Australian Smart Meter Experience

Summary of Resources

November 2018

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1. Overview

Smart meters generally share two features. The first is their ability to record energy use with a high degree of granularity. Smart meters typically measure electricity consumption in 30-minute intervals and send consumption measurements daily. In the near future, Australian smart meters will enable access to consumer energy data with a granularity of 5 minutes. Smart meters can also be set to measure consumption of particular equipment on site (e.g. air conditioning). The second shared feature is they allow two-way communications between the consumer (e.g. household) and the data manager. This requires access to sophisticated communications technology and infrastructure. This feature means meters can be read remotely and that smart meters can deliver a suite of added services to consumers such as in-home control devices to reduce costs during peak pricing periods and enable new energy management technologies like batteries and photovoltaics.

Australia's interest in smart meters can be traced back to the early 2000s when the Council of Australian Governments (COAG) commissioned an *Energy Market Review* (the *Parer Review*) which recommended the mandated rollout of *interval meters* to households and small business customers to increase demand side participation in the newly formed national electricity market.

Subsequent work at a national level between 2002 and 2006 supported the implementation of new metering arrangements: by this time, advancements in technology meant that *smart meters* were being considered instead of interval meters in order to secure a wider range of customer and network benefits.

In 2007, COAG committed to a national mandated rollout of electricity smart meters in areas where benefits outweighed costs (AEMO 2008). Recognising that overall costs and benefits of advanced metering infrastructure were likely to vary by jurisdiction (especially by states/territories), a National Smart Metering Cost Benefit Study was commissioned to evaluate where an economic case could be made to pilot smart meters. Meter functionality, cost recovery models, privacy concerns and the potential benefits to customers, distributors and retailers were all key issues under consideration. Cost-benefit analyses, principally conducted by external consultants, have been a key technology of smart meter policy-making more generally. Many subsequent programs for smart meter deployment have been the subject of such analyses, including the *Smart Grid Smart City Program* and Victoria's *Advanced Metering Infrastructure Program* (see below).

Shortly thereafter, a *National Smart Meter Program* was announced to coordinate these pilots, which included the *Smart Grid Smart City* initiative and Victoria's *Advanced Metering*

Infrastructure Program, as well as to facilitate changes to enabling legislation. This included a change to the *National Electricity Rules* in 2009 to allow jurisdictions to mandate the rollout of new smart meters.

The sustained interest by Australia in advanced metering during the early 2000s can be set amidst a broader context of the nationalisation and liberalisation of the electricity sector as well as growing concerns about the infrastructure costs of meeting peak load demands (Chandrashekeran et al 2018; Godden and Kallies 2018; Lovell 2016). The ability of more sophisticated metering to support greenhouse gas reduction goals also became an increasingly important narrative justifying smart meter rollouts.

The *Smart Grid, Smart City Program* was a federal government initiative making available up to $100 million for the implementation of a fully integrated smart grid at commercial scale, through the National Energy Efficiency Initiative (NEEI). In total, around $490 million was invested in the Program by all contributors, in particular the successful consortium of AusGrid (one of the three New South Wales electricity distribution entities) and other partners including technology companies, utility companies and universities. Many of the findings and recommendations of the Program – which targeted technological deployment, cost reflective pricing, consumer behaviour change and energy market reform – were developed and implemented as part of subsequent national reforms by the Australian Energy Market Commission (AEMC) – the policy adviser and rule maker for the national electricity market.

Thus far, however, the largest deployment of smart meters has occurred through the state of Victoria's *Advanced Metering Infrastructure Program* and it offers many lessons for smart meter design and delivery in other jurisdictions.

Support for smart meters in Victoria similarly has origins in the early 2000s. The Victorian Essential Services Commission published a ruling in 2004 supporting the mandatory rollout of new manually-read interval metering technology under the promise of increasing retail competition and achieving better economies of scale in the purchasing and rollout of meters. In 2005 the Victorian State Government commissioned consultants CRA International and Impaq Consulting to produce a cost-benefit study of deploying advanced metering with two-way communications capabilities. In 2006 the Government expanded the ESC ruling to approve the rollout of smart meters and in 2007 a technology pilot was conducted by the Victorian Government.

The Victorian *Advanced Metering Infrastructure Program* was implemented between 2009 and 2013 during which time 2.8 million meters were installed covering 93% of households and small businesses. Smart meters were installed by distribution businesses with customers charged upfront AUD$760 for the meter (VAGO 2015).

Two reports from Victoria's Auditor-General (in 2009 and 2015) were highly critical of the overall governance of the *Advanced Metering Infrastructure Program* and the poor delivery of

promised benefits (particularly to consumers). In-home tools to access user-friendly information about electricity use are still not widely taken up, which has led to a failure to drive expected innovation and behaviour change. Time of use pricing, whilst technologically-enabled through the smart meter deployment, has proven politically highly-contentious based on concerns about inequitable impacts particularly for low income and vulnerable households. The rollout lacked a comprehensive communications campaign to encourage consumers to capitalise on the benefits of their meters.

Nevertheless, Victoria now has near-universal provision of advanced metering infrastructure with sophisticated metering functionality, and work is continuing to deliver new initiatives to realise the value of the AMI Program for example, the Centre for New Technologies (www.energy.vic.gov.au/c4net).

Declining electricity consumption and the public backlash of Victoria's mandated distributor-led smart meter rollout shifted the political landscape from the early 2010s towards more market-oriented policies. Consumer choice and innovation within the electricity sector became the dominant policy narratives for smart metering. Some parts of the industry and government began to support a new model where retailers, rather than distributors, would have responsibility for metering services and functions would be minimalist (Chandrashekeran et al 2018).

In 2012, the Australian Energy Market Commission published the Final Report of *The Power of Choice Review* with the stated goal of *'giving consumers options in the way they use electricity'*. Between 2012 and 2018, the AEMC and others have pursued a package of new rules and reviews to implement the recommendations of the *Power of Choice* report.

Of relevance to metering, the AEMC has introduced *competition in metering* reforms. From 1 December 2017, all new and replacement meters within the National Electricity Market will be 'smart meters'. Metering services have been unbundled and can now be subject to competition. Responsibility for metering services has been shifted from distributors to retailers, who will also be able to offer smart meters to customers of their choice; customers will also be able to request smart meters from their retailers. The AEMC has set a minimum threshold of smart meter functionality for the national rollout, which is lower than the Victorian program; it is argued that customers will be willing to pay for higher functionality where they see value in doing so. A single retailer does not own all the customers on a street therefore, compared to a distributor-led rollout, the retailer-led rollout is slower and has higher per meter installation costs. It is as yet unclear how these higher costs are being passed on to consumers. The lack of scale will also delay universal deployment with some estimates suggesting the full transition to smart meters could take over 30 years.

In the last three years, two major shifts have intersected with – and are reshaping – the rollout of advanced metering infrastructure.

The first is the ongoing debate about energy market reform, particularly to control spiralling energy prices and to address security-of-supply concerns after some high profile blackouts. Energy prices and energy security are politically charged issues in Australia and consumer engagement with the market and demand management are receiving increasing attention.

The second is the increasing focus on the kinds of risks and benefits that smart meter technology has enabled through access to electricity consumption data. In 2017, the Productivity Commission published its inquiry report into *Data Use and Availability* in which it proposed an overhaul of Australia's data regulatory framework and recommended a new Consumer Data Right. In the same year, the Australian Government commissioned a report into *Open Banking in Australia*, which put forward a proposed framework for the new Consumer Data Right; a range of issues identified in this report were the subject of further intense public scrutiny the subsequent *Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry*. In parallel, *Australian Consumer Law* has also been reviewed between 2015 and 2017.

The Australian Government has since embarked on a program of reform to legislate the Consumer Data Right. This will be implemented initially in the energy, banking and telecommunications sectors. Framework legislation for the Consumer Data Right is currently under consideration (Australian Government Treasury 2018). Sector-specific regimes, including for the electricity sector, are to be developed subsequently. In 2018, the COAG Energy Council commissioned consultants HoustonKemp Economists to prepare a consultation paper on *Facilitating Access to Consumer Energy Data*; it outlines plans to create a platform of raw energy use data that third parties can access subject to accreditation processes and consumer consent.

The Australian experience with smart meter deployments extends over 15 years and continues to unfold as Victorians seek to realise a wider spectrum of consumer benefits promised under their mandated high-functionality smart meter rollout, as the unbundling and contestability of metering services across the national electricity market continues, as Australia's consumer data landscape is reshaped, and as the 'smart' agenda builds momentum.

2. Lessons from the Australian experience

Australia has now considerable experience with a comprehensive smart meter rollout in Victoria, as well as limited experience from a more recently commenced rollout across the rest of Australia (excluding Western Australia and the Northern Territory). A core problem of the Victorian rollout was the lack of consumer benefits proportionate to the costs of the rollout. Robust governance and monitoring regimes will be crucial for the social acceptance of new technology.

One of the authors, Dr Chandrashekeran, has recently co-published a report on customer-focussed rollouts that identified a range of key issues with the AEMC rollout, which can provide important lessons for Germany.

Key recommendations include:

- Development of consistent and simple communications around smart meters for all households, notifying them of their entitlements and rights
- A public campaign to raise consumer awareness about benefits of smart meters, including access to energy data and a process for user-friendly access to this data
- Targeted communications for vulnerable consumers
- Mandating of single standard meter data format for all customers
- Provision of high quality user-friendly tariff comparison websites
- Provision of information about benefits, cost and risk of smart meter services
- A regular review of consumer protection frameworks
- Regulating for transparency around additional costs of smart meters, including a monitoring and reporting system on smart meters
- Apart from ensuring a flow of benefits to the consumer, the protection of consumer data and consumer privacy more generally has been a pressing issue in public discussion. As discussed above, with the consumer data right under consideration this is currently an area in development.

Some key items for future research include:

- consumers' comprehension and their effective capacity to consent to third party use of their data

- particular risks for vulnerable groups, such as the possibility to combine data sets across sectors and potentially discriminate against customer groups deemed 'uneconomic' by service providers

We need to find meaningful ways to reduce energy prices and expand new energy services like solar and electric vehicles across Australia. This involves both empowering consumers through a clear and streamlined approach to energy data use and access, and a strong data governance regime that protects consumers against new vulnerabilities and risks.

3. About the Authors

This report draws on work undertaken by Dr Svenja Keele, Dr Sangeetha Chandrashekeran, Professor Lee Godden (all University of Melbourne) and Dr Anne Kallies (RMIT) for the Energy Transition Hub. The Australian-German Energy Transition Hub is supported by the Commonwealth through the Department of Foreign Affairs and Trade.

Relevant previous publications by the authors include:

- Chandrashekeran, S., Dufty, G. and Gill M. 2018 *Smart-er Metering Policy: Getting the framework right for a customer-focused smart meter rollout*, University of Melbourne: Victoria.
- Godden, L. and Kallies, A. 2018 'Smart Infrastructure: Innovative Energy Technology, Climate Mitigation and Consumer Protection' in Zillman, D., Godden, L., Paddock, L & Roggenkamp, M. (eds) *Innovation in Energy Law and Technology: Dynamic Solutions for Energy Transitions*, OUP: Oxford

4. Australian Smart Metering Timeline and Key Reports

National Program

2002 COAG *Energy Market Review* (*Parer Review*)

2007 COAG commits to national mandated smart meter rollout subject to cost-benefit analysis

2007 COAG *National Smart Meter Program*

2008 NERA Consulting *Smart Metering for Electricity Consumers in Selected Jurisdictions* (for AEMC)

2008 NERA Consulting *Cost Benefit Analysis of Smart Metering and Direct Load Control, Overview Report for Consultation* (for MCE)

2009 Changes to National Electricity Rules to allow mandated rollout (later revoked in 2013)

2010 AEMC *Request for Advice on Cost Recovery for Mandated Smart Metering Infrastructure*

2012 AEMC *Power of Choice Review*

2012 AEMC *Power of Choice Supplementary Paper – Principles for Metering Arrangements*

2013 KPMG *The National Electricity Market – A case study in microeconomic reform* (for AEMC)

2014 Energy Networks Australia *Smart Choices in Metering*

2017 AEMC smart meter rollout starts 1 December

2014-2018 AEMC reviews and rule changes to implement the competition in metering reforms, including making metering services contestable, developed a shared market protocol for electricity business-to-business communications framework, meter replacement and customer transfer processes, fixing inaccurate meter reads, metering installation timeframes, improving demand side participation information provision, and improving customer access to information about their energy consumption.

Smart Grids, Smart Cities Program

2009 Australian Government – Smart Grid Smart City A New Direction for a New Energy Era

2014 AusGrid – Smart Grid Smart City Executive Report

2016 Australian Government – Smart Cities Plan

Victoria's Advanced Metering Infrastructure Program

2004 Victorian Essential Services Commission – Mandatory rollout of interval meters for electricity customers - Final decision

2005 CRA and Impaq Consulting– Advanced Interval Meter Communications Study (for Victorian Department of Infrastructure)

2006 Mandatory rollout approved by Victorian Government

2007 Victorian Department of Primary Industries – AMI Technology Trials Report November 2007

2009 St Vincent de Paul – Customer Protections and Smart Meters: Issues for Victoria

2009 Victorian Auditor-General's Office – Towards a smart grid - the rollout of AMI

2009-2013 Advanced metering infrastructure program implementation

2010 Oakley Greenwood – Benefits and costs of the Victorian AMI Program - Final Report (for Victorian Department of Primary Industries)

2010 Victorian Essential Services Commission – Regulatory Review – Smart Meters Final Decision

2011 Victorian Department of Treasury and Finance – Review of the advanced metering infrastructure program – Issues paper for public consultation

2011 Lockstep Consulting – Privacy impact assessment of Victoria's advanced metering infrastructure (for Victorian Department of Primary Industries)

2011 Deloitte Consulting – Advanced Metering Infrastructure Cost Benefit Analysis (for Victorian Department of Treasury and Finance)

2011 Deloitte Consulting – Advanced Metering Infrastructure Consumer Impact Study (for Victorian Department of Primary Industries)

2012 Deloitte Consulting – Flexible Pricing Customer Impact Study (for Victorian Department of Primary Industries)

2015 Victorian Auditor-General's Office – Realising the benefits of Smart-Meters

2016 Victorian Energy and Water Ombudsman – Solar and Smart Meter Report

Energy Policy and Data Reform

Australian consumer law

2013 Australian Government – *Australia Consumer Law – A framework review*

2017 Australian Government – *Australian Consumer Law Review Report*

National energy policy reforms

2017 Dr Alan Finkel – *Blueprint for the Future: Independent Review into the Future Security of the National Electricity Market*

2017 Australian Government – *A Better Energy Future for Australia*

Data and privacy

2014 The Australian Privacy Principles replace the National Privacy Principles and Information Privacy Principles

2015 Australian Government – *Prime Minister's Public Data Policy Statement*

2017 Productivity Commission – *Data Use and Availability Inquiry Report*

2017 Australian Government Treasury – *Review into Open Banking*

2018 Australian Consumer Competition Commission – *Consumer Data Right Rules Framework*

2018 Australian Government Treasury – Consumer Data Right

2018 HoustonKemp Economists - *Facilitating Access to Consumer Energy Data – Consultation Paper* (for COAG Energy Council)

5. Additional references

Chandrashekeran, S., Dufty, G. and Gill M. 2018 *Smart-er Metering Policy: Getting the framework right for a customer-focused smart meter rollout*, University of Melbourne: Victoria.

Godden, L. and Kallies, A. 2018 'Smart Infrastructure: Innovative Energy Technology, Climate Mitigation and Consumer Protection' in Zillman, D., Godden, L., Paddock, L & Roggenkamp, M. (eds) *Innovation in Energy Law and Technology: Dynamic Solutions for Energy Transitions*, OUP: Oxford.

Lovell, H. 2017. "Mobile Policies and Policy Streams: The Case of Smart Metering Policy in Australia." *Geoforum* 81: 100-08.

Lovell, H. 2016, "The Role of International Policy Transfer within the Multiple Streams Approach: The Case of Smart Electricity Metering in Australia." *Public Administration* 94, no. 3: 754-68.

Lovell, H. 2017. "Are Policy Failures Mobile? An Investigation of the Advanced Metering Infrastructure Program in the State of Victoria, Australia." *Environment and Planning A: Economy and Space* 49, no. 2: 314-31.

Lovell, H. 2018. "The Promise of Smart Grids." *Local Environment* [Online First]

6. Key legislation[1]

Provisions for metering are set out in subordinate legislation; the National Electricity Rules (under the National Electricity Law) and the National Electricity Retail Rules (under the National Electricity Retail Law). Changes to this over-arching legislative framework to enact the 'competition in metering reforms' were adopted by the AEMC in 2015. The NEL, NERL together with federal and state privacy and consumer law form the customer protection framework in relation to metering.

National Electricity Law (NEL) and National Electricity Rules (NER)

- The NEL is contained in a Schedule to the *National Electricity (South Australia) Act 1996*. The NEL is applied as law in each participating jurisdiction of the NEM by application statutes.
- The *National Electricity Rules* govern the operation of the national electricity market (NEM) and are made by the AEMC under the NEL.
- In making the NER, the AEMC is required by law to apply the *National Electricity Objective* to 'to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to: price, quality, safety and reliability and security of supply of electricity and the reliability, safety and security of the national electricity system.'
- Rules are regularly amended by the AEMC.
- The states continue to be responsible for the licensing of electricity industry participants as well as the reliability and safety standards for electricity supply regimes.

[1] Electricity law in federated states such as Australia is highly complex; this section identifies some of the principal pieces of enabling legislation but is not intended to be comprehensive.

National Energy Retail Law (NERL) and National Energy Retail Rules (NERR)

- The NERL is set out in the *National Energy Retail Law (South Australia) Act 2011*. The extent to which this law applies in each state and territory depends on the application of legislation passed by each jurisdiction.
- The *National Energy Retail Rules* govern the operation of the National Energy Retail Market. The Rules have the force of law, and are made under the NERL.
- The NERL, NERR and the National Energy Retail Regulations are the principal suite of legal instruments that comprise the *National Energy Customer Framework* (NECF), which regulates the sale and supply of electricity and gas to retail customers. Application Acts in each participating jurisdiction set out the specific jurisdictional arrangements of each jurisdiction for transitioning to the NECF, and any jurisdiction-specific requirements.
- The NECF provides energy-specific consumer protections and operates alongside the *Australian Consumer Law* set out in Schedule 2 of the *Competition and Consumer Act 2010*. The Australian Consumer Law applies in all states and territories and applies to all Australian businesses. It provides consumer protections in areas such as unfair contract terms, product safety, misleading information, marketing, quality guarantees and product liability.

AEMC Competition in Metering Reforms

- Principal changes to national metering services were enacted by the AEMC through *National Electricity Amendment (Expanding competition in metering and related services) Rule 2015* and *National Energy Retail Amendment (Expanding competition in metering and related services) Rule 2015*.
- Additional electricity market reviews and rule changes are outlined at https://www.aemc.gov.au

Victorian Advanced Metering Infrastructure Program

- An amendment to the *Electricity Industry Act 2000* (Vic) provided the authority for the government to make orders for advanced metering infrastructure.

Customer Protection Framework

- Retailers and distributors handling data are subject to security obligations in chapter 7 of the NER. This chapter of the rules sets out requirements around the collection of metering data, data handling and access to data security and confidentially provisions.
- Additionally, retailers and distributors need a licence by state Essential Services Commissions to operate. As a condition of these licences, participants are bound by industry codes of practice.
- Privacy protections are set out in *Privacy Law 1988* (Cth) and the *Australian Privacy Principles*, as well as relevant state-level privacy legislation.
- Australian Consumer Law is set out in Schedule 2 of the *Competition and Consumer Act 2010*
- The new Consumer Data Right provisions will amend the Australian Consumer Law and introduce more specific privacy safeguards.