

# The smart controls revolution: A revolution for who? And for what purpose?

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# Beyond Behaviour Change Research Program

- Over 10 years of household research into:
  - smart meters
  - cost-reflective pricing forms
  - direct load control and peak incentive/rebate programs
  - smart homes and smart technologies
  - heatwave vulnerability
  - impacts of energy policy for health and wellbeing
- Informed by sociological theories of consumption and change
- Industry and publicly funded research



# Great expectations

- Internet of Things the ‘digital revolution’ or ‘next great disruptor’ for Australia (Heydon and Zeichner, 2015)
- Australia pioneering emerging technologies (e.g. smart meters, smart grids, direct load control, rooftop solar)
- ‘Prices-to-devices’ and ‘set-and-forget’ technologies advocated to assist householders achieve demand response in the changing energy market (e.g. variable tariffs), and lower their energy bills
- In 2016 market analyst HIS Markit estimated that 80 million smart home devices were sold worldwide, a 64 per cent increase from 2015.
- Research on smart home control other than in ‘early adopters’ households?



# The ideal domestic energy consumer

- Makes economically rational decisions about energy cost when ‘deciding’ to use an energy consuming appliance (even when can afford to pay more)
- Data hungry and technology capable
- Up-to-date with energy market and technology issues
- Strong literacy and numeracy skills
- Prioritises energy efficiency
- Has control over energy use of others in the home

**A rare beast?**



# Our smart home research



- **Automating the Smart Home project**
  - 3-year national project on homes with programming and communications tech to connect appliances and services for remote control, monitoring or access
  - Interviews with households (23) and smart home industry professionals (17)
  - funded by Australian Research Council



- **Smart Home Control project**
  - trial of off-the shelf, self-install home control devices in 46 households
  - included low-income households
  - funded by Energy Consumers Australia



# Lifestyle trumps energy in smart home marketing



- Predominant marketing themes:
  - enhanced comfort
  - more convenience
  - better security
  - personalisation
- Energy saving and load shifting are **minor components**

*'Elevating your standards'* (Sony automation)

*'Your home is a place where you experience **comfort, romance, and peace of mind**—a place where you experience pleasance.'* (Lutron home automation)

Smart Home Control Briefing Paper:

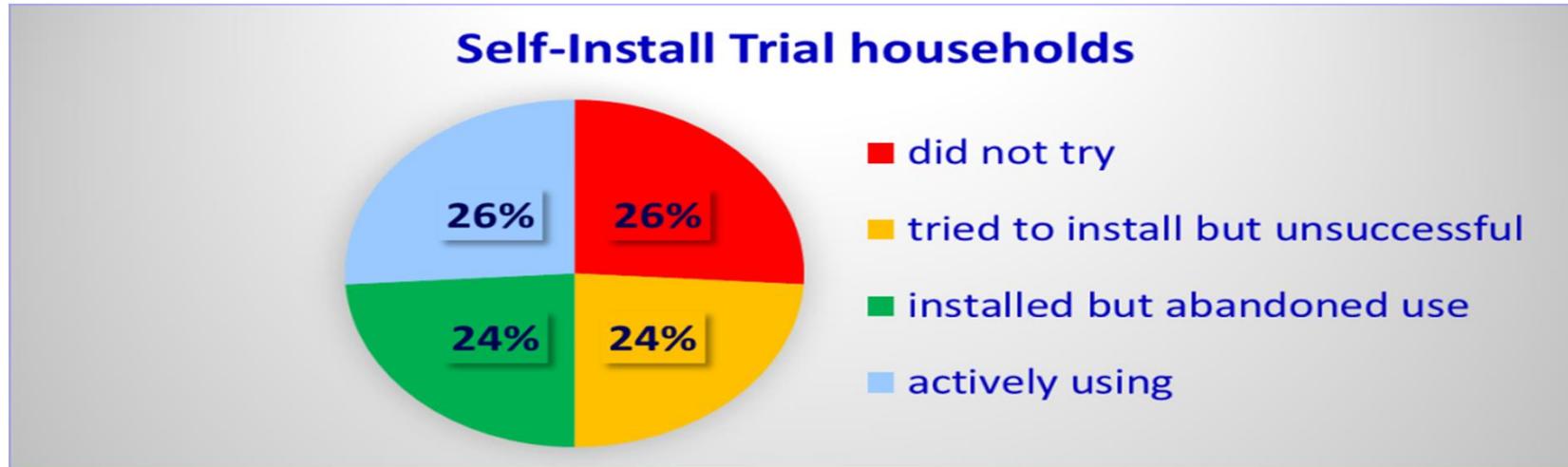
<http://cur.org.au/project/smart-home-control-exploring-potential-enabling-technologies-households/>



# Inside the Home



# Smart home tech does not interest everyone



- Interests tech-enthusiasts
- Little interest in over 55s: *I kind of handed [the smart plug] to my 14 year old son and said “Here, what do you make of these?” He got the Smart Switch out and had a go at installing it. (householder)*
- More interest in manual control via smartphone app than programming/automating appliances

# Smart home tech is not 'easy' to set up and use

- 3 common brands of smart plug
- Wide range of difficulties experienced including:
  - unreliable internet, insufficient data
  - incompatible smartphones
  - app installation/operation issues including delays, freezing
  - various other glitches
- Installation took time, skills and persistence → observed Installations took 45 mins – 105 mins
- Products failed after installation
- Frustration, disappointment





# Smart control can be inconvenient or conflict with other priorities

- Dependence on carry phone around home
- Can require unlearning of energy saving routines: lighting, children: *It's not helping [my son] to remember to [switch things off himself].* (householder)
- Some households want **to reduce** use of tech/smartphones at home





# Smart home control enables much more than energy management

*I'd definitely be switching the air con on an hour before I get home. (Dean)*

*I put my Christmas tree up, so I'm thinking, oh maybe that's a good place to use it. (Max)*

*I could turn my kettle on from my phone. (Sandy)*



- Security and safety
- Small conveniences
- Increased comfort
- Enhanced aesthetics, ambiance
- Relationship management (kids, housemates)
- Health and wellbeing outcomes





# Demand shifting interest/ capacity is limited

- Around half of households with understand electricity to be cheaper at night
  - Dishwashers already shifted
  - Trial households did not use identify smart plugs as way to access ‘cheaper’ night time electricity
- Solar PV households suggested using smart plugs to maximise financial benefits from solar – but didn’t





# Smart control enables both increases and decreases in energy consumption

- *To be honest I think that if anything it might encourage us to use more electricity, because the notion of turning something on when you're not there inherently means you're using electricity you wouldn't be using. (householder)*
- *'Goodnight' function: People do tend to possibly leave lights on more because they know they're going to hit that... good night button somewhere along the line, so maybe there is a bit more waste... definitely there's more standby power than obviously without [smart home control]. (integrator)*





# Smart homes are fun, a ‘project’ for early adopters

- Often time consuming rather than time saving
- Every home needs a ‘gadget-y kind of person’
- Looking after the tech can become ‘work’: *You’ve got more apps, you’ve got more sources of [data and technology] which just falls apart, so I’m finding ... I’m spending time managing it, and ... [now I’m] feeling less tolerance and energy to do that. I just want things to kind of work.*



# Supporting research from the UK

- Trial of market-ready SHTs, professionally installed
- 7/10 households included an IT specialist or engineer
- Conclusions:
  - learning to use smart home technologies is a demanding and time-consuming task
  - limited or no use of the SHTs **to manage their energy use**
  - risk that smart control may generate forms of energy intensification



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Tom Hargreaves ✉, Charlie Wilson & Richard Hauxwell-Baldwin  
Pages 1-13 | Published online: 22 Feb 2017

<http://www.tandfonline.com/doi/abs/10.1080/09613218.2017.1286882>



# Conclusion

- It's possible in theory, but...
- Theory does not necessary apply in the messiness, busy-ness of household life
- Dependence on supporting infrastructure for widespread household (reliable internet, modern & expensive smartphones) is an equity concern
- **Much more moderate expectations needed for domestic setting**
- **Risk of energy intensification needs further research**

Full reports, methodology etc at:

<http://cur.org.au/research-programs/beyond-behaviour-change/>





# Thank you

Research partners/funders: TransGrid, Ausgrid, Endeavour Energy, Australian Research Council, Energy Consumers Australia, Victorian Council of Social Services, Department of Health and Human Services, Consumers Action Law Centre

**Do you use smart home control, automation, or voice-activated devices such as Alexa or Amazon Echo? We would love to interview you – please contact Larissa.**

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