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# The Smart Meter Revolution

How Australia Fell Behind, and How We Can Get Back On Track



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This Paper was prepared by Delos Delta in collaboration with Topfer & Associates to advance policy discussion and the roll out of smart utility meters in Australia.

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# 1. Introduction



Smart cities. It's pretty hot right now. And well it should be. Smart technologies that make our cities and communities more liveable, sustainable, innovative, productive and inclusive – we all want that!

And so we are investing in fixed and wireless connectivity, smart parking, big data storage and analysis, smart waste management, smart buildings, block chain, smart street-lighting, hackathons, smart environmental monitoring, smart mobility, digital democracy, and so on and on.

All this is good. But if we want a smart nation, we need to start with the basics, the foundation of our modern society and economy – resource management. Our electricity, water and gas. Utilities. Directly, they represent around \$41.2 billion of our national economy. And more importantly, our standard of living, and our sustainability of living, depends critically on these resources and their management.

We have the technology! It's a simple yet extremely powerful device called a smart utility meter. A device that provides real time information and management of resource usage, to save costs, drive sustainability, improve network performance, and reduce bill shock.

Sadly in Australia, for a country that aspires to be a smart technology leader, we are well behind in the rollout of smart utility meters. In 2017, Australia had 29.9% smart meter penetration for electricity – compared to 47.6% in Japan, 51.8% in USA, 67% in Canada, 73.1% in New Zealand, 84.1% in Spain, 96.5% in China, and 100% in Italy. We are lagging far behind our peers, and much benefit - for consumers, our economy, the environment, and utility networks – is being lost.

It doesn't have to be this way. Improved awareness, regulatory reform, and leadership, both political and commercial; all these have a role to play in accelerating the installation and integration of smart utility meters.

In this discussion paper, Delos Delta examines the benefits of smart meters, the explosion of smart metering around the world, the reasons why Australia is lagging in implementation, and how we can remedy this deficiency.

We can't have smart cities without universal smart utility meters! This is a public policy priority for Australia. We need to get moving, and much faster.

## 2. Smart Meters vs. Dumb Meters



Put really simply, we can have two types of utility meters. Smart meters, or dumb meters.

Dumb utility meters are what we've had in Australia for a long time, and, for the most part, still do today. More commonly called accumulation meters, they simply record total resource usage, and require manual reading at various intervals for billing and reporting.

Smart meters, on the other hand, are an incredibly intelligent and compelling technology. They use digital technology and connectivity networks to measure, report and manage resource consumption and a range of other utility and network parameters in real time. This means that meters are read remotely and automatically, rather than on-site, infrequently and manually (as per dumb meters).

N.B. For completeness, we can catalogue a third type of meter, sitting half way between the dumb and smart meters – the interval meter. Such meters record utility consumption at more regular intervals (typically every half an hour), but still need to be manually read.

### 3. Why Smart Meters?



SMART METERS PROVIDE CUSTOMERS WITH REAL TIME UPDATES OF ENERGY CONSUMPTION.

Smart metering technology offers a range of significant benefits compared to traditional dumb meters.

This includes:

- ▶ improved accuracy and convenience for customers
- ▶ remote reading and validation of consumption information (avoiding manual meter readings and the associated challenges of site access and data accuracy)
- ▶ reduced instances of 'bill shock' caused by unanticipated consumption or estimated meter readings
- ▶ immediate awareness of outages and supply quality issues at customers' premises and the edge of the network
- ▶ more efficient and interactive pricing and demand response options allowing customers and utilities to reduce their costs
- ▶ remote disconnection and reconnection of supply for purposes such as changing occupants or in times of emergency.

In their information sheets, the AEMC summarises the consumer benefits of smart electricity meters as:

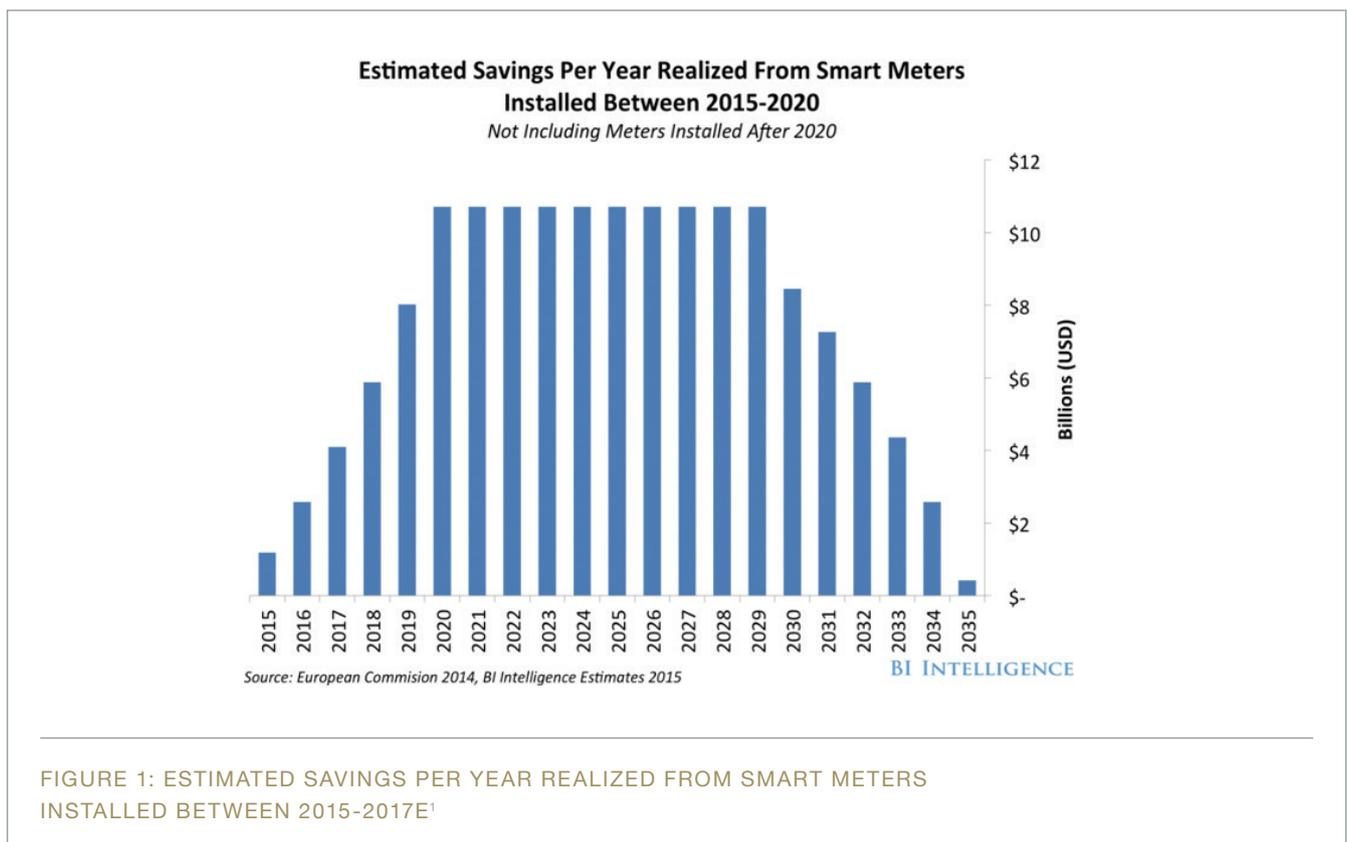
- ▶ better information
- ▶ cost reflective pricing
- ▶ better network service
- ▶ better retail service
- ▶ new products and services

Beyond these well-documented benefits of smart metering, there are more advanced opportunities for sustainability, cost efficiency, and customer benefit. By leveraging connectivity and detailed supply data, customers and utilities can integrate resource consumption with other supply and demand options to completely revolutionise the supply chain and customer experience.

Some examples of such enhancements include:

- ▶ Automated controlled or managed load, allowing customers to reduce consumption (and costs) during peak periods and shift to lower cost off-peak periods whilst still receiving the preferred utility/price balance. This is currently used for electrical appliances such as water heating, pool pumps and air-conditioning but could be expanded to many other services with the introduction of more sophisticated analytics and communications. Extrapolation to electric vehicles is also an obvious future opportunity, as well as adoption in water and gas industries.
- ▶ Improved security and reduced theft or leakage by detection of tampering or supply anomalies.
- ▶ Better integration of localised supplies and storage to improve operational performance and utilisation of distribution and supply systems.

The value of smart utility meters has been measured and verified in a range of national and international studies. One study for the USA found that smart meter installations up to 2020 should deliver national benefits of almost US\$11 billion per annum. Most of these benefits are expected to be derived from reduced utility operating costs, reduced peak energy demand, deferred or avoided infrastructure investment and improved integration of distributed supply and storage options (such as PV generation and battery storage).



1. "IoT For Utilities: Smart Water Gas & Electric Utilities Coming Soon," Business Insider, last modified December 20, 2016, <https://www.businessinsider.com/internet-of-things-utilities-water-electric-gas-2016-10/?r=AU&IR=T>.

## 4. The Smart Meter Revolution: Australia Playing Catch-up

The many benefits of smart utility metering are driving vast increases in their global up-take. Governments and regulators around the world have been implementing policies that promote adoption of smart meters, specifically with the intention of improving customer engagement, sustainability and cost efficiencies.

In December 2017, the US Energy Information Administration reported that half of all US electricity customers had smart meters, with installations nearly doubling since 2010<sup>2</sup>.

A report by the US Department of Commerce in November 2017 shows global smart meter investment from 2015 to 2016 grew by 61%, led by Japan. This trend is predicted to continue towards a total of \$19.7 billion in global smart meter investment by 2020, particularly in Europe as member states look to achieve 80% penetration by the 2020 target<sup>3</sup>.

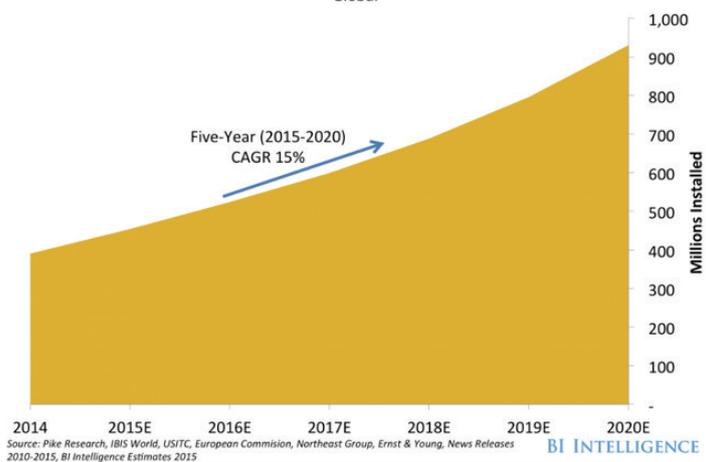
The rapid growth in global smart installation is clearly illustrated in the graph below, as estimated by BI Intelligence in 2015. A compound annual growth rate of 15% over 5 years is impressive by any standard.

2. "Nearly Half of all U.S. Electricity Customers have Smart Meters," U.S. Energy Information Administration, last modified December 6, 2017, <https://www.eia.gov/todayinenergy/detail.php?id=34012>.

3. Department of Commerce, International Trade Administration, 2017 Top Markets Report Smart Grid: A Market Assessment Tool for U.S. Exporters (United States Government, November 2017).

### Estimated Number Of Smart Meters Installed

Global



Source: Pike Research, IBS World, USITC, European Commission, Northeast Group, Ernst & Young, News Releases 2010-2015, BI Intelligence Estimates 2015

BI INTELLIGENCE

FIGURE 2: ESTIMATED NUMBER OF SMART METERS INSTALLED<sup>4</sup>

While global smart meter penetration is increasing quickly, progress across different countries is highly variable. For the electricity sector in 2017, smart meter penetration ranged from 0% in Vietnam to 100% in Italy – note the sample of countries in the table below, as reported by the US Department of Commerce.



SMART METERS HAVE ALREADY BEEN DEPLOYED IN COUNTRIES WORLDWIDE

4. Business Insider, “IoT For Utilities: Smart Water Gas & Electric Utilities Coming Soon.”

Electric Smart Meter Penetration, 2017					
Market	Percentage of Customers	Market	Percentage of Customers	Market	Percentage of Customers
Italy	100.00%	Australia	29.90%	Thailand	3.60%
Finland	97.60%	United Kingdom	29.80%	Other Europe	1.10%
China	96.50%	Poland	27.70%	Czech Republic	1.00%
Sweden	95.80%	North Africa and Middle East	24.60%	Belgium	0.80%
Spain	84.10%	France	23.80%	Ireland	0.80%
New Zealand	73.10%	Mexico	14.20%	Philippines	0.80%
Denmark	69.50%	Romania	10.10%	Sub-Saharan Africa	0.50%
Canada*	67%	Austria**	8.5%	India	0.50%
United States	51.80%	Rest of Latin America & Caribbean	5.90%	Rest of Asia	0.40%
Japan	47.60%	Singapore	4.90%	Indonesia	0.20%
Netherlands	46.50%	Malaysia	3.90%	Vietnam	0.00%
Portugal	39.40%	Germany	3.80%		
Korea	32.70%	Brazil	3.60%		

Data Sources: Bloomberg New Energy Finance [35]; \*Natural Resources Canada [128]; \*\*Austrian E-Control [129]

TABLE 1: ELECTRIC SMART METER PENETRATION, 2017

For Australia, as noted in the introduction, we are not high performers. From an absolute perspective, for a highly affluent country, with some of the highest electricity prices in the world, and a national Smart Cities Policy (by the Australian Government), 29.9% penetration is very low. And from a comparative perspective, Australia has fallen well behind our peers, major trading partners, trans-Tasman neighbours, and smart technology leaders.

Not only does Australia find itself well down the smart utility meter leader-board, our rate of increase is also very slow. Under the current “Power of Choice” electricity reforms, the rollout of smart meters is focused on new and replacement meters, which is only 3%-4% of the total meter population. With such a narrow focus, it could take 25 – 30 years for (close to) full deployment of smart electricity meters in Australia!

A low baseline and low acceleration for smart meters in Australia is not a positive result or outlook.

4. Business Insider, “IoT For Utilities: Smart Water Gas & Electric Utilities Coming Soon.”

## 5. Why Is Australia Lagging?

The benefits of smart metering have been long recognised in Australia, and attested in numerous quantitative studies. In 2008, for example, a detailed national cost benefit study estimated that the Net Present Value of smart electricity metering was between \$179 million and \$3.9 billion (over 20 years).<sup>5</sup>

Ten years later and we only have 29.9% smart electricity meter penetration! Why?

Answering this question is not straightforward. A complex of interconnected factors – regulatory, leadership, inter-governmental, policy, technical, *inter alia* – have all played a part. Amongst all these factors, two are worth highlighting.

The first relates to the Victorian smart meter experience, a time when we perhaps moved too quickly, and stumbled out of the starting blocks. After a number of cost benefit studies in 2004 and 2005, which estimated a smart metering NPV of more than \$200 million, in 2006 the Victorian Government mandated the rollout of smart electricity meters to all homes and small businesses.

Commencing in 2009, 98.6% of sites in Victoria had smart meters by mid 2014 - a tremendous increase in penetration over a short period of time.

Nonetheless, overall this initiative has been negatively assessed due to higher than expected deployment costs, unexpected price increases for customers, and lack of demonstrable benefits for customers (in the short term). The 2015 Victorian Auditor-General review of the smart metering program highlighted a range of concerns, and noted a net cost to consumers of some \$300 million – half a billion dollars lost compared to the original cost-benefit study!<sup>6</sup>

5. NERA Economic Consulting, Cost Benefit Analysis of Smart Metering and Direct Load Control Final Executive Summary: Report for the Ministerial Council on Energy Smart Meter Working Group, (Sydney: 23 May 2008).

6. Victorian Auditor-General's Office, Realising the Benefits of Smart Meters, (Melbourne: September 2015)



#### THE BENEFITS OF SMART METERS ARE REALISED THROUGH MARKET SATURATION

The unfortunate end result of this initiative has been a legacy of wariness and over-caution when setting smart metering policy across Australia. And this brings us to the second factor we wish to highlight as a cause of Australia's slow move to smart meters.

This factor is the AEMC's "Power of Choice" reforms, which utterly reject the Victorian model of universal mandated upgrade of electricity meters, and relies on a market-based approach. In fact, under these reforms, the only meters that must be upgraded to smart meters (from 1 December 2017) are new and replacement meters – i.e. per annum, about 3-4% of the total number of smart meters (as noted earlier in this paper).

However, this policy brings a range of remaining challenges that repress smart meter installations – and this is where further significant gains can be made from regulatory refinements.

More specifically, this approach remains sub-optimal for several reasons:

- ▶ The costs of each installation are relatively high due to the ad hoc geographic nature of new customer connections and meters requiring replacement.
- ▶ Many of the benefits of smart metering require market saturation to be (effectively) realised, such as: avoiding manual meter readings, outage management, theft detection, demand response and time-based pricing incentives, and optimal capital investment planning.
- ▶ Smart meters should form part of a broader connected energy platform that integrates renewable energy, storage, smart grids and home energy management. In fact, smart meters provided the underlying business case for smart grid and Internet of Things (IOT) extrapolation. This is undermined by the slow and sparse smart meter role out approach.

## 6. Pathways to Smarter Utility Management For Australia

China has basically achieved complete penetration of smart electricity meters. The EU has a target of 100% smart metering by 2020. Japan, the USA, and Canada are accelerating their efforts towards full deployment. And New Zealand is a full 43 percentage points ahead of us!

Yet in Australia, normally an innovation and technology leader, we are progressing with a prolonged and cautious deployment of smart utility meters. Against a background of smart city and energy efficiency aspirations and imperatives, our approach is anomalous. It risks resource efficiency, consumer/economic benefits, network optimisation, and our international reputation as a smart technology leader.

Australia can and should do better.

We cannot continue to allow the types of protracted review and reform processes that have been followed over the last decade. There is now an urgent need for progress and customer improvements.

To drive better smart metering outcomes we recommend that the Australian Government establish a dedicated team to explore prospective policy reforms and expedite change.

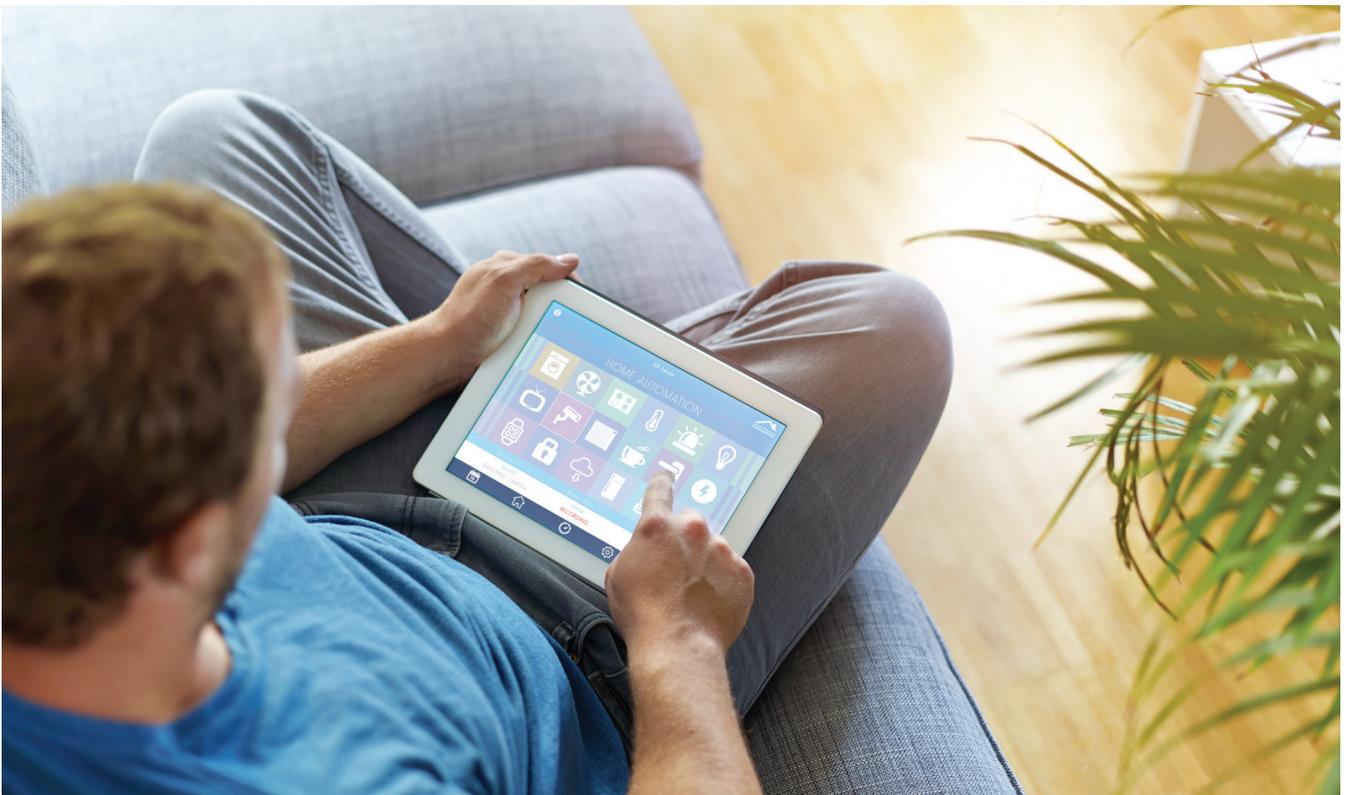
Specific regulatory reforms that should be canvassed, include:

- ▶ Establishing a deadline for electricity retailers to replace all manually read meters with smart meters. We suggest 2023 would be achievable and in the best interests of all customers and market participants. This approach is consistent with the European Union mandate for all electricity meters to be smart meters (in their case, with a target of 2020).
- ▶ Alternatively, requiring a gradually decreasing interval for all utility meter readings, with phasing, for example, from every two months in 2019, to every 30 mins in 2023. This policy will improve the frequency of information provided to consumers and retailers, and strengthen the business case for competitive market smart meter installation.
- ▶ Providing direct government incentive funding to progress the implementation of smart metering and smart grid initiatives, in a similar manner to the USA. Innovative outcomes such as home energy management, PV/battery integration, microgrids and Electric Vehicle charge points could be accelerated using such programs. The large public benefits of smart metering presents a strong argument for government incentive funding.

- ▶ Undertaking a market evaluation to determine the business case for water and gas smart meters. This should be followed (if demonstrably favourable) with a program for regulatory reforms and deployment strategies, drawing on the lessons from the electricity industry approach to ensure more expeditious deployment.
- ▶ Working with the industry to establish robust consultation frameworks and customer engagement programs to ensure effective regulatory arrangements, standards, information provision and deployment programs.
- ▶ Developing smart city road maps that demonstrate integration of energy and water utilities operations with other smart city initiatives such as transport (and EV), parking, smart signs, street lighting, safety, emergency services, waste management, infrastructure management, etc.
- ▶ Requiring that distributors measure and report on quality of supply (and other agreed characteristics) to ensure customers receive the full range of smart metering benefits.
- ▶ As smart meter deployments grow and the range of capabilities between meter providers widens, there is a need to provide public information regarding smart meter deployments, meter capabilities and functionality. This information could be captured and shared by AEMO as part of its market operations and metering responsibilities.

If we are to have smart cities and smart resource management, Australia needs to rapidly accelerate its deployment of smart utility meters.

The benefits and reform pathways are clear. Other nations have set the pace, and now look on as Australia falls behind. For a nation that prides itself on intelligence, innovation and economic dynamism; now is the time for leadership and expedition.



THE FUTURE FOR SMART UTILITY METERS IS NOW!

## 7. References

Business Insider. "IoT For Utilities: Smart Water Gas & Electric Utilities Coming Soon." Last modified December 20, 2016. <https://www.businessinsider.com/internet-of-things-utilities-water-electric-gas-2016-10/?r=AU&IR=T>.

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Victorian Auditor-General's Office. *Realising the Benefits of Smart Meters*, (Melbourne: September 2015).