

# Smart electricity meters: How households and the environment can benefit

Update Report

June 2013



Parliamentary Commissioner  
for the **Environment**  
Te Kaitiaki Taiao a Te Whare Pāremata

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## 1. Introduction

In June 2009, the Parliamentary Commissioner for the Environment released a report titled *Smart electricity meters: How households and the environment can benefit*. The report focused on concerns that the new electronic meters being installed in households around New Zealand by electricity retailers were not as 'smart' as they should be, and thus not provide benefits for householders or the environment.

## 2. Background

When the report was released in 2009, a large-scale installation of electronic meters in New Zealand was just beginning, with the roll-out of meters to 1.3 million households due to be completed by 2013.

These new meters benefit electricity retailers because they allow remote meter reading, more accurate meter reading, and remote connection and disconnection. A range of add-on features can be included in meters that give householders more control over their electricity use, and thus potentially reduce their bills and consequently the environmental effects associated with the supply of electricity.

The New Zealand roll-out of electronic meters is unusual internationally, in that it has largely been left to the market. In other countries, regulatory bodies have been much more involved in specifying what these meters could do. In New Zealand, the retailers were left to decide on the features the meters contained. The opportunity for these meters to provide a wider range of benefits at little extra cost has been lost.

The Commissioner's interest is in the potential environmental benefits enabled by really smart meters. Around a quarter of New Zealand's greenhouse gas emissions from the energy sector come from burning coal and gas in power plants to generate electricity. In addition, as the demand for electricity grows, more power plants must be built, and all new power plants have environmental impacts.

The use of electricity typically reaches an annual peak about 6 pm on the coldest day of winter, when people get home from work and switch on heaters, lights and appliances. Growing demand for peak power leads to the need to build more power plants and to invest more in power lines. And at peak times, the power plants that burn gas and coal are used at high capacity resulting in high carbon dioxide emissions. Consequently, peak electricity use is very expensive – both economically and environmentally.

### **3. Main findings of the investigation**

International evidence examined during the investigation showed that smart meters - with the right features - have a real and long-lasting impact on household electricity use, both at peak times and over time. It was found that the electronic meters that were being rapidly rolled out across New Zealand are not particularly 'smart'. They could have included a low cost component that would link the meter to a home area network – a network that connects the devices in the home that use electricity. This would have made it easy for householders to access real-time information on their electricity use using conveniently located displays, and enabled the introduction of smart appliances.

Regulatory intervention should not be done lightly and this is an area of rapid technological change. But the opportunity for delivering benefits to the householder and the environment at a small increase in the cost of the meters has been lost; retrofitting additional features is likely to be much more expensive.

## 4. Reaction to the report

### Government and Political Parties

The report was initially welcomed by the then Minister for Energy and Resources, Hon. Gerry Brownlee who stated that he personally believed "...*the next generation in electricity innovation will revolve around smart meters, smart grids and smart appliances*", and that smart meters "*have to be genuinely smart and not just revenue tools for the retailers.*"<sup>1</sup>

However, in December 2009, the Electricity Commission presented a report to the Minister, recommending against regulation.<sup>2</sup> This conclusion was based on a benefit-cost analysis, which unfortunately lacked transparency and adequate referencing of data sources.<sup>3</sup> It was, however, evident that the estimated benefits were considerably lower than those in overseas studies and the costs much higher. For instance, the cost of a home area network silicon chip was taken to be between four and ten times higher than in Australia.<sup>4</sup>

In March 2010, the Minister announced that he had accepted the advice of the Electricity Commission.

In contrast, the Labour Party's Energy Spokesperson said "*The Government needs to set standards for smart meters, so that those meters can live up to their name ...Smart meters need to be able to deliver two-way communication via a reliable network so that they can work for the benefit of consumers as well as retailers.*"<sup>5</sup>

The Green Party proposed legislation to set minimum requirements for the provision of smart meters and require providers of the meters to inform domestic consumers of their options. In February 2010, The Smart Meters (Consumer Choice) Bill was drawn from the member's ballot, but did not proceed.

In August 2009, the Commissioner spoke on smart meters to the Commerce Select Committee for the first time. In December she returned to provide her response to comments from industry representatives and others who had been asked by the committee to provide their views on the subject.

The Commissioner appeared before the committee for a third time in August 2011, and the committee finally published their findings the following month.<sup>6</sup> The committee did not reach consensus. While the main report recommended the House only take note of the Commissioner's findings, it also included two 'minority views' from opposition parties. Both the Labour Party and the Green Party reiterated their support for the main findings of the report, with the former noting that the Electricity Authority had: "*taken a hands off approach that appears to favour the electricity retailers above consumers.*"<sup>7</sup>

## International Commentators

In December 2009, the Commissioner met with a team from the International Energy Agency (IEA). Subsequently, the IEA recommended that the Government *“Review the decision with regard to the regulation of the roll-out of advanced metering technology and take into greater consideration the needs of the future smart grid.”*<sup>8</sup>

In December 2010, the Commissioner met with a team from the Organisation for Economic Cooperation and Development (OECD). The Economic Survey that followed the team’s visit contained support for the Commissioner’s views on smart meters.<sup>9</sup>

## Industry and other commentators

Several major retailers rejected the report’s conclusion that the opportunity was being missed, claiming instead that retrofitting existing meters was a low-cost and straightforward solution. For example, in September 2009 Mighty River Power’s Regulatory Manager Robert Allen commented: *“Mighty River Power’s smart meter deployment is capable of being upgraded to meet multiple standards in the future.”*<sup>10</sup> It should be noted that thus far no significant upgrades have been undertaken.<sup>11</sup>

Mike Underhill, the chief executive of the Energy Efficiency and Conservation Authority (EECA), broadly agreed with the main findings of the report, but made the very good point that smart meters *“need to be coupled with smart appliances, and electricity companies need to offer smart pricing so that this triangle can come together.”*<sup>12</sup>

Sue Chetwin, Chief Executive of Consumer NZ, supported calls for more regulation of smart meters and the electricity system in general, saying that, *“...a light-handed regulatory approach to electricity supply does not work. Despite that, the rollout of smart meters is being driven by the market. Electricity is too important a utility for that.”*<sup>13</sup>

Ralph Matthes, the Executive Director of the Major Electricity Users Group welcomed the report, commenting that, *“Increasing the elasticity of demand side response by effective use of smart meters will improve competition, lower relative prices and better use resources. The environment will also be a winner.”*<sup>14</sup>

Neil Cheyne, General Manager of Electronics Design at Fisher and Paykel stated in an interview that smart appliances could be available in one to two years. He went on to say that *“The technology is readily available if consensus is reached. The issue is not a technology one, the issue is that the electricity industry does not know what it wants.”*<sup>15</sup>

## **5. Responses to the Commissioner's recommendations**

The report contained nine recommendations to Ministers dealing with a range of issues associated with smart meters. A letter detailing the responses to these was received from the then Minister of Energy and Resources, Hon Hekia Parata, on 5 July 2011.

However, since this is an area of rapid change, the Commissioner sent a letter early this year to the current relevant Ministers, requesting updated responses to the recommendations. These updated responses are contained in two letters in the Appendix to this report – one from the Minister of Energy and Resources, Hon Simon Bridges, and one from the Minister for Climate Change Issues, Hon Tim Groser.

## 6. Some continuing issues

Since the roll-out of 'smart meters' by electricity retailers is nearly complete, some of the recommendations in the report have been superseded by events. The focus now should be broader – on the host of ways in which New Zealand's electricity grid can be made smarter.

What is a smart grid? Often described as the energy internet, smart grids involve using modern digital communication technology to allow greater control of the whole electricity system, and make it more effective and efficient.<sup>16</sup> This includes linking with end user area networks (through really smart meters), establishing better interconnection between distributed energy sources such as photovoltaic cells, and (ultimately) enabling the integration of electric vehicles into the system. The development of a much smarter grid will be a fundamental requirement for reaching the Government's target for 90% of electricity to be generated from renewable sources by 2025.

The smart meters report stressed that both households and the environment benefit from reducing electricity consumption especially at peak times. Lines companies are also beneficiaries of reducing peak power because it avoids or delays the need for expensive upgrades in line capacity. But in the same way in which the retail companies rolling out the smart meters have failed to put in the functionality that would benefit householders and the environment, they have also not put in the functionality that would benefit lines companies.

This is clearly illustrated in Waikato where the lines company WEL Networks are currently installing 'smart boxes' in 45,000 homes and businesses in order to gain the ability to manage the network better. The smart boxes include the capacity for consumers to better control their electricity use in the future.<sup>17</sup> In effect, thousands of Waikato households will soon have two digital electricity meters – one installed by the retailer, Genesis Energy, and another installed by the lines company WEL Networks.

The Chair of New Zealand's first Smart Grid Summit has summed up the situation:

*"Nobody is currently taking leadership in the country; and this is certainly not helped by the fact that the electricity industry structure in New Zealand is rather unique. While the line companies (distributors) would accrue the greatest benefits from a smart grid, the retail companies are the ones that have been put in charge of the so-called smart meters."*<sup>18</sup>



Currently, there is an expectation by some that New Zealand will have a surplus of electricity in the next few years, and this will certainly be the case should the aluminium smelter shut down. However, the country is clearly experiencing significant growth in peak power, as evidenced by the construction of new gas peakers in Taranaki.<sup>19</sup> These power plants are, of course, adding to the country's greenhouse gas emissions.

Some electricity retailers are experimenting with providing niche products that could give householders more control of their energy consumption. But inconsistency across retailers and across the country does not provide a basis for the development and marketing of smart appliances.

A research team at the University of Canterbury's Electric Power Engineering Centre has been granted over six million dollars to find ways of making New Zealand's national grid smarter.<sup>20</sup> This is good news, but technology alone will not address the problem of our fragmented electricity system in which the investment decisions of different companies are driven by such different incentives.

# Endnotes

- 1 Press Release, *"Smart meters the smart way"*, 25 June 2009.
- 2 Electricity Commission, 2009, *"Advanced Metering Infrastructure in New Zealand: Roll-out and Requirements"*.
- 3 NZIER, 2009, *"Cost-benefit analysis of additional smart meter functionality: Home area networks and in-home devices"*.
- 4 Department of Primary Industries, 2008, *"Advanced Metering Infrastructure: Review of basis of selection of Zigbee Smart Energy profile for HAN functionality in Victoria"*, p.4.
- 5 Press Release, *"Government can make smart meters live up to their name"*, 25 June, 2009.
- 6 A source of confusion that persisted throughout the Commerce Committee hearings was the use of the terms 'HAN-functional' and 'HAN-capable'. A HAN is a **h**ome **a**rea **n**etwork. The Commissioner said that smart meters should be HAN-functional. The Electricity Authority said that the meters were HAN-capable, leaving the impression that these were the same. A HAN-capable meter must be retrofitted with an additional device to become HAN-functional, requiring a visit from an electrician to the house.
- 7 Commerce Committee, *"Report from the Parliamentary Commissioner for the Environment on Smart Electricity Meters"*, 2011, p.9. On 1 November 2010, the Electricity Commission was replaced by the Electricity Authority as the major regulator of the electricity sector.
- 8 IEA, *"Energy policies of IEA countries – New Zealand 2010 review"*, p.114.
- 9 OECD, *"OECD Economic Surveys: New Zealand 2011"*, p.161.
- 10 Letter from Mighty River Power to the Commerce Select Committee, 14 September 2009.
- 11 About a million 'advanced meters' have now been installed in homes and businesses in New Zealand (Energy News, *"Trust Power tests market for smart meter supply, services"*, 20 December 2012). As of March 2013, none are HAN-functional with one small exception. About 350 homes that are taking part in Genesis Energy's HomeIQ trials have HAN-functional smart meters (Genesis Energy, pers. comm. 8 March 2013).
- 12 Press Release, *"Smart pricing, smart appliances needed alongside smart meters"*, 25 June 2009.
- 13 Consumer, *"Smart meters not so smart"*, 2 Jul 2009
- 14 Press Release, *"MEUG welcomes PCE report on smart meters"*, 25 June 2009.

- 15 Energy News, *"Smart appliances ready if the industry wants them – F&P"*, 11 March 2010.
- 16 A simple example is automated reporting of an area experiencing a power cut.
- 17 <http://www.wel.co.nz/Smarter-Homes/Smartbox/> The Smartboxes contain a Zigbee Home Area Network radio system.
- 18 Budde, Paul. 2010. *New Zealand - Smart Grids Analysis 2010*. Available online at [www.budde.com.au/Research/New-Zealand-Smart-Grids-Analysis-2010.html](http://www.budde.com.au/Research/New-Zealand-Smart-Grids-Analysis-2010.html)
- 19 A 200 MW gas peaker near Stratford was commissioned in June 2011 and a 100 MW gas peaker near Waitara was commissioned in March 2013.
- 20 Press Release, *"Researchers out to demystify smart grids"*, 11 June 2013.

# Appendix 1 - Correspondence recieved from Minister of Energy and Resources



## Office of Hon Simon Bridges

MP for Tauranga  
Minister of Energy and Resources  
Minister of Labour  
Associate Minister for Climate Change Issues

18 MAR 2013

ERPH12-13/504

Dr Jan Wright  
Parliamentary Commissioner for the Environment  
PO Box 10 241  
WELLINGTON 6143

16 MAR 2013

Dear Commissioner

21 MAR 2013

Thank you for your letter of 15 January 2013 to Hon Phil Heatley. I am pleased to respond as the new Minister of Energy and Resources. I appreciate the role you have played in generating constructive debate on the role of smart electricity meters in New Zealand and I am pleased to contribute to your update report. Please note that I am also responding on behalf of the Minister of Consumer Affairs.

The rollout of smart meters in New Zealand is being undertaken by electricity retailers and distributors. I'm advised that more than 800,000 smart meters have been installed since 2005, and over 1 million are expected to be installed by December 2013. The major electricity retailers have been installing smart meters as part of their competitive positioning in the market and they are beginning to use smart meters and the associated technology to provide consumers with information on their consumption and offer cost-reflective time-of-use tariffs. The immediate benefits for consumers include:

- No estimated bills;
- Remote meter reading;
- Changing retailers will be easier due to a remote final meter read; and
- More information allowing consumers to better understand their electricity costs.

I'm advised that in New Zealand the roll out has not imposed direct costs on consumers. This contrasts with many other countries where the rollout has been mandated by government, implemented through monopoly lines companies, with the costs of the rollout either charged to consumers or subsidised by government. The rollout in New Zealand is voluntary, not subsidised by the Government, and there are no specific charges to consumers.

The operational governance of the electricity market is delegated to the Electricity Authority (the Authority). The Authority develops and implements the Electricity Industry Participation Code 2010 (the Code), which governs the operation of the market consistent with its statutory objective to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

The Authority is responsible for amending the Code and developing non-Code solutions, where appropriate, for electricity metering. The Authority considers that metering services in New Zealand are workably competitive, with multiple retailers, distributors and other parties obtaining metering services from competing meter owners and operators. The Authority considers that commercial negotiation currently represents the most efficient approach for participants in the metering service market to obtain access to metering data and service for the long-term benefits of consumers. Unnecessary regulatory intervention would risk hampering the efficient development and operation of the metering services market by diminishing the commercial and competitive incentives for the efficient provision of metering data and services.

The Authority completed a comprehensive review of metering arrangements in 2012 resulting in a completely revised Part 10 of the Code, which is scheduled to become effective on 6 June 2013. Part 10 regulates standards, installation, testing, maintenance and certification of meters.

The Authority continues to monitor the actions and behaviours of participants in the metering services market to confirm whether the market remains workably competitive, and has signalled a willingness to intervene if there is evidence of the market becoming uncompetitive.

Actions taken that specifically address the recommendations of your 2009 report are detailed below.

#### **Recommendation 1: Requirement for HAN functionality**

Electricity market participants continue to roll out smart meters in New Zealand at a rate of approximately 11,000 per month. While the smart meter is a key component of the set of technologies used to provide home area networks (HAN) it is not necessarily the master device to enable HAN.

The functionality and capability of smart meters reflect the commercial decisions of the parties financing the deployment. A regulatory intervention to mandate particular types of meters or functionality risks undermining investment decisions and innovation. As benefits emerge, use of HAN devices within a house will be a matter of consumer choice.

The Authority's review of Part 10 of the Code did not identify a need to mandate specific HAN functionality for smart meters.

#### **Recommendation 2: Requirement for open access protocols**

An Authority proposal to mandate compliance with three electricity information exchange protocols contained in Part 12A of the Code will facilitate the exchange of information about line charges between distributors and retailers. This protocol will allow parties to have efficient access to information and functionality provided by the smart meter.

**Recommendation 3: Public information campaign**

Electricity retailers are very aware of the importance of informing customers of the benefits and advantages of smart meters. The Authority has published two factsheets about the use and benefits to consumers of smart meters. They cover how smart meters communicate, radio frequency fields from smart meters, legislation and guidelines for their use, and where to go for further information. I enclose copies of the factsheets for your information and they can also be accessed on the Authority's website at: <http://www.ea.govt.nz/consumer/factsheets/>.

**Recommendation 4: Pilot study to quantify the benefits of in-home displays**

The industry itself is undertaking pilot studies with many retailers running extensive trials of smart products or bringing products to market. It is questionable if a government run pilot study into the benefits of in-home displays would be of any value given that the industry is well advanced in bringing these products to market.

Two retailer products worth mentioning, and which you are likely already familiar with, are Mercury Energy's Glo-bug and Genesis Energy's Tomorrow Street programme. Glo-bug is a pre-payment product that uses an in-home display device to signal credit available. Households in the Tomorrow Street programme are trialling a number of new energy products including home energy management systems.

**Recommendation 5: Requirement for import and export functionality where there is micro generation**

The Authority's review of Part 10 of the Code during 2011 and 2012 did not identify a need to mandate import/export functionality. The Authority's Retail Advisory Group also reviewed arrangements for the purchase of electricity by retailers from small-scale distributed generation and did not identify a need to mandate for smart meters to have import/export functionality.

My officials have advised that most smart meters have import/export functionality even without a mandate. Retailers are not required to buy surplus electricity from distributed generation but most retailers do, and have information on their websites on the terms and conditions for purchasing from small-scale distributed generation.

**Recommendation 6: Intervention to ensure retailers provide household tariffs that better reflect the cost of generation and transmission at different times**

I expect retailers will offer time of use tariffs to households when their customers want this option and the level of smart meter penetration is sufficient to allow for this effectively. The Authority's focus is on improving retail competition in the knowledge that improvements in competition will encourage retailers to offer cost reflective tariffs to attract and retain customers.

**Recommendation 8: Requirement to offer an average-cost tariff**

As cost reflective tariffs are not yet widely available, there is no need to require retailers to offer average cost tariffs. Should time of use pricing for domestic consumer become more widespread, I expect retailers will continue to provide average cost tariffs to customers who want them. If these tariffs are not available to customers, I will consider the need for regulation at that time.

**Recommendation 9: Maintain requirement for retailers to offer low fixed charge tariffs**

Electricity retailers are still required to offer a low fixed charge option to households and continue to do so.

Thank you again for taking the time to write.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'S. Bridges', is written over a faint circular stamp.

Hon Simon Bridges  
**Minister of Energy and Resources**

cc: Hon Craig Foss, Minister of Consumer Affairs

## Appendix 2 - Correspondence recieved from Minister for Climate Change Issues



### Office of Hon Tim Groser

Minister of Trade  
Minister for Climate Change Issues  
Associate Minister of Foreign Affairs

13-M-00116

11 FEB 2013

Dr Jan Wright  
Parliamentary Commissioner for the Environment  
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WELLINGTON 6143

Dear Dr Wright

Thank you for your letter of 15 January 2013 regarding your 2009 report *Smart electricity meters: How households and the environment can benefit*, and your recommended actions.

In particular you are enquiring whether any work has been undertaken in relation to Recommendation 7 requesting that a study be initiated into CO<sub>2</sub> emissions and electricity supply and demand.

No action has been taken regarding that recommendation. The reasons behind this decision were outlined in a response provided by the previous Minister for Climate Change Issues, Hon Dr Nick Smith, on 22 July 2011. Essentially, the claimed emission benefits were small in scale and dependent on a strong assumption regarding the generation displaced.

I wish you the best with the updating of your *Smart electricity meters* report and I look forward to receiving a copy in due course.

Yours sincerely

Hon Tim Groser  
Minister for Climate Change Issues

