

THE INFLUENCE OF GOVERNMENT ENVIRONMENTAL POLICIES AND REGULATIONS ON ENERGY EFFICIENCY ADVERTISING OF RESIDENTIAL PROPERTIES

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ABSTRACT

Problem/purpose – Governments globally have been frustrated in developing strategies to imbue energy efficient housing into social acceptance. The Federal and State Governments of Australia have introduced a range of voluntary and mandatory energy efficiency policies to reduce the energy use of individual households. In a free market economy, real estate agents are expected to play an active role in motivating homebuyers in purchasing energy efficient housing through advertising. This research aims to examine whether real estate agents effectively responded to the introduction of new government environmental policies and regulations relating to energy efficiency when advertising detached houses in Melbourne.

Design/methodology/approach – The research examined all detached dwelling advertisements in regional Victoria during the period of 2008 – 2013 with over 40,000 advertisements reviewed. By using time series analyses, histograms, Spearman correlations and Kruskal-Wallis tests, the dataset was tested to produce evidence whether the appearance of words promoting energy efficient technologies in housing advertisements were influenced by the introduction of State and Federal government environmental policies relating to housing energy efficiency.

Findings – Even though there was evidence of temporal increases in the appearance of words and phrases promoting energy efficient features in housing advertisements when new government environmental policies were introduced, such increases were found to be minor. However, the appearance of such words and phrases increased significantly with the introduction of government environmental policies that were associated with financial benefits for homeowners. Overall, the results highlight that energy efficiency and housing sustainability features were still not considered to be a major factor by real estate agents when advertising residential properties. Therefore more direct action policy related to housing energy efficiency is required.

Originality/value – The research examined the effectiveness of the Australian government's strategy of using market forces to create demand for energy efficiency housing. It aimed to acquire a thorough understanding of the extent that the real estate agents promote housing energy efficiency to buyers and how responsive they are to government environmental policies and strategies relating to energy efficiency in the residential sector.

Research limitations/implications – The research highlights the importance of effective engagement of real estate agents in empowering homebuyer interest in residential energy efficiency and promoting energy and sustainability issues through advertising. It also emphasises the necessity of reviewing the current legislative mechanisms in order to align the intent of the legislation with the actual outcomes.

Keywords: Energy efficiency, Advertising, Real estate agents, Housing, Government policies

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INTRODUCTION

Anthropological activity and its effects upon the environment has become one of the greatest challenges facing humanity. The discourse relating to the environment and how we can change behaviours and perceptions for the benefit of future generations is at the centre of numerous research and political activities. Traditional neo-liberalisation of economic structures and markets rely heavily upon the economic maxims of supply and demand (Simon (1957). However how markets respond to innovations will often depend upon the perceived benefits by the consumer to their individual circumstances. Without the perception of a strong connection between innovative technology and derived benefits markets are left to adopt such technologies at their own pace, which can be slow. One means of overcoming market inertia is government intervention (Pellegrini-Masini et al., 2010).

When entering the narrative of the climate change due to negative human activities it is necessary to acknowledge amongst the layers of research, policy and vested interests of people. It is these people who make choices about the house they live in and the factors they consider in making those choices. To this end governmental policies can have a significant impact upon market acceptance of technological innovations, in this case innovations aimed at enhancing lifestyles by avoiding irreversible climate change (Hurst, 2012).

Housing markets are unique in that they are largely driven by emotional choice and do not conveniently follow the economic model of the 'rational' person and therefore represent interesting and significant challenges when considering technology innovation adoption (Christie et al., 2008). Traditional housing choices typically centre on location and required housing attributes. Given these necessities, house buyers have not thus far responded earnestly to the call from researchers and governments to include energy efficient and sustainable house characteristics in their decision process. However early signs of the impact of energy efficient technologies upon prices are being reported albeit in low numbers (Macintosh and Wilkinson, 2010).

The Australian government, like many international governments, have made various attempts to introduce policy to encourage the uptake of energy efficient technologies into housing choice, by in large these have not succeeded and as such current Australian political belief is that markets will 'naturally' adopt such technologies due to their intrinsic benefits (Macintosh and Wilkinson, 2010). Whilst this is probable it raises the question 'Can we integrate energy efficient technologies and behaviours into enough of the housing stock in time to abate further environmental damage?'

This research reviews how market facilitators, that are real estate agents, are promoting energy efficient technologies and whether there is any apparent relationship to government policy shifts. If such relationships are observed it would infer that greater and more direct action by governments is necessary than currently exists. This paper is structured as follows: a review of the extant literature concerning government policies relating to environmental imperatives and real estate agency marketing, the adopted methodology together

with the rationale for such an approach, results and discussion followed by the customary conclusion and recommendations.

LITERATURE REVIEW

Key global policies affecting environmental sustainability

The discourse surrounding climate change due to human activities has become one of the most widely debated issues in global politics today. Resulting disparate policies have emerged to deal with issues of sustainability generally founded upon the pillars of environmental, social and economic. The significant effort seen from the international community towards achieving sustainability can be attributed to the publication of the Brundtland report in 1987 (Hurst, 2012).

The need to urgent action gained prominence in 1987 after the publication of the Brundtland report that was titled “our common future”, which was a report on the deliberations of the World Commission on Environment and Development (WCED, 1987). The mandate given to the commission was threefold; to critically examine the environment and development issues, to suggest new forms of international co-operation on environmental issues, and finally, to create awareness and increase the level of commitment to action by individuals, organisations and governments (WCED, 1987). The report recognised that governments could aid in the achievement of environmental sustainability goals through unique customised policies. With reference to energy specifically, the commission recommended that governments develop policies targeted at energy efficiency as a national strategy. The main reason for this is that governments should play a leading role in the production and usage of energy, and via policy drive efficiency in practise.

Since 1987 countries globally have implemented numerous policies of varied forms with varying degrees of success. More recently The United Nations Conference of Sustainable Development held in Brazil in 2012 saw a shift from the adoption of certain environmental sustainability initiatives to practical measures for implementing sustainable developments in the world (UN, 2012). The conference resulted in several resolutions by member states including, to ensure access to affordable, reliable, sustainable and modern energy for all (UN 2012). To this end, specific targets were set at the conference to be achieved by the year 2030 and the conference was named as the future we want, Rio+20. Essentially these targets can be distilled into a greater focus on future technologies and more rapid uptake of sustainable behaviours globally. It is the pace of change, or more particularly the lack of it, that is concerning the UN. The Australian context is now considered.

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

In response to the Bruntland report Australia has implemented, amended and repealed numerous policies intended to achieve agreed environmental targets. The effectiveness and ability of these policies to achieve

the stated is often intensely debated by the various political parties, generally guided by the party's creed (Brenner et al 2010). When considering new houses and those with substantial renovations beyond the pre-existing roofline, the Australian government has implemented several policies to achieve environmental sustainability. For example, policies in the form of minimum energy performance regulations such as the National House Energy Rating Scheme (NatHERS) have been enshrined in the national building codes of Australia to ensure certain baseline standards (Clune, 2012). Besides the regulatory requirements, the Australian government has also initiated and implemented several funding policies to boost the uptake and diffusion of sustainable technologies in the housing sector such as the solar rebates such as Solar Homes and Communities Program (SHCP).

The neoliberal doctrine of successive Australian governments has led to environmental policies typically having significant regard for the local economy. This however is often at the expense of potentially more robust policies (Peck et al 2009, Brenner et al 2010). Studies on the relationship between energy performance/efficiency and residential property values in housing markets are not widely known and is still not well researched (Fuerst & McAllister 2011). Further how housing markets respond to energy policies aimed at reducing energy consumption is also not well understood (Hurst and Halvitigala, 2016).

In order to understand the relationship between energy efficiency and market responses it is necessary to momentarily return to international perspectives. Laquatra et al. (2002) found that, empirical studies in the US provided evidence to support the argument that energy efficiency improvements in housing are capitalised into the values of properties to some degree albeit weaknesses in the reviewed studies making it impossible to draw reliable conclusions about the magnitude of that capitalization in typical property market environments. Banfi et al. (2008) also found a willingness of consumers to pay for environmental sustainability features in Swiss residential dwellings. In the Netherlands, Brounen and Kok (2011) found that, apart from the other usual factors of size and location and other factors in a hedonic model, a price premium of up to 15% of selling price was derived for energy-efficient homes. In the UK, Fuerst et al. (2013) found a positive relationship between energy rating and dwelling price (log price per square metre). Unfortunately Australia does not generally utilise energy certificates and therefore such studies cannot be replicated here.

Studies on relationship between energy performance and sale prices of houses within the Australian context have also been scarce. In the Australian context, Berry, Marker and Chevalier (2008) found a statistically significant relationship between energy efficiency rating and house price in the ACT region of Australia even though evidence of a non-linear effect with the marginal price effect declining as rating increases was detected. Wong et al. (2016) also found that houses with sustainability features sold for a median price of at least 10% higher than the median house price of properties without sustainability features in Townsville Queensland.

Incorporation of sustainable techniques into housing advertisements by real estate agents

The influence real estate agents have upon markets via marketing is well documented (Bridge 2001, Perkins et al 2008, Brinkman 2009). Aune (2012) argued that the estate agency sector can be relevant in making energy performance a visible part of dwellings through advertisements. Green Gurus (2011) further suggested that real estate agents are also the missing link in the optimisation of the flow of information on energy and water efficient homes, hence their decision to use the information to advertise properties can be important in the sale of properties.

In the sale process of residential properties real estate agents consider some factors to be more important drivers of sales for houses as compared to others. Since listing prices and house characteristics are the primary, essential information that buyers consider during a first preliminary inspection, real estate advertisements can be considered as the first step of a house transaction (Robertson & Doig 2010; Semeraro & Fregonara 2013). Therefore, it is interesting to examine whether real estate agents incorporate sustainability techniques in their adverts in the Australian context.

Since environmental sustainable techniques are believed to enhance the value of properties, it is important to understand whether real estate agents advertise properties for sale using any of the sustainable technologies by mentioning such technologies in the advertising material. Mandatory energy standards, affecting new houses, do not impact existing houses, which form a larger proportion of the Australian housing stock. In such situations the various state governments have opted for voluntary schemes to improve the energy efficiency and sustainability of older housing stock, such as the home insulation scheme and solar hot water schemes in Australian government (DEWHA 2009). This is the case in the Australian state of Victoria, where this research is located. Although previously mandated energy performance disclosure was introduced in Queensland it has since been withdrawn the state government preferring market driven approach (Bryant & Eves 2012).

Studies on environmental sustainability advertisements as part of real estate sales processes are limited. Aune (2012) conducted a review of real estate advertisements published over a period in Sweden, Norway and UK and found that 79% of the UK and 39% of the Swedish advertisements raised energy-related issues, but was missing in the Norwegian advertisements. The author claimed that an explicit emphasis on environment or sustainability issues, energy saving or low energy performance was extremely rare in the review. It was then argued by the author that, the fact that 14% of the British advertisements were followed by a description of energy standard and number indicating the possibility for improvement suggests the front end of a trend of giving energy conservation and environmental issues a greater emphasis in real estate sales advertisements. Green Gurus (2011) conducted a study in Perth, Western Australia, and their findings suggested that real estate agents incorporate and highlight the benefits of sustainability concepts in their marketing material to promote the green credentials of properties they are selling.

Concluding comments

Government policy is aimed to regulate, influence and guide social norms and behaviours. The ‘waves’ of environmental policies impacting upon housing markets as a result of successive Australian governments may have led to market confusion or even indifferences to sustainability potentially resulting in negative attitudes. How markets have responded to policy introduction, changes and repealed regulation is the subject of this research.

RESEARCH METHODOLOGY

The aim of this research is to examine if there was a relationship between the introduction of government policies related to energy efficiency in the existing housing stock and how real estate agents promoted energy efficient technologies in housing advertisements. Data used in this study are all real estate agent advertisements that were used to promote detached residential properties in regional Victoria between July 2008 and June 2013 that were provided by the Real Estate Institute of Victoria (REIV). Since the objective of the research was to examine the relationships between variables statistically, quantitative approach was employed as the most appropriate research methodology. The dataset was divided into four groups based on when different energy efficiency related policies were introduced or modified. The periods were: 2nd quarter 2008 – 1st quarter 2009: Solar Hot Water Rebate introduced (Policy period 1); 2nd quarter 2009 – 1st quarter 2010: Energy efficient homes package and solar hot water rebate introduced (Policy period 2); 2nd quarter 2010 – 2nd quarter 2012: Renewable energy bonus system introduced (Policy period 3); and after the 3rd quarter of 2012 where no specific concessions were offered (Policy period 4). The dataset used in this study consisted of 40,952 advertisements with 4,204 from policy period 1, 9,584 from policy period 2, 18,553 from policy period 3 and 8,610 from policy period 4. This information was then constructed to form the required dataset for evaluation.

The advertisements were audited to examine the energy efficient characteristics stated in each advertisement. The most widely available and effective financial incentive available is the government’s policies related to solar hot water rebate. Therefore the energy efficient building technologies considered in this research are those relating to solar and hot water energy efficiency technologies. Energy efficiency related words and phrases within advertisements were first grouped into primary categories that identified the “nature” of the lexis used in order to further understand if the appearance of those words were affected by the introduction and modification of government policies related to solar hot water rebates. Table 1 illustrates the energy efficiency related words and phrases examined and their primary categories.

Table 1: Energy efficiency variables examined in advertisements and their descriptors

Variable	Word descriptors (words that SPSS (version 24) looked for within the advertisement)
Solar boosted	Solar boosted, Solar enhanced
Solar electricity	Solar electricity, Solar electric
Solar system	Solar system

Solar energy	Solar energy, Solar-energy
Solar HWS	Solar HWS, Solar hot water, Solar heated, Hot water
Solar power	Solar power, Solar-power
Solar panel	Solar panel

(Source: Authors)

The dataset were then explored and tested to find insights on how real estate agents promote solar hot water energy efficient characteristics in their advertisements and, more particularly, to produce evidence whether the words and phrases promoting such characteristics were influenced by the introduction and modification of government energy efficient policies. The appearances of solar hot water related words and phrases in the advertisements were first examined in relation to different policy periods by using percentages, time series and histograms. Kruskal-Wallis test, a rank-based nonparametric test (Pallant, 2004), was then calculated to examine if there was a significant difference between the appearance of solar hot water energy efficient words in different policy periods which brought different financial benefits to home owners. Lastly, the Spearman correlation coefficients, which measure the strength and direction of association between two ranked variables (Pallant, 2004), were calculated to examine if the nature of the above identified features advertised by real estate agents was correlated with the policy periods where different government policies relating to solar hot water rebates were introduced.

RESULTS AND DISCUSSION

Water heating accounts for about 21% of energy use on average in Australian residential homes and it is responsible for about 23% of greenhouse gas emissions (Department of Climate Change and Energy Efficiency, 2010). Due to their significance in environmental sustainability, the Australian government has introduced several policies related to solar hot water systems in existing dwellings at federal and state government levels that offer financial incentives to home owners. The most widely available and effective solar hot water rebate policies introduced are as follows.

July 2007, Solar Hot Water Rebate – AUD 1000 rebate system for the installation of solar and heat pump hot water systems in existing homes. The dwelling must be a principal place of residence and the applicant's taxable family income must have been less than AUD 100,000.

February 2009, Energy Efficient Homes Package – the previous system was modified with this new policy with no income limitation and with the rebate increased to AUD 1600.

February 2010, Renewable energy bonus scheme – The Solar Hot Water component was superseded by the Renewable Energy Bonus Scheme. This helped eligible home-owners, landlords or tenants to replace electric storage hot water systems with solar or heat pump hot water systems. Eligible households could claim a rebate of \$1000 for a solar hot water system or \$600 for a heat pump hot water system.

July 2012 – The concessions offered terminated

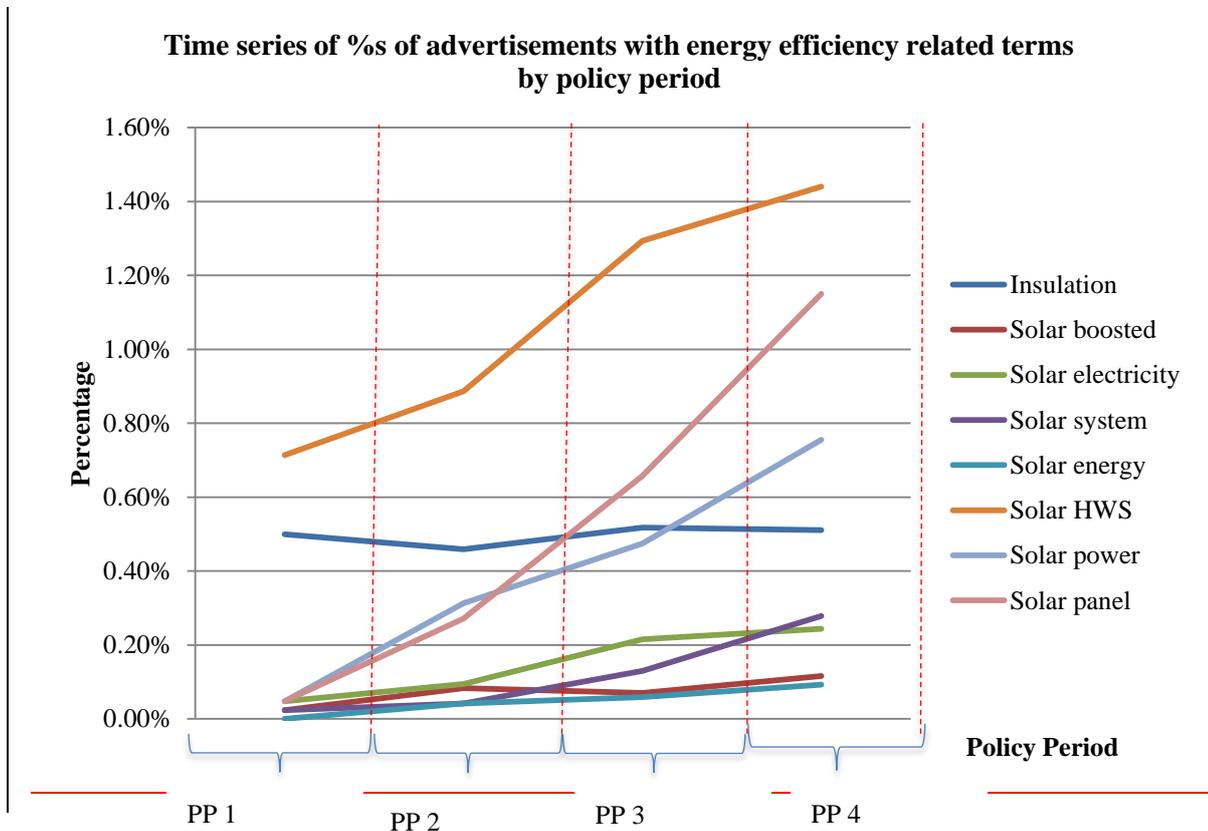
The extant literature suggests that better energy performance in housing positively affects their values and hence selling prices. Therefore it is expected that the way real estate agents script the energy efficiency features in housing is influenced by the introduction and modification of government policies related to solar hot water rebates. The research focus was first placed on examining how the appearance of energy efficiency related words and phrases in the advertisements for dwellings for sale varied with the introduction and shifts of the above energy related policies in existing housing. Results are illustrated in Table 2 and Figure 1.

Table 2: Percentages of advertisements with energy efficiency related terms by policy period

	Policy period			
	Policy period 1 (2 nd quarter 2008 – 1 st quarter 2009)	Policy period 2 (2 nd quarter 2009 – 1 st quarter 2010)	Policy period 3 (2 nd quarter 2010 – 2 nd quarter 2012)	Policy period 4 (3 rd quarter 2012 – 2 nd quarter 2013)
Insulation	0.5%	0.46%	0.52%	0.51%
Solar boosted	0.02%	0.08%	0.07%	0.12%
Solar electricity	0.05%	0.09%	0.22%	0.24%
Solar system	0.02%	0.04%	0.13%	0.28%
Solar energy	0.00%	0.04%	0.06%	0.09%
Solar HWS	0.71%	0.89%	1.29%	1.44%
Solar power	0.05%	0.31%	0.47%	0.75%
Solar panel	0.05%	0.27%	0.66%	1.15%

(Source: Authors)

Figure 1: Time series of %s of advertisements with energy efficiency related terms by policy period

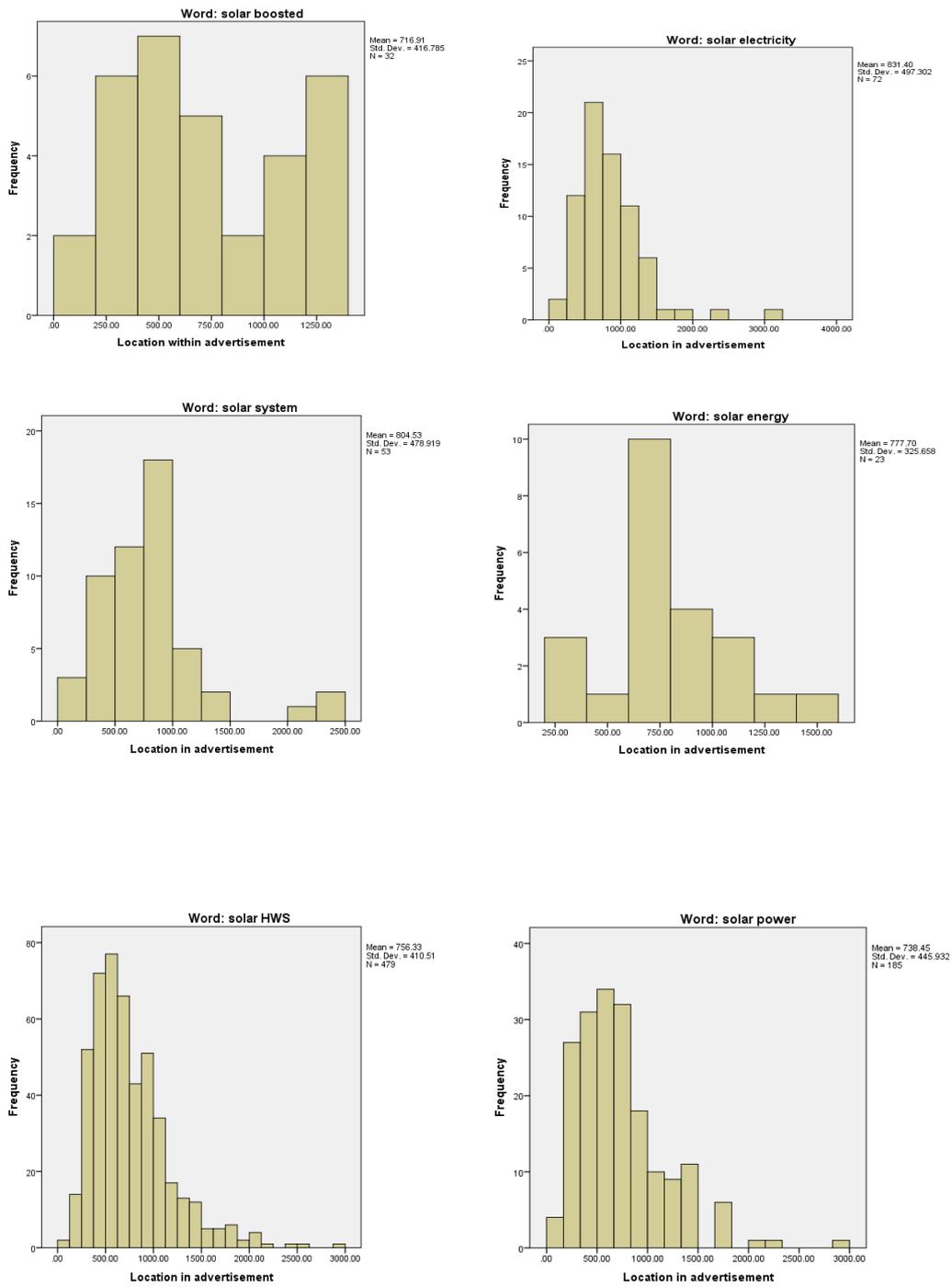


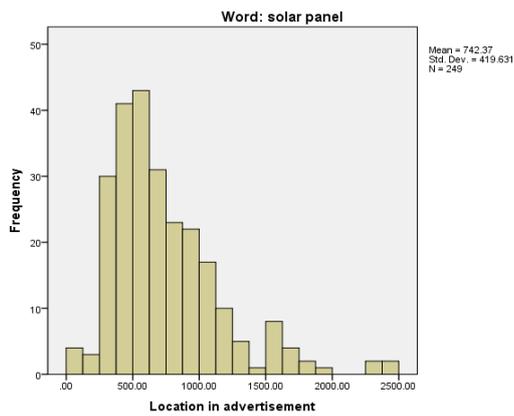
(Source: Authors)

Despite the increasing legislative frameworks encouraging energy efficiency in housing, findings suggest that solar hot water technologies were not considered to be a major factor by real estate agents when advertising detached dwellings. As shown in Table 2, less than 1% of the advertisements have mentioned most of the energy efficient and housing sustainability features examined in the study. The study finds that agents tend to follow standard wording when describing such features and put more emphasis of typical housing characteristics such as number of bedrooms in their advertisements. However, as shown in Table 1 and Figure 1, the appearance of solar and hot water related energy efficient characteristics in real estate advertisements show some noticeable increases with the introduction or modification of government policies related to solar and hot water systems in dwellings. The main energy efficient features that show significant increases were solar panel, solar system and solar HWS. These increases exhibit a consistent upward trend. It is during the Policy Period 2 that a notable escalation in appearances of solar words is observed. This policy period saw significant public debate about the need for carbon emission reduction with the then Prime Minister Kevin Rudd highlighting the urgency of climate change (IEA, 2016). It is not possible, without further modelling, which is beyond the scope of this article, to discern if the increase is due to proposed policies by the Rudd government or heightened media exposure. In either case it is apparent that in terms of solar technologies markets appear to respond positively to external influences, albeit with considerable inertia.

In the next step of the analysis, the specific location of the above identified energy related keywords within the text string was examined by using histograms in Figure 2 to illuminate the importance given by real estate agents to those characteristics within the advertisement. As shown in the histograms shown in Figure 2 below, the energy related terms solar power, solar HWS and solar panel started to appear in most of the advertisements within the first 700 characters where characters represented letters, space between words and any punctuation marks in the wording of advertisements. It can be noted that the average number of characters in an advertisement is about 2000 characters. This suggests that real estate agents tend to include these energy efficiency characteristics in the first half of the advertisement which discusses the persuasive primary features of the house. Therefore it is clear that real estate agents perceive a benefit in promoting house energy efficient technologies and promote them in a manner that best aligns to the desires of the market.

Figure 2: Histograms showing the position of the energy related words in advertisements





(Source: Authors)

As discussed above, different solar hot water related government policies were designed to make the installation of solar hot water system more affordable to the average property and varied in the financial incentives and their effectiveness. In the next step of data analysis, the data were explored and tested using Kruskal-Wallis test to produce evidence whether there were significant differences in the appearance of solar hot water technologies in advertisements produced in different policy periods.

Table 3: Kruskal – Wallis test results for the policy period and the appearance of energy efficient characteristics in advertisements

Variable	Chi-Square	df	Sig.
Insulation	0.456	3	0.928
Solar boosted	3.374	3	0.338
Solar electricity	11.552	3	0.009**
Solar system	24.185	3	0.000**
Solar energy	4.822	3	0.185
Solar HWS	22.116	3	0.000**
Solar power	37.186	3	0.000**
Solar panel	82.413	3	0.000**

(Source: Authors)

As shown in Table 3, statistically significant differences exist between the appearance of energy efficient technologies, solar electricity ($H = 11.552, p < 0.01$), solar system ($H = 24.185, p < 0.01$), solar HWS ($H = 22.116, p < 0.01$), solar power ($H = 37.186, p < 0.01$) and solar panel ($H = 82.413, p < 0.01$) in the advertisements produced in different policy periods examined in this research. However, low chi-square values suggest that the variable policy period had a low influence on the appearance of words related to solar hot water technologies in advertisements. The first and second policy periods examined provided policies aimed to encourage the uptake of solar and other energy efficient technologies whilst the third period somewhat less so and the fourth period no concessions at all. These periods represent a tumultuous period in

Australia's political history. That the Chi-square indicates low influence on the appearance of solar words is perhaps a reflection of the inertia that exists within housing markets. This would infer that more direct action from governments is required if housing markets are to imbue energy efficient technologies, in this case solar, into everyday advertising parlance, which is necessary for it to be market driven.

In order to further examine if the nature of solar hot water technologies advertised by real estate agents were influenced by the introduction and modification of government policies related to solar hot water rebates, the Spearman correlation coefficients between the policy period and the appearance of various solar hot water technology terms in advertisements were calculated next. The results are shown in Table 4.

Table 4: Correlation between the policy period and the appearance of energy efficient words in advertisements

Variable	Spearman correlation coefficient
Insulation	0.002
Solar boosted	0.007
Solar electricity	0.016**
Solar system	0.024**
Solar energy	0.010*
Solar HWS	0.022**
Solar power	0.029**
Solar panel	0.045**

** Correlation is significant at 1% level (2- tailed); * Correlation is significant at 5% level (2- tailed)

(Source: Authors)

The findings suggest that there are significant differences in the manner the majority of the solar hot water technologies advertised by real estate agents in different policy periods examined. Even though the correlations are not strong, the correlation coefficients suggest that the appearance of energy efficient terms 'solar electricity', 'solar system', 'solar HWS', 'solar power', and 'solar panel' were significantly correlated with the policy period where those terms were more frequently appeared in the advertisements as the time progressed with the introduction and modification of solar hot water rebates that offer more effective incentives to more eligible home owners. These findings support the findings of descriptive statistics and Kruskal-Wallis tests. Overall, the results suggest that environmental issues were not considered to be a major factor by real estate agents when advertising detached dwellings. However, the results find some correlations between the appearance of energy efficient features in advertisements and the introduction of different government policies related to housing energy efficiency.

The increase in appearances of words relating energy efficient technologies, particularly solar, could be the result of numerous factors, possibly interrelated. These could be; awareness of the benefits of such technologies resulting in installations, which would be an objective of policy, awareness of market interest by real estate agents, resulting in inclusion in advertisements, or possibly increased energy costs resulting in

households seeking ways of reducing energy costs. With regard to increased energy costs, if the motivation of the house owner is to reduce energy costs it is improbable that such a household would outlay the capital required to purchase and install such systems and then sell the house without having had time to recover the initial outlay. Exceptional circumstances acknowledged.

CONCLUSIONS

Housing markets exhibit considerable inertia and this largely driven by the purpose they serve, that is, to provide shelter and security for its occupants. Therefore when confronted with the need to change behaviours people must be encouraged to do so and this is the role of government, to visualise future requirements and enable structural society change to meet those needs. The examination of the effectiveness of policy intervention to encourage the uptake of energy efficient technologies has been to focus of this treatise. Real estate agents, as housing market facilitators, are at the forefront of promoting houses when they are offered for sale and will therefore aim to highlight the characteristics of the house that are most desired by the market. The increase, albeit slight, in appearances of energy efficient technologies, particularly solar, suggest a growing market awareness and appetite for these technologies. Yet there is still a long way to go if governments maintain the current “free market” policy, a characteristic of neo-liberal doctrine.

The findings of this research suggest the free market strategy is likely to imbue energy efficient technologies into housing markets but we have not yet reached a critical mass in terms of them being considered a norm in the housing market. The question then remains will real change be effected before scientific predictions of a point of no return is reached? A continued neo-liberal doctrine suggests this will not happen and therefore a more direct action policy is required.

This research is part of greater project that aims to more thoroughly consider the impact of real estate agent advertising of energy technologies on housing markets. It is therefore acknowledged that limitations may be evident in this article and these are being progressively addressed as the research progresses.

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