

Shifting routines, changing demand: Australian perspective



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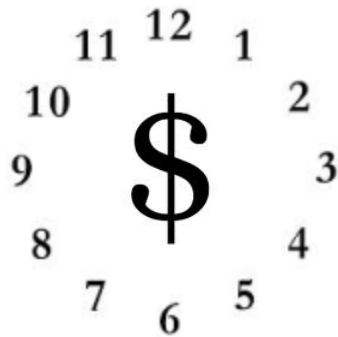
@yolandestreng

Australia's residential peak energy demand

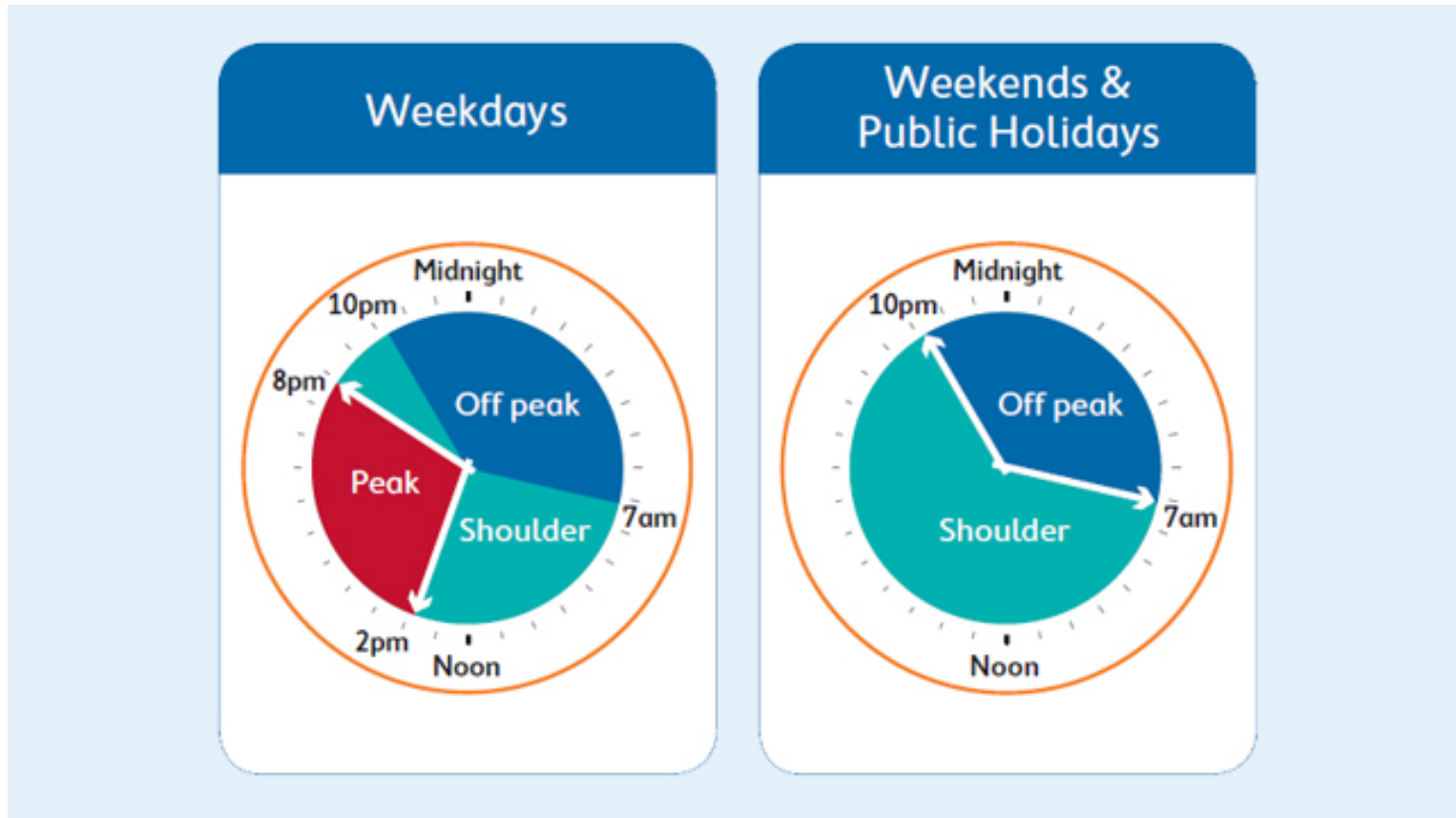
- Residential energy demand has dropped or stabilised in all electricity supply regions of the National Electricity Market (AEMO 2013).
- Electricity prices: **70% real term increase in the last five years** (PC 2013).
- Over 50% of costs associated with increased network (poles and wires) investment (PC 2013).
- **Residential air-conditioning demand on hot days** one of the main reasons for this investment.
- Penetration of residential **air-conditioning has more than doubled** in the last decade (DEWHA 2008).
- **72% of Australian homes have some form of mechanical cooling** (ABS 2011).
- Growing gap between average and peak electricity demand.

Shifting routines, changing demand

- Dynamic pricing
- Direct load control (automation)

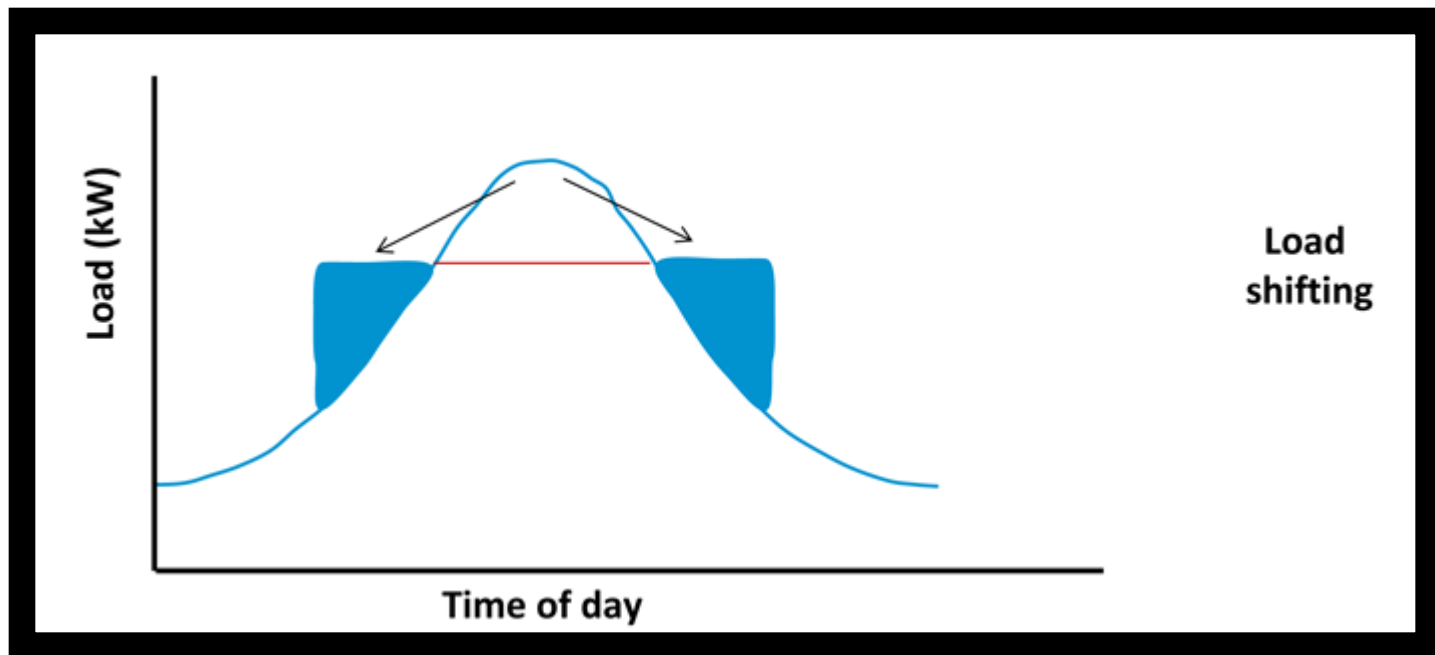


Time-of-Use (TOU) tariffs



Source: <http://www.ausgrid.com.au/Common/Our-network/Metering/Time-of-use-pricing.aspx>

Critical/ dynamic peak pricing (CPP/ DPP) and rebates



Source: <http://eex.gov.au/opportunity/load-shifting/>

International demand response (shifting)

- Time-of-use (TOU) tariffs – 3-6%
- Critical peak pricing (CPP) – 13-20% or 27-44% when combined with ‘enabling technologies’ (energy feedback and automation)
- Critical peak rebates (CPR) – 15-20% demand reduction
- **‘Information-only’ trials** (critical peak alerts) – 13-15% (defined by absence of a price signal) (Australian trial)



Source: Strengers 2013, ‘Smart energy technologies in everyday life: Smart Utopia?, Palgrave Macmillan (drawing on data from Brattle Group, USA)

Regular afternoon/ evening routines appear inflexible

*‘Walk in the door, **run the bathtub**, and while I’m running the bathtub **I start to get dinner ready**. So I’m usually using the stovetop, or both the microwave and the stovetop to get something ready on a weeknight, because **we cook ahead of time and freeze things**. So I’m reheating maybe a pasta sauce or something to put over, and cooking pasta, or like I’m just **boiling the kettle** to make some couscous to go with a stew that I’ve gotten out of the freezer. And **then we bath Lyn, Michael comes home, we sit down and eat dinner**, and then **we read and have songs** until bedtime, which is 7 o’clock. And then **Lyn goes to bed at 7** and then **Michael will go and play computer games** religiously, because he’s a computer game nut, and I will either sit in the computer room with him and **work on stuff, community stuff**, because I’m doing lots of community stuff at the moment, **or I’ll go and sit in front of the TV** and **watch and knit**. Yeah ... and then **Matt will come out at like 10 o’clock** after he’s played computer games and then **we’ll watch something together on TV**’ (Cath, ‘Changing Demand’ project, describing afternoon/ evening routine).*

Does TOU disrupt these routines?

- ‘...Realistically **we don’t live in a time-shifted world** where some people get to start work at 4 am and come home at 3 and can cook their dinner at 3 o’clock in the afternoon. Like, **we work from 9 to 5, or 8 to 4:30, and we all come and we all have to cook dinner.** The majority of people have to. So basically **I just see peak pricing as a way for energy companies to just shaft users**, and that **I don’t really feel like I have much choice**’ (Cath).

How are critical peak alerts different?

- **Interviewer:** *‘Do you think that sort of thing would need to be financially rewarded or anything [for responding to a peak reduction message]?’*
- **Cath:** *‘...I didn’t think that. I thought that people would do it **out of the goodness of their hearts**. If you said, you know, “**Why don’t you go and have a picnic?**” Or go to the river and do like a family, you know, spend time with your family or get into the outdoors, like **it’s nice and cool by the river**, or something. But if you gave domestic users the ability to reduce their bills by not using energy on a peak day or something, then **I think people would definitely do that**, because it’s something easy they can do. For sure. **People would just have a barbecue. ...** If you told me that **6 days a year in the afternoon I had to not use any energy** and turn my energy off at the **mains**, **I would do it**. If you told me that I could have a 30% saving on my electricity bill over the year, [that would be even better].’*
- **Interviewer:** *‘So that’s quite different to needing to do something differently every day of the year?’*
- **Cath:** *‘Definitely. Definitely.’*

How do people respond to critical peak alerts/ pricing?

1. Reduce/ avoid using the air-conditioner

- seek other ways of achieving thermal comfort)

2. Instigate a self-enforced 'blackout' by turning off other appliances

- lights, dishwashers, washing machines, televisions, pool pumps, reffridgerators etc.

3. Leave the house

- Visit pool, cinema, beach, friend's house, library, shopping centre, restaurant

Why are critical peak alerts successful?

1. The common good

So ***it's a bit like in the water industry*** where you've got in some situations, voluntary restraint where the water utility advertises or puts the message out: 'please conserve water'. And you find that ***there is a community response and people do cut back***. If you're out washing your car and the neighbours give you a bad look it sort of reinforces that attitude. And I wonder, I'm just speculating, that ***this sort of common good aspect, may be a feature in this response, which doesn't fit well with the theory of an economically rational consumer that I have in my mind***' (electricity retailer and distributor, dynamic peak pricing trial, PhD).

2. Notification of an exceptional circumstance

- ‘No, when there are **power failures** we wouldn’t use it [the heater/ air-con]. ... And we try not to use it unless it really is cold’ (Household 48, PhD).
- ‘Yeah, there was another time where we had a **power blackout** and we just said, “**let’s just go to the beach**”’ (Household 60, PhD).
- ‘They sent us an email and they send me a text message on the mobile phone to tell me “the peak period is going to be or high priced period is going to be between two and four, or two and six”. **So we go around and turn off all the power points and we don’t use anything**’ (Household 56, PhD).

3. Direct link to specific practices

*'It's mostly if the weather is very hot or very cold, **so it obviously refers to the air-conditioning and heating**' (Household 48, PhD)*



Direct load control & automation

‘We’re wasting our time trying to make people smart about energy. We should be making our devices smart about energy. Consumers should set the parameters they want, and then the system should do the monitoring for them. ... We’ve come to realize that today’s consumers want control. But they want it delivered as cruise control. Consumers should NEVER have to respond to energy information. They should tell the system (once) how they want it to respond and then let the system do the watching’.

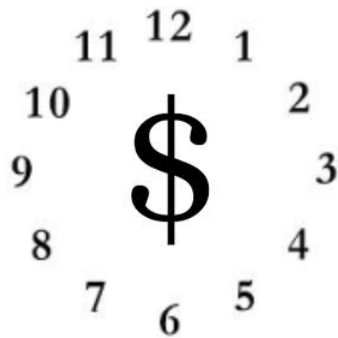
Berst, J 2012, *Smart grid momentum: Think less about people more about devices*, SmartGridNews.com, 5 March 2012, <<http://www.smartgridnews.com>>.



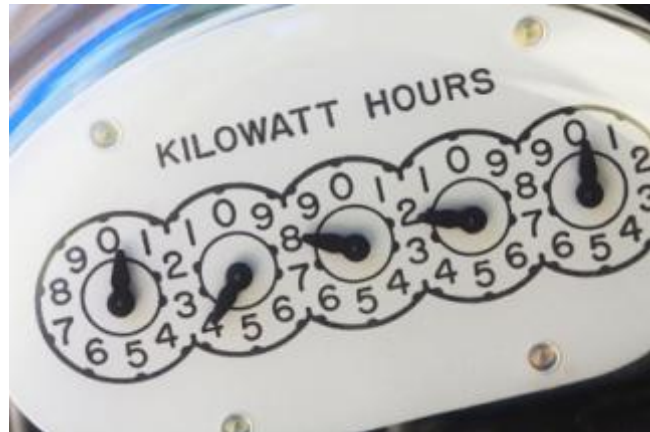
Direct load control

- High satisfaction with DLC air-conditioner trials, **BUT... cooling practices are still changing**
 - *‘I have been thinking about putting in a couple of ducts in here for the air-conditioning as well, just for the puppies you know, just when it’s really hot.’* (Ian, Co-managing home energy demand project).
- **Current trends in Australian cooling practices:**
 - Increasing penetration and multiplication of cooling appliances
 - Larger cooled floor space (open plan format)
 - Increasing duration/ intensity of usage
 - Increasing number of rooms with air-conditioning

Where to next?

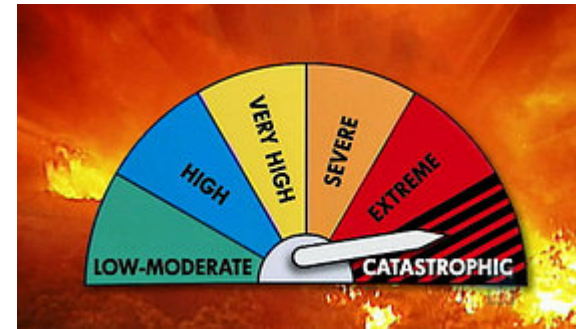


Rethinking communication & engagement



Learning from other successful campaigns

- **Water restrictions/ targets**
- **Natural disasters**
- **Bushfire alert systems**
- **Health campaigns**
- **Critical peak alerts/ pricing**
- **Energy shortages**



See: Nicholls, L. & Strengers, Y. 2014, 'Air-conditioning and antibiotics: Demand management insights from problematic health and household cooling practices', *Energy Policy*, 67, pp 673–681
<http://dx.doi.org/10.1016/j.enpol.2013.11.076>

Creating opportunities for 'slow time' and 'cold spots'



*'So last time we had a power out, I said, "When there's power outages **more babies get made.**" [Laughter] Because there's nothing to do!' (Cath).*

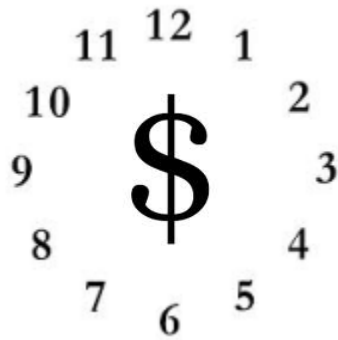
*'**We use it as a bit of fun.** ... "Okay, it's a red light – candles everybody!" ... You know the TV's off and that sort of thing' (Household 50, PhD*

See: Leshed, G & Sengers, P 2011, "'I lie to myself that i have freedom in my own schedule": productivity tools and experiences of busyness', paper presented to Proceedings of the 2011 annual conference on Human factors in computing systems, Vancouver.

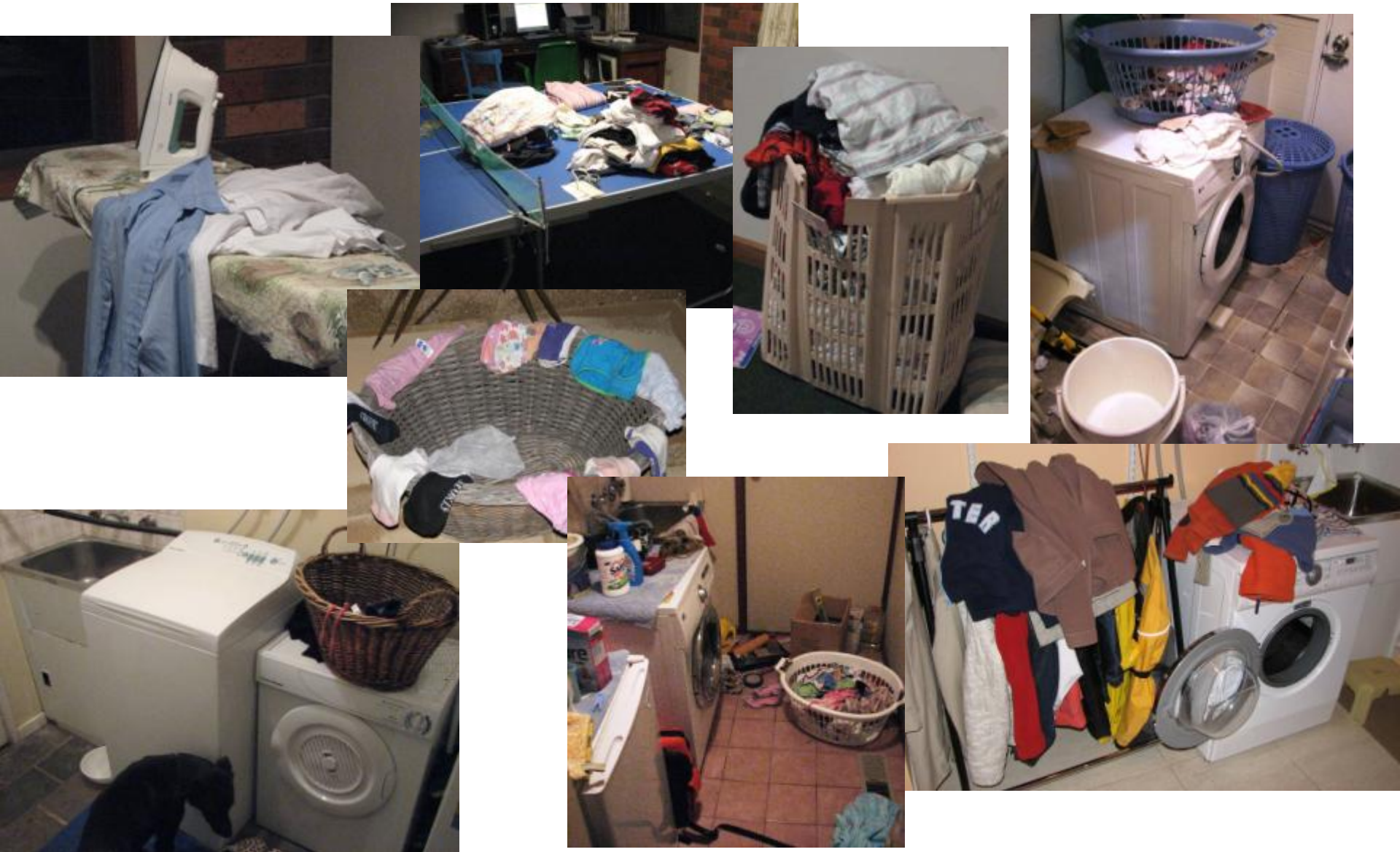
Southerton, D 2003, "Squeezing time': allocating practices, coordinating networks and scheduling society', *Time & Society*, vol. 12, no. 1, pp. 5-25.

Redefining 'smartness'

- From this...



To this...



Acknowledgement

‘Changing demand’ project: <http://familyenergystudy.net>, funded by the Consumer Advocacy Panel (www.advocacypanel.com.au) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas. The views expressed in this document do not necessarily reflect the views of the Consumer Advocacy Panel or the Australian Energy Market Commission.

‘Changing demand’ co-investigator: Dr Larissa Nicholls