and, in the view of the researcher, a viable one.

As stated previously, the Australian government appears to favour neo-classical economic theory as the market driver for energy efficient technologies (Ben-David 2012), one of the key assumptions of which is rational behaviour. Here the perception of efficacy or usefulness to the consumer is a hallmark of this theory particularly as it applies to the forces of supply and demand. However, housing choices are well recognised as often being partly or largely irrational, at least in economic terms (Christie, Smith & Munro 2008).

One of the challenges of extensive research projects such as this one is the potential for underlying change that may affect findings with old data claiming to interpret contemporary trends. This is not likely to be the case here. Urban environments and housing markets exhibit considerable inertia and therefore change slowly in character (Filion 2015). This presents opportunity for further research. Efforts to address climate change must be ongoing and therefore as demonstrated in this research, developing engagement by agents is an important. Research aimed at informing and influencing greater engagement by real estate agents could only be positive.

Finally, and importantly, the findings reveal a potential for inequality exists in opportunities for low income households to engage with energy efficient technologies that would financially benefit these households. In itself this finding is not new (Balta-Ozkan et al. 2013; Poortinga et al. 2018). However, it is hoped that providing further evidence will inspire additional research to address and resolve this increasingly important issue.
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Appendix 1

Glossary of Terms

The following is a glossary of terms used in this thesis and where noted, explanations have been sourced directly from the respective websites.

**ABCB** - Australian Building Codes Board. The ABCB is a Council of Australian Government standards writing body that is responsible for the development of the National Construction Code. The ABCB is a joint initiative of all three levels of government in Australia. (ABCB 2019)

**ABS** - Australian Bureau of Statistics. The ABS is Australia’s national statistical agency, providing validated and official statistics on a range of economic, social, population and environmental matters. (ABS 2019)

**ACT** - Australian Capital Territory. A federal Australian territory located in southern portion of the Australian state of New South Wales.

**ASHRAE** - American Society of Heating, Refrigerating and Air-Conditioning Engineers. A global professional association. The aim is to provide standards and promote best practice in the provision quality conditioned air throughout the built environment.

**BCA** - Building Codes Australia. These are a uniform set of technical provisions for the design and construction of buildings and other structures throughout Australia. (ABCB 2019)

**BOM** - Australia’s Bureau of Meteorology. The Bureau of Meteorology is Australia's national weather, climate and water agency. BOM provides weather forecasts, warnings, monitoring and advice spanning the Australian region and Antarctic territory. (BOM 2019)

**CAV** - Consumer Affairs Victoria. CAV is a government authority responsible for the protection consumers in a range of business dealings. They oversea ethical business practices and administer a range of legislation including the Estate Agents Act 1980. (CAV 2019)

**CFL** - Compact Fluorescent Lamp. A domestically available low energy lighting technology.

**GHG** - Green House Gas. Is a term that describes is any gas in the atmosphere which absorbs and re-emits heat. It is a collection of various naturally occurring gas. It is the excessive production of some of these gases, specifically carbon dioxide, that is causing environmental scientist concern.

**LED** - Light Emitting Diode. A form of low energy lighting which recently become commercially available for domestic lighting.

**NatHERS** - National House Energy Rating Scheme. A national house energy efficiency performance rating system that is scored out of 10 where 10 is the maximum possible energy efficiency performance. It assesses design and materials used within the dwelling. Very few houses in Australia achieve this level.
**PV**- Solar photovoltaic panel. A technology that converts light into electrical energy via semi-conducting materials. Domestically these are installed as solid panels. On sunny days each panel is typically designed to provide about 250 watts of electrical power.

**REIV**- Real Estate Institute of Victoria. The REIV is Victoria’s real estate agency industry peak body representing agents on matters policy and legislative interests. The REIV is also a major provider of training, both accredited and non-accredited.

**ZEH**- Zero Energy Housing. These are bespoke designed or retrofitted houses whose primary aim to have a zero net energy consumption. These houses generally consume energy from the grid but also generate energy locally (onsite) to return to the grid giving a net zero consumption rating.
Appendix 2

Publications emanating from this thesis

Journal

Book Chapter

Conferences


Hurst, N. and Reed, R. (January 2011) An Examination (Analysis) of Drivers behind Residential Auction Sales, Proceedings of 17th Pacific Rim Real Estate Society (PRRES) Conference Bond University, Surfers Paradise, Australia. (Refereed)