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Intelligent metering for water: potential alignment with energy smart metering

Science Report – SC070016/SR2 (WP3)

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Steve Killeen

Head of Science

Executive Summary

The smart metering concept is well advanced in the energy sector and a detailed set of requirements for smart metering has been developed by energy retail companies, in anticipation of a government mandate for national rollout over a 10-year programme.

In the water industry, where a minority (typically one in three) of consumers are actually metered, the focus is on the benefits of moving towards 100 per cent metering.

This report identifies opportunities from intelligent water metering for: water demand management; system and energy demand management; carbon reduction; improved affordability; and support for potential water supply competition.

Investigation and development of intelligent water metering is less well advanced than energy but this is understandable given the different regulatory frameworks and political drivers. Some work has been done on intelligent water metering (such as the Intelligent Metering Initiative), with some input from the energy sector to this work.

This report aims to examine the potential for aligning intelligent[i] water metering systems with energy smart metering. With large-scale rollout of energy smart metering anticipated by Government and the energy industry, this report describes the smart metering developments in energy and opportunities for the water sector.

Energy smart metering developments have been mindful of water metering and have made provision for the use of the energy smart metering infrastructure for intelligent water metering. As a consequence, there are currently no technical barriers to using the proposed energy smart metering infrastructure for intelligent water metering, subject to suitable commercial and access arrangements being put in place. However, the energy smart metering operational framework is still in development and there is a risk that any future development work might introduce technical barriers unless water and energy sectors cooperate closely to prevent this.

The report also explores the current political environment; whilst there is a government expectation of universal smart energy metering in 10 years, this is not yet formal policy. For the energy industry (and therefore the water industry if the energy framework is to be considered) to plan with some certainty requires a government mandate for energy smart metering to all domestic premises (and potentially small business premises) in Great Britain and an interoperable framework to build on but an opportunity exists for water sector to use the energy infrastructure in the future. Opportunities were investigated for a jointly developed, universal, coordinated installation and rollout of energy and water smart metering solutions. The report concludes that this is unlikely to be a realistic possibility in useful timescales.

There is currently no formal interface between the water industry and energy smart metering development and we recommend that this is put in place formally, with water sector input into energy smart metering development and energy sector input into water metering initiatives. We also recommend the setting up of a strategic policy group to encourage input from the energy and water industry in each others' work. There is currently no centrally coordinated policy group for metering and/or intelligent metering in the water sector that encompasses all water companies and key stakeholders (the Intelligent Metering Initiative includes a subset of stakeholders).

These recommendations should ensure the water sector has the opportunity to use the energy smart metering infrastructure, even if the rollout is not coordinated in a joint water and energy implementation programme. A policy group can also inform the energy industry of any progress in intelligent water metering initiatives.

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- The Energy Retail Association
- Ampy Landis and Gyr
- Sensus
- Elster Metering

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1 Introduction

This report examines the potential for aligning intelligent water metering systems with energy smart metering.

The report investigates smart metering developments in energy and the opportunities they offer to water, rather than looking at the requirements of water metering and how they could be integrated into energy sector developments.

The Environment Agency advocates a stepped increase in domestic water metering across England. This includes substantial progress to full metering across the water-stressed South East by 2015, with the remainder of England following over the next two decades. Recent changes in the Government's and Ofwat's position on metering make high rates of meter penetration a likely outcome over the next five to 15 years.

This report was commissioned to review the opportunities for aligning intelligent metering in water with the current energy smart metering programme. The report focused on a number of key opportunities which were defined as:

- providing real-time consumption and cost information to customers;
- providing 'whole network' information on water usage levels;
- reducing meter-reading costs;
- reducing carbon costs through automatic meter-reading (AMR) systems;
- billing based on accurate meter readings;
- supporting flexible tariffs;
- identifying and managing excessive customer use and service pipe leakage;
- implementing communications to individual homes via the energy communications network;
- supporting developments in consumer goods and intelligent buildings.

Further discussions with the Environment Agency on metering in the water sector highlighted the following as the key opportunities:

- water demand management;
- energy demand management;
- carbon reduction;
- affordability;
- support for water supply competition.

With a large-scale rollout of energy smart metering anticipated by Government and the energy industry, there may be opportunities to align present and future programmes between the energy and water sectors. This report looks at what these opportunities are, the benefits and the logistics of how the energy and water sectors could align.

It is anticipated that Government will provide more clarity on their plans for energy smart metering in their response to the 2007 consultation that is due in spring 2008.

2 Energy smart metering

2.1 Background

It is not the aim of this report to look at specific smart or intelligent water metering solutions. Rather, we demonstrate the capability for alignment of intelligent water metering with proposed energy smart metering and show how this could function.

2.2 Policy position

2.2.1 Government policy position

The Government (primarily the Department for Business, Enterprise & Regulatory Reform (BERR), but also the Department for Environment, Food and Rural Affairs (Defra)), the regulator (Ofgem) and the energy industry as a whole have been considering smart metering for a number of years now. Ofgem published a consultation paper on domestic metering innovation in February 2006[ii] and its conclusions in June 2006[iii].

In the 2007 *Energy White Paper: Meeting the energy challenge*[iv], the Government made a number of proposals about billing and metering designed to give customers information to help them reduce their energy consumption.

In the *Energy White Paper*, the Government set out its expectation that, over the next ten years, all gas and electricity customers would have smart meters with visual displays or other ways of providing real-time information if shown to be effective. The Government define a smart meter as an interval meter allowing two-way communication between the energy supplier and the customer."

In August 2007, BERR issued the consultation paper *Energy billing and metering: Changing customer behaviour – A consultation on policies presented in the Energy White Paper*[v].

That consultation sought views on how to promote awareness of domestic energy use through a requirement for energy suppliers to:

- present consumption data, preferably in graphical form, on consumers' bills to allow consumers to compare different periods of energy consumption;
- provide real-time display units to certain customers for them to see how much electricity they were consuming.

The consultation also covered the installation of smart meters for business customers above a certain energy-use threshold, where proven to be cost-effective.

Importantly, it also sought views on how smart meters in the domestic and small business sector might be deployed, including the method and costs of doing so.

As an indication of the level of government interest, the Prime Minister made the following statement on energy smart meters:

"*For every household – over the next decade – there will be the offer of a smart meter that will allow two-way communication between the supplier and customer – giving more accurate bills and making it easier for people to generate their own energy through microgeneration and sell it onto the [electricity] grid*."

Right Honourable Gordon Brown MP[vi]

2.2.2 Energy industry policy position

The energy industry has been fully engaged in the smart metering debate resulting from recent consultations and papers. There has been a consistent desire for smart metering which can be seen in the responses to the August 2007 BERR consultation.

Organisations as diverse as the Energy Retailers, the regulator (Ofgem), consumer champions (energywatch, NCC) and the Energy Savings Trust are all driving for the rollout of energy smart metering to all domestic households. There are differences in the market model desired by different parties, but little divergence in the desire for smart metering itself.

Several organisations have publicly called for a clear policy on smart metering:

"*It is vital that the Government continues to show commitment to reducing energy consumption. Smart meters are essential if we are to give consumers accurate information about their energy use, their energy costs and their carbon emissions*."

Philip Sellwood, Chief Executive, Energy Saving Trust

"*Everyone can benefit from smart meters. Suppliers can reduce their costs and provide everyone with an accurate bill. Consumers can get up to date, understandable and accurate information on the energy they are using. Installing smart meters makes sense – we just need to do it!*"

Allan Asher, Chief Executive, energywatch

"*We are calling on the Government to give a clear mandate to the energy supply industry to roll out smart meters across Great Britain to put consumers in full control of their gas and electricity use*."

Jill Johnstone, Director of Policy, National Consumer Council (NCC)

The UK energy retail industry is the most competitive in Europe and has consistently been amongst the two most active retail markets in the world. Approximately 100,000 customers switch energy supplier every week and it is thus essential that any rollout of smart meters supports the competitive retail market and that once installed, a smart meter should not need to be replaced when a customer changes energy supplier. This principle is known as "interoperability".

In the absence of any government or regulator-led programme of work to develop an operational framework for smart metering, the Energy Retail Association (which represents the six largest electricity and gas suppliers in the UK domestic market) initiated the SRSM project in autumn 2006. This project is developing a smart metering operational framework and it is the output from this project (including interoperability) that forms the core definition of what might be available from the energy industry.

However, this work has been presented as "proposals and options" to date, as it cannot be the Energy Retail Association (ERA) that sets the framework for energy smart metering for the whole industry. This work must be picked up, developed and agreed by the Government, Ofgem or some wider industry body.

2.2.3 Status as of March 2008

At the time of preparation of this report, a number of decisions are due which may affect the issue discussed. We present here a summary of the current position.

Responses to the August 2007 BERR consultation were returned in October 2007 by 91 respondents and Government has not yet published its response.

It is not yet known what form any Government statement on smart metering for domestic and small business premises might take.

The Government has stated in the 2008 Budget that it will "*require energy suppliers to provide smart meters for medium and large businesses within the next five years to improve information on energy consumption and help support the energy services market*", but there is no further statement on domestic and small businesses.

Until a statement from Government is produced, there is uncertainty as to how, or even whether, smart metering will be required to be rolled out to all UK domestic premises.

In addition, until the framework for smart metering is known, the proposals and options developed by the ERA SRSM project must be taken as just that and not as any sort of definitive statement of the way forward for energy smart metering.

2.3 Energy smart metering concepts

At the most basic level, a traditional 'dumb' meter provides a count of the quantity of energy (or volume of water) passed down a pipe or wire, in accordance with the Measurement Instruments Regulations. Datalogging and automatic meter-reading (AMR)[vii] extend the basic measurement capability of the meter by enabling a reading to be transmitted to a receiving device at a pre-specified interval or on demand. 'Smart' operation extends the communication functionality in both directions, allowing utility companies, suppliers and consumers to benefit from more sophisticated interaction.

The Energy Retail Association (ERA) has developed a comprehensive specification for a smart metering solution for the energy (gas and electricity) sector. Figure 2.1 below shows the elements of any smart metering solution (the diagram is reproduced from an ERA presentation on smart metering interoperability given to the IET seminar on 12 February 2008: *Smart metering: Gizmo or revolutionary technology?*). Interestingly, the specification contemplates a number of components which communicate with the system, one of which can be the water meter.

This architecture can be mapped onto any remote reading functionality, including AMR.

This work is being carried forward by a number of industry groups who are looking at the requirements and opportunities for realising the benefits of smart metering. We provide some examples of these organisations later in this report.

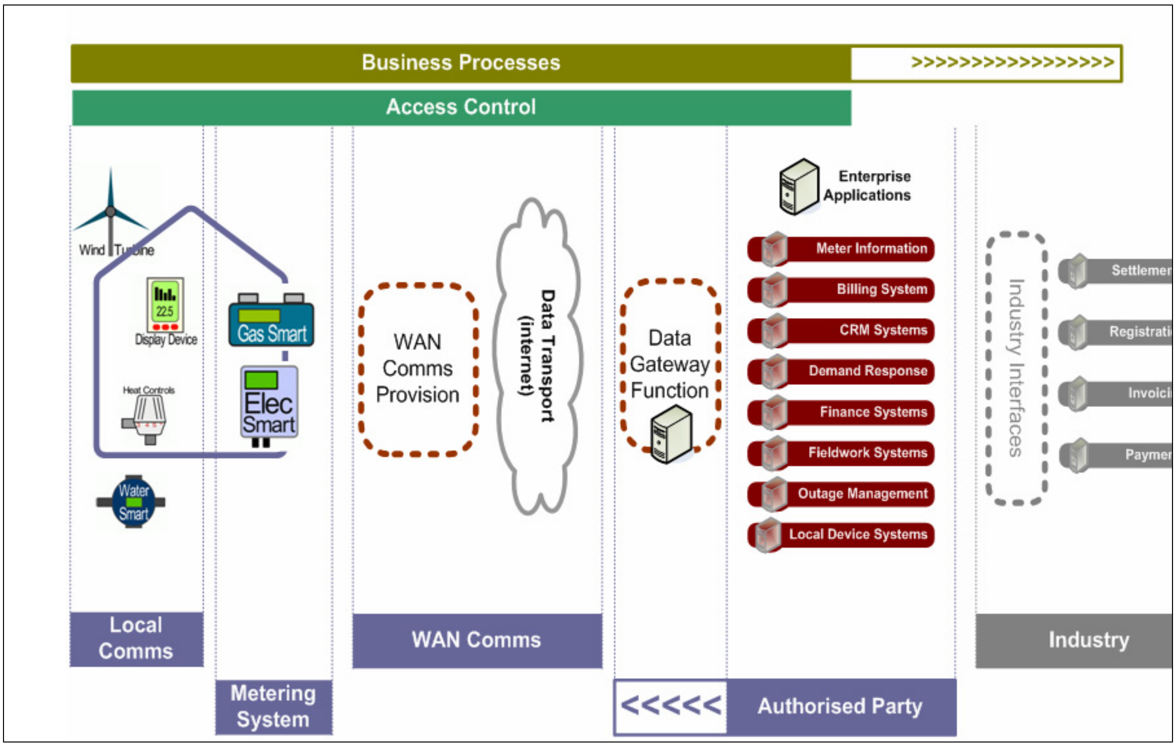


Figure 2.1: Smart metering architecture © Energy Retail Association 2008

As can be seen from the diagram, the system consists of a number of discrete elements, which are explained in more detail below.

2.3.1 Metering system

The metering system is defined as "*a single device or meter, or a combination of devices used to deliver the Lowest Common Denominator as defined in the Operational Framework Schedule L 'Smart Meter Functional Specification'*."

The metering system comprises the metrology element of the meter itself (the Measurement Instruments Regulations compliant element of the meter which registers a flow, a quantity or some other event) together with:

- the ability to store, process and display data;
- support for flexible tariff arrangements (block tariffs and time-of-use tariffs);
- the capability for two-way local and WAN communications;
- meter import/export to support microgeneration;
- the ability to remotely configure, monitor and manage the metering system;
- the capability to:
  - enable and disable supply for all electricity meters – subject to cost for all gas meters;
  - support the ability to switch between credit and debit (prepayment and pay-as-you-go) operation.
  - manage vacant premises – for safety and credit control.
- display information to customer - a key area for flexibility and differentiation.

This capability could be created in the meter, but could be delivered by additional hardware – the operational framework is flexible on this at the moment in order to not constrain solution options until the market model and framework is better known.

The metering system will need to be configured to enable end-to-end communications to and from local devices (such as a water meter).

The full definition for the proposed metering system can be found in the Energy Retail Association's Smart Metering Operational Framework Proposals and Options v1, August 2007[viii].

If an intelligent water metering solution was to be considered connected directly to the WAN communications infrastructure, a water metering system would have to be defined to fit into this element of the overall architecture. This would need to be defined at an appropriate level for water metering to ensure interoperability, as defined later.

2.3.2 Local communications

This allows the metering system to communicate with any local devices which are provided as part of the system. These could include consumer display devices giving cost, consumption and status information or other devices, such as controls or appliances or a water meter enabled with the same communications mechanism, protocols and data exchange format.

It is not envisaged that a dedicated electricity meter to water meter link will be established here. The facilities that will be available to the water meter will be the interoperable interfaces defined in the interfaces diagram in Figure 2.2. It is expected that the local communications link is the most likely interface for use with water metering, but direct connection to WAN communications is an option, as would be a gateway that acts as a translator/medium between the water meter and the energy smart metering system,

2.3.3 WAN (Wide Area Network) communications

The ability for the energy smart meter to communicate with a WAN is important, as it provides the means for transmission and reception of data and communications to and from the outside world.

The interface can be proprietary (specific to a particular manufacturer) or based on an industry-wide agreed standard. Use of an industry standard will enable true smart operation, particularly if this communication is going to be opened up to third parties (such as water companies) and is discussed in the next section on interoperability.

A water metering system could be defined for connection directly to the WAN network, as highlighted above. The water metering system will have to comply with the interface requirements, as will an electricity or gas smart metering system.

2.3.4 Data gateway functionality

In order to achieve benefits over and above meter reading functionality, it is necessary for an authorised party to be able to access the individual meter and its parameters, either to be able to interrogate it or reprogram it in some useful way. This could include remote actuation or disconnection or changing tariffs.

This is a key feature of smart metering and provides a level of functionality and inter-activity over and above the more traditional AMR systems.

The gateway is a logical entity for the purposes of this diagram and will need to be configured to enable communication to the energy smart metering system and subsequent local communication to a water meter.

2.3.5 Industry interfaces

In addition to suppliers or their agents interacting with the consumer meter, the energy industry has are a number of discrete processes which make use of meter data. These include accounting for energy bought and sold in wholesale markets (energy balancing mechanisms), associating a consumer's supply with a particular supplier (registration), or network operators charging for the use of their systems (invoicing).

2.3.6 Access controls

Security is an important consideration where data specific to customer and supplier is exchanged and therefore a set of protocols must ensure that access is only given to authorised parties. These are integral to any smart metering specification.

This is also important to ensure that a correctly authorised agent (which could be the incumbent energy or water supplier) communicates with a specific, uniquely identified, meter. This will be a key factor for consumers switching suppliers in the competitive market.

Any communications mechanism will also have encryption requirements and standards.

2.4 Specification for energy smart metering

2.4.1 The Energy Retail Association SRSM project

The Energy Retail Association has developed and published a framework for the operation of smart metering in Great Britain. The primary focus is on domestic non-half hourly (NHH) electricity and domestic Small Supply Point[ix] gas metering. This has produced a rigorous and publicly available definition of smart metering intended to provide a reference for manufacturers, energy suppliers and policy groups.

Whilst this is currently used as the reference for industry, it does not have any formal governance in industry. It is expected to be picked up and developed further with the government/regulator/industry taking leadership/ownership for smart metering in GB. However this cannot be guaranteed, as we have described earlier.

Although primarily intended for the domestic sector, the operational framework is also applicable to non-domestic consumers. In essence, this document has defined a 'smart meter'[x] in a format which could be adopted by the entire supply chain, where adoption will guarantee interoperability and provide a platform to support a wide range of appliances, service offerings and other facilities.

The smart metering system is defined by the ERA operational framework as follows:

- Capable of two-way communication with authorised parties and local devices and delivers consumption information to customers and suppliers at a flexible and configurable level of detail. Two-way communication enables authorised parties to configure, monitor and manage the metering system without the need for visits to premises.
- Supports flexible tariff structures, including time of day, type of day and consumption-based profiles for energy consumption. This will allow for innovative tariff structures to be introduced for gas and electricity supply.
- Electronic storage and display of data, including tariff and consumption.
- Handles meter import/export consumption, supporting microgeneration.
- Will include the necessary components to enable and disable supply of energy at the metering system itself. This function will enable all smart metering systems to switch between credit and debit (prepayment and pay-as-you-go) operations. It will also provide the opportunity to introduce new safety and credit control procedures to manage vacant premises.

The functional specification also covers details such as the memory, display and security requirements for a metering system.

The functional specification represents the minimum requirements of the operational framework. It does not mean that every metering system will be exactly the same - the framework is flexible, and can support metering systems with more advanced functionality and developments in metering technology.

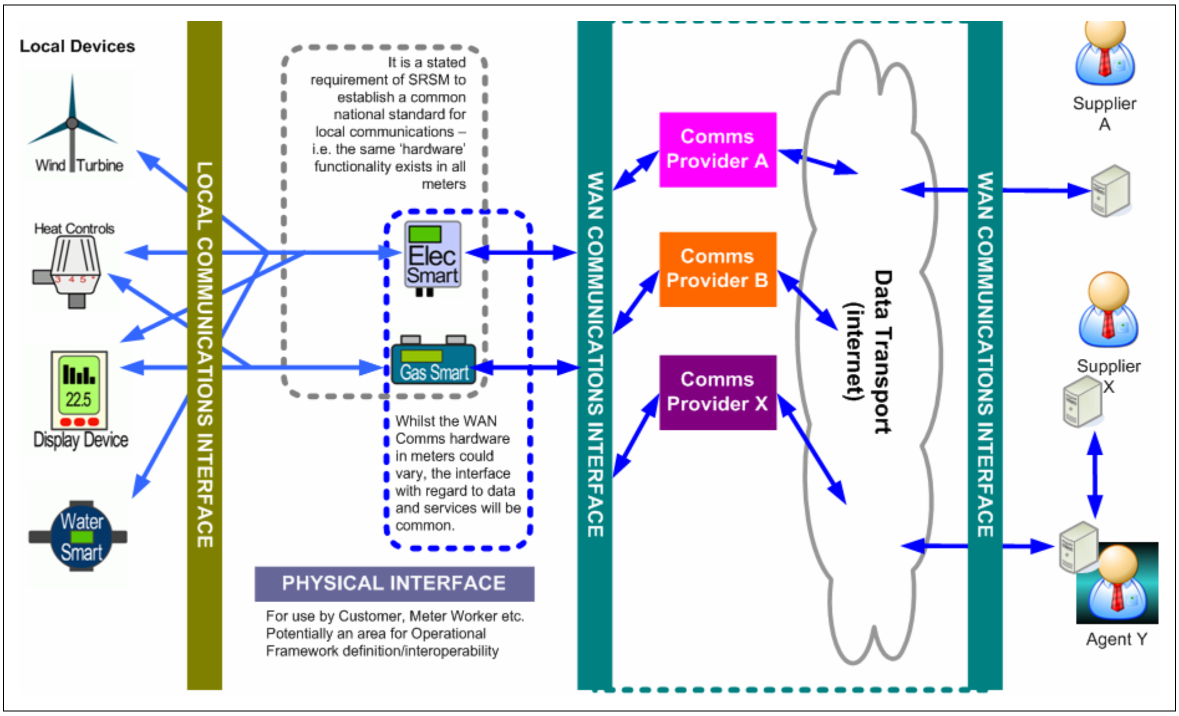
The specification also acknowledges that a number of premises have particular energy supply or meter location requirements. To ensure that, for example, polyphase electricity supply or semi-concealed gas meter locations are included in the Operational Framework, meter variants are included in the specification.

This standard is forward-looking and aspirational at present, requiring both government and industry support to develop systems to this standard and integrate them into the commercial energy proposition for consumers. At the time of writing (March 2008), an announcement regarding the level of government support for smart metering is expected from BERR in spring when it publishes the response to its second consultation on energy billing and metering. This will potentially provide greater clarity and certainty about the potential for wide-scale smart metering.

2.5 Interoperability

In the energy model, smart meters require two defined interfaces for communication. One is for communication with a home network of devices within the property, which could include other utility meters (the ‘local communications interface’) and a second is to communicate with the outside world (the ‘WAN communications interface’). Both of these interfaces are two-way, as illustrated in Figure 2.2 (the diagram is reproduced from an ERA presentation on smart metering interoperability given to the IET seminar on 12 February 2008: *Smart metering: Gizmo or revolutionary technology?*). There is also a physical interface defined for interaction at the meter, but it is assumed that this will not be used within the automated supplier/consumer data chain. Any requirements of the physical interface as a fall-back option should be covered in further development of the operational framework.

Figure 2.2: Smart metering interoperability - © Energy Retail Association 2008



In order for the full potential of smart metering to be achieved, interoperability – the ability for devices and systems to communicate in a consistent way based on an agreed industry standard – is important.

Within the competitive energy industry sectors, competition must be supported and this is enabled by the use of proposed common data and messaging protocols which are open and transparent. Hence the data, commands and services issued and/or generated to and from meters will be in a common format across this interface and the waypoints and nodes in between will be effectively transparent.

As can be seen from Figure 2.2, if water metering hardware can adopt the relevant protocols across the interfaces, it will be relatively straightforward to interface with the energy metering infrastructure. This feature has been one of the design goals of the Energy Retail Association's Supplier Requirements for Smart Metering (SRSM) project.

The two key interfaces are the WAN and the local communication interface.

2.5.1 WAN communications interface

In the energy smart metering architecture, the Wide Area Network (WAN) is the key to providing the requisite secure two-way communication between authorised parties (suppliers, agents and so on). At the time of writing, no decision had been made about the physical format of this infrastructure. The ERA's operational framework describes the results of an early investigation of potential WAN communications. However, the current position is that a firm decision on design and deployment of such a network is on hold pending more details on government policy. At the time of writing, data transmission based on an IP/XML protocol is envisaged.

If the approach to communication for intelligent water metering was via direct connection to the WAN network, a water metering system would have to be compliant with this interface. This would require a strict definition and agreement with key stakeholders for adoption.

2.5.2 Local communications interface

Under the current energy smart metering model, it is assumed this will be the connection point for water meters into the metering system, but the WAN communications network could be available, as described above. This is currently under further development. The latest position and technical discussions can be found at the following website: http://www.srsmlocalcomms.wetpaint.com.

2.6 Examples of dataflow to/from water meters

Whilst the data and communications definitions are not finalised, below are some examples of how data could pass through the proposed system to and from the meter. It is assumed that the following conditions have been met (these are prerequisites of being able to use the energy smart metering infrastructure for water):

- the energy smart metering infrastructure can support intelligent water metering;
- all commercial arrangements are in place to allow water companies to use the energy smart metering infrastructure, most importantly the WAN network;
- access control is granted to allow water companies to use the infrastructure.

Two examples are described in this section consistent with the two opportunities identified in this paper, namely connection of a meter to WAN via local communications facility and an energy smart metering system; and directly to the WAN network.

2.6.1 Using local communications

This option has formed the basis of discussions to date.

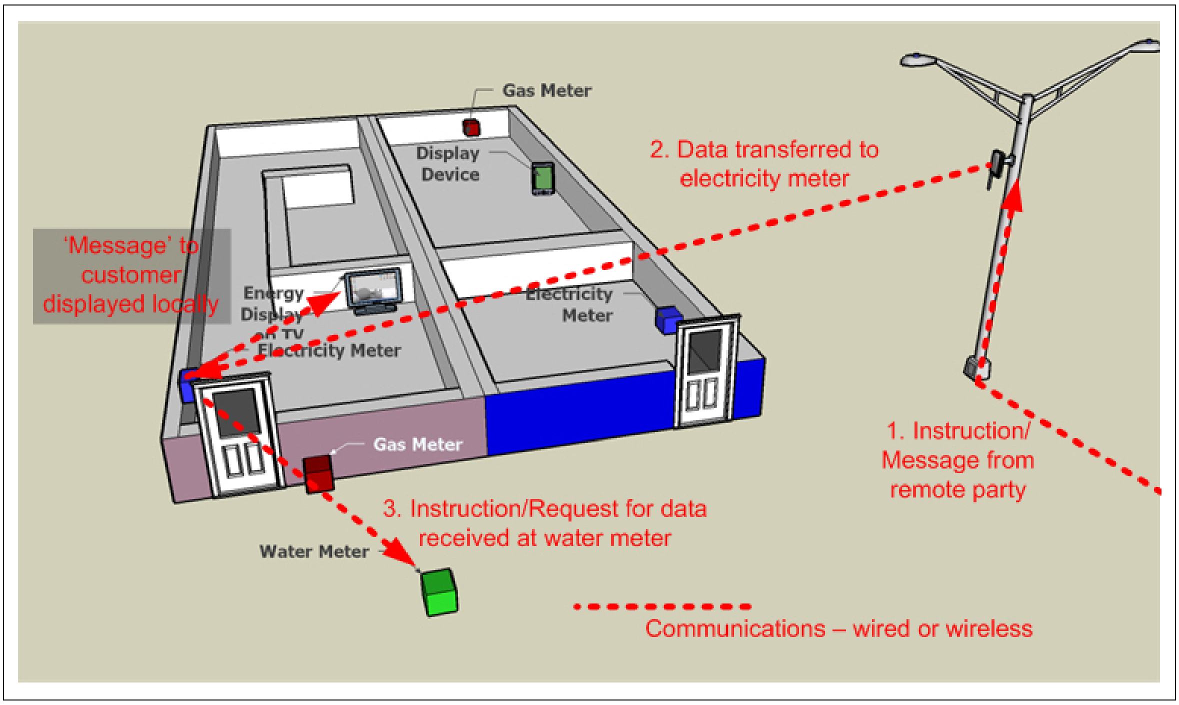


Figure 2.3: Potential route for data request to water meter

The water company is an authorised party with a service contract in place for access to a physical WAN communications link to the electricity smart metering system.

The water company sends an instruction from its data gateway (or a service provider's gateway) via the WAN communications service in the data exchange format defined. This is sent using the defined protocol to the water meter via the electricity meter using the local communications mechanism (on the basis that this is a free-to-use local communications service, such as open low power radio).

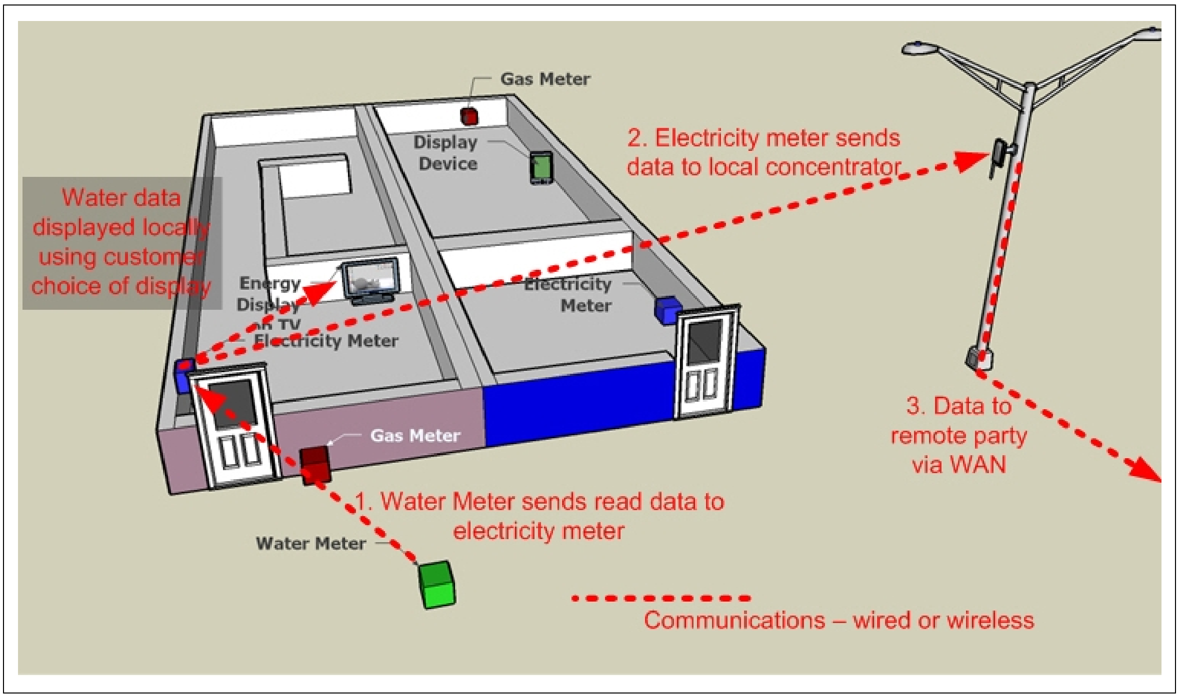


Figure 2.4: Potential route for data return from water meter

The water meter then responds to the gateway of the authorised party using the local communications service, the electricity meter as a node and the WAN communications service. The data is received at the gateway in the agreed data exchange format.

The data sent to/from the meter in this way could be any data supported by the infrastructure. For example, it could be:

- a request for meter reading, with meter reading returned;
- a change to water tariff structure or price and acknowledgement of change receipt/processed.

2.6.2 Directly connected to the WAN communications network

Whilst the current SRSM options suggest that the water meter could interface via the local communications network, it is also feasible for it to connect directly to the WAN itself. An example of how this might work is illustrated in the diagram below.

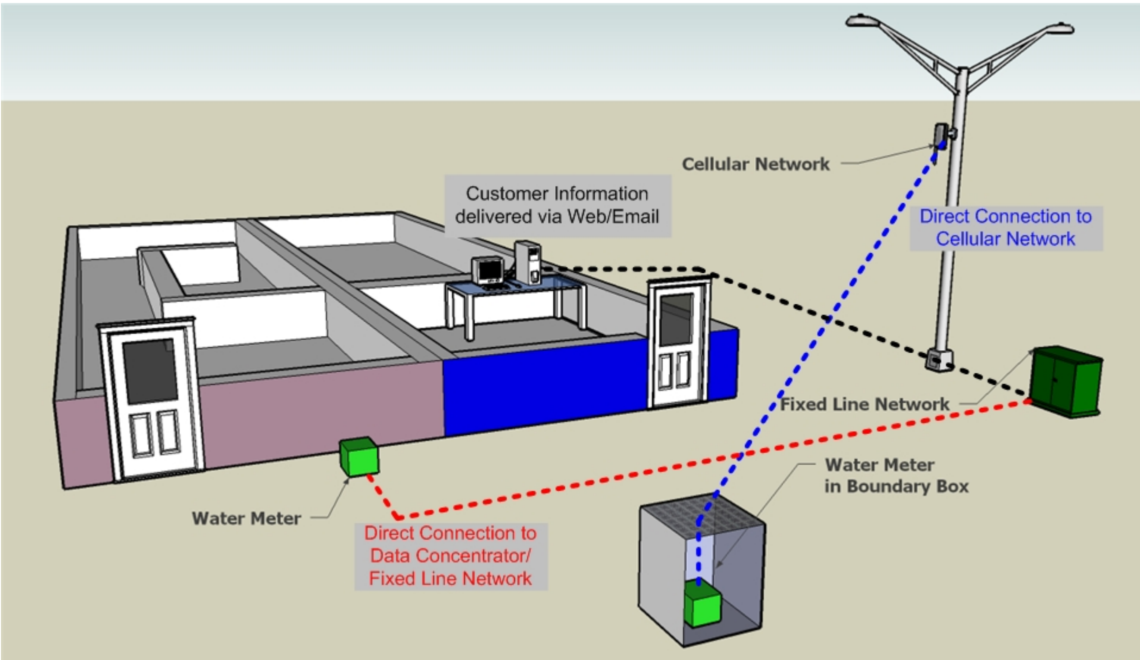


Figure 2.5: Water meter direct connection to the WAN

In this example, the water metering system could interface directly with the data concentrator and onto a cellular network or onto the fixed line network. This is a feasible option recognised in the ERA's smart metering framework. It does however require the water metering system to be suitably equipped to use WAN communication protocols and access controls. This is likely to require some detailed definition of the water metering system and an operational framework for intelligent water metering.

2.7 How alignment could be implemented

Technical alignment can be achieved by defining and implementing the appropriate specification for access to the energy smart metering network. This would entail the organisations from both sectors cooperating in the following ways.

The energy sector will need to provide details of local communication specifications and access protocols to all interested parties in the water industry. Details of the access protocols should also be available. These specifications should be available as a firm, baselined standard to enable interoperability to be guaranteed from the start. The interfaces to the WAN should be defined (again in their final form) and there should be a guarantee of sufficient bandwidth and resilience to support not only the data flows associated with energy metering but also anything associated with water metering. For this reason, it will be necessary to ensure that access to this national network is strictly controlled. It may be necessary to get prototypes (or simulations) of the proposed networks working at an early stage.

Conversely, the water industry will need to define an appropriate meter specification and the data definition and flows required for all current (and potential future) transactions to and from the water meter.

Any commercial arrangements governing contracts for access, costs and service level agreements must be agreed in a way which is satisfactory to all parties.

The alignment process does not require a definition of facilities or services which might be provided, merely that data transfer can take place with defined communication routes to and from meter installations. Commercial arrangements will be required.

Much work still remains to be completed and the industry appears to be waiting for a guiding mandate from Government before committing to a particular solution.

In the interim, work is being undertaken in the water sector under the banner of the Intelligent Metering Initiative, which could consider the opportunities of alignment of water with energy smart metering.

2.8 Existing smart metering solutions

2.8.1 Smart metering map

As part of its research, the Energy Retail Association has compiled a reference to examples of smart metering projects in electricity, gas and water which can be found at http://www.energy-retail.org.uk/smartmeters.html. This is in the form of a clickable google map which provides access to further details about each project or initiative. The map is illustrated in Figures 2.5 and 2.6.The live version is regularly updated with examples of smart metering projects, developments and announcements provided by collaborators to the smart metering collaboration network.

Figure 2.6 The smart metering map (1 of 2)

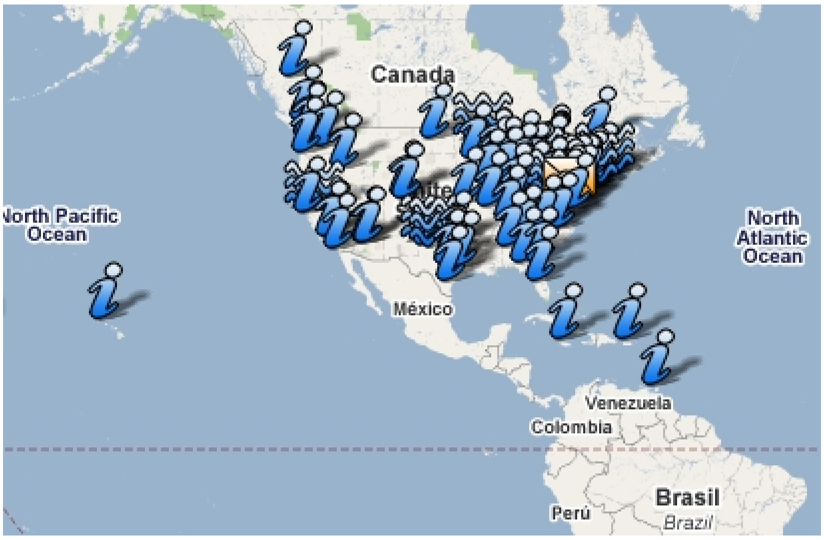


Figure 2.6 The smart metering map (2 of 2)

Included in these examples are the current Energy Demand Reduction Project trials in Great Britain. These are being managed by Ofgem on behalf of BERR and constitute four large energy suppliers (E.ON UK, EDF Energy, Scottish Power and SSE) trialling energy smart metering solutions. The main focus of these trials is to establish customer response to smart metering amongst other consumer display methods, but they will naturally trial the technology as well.

2.8.2 Understanding price elasticity

Understanding and modelling consumer behaviour in response to changing tariff structures is an important tool in assessing the true opportunities and benefits from smart metering. A number of studies are underway which focus on the changes in behaviour resulting from awareness of the true cost of consumption but, in our opinion, there are opportunities to study the behaviours that result from varying time-of-use and rising block tariffs.

2.8.3 Developments in the water industry

Discussions were held with a selection of meter manufacturers (acknowledged in this report) to gauge their views about how the technology and systems in the water sector may develop over time. A number of interesting developments are building on AMR technology implemented in various parts of the world. In particular, one manufacturer has the ability to support two-way metering across a fixed radio network and can support tariff changes (including seasonal and/or rising block tariffs), together with a number of other features.

Within the water industry, there are growing opportunities for network systems to offer interoperable data and communications between different manufacturers' equipment. Examples include the Wavenis System[xi] or the Flexnet System[xii] or M-Bus[xiii], the wired network system for managing metered data.

There are opportunities for the market to move away from manufacturer-specific systems towards a level of market-driven interoperability, particularly for the WAN component of smart/intelligent metering.

From these discussions, we conclude that technology is not likely to be a barrier to possible convergence.

The Intelligent Metering Initiative is seeking to "*drive the whole industry forward with a greater understanding of the issues and a more complete evidence base*". This should continue to be mindful of energy sector developments.

2.9 Realising the benefits of smart metering

The Environmental Agency has highlighted some areas of importance which we have examined here, including:

- providing real-time consumption and cost information to customers;
- providing 'whole network' information on water usage levels;
- reducing meter-reading costs;
- reducing carbon costs through AMR solutions;
- billing based on accurate readings;
- supporting flexible tariffs;
- identifying and managing excessive customer use and service pipe leakage;
- implementing communications to individual homes via the energy network;
- supporting developments in consumer goods and intelligent buildings.

In addition to these points, we have considered support for water competition.

This section explores how these could be realised with reference to the features of smart metering systems discussed earlier, including the smart metering architecture (see page 5) and interoperability gateways (see page 9).

The report spans the benefits from a basic 'dumb' meter (which simply provides an indexed reading at the meter); an automatically read meter (where the reading can be interrogated and delivered remotely) and a fully smart meter (where full interoperability and advanced communications are enabled).

2.9.1 Delivering real-time use/cost information to customers

Real-time consumption information is, in theory, available to consumers from dumb water meters which have the ability to log readings. In reality this is not practical, and requires the consumer to be proactive in reading and processing the data.

With an AMR solution, and the ability for the meter reading to be replicated to an in-house display, it is possible for consumers to see and react to a continuously updated consumption reading. Conversion to a cost cannot be made without an understanding of the tariff structure and rates. Under full smart operation, however, the meter itself is able to receive and store full details of the current tariff and charging arrangements and so display cost (as opposed to consumption) information direct to consumers.

The OWL wireless energy monitor is an example of a device aimed at domestic electricity consumers with the ability to monitor electricity usage. The product is primarily intended as an educational device to aid understanding of the cost of operating electrical appliances in the home. It is not intended to replace an accurate electricity meter reading, so cannot be used to verify or check an electricity account. There is no commercially available analogue in either gas or water and so this device has limited use as part of a smart metering installation.

2.9.2 Providing ‘whole network’ information on water usage

The goal of providing whole network information is to be able to derive an analysis of water usage at a level of granularity chosen by the network operator. The key to this is the ability to collect timestamped readings (as opposed to estimates). This can be available from either an AMR or a smart system, although the former is only available at the point at which the meter is interrogated as part of the read cycle and therefore is unlikely to enable fine analysis of diurnal usage. Real benefits from whole network information can come from the ability of the water meter to be reprogrammed to deliver read data at an interval determined by the supplier, effectively in real time.

This feature depends on the coverage of meters installed with bi-directional access to the WAN infrastructure.

In reality, there are some fundamental questions to be addressed in order to assess the true benefits of such a facility. For example, if water companies are to benefit then the costs of processing an increased number of readings and reconfiguration of individual meters must be justified by the benefits gained. These benefits are unknown at this point in time. Under current plans, full metering appears an unlikely prospect in the short or medium term - and 100 per cent meter penetration may never be practical due to difficulties in metering some flats and properties on joint supplies

This area would merit further consideration to assess whether there is a true benefit to water network operators. One main source of quantifiable carbon benefits is likely to be the reduction in pumping costs and in ‘find and fix’ reactive maintenance activity, though it is not clear how ‘whole network’ monitoring could contribute to this.

The ability of meter hardware to detect leakage flows downstream of the meter is of great benefit. Modern meters are increasingly able to differentiate flows due to leakage from normal use, and can be programmed to identify this in increasingly sophisticated ways. Severn Trent has recently announced a meter with such ability[xiv].

Data reported by Ofwat indicates that there is a significant reduction in water supply pipe leakage where a meter is installed[xv]. Rapid identification of this through a combination of water meter installation and AMR with leakage sensing capabilities could bring very significant reductions in treated water lost to leakage.

2.9.3 Reducing meter reading costs

Both AMR and smart metering will reduce the overall unit cost of obtaining meter readings as the efficiency of read collection is increased. In terms of the system architecture, in an AMR system, the WAN networking component is replaced by intermediate storage (such as the computer or terminal carried by the operator) or a fixed radio network. Without doubt, the unit cost of obtaining an individual reading is expected to be cheapest when using a remote communications network, as it precludes a meter reader having to visit the locality to obtain the reading.

Maximum economies of scale will be obtained where every metered property in the locality is smart, so obviating the need for ‘special read’ visits to meters that are not reachable by electronics. Indeed, the full smart solution – based on open standards and protocols for interoperability – is likely to enable lowest possible lifetime costs as there is no ‘lock in’ to a proprietary standard or type of meter.

2.9.4 Reduced carbon costs

The cost of carbon is largely a factor of the quantity of water pumped into a water network system, that is, the costs of transportation. Leakage on either side of the meter requires additional energy to top up the leakage flows. This also correlates to an increase in water treatment costs.

Fitting meters which raise awareness of water usage, together with water-saving appliances and water-reduction measures can reduce demand per capita. A benefit of the intelligence provided by a smart meter is the ability to display real-time environmental impact and cost data to the consumer (as has been done in Victoria, Australia). The two-way capabilities of a smart meter could be used to update the meter with real-time data.

The Carbon Trust has studied the potential carbon benefits from the use of advanced metering systems and concluded that, in the SME sector, over 12 per cent of carbon savings can be identified, and over five per cent implemented[xvi] by using advanced metering systems to monitor and report on energy usage. Whilst encouraging, current costs restrict the benefits to larger multi-site users, with a payback exceeding five years for smaller, single site SME businesses. They also cite the fact that significant benefits could accrue to ‘UK plc’ from a blanket rollout of advanced metering across all but the smallest of SMEs, illustrating that, growing the advanced metering base organically and driven by consumers themselves is not ideal.

Darby [xvii] states that “*Savings are typically of the order of 10 per cent for relatively simple displays (McLelland and Cook 1979; Dobson and Griffin 1982; Mountain 2006). These are small panels that can be carried around the home, typically showing instantaneous electricity consumption along with cost per hour at the current rate. The most recent displays also show carbon dioxide emissions for a given rate of consumption. They cost £15-£80. Trials are under way in the UK at the time of writing*.” and “*Savings have been shown in the region of five to 15 per cent and zero to 10 per cent for direct and indirect feedback respectively*.” Although Darby describes direct displays as a supplement to the meter, there have been studies of displays deployed in the absence of smart or interval metering that present positive results.

Sustainability First have estimated that smart meters, as part of a package of energy-saving initiatives, might produce a one to three per cent energy saving in the domestic sector[xviii].

2.9.5 Billing based on accurate readings

It is the very nature of utility companies that they tend to operate to a routine consumer billing cycle. In general, where an exact reading is used for producing an invoice, it is already historic and sophisticated usage profiling algorithms have to be employed to estimate usage and extrapolate consumption to a future date.

By definition, all metered properties can have a bill which is based on an accurate meter reading. The question, however, is one of time lag between taking the reading and processing the invoice for the consumer. The proposed standard for energy smart meters requires that a smart meter can be programmed to deliver a reading at a specified date/time or interval (or indeed can be polled on an ad hoc basis to meet operational or customer requirements). An AMR initiated onsite will be based on the most efficient route of the meter reader, which may not suit the consumer. However, fixed radio base AMR solutions in water can achieve the same result as the smart meter – with the reading being generated by a remote management system.

In a competitive retail scenario, one benefit will be the ability to take a meter reading at the point of switch from one supplier to another. In the energy industry, this is usually done by taking a reading within a defined time window of the supply change, or by the consumer. The ability to remotely initiate a meter reading will be beneficial in facilitating switching and reducing billing disputes caused by erroneous or badly timed readings.

2.9.6 Potential for flexible tariffs

Flexible tariffs are becoming an increasingly important component of demand-side management strategies in energy, and are being increasingly talked about as a tool for managing demand in domestic water supply (for example, the ‘rising block’ tariff structure often referred to).

The ‘economy 7’ tariff has existed in the electricity sector for many years and is an example of a two-rate time-based tariff. In order to implement a tariff which reflects usage on a particular day, time or season, the meter must be able to log a reading at a point in time and store that data until it is uploaded to the supplier, either via AMR or via the host WAN network. Either of these solutions will support a flexible tariff structure, which can be based on accurate readings.

The feature defined by the energy smart meter is that the readings will be stored by the meter itself, and the capture cycle can be configured ‘on the fly’ to capture date and time-stamped readings to a given schedule, so giving more flexibility. Also, due to the existence of the home networking capability, the actual cost can be displayed to the consumer instantaneously. We have seen examples of where this functionality exists in water metering equipment –supporting rising block and seasonal tariffs (or a combination of both). Thus, technology should not be a factor in limiting alignment. However, there is a strong case for further investigation into the price elasticity effects of different tariff models in order that the true benefits from technology can be realised.

2.9.7 Remotely operable valves to manage usage and leakage

Although currently not permitted under current legislation, the ability to interrupt and reconnect a water supply is technically feasible. Interoperability between the water metering system and an authorised remote party will permit this to happen. This is already provided for by the specification for gas and electricity metering as there is a benefit in being able to remotely isolate a supply, either because of bad debt, vacant property, or to support prepayment metering. For the water meter, there could be a system message and defined dataflow which is reserved for future use should the need arise to support remote connection or disconnection.

2.9.8 Enabling a water meter to become a node to a network

As can be seen from Figure 2.2: Smart metering interoperability, the smart metering architecture can accommodate the presence of a water meter as another component which talks across the local communications interface. In addition, as defined above, a water metering system could directly connect to the WAN communications network.

Provided that manufacturers and suppliers can support the development and implementation of the communications protocols and base metering functionality, the water meter can operate as a node within the overall network.

2.9.9 Developments in consumer goods/intelligent buildings

As mentioned earlier, a number of groups are looking at various applications which can integrate into a whole house network and capitalise on the benefits of interoperability, such as:

TAHI – The Appliance Home Initiative

TAHI is a reasonably mature cross-industry organisation establishing solutions to support and promote interoperability within a home. It has a number of industry sector groups looking at particular requirements and issues, including energy and sustainability, healthcare, buildings and entertainment. TAHI has a wide range of members from large corporates to small companies, and from government departments to local councils. In 2008 TAHI is starting work on a CENELEC standard for interoperability between systems that can be used to deliver services and applications to a home. Smart meters and devices and services that could interact with smart meters are at the core of this work. It would be useful for the Environment Agency to keep abreast of TAHI developments.

Green Alliance

The Green Alliance is an independent charity, promoting sustainable development by ensuring that environmental solutions are a priority in British politics. They work with government, business and the NGO sector to encourage new ideas, facilitate dialogue and develop constructive solutions to environmental challenges.

In their report *Teaching homes to be green: smart homes and the environment*[xix], they have argued for a mandate from May 2008 requiring all homes to have a smart electricity meter within ten years. Their report also calls for a move towards water smart metering and acknowledges the smart water meter as one of the core components of a 'smart' home. However, the report recognises that "*the development of smart water meters has also not progressed as quickly as smart electricity meters, as the debate on whether to universally meter water is still underway. Only a quarter of GB homes are currently metered and a negligible percentage of these have smart water meters*."

European Standardisation

CECED (European Committee of Domestic Appliance Manufacturers)

CECED is an initiative on a European scale by white goods manufacturers, and they are in the process of having their proposals for an interoperable protocol approved by CENELEC during 2008. The aim of the CHAIN (CECED Home Appliances Interoperating Network) initiative is to allow appliances from different manufacturers to talk to each other, and potentially other systems and devices within a home.

CHESSS

CHESSS is a project by standards bodies, with European funding, to establish the need for customer service standards within the EU. Their scope includes billing and metering. The project is shortly to announce proposals for the next stage following desktop and seminar exercises.

SerCHo

This is a German exercise similar to TAHI, focusing on the delivery of interoperable, sustainable services through smarter use of technology, including metering.

ECHONET

This is a Japanese initiative similar to TAHI and SerCHo.

2.9.10 Support for water competition

As in the energy sector, support for competition in water relies on the ability to attribute a consumer's supply to one registered water supplier and to be able to handle switching between suppliers. The success of this crucially requires meter readings to be taken at a defined point during the supplier switching process such that the customer's account can be transferred efficiently and with a continuous consumption. Competing suppliers are able to differentiate on the basis of, amongst other factors, customer service and a range of supply and tariff options tailored to different types of customers and their needs. The ability to collect instantaneous meter readings and to reflect the effects of changing supplier in real time are two key ways in which smart metering can support competition. Further work could be done in this area to develop principles to support competition.

3 Alignment with energy smart metering

3.1 Considerations for alignment

The conceptual architecture for energy smart metering allows for the inclusion of an intelligent water meter as a local device to the energy metering system with full connectivity to an authorised party (such as a water company). In order to align within this framework, the pre-requisites are:

- the smart metering conceptual design must be implemented;
- the WAN network design must have sufficient bandwidth to accommodate the anticipated network traffic;
- manufacturers and system integrators must agree and adopt any protocols;
- the supporting WAN network must be in place and operating before the water meter can interface with it;
- enterprise applications and business processes within the water suppliers must be configured to be able to take advantage of the two-way communications;
- water meters must be available which support the communications and access protocols defined by the energy smart metering solution;
- the commercial business case and funding model must be developed and agreed.

Timing considerations will also play an important part in alignment. Either the energy smart metering WAN must be completed locally before a suitable water meter is installed and enabled to connect via local communications, or water metering systems must be compatible with the future energy metering solution to connect directly to the WAN communications network.

The lack of a firm policy for energy smart metering presents a risk in that the water industry may not have sufficient clarity on which to base a decision. The risk of stranding installed equipment may result in water metering taking its own course.

3.2 Current policy on energy smart metering

In the energy sector, suppliers are trialling smart metering for electricity and gas.

The Energy Retail Association takes the view that, for mass rollout, a mandate from Government for energy smart metering is required. The stated government position is that households in the UK will have the offer of a smart meter for electricity and gas in the next 10 years.

At present there are some significant unknowns which preclude a concrete implementation plan being developed. For example:

- government policy on any rollout is not clear;

- there is no agreed market model;
- the target start and end dates are unclear;
- no final technical solution is agreed and it is unclear who will own the programme for physical delivery.

Within Government, an announcement is anticipated from BERR in response to the results of their consultation on metering and billing; this has not been forthcoming as at 27 March 2008.

Whilst there are numerous AMR solutions for electricity and gas (mainly in the non-domestic sector), smart metering solutions are being trialled by major suppliers for domestic electricity, gas and water.

The key dependency is having the communications network in place. In order to complete the design of and commence a nationwide rollout, the industry is requesting a "mandate" from Government for energy smart metering.

3.3 Growth in the provision of water meters

The Environment Agency itself has commented that[xx] "*The UK is unusual among Organisation for Economic Cooperation and Development (OECD) countries in that most households are not metered. Levels of household water metering for England and Wales in 2006-07 ranged from under eight per cent (Portsmouth Water) to nearly 66 per cent (Tendring Hundred). The average is 30 per cent. This is growing at a rate of about two per cent per year. On current trends, it will be 45 per cent in 2015 and 64 per cent in 2030. In the water-stressed South East of England, rates of metering are below average.*"

The Environment Agency is calling for household metering to be accelerated where it is most needed, with water companies in seriously water-stressed areas metering on compulsory basis. Ideally the majority of homes in seriously water-stressed areas should be metered by 2015 but the Environment Agency recognises that a great many meters will need to be installed, and that some companies may not be able to achieve full metering until 2020. In their Strategic Direction Statements, water companies declared plans for metering ranging from optant metering only (individual households opting for a meter to be installed) through to full compulsory metering, with likely dates for achieving full installation ranging from 2012 through to 2035.

The fact that the rate of planned installation of water meters is relatively low and, for most areas, is likely to be for individual households rather than on a geographical basis, supports our view that the industry would benefit from a national plan for water metering installation.

3.4 Rollout implications

The benefits cited in the last section may only be realisable if there is a critical mass of intelligent meters installed in a given location – and this depends on what water sector companies do in the next 15 years. There is support for a move towards increased metering, although this is not specifically aligned to smart or intelligent metering. As a result, there are no formal plans for a move to smart or intelligent metering at this point and there are also no obvious indications of a desire to align with energy smart metering. The fact that water smart metering systems with two-way communication with water meters exist, and are supporting domestic tariffs, demand management and leakage identification will, in our opinion, preclude incentives for alignment.

In order to look at possible alignment options, we examined some rollout options for energy smart metering and considered how the water industry might take advantage of the advanced communications network which will be created as a result.

Market-led rollout with no government mandate for energy smart metering

It is still an option for Government not to mandate energy smart metering and leave the market to rollout smart meters where it is cost-effective to do so.

In this scenario, the Energy Retail Association responded to the August BERR consultation on metering and billing with the following:

"*If that policy is no action and to leave the market as is, driven by supplier business case, then an operational framework will be delivered into whatever governance arrangements are deemed the most appropriate and it seems likely that there will only be market penetration of about 25-30 per cent of domestic customers, as that seems to be the only segment where the supplier business case exists*."

The implications of 25-30 per cent coverage of domestic energy customers will need to be assessed by the water sector. It is not known at this point what the implications will be for availability of WAN communications.

Regional franchise rollout for energy smart metering:

The Regional Franchise Model is the preferred option of the Energy Retail Association and has significant support within the energy industry. The principles of this are set out in the Energy Retail Association response to the August BERR consultation on metering and billing[xxi].

This would result in universal energy smart metering within 10 years with a coordinated, managed rollout. WAN and local communication infrastructures would be available nationwide after the 10-year rollout period and could be made available to the water sector. Depending on how the rollout was executed, there might be the potential to connect to the communications infrastructure earlier on a region-by-region basis.

Market-led rollout with government mandate for energy smart metering:

This model is the preferred option of the regulator Ofgem and it is assumed that there will be a deadline set for completion of universal rollout of smart metering.

In a market-led rollout, there is much uncertainty as to how the communications infrastructure would be rolled out, as it will be in the gift of the market participants. Participants may seek to rollout communications on a regional basis to support targeted regional rollout, or they may seek to implement a national communications infrastructure to be available for any customer installation of energy smart metering.

The WAN and local communications infrastructures would be available nationwide after the universal rollout deadline and this could be made available to the water sector.

4 Conclusions

The technology available today for metering and communications means that smart metering is a technically feasible option for consumers in the energy and water sectors.

The energy sector has developed a comprehensive and detailed operational framework for energy smart metering which supports water intelligent/smart metering and is defining open standards for accessing the communications network that will be installed to support energy smart metering.

As at March 2008, it has not been agreed that this operational framework would be adopted for use in energy smart metering, but the operational framework design and architecture ensures that it can be agnostic to any market model that is defined by Government as well as supporting innovative offerings. This should ensure that its principles survive intact in any future development of energy smart metering.

Within the water sector, there are no technological barriers to aligning a smart metering programme with the energy smart metering rollout. However, current plans for installation of meters, whether basic ‘dumb’ meters, AMR or more advanced smart/intelligent water metering, suggest that it is unlikely that a significant proportion of households will have a smart meter fitted over the next 10 years.

This leads to a conclusion that a jointly developed, universal, coordinated rollout of energy and water smart metering solutions is unlikely to be a realistic possibility.

There is a potential risk during the next 10-15 years that the energy and water sectors will diverge rather than converge on a common solution for communicating with and remotely controlling household meters – largely due to different regulatory/government drivers (potential energy mandate versus water company decisions on the basis of cost benefit analysis).

Interoperability (the ability for all types of meter to access the national network) is a key feature for a smart metering programme to become a reality across the country.

It is recommended that, with support from the relevant agencies, the energy and water sectors look to supporting the interoperability protocols such that a single infrastructure can service the needs of electricity, gas and water consumers.

This will give water companies the opportunity to use the energy smart metering infrastructure, even if the rollout is not coordinated in a joint water and energy implementation programme.

However, all of these conclusions are based on a government mandate for energy smart metering to all domestic premises (and potentially small business premises) in the UK and an interoperable operational framework.

5 Recommendations

5.1 Establish a strategic policy group

In order to ensure future opportunities for commonality between energy and water intelligent metering are maximised and divergence is minimised, it is recommended that a strategic policy group be established. The nature of this group requires further consideration but members should include government departments, regulators and industry representatives. The objective of this group would be to set strategic policy for energy/water intelligent meeting and provide a framework to encourage input from the energy and water industry.

5.2 Wider involvement in the smart metering debate

It is recommended that the water industry recognise the opportunities of alignment with energy smart metering and represent itself in the wider debate about smart metering, including input to energy smart metering definition. At the least, the aim of this representation should be to ensure that the potential alignment that currently exists is not compromised in future developments.

6 Appendix 1 – Competitive energy market in Great Britain

The energy market in Great Britain has been transformed from the traditional, vertically integrated supply companies into a fully competitive, market based industry over the last 20 years.

Domestic and industrial consumers are able to choose from a range of competing gas and electricity suppliers. The business of distributing electricity and gas across the country is managed by distributors, who have responsibility for overall management of the physical networks and balancing of the supply/demand for consumers.

In addition to competition in energy supply, competition also exists in metering. A range of players are able to compete to provide meters to consumers, under contract to suppliers (meter asset managers) and to install and maintain meters (meter operators).

Regulatory price controls, operated by Ofgem, cover the gas and electricity transmission and distribution energy companies but not the competitive supply or metering companies.

Glossary

A

Access controls • Defines authorised parties allowed to interact with a metering system using WAN communications; who or what is allowed to interact with a metering system using local communications; what functions or features of the metering system an authorised party or local device can use; and what data an authorised party or local device can read, write or erase.

AMR • Automated meter reading. Generally, this uses one-way communication to send meter data from the meter to a data retrieval system.

B

BERR • Department for Business, Enterprise and Regulatory Reform.

C

CECED • European Committee of Domestic Equipment Manufacturers. CECED promotes the industry's mission to increase the performance while reducing the environmental impact of the appliances.

CENELEC • European Committee for Electrotechnical Standardisation. CENELEC's mission is to prepare voluntary electrotechnical standards that help develop the Single European Market/European Economic Area for electrical and electronic goods and services removing barriers to trade, creating new markets and cutting compliance costs.

CHESSS • CEN Horizontal European Service Standardization Strategy (CHESSS) is examining the feasibility of taking a generic cross-sector approach to service standardization. A European Commission and EFTA-financed feasibility study, CHESSS is aimed at identifying how standardization can apply across multiple service sectors, rather than being sector-specific, and it will seek to determine to what extent the requirements for future standardization could be met by a finite number of generic standards addressing the fundamental aspects of design of services, information on services, problems with services, and payment for services.

D

Defra • Department for Food, Environment and Rural Affairs

DTI • Formerly the Department for Trade and Industry whose responsibilities have now been subsumed into BERR.

E

ECHONET • An abbreviation of Energy Conservation and Homecare NETwork. The mission of the ECHONET consortium is to develop ECHONET systems - designed to control home appliances directly and connect to home electronics devices through a gateway. This design will enable industry participants to develop a variety of systems having different communication speeds and levels of technological sophistication while maintaining optimum cost performance.

EFTA • European Free Trade Association

ERA • Energy Retail Association. The trade association which represents the six largest electricity and gas suppliers in the domestic market in Great Britain.

G

Green Alliance • UK organisation that aims to promote sustainable development by ensuring that the environment is at the heart of decision-making.

IET • The Institution of Engineering and Technology is one of the world's leading professional societies for the engineering and technology community. The IET has more than 150,000 members in 127 countries and has offices in Europe, North America and Asia-Pacific. The Institution provides a global knowledge network to facilitate the exchange of knowledge and ideas and promotes the positive role of science, engineering and technology in the world.

Interoperability • The Institute of Electrical and Electronics Engineers defines interoperability as "*the ability of two or more systems or components to exchange information and to use the information that has been exchanged*".

M

Microgeneration • The UK Government through the means of the Energy Act 2004 defines micro-generation as generation of a capacity of less than 50 kW.

Measuring Instruments Regulations • Measuring Instruments (Active Electrical Energy Meters) Regulations 2006, ISBN 0110747593 and The Measuring Instruments (Gas Meters) Regulations 2006, ISBN 0110751493.

Measuring Instruments Directive • The Measuring Instrument Directive (MID) is a new European Union (EU) directive aimed at creating a single market for measuring instruments across the EU. The fundamental principle being that meters which receive a MID approval can be used in any other EU country irrespective of where in the EU that approval was granted. The MID covers a range of measuring instruments which include gas, water and electricity meters.

N

NCC • National Consumer Council.

NHH • Non-half hourly meter: means a Supplier Volume Allocation meter which provides measurements other than on a half-hourly basis for settlement purposes (as defined in the electricity industry's Balancing and Settlement Code, available from http://www.elexon.co.uk/bscrelateddocs/default.aspx).

Ofgem • Office of Gas and Electricity Markets, regulates the electricity and gas markets in Great Britain.

O

OWL • The OWL is a device that indicates the total amount of electricity a home or office is using. It consists of a simple sensor that clips around one of the wires to the electricity meter, a transmitter that sits by the meter and the wireless LCD display that can be placed in a convenient location.

R

Rising block • A tariff structure where a higher price applies above a specified level of consumption.

S

SerCHo • The SerCHo project (Service Centric Home), funded by the BMWi, is concerned with the development of a holistic solution, consisting of a "home service platform", a “service provider platform" and an "ambient service framework", providing procedural models and service creation and deployment tools for the support of service development and management. With the help of SerCHo Framework Services, future services can be designed to be ubiquitously useable and to support users more efficiently. Examples of such services include communication, maintenance, information, domestic appliance control, security and healthcare services.

Small Supply Point • In the GB gas market, a gas supply consuming less than 73,200 kWh per annum.

SRSM • Supplier Requirements for Smart Metering. The purpose of the Smart Metering Operational Framework Proposals and Options (operational framework) is to define a framework for the operation of smart metering in Great Britain. The key objective of the operational framework is to create an interoperable platform for smart metering.

T

TAHI • The Application Home Initiative. TAHI is a reasonably mature cross industry organisation looking at establishing solutions to support and promote interoperability within a home. It has a number of industry sector groups looking at particular requirements and issues, including energy and sustainability, healthcare, buildings and entertainment. TAHI has a wide range of members from large corporates to small companies, and from government departments to local councils. It's purpose is to establish frameworks and standards that would support appliances and networks within a home to work together to deliver new services..

W

WAN • Wide Area Network. This should be defined in the Smart Metering Operational Framework (see SRSM).

[i] The terms 'smart' and 'intelligent' are used generally within the energy (electricity and gas) and water industries respectively and often interchangeably. The terms are used to refer to a set of metering functionality which is defined in more detail in Section 2.

[ii] http://www.ofgem.gov.uk/Markets/RetMkts/Metrng/Smart/Documents1/12813-2006.pdf [accessed 27th March 2008]

[iii] http://www.ofgem.gov.uk/Markets/RetMkts/Metrng/Smart/Documents1/14527-Metering Innovation_Decision document_final.pdf [accessed 27th March 2008]

[iv] http://www.berr.gov.uk/energy/whitepaper/page39534.html [accessed 27th March 2008]

[v] http://www.berr.gov.uk/consultations/page40850.html [accessed 27th March 2008]

[vi] http://www.number10.gov.uk/output/Page13791.asp

[vii] Automated meter reading – the ability for a meter to communicate with an external data capture or management system.

[viii] A copy can be obtained from the Energy Retail Association, see http://www.energy-retail.org.uk/documents/SmartMeteringOperationalFrameworkProposalsandOptionsSummary_003.pdf [accessed 27th March 2008]

[ix] Defined as gas meter points consuming less than 73,200 kWh per annum. Generally this equates to domestic gas consumers although the threshold is based on consumption, not type of property or activity.

[x] See http://www.energy-retail.org.uk/documents/SmartMeteringOperationalFrameworkProposalsandOptionsSummary_003.pdf for a summary of the operational framework document [accessed 27th March 2008]

[xi] A description of Wavenis can be found at http://www.coronis.com/descr_techno.php?lang=en [accessed 27th March 2008]

[xii] http://na.sensus.com/flexnet/ [accessed 27th March 2008]

[xiii] http://www.m-bus.com/ [accessed 27th March 2008]

[xiv] See http://www.severntrentservices.com/enews/vol20/water_supply.aspx [accessed 27th March 2008]

[xv] Average SPL figures (Environment Agency, March 2008):

unmeasured properties	42.5 l / property / day;
externally metered properties	19.5 l / property / day;
internally metered properties	39 l / prop/day

[xvi] See *Advanced Metering for SMEs* (Carbon Trust) 2007 http://www.carbontrust.co.uk/Publications/publicationdetail.htm?productid=CTC713&metaNoCache=1 [accessed 27th March 2008]

[xvii] Sarah Darby, April 2006. *The effectiveness of feedback on energy consumption: A review for Defra of the literature on metering, billing and direct displays* http://www.defra.gov.uk/environment/climatechange/uk/energy/research/pdf/energyconsump-feedback.pdf [accessed 27th March 2008]

[xviii] http://www.sustainabilityfirst.org.uk/publications/smartmeters2007.htm [accessed 27th March 2008]

[xix] Available at http://www.green-alliance.org.uk/uploadedFiles/Publications/reports/TeachingHomesToBeGreen.pdf [accessed 27th March 2008]

[xx] See *Household water metering: Position statement* at http://www.environment-agency.gov.uk [accessed 27th March 2008]

[xx] See http://www.energy-retail.org.uk/documents/ERAResponsetoBERRConsultationonMeteringandBilling.pdf [accessed 27 March 2008]

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