

Smart home control devices

Summary and assessment of energy
and lifestyle marketing claims

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1. | Introduction

This briefing paper presents a content analysis of marketing materials for smart home control devices. It forms Stage 1 of the **Smart Home Control** project, funded by Energy Consumers Australia.

The **Smart Home Control** project will inform policy, program, and technology development intended to assist Australian households in managing energy consumption of their home appliances and respond to energy market reforms such as cost-reflective pricing tariffs.

It will provide an analysis of the benefits and detriments of 'off-the-shelf' smart home control devices and concepts for residential consumers in their everyday lives. These include smart light bulbs, switches and plugs controlled via a smart phone application ('app'). They are part of a broader suite of 'enabling technologies' intended to assist households to manage or reduce their energy demand.

While there has been some research conducted to identify how early adopters (tech-savvy consumers) are making use of smart home control devices (CALC 2014), there has been very little attention to potential use and energy outcomes in 'regular', financially disadvantaged or technologically-disinterested households.

As such, the project explores expected benefits and detriments of home control devices in relation to households who are:

- *more* likely to be disinterested, unable to afford enabling technologies, or vulnerable to energy market reforms, and/or use technologies in unanticipated ways (e.g. larger households with children, older people, low-income, women, renters), or;
- not part of the above-mentioned categories but neither are they early adopters of home control devices ('regular' households).

The project is being conducted in three stages:



Stage 1

Content analysis of smart home control marketing materials and concepts (presented in this briefing paper).



Stage 2

In-depth household research with Victorian and South Australian households who are invited to experiment with off-the-shelf smart home control products.



Stage 3

Five focus groups with householders to test relevance and understanding of emerging off-the-shelf smart home control devices and concepts proposed or promoted by or for the energy sector.

The Stage 1 content analysis involved a qualitative (thematic) analysis of marketing materials for smart home control systems and devices being sold or marketed in Australia or likely to be in the future. The analysis aimed to identify:

- What concepts and ideas are promoted and marketed to households;
- How these devices are intended to help households save money or manage energy use;
- Who these products are primarily promoted towards, and/or who is anticipated to use them (e.g. age, family makeup, income, lifestyle, work status and gender).

This paper does not assess whether the devices will achieve the promoted ideas. Later research stages will address this issue.

This briefing paper is divided into 7 sections.

Section 2 outlines the emergence of digital approaches to energy management in Australia; Section 3 details how the marketing content analysis of smart was performed and what products were included; Section 4 describes the key themes which emerged from the analysis; Section 5 presents the 'Energy and Cost Saving' theme in detail; Section 6 outlines the current target audience for smart home device marketing and some challenges disadvantaged or disinterested consumers may face; and Section 7 summarises the contribution of Stage 1 of the Smart Home Control project.

2. | The 'digital revolution' of home energy management

Emerging or enabling technologies such as smart appliances, digital devices, internet-enabled consumer electronics and home control applications are increasingly referred to as part of a 'digital revolution' or 'next great disruptor' for Australia (Heydon & Zeichner 2015).

Australia has pioneered the deployment of enabling technologies in the residential sector through national consortiums such as *Solar Cities* and *Smart Grid*, *Smart City* (Langham et al. 2014), the Victorian mandated installation of smart meters, and related retailer- or distributor-led trials and programs. Technologies have included residential solar photovoltaic generation, in-home energy displays and portals, standby controllers, and direct load control of air-conditioners and other large appliances. The research team has been involved in several of these trials in past work (Nicholls & Strengers 2013; Strengers 2010, 2011a, 2011b; Strengers & Nicholls 2013).

Less attention has been paid to smart home control systems and emerging 'off-the-shelf' **smart home control technologies**. These include smart switches, sensors and lights, which incorporate programming capability and communications technologies to connect appliances and services, allowing them to be remotely controlled, monitored or accessed. Smart phone/ tablet applications (apps) allow householders to control these devices from any location. They may also provide energy consumption data and information (feedback). Smart home control technologies are marketed and promoted as ways to give consumers greater control and understanding of their energy consumption (Fox-Penner 2010).

Off-the-shelf products are now easily accessible: they can be purchased from major retailers such as *Harvey Norman*, *Bunnings*, *JB HiFi* and *Jaycar*. They are experiencing increasing market share in Australia and internationally and are rapidly becoming more affordable (even over the course of this project). Smart home control technologies and concepts are also strongly aligned with the AEMC's (2012) *Power of Choice* review and reforms, which seek to give householders greater control and choice over household energy management.



3. | Content

The research team conducted a thematic content analysis of smart home control industry marketing materials sourced online (Schreier 2012). Products included in the analysis were smart light bulbs, switches, sensors, home control hubs (both integrated and separate) and thermostats. The review

All products included were either commercially available 'off the shelf' devices which households can install themselves, or integrated smart home control systems which would usually require professional installation. The analysis primarily focused on products available in the Australian market, but included other market-leading products not yet available in Australia, but likely to be in the near future.

Google search terms such as 'smart home technology', 'smart device', 'home automation' and 'internet of things' were used to collate this product list. Review websites *CNET* and *Gizmodo* were also used to identify products for collation. Additionally, the research team visited home electronics stores, such as *Harvey Norman*, *Bunnings*, *JB HiFi* and *Jaycar* to assess which off-the-shelf devices were available in stores in Australia. In total, 42 individual products and systems were selected for analysis.

The analysis focused on identifying products that have the capacity for energy management or load shifting (see Section 5 below). Products that are specifically and primarily marketed for other purposes were excluded, such as home security or entertainment. Smart appliances which would require replacement of existing home appliances (e.g. smart TVs, smart dishwashers and smart washing machines) were also excluded because: a) the cost of upgrading would likely outweigh any potential energy

cost savings, and b) households could use smart switches to control existing appliances of these types. The devices captured are not intended to constitute a representative sample of smart home control devices or cover all commercially-available products. They provide a snapshot of the types of technologies that are currently or soon to be available for consumers to purchase in retail outlets, online, or through residential system installers.

Both images and text content were analysed using *NVivo* qualitative analysis software. Images were coded into categories identifying the type of image (e.g. cartoon, real life or studio photograph), lifestyle depictions (e.g. domestic work, happiness or luxury), presence of people and their demographic characteristics (e.g. ethnicity, gender, life stage), and representations of the technology (e.g. whether it was featured in use or in the background). Text content was coded thematically, based on the concepts and ideas promoted in the material, such as energy saving or management, lifestyle advantages, comfort, aesthetic considerations, and security or peace of mind. Only text that described the potential uses, services and lifestyle impacts provided by the products was coded.

Table 1 categorises the 42 smart home control products analysed as part of this review, and includes a brief summary of potential energy management benefits for household consumers as identified by the research team. Products are divided into five categories: smart bulbs and lighting, smart switches, home control hubs, integrated home control systems and smart thermostats. Each category includes at least five products which were reviewed as part of this analysis. In addition, twelve online product reviews were also analysed which covered each category.

Table 1 Smart home control products analysed and their possible energy management benefits

* Not all functions apply to all products

** The companies listed in this table make other products that were outside the scope of this analysis

| Product Category | Functions which may be used for energy management* | Companies/Products reviewed** |
|--|--|---|
| Smart Bulbs and Lighting Smart Bulbs and Lighting | <ul style="list-style-type: none"> - Can be operated remotely (e.g. via smartphone app) - Can be programmed to automatically turn lighting on or off at designated times or in response to sensors, respond to information from the internet (e.g. sunrise and sunset) or other sources (e.g. dynamic/critical peak pricing messages) - Lamp dimming capabilities - Light emitting diode (LED) lamps use less energy than older lamp technologies | BeON, LiFX Color 1000, Loxone, Osram Lightify, Philips Hue, Belkin Wemo LED lights, Aeotec LED Bulb Product reviews analysed: - Belkin Wemo lights on How-To-Geek - Osram Lightify on Pocket Lint - Philips Hue on CNET |
| Smart Switches (often combined with Sensors) Inserted between an appliance and the power socket | <ul style="list-style-type: none"> - Enables remote control of appliances (e.g. via smartphone app) - Can be programmed to automatically turn lighting on or off at designated times or in response to sensors, respond to information from the internet (e.g. sunrise and sunset) or other sources (e.g. dynamic/critical peak pricing messages) - Some smart switches provide energy use data | Devolo, Efergy Ego, SwannOne Smart Plug, mydlink WiFi Smart Plug, Samsung Smartthings Outlet, Wemo Switch, Aeotec Plug In Smart Switch 6, Watts In Plug, Jaycar Neo, Notion Product reviews analysed: - Efergy Ego on PC Advisor - Belkin Wemo Insight on PC Advisor - Dlink sensor on Trusted Reviews |
| Home Control Hub An off-the-shelf stand-alone device that communicates with and controls other home technologies | <ul style="list-style-type: none"> - Controls lights and appliances (e.g. lighting, entertainment, security, and heating/cooling) - Can be accessed remotely (e.g. via smartphone app) - May respond to voice commands and speak to home occupants - Can be programmed to automatically turn technologies on or off at designated times or in response to sensors, respond to information from the internet (e.g. sunrise and sunset) or other sources (e.g. dynamic/critical peak pricing messages) - Can provide energy monitoring information or advice | Amazon Echo, Apple Homekit, Lowes Iris, Pella Insynctive, icontrol Piper, Ninja Blocks Ninja Sphere, Lucis Nubryte, Samsung SmartThings Home Monitoring Kit, Wink Hub, Vera Edge, Insteon Hub Product reviews analysed: - Amazon Echo on TechRadar - Samsung SmartThings on CNET - Lowes Iris on CNET - Lucis Nubryte on Poc Network |
| Home Control Systems (integrated) Typically professionally installed integrated system that communicates with and controls other home technologies | <ul style="list-style-type: none"> - Can control a range of home services including lighting, blinds, security, watering, audiovisual appliances and heating/cooling - Can be accessed remotely (e.g. via smartphone app) - Automatically turns appliances and lights on or off at specific times or in response to sensors - Enables remote control of lights and appliances (e.g. via app) - Can be programmed to automatically turn technologies on or off at designated times or in response to sensors, respond to information from the internet (e.g. sunrise and sunset) or other sources (e.g. dynamic/critical peak pricing messages) - Most provide energy monitoring information or advice - User interface may be a wall pad and/or app | Lutron, Honeywell Lyric, Clipsal, Vantage Equinox, Fibaro Z-Wave, Savant Pro No product reviews of systems included |
| Smart Thermostats | <ul style="list-style-type: none"> - Automates home heating and cooling, adjusting temperature based on information from sensors, timers and from typical user preferences and patterns - May also be controlled via an app or wall unit - Can be programmed to respond to information from the internet (e.g. weather forecasts) or other sources (e.g. dynamic/critical peak pricing messages) - May provide energy monitoring information or advice | Honeywell WiFi Smart Thermostat, Lyric, Ecobee3, Nest Learning Thermostat, Insteon Thermostat Product reviews analysed: - Nest on Engadget - Ecobee3 on CNE |

4. | Summary of key themes

The analysis identified 11 key themes which capture the core ideas and expectations promoted and intended for smart home control products. The themes cut across all of the product categories and are summarised in descending order of frequency in Table 2 below. All themes were present in both product marketing materials and product reviews, with the exception of Theme 11 (Technology needs more development) which was unique to product reviews.

Themes which appeared infrequently were omitted. These included luxury or distinction, health and wellness, accessibility and personal satisfaction.

With the exception of Theme 4 (Energy and cost saving) each theme is briefly discussed below, noting any implications for energy demand management. Theme 4 is then discussed in more detail in Section 5.

Table 2 Summary of the potential benefits of smart home control products in marketing to consumers

| Theme | Core idea | Illustrative Quote from Marketing |
|--|--|---|
| 1. Control and empowerment 34 items with 71 references | Monitoring and remotely accessing devices (lights, appliances etc.) gives householders more information and control over energy and device use in their home. | "Start to be the king of your domain" (Wink Hub) |
| 2. Comfort and relaxation 32 items with 58 references | Households will enjoy greater comfort, relaxation, entertainment and fun at home. Smart devices improve home aesthetics and enhance moods of users and guests (e.g. through sound, lighting, temperature and control). | "On the way home, switch on your air conditioner, turn on the lamp and get ready to rest!" (Efergy Ego) |
| 3. Convenience, ease-of-use and effortlessness 26 items with 50 references | Automating and connecting devices in the home makes life easier and reduces complications. | "Step out of your car and activate hallway, kitchen and family room lights, as well as air-conditioning and your favourite music." (Clipsal) |
| 4. Energy and cost saving 23 items with 48 references | Monitoring and/or automating appliances saves householders money on their energy bills and lowers consumption. | "Senses whether anyone's home and which rooms are occupied, delivering comfort when you're at home and saving you energy and money when you're not." (Ecobee3) |
| 5. Security, peace of mind and disaster mitigation 24 items with 45 references | Monitoring and/or controlling devices (particularly remotely) reduces anxiety and security risks, and increases confidence that the home is safe. | "The simulated occupancy feature controls all of your WeMo connected electronics through a random algorithm to turn things on and off automatically. It will appear as if you're at home, even when you're not." (Wemo) |
| 6. Individualisation and personalisation 20 items with 31 references | Smart technologies and the home can be adjusted and adapted to suit individual needs or lifestyles. | "You can set device schedules so that you can walk into a brightly-lit home every day after work with your favorite song playing and the AC exactly where you want it." (Dlink) |
| 7. Ease of set up 18 items with 25 references | Simplicity is incorporated into the design of technologies, making it easy and seamless for householders to set up. | "User-friendliness and flexibility of the Fibaro app will make your intelligent Z-Wave system simple and straightforward. You will not need a university degree in engineering or computer science!" (Fibaro) |
| 8. Intelligence and smartness 14 items with 26 references | The technology is intuitive and knowledgeable, and is able to learn and improve its performance over time. | "The Nest Learning Thermostat automatically adapts as your life and the seasons change. Just use it for a week and it programs itself." (Nest Thermostat) |
| 9. Automation as essential 11 items with 16 references | Smart technologies will be standard in homes in the near future and are becoming increasing 'normal'. | "It's not laziness, it's the future!" (Samsung SmartThings) |
| 10. Emerging technologies as path to future possibilities 8 items with 10 references | The potential of smart technology is continually growing, with some products designed to be able to incorporate future technology developments including through software upgrades. | "Always More to Come"(Piper) |
| 11. Technology needs more development (theme only present in product reviews) | Improvement and evolution is ongoing, with some devices not yet fulfilling promises e.g. hard to set up, time consuming, incompatible with existing devices, unreliable or do not perform as described. | "But the design looks and feels like it certainly wasn't ready for release." (Amazon Echo review on TechRadar) |



Theme 1: Control & empowerment

Control and empowerment was the most prominent theme throughout the material, with a number of product sites promoting the ability to ‘monitor’ and ‘control’ the house at the ‘touch of a button’. The consumer is assured that smart technologies will provide much greater power over one’s home. Ideas include monitoring or controlling devices remotely through alerts sent to a smart device, accessing and acting on live streaming video, or controlling devices via an app “from the palm of your hand” (Apple Homekit). Imagery in articles focuses heavily on home control via smartphones and other interfaces. The benefits of enhanced control are predominantly represented as personal empowerment but some companies also link these ideas of control to energy management.



Theme 2: Comfort & relaxation

The second most prominent theme identified the ways that devices are intended to improve the aesthetic experience of the home, by controlling ambient features such as temperature, lighting, audiovisual features and blinds. Aspects of the home are adjusted in response to stimuli or commands to enhance user comfort, induce relaxation or create atmosphere for entertainment or other activities. Colour, brightness and arrays of lights in and around the home are central to creating the right ‘mood’ and interact with other smart technologies to help play host and entertain guests, as the following quote illustrates: “The perfect shade of light. Day light. Candle light. Party lights...whatever the mood, whatever the setting, whatever the time of day” (Aeotec Z-Wave).

Smart home devices are intended to ensure that the home is “just the way you

like it” (Fibaro Z-Wave Home Center). This theme presents smart devices as combatting ‘busyness’ and creating a home which is a sanctuary from work or chores. Imagery included happy and relaxed people often on comfortable couches and enjoying time by themselves or with family members. Prioritising improved comfort may undermine energy savings, by encouraging more households to maintain energy-intensive ‘set-point’ temperatures, or to switch on the heating or air conditioning before getting up or getting home. It may also normalise expectations for enhanced comfort, electrically-enabled aesthetic experiences, and new entertainment possibilities that could undermine anticipated energy savings.



Theme 3: Convenience, ease-of-use & effortless

Convenience, ease-of-use and effortless was promoted as an outcome of various functions such as: simple set-up and installation; ‘one touch’ or single button operation of multiple appliances; adjusting appliances via a smartphone app without needing to get off the couch; programming appliances to turn on and off automatically; or having appliances respond to a householders’ presence or habits. Such interactions were promoted as being simple, easy or effortless; however explicit claims of time saving or efficiency improvements were rare. This theme was also commonly reflected in imagery depicting people pressing buttons or using devices that performed multiple functions. Ideas of convenience were sometimes combined with energy-saving messages to emphasise the ease at which appliances and devices can be automatically, remotely or simply switched off when not in use.



Theme 4: Energy & cost saving

See Section 5



Theme 5: Security, peace of mind, and disaster mitigation

Over half of the materials analysed also suggested that smart home control technologies will provide the home and its occupants with greater safety, security and peace of mind. This idea is promoted as being realised through a range of functionalities such as the remote monitoring of appliances, the use of motion sensors, or scheduled lighting patterns. These functions are designed to provide alerts or alarms to ward off intruders or give the illusion of the house being occupied. This theme was depicted by images intended to remind householders of the various threats to their home and family, such as burglars and fire, which were contrasted with images of peaceful homes and relaxed occupants protected by smart-technology enabled security. Responding to consumers' security fears appears to be a key marketing strategy. Some security products claim to operate more efficiently than available alternatives.



Theme 6: Individualisation and personalisation

The theme of individualisation and personalisation explores the options that are available to the user, and suggests that everyone is different and may have differing expectations of how their home responds and interacts with them. Marketing materials typically promote a wide range of options and choices (in the form of smartphone app controls or other functionalities) that allow for customisation. The central idea here is that smart home devices are adaptable to suit individual needs, and can be tailored to suit everyone's unique lifestyle. Marketing sites make clear that these devices help to "create



Theme 7: Ease of set up

The promoted simplicity and ease-of-use of smart home control devices was highlighted in almost half the products reviewed, with companies clearly stating that installation is 'hassle-free'. This was contradicted in some of the review sites, which noted difficulties experienced in trying to install and use seemingly simple or straightforward devices (see Theme 11). For example, a CNET review of the *Samsung SmartThings Hub* highlighted the difficulties in configuring the device. It noted glitches in the system and a confusing app interface which directly contradicts the company website's claims about simple set-up.



Theme 8: Intelligence and smartness

Theme 8 highlighted the promoted intelligence and adaptive capacity of smart home devices to 'learn' households' needs, and intuitively 'know' what they want. This theme is associated with devices that claim to be able to 'think' on occupants behalf, as puts forward the idea that "your home can control itself" (Apple Homekit). For example, some devices such as home control hubs claim they are "always getting smarter and adding new features and skills" (Amazon Echo), whilst others such as *ecobee3* and *Nest* learn users'

preferences to build a profile on what to deliver. Products such as *Vera Edge* can operate automatically in response to different conditions, such as changes in light or temperature. Some companies also associate energy saving claims with their product's intelligence, suggesting that they save energy by learning occupants' habits and turning appliances off or heating and cooling down when rooms are unoccupied. As *Nest* states: "Most programmed thermostats stay at the same temperature all day. And that wastes energy. Programming just doesn't work. So Nest found a better way. And a whole new way: it learns."



Theme 9: Automation as essential

The development and expansion of smart devices for the home has been quite rapid, with some companies suggesting that automation is establishing itself as the 'new normal'. This theme suggests that the ubiquity of these technologies is creating an expectation of 'smartness' in the home and that once people have experienced "all the benefits it affords, you'll wonder how you ever lived without it" (Lutron).



Theme 10: Emerging technology and future possibilities

Several products make reference to the future proofing embedded in some devices that will allow for integration and networking with other devices as new technologies emerge and evolve. As there is "always more to come" (Piper) it is apparent that some companies are designing products to incorporate these expansions in the industry. This theme suggests that the industry is signalling rapid change and constant upgrading in the use of smart home control products which may have implications for energy demand and affordability.



Theme 11: Technology needs more development

The final theme was not present in the marketing materials but emerged in review sites where users reported some contradictions in what was being promised by companies about their products. Whilst reviews were generally positive and reflected many of the themes discussed above, there were also suggestions that some products may not be ready for the market yet, and have been released prematurely. Issues with configuration, integration with other devices and useability suggest that more development is needed to overcome some clunky performance. This may slow down some of the fast-paced change and 'essential' nature of smart home devices as predicted by other companies and reflected in themes 9 and 10.

5. | Energy and cost saving (Theme 4)

Energy savings and bill reductions were widely claimed as outcomes of using smart control devices. Energy savings were usually presented as just one of many potential benefits of smart home control technologies (see Table 2 and Section 4 above). Explicit claims of environmental benefits, such as greenhouse gas emission reduction, were noticeably absent. Although marketing materials did not usually provide detail about energy savings, or the ways they could be achieved, we point towards four possibilities.



i) Energy monitoring

Energy monitoring functions which can provide the household with data about energy use of appliances or the home more broadly are available in most product categories (see Table 1), except for smart bulbs and lighting where the focus is more on efficiency. This functionality is sometimes promoted as a way for households to avoid 'bill shock'. The key idea is that householders will have a better understanding of how much their energy bill is likely to cost and can therefore better manage their energy use. The marketing materials also highlight the capacity of energy monitoring to identify high energy use appliances. These ideas were only depicted in a few of the materials analysed.

Two main assumptions associated with energy monitoring possibilities are that households will actively use the monitoring functions (e.g. smartphone app) and that households can and will change their use of electricity in response to the data they receive. For example, the *Efergy Ego* website states that "consumers who understand their home energy consumption are more likely to make positive behavioural changes which lead to big savings on their energy bills". *Aeotec* says "from anywhere in the world you'll be able to see which devices are turned on and how much that is costing you". No advice is provided on how energy data can be translated into the energy savings described.



ii) Incorporating energy efficiency technology into smart devices

Another promoted energy benefit of smart home control technologies is their incorporation of more energy efficient technology. For example, smart lighting was advertised as incorporating LED lamps and therefore saving energy for the household. These claims are realistic if they are installed to replace less efficient technology such as incandescent, halogen or compact fluorescent lamps (CFLs). These energy savings claims will likely be realised regardless of whether the household utilises other smart control features, as long as usage does not increase substantially and as long as these devices/appliances replace rather than add to existing lighting.



iii) Automation, sensors and remote control of devices

The use of sensors to detect when people are home and the capacity to turn devices on or off remotely or on a pre-defined 'schedule' assumes that these features will be used to reduce the amount of time devices or appliances are left switched on (see also Theme 8). For example, products suggest that householders can "save energy by setting your system to turn off lights in empty rooms" or "schedule shades to close at mid-day for effortless energy efficiency" (Savant). Some smart devices include assumptions which differ to common usage patterns in most Australian households, i.e. the assumption that households would normally maintain the home at a setpoint temperature

throughout the year whether awake or asleep and regardless of whether anyone is at home. This is illustrated in *Honeywell*'s marketing of its smart thermostat: "Lyric knows when you're home early from work, or when you're out late with friends. It keeps your home at just the right temperature, allowing you to save money too" (Honeywell). Similarly, the *ecobee3* claims that it "saves homeowners an average of 23% annually, paying for itself in energy savings" and bases its "internal analysis" on a 22°C setpoint for the home. The energy outcomes for Australian households will also depend on other issues including, as *ecobee3* says, that "savings will vary based on geographic location, local weather conditions, type of heating and cooling equipment, size of home, and your home's energy-tightness".



iv) Load shifting

There were no references to load shifting potential in the marketing material, but this topic was mentioned on one product review website. In reviewing the *Efergy Ego* and *Belkin Wemo* smart switches, *PC Advisor* described the interest that energy companies have in this technology as follows: "The grid almost falls over every night between 5pm and 7pm as everyone gets home". With capacity for remote control and scheduling, these switches and other smart technologies could be used to operate appliances such as washing machines or dryers during off-peak times when electricity is cheaper and there is less demand from the electricity grid. However, the smart home control devices analysed are not being marketed for their load shifting potential and it is unclear what opportunities they hold in this regard.

6. | Intended users of smart home control products



Smart technologies were presented as ways to address time pressures and enable the user to “stay on top of your busy life” (NuBryte). Busy parents and/or working professionals who are “always on the go” will be able to “effortlessly organize your home, and your family” (NuBryte). In marketing imagery, users were typically happy and relaxed adults between 30 and 50 years old in ‘smart casual’ or business clothing. Older people and teenagers were rarely depicted and users of the devices were more often depicted as women rather than men. Many images were studio photographs of smart home control devices without any people or evidence of domestic interaction within the home. In the few images that did depict household chores, these were predominately food provisioning and ironing. The homes depicted in the images were usually modern, tidy and of medium to large size. Other than high-end integrated systems, the lifestyles depicted were comfortable but not opulent by Australian standards. There were no obvious references to vulnerable or disengaged households, and only one statement from *Clipsal* mentioned the benefits of smart technology to simplify tasks or the elderly or disabled. From the material analysed, there was nothing to indicate that the companies were deliberately targeting or likely to appeal to low-income or disadvantaged households. The target market appears to be professional, middle-class, aspirational consumers.

Challenges for households including disadvantaged and disinterested consumers

As identified in the introduction, the Smart Home Control project is interested in households who are not early adopters of enabling technologies including those who may be more likely to:

- be disinterested or unable to afford enabling technologies;
- be vulnerable to energy market reforms, and/or;
- use technologies in unanticipated or unexpected ways.

Given that the marketing materials analysed target and speak to a relatively narrow range of households, we speculate here about some of the challenges households may face in making use of smart home control devices in the ways energy policy makers and other advocates of enabling technologies currently suggest (see Section 2). These issues will be explored in subsequent stages of this research.



i) Ease-of-use and usefulness

Smart control marketing materials are promoted as being simple and easy to use (Theme 7). However, this is refuted in some cases by product reviews which suggest their functionality is not fully developed (Theme 11). There is a risk that households who are already disinterested in these types of devices may be put off by 'glitches' or paying for devices which do not work as easily or effectively as promoted. We also note that most require operation via a smartphone app and/or require a home Wifi connection. These requirements would prevent access for some older and low-income households (ABS 2016) who are less likely to: a) have these technologies, b) be familiar with how to operate them, and/or c) have confidence to independently download and update apps. This may limit the usefulness of these devices, particularly with older residents. In other studies where similar devices have not been



ii) Affordability of devices

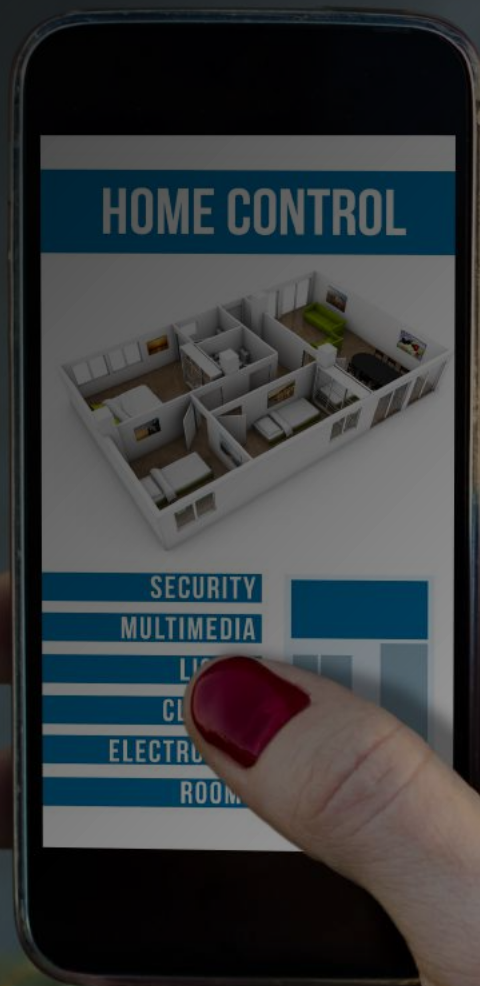
Costs currently range from AU\$30–40 for switches or bulbs, hundreds of dollars for hubs through to thousands of dollars for integrated/professionally-installed technologies. Low-income households may view even the cheapest smart home control devices as discretionary or 'luxury' items unless they have a special interest in this technology. The rapidly increasing affordability of these devices may change this situation over time, encouraging greater uptake. However, it is important that the likely energy savings match or exceed the cost of devices if the energy sector intends to encourage financially-constrained households to invest in smart home control devices in order to reduce their vulnerabilities to proposed energy reforms such as cost-reflective pricing.



iii) Energy-saving and -shifting opportunities

The energy claims provided by companies are not backed up with clear evidence and may mislead or confuse households into thinking they may save more energy than is feasible or possible. Further, we note that the opportunities for low-income households to save money with these devices may be less than anticipated because they are more likely to already be turning off appliances and lighting when not in use to reduce their energy bills (ABS 2013). The load shifting opportunities for households are currently unclear and are not promoted in smart home control device marketing materials.

7. | Conclusion



This content analysis of smart home control marketing materials indicates that the promoted benefits of these devices are not strongly aligned with energy policy objectives. Only one of 11 themes identified relates to energy and cost savings. Further, load shifting was not mentioned or promoted by any companies selling smart home control products. In contrast, several other themes identified in the analysis may undermine energy and cost savings for households (e.g. promoting higher levels of comfort, convenience and entertainment). Middle-class aspirational consumers, who represent the target market for these devices, are likely to be more interested in these 'other' benefits than energy savings. It is currently unclear whether these products will assist households in the current or future energy market. The subsequent empirical research being conducted for this project will seek to understand how smart control devices are being integrated into everyday practices in households. It will identify what benefits are realised for Australian households and how these devices may support or undermine the intended benefits of enabling technologies in the energy sector.

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