

Smart Grids, Messy Society?

An evaluation of the implementation of smart grids in Australia

*Assoc Prof Heather Lovell
University of Tasmania
Seminar – 22nd May 2015*







What I will cover

1. Overview of the ARC Fellowship research
2. Paper – policy dynamics
3. Conclusions

1. OVERVIEW OF THE RESEARCH

In a nutshell

- How is learning is taking place from the early implementation of smart grids in Australia, and with what effect?
- contributes to 2 broad strands of scholarship about *innovation* from **policy studies** and **science and technology studies**
 - aims to rectify a lack of attention to **geography** and the particularities of place that is common to both sets of theory

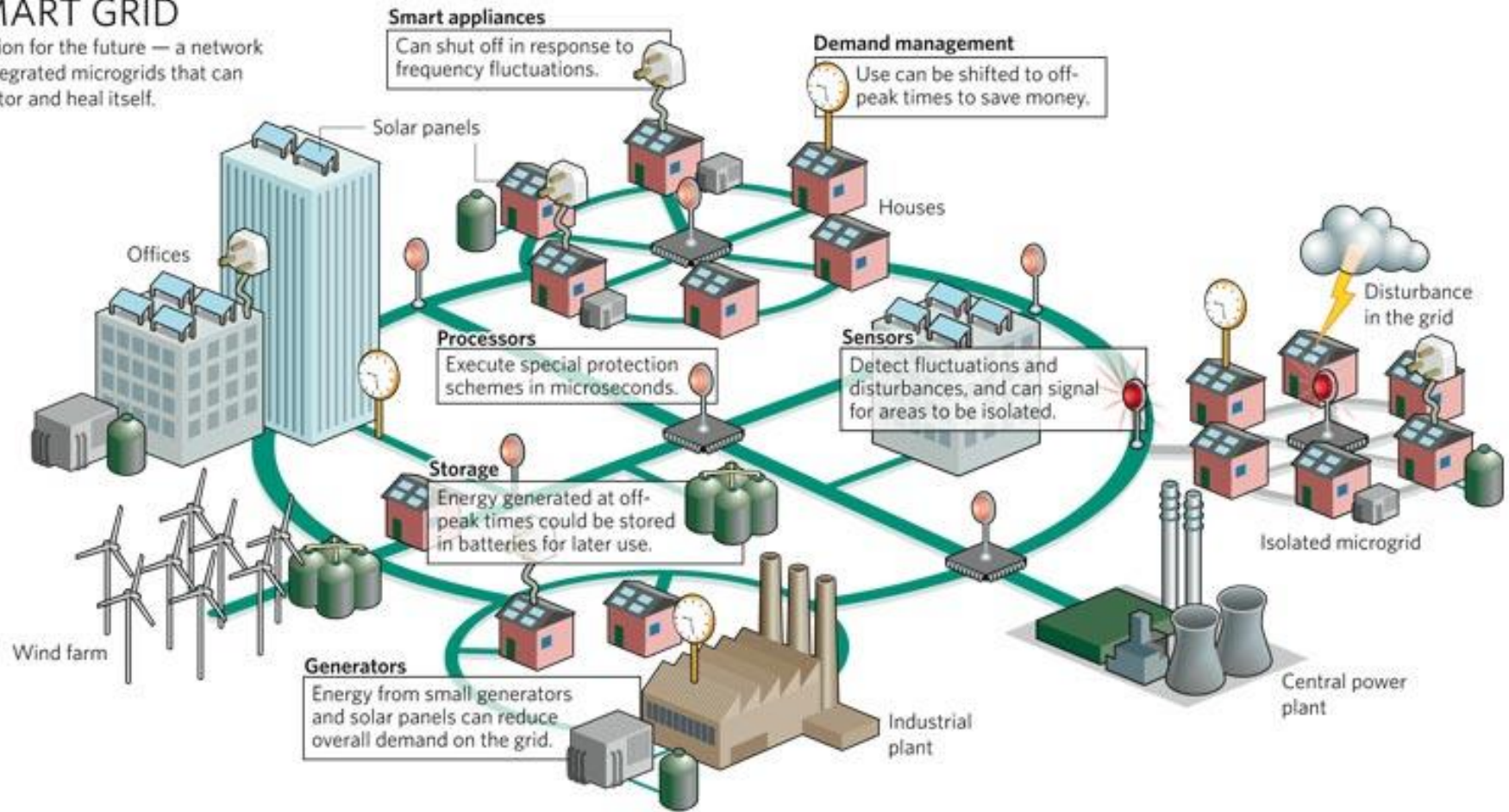
theories of
policy change

Visibility
Materiality
Spatial logics
of learning

theories of
technology
innovation

SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



<http://smartgridtech.files.wordpress.com/2012/05/sg-nature.jpg>

a “nationwide network that uses information technology to deliver electricity efficiently, reliably, and securely”

US National Institute of Standards and Technology (NIST), 2013.

“Our national electricity system is like an old car. It works, but could be more efficient, and is sometimes unreliable. Like a modern car, a smart grid conducts regular checks to make the electricity system work smarter and better, reducing running costs in the long term and responding to changing conditions and emergency situations.”

<http://www.industry.gov.au/Energy/Documents/smart-grid/smart-grid-factsheet1.pdf>



z-Credit 500

3200
imp/kWh

88888888 kWArh
88
*E1▶R: L1 ON
*E2▶R: L2 ON
LAN
WAN
HAN

Config

Scroll

SECURE

1 Phase, 2 Wire, 240V, 10-100A, CI 1.0, 50Hz

USM82012



Type Code: E1E102
1E/2E, Year 2009
Integrated Communication:
Mesh Radio LAN ZigBee HAN WAN Port

Service disconnect
relay : 100Amps
Load control relay
SW1(L1): 31.5Amps

SILVER SPRING

Mesh Radio



NZ2834

Four areas of enquiry

Policy problems & solutions: Do smart grids provide a solution to the multiple policy problems on the Australian utility infrastructure agenda? What sorts of new data and knowledge are enabled by smart grids, and who does this benefit?

Discourse: What constitutes the political vision of Australian smart grids (ie what are its political drivers; what work does the term 'smart grids' do, and for whom)?

Experimentation and learning: How are smart grids being operationalized in Australia, and with what results? How have early experiments with smart grids affected subsequent policies, programmes and initiatives? What insights are provided by the early public acceptance or rejection of other related technologies?

The geographies of innovation and learning: how is learning from experiments with smart grids being adapted to fit different contexts (including internationally, state-by-state within Australia, and in the context of other utilities (water, transport, gas))? For instance, how is Tasmania adapting the notion of smart grids (originally conceived of for large cities) to its more dispersed rural population? At an international scale, what information or knowledge sharing has been taking place between Australia and other leading smart grid countries, and with what effect?

Why Australia?

- International leader on smart grids: world's first smart grid standard, world's largest smart grid experiment
 - the State of Victoria *Advanced Metering Infrastructure* project (2006+)
 - the Federal Government *Smart Grid Smart City* project (2010-13)





Stop Smart Meters Australia

Fighting for your financial & physical health, privacy, and safety in Australia



<http://www.peoplepowervictoria.org.au/home>
<http://stopsmartmeters.com.au/>

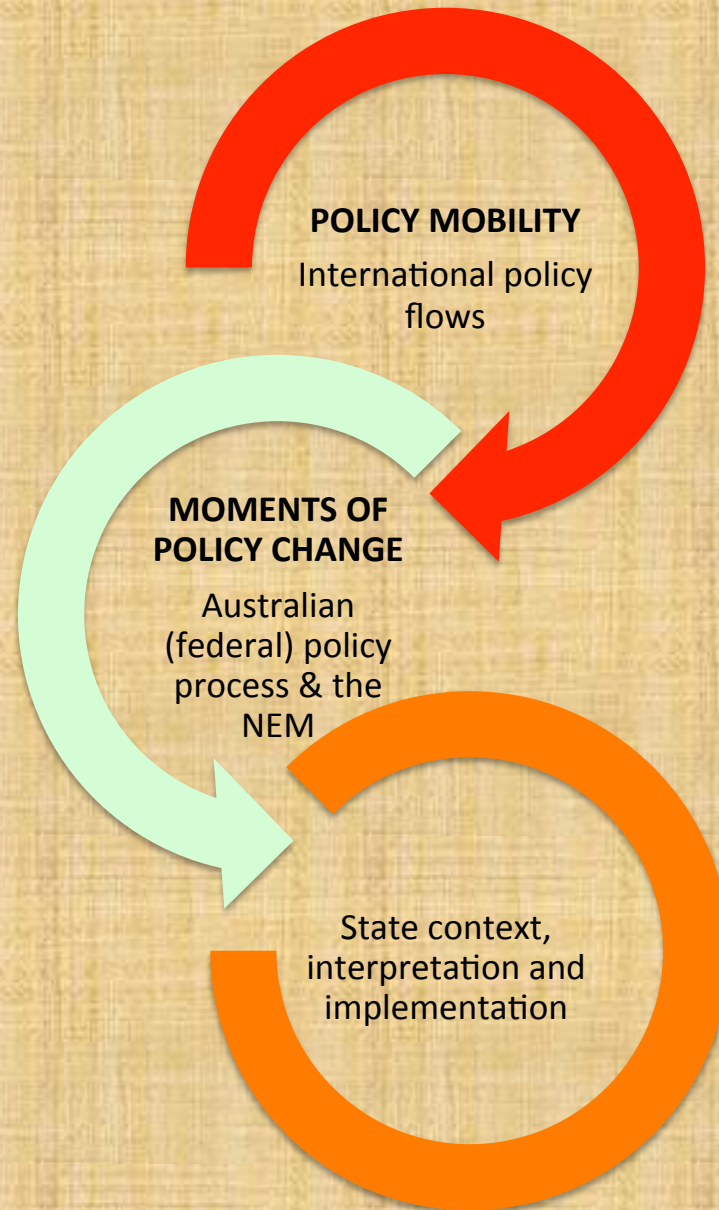
**2. PAPER: “FAST POLICY SLOWS
DOWN & SETTLES: THE CASE OF
ADVANCED METERS IN AUSTRALIA”**

In a world of international ‘fast policy’ what happens when policies settle in a particular place?

Are tensions evident between fixity and flows?

Between local context and global flows of policies, knowledge and expertise?

How do flows (of policies, problems, politics) continue to have influence, even once a policy decision has been made?





z-Credit 500

3200
imp/kWh

88888888 kWArh
88 Hz kWh
*E1▶R: L1 ON * WAN
*E2▶R: L2 ON * HAN

Config

Scroll

SECURE

1 Phase, 2 Wire, 240V, 10-100A, CI 1.0, 50Hz

USM82012



Type Code: E1E102
1E/2E, Year 2009

Service disconnect
relay : 100Amps
Load control relay
SW1(L1): 31.5Amps

Integrated Communication:
Mesh Radio LAN ZigBee HAN WAN Port

SILVER SPRING

Mesh Radio



NZ2834



2007 COAG Policy
mandatory
implementation of
advanced meters
across the National
Electricity Market



**2009 Rule change
in the National
Electricity Law [8a]**
to allow for
mandatory
installation
[National Electricity
(South Australia)
(Smart Meters)
Amendment Bill
2009]



**2012 Power of
Choice Review**
advocates a
market-led
implementation
process, through
introducing
competition in
metering services



**2013 National
Electricity Law [8a]
change revoked**
[Statutes
Amendment (Smart
Meters) Bill 2013]

- *curious degree of uncertainty about what sort of a policy Australia now has for advanced meters, and why*

Methodology/data collection

INTERVIEWS (Apr-May 2015)

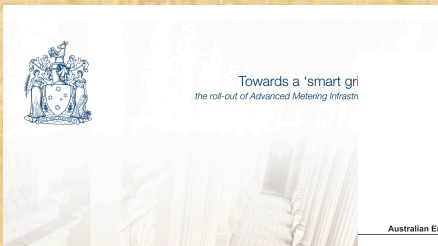
- #001 state government
- #002 environmental Consultancy
- #003 energy market governance
- #004 standards organisation
- #005 utility
- #006 standards organisation
- #007 energy market governance
- #008 industry body
- #009 state government
- #010 federal government
- #011 industry body
- #012 utility
- #013 consumer organisation
- #014 research institute

MEETINGS (Feb-May 2015)

- A1 25/02/2015 state government
- A2 06/03/2015 state government
- A3 24/03/2015 utility
- A4 30/04/2015 AEMC public forum, Sydney

POLICY DOCUMENT REVIEW

c30 industry, government and NGO reports; plus many websites



Towards a 'smart grid'
the roll-out of Advanced Metering Infrastructure

Australian Energy Market Commission

DRAFT RULE DETERMINATION

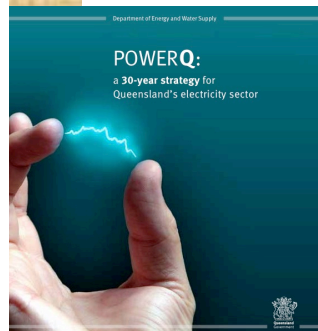
National Electricity Amendment (Expanding competition in metering and related services) Rule 2015

National Energy Retail Amendment (Expanding competition in metering and related services) Rule 2015

Rule Proponent
COAG Energy Council
26 March 2015



RULE CHANGE



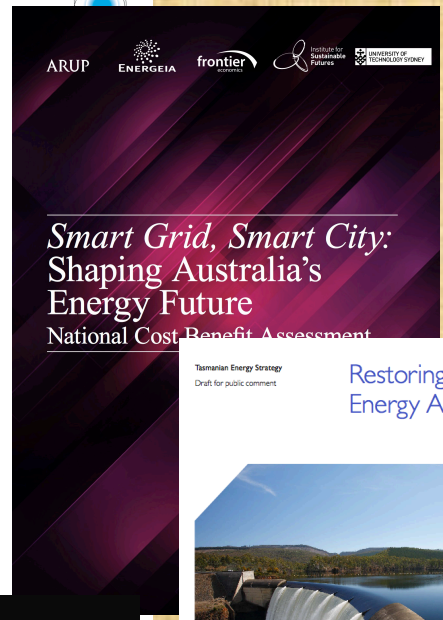
POWERQ:
a 30-year strategy for Queensland's electricity sector

Australian Energy Market Commission

FINAL REPORT

Power of choice review - giving consumers options in the way they use electricity

30 November 2012



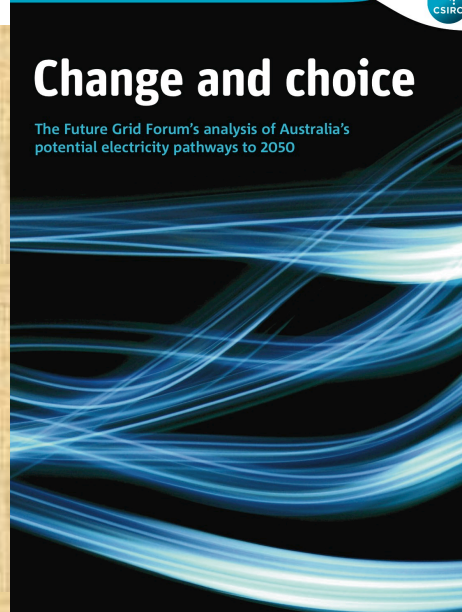
Smart Grid, Smart City:
Shaping Australia's Energy Future
National Cost Benefit Assessment

Tasmanian Energy Strategy
Draft for public comment

Restoring Tasmania's Energy Advantage



STATE OF THE ENERGY MARKET



Change and choice

The Future Grid Forum's analysis of Australia's potential electricity pathways to 2050



MINIMUM FUNCTIONALITY OF ADVANCED METERS

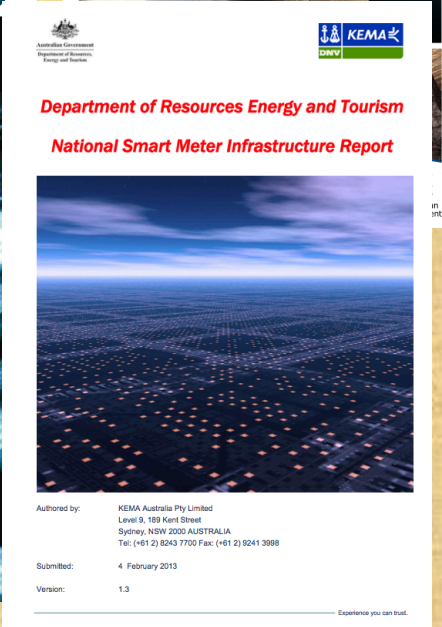
ADVICE TO COAG ENERGY COUNCIL

November 2014



Energy White Paper 2015

www.ewp.industry.gov.au



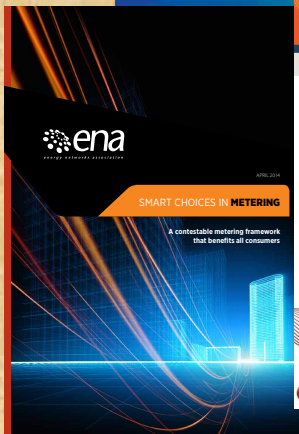
Department of Resources Energy and Tourism
National Smart Meter Infrastructure Report

Authorised by: KEMA Australia Pty Limited
Level 9, 189 Kent Street
Sydney, NSW 2002 AUSTRALIA
Tel: (+61 2) 9243 7700 Fax: (+61 2) 9241 3998

Submitted: 4 February 2013

Version: 1.3

Experience you can trust.



SMART CHOICES IN METERING

A contestable metering framework that benefits all consumers

April 2014

Initial empirical findings

1. International flows of advanced meter policies

- significant efforts at international promotion and learning from elsewhere
- positioning of Australia in relation to these

2. Messiness of the policy process

- an advanced meter policy was adopted in Australia in 2007, but lots has since changed
- original policy problem that advanced meters were the solution to - peak demand - is no longer a big problem (and was never a problem in all places from the start)
- advanced meters were implemented in the State of Victoria and this did not go well

So how can we explain this?

- 1. International flows:** policy mobility, transfer and 'fast policy'
- 2. Messiness of the policy process:** Kingdon's multiple streams framework



1. Policy mobility, transfer and 'fast policy'

“...networks of policy advice, advocacy, and activism now exhibit a precociously transnational reach; policy decisions made in one jurisdiction increasingly echo and influence those made elsewhere; and global policy ‘models’ are exerting normative power over significant distances.”
(Peck 2011: pp773).

2. Messiness of the policy process

Policy Stream Convergence

Problem

Policy

Politics

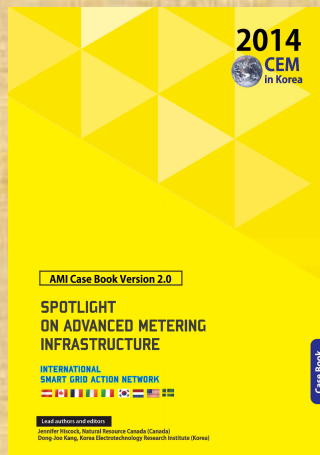
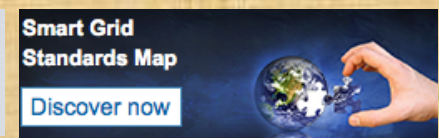
Policy
Window



“Policy windows open infrequently, and do not stay open long. Despite their rarity, the major changes in public policy result from the appearance of these opportunities.” (Kingdon, 2003: 166).

International flows of advanced meter policy

- **International Smart Grid Action Network (ISGAN)** “... a mechanism for multilateral government-to-government collaboration *to advance the development and deployment* of smarter electric grid technologies, practices, and systems. It aims to improve the understanding of smart grid technologies, practices, and systems *and to promote adoption of related enabling government policies.*” (emphasis added, <http://www.iea-isgan.org/?c=1>)
- **The Global Smart Grid Federation** aims to: “... *Support rapid implementation of Smart Grid technologies...*” and to “*Foster the international exchange of ideas and best practices on energy issues*” (emphasis added, <http://www.globalsmartgridfederation.org/about-gsgf/>).



“Case studies offer the reader points of comparison but, more importantly, tell stories in a brief and concise way that makes it easier for the reader to extract key points and gain important insights...This Case Book attempts to structure the case studies *in such a way that their stories can be understood and leveraged by others.*” (pp.2).

“We went to New Zealand and had a look over there to see how they've done it there. That's been quite influential on the thinking here.”

(Interview 001, state government, April 2015).

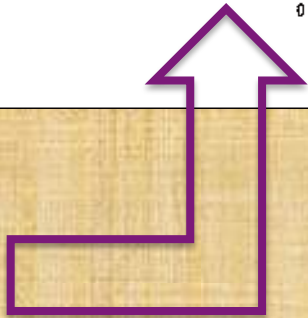
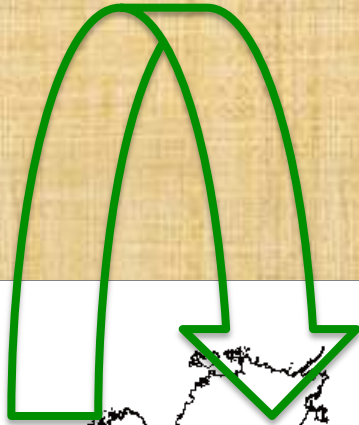
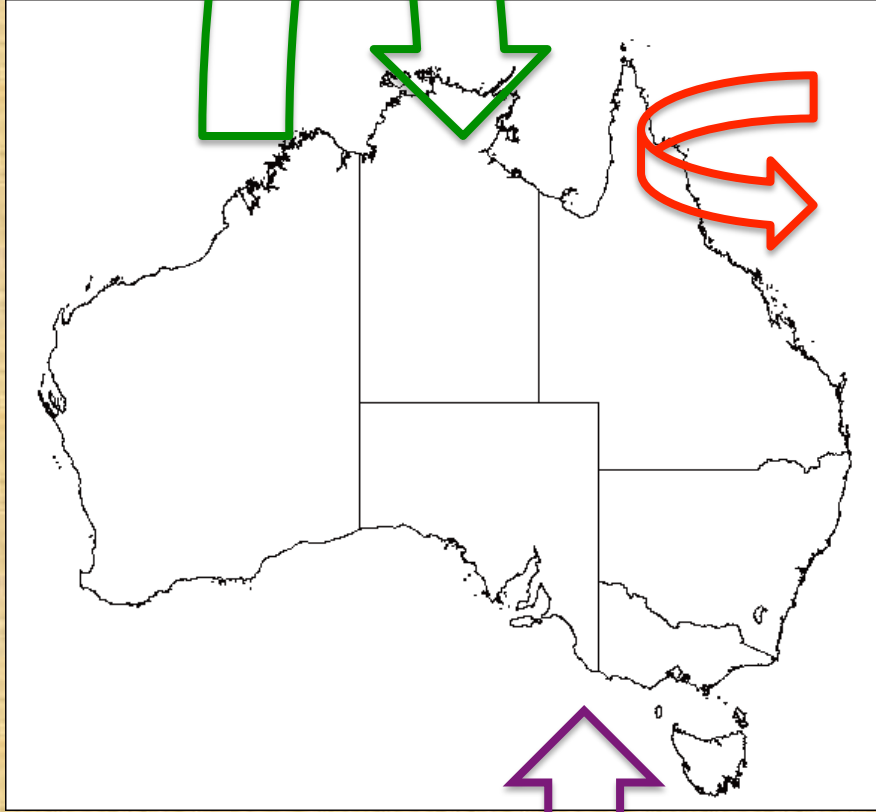
“Australia is comfortably positioned behind the global leaders in Smart Grid technology and implementations *so that we are neither on the “bleeding edge” nor too far behind.* We are in a unique position to learn from international pilots and trials which have already demonstrated that there are Smart Grid benefits... Industry respondents to a recent [] survey see the USA as the leader in consumer technology, the Europeans as ahead in integrating renewable energy into the grid, and the Chinese as doing impressive things with sensated infrastructure. *But Australia is “right up there” compared to international counterparts, with existing pilots and roll-outs plus the “Smart Grid, Smart City” initiative seen as international firsts.*”

(Smart Grid Australia, Maximising Consumer Benefits Report (undated; pp48))

“A: In terms of the smart appliances, ... Australia does have a lot of involvement internationally and we are really leaders in the ... we are heading up those projects at the IEC level, so the knowledge in Australia is very good, *as for the uptake, not so much...*

B: The uptake's shocking in Australia, it's just the nature of society, but you'll know that anyway. Australian's are slower at doing things and we're not an authoritarian government in as far as - “everyone's going to smart grid tomorrow” - there's all this conversation about choice and you can choose if you're part of the grid or not part of the grid or ... you know, a lot of places in the world don't give people that choice.”

(Interview 004, standards organisation, April 2015)



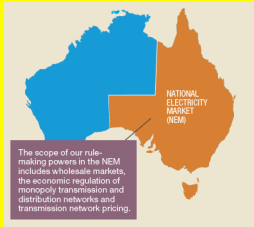
POLITICS: Demand Side Participation, NEM

Improving User Participation in the Australian Energy Market

Discussion Paper

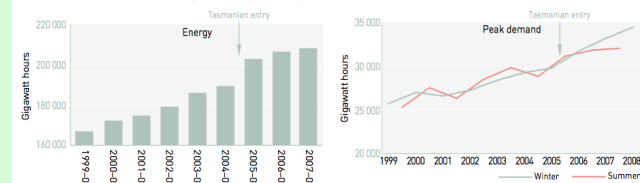
User Participation Working Group
Ministerial Council on Energy Standing Committee of Officials

March 2004



PROBLEM: rising consumption & peak demand

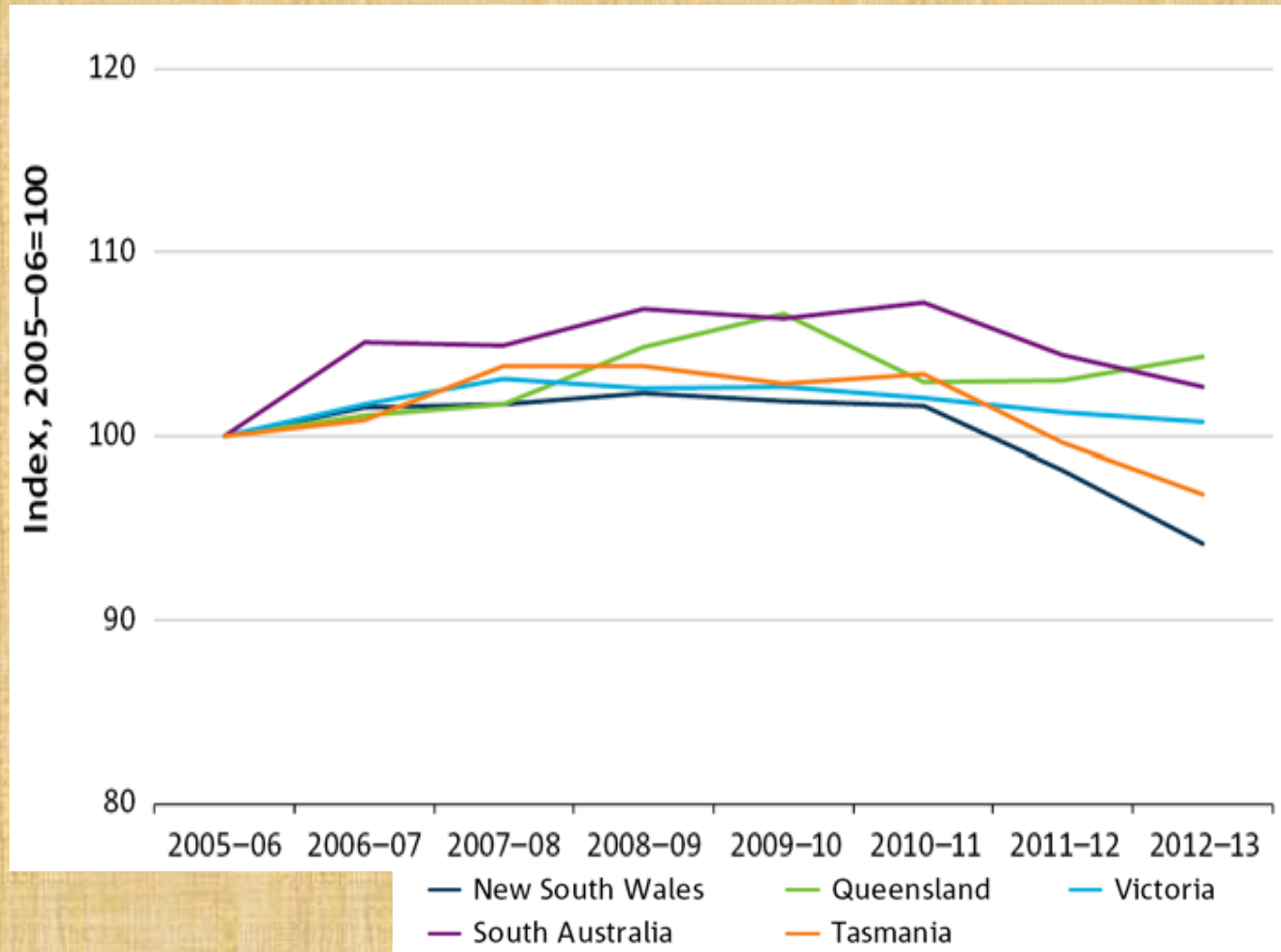
National Electricity Market energy consumption and peak demand since 1999



POLICY:

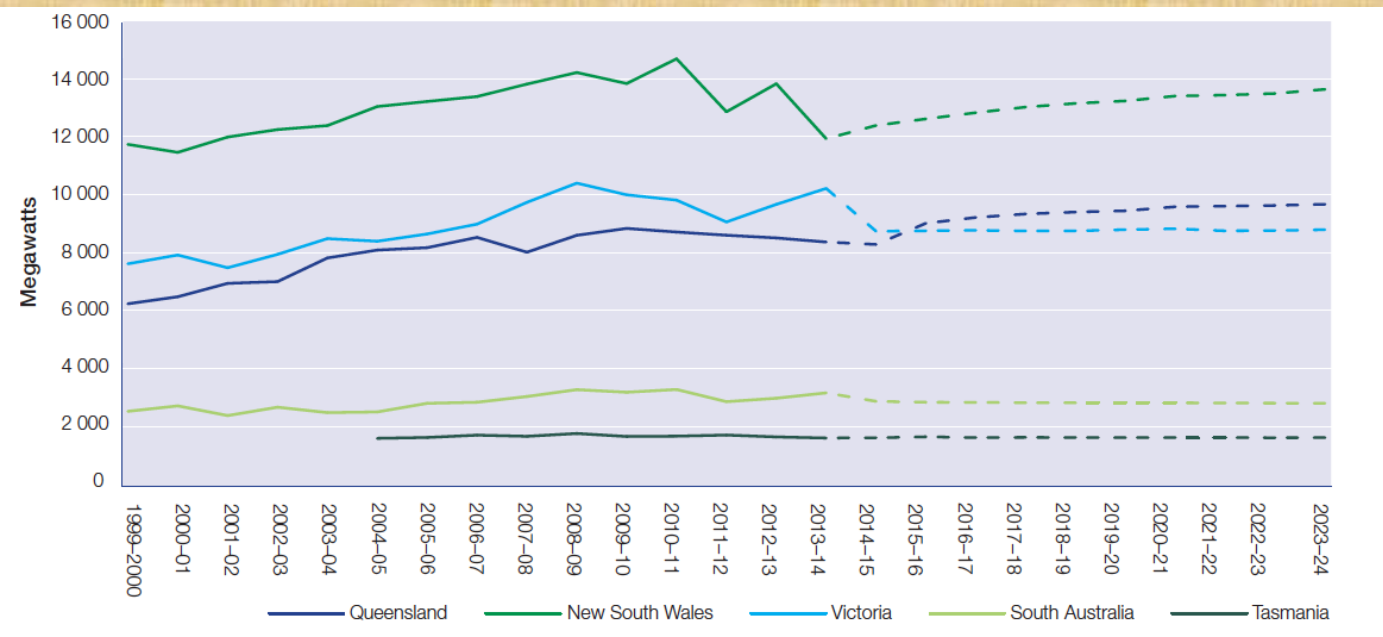


Dynamics in the *problem stream*: falling electricity consumption



Index of historical electricity consumption (TWh) in Australian (NEM) states Source: AEMO (2013)

Dynamics in the *problem stream*: falling peak electricity demand



Annual maximum electricity demand and forecast max demand in Australian (NEM) states

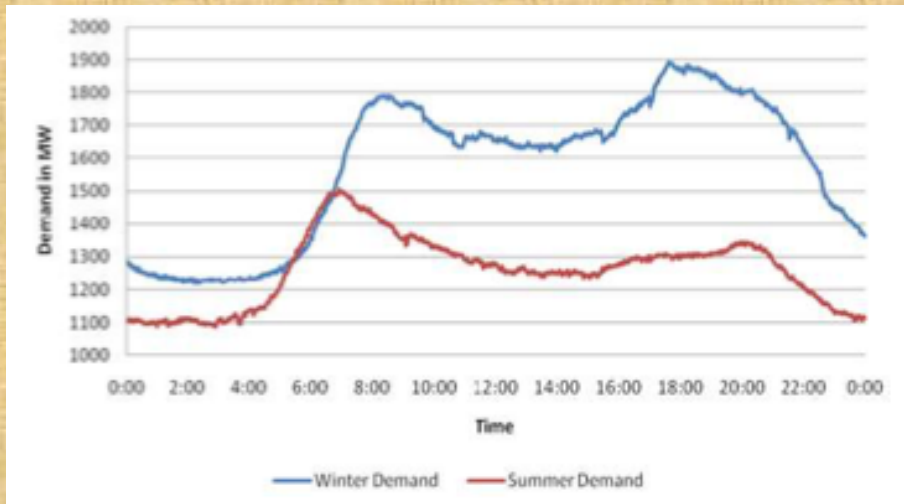
Source: AER State of the Energy Market 2014, pp5.

Source: AER State of the Energy Market 2014, pp24

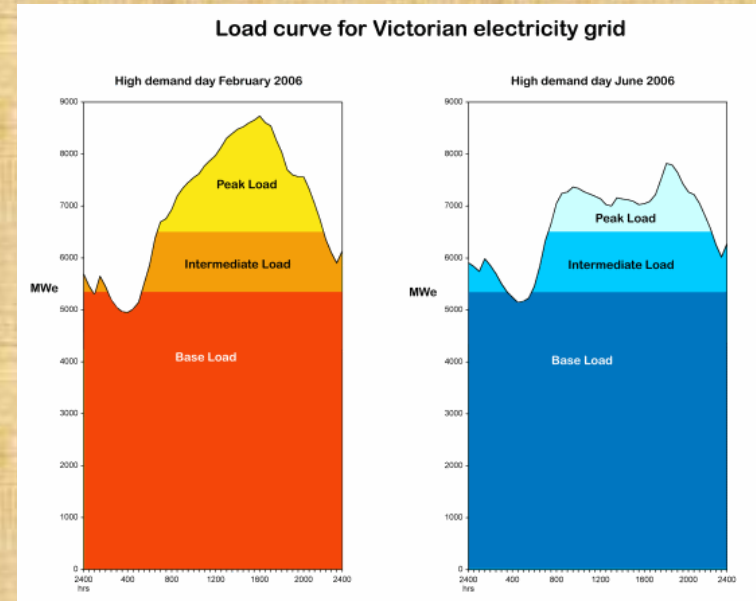
Table 1.2 Maximum demand growth, by region, 2013-14

	QUEENSLAND	NEW SOUTH WALES	VICTORIA	SOUTH AUSTRALIA	TASMANIA
Change from 2012-13 (%)	-1.6	-13.6	5.6	5.9	-2.1
Change from historical maximum (%)	-5.2	-18.6	-1.7	-3.4	-8.2
Year of historical maximum	2009-10	2010-11	2008-09	2010-11	2008-09

Dynamics in the *problem stream*: state-to-state variation



(source: Electricity Supply Industry Expert Panel, 2012; pp15)



source - <http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/Appendices/Australia-s-Electricity/>; accessed 20 May 2015

TASMANIA

vs.

VICTORIA

Dynamics in the *problem stream*: ‘the death spiral’

The screenshot shows a news article from Business Spectator. The main headline is "Australia stares down an electricity 'death spiral'". The article is dated 11 DEC 2013, 7:14 AM. The author is TONY WOOD. The article discusses the challenges facing Australia's electricity transmission and distribution network businesses, including rising prices and falling demand. It mentions that electricity prices have doubled in recent years and that consumers are paying some of the highest prices in the developed world. The article also notes that the economy has become less reliant on electricity as it moved away from electricity-intensive manufacturing. A photo of power lines is included in the article. The article is part of a series of articles on the "death spiral" of electricity networks, with a link to a previous article titled "Reforms needed to stave off electricity 'death spiral'".

Death spiral begins for Australian electricity companies

Australian electricity prices have doubled over recent years leaving consumers paying some of the highest prices in the developed world. As Jess Hill reports, the bulk of the increase can be attributed to consumers paying off large costs incurred by network companies which have invested in infrastructure, despite demand falling each year since 2009. This makes alternatives such as solar power increasingly attractive, leaving fewer consumers of grid electricity paying the price policy built on false projections.

Australia stares down an electricity 'death spiral'

TONY WOOD | 11 DEC 2013, 7:14 AM | 27 INDUSTRIES | RESOURCES AND ENERGY | CLIMATE | ENERGY MARKETS | SMART ENERGY

Australia's electricity transmission and distribution network businesses are facing some unprecedented challenges and the answers are neither obvious nor painless. A history poor regulation is going to make life more difficult for what were supposed to be low-risk and low-return, regulated monopoly businesses.

One of their biggest problems is that virtually for the first time in 50 years, electricity consumption is falling. Grattan Institute's new report, *Shock to the system: dealing with falling electricity demand*, analyses the consequences of this extraordinary trend and concludes that a big and nasty correction is coming.

For most of the last half of the 20th century, Australia's electricity use grew at a steady rate of 6 per cent a year, on average. But in the early 1990s things began to change. The economy became less reliant on electricity as it moved away from electricity-intensive manufacturing. Nevertheless, the growing economy still drove growth in total electricity consumption.

But around 2006 even a growing economy was not enough. Growth in electricity consumption in the eastern states first flattened and then consumption levels began to fall. In Western Australia the same trend is emerging. In neither place does it show any sign of going away.

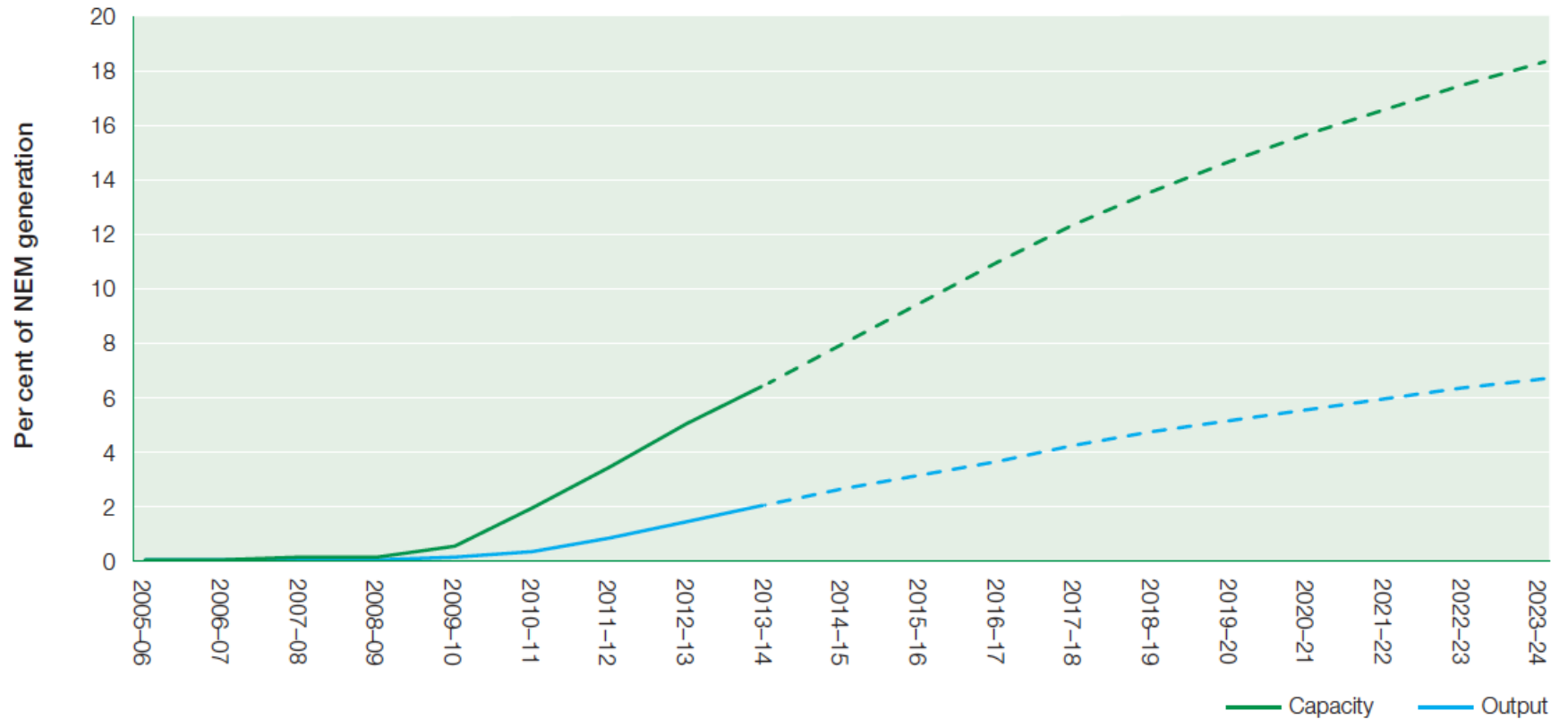
It was a few years ago that economists at AGL Energy started talking about a "death spiral" for the roughly \$100 billion Australia has invested in its electricity networks.

The idea was that as consumers generate their own power from solar panels and supplement this at night with battery storage, they will opt out of the national power grid completely.

“...retail electricity prices have been rapidly escalating, largely as a result of significantly increased investment in networks. This is leading to concerns of a ‘**death spiral**’- that is, high prices driving consumers to invest in solar PV and battery storage and to disconnect from the grid.”

(Department of State Growth (2014) *Draft Tasmanian Energy Strategy* (pp6, emphasis added)).

Solar PV generation capacity and output



Source: AER *State of the Energy Market* (2014, pp29).

Dynamics in the *politics stream*



“...in Victoria they had the mandatory roll-out of electricity smart meters, but I doubt that’s going to be repeated in any other states”

[Interview 006, government institute, April 2015]

“[Victoria] has caused problems because they’ve seen what’s happened there, they’ve had friends and relatives had these terrible things happen to them and they think that, we’re next, it’s going to happen to them too. So there was a lot of negative reaction against the Victorian roll-out from consumers and that has filtered up to here, yeah.

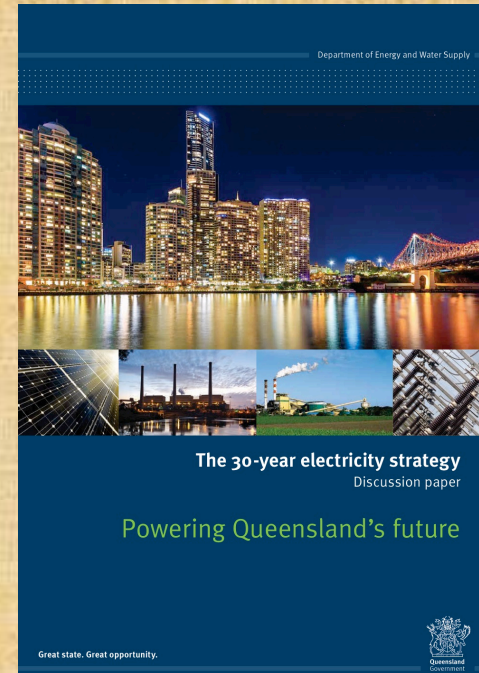
I: And has that made it essentially ... I mean, it seems like it’s made it impossible for any state to go ahead with any kind of mandatory [implementation]...?

M: Yes, that would not happen anymore.”

[Interview 001, state government, April 2015]

“Based on the Victorian experience, the Queensland Government has ruled out a mandated rollout of advanced meters in Queensland and will support the customer-driven approach.”

Queensland Government - Department of Energy and Water Supply (2013) *The 30-year electricity strategy Discussion paper: Powering Queensland's future* (pp12)



“Not only were Victorian customers not given a choice of meters, they were also charged the upfront cost of the meter and its installation, a decision which is still costing them. The [NSW] Government has listened to customers and that is why ultimately customers will decide what they want and when they want it.”

NSW Minister for Resources and Energy Anthony Roberts, *Media Release - NSW GETS SMART ABOUT METERS*, 28 October 2014.

3. CONCLUSIONS

So what? (policy)

- International *and* domestic flows of policy around advanced meters
- Separation of policies, politics and problems helps explain complex twists and turns in advanced meter policy
 - mismatch of these flows helps explain sense of unease and ambiguity about *how and why Australia's advanced meter policy has changed over time*

So what? (theory)



POLICY MOBILITY: A better understanding of context (a framework). Consideration of continued presence of policy flows

MSF: bringing up to date through incorporating international flows. Changes in streams over time mean issues drop in and out of the agenda...

...policy window or cat flap?



THANK YOU – ANY QUESTIONS?