

# Analysis on disablement/ enablement functionality for smart gas meters

On behalf of the Department of Energy and Climate Change

Report version: FINAL

Status: Issued to Client

Classification: PUBLIC

Issue Date: 18<sup>th</sup> June 2010

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## Executive Summary

Gemserv was appointed by the Department of Energy and Climate Change (DECC) to undertake analysis on disconnection/ reconnection functionality for smart gas meters (“the project”) that would be used to help inform the Government’s final decision on this element of functionality for gas meters in the domestic sector.

As part of this work, Gemserv was asked to consider the case for retrofitting a device to existing gas meters to provide the required smart functionality and examined the associated issues of technical capability, maintenance, management and safety. Two types of retrofit device were assessed:–

1. “Non-Valve Retrofit” – retrofit solution providing smart meter functionality<sup>1</sup> Categories A-D (i.e. excluding Category F: remote disablement and enablement of supply); and
2. “Valve Retrofit” – retrofit solution providing valve functionality external to the existing meter supporting Category F - Remote disablement and enablement of supply that will support remote switching between credit and pre-pay to allow remote disconnection/ reconnection capability.

After carrying out extensive consultation with relevant stakeholders, Gemserv has concluded that, subject to DECC’s economic assessment, there are no grounds that would prevent the use of a valve in the proposed roll out of gas smart meters.

This conclusion is based on the premise that the main purpose of the valve is to principally support debt management for both suppliers and consumers by allowing remote and self- disconnection and reconnection. The valve is not a replacement for the existing Emergency Control Valve (ECV) that is installed in all domestic gas installations, nor is it an alternative for isolation and reconnection processes as required under the Gas Safety (Installation and Use) Regulations 1998.

Gemserv has also examined the issues relating to the use of a retrofit device to provide smart meter functionality to existing gas meters rather than to install new smart meters. We conclude that retrofit devices are being developed that are suitable for a significant number of the current GB gas meters manufactured and installed post 2000 and that these devices could provide all the required smart meter functionality, with the exception of facilitating remote connection/ disconnection of the consumer gas supply. On the basis of the evidence obtained during its investigation, Gemserv has concluded that the fitting of such devices could reduce both acquisition and installation costs incurred in the overall gas smart meter rollout associated with the provision of the required functionality for many consumers currently taking gas on credit tariffs.

However, it is also recognised that the installation of a retrofit device could introduce additional and unnecessary costs if a gas meter was to be subsequently swapped out for a smart valved meter before the useful asset life of the retrofit device has been reached, as may happen should the consumer request transfer to a tariff requiring a valve. The rationality of the investment is bounded by two key factors:

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<sup>1</sup> As set out in Table 1 (page 22) of “Towards a Smarter Future: Government Response to the Consultation on Electricity and Gas Smart Metering”, The Department of Energy and Climate Change, December 2009.

1. The number of consumers who will eventually switch towards a tariff requiring a valve such as pre-payment or Pay-As-You-Go (PAYG) terms; and
2. The age of the meter at the time the retrofit solution is fitted, as the older the meter, the lower the overall benefit attributable to retrofit solution.

In respect of the first factor, Gemserv supports the views expressed by a significant number of stakeholders that one of the benefits of gas smart meters with valves could be the opportunity to provide additional consumer benefits through the provision of new tariffs, such as a PAYG product. Gemserv has no absolute view as to the extent of the eventual take-up of this product, but believes that the installation of retrofit devices where appropriate should not prevent the development of markets for such products. We have no reason to dispute the research that has been undertaken by Consumer Focus which suggests PAYG take-up could be 20% to 25% of customers currently on credit tariffs.

Finally, Gemserv supports the need for a review of a number of industry practices regarding disconnection and reconnection of the gas supply to minimise the risks to consumers that may arise from inappropriate disconnection or reconnection through the introduction of gas smart meters.

# 1. Introduction

## 1.1 Background and Purpose

In its December 2009 response to the consultation on electricity and gas smart metering, the Department of Energy and Climate Change (DECC) noted that further work was needed to assess the issues regarding the functional requirement for gas smart meters to include a valve to remotely connect/ disconnect gas supply.

DECC subsequently commissioned Gemserv to undertake analysis on disconnection/ reconnection functionality for smart gas meters (“the project”) that would be used to help inform the Government’s final decision on this element of functionality for gas meters.

The objectives of the project were to:

- Review, assess and consolidate the available information, including costs and benefits;
- Test the robustness of the arguments made in relation to the gas valve; and
- Examine issues relating to retrofitting, technical capability, safety and maintenance requirements, commercial operations and cost implications across the piece. A glossary of terms used in this report is set out in Appendix 1.

## 1.2 Scope

The project scope included a review and consolidation of available information (i.e. work already undertaken by DECC, stakeholder submissions, other sources etc.) and testing the robustness of the arguments for the inclusion of a valve in gas smart meters for the domestic sector. Further, the project also considered the case for retrofitting existing gas meters with smart functionality and examined the associated issues of technical capability, maintenance, management and safety.

Gemserv’s analysis covers the technical, operational (including safety and maintenance) and economic issues to be considered in determining whether to include the gas meter valve in the minimum mandate. Where possible these have been quantified and the cost benefit implications explored.

Key areas and questions considered included:

- Reviewing/ gathering evidence to assess the robustness of the cost-benefit assessment and other assumptions underlying the economic modelling;
- Assessing the economic and technical viability of a Valve-Retrofit approach (i.e. a valve fitted external to the meter case), including consideration of costs, benefits and drawbacks, reliability and installation;
- Assessing the economic and technical viability of a Non-Valve Retrofit approach comprising non-valve related functionality for gas meters, including consideration of current experience, likely costs, benefits and drawbacks, reliability and installation;

- Reviewing the technical capabilities of valved meters, including consideration of their expected operating life, reliability (gas tightness, resistance to contamination, frequent/ infrequent operation), warranties, battery requirements (e.g. life, use, disposal);
- Reviewing the interactions with the existing safety regime – identifying areas of increased risk and, where proposed, reviewing and assessing counter measures provided by stakeholders – clearly identifying any areas where further work is required by relevant players;
- Considering any gas network implications from the valve/ mixed approach, including consideration of the impact of pressure losses, variances in gas pressure, and network management;
- Reviewing data/ experience from the current operation of prepayment meters and determining its relevance to smart metering;
- Customer interaction with gas meters, including consideration of the current system and how this might need to change with the roll out of smart meters and whether this will present new issues; and
- Lessons from other markets and other considerations.

Further, as part of this work, Gemserv collected various cost information which has been provided to DECC to support development of its impact assessment.

### 1.3 Context

This section of the report sets out the background to the issues under consideration in the report.

#### *(a) Current Requirements*

New gas meters have to comply with the requirements of the Measuring Instruments Directive (MID). Test houses across Europe can undertake the necessary tests on meters and then stamp them to show they comply with the MID requirements.

Prior to the introduction of the MID the gas meters used in the UK were stamped by Ofgem. These gas meters have to comply with the Gas Meters Regulations which require the meter to be accurate to within +/-2%. There is a requirement in the Gas Act to maintain meters in 'proper working order for registering the quantity of gas supplied'. Meter Asset Managers (MAMs) are able to demonstrate that they are complying with this legal requirement by undertaking In-Service Testing. Chapter 17 of the Meter Asset Managers Code of Practice (MAMCoP) also requires policies to be put in place to monitor the performance and functionality of meters.

When the accuracy of a population of meters drifts outside the accuracy limit the MAM will initiate a meter replacement exercise. The technical asset life of the meter will predominantly be determined by its accuracy performance. For current gas meters this will probably be somewhere between 20 and 30 years based on In-Service Testing results.

The meters for In-Service Testing currently come from a process known as 'churn'. This is where a Pre-Payment Meter is installed and the removed credit meter is then available for In-Service Testing.



*(b) Emergency Control Valve*

It is a requirement of the Gas Safety (Installation and Use) Regulations 1998 that an Emergency Control Valve (ECV) is fitted on the gas supply to a property which the consumer can operate in the event of an emergency to shut off the gas supply to the property. The specification for this valve requires that it will let less than 15cc/hr of gas leak past the valve at a supply pressure of 350mbar. The ECV is also required to withstand tests for high temperatures and fire resistance. However, the valve that is fitted to smart meters for remote disconnection/ reconnection will probably have to meet the same performance requirements as those fitted in pre-payment meters which allows a “let-by” of 5,000cc/hr at 50mbar inlet pressure. This valve does not have to pass the same high temperature and fire resistance tests as an ECV.

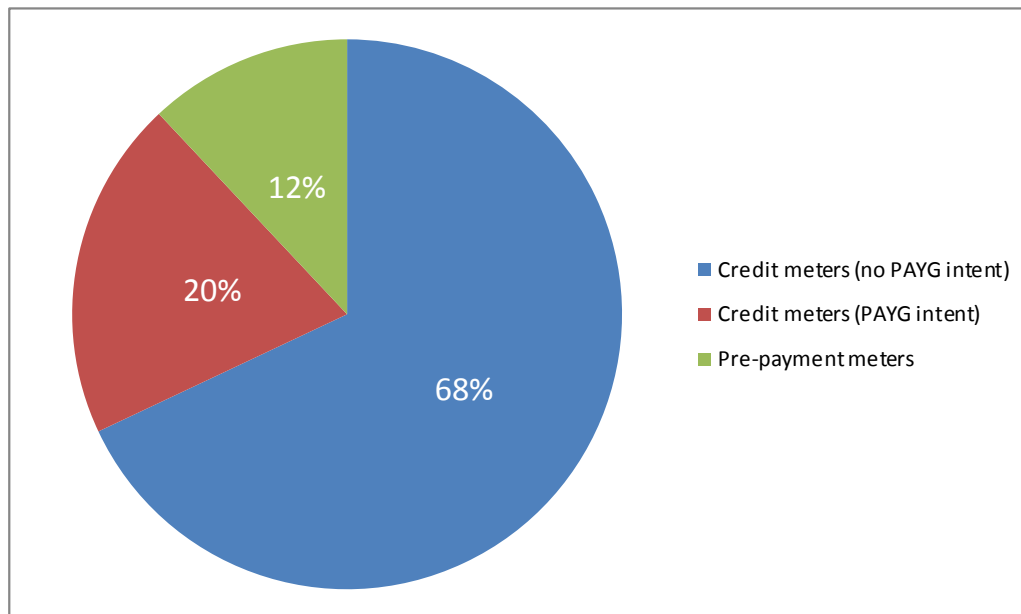
When the ECV is closed the gas supply is said to be “isolated”. Due to the lower specification of the valve in the smart meter it cannot be used to isolate the gas supply and so, in this report, we refer to the gas supply being “disconnected” when the valve in the smart meter is closed.

*(c) Pre-Payment and Pay-As-You-Go Meters*

Pre-Payment Meters (PPM) are meters which have an electronic module on the front of the meter and a valve inside the meter which closes when there is no credit on the meter. Consumers can add credit to the meter with a smart card that their Gas Supplier provides. Some of the credit added to the meter by the consumer will be used to pay off the debt (if the consumer has gas debt) and the remainder will be used to supply gas. There are just over 2 million pre-payment meters in use currently in the UK. Northern Ireland also operates meters that support Pay As You Go (PAYG) tariffs. Credit is again added to these meters by the consumer but all of that credit is used to supply gas. A valve in the meter closes when credit has been used up. The valve in PAYG meters is the same as for PPM, however PAYG meters in Northern Ireland are less complex than PPM in Great Britain because they are not required to allocate credit against existing debts.

Figure 1 illustrates the current Pre-Payment Meter population and expected uptake in PAYG tariffs, subject to appropriate meter functionality and infrastructure being in place.

**Figure 1: Current Pre-Payment Meter Population and Expected Uptake of PAYG Tariffs**



Experience in Northern Ireland shows that PAYG tariffs could increase to 40% of customers, whilst parallels with the mobile phone market show PAYG increasing towards 60%. However other research indicates that the take-up of PAYG tariffs in the GB gas market is likely to be attractive to around 20% of GB customers currently on credit tariffs by 2020.

#### *(d) Smart Retrofit Solutions*

As an alternative to installing a smart gas meter it has been proposed that an additional module could be fitted to an existing installed meter to provide a “Non-Valve Retrofit” solution delivering smart meter functionality<sup>2</sup> Categories A-D (i.e. excluding Category F: “Remote disablement and enablement of supply”).

To achieve the same capability as a smart meter with a valve an external valve would also have to be fitted within the meter installation providing a “Valve Retrofit” solution delivering smart meter functionality Category F. These modules would connect to the pulse of the meter to compute the consumption of gas.

The majority of gas meters within Great Britain are diaphragm credit meters and meters fitted in Great Britain since 2000 generally record gas consumption in metric units, whilst meters fitted prior to 2000 typically recorded gas consumption in imperial units.

However, the majority of installed meters (both metric and imperial) are likely to have a “pulse output” capable of providing an electrical signal for measurement purposes that is produced by a magnet fitted to the input shaft of the meter. Each time the shaft rotates the magnet passes by a detector which creates a small electrical pulse. This can then be counted by a logger which would be hard wired to the meter. Some meters manufactured during the 1990s had both the magnet and the detector circuit built into the meter - these are known as “pulse equipped meters”. In contrast, meters made from 2000 onwards had the magnets installed but not the detectors - these are known as “pulse ready” meters and they require the detector unit to be fitted to the index of the meter to complete the pulse unit. Non-Valve Retrofit solutions can be readily fitted to both “pulse equipped” and “pulse ready” meters via a port on the meter index (i.e. it is not necessary for the Meter Operator to break the metrological seal to fit a Non-Valve Retrofit device to these meters). However pulse equipped meters will be Imperial and are unlikely to be suitable for retrofit either based on economic (age of the meter) or technology (not compatible with the smart metering specification) grounds.

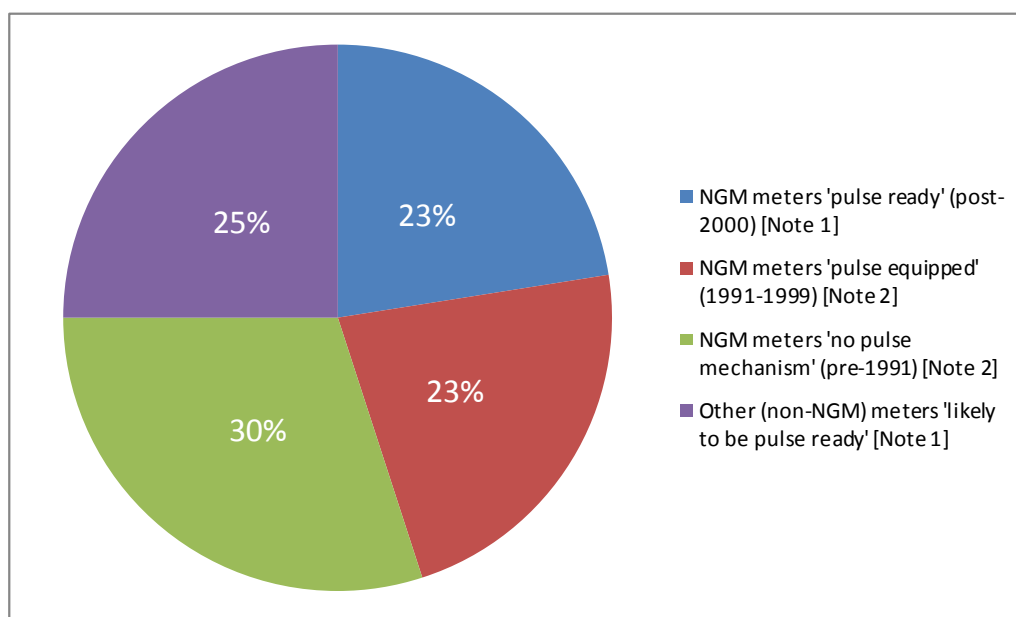
It should be noted that PPM are unlikely to be suitable for a Non-Valve Retrofit solution as the pulse output is already used to support PPM functionality and is located within the meter and would require metrological seals to be broken in order to accept such a device.

Figure 2 indicates the age profile of meters within the GB and the availability of a pulse signal output suitable for a Non-Valve Retrofit solution.

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<sup>2</sup> As set out in Table 1 (page 22) of “Towards a Smarter Future: Government Response to the Consultation on Electricity and Gas Smart Metering”, The Department of Energy and Climate Change, December 2009.

**Figure 2: Age Profile and Pulse Availability of Current GB Gas Meter Stock**



## 1.4 Structure of this Report

The remainder of this report is structured as follows:

- Section 2 sets out Gemserv's project management arrangements for this work, and provides details of the Gemserv project team, the project approach and Gantt chart;
- Section 3 covers details of Gemserv's information gathering and investigation to identify the key issues relevant to this project;
- Section 4 sets out Gemserv's assessment and analysis of the key issues;
- Section 5 sets out Gemserv's conclusions in respect of its assessment and analysis of issues;
- Appendix 1 provides a Glossary of Terms;
- Appendix 2 provides an overview of Gemserv's project team;
- Appendix 3 sets out the initial project Gantt chart;
- Appendix 4 sets out the questions in the stakeholder consultation; and
- Appendix 5 provides a summary of the responses to the stakeholder consultation.

## 2. Project Management

### 2.1 Project Team

Gemserv's project team comprised:

- Barry Cook – Technical Consultant
- Andrew Knights – Technical Consultant
- Steve Ladle – Technical Lead
- Nick Halliman – Project Manager
- Mayokun Alonge – Analyst
- Whitney Slavinskis – Client Manager

Pen portraits for each member of the project team are set out in Appendix 2.

### 2.2 Project Approach

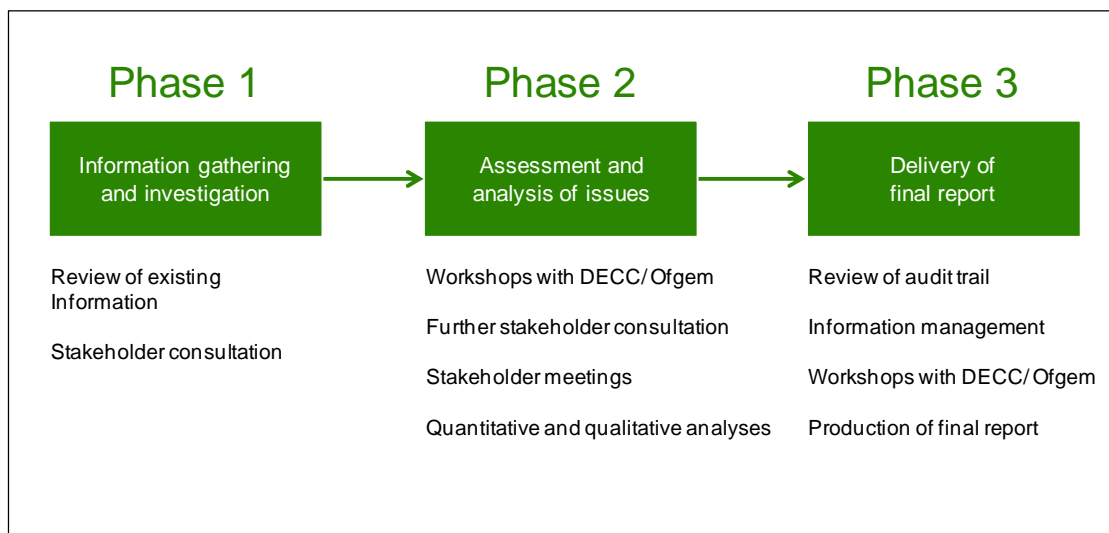
Gemserv's approach to this work comprised three phases over the period February to May 2010:

- Phase 1: Information gathering and investigation;
- Phase 2: Assessment and analysis of issues; and
- Phase 3: Delivery of Final Report.

Throughout this project Gemserv has maintained an audit log of all correspondence, issues and analysis to ensure objectivity and provide the ability to demonstrate evidence underpinning all conclusions.

This approach is illustrated in Figure 3 and described further below.

**Figure 3: Gemserv's Approach**



Prior to Phase 1, meetings were held with DECC and Ofgem to 'unpack' the specification of work and to understand the scope, constraints and expectations for this project. Key principles underpinning this approach are that it must be evidence based, address the key areas of concern raised by stakeholders and, where relevant, provide further relevant insights from Gemserv's experience and wider discussions with stakeholders. Throughout the project regular communications with DECC were maintained to ensure that the work was progressing to DECC's satisfaction.

Phase 1 comprised a review of existing information to identify the key categories of issues and a stakeholder consultation to explore issues further.

Phase 2 focussed on assessment and analysis of the issues; this included further consultation and meetings with key stakeholders and workshops with DECC and Ofgem to support qualitative and quantitative analyses and challenge preliminary conclusions.

Phase 3 focussed on the production of this report and included further meetings/ workshops with DECC and Ofgem and a review of the audit trail and information management supporting this report.

## 2.3 Project Plan

The initial project Gantt chart is included in Appendix 3.

### 3. Information Gathering and Investigation

#### 3.1 Identification of Issues

Phase 1 initially comprised a desk-based review of existing information, including DECC's December 2009 proposals and associated consultations and stakeholder representations.

Assessment of this information identified the following six categories of issues:

- Safety
- Technical
- Commercial
- Regulatory
- Consumer
- Retrofit

Further, Gemserv noted that it was important to understand stakeholders' opinions on the purpose and proposed use of the valve, as this would underpin consideration of requirements for each category of issues.

#### 3.2 Stakeholder Consultation

Gemserv consulted with stakeholders to further explore these issues from different perspectives. This consultation comprised a series of questionnaires aimed at different stakeholder groups, as set out in Appendix 4. However, to ensure full coverage of issues, stakeholders had full transparency of all questions and were invited to respond to any questions.

In summary, Gemserv consulted with 50 stakeholder organisations, with an overall response rate of 80%, as shown in Table 1.

**Table 1: Stakeholder Consultation**

Stakeholder group	Number of organisations contacted	Number of organisations responded	Response rate
Meter Manufacturers	10	7	70%
GB MAP/ MAM[1]	5	3	60%
International MAP/ MAM	4	1	25%
Gas Network Owners	8	7	88%
Gas Suppliers (Domestic)	8	7	88%
Gas Suppliers (Industrial & Commercial)	4	4	100%
Others, comprising: Consumer Focus; Fuel Poverty Action Group; Sustainability First; NEA; Gas Forum; AMO; ERA; ENA; SBGI; Gas Safe Register; SGS; BEAMA; Phoenix Natural Gas.	13	10	77%
Totals:	52	39	75%

[1] MAP: Meter Asset Provider; MAM: Meter Asset Manager

The stakeholder responses to this consultation have been provided to DECC under the terms of the Non-Disclosure Agreement and a summary of views expressed is set out in Appendix 5.

## 4. Assessment and Analysis

### 4.1 Economic and Technical Viability of a Valve Retrofit Approach

This section sets out Gemserv's assessment of the economic and technical viability of a valve retrofit approach (i.e. a valve retro-fitted external to the meter case), benefits and drawbacks, reliability, and installation.

The fitting of a valve outside of the meter presents a number of significant challenges. There are allowed pressure losses across a meter installation which are challenging for designers of meter installations. The allowances for the pressure drop across the meter installation may have been fully used by the designer and so an additional valve in the installation would need to have an almost zero pressure loss if the limit is not to be exceeded. This could only be achieved by over sizing the valve which will add further cost. Exceeding the allowed pressure drop could have consequences for achieving a safe working pressure at the connected appliances.

Positioning of the valve would also be a problem and might require some reworking of the installation which would increase costs. Installation could not be completed without breaking into a gas way and therefore gas qualified labour would be required to make the installation. In addition to this, other upgrade items for a Non-Valve Retrofit would be required as described below.

Having an external valve gives rise to the risk of tampering as the wires to the valve would be exposed. A wireless operated valve would again significantly increase costs.

### 4.2 Economic and Technical Viability of a Non-Valve Retrofit Approach

This section sets out Gemserv's assessment of the economic and technical viability of a retrofit approach for non-valve related functionality for gas meters. This assessment includes consideration of current experience, likely costs, benefits and drawbacks, reliability, and installation.

Non-Valve Retrofit devices are now being demonstrated that can be appended to existing pulse enabled credit meters to provide the required smart functionality without the need to replace the existing meter. These devices are also being designed to be capable of linking to an In-Home Display through a home area network.

From the qualitative information supplied by some of the meter manufacturers, the costs for these devices are lower than for a valved smart meter and also offer reductions in installation costs, as the device does not have to be installed by a gas trained operative.

In addition, the installation would be simpler and would reduce instances where fitting the smart valved meter (i.e. necessitating a break into the gas pipework) causes other problems for the consumer (e.g. boiler fails to re-light, meter needs to be relocated involving structural work).

Gemserv has now seen two examples of retrofit solutions. The first unit is under development by a meter manufacturer. This prototype unit offers a robust device which is firmly attached to the meter

and looks as though it is an integral part of the meter. Battery life for the unit is expected to be up to 15 years.

A second device seen by Gemserv is currently being installed on existing meters. Around 5,000 of these units have been installed and are working satisfactorily.

A disadvantage of the second device is that it is connected to the meter with a wired connection. Whilst not as robust as the unit being developed by the meter manufacturer it is adequate. There would be little incentive for a customer to tamper with the unit and it is unlikely to be damaged or dislodged accidentally. Battery life of this unit is nine years but a revised unit is about to be introduced which, it is claimed, will have twice the battery life.

Neither device would be able to support remote disconnection/ re-connection or self disconnection and therefore could not be considered for consumers who want to use the PPM or PAYG functionality.

A further consideration is whether a consumer on a credit tariff is fitted with a Non-Valve Retrofit device, as a valved smart meter would need to be installed if they later decide to move to a PAYG tariff. However where the valve functionality is not immediately required, a Non-Valve Retrofit approach could provide a potentially cheaper solution and could also enable a greater number of gas meters to be converted to smart functionality in a shorter time scale because of the reduction in installation time and the lack of the need for an appropriately qualified gas operative to install the device.

There are some other conditions which would need to be considered before using a Non-Valve Retrofit device on a meter. In-Service Testing has shown that some models of meter have an unacceptably high proportion of meters which are outside meter accuracy limits. Most of these model types are Imperial reading meters. Where In-Service Testing has identified model types outside meter accuracy limits these meters should be replaced and should not be considered suitable for a Non-Valve Retrofit solution.

Most systems under development for handling smart metering data are also likely to require reads in metric units. It would therefore appear to make sense to restrict the use of Non-Valve Retrofit devices to metric meters, most of which have been manufactured since 2000. These meters will still have significant residual technical asset life as information from stakeholders indicates that the technical asset life for metric meters is at least 20 years and possibly up to 30 years.

Meter operators for the majority of meters installed in GB have indicated that circa 48% of the current GB gas meter stock (see Section 1.3) (equivalent to circa. 9.5 million meters) would meet the above requirements and could readily accept a Non-Valve Retrofit device. This would provide all of the required functionality, including two-way communications, apart from the ability to disconnect/reconnect the gas supply remotely or to support self-disconnection.

Some stakeholders have queried the reliability of pulses but National Grid has provided evidence to show that modern pulse units have extremely good levels of reliability and some smart meters still utilise a pulse for computing the data consumption from the meter. National Grid also provided some information on their experience of using Optical Character Recognition (OCR) devices. The number of these units installed to date is too small to draw any significant conclusions on their reliability and more widespread trialling would be necessary if they are to be used. However as these would only be fitted to meters which could be seen as already nearing the end of their asset lifetime, it would not seem practical to fit such devices as an alternative to a valved smart meter.



Overall the Non-Valve Retrofit approach cannot be looked at in total isolation from the smart meter rollout approach. If the rollout focussed on the oldest meter assets first, retrofitting may be uneconomic as by the time the credit meters capable of being retrofitted came up for smart functionality replacement, such meters may also be nearing the end of their asset lives. If some other rollout approach was adopted, then up to 48% of the current credit meter stock could be retrofitted if valve functionality was not specifically required at the time of the installation.

If the use of Non-Valve Retrofit devices is accepted, Gemserv notes that it will be necessary to produce a specification to embed requirements such as interoperability, robustness, tampering resistance and battery life.

### 4.3 Interactions with the Existing Safety Regime

This section sets out Gemserv's review of the interactions with the existing safety regime – identifying areas of increased risk and, if proposed, reviewing and assessing counter measures provided by stakeholders – clearly identifying any areas where further work is required by relevant players.

#### 4.3.1 Purpose and Use of the Valve

National Grid Metering has provided Gemserv with a copy of the PRS22 specification. Investigation of the relevant clauses has confirmed that the degree of let by allowed with these valves makes it unsuitable for purposes of isolation and most stakeholders have similarly confirmed that they believe the valve is unsuitable for isolating installations. An interview with a member of the working group producing the European specification for a smart meter has confirmed that valves will be optional in the European specification and that two types of valve will be proposed; the first will be for pre-payment type operations and will be based upon National Grid's PRS22 specification. The second type of valve will be to a higher specification (similar to the current ECV standard) and will be suitable for isolating the supply. The remaining potential uses of the valve have been checked against the requirements of the Gas Safety (Installation & Use) Regulations ((GS (I&U) Regulations). Gemserv understands that Regulation 22 of the GS (I&U) Regulations sets out the conditions when testing and purging of the installation is required. "Work" – as defined by the regulations – is when a gas way is disconnected. In the case of the opening of the valve in the smart meter no Work is undertaken and therefore under Regulation 22(1) and 22(2) purging and testing is not required.

One stakeholder questioned whether Regulation 22(3) of the GS (I&U) Regulations would mean that testing and purging of the installation would be required when the valve is opened. The guidance notes to Regulation 22(3) of the GS (I&U) Regulations make it clear that this is not intended to apply in situations where the interruption to supply has been caused by a valve closure rather than the breaking of a gas way. Purging and testing of the connected appliances and pipework is not therefore required.

The valve in the smart meter may be armed remotely but it must only be opened by the consumer or their agent after they have confirmed that all appliances are switched off and there are no open ends of pipework. This will bring the smart metering procedures to an equivalent level to current Pre-Payment Meter procedures which have a good proven safety record in this respect.

Another proposed use of the valve is for disconnecting the gas supply at the time of a change of tenancy. Gemserv believes the key point here is the potential to improve the current level of safety. It is not uncommon for departing tenants to remove appliances sometimes leaving open ends of pipework. Although the ECV will have been closed to enable disconnection of the appliance, also

having the meter valve closed could provide an opportunity to ask the incoming tenant if basic safety checks have been completed prior to opening the gas valve.

Some manufacturers have indicated that their meters also monitor gas flow rates initially after the meter valve is opened. If the flow of gas indicates a possible open end on the installation pipework a valve closure is triggered. Whilst this is not currently a requirement for smart meters it could potentially provide further protection.

Regulation 16(3) of the GS (I&U) Regulations places responsibilities on Suppliers where meters are removed to close the ECV and seal it with an appropriate fitting. If the meter is not replaced within 12 months then the service pipe to the property must also be cut off. The meter valve is not an alternative to removing the meter, closing and sealing the ECV and subsequently isolating the service pipe. The meter valve should not therefore be used as an alternative to situations where a meter would normally be removed from the property.

#### **4.3.2 Denial of Service**

Unwanted valve closures can also result from software faults. The most significant instance of a software fault leading to mass valve closures was with a new model of PPM in January 2009. Approximately 2,000 meters were affected by this incident, which resulted in significant disruption. This resulted in a large number of engineer visits at the rate of more than one visit per meter. This problem was the result of weaknesses in management controls over implementation of changes to software; consequently it is vital that a protocol is agreed whereby changes to software are checked and audited by competent personnel not directly involved in re-writing the software. Strict protocols for implementing software modifications need to be agreed as part of the wider market processes supporting the smart meter rollout if consumers are to be protected against unnecessary valve closures.

Another issue that needs to be recognised is that smart meters fitted with electronic communication and the capability to disable gas supply present different security challenges than for conventional meters. It will be important that the smart meter programme ensures that the security issues are considered and addressed.

#### **4.3.3 Implications of Battery Life**

Whilst Gemserv believes that battery lives of over 10 years can be achieved with gas smart meters it will still be necessary to carefully plan battery replacement programs if consumers are not to suffer unnecessary valve closures when the battery fails. Consideration needs to be given to whether the valve should close or remain open as a result of battery failure or other similar circumstances (e.g. communications failures). Another alternative maybe that the valve remains in whatever position it was at the time, however this is likely to be less attractive to industry participants. Clearly there will be a balance that needs to be struck between consumer inconvenience should the gas supply be disconnected through no fault of their own and supplier concerns over the potential for increased debt and/or theft of gas.

#### **4.3.4 Implications for Theft of Gas**

The introduction of smart meters either with or without valves will not prevent theft of gas.

Gemserv notes that additional information provided via smart metering should allow suppliers to better monitor usage and identify potential situations at a far earlier stage.

### 4.3.5 In-Service Testing

Smart meters will still need to undergo In-Service Testing. However valved smart meters will be capable of operating in both credit and pre-payment modes and will not give rise to churn. It will therefore be necessary to undertake some targeted replacement of smart meters to undertake In-Service Testing of these meters. For non-valved smart meters (including Non-Valve Retrofit meters) churn should still exist as and when consumers request a switch from credit to pre-payment/PAYG and vice-versa.

Whilst undertaking In-Service Testing of smart meters it would also be sensible to check the opening/closing of the valve as a way of monitoring valve performance. Where a smart meter has both electronic and mechanical indexes a check should also be made of any mismatch between the two indexes as this could be indicative of pulse problems.

## 4.4 Gas Network Implications from Valve/ Mixed Approach

This section sets out Gemserv's consideration of gas network implications from a valve or mixed approach, including impact of pressure losses, variances in gas pressure, and network management.

### 4.4.1 Downstream Impact

Gemserv believes that pressure losses due to the installation of valved smart gas meters should not be an issue. Gas Networks require any MAMs who wish to connect their meters to the Network to warrant that a suitable pressure will be maintained at the outlet of the meter. Maintenance of this system will continue to protect the Networks from excessive pressure losses.

### 4.4.2 Upstream Impact

Networks are required by the Gas Safety (Management) Regulations to supply a safe working pressure at consumers' appliances. Based upon European appliance standards this safe working pressure is taken as 14mbar. Networks guarantee a minimum pressure at the outlet of the ECV of 19mbar and the maximum pressure loss across internal pipework as allowed by British Standards is 1mbar. This means that the maximum pressure drop across a meter installation is 4mbar. Meter installers are required by Networks as a condition of connecting to their Network to warrant that the pressure loss across the meter installation will be no greater than 4mbar. As the current European standard for diaphragm gas meters, BS EN 1359 allows a pressure drop of up to 2mbar across the meter, meter installation designers will still need to plan carefully to keep the total pressure drop across the meter installation to below 4mbar.

Adding a Valve Retrofit valve to a meter installation presents a problem because the designer of the meter installation may have used up the full 4mbar pressure drop in the meter installation. Any additional valve would therefore need to have an almost zero pressure drop across it to guarantee the safe working pressure of 14mbar is maintained at the appliances.

Questions have also been raised about the impact on Network pressures of having 22 million meters fitted with valves. The reality is that this will have no impact. Networks have to guarantee a minimum pressure at the outlet of the ECV. What is installed after the ECV will not have any impact on the pressure at the ECV; it can only affect the pressure at the connected appliances. For that reason the designers of meter installations will have to ensure that the meter installation, including the smart meter, still does not have a pressure drop greater than 4mbar across it. By continuing the current

regime of Networks receiving warrants from meter installers the Networks will be protected from any adverse pressure effects of installing smart meters.

#### 4.4.3 Network Management

Some manufacturers indicated that another benefit of the valves in Smart Meters is that they could be used to switch off the supplies to properties when there has been a gas supply incident. Most Networks were not convinced that this offered an alternative to the current operational practices. They are likely to have no ultimate control of the valves and as such, it could still be possible for a valve to be re-opened in error by a supplier when the Network had previously requested closure and assumed this to be the case, thus comprising an assumed safe position. Further, an engineer's visit to test and purge the meter and internal pipework when the supply is restored would still be required. However if the central communications system (provided by the DCC<sup>3</sup>) can be designed to support operation of the valve, say by postcode, then this would still allow some improvement in taking large numbers of affected properties off quickly in the event of say a water ingress incident or other local emergency.

Whilst it was also suggested by some respondents that these valves could be used for emergency load shedding, Gemserv agrees with the majority of stakeholders that pointed out that this process would be highly inefficient due to the very small loads saved by each valve closure and that isolating Industrial and Commercial Users, which is current practice, would be far more effective. Further, in practice, as all current operational procedures are designed to maintain gas to domestic consumers as far as is reasonably possible, the ability to remotely disconnect is unlikely to be an advantage.

### 4.5 Experience from the Current Operation of Pre-Payment Meters

This section sets out and reviews data/ experience from the current operation of Pre-Payment Meters and determines its relevance to smart metering.

Where relevant, Gemserv's analyses have been underpinned by current experience of PPM across Great Britain. However it must be recognised that only the latest generation of PPMs powered by single Lithium batteries<sup>4</sup> is relevant to this investigation as it is this technology that is likely to be used in smart meters. Earlier PPM are powered by alkaline batteries that have lower capacities than lithium cells and have poorer quality valves, which can provide little information to inform the smart meter debate. It is expected that smart meters with valves would be designed around the latest power sources and latest versions of the valve design.

#### 4.5.1 Valve Operation

Doubts have also been expressed about whether valves left in the open position for a number of years will close when required. Several valved E6 credit meters have been identified that were manufactured in 1999 and have been in service as credit meters for over 10 years with the valve in

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<sup>3</sup> DCC: "DataCommsCo" as described by the Smart Metering Implementation Project (previously referred to as the Central Communications Provider).

<sup>4</sup> National Grid Metering has advised that it has approximately 226,000 PPM powered by Lithium batteries and 1,178,000 PPM are powered by Alkaline batteries.

the open position. Gemserv witnessed site testing of valve operation on two of these meters; in both cases the valve closed satisfactorily. Whilst this does not provide conclusive evidence over valve operation, it does provide a good initial indication of valve reliability consistent with manufacturers' assertions.

Research from Consumer Focus highlights that some current PPM consumers leave the meter self-disconnected for considerable periods of time, say during the summer period when heating is not required. We have not found any evidence to suggest that this gives rise to increased occasions where the valve may fail to re-open when the consumer adds credit to the meter.

Gemserv notes that most meters will have the valves held in the open position for extended periods and that if the meter then calls for the valve to close it will detect if closure has not happened. In these circumstances a fault will be registered which the responsible MAM will have to address. Gemserv has not been made aware of any safety issues arising from the valves in PPMs only partially opening and it is therefore reasonable to suggest that partial opening or closing of the valve in a smart meter is not likely to be an issue. For this reason uncertainty over whether these valves will close when prompted is a commercial issue rather than one of safety.

#### 4.5.2 Self-Disconnection and Reconnection

In the current PPM market, consumers do experience the closure of the valve when they either run out of credit on the meter or when the valve closes in error. For smart meters with valves the same situations will arise and additionally valve closures will occur for PAYG customers who decide to self-disconnect and very occasionally for credit customers either as a result of remote operation of the valve closure or through meter faults.

In all circumstances, Gemserv believes that there needs to be strict procedures detailing the self-reconnection process and suppliers must ensure that consumers are made aware of this, with potential reminders particularly where the valve stays open for long periods. Remote re-connection without the presence of either the consumer or a qualified engineer must not be allowed. The continuation of the current PPM process whereby a manual control at the valve needs to be activated once the reason for the valve closure has been resolved, should be continued albeit in the smart meter environment there is the potential for this process to be operated via the In Home Device. The potential to lose supply through valve closure (whether intentional or accidental) needs to be addressed for vulnerable consumers who could be on credit meters. The current Gas (Standards of Performance) Regulations 2002 require that Suppliers respond to PPM consumers who are off supply within four hours, 8am-8pm on working days and 9am-5pm on other days; the penalty for non-performance is £20. This standard may need to be extended to cover all consumers with gas smart meters who find themselves without supply because of a meter problem.

Another area that may be improved through the proper use of the valve disconnect facility is for change of tenancy. Currently in premises where supply is via a PPM, incoming consumers may find themselves continuing to pay off a previous consumer's debt if they use the previous card for the meter. If the meter is remotely disconnected on change of tenancy then the incoming consumer would have to contact the supplier who could then ensure that the appropriate tariff is recorded. This could further be extended to all meters to ensure that the supplier is aware of the incoming consumer before supply is reconnected.

### 4.5.3 Unplanned maintenance

Whilst the reliability of the valves in the latest Pre-Payment Meters have improved there are still more call-outs made to this type of meter than to non-valved meters. The responses received from meter manufacturers indicate that they had very few meters returned to them because of valve failures. However, this does not take into account call-outs made to meters where the valve is reset by the engineer. National Grid has indicated that in the first year of installation between 1.4 and 2.5 visits per 100 meters were undertaken to reset valve problems on two of the latest Pre-Payment Meters. Changes to the functionality of smart meters compared with Pre-Payment Meters may reduce the level of call-outs to valve closures. PAYG customers may also self disconnect less and this too will reduce call-outs to valve related problems, but some call-outs must still be expected with smart meters which will have an impact on the costs of maintenance. For example, with a call out rate of 2.5 visits per 100 meters and a call out cost of £40, the annual cost of maintenance would be increased by £1 per meter.

## 4.6 Customer Interaction with Gas Meters

There was variance in stakeholders' views on what proportion of consumers they thought would move to PAYG type metering should this be promoted as a result of the introduction of smart valved meters.

A number of responses discussed the level of PAYG in the mobile phone market stating this to be at around 60%, although this may be reducing with the introduction of SIM-only deals which allow for short, often one month only contracts<sup>5</sup>.

The take up of PAYG in the energy sector is seen as unlikely to reach these levels for a number of reasons:

- Many mobile phone contracts are for periods of 24 months or more whereas in gas consumers can change supplier with no contractual notice;
- There is a significant take up of mobile phone PAYG by the parents of children who they provide with mobile phones but who want to limit the financial exposure;
- People with a main work phone on contract who have a second phone for more limited private use often chose to operate the second phone on pre-pay because its usage will be low volume; and
- There is a high usage of pre-pay mobile phones by people over 65 as they use these only very occasionally, being seen as more of an emergency measure rather than for general usage

In Northern Ireland where PAYG is available, the take-up is nearer to 40% but again this may not be directly comparable to the GB market. The Northern Ireland gas market is a lot newer than the GB market and was developed with PAYG as a key offering from the outset. For electricity, customers receive a discount compared to standard credit for direct debit customers and there is already a wide range of credit top-up facilities, including phone and internet. Also "friendly credit" means users cannot self disconnect at weekends or between 4pm-8am (and this can be extended to 11am on

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<sup>5</sup> Ofcom: 'The Consumer Experience Market 2009 Research Report', p.21  
(<http://www.ofcom.org.uk/research/tce/ce09/research09.pdf>)

request). This safeguard was required by NIAUR (the Northern Ireland Authority for Utility Regulation) due to concerns from consumer groups and others about self disconnection.

Provisional data from Consumer Focus suggests that at least 22% of energy consumers who do not already have a PPM would be interested in a PAYG energy tariff if the price was competitive with direct debit and they could top up easily. This was based on an online survey of 1839 consumers conducted in March 2010 by ICM. No adjustment has been made to make the sample representative of GB demographics or payment method. Direct debit customers were over-represented – 79% compared to Ofgem figures of around 53%. Cash and cheque customers significantly under-estimated 8% compared to Ofgem figures of around 30% gas accounts being quarterly billed. Final analysis is expected to be available during Summer 2010. The data indicates that customer demand for pre-payment and PAYG tariffs in the GB gas market could increase to 30% to 35% by 2020.

Consumer groups and many suppliers argue that the PAYG market will not develop either at all or as quickly as it could, if smart meters are not universally fitted with a valve. The downside of this would be that consumer choice is restricted and for many consumers they will not be able to take up tariffs which they would view as more attractive in terms of the overall costs they pay for their energy and for the additional control that PAYG would give them. They also believe that consumers would be deterred from switching to PAYG if they were on a non-valved credit meter with smart functionality provided via a Non-Valve Retrofit and, in order to switch to PAYG, they had to request the installation of a new (valved) meter from their supplier of choice. The need for a meter exchange could deter individual take up and add costs for additional installations and assets.

These groups recognise that the installation of valved smart meters to all consumers, regardless of whether they require the functionality provided by the valve, will increase overall costs through both higher installation and increased maintenance. However their view is that the benefits will outweigh these costs. Examples of the main benefits quoted include:

- Reducing the time taken to switch to PAYG where a customer is either starting to incur debt or wants to better manage their energy budget;
- Eliminating the costs incurred in order to gain a warrant for switching a customer from a credit to a PPM meter;
- Reduction in potential stranding costs for smart meters, where a non-valved smart meter has been installed to a credit customer who later switches to PAYG and needs a valved smart meter installed;
- Reduction of the tariff differentials between credit and PPM/ PAYG and equalisation of hardware costs; and
- Lower overall consumer debt levels.

A population of 22% on PAYG will mean an increase of around 4 million consumers who need to regularly interact with their meters (N.B. this would be in addition to the existing 2 million PPM customers who will be familiar with the operation of their meter). Consideration needs to be given to ensuring that customers who opt for PAYG tariffs have information and training so that they can add credit and enable supply successfully. This is relevant to the initial roll out and in the longer term when people opt for PAYG. Consideration will also need to be given to vulnerable consumers with mobility issues or where meters are not easily accessible. Re-location of the meter installation to enable easy access to the meter is likely to be neither financially viable nor practical in many situations. In these circumstances it may be better if the consumer can interact with the meter via the In-Home Device (“IHD”).

## 4.7 Lessons from Other Markets and Other Considerations

### 4.7.1 International Experience

Sustainability First<sup>6</sup> notes that there are around 50 countries where some use of prepayment meters is made, although some of these are small island states. Prepayment is widely used in a relatively small number of countries outside Great Britain – e.g. Northern Ireland, Tasmania and South Africa.

Outside Great Britain Pre-Payment Metering is almost always used just for electricity and not for gas. In a number of countries there is often considerable opposition to the use of prepayment from consumer organisations and parliamentarians.

Gemserv's investigation has revealed that gas meters with a valve are used in Japan; however, these are significantly different to Pre-Payment Meters in the UK due to the requirement for Japanese models to withstand increased seismic activity and are therefore considered to be not relevant to this analysis. Further, Gemserv has found limited information on valve operation in Europe other than in the Republic of Ireland where they are rolling out smart meters with valves.

### 4.7.2 Semi-Concealed Meter Boxes

The responses to the questionnaires and separate discussions with stakeholders have also highlighted the potential issue of the installation of new meters in semi-concealed meter boxes. These boxes have been widely used during recent years but only one of the smart meters seen by Gemserv will fit within the box without modifying the box through additional moulding. The alternative to re-site the box would be an expensive option. As part of the box is below ground some concerns have been raised about water ingress into the box and the impact that this might have on the electronics of the meter. The smart meter that Gemserv is aware of will be mounted at a higher level in the box but the long term performance of meters in this environment is something that MAMs may want to monitor.

### 4.7.3 Further considerations

Other areas that will need to be considered include:

- Whether the Ofgem's EDRP (Energy Demand Reduction Programme) gives any evidence on increased call-outs in a smart meter environment; and
- The implications of the In-Home Display unit not working or being mislaid/ lost, especially if this is seen as key in improving the safety of the reconnection process.

## 5. Conclusions

This project has reviewed, assessed and consolidated the available information (including costs and benefits), tested the robustness of the arguments made in relation to the gas valve, and examined issues relating to retrofitting, technical capability, safety and maintenance requirements, commercial operations, and cost implications across the piece.

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<sup>6</sup> 'Smart Pre-Payment in Great Britain', Sustainability First (Gill Owen, Judith Ward), March 2010,



After carrying out extensive consultation with relevant stakeholders, Gemserv concludes that, subject to DECC's economic assessment, there are no grounds that would prevent the use of a valve in the proposed roll out of gas smart meters.

Furthermore, Gemserv concludes that a robust Non-Valve Retrofit solution providing all non-valve related smart functionality may be a suitable alternative for credit meters manufactured since 2000 which register gas consumption in metric units and are within prescribed accuracy limits as determined through In-Service Testing regimes.

However, Gemserv's conclusions are predicated on the following safety, technical, commercial, regulatory, consumer and retrofit conditions, and observations related to the key issues identified as part of this project.

## 5.1 Safety Issues

It is noted that Pre-Payment Meters fitted with valves have been installed at premises in Great Britain since 1993 and there are approximately 2.2 million meters of this type currently in operation. Within the scope of this project, Gemserv has found no record of reported safety incidents and has received no stakeholder representation or evidence of safety-related issues with these meters.

The valve specification for existing Pre-Payment Meters is the same as that proposed for smart meters. Following consideration of this specification, Gemserv notes the following conditions relating to a valve fitted in smart meters:

- The valve is not suitable for the isolation of the supply to the property and is not an alternative to the ECV;
- The valve it is suitable for the disconnection of gas supply to a property for debt management purposes facilitating the introduction of new tariff regimes (e.g. PAYG), and when used for this purpose complies with the requirements of the Gas Safety (Installation and Use) Regulations (1998);
- The valve cannot be used as an alternative to meter removal together with capping of the ECV and subsequent isolation of the gas service as required by Regulation 16(3) of the Gas Safety (Installation and Use) Regulations (1998); and
- The valve can be remotely 'primed' (i.e. enabled for reconnection, for example via the central communications provider but must only be opened following positive interaction by the consumer (or agent acting on their behalf) at the premises. Gemserv understands that testing and purging of the internal pipework is not necessary following re-commissioning of the supply as this does not constitute 'Work' under the Gas Safety (Installation and Use) Regulations (1998) and there would be no ingress of air into the pipework.

Further, Gemserv makes the following observations:

- The valve has potential for use during change of tenancy process to enhance safety at short-term vacant premises and to ensure that supply contracts are in place with new tenants;
- There is some potential for the use of the valve in gas supply emergencies and network maintenance, but this does not replace the current procedures used by the Networks; and
- The valve could bring about additional consumer benefits, e.g. connection of CO devices, smoke alarms/ fire protection.

## 5.2 Technical Issues

There were no technical issues identified that would prevent the use of gas meters with an integral valve, however there are a number of observations in this respect, as set out below.

### 5.2.1 Battery Life

There was a range of responses on battery life, with one meter manufacturer stating a 5-7 year battery life, and others stating a 10-15 year life. We are satisfied that the modern Lithium batteries installed in smart meters will have a life of 10-15 years. Battery life will be impacted by frequency of valve closures and communication activity.

To avoid in service battery failure and a possible interruption in the gas supply, consideration should be given to a battery replacement programme based on a 10-year cycle, however this could be extended if testing of batteries removed after 10 years reveals significant capacity remaining. Gemserv therefore recommends that a battery replacement programme is initiated to replace batteries prior to end of life failure.

Battery replacement will be made easier if the valve in the meter can be kept in the open position whilst battery replacement is undertaken as this will mean the batteries in meters fitted in outside meter boxes can be replaced without the consumer being present.

Consideration must also be given to the problems arising from a mass replacement of Lithium batteries. Lithium batteries are classed as dangerous goods and there is detailed legislation surrounding their transportation and disposal. Disposal methods for Lithium batteries are very environmentally unfriendly and it must be hoped that recycling is better established by the time battery exchanges are required.

### 5.2.2 Default Valve Position

The industry should consider a common standard for valve position under battery failure or loss of communications conditions. From a consumer protection perspective, Gemserv recommends that valves do not close in the event of a communications failure. If consumers on PAYG and PPM tariffs cannot append credit when communications are lost there should be a 4-hour standard of service introduced to try and prevent those consumers losing supply.

### 5.2.3 In-Service Testing

In-Service Testing of meters will still be required following the introduction of smart meters, however it is likely that meters will need to be proactively targeted for replacement as 'churn' meters (i.e. credit meters removed as a result of PPM installations) will not be available. In-Service Testing procedures

for smart meters should include checks on the operation of the valve in the smart meter and the reconciliation between the electronic and mechanical indexes (where relevant). The industry should agree detailed proposals for the In-Service Testing of smart meters as a matter of urgency.

#### **5.2.4 Semi-Concealed Meter Boxes**

Some of the smart meters investigated will not physically fit into this type of meter box without an extension piece being fitted to the box, whilst Genserv is satisfied that the more compact smart meters will fit inside semi-concealed meter boxes.

Consideration should be given to the potential problems of water ingress into this type of box and the long-term impact that this might have on the meter.

#### **5.2.5 Valve Reliability After Prolonged Periods in the Same Position**

Concerns have been expressed that valves which have been left in the same position for a period of years will not operate satisfactorily when required. Genserv has witnessed some limited site testing on such meters where in both cases the valve closed satisfactorily. Whilst this does not provide conclusive evidence over valve operation, it does provide a good initial indication of valve reliability consistent with manufacturers' assertions.

Gas Suppliers may be able to identify Pre-Payment Meters where the consumer has not self disconnected for an extended period. Suppliers may wish to initiate their own service visits to these properties to gain further information on valve reliability.

#### **5.2.6 Security**

Consideration should be given to preventing unauthorised interference with the valve through robust information security arrangements.

### **5.3 Regulatory Issues**

Genserv recommends that protection for Vulnerable Customers<sup>7</sup> against unauthorised valve closures is embedded in the industry codes of practice.

### **5.4 Consumer Issues**

Genserv's conclusions and recommendations regarding Consumer issues are set out below.

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<sup>7</sup> As defined in the Supplier Licences and including other customers requiring special consideration (e.g. under-18s, pensioners etc.).

### 5.4.1 Regulatory requirements for the reconnection processes

Reconnection will be an important issue as it could be required both as a result of self-disconnection, supplier disconnection or meter problems.

Checks prior to remote disconnection for vulnerable customers/ pensioners/ under-18s will need to be reviewed by the gas industry to ensure that they continue to be appropriate for smart meters fitted with valves. Therefore further consideration needs to be given to:

- Ensuring that a supplier representative is available if required to assist reconnection in vulnerable customer households;
- For consumers with mobility issues or those living in blocks of flats where access to the meter is difficult, interaction with the meter via the In Home Display could be a preferred option; and
- Whether non-valved meters (or valved meters but with the valve actuator disabled to prevent operation of the valve) should be installed in households for certain classes of vulnerable customer to avoid accidental disconnection (valve closure etc.).

### 5.4.2 Customer Training

Customers are likely to have more interaction with gas meters in the smart world and as a result there will be a significant training requirement to ensure that customers understand the operation, information and implications of the meter. Even those customers operating on credit tariffs will require guidance on how to obtain the maximum benefits from their smart meter. The temptation may be to do the training when the meter is installed but it will also need to be available when customers change tariffs.

## 5.5 Retrofit Issues

### 5.5.1 Valve Retrofit

Gemserv does not believe that a valve retrofit is a viable option for the reasons outlined in Section 4.

### 5.5.2 Non-Valve Retrofit Device Providing Smart Meter Functionality

Gemserv is satisfied that the use of a Non-Valve Retrofit device on meters manufactured since 2000 is a technically viable option which could be considered. However, meters manufactured before this date will not have sufficient residual asset life to make this an economically viable option. In addition to this, most diaphragm meters manufactured before 2000 will still be registering Imperial units which would make them less attractive for retrofit.

Overall the Non-Valve Retrofit approach cannot be looked at in isolation from the smart meter rollout approach. If the rollout focussed on the oldest meter assets first, retrofitting may be uneconomic as by the time the credit meters capable of being retrofitted came up for smart functionality replacement, such meters may also be nearing the end of their asset lives. However, if some other rollout approach was adopted, then many meters with an asset life of 10 or more years could economically be retrofitted if valve functionality was not specifically required at the time of the installation.

## Appendix 1: Glossary of Terms

Term	Definition
Credit tariffs	These are the traditional tariffs offered by suppliers whereby the bill for gas is presented after consumption of the gas based on an estimated or actual meter reading.
Disconnection	A temporary action to prevent further gas being used by a consumer. The disconnection can be effected by the valve in the meter closing because there is no more credit or through a remote action taken by the supplier to instruct the meter to close the valve.
E6 Meter	Meter utilising ultrasonic technology. Has a maximum capacity of 6m <sup>3</sup> /h and is based on BS En 14236.
EDRP	Ofgem's Energy Demand Research Project – a large scale Great Britain-wide trial initiated in late 2007 which is seeking to better understand how consumers react to improved information about their energy consumption. <a href="http://www.ofgem.gov.uk/sustainability/edrp/Pages/EDRP.aspx">http://www.ofgem.gov.uk/sustainability/edrp/Pages/EDRP.aspx</a>
Emergency Control Valve (ECV)	The ECV is normally situated immediately adjacent to the gas meter and allows the incoming gas supply to the property to be turned off in the event of a gas emergency. It can be inside the building, on an outside wall or, in some cases, within the grounds of the premises. The ECV is at the end of the service pipe and both these items are the property and responsibility of the licensed gas transporter who carries gas to the premises.
Isolation	A permanent action to prevent further gas being used by a consumer. Isolation is normally done by removing the meter and capping the pipe work so that gas cannot flow into the property.
Meter Asset Manager (MAM)	The party responsible for validating, storing and maintaining master asset information for gas meter points. Normally appointed by a gas supplier and operates under an industry developed Code of Practice (MAMCoP).
Meter Asset Provider (MAP)	The party responsible for the ongoing provision of the meter installation at a meter point.
Meter Owner	The person or party owning a gas meter and/or a meter installation.
PAYG tariffs	Similar to PPM (see below) but seen as a potential growth market for customers who want to pay for their gas as they use it and prevent them being able to get into debt, as can happen under a credit tariff. The relevance of smart meters is that these should allow innovation in the payment methods that can be supported similar to the variety offered in the mobile phone market.

Term	Definition
Prepayment Meter (PPM)	<p>A meter which only allows gas to flow when a customer has paid for the gas ahead of its use. Historically PPM was installed where a customer was in debt as a means of both paying off the debt whilst still being allowed to take gas.</p> <p>Payment is normally made at charging facilities such as Paypoint outlets where a card or token is updated with an amount of money which is then transferred onto the meter. The tariff used by the meter is designed to both pay for the gas as it being used and to collect part of any outstanding debt.</p>
Reconnection	<p>The re-establishment of gas flow following disconnection. This can occur when further credit is added to the meter which then allows the valve to open. It can also be done through a remote action taken by the supplier to instruct the meter to open the valve. For safety reasons the consumer normally has to also manually activate a reset before the valve can actually open and allow gas to flow.</p>
Retrofit	See Section 1,,3(d)
U6/G4 Meters	Diaphragm meters with a maximum capacity of 6m <sup>3</sup> /h based on the European specification BS En 1359.

## Appendix 2: Gemserv Project Team

Gemserv's core project team comprises:

- Barry Cook (Subject Matter Expert – Gas Metering Arrangements)
- Andrew Knights (Subject Matter Expert – Markets and Regulation)
- Steve Ladle (Technical Lead)
- Nick Halliman (Project Manager)
- Mayokun Alonge (Analyst)
- Whitney Slavinskis (Client Relationship Manager)

Pen portraits for each member of the core project team as set out below.

### Barry Cook

Barry has extensive technical experience in the functionality of Pre-Payment Meters as a result of his role as Technical Manager for National Grid's 15 million domestic credit and Pre-Payment Meters. During his time with National Grid Barry conducted regular liaison meetings with metering equipment manufacturers to discuss faults and agree new product developments, adding his insight into many of the issues that may arise with valve functionality in smart meters. He has previously negotiated amendments to functionality changes of Pre-Payment Meters with gas suppliers.

Barry is also able to offer technical support for retrofit options, having significant experience in this area including the management of field trials of such devices. He has attended numerous seminars on smart meters held both in the UK and internationally, gaining an awareness of the available products and unresolved issues relating to smart gas metering. Barry regularly represented National Grid Metering at industry meetings with bodies including Ofgem, Gas Safe Register, and HSE and on industry forums such as the MAMCOP group. Since leaving National Grid Metering in February 2010 he has formed his own company, Metering Consultancy Solutions. Barry also chairs the Gas Measurement Committee of the Institution of Gas Engineers and Managers.

### Andrew Knights

Andrew has 30 years of experience within the UK oil and gas sector, with the last three years spent in a high exposure role interfacing with Government and Government agencies. Since establishing his own gas industry consulting business, Andrew's contracts have included acting as joint developer of a complete revision of the UK downstream gas and electricity national emergency management procedures and management of UK industry response to potential change of the UK gas quality. In his previous role as Gas Regulation Manager at Total, Andrew was responsible for market and impact analysis created by the application of change in the regulatory and legislative environment. Andrew also has experience as industry representative on a number of groups including the Government/ industry Energy Emergency Executive Committee, Gas Advisory Task Group and Gas/ Electricity Interaction Task Group. He has been a key figure in the development of national gas and electricity emergency plans and a lead industry participant in the development of low cost, long-term capacity allocation in the UK gas Network.

### Steve Ladle

Steve has over 25 years experience in the energy industry and for the last 15 years has been fully involved in the evolution of the UK gas market, particularly with regard to the development of industry codes and governance arrangements. As Head of Regulation with Total Gas & Power, he has been a past Chairman of the Gas Forum and has chaired a number of its major workgroups developing industry views on areas such as gas shipping, UK gas balancing arrangements, distribution network sale, transmission/ distribution price controls and safety. Steve has also been a member of the Network Code Modification panel and, until recently, was a director of the Gas Industry Safety Group. Steve is currently Chair of the iGT Uniform Network Code Panel.

Before entering the energy industry, Steve was a Health and Safety Assessor for a major insurance company and was an Associate Member of the Institute of Industrial Safety Officers.

### Nick Halliman

Nick has extensive experience in the development and delivery of industry trading arrangements and, whilst at Gemserv, has delivered consultancy and project management services for clients in electricity, gas and environmental markets across the UK and Ireland. Before joining Gemserv, Nick worked as a consultant with Engage Consulting, prior to which he worked for Powergen (now E.ON UK) over a 12-year period in various roles across the electricity supply chain. Nick's key experience includes: utility regulation (including business separation); energy trading, settlement and metering; development of market arrangements and internal capability supporting retail and wholesale market development between 1994 and 2001; and commercial operations covering scheduling and despatch of Powergen's power station fleet and coordination of demand-side response (demand side bidding, peak demand notification and load management) and ancillary services.

### Mayokun Alonge

Mayokun has experience of working with market participants in a number of regulated market and has developed excellent client relationship skills and now provides client delivery services for the Gas and Metering team within Gemserv. Mayokun has delivered projects and provides ongoing support to a number of well known organisations such as ERA, Gas Forum, UKRPA, AMO, MOCOPA and iGT UNC.

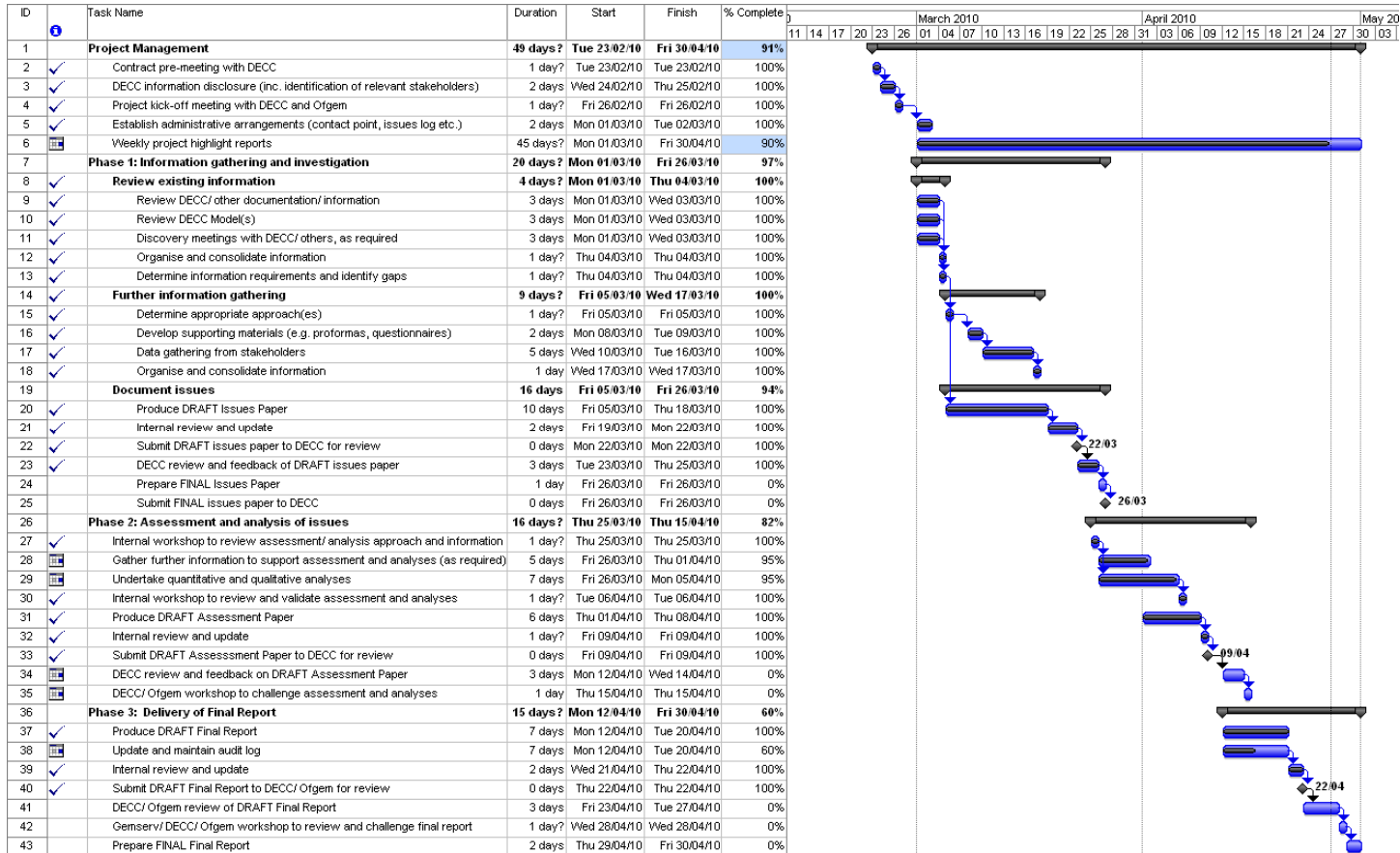
Mayokun previously provided analytical support and designed and conducted user acceptance testing for the team providing services to the Central Market Agency within the Scottish water market – the first competitive water market in the world. Working in this environment Mayokun developed an excellent understanding of the water industry and the workings of competitive markets. Mayokun was an integral part of managing the CMA helpdesk which provides advice and support to the CMA in order for them to respond to market participants effectively.

### Whitney Slavinskis

Whitney has extensive experience in business development within the Technology, Media and Telecommunications (TMT) and finance sectors working for Arqiva, the leading UK broadcast and telecommunications infrastructure company. She worked on a various technical communications projects and has good working knowledge of one-way and two-way communications standards. Whitney has been involved in smart metering industry debates. Prior to this, Whitney project-managed and successfully executed the £2.5 billion sale of National Grid Wireless (NGW) to Macquarie. Whitney is Gemserv's Gas and Metering Client Manager.



## Appendix 3: Project Gantt Chart



## Appendix 4: Stakeholder Consultation

Questions for Meter Manufacturers
<ol style="list-style-type: none"><li>1. What do you see as the main purpose of the gas valve in your smart meter?</li><li>2. Are there any other purposes for the gas valve?</li><li>3. What is the procedure for opening the gas valve in your smart meter?</li><li>4. What is the procedure for closing the gas valve in your smart meter?</li><li>5. What safety features are there associated with the above procedures or the operation of your smart meter to protect the consumer?</li><li>6. What specification is the valve in your smart meter built to?</li><li>7. What test history do you have for the valve in your smart meter?</li><li>8. How many meters utilising this valve have been installed in the field?</li><li>9. What supporting evidence do you have for the reliability of your valve in the field?</li><li>10. Does your smart meter utilise a pulse fitted to the measuring unit for computing gas consumption?</li><li>11. If not, how is the gas consumption calculated by the smart meter?</li><li>12. If your smart meter includes a pulse, what information do you have on the reliability of that pulse?</li><li>13. What is the battery life of your smart meter?</li><li>14. What provisions are in place to prevent the remote actuation of the gas valve to protect against the accidental cut off of a vulnerable consumer?</li><li>15. What safeguards do you follow when making software changes to your meter?</li><li>16. Can tilt tamperers be detected even if the valve has been closed?</li></ol>
<p><b>Costs - Please provide information on the following cost areas:</b></p> <ol style="list-style-type: none"><li>17. New meter without valve</li><li>18. New meter with integrated valve</li><li>19. New meter with separate valve</li><li>20. Retrofit existing meter with smart functionality and separate valve</li><li>21. Retrofit existing meter with smart functionality but without valve</li></ol>
<p><b>Other:</b></p> <ol style="list-style-type: none"><li>22. For the above what is the impact on cost as production volume increases?</li><li>23. What is the optimum manufacturing timescale for the universal replacement of all gas meters with new smart meters?</li></ol>
Questions for MAM and MAP
<ol style="list-style-type: none"><li>1. What do you see as the main purpose of the gas valve in your smart meter?</li><li>2. Are there any other purposes for the gas valve?</li><li>3. Can you provide Gemserv with a copy of the specification for the valves fitted to your Pre-Payment Meters or the sections of your Pre-Payment Meter specification that are relevant to the valve and its testing?</li><li>4. How many Libra 210 and Q smart meters did you have installed in the field at the start and end of 2009?</li><li>5. During 2009 how many call-outs to Libra 210 meters were as a result of valves failing to open when required (F11 fault)?</li><li>6. During 2009 how many call-outs to Libra 210 meters were as a result of valves failing to close when required (F12 fault)?</li><li>7. During 2009 how many call-outs to Q smart meters were as a result of valves failing to open when required (F11 fault)?</li><li>8. During 2009 how many call-outs to Q smart meters were as a result of valves failing to close when required (F12 fault)?</li></ol>

9. Do you have any domestic sized credit meters installed which have internal valves?
10. What evidence do you have on the reliability of meter pulses fitted to domestic sized meters?
11. How many credit to pre-payment exchanges did you carry out in 2009?
12. Approximately what % of your pre-payment population does that represent?
13. Have you had unplanned valve closures on Pre-Payment Meters due to faults with the meter's software?
14. Do you have any Automatic Meter Reading devices fitted to any domestic or non-domestic meters which obtain a meter reading from the meter either by utilising the pulse output from the meter or via an Optical Character Recognition device?
15. What is the additional installation cost of fitting new meters versus upgrades to an existing gas meter? What type of resource would be required to install a new smart meter with valve versus retrofit of an existing meter (without valve)?
16. Could less skilled operatives install a retrofit device where there is no requirement to interrupt the gas supply? If so, what would be the cost saving per installation?
17. Do you intend to multi-skill operatives to be capable of installing both the gas and electricity smart meter where the gas meter requires a valve to be fitted?

#### **Questions for International MAP/ MAM**

1. Are there any other purposes for the gas valve?
2. How many smart gas meters do you have installed?
3. Do the smart gas meters you have installed have internal valves?
4. Are you using the valve in the meter to control bad debt or for any other purpose?
5. What information do you have on the reliability of the valve such as call-out rates to valve related problems?
6. Are meters with valves, if fitted used to isolate premises in the event of local supply emergencies, and if so what is the regulatory control on such actions?
7. What other benefits, if any, do smart meters, with and without valves provide to network operations and the development of smart grids?
8. What are the costs associated with the manufacture, installation and maintenance of smart meters, both with and without valves?

#### **Questions for Gas Network Owners**

1. What do you see as the main purpose of the gas valve in the smart meter?
2. Are there any other purposes for the gas valve?
3. How do you ensure that meter installations connected to your Network do not result in unsafe gas pressures at consumer's appliances?
4. What procedures do you follow when re-commissioning distribution mains and services following a gas supply emergency?
5. What evidence is there, if any, that meters with valves can be safely used in relation to the isolation of supplies to manage local emergencies and security of supply issues? What statutory or regulatory provisions would need to be amended, and how, to allow such provisions?
6. What benefits, if any, would smart meters with valves provide to the development of 'smart' grids?
7. Is there a need for a technician to be present when the function of a meter is changed? If so, what actions does the technician perform and what can be done to remove the need for the technician to be present?

#### **Questions for Large Domestic Gas Suppliers**

1. What do you see as the main purpose of the gas valve in the smart meter?
2. Are there any other purposes for the gas valve?
3. What evidence do you have to support your view that the use of valves in smart meters will not have a significant impact on maintenance costs?
4. In what way do you believe the operation of the valve will be different between the Pre-Payment and Pay As You Go environment?
5. What evidence do you have on the reliability of valves in Pre-Payment Meters? What procedures do you propose to follow to ensure that vulnerable customers do not have their gas supplies remotely disconnected?

6. What commissioning procedures do you follow to ensure that data quality is robust and that meter details are correctly linked to the address of the installed meter?
7. Please could you explain all the uses that you propose for the valve in the meter and state whether you believe that these uses are compatible with the specification of the valve?
8. What proportion of your Pre-Payment customers do you expect to move to PAYG?
9. What evidence do you have in relation to the costs of meters both with and without valves and the impact of increasing the scale of production?
10. What financial benefits or dis-benefits, if any, do you assess will be applicable to consumers?
11. Other than technical and financial issues what other benefits/ dis-benefits do you see being delivered by meters with and without valves?
12. What evidence is there, if any, that meters with valves can be safely used in relation to the isolation of supplies to manage local emergencies and security of supply issues? What statutory or regulatory provisions would need to be amended, and how, to allow such provisions?
13. What benefits, if any, would smart meters with valves give to the development of 'smart' grids?
14. What additional services and products could be provided to the market as a result of the universal introduction of valved meters? What value to the consumer can be ascribed to these services?
15. What benefits, if any, would be available to the security and safety of consumers resulting from the introduction of valved meters?
16. Is there a need for a technician to be present when the function of a meter is changed? If so, what actions does the technician perform and what can be done to remove the need for the technician to be present?
17. Is the current regulatory framework strong enough for use of remote switching/ disablement?
18. Do you have concerns about the current level of data quality to ensure that correct properties are connected/ disconnected? If so, what does the industry need to do to improve this?
19. What percentage of your Domestic customers do you currently isolate each year for:
  - a. Bad debt/ non-payment?
  - b. Change of tenancy (at the request of the outgoing customer)?
  - c. Vacant premises?
  - d. Other?
20. If the ability to remotely disconnect is available how do you see these percentages changing for:
  - a. Bad debt/ non-payment?
  - b. Change of tenancy (at the request of the outgoing customer)?
  - c. Vacant premises?
  - d. Other?
21. For your own customers, are there circumstances under which you would still request physical meter isolation and/or removal even when remote disconnection is available?

#### Questions for Independent Gas Suppliers

1. What do you see as the main purpose of the gas valve in the smart meter?
2. Are there any other purposes for the gas valve?
3. Do you support the mandating of a valve in the meters to be installed in Domestic properties? If so, please explain what benefits you believe this will bring.
4. Other than technical and financial issues what other benefits/ dis-benefits do you see being delivered by meters with and without valves?
5. Do you have any views on whether meters with valves can be safely used in relation to the isolation of supplies to manage local emergencies and security of supply issues? What statutory or regulatory provisions would need to be amended, and how, to allow such provisions?
6. What benefits, if any, would smart meters with valves give to the development of 'smart' grids?
7. What additional services and products could be provided to the market as a result of the universal introduction of valved meters in the Domestic market? What value to the consumer can be ascribed to these services?
8. What benefits, if any, would be available to the security and safety of consumers resulting from the introduction of valved meters?

9. Is the current regulatory framework strong enough for use of remote switching/ disablement?
10. Do you have concerns about the current level of data quality to ensure that correct properties are connected/ disconnected? If so, what does the industry need to do to improve this?
11. For your own customers, are there circumstances under which you would still request physical meter isolation and/or removal even when remote disconnection is available?

#### **Questions for Meter Testing and Accreditation**

1. What do you see as the main purpose of the gas valve in the smart meter?
2. Are there any other purposes for the gas valve?
3. When testing meters that have been returned from the field do you check the pressure drop across the meter?
4. If a meter that has been returned for testing has a valve do you check the functioning of the valve?
5. When a meter is sent to you for approval do you record the pressure drop across the meter?
6. What is the allowed pressure drop across a MID approved meter?

#### **Questions for Trade Associations**

1. What do you see as the main purpose of the gas valve in the smart meter?
2. Are there any other purposes for the gas valve?
3. What evidence do you have that supports the UK initiative with respect to smart meters with and without valves in comparison to other markets in Europe and how do the markets relate in relation size and complexity?
4. What evidence do you have from your membership that supports the UK initiative with respect to smart meters with and without valves from a commercial and safety perspective?
5. What evidence is there, if any, that meters with valves can be safely used in relation to the isolation of supplies to manage local emergencies and security of supply issues? What statutory or regulatory provisions would need to be amended, and how, to allow such provisions?
6. Is the current regulatory framework strong enough for use of remote switching/ disablement?

## Appendix 5: Summary of Stakeholder Responses

The following is a summary of the stakeholder responses to the consultation as relevant to the key issues.

### 1. Purpose of the Valve

As part of the stakeholder consultation, Gemserv sought stakeholders' opinions on the purpose and proposed use of the valve.

The responses were almost universal in agreeing that the main purpose for the valve was to assist in supplier management of consumer debt and to support the ability to switch between credit and prepay tariffs without the need for gas meter operator visits.

Some respondents also supported the use of the valve to disconnect supply at change of tenancy or when properties were vacant, whilst one respondent believed this was not appropriate as the valve was not designed to be a mechanism for safe isolation of the supply point.

Others suggested that remote disconnection may be used as a network management tool to temporarily disconnect gas consumers from the network, possibly when a local issue is planned on the network or for local emergency management.

The vast majority of respondents did not believe that remote disconnection was viable to support load management during either normal or emergency conditions.

A number of respondents including Consumer representatives stated that the mandating of a valve would facilitate the development of the PAYG market.

Some respondents suggested that the valve could also be linked to other devices such as CO sensors and smoke alarms or could be closed by the consumer should gas be smelt.

One respondent also suggested the valve could be operated by the consumer to support maintenance or exchange of home gas appliances.

### 2. Safety Issues

The stakeholder consultation requested stakeholders' views on any safety issues associated with remote disconnection/ reconnection and associated issues related to smart gas meters. Stakeholder issues were grouped into four key areas:

- Remote Disconnection and Reconnection;
- Tampering and Theft of Gas;
- Emergency Isolation; and
- Data Quality and Security.

#### **(a) Remote Disconnection and Reconnection**

No parties specifically commented on any issues associated with the use of remote disconnection by suppliers of the gas supply.

Meter Manufacturers noted that their meters would issue a confirmation of closure which could be sent back to the supplier. Any indication that the valve had only partially closed would also be

monitored and passed back to the supplier so that a call-out to investigate the problem could be raised.

Views on re-enablement were mixed. Generally, respondents stated that reconnection should not be carried out unless there was a user present at the meter – that is, suppliers could set an indicator to allow reconnection but positive confirmation would be needed at the meter before the valve could be re-opened.

Generally respondents were comfortable that reconnection did not require any “purge and relight process”<sup>8</sup> because the pipework itself had not been broken, although one respondent did believe a qualified gas engineer should be in attendance. Reconnection procedures would require the customer to confirm that all connected gas appliances were closed and then to activate a reset button to re-open the valve.

Some meter manufacturers noted that their meters could monitor flows before and during the valve opening and shut down the valve if a constant flow was detected, indicating that a gas appliance was still open.

Views were also mixed as to whether the reconnection process could be performed from the In-Home Display (IHD) or only at the meter itself.

#### ***(b) Tampering and Theft of Gas***

Some manufacturers noted that their meters could detect tampering and would close the valve under such circumstances. One manufacturer believed that tilt tampering was not an issue for modern diaphragm meters as their meter was not susceptible to tilt effects. Whilst only commented on by a very small number of respondents, one respondent stated that an internal valve was a more secure option for revenue protection purposes being a more secure means of locking a gas point (more difficult to be interfered with than an external valve, hence reducing the potential for theft of gas). A second respondent believed it would have little impact on theft and they would still have to make attempts to assess the customer’s circumstances in order to take them into account (e.g. evidence of vulnerability). Physical site visits would still be needed to establish if genuine theft was occurring and to record appropriate evidence.

#### ***(c) Emergency Isolation***

Respondents who commented on this were in general agreement that the meter valve could not be seen as a replacement for the ECV. The purpose of the valve in the meter was to disconnect the supply not to isolate the supply point. Physical site visits by a qualified operative would still be required during emergencies and network supply problems to check that the ECV had been closed and to check if purge and relight procedures needed to be carried out when the ECV was reopened.

#### ***(d) Data Quality and Security***

Several respondents commented on the importance of quality data to ensure that the correct meters can be operated safely (e.g. to avoid erroneous disconnections). A number of respondents felt that the installation was the best time to fully validate that information relating to all aspects of the smart meter set up was correct. This would require communication with the supplier via the central communications hub once the meter has been installed.

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<sup>8</sup> “Purge and relight” is the name given to a safety procedure necessary to remove a gas/air mixture from pipework. Air can enter the pipework when any fitting or pipework is disconnected and it is then necessary to remove it via the purge and relight process. The purge and relight process must be carried out by a suitably qualified competent engineer.

With regard to information and data security, a number of respondents (mainly meter manufacturers) commented on the level of encryption and authentication used by their products with a view to reducing the risk of accidental or mischievous operation of a remotely controlled valve. Also referenced were additional tampering risks introduced should a separate valve be installed, an internal valve being regarded as more secure.

The ability to remotely close the valve was commented on as an additional security feature where premises have been vacated.

### **3. Technical Issues**

The stakeholder consultation requested stakeholders' views on any technical issues associated with remote disconnection/ reconnection and associated issues related to smart gas meters. Stakeholder issues were grouped into seven key areas:

- Valve Specification;
- Reliability;
- Battery Life;
- Meter Boxes;
- Maintenance;
- In-Service Testing; and
- Other Installation Problems.

#### **(a) Valve Specification**

. Those respondents who commented, concurred that the valve within a smart meter is not suitable for isolating supplies, i.e. as an alternative to an ECV.

#### **(b) Reliability**

A number of respondents, mainly manufacturers and MAMs, commented on reliability issues. There was general agreement that whilst the older valved meters had poor reliability records, the more modern smart gas meters with valves were far more reliable. Some information was supplied about call out rates but this was not definitive in differentiating between call-outs where the valve had closed inadvertently or where the valve had been closed deliberately but the consumer needed assistance.

There was also a question raised about the reliability of valves that have been operated in the same position for a number of years with one respondent suggesting that there should be an annual check on the valve operation.

#### **(c) Battery Life**

Most respondents agreed that the battery life should be in excess of 10 years based on weekly valve operation, but all recognised that the battery life was likely to be lower than the overall meter asset life. One respondent suggested a battery life of 5-7 years. Further, there was no consistent opinion as to whether the valve should close when the battery came to the end of its life or remain open.



#### **(d) Meter Boxes**

Some comments were made about the advisability of installing smart meters (with or without valves) in semi-concealed meter boxes due to the risks of water ingress. Comments were also made about the need to re-site meters particularly where they may need to be accessed more frequently.

#### **(e) Maintenance**

This subject was not really commented on other than by one trade association, who considered that there should be annual checks on the valve operation, and one meter manufacturer, who suggested that there should be mandatory safety checks every two years including all gas devices in the home. Another manufacturer whose product uses rechargeable batteries suggested a visit would be necessary every four years to replace batteries.

#### **(f) Other Installation Problems**

One stakeholder involved in the installation of smart meters has reported a significant number of attempted installations which have had to be aborted. The reasons for aborting the installations include the poor condition of the existing installation, refusal of access by the consumer, the replacement smart meter does not fit in the space occupied by the existing meter, and there is no signal for the communications unit. In a mass roll out of smart meters installers will need to develop strategies for dealing with these issues if significant additional roll out costs are to be avoided.

### **4. Commercial Issues**

The stakeholder consultation invited views on commercial issues associated with remote disconnection/ reconnection and associated issues related to smart gas meters.

A number of respondents provided some information on potential savings through improved debt management. These related to the avoidance of the need to exchange meters when moving between payment methods (credit to prepayment etc.). Some respondents also suggested that smart meters would reduce the need to take out warrants when moving reluctant consumers from credit to prepayment tariffs.

Different views were expressed on the issue of meter stranding. One common view was that it would reduce overall costs if only those meters requiring a valve (pre-payment and PAYG plus meters at the end of their asset life) were initially replaced with smart valved gas meters, thus reducing the number of meters that are otherwise replaced prematurely. Other respondents argued that by allowing a different meter for consumers who did not immediately need the valve functionality would increase costs as meters would continue to be swapped out in line with changing consumer preferences. Suppliers did not give any indications of their proposed marketing of PAYG tariffs.

### **5. Regulatory Issues**

The stakeholder consultation invited views on regulatory issues associated with remote disconnection/ reconnection and associated issues related to smart gas meters.

A number of respondents referenced the need for a review of the current industry practices in place to protect consumers. These include the need for “friendly” periods to be identified so that consumers can not be disconnected after say 8pm, at weekends or on bank holidays. Also suggested was the need for valved smart meters installed in the homes of certain customer groups (e.g. vulnerable

consumers) on credit tariffs to have the remote enablement/ disablement functionality disabled to prevent unintended operation of the valve.

## 6. Consumer Issues

Gemserv's stakeholder consultation invited views on consumer issues associated with remote disconnection/ reconnection and associated issues related to smart gas meters.

The general consumer view from the representative organisations consulted was that valves should be mandated as a means of driving the uptake for alternative payment methods, particularly PAYG. This was seen as a method that would be preferred by many customers with estimates for take up varying between 20% to 40% by 2020, with some commentators drawing parallels with the mobile phone market with up to 60% of customers on PAYG tariffs. Additional points made argued that the move to PAYG would give consumers far more control over their spending on energy and would reduce the overall potential for debt. Also, significant take up would itself drive more innovation which would reduce the overall transaction costs currently associated with pre-payment and PAYG. Lastly, reductions in overall debt levels would be beneficial for all consumers as it would reduce suppliers' cost to serve.

## 7. Retrofitting Issues

The stakeholder consultation invited views on retrofitting issues associated with remote disconnection/ reconnection and associated issues related to smart gas meters.

Views were divided on the issue of Non-Valve Retrofit. Those in favour believed that it was a suitable alternative for a significant proportion of gas meters, where pre-payment or PAYG was not likely to be required and the meter had a reasonable remaining asset life. A point made was that not only would the retrofit device be cheaper but the installation could be carried out at the same time as the electricity upgrade, as the operative would not need to be gas trained. The overall installation would also be considerably quicker.

Those against argued that it would be more expensive as retrofit devices would be of similar cost to new smart meters and that they would have to be thrown away when a consumer wanted to change to an alternative payment method requiring a valved smart meter. Consumer groups and those suppliers pro mandating valves also believed that retrofit devices would limit the development of alternative innovative payment methods, particularly for PAYG which could assist in reducing the overall level of gas consumer debt.

## 8. Economic Issues

The stakeholder consultation invited views on economic issues associated with remote disconnection/ reconnection and associated issues related to smart gas meters.

Various costs were collected during the exercise relating to the:

- Cost of a smart meter with and without valve;
  - Cost of retrofit devices;
  - Installation times/ costs for smart meter and retrofit;
  - Information on potential callout levels;
  - Information on asset lives for various elements of the meter; and
- Views on the skill level of operatives installing meters.

