

The smart metering programme: a consumer review

A report to Which? by the Centre for Sustainable Energy

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Contents

Executive Summary.....	3
1. Introduction.....	8
2. Defining consumer interests in smart metering.....	10
2.1. Using the consumer interest R-A-G assessment framework	14
3. Key features of the UK smart metering programme from a consumer perspective	15
4. Assessing the current smart meter programme	21
5. Key issues emerging and possible remedies	25
5.1. The reliance on “competitive pressures in the energy supply market”	25
5.1.1. Possible remedies to control costs and ensure pass through of benefits.....	27
5.2. Overplayed data privacy concerns vs under-stated system data needs?	27
5.2.1. Possible remedies to manage data privacy concerns and meet system data needs	29
5.3. The choice of energy suppliers to lead roll-out: risks of distrust and inefficiency.....	30
5.3.1. Possible remedies to address distrust and secure street-by-street roll-out.....	32
5.4. DECC’s limited perspective of consumer concerns in a social context	33
5.4.1. Possible remedies to address consumer concerns effectively.....	35
6. Revised assessment following remedies	37
7. Conclusions and recommendations	40

List of Tables

Table 1: Consumer interests R-A-G assessment framework for the smart metering programme.....	12
Table 2: Customer interest assessment of current smart metering programme proposals	22
Table 3: Consumer interests assessment assuming remedies have been implemented	37
Table 4: Summary showing the impact of remedies on current plans.....	41

Executive Summary

The introduction of smart meters into the homes and businesses of the UK between now and 2019 carries the potential for significant individual and collective benefits, including:

- Engaging consumers with their energy use, stimulating changes in their energy using habits.
- Underpinning the development of services which encourage and enable consumers to manage their demand and thus deliver system-wide benefits such as:
 - reduced electricity generating costs;
 - improved system efficiency (short and long-term);
 - better management of the intermittency of generating sources such as wind power, and;
 - improved demand forecasting for gas and electricity by time and location through more accurate customer demand profiles.
- Reducing operating costs for energy suppliers through reduced meter reading costs and more accurate bills (leading to fewer complaints)
- Optimising network investment choices between network infrastructure and demand management options

The Department of Energy and Climate Change (DECC) estimates these benefits will outweigh by £7.1 billion the costs of introducing and operating smart meters in every building the UK.

However, the implementation of smart metering can only succeed – and deliver these benefits – with the co-operation and consent of consumers. After all it is consumers who will have to accept a smart meter into their homes, respond to its feedback and signals, and bear whatever cost is incurred and passed through in their bills.

Yet there are a number of signs that the needs and concerns of consumers are not being fully integrated into either the design of the smart meter system or the roll-out programme. This has the potential either to put the programme's overall success at risk of consumer rejection or to create a system which fails to serve the interests of consumers who will be footing the bill.

To examine and address these concerns, *Which?* commissioned the Centre for Sustainable Energy (CSE) to review the smart metering programme explicitly through the lens of the interests of existing and future domestic consumers.

Defining consumer interests in smart metering

The first step in the review was to define the nature of consumer interests in smart metering in order to underpin a consumer-oriented assessment framework for the smart metering programme. In broad terms, consumer interests can be defined in terms of cost, confidence, benefits, and fairness, and boiled down into seven different consumer-oriented objectives for the UK smart metering programme:

1. Roll-out and operational costs as low as possible (given other objectives) and efficiently incurred
2. Cost recovery by energy suppliers (and other service providers) from consumers is transparent and distributed fairly across consumers (and between existing and future consumers)

3. Meter roll-out programme is trustworthy and confidence inspiring (addressing consumer concerns and avoiding costly hold ups)
4. Robust, secure and confidence-inspiring operations (once installed)
5. Full realisation of the informational benefits of smart meters for consumers through effective data provision and consumer-friendly interfaces
6. Enabling of new services which can benefit the energy system as whole and offer individual consumer benefits and choice (e.g. demand response and load shifting through time-of-day tariffs etc)
7. Benefits accruing to suppliers and others in the 'system' as a result of smart meter programme are shared fairly with consumers.

These objectives were then used to produce a traffic light (or 'R-A-G') – RED, AMBER, GREEN – assessment framework with descriptors for each level of performance (see Section 2 and Table 1 on page 12). Such a framework enables an assessment of the smart metering programme based on an understanding of consumer interests and needs from the programme. This is in stark contrast to types of assessment which have tended to dominate the official literature: technological assessments (can it work?) and economic assessments (what will it cost and what is the financial value of benefits it will deliver?).

Describing the smart metering programme from a consumer perspective

Before assessing the smart metering programme from a consumer perspective, it was necessary to describe the key features programme from a consumer perspective (see Section 3). The review therefore used published government documents to provide what could be seen as the government's answers to the following consumer-oriented questions:

- A. What will it cost (both me and the government which spends my taxes) and how much will I have to pay?
- B. How are those costs going to be controlled so that I know I'm not paying over the odds?
- C. Who will be doing what to my electricity and gas meters and when?
- D. Who will get to know what about me and my energy use?
- E. What risks are there that someone else will be able to get hold of this data and misuse it?
- F. What benefits and services will this smart meter enable me to access – and what will I have to do (or pay) to get them?
- G. Am I going to pay my fair share of the costs (and no more) and will I get my fair share of the overall benefits (and no less) of having a smarter energy system?
- H. What about everyone else – and particularly more vulnerable households?
- I. Are smart meters safe?

Reviewing the smart metering programme from a consumer perspective

The answers to these questions were then reviewed against the consumer interests R-A-G assessment framework (as detailed in Section 4, Table 2 starting on page 22).

This review produced one **RED** and 6 **AMBER** gradings, indicating there is currently a meaningful risk – in terms of both high probability and high impact – that the smart metering programme will fail consumers.

A number of particular risks emerge from the review:

- The reliance on “competitive pressures in the energy supply market” to control programme costs and to ensure the benefits are passed through to consumers appears naïve given official recognition of the currently limited nature of such pressures. This leads to a **RED** grading for ‘cost’.
- The approach being taken to data privacy may conflict with the system’s need for data to optimise performance, thus undermining the full realisation of the anticipated benefits.
- The choice of energy suppliers as lead delivery agents for the programme builds in consumer distrust from the beginning and limits the potential for area-based street-by-street programmes which are likely to be (a) more cost-effective and (b) more likely to enable social and community interventions which can involve consumers in the roll-out and establish positive social norms regarding reactions to smart meters.
- DECC’s understanding of consumer concerns is developing but it still appears to have a limited perspective on: (a) how these concerns might play out within the media and society more widely during the roll-out process and thus create delivery risks, and (b) what types of interventions (and by whom) might be required to mitigate these risks.

Understanding the issues and developing possible remedies

The evidence to support each of these conclusions is explored in more detail (Section 5) with a particular focus on identifying possible remedies to:

- control costs, ensure pass through of benefits and avoid potential for legitimate ‘rip off’ claims;
- manage data privacy and security concerns whilst meeting system data needs;
- address distrust in energy suppliers and secure street-by-street roll-out to increase consumer engagement, improve cost-effectiveness and enhance competition between suppliers on their smart meter offerings;
- understand consumer concerns and develop interventions to assuage them.

Without these remedies, the programme as currently designed may run into deployment problems as a result of increasing consumer resistance. Alternatively, without remedy the programme may fail to deliver a full share of its benefits to consumers, instead enabling energy suppliers and others in the energy market to gain at the expense of consumers.

With the remedies applied, the smart metering programme would score 3 **AMBER** and 4 **GREEN** gradings on the assessment. The 15 proposed remedies for DECC, Ofgem and, where relevant, responsible consumer advocates, are outlined below.

The recommended remedies for action by DECC and Ofgem

Controlling costs and the pass through of benefits

- i. Require that the metering costs are separated out on consumer bills and tariff quotes so that consumers have an opportunity to see directly what they are paying and how it varies across energy suppliers.
- ii. Use early, transparently and aggressively its new powers under the Energy Act 2011 to obtain information from energy suppliers so that the costs and benefits and the efficiency of delivery can be evaluated.
- iii. Have explicit plans to intervene to protect consumers in the event of evidence of consumer detriment, including threat of fines and compensation payments.
- iv. Stop assuming and publicly stating that competition in energy supply markets will be sufficiently strong to keep costs to consumers as low as possible and instead be explicit about the steps which will be taken to ensure that consumers will not get 'ripped off'.

Managing data privacy and security concerns

- v. Make public quickly and consistently the fact that a smart meter cannot act as a 'spy in the home' in any meaningful use of that phrase, and develop a communications and media strategy to reinforce this message.
- vi. Put in place (and publicise) very harsh penalties on energy suppliers or other parties in the smart metering system for breach of data privacy.
- vii. Emphasise the benefits of smart meters, most particularly the benefit most resonant for consumers: accurate bills.
- viii. Take the most generous possible perspective on what does, or might in future, constitute a regulatory duty for licensed players in the energy market.
- ix. Ensure that all aspects of the energy market (including trading and settlement) are using smart meter data in ways which maximise potential net benefits to consumers.

Delivering a cost-effective, community-engaging, competition-enhancing, street-by-street roll-out

- x. Mandate energy suppliers to work in co-operation to procure and commission a national street-by-street roll-out process where all households in each neighbourhood are involved in a common enterprise on a common basis over the same period of time.
- xi. Develop a funded programme of interventions to maximise the value for consumers of street-by-street roll-out and ensure it addresses consumer concerns and enhances competitive comparisons between supplier offerings.

Understanding consumer concerns and developing interventions to ensure they are assuaged

- xii. Explore the potential value of 'bottom-up' social communication processes to build consumer support.
- xiii. Focus on the simplest, most resonant consumer benefit – accurate bills – and treat all other benefits as 'added extras' rather than the main event.
- xiv. Establish a clear understanding of how different consumer concerns which are being identified in consumer research 'segment' across the population and the implications for how best to communicate with and engage different segments.
- xv. Develop their own 'anti-smart meter' campaign strategies (a) to understand how these might be established, capture media attention and secure public reaction, and (b) to test countervailing strategies to neutralise or undermine such approaches.

The positive impact on consumer interests of applying these remedies to the current plan is summarised in the Table 4 below. The remedies both reduce the risk of that the programme will fail to meet the interests of consumers and enhance the likelihood that the roll-out will be completed successfully.

Table: Summary of consumer interest assessments showing the impact of remedies on current plans

HIGH LEVEL CRITERIA	Consumer-oriented objective	Current plans	Remedied plans
1. COST	<ul style="list-style-type: none"> Roll-out and operational costs as low as possible (given other objectives) and efficiently incurred 		
2. TRANSPARENCY and DISTRIBUTION of costs	<ul style="list-style-type: none"> Cost recovery by energy suppliers from consumers is transparent and distributed fairly across consumers 		
3. CONFIDENCE-INSPIRING ROLL-OUT	<ul style="list-style-type: none"> Meter roll-out programme is trustworthy and confidence inspiring 		
4. CONFIDENCE-INSPIRING OPERATION	<ul style="list-style-type: none"> Robust, secure and confidence-inspiring operations (once installed) 		
5. INFORMATIONAL BENEFITS	<ul style="list-style-type: none"> Full realisation of the informational benefits of smart meters for consumers 		
6. ENERGY SYSTEM BENEFITS	<ul style="list-style-type: none"> Enabling of new services which benefit the energy system as whole and offer consumer benefits and choice 		
7. CONSUMERS' SHARE OF SYSTEM BENEFITS	<ul style="list-style-type: none"> Benefits of smart meters accruing to suppliers and others in the 'system' are shared fairly with consumers 		

1. Introduction

The introduction of smart meters into the homes and businesses of the UK between now and 2019 carries the potential for significant individual and collective benefits. For example:

- Smart meters have the potential to engage consumers with their energy use, stimulating cost-saving changes in their energy using habits and exposing to them the benefits of energy saving interventions.
- An effectively designed smart metering system can provide the bedrock for the development of services and ‘offerings’ which encourage and enable consumers to manage their demand and thus deliver system-wide benefits such as:
 - reduced electricity generating costs;
 - improved system efficiency (short and long-term);
 - better management of the intermittency of generating sources such as wind power, and;
 - improved demand forecasting for gas and electricity by time and location through more accurate customer demand profiles.

In addition, smart meters will deliver operational cost savings for suppliers (such as reduced meter-reading and more accurate billing, leading to fewer customer complaints).¹

- The data from smart meters, if properly managed and analysed, can help to optimise network investment, facilitating least-cost choices between network- and demand-oriented solutions.

However, these benefits, estimated by the Department of Energy and Climate Change (DECC) at £7.1 billion (after costs)², can only be realised if the design and operation of the smart meter system is coherent and reliable and, even more crucially, if the roll-out of smart meters is successful.

That design coherence and roll-out success is fundamentally dependent on meeting the needs and concerns of consumers; after all it is they who will have to accept a smart meter into their homes, respond to its feedback and signals, and bear whatever cost is incurred and passed through in their bills.

While the government tends to lead its promotion of smart meters with the benefits to consumers,³ there are a number of signs that the needs and concerns of consumers are not being fully integrated into either the design of the smart meter system or the roll-out programme. These signs include:

1 There are, of course, questions about the extent to which these benefits will be passed through to consumers.

2 See DECC impact assessments for domestic and business sectors at http://www.decc.gov.uk/en/content/cms/consultations/smart_mtr_imp/smart_mtr_imp.aspx. The estimated total cost across both domestic and business sectors is £11.7 billion and the benefits add up to over £18.7 billion, of which roughly half are cost savings to energy suppliers and a third are savings by domestic and smaller business consumers as a result of them responding to better energy consumption data by reducing their energy use. These figures are net present values (NPVs) in 2009 prices of the total estimated costs and benefits between 2011 and 2030 (at the standard HM Treasury policy assessment discount rate of 3.5%).

3 For example, DECC *Smart Meter Implementation Plan consultation* August 2011: says in its opening paragraph, before mentioning wider ‘smarter’ energy system benefits: “The roll-out of smart meters will give people far better information about, and control over, their energy consumption and deliver other significant benefits to consumers. For example, it will bring an end to estimated billing and make it easier to switch energy supplier.”

- The choice of energy suppliers as the lead agents for the roll-out, in spite of their now being largely distrusted (a) to act in their customers' interests and (b) not to abuse this role with the mis-selling of other products and services.⁴
- The apparent lack of control over the energy suppliers' approaches to cost-recovery, in spite of official concerns about the limits of competition in the domestic energy market⁵ and the value for money of the programme as a whole.⁶
- The consumer protection focus being on preserving data privacy (which could potentially hamper the effective and beneficial development of 'smart' networks) rather than on developing consumer trust and understanding and focusing tightly on unambiguous consumer benefits like more accurate bills.⁷
- The very limited attention given to date to the potential value of social processes and community-oriented interventions to support smart-meter installation and use.⁸

In isolation, each of these signs may result from a reasoned, evidence-based position which can be defended, albeit on rather narrow terms. Taken together, however, they give rise to a growing sense that the government, regulator and the energy industry may have lost sight of:

- a. the interactions between different aspects of the smart metering programme and their likely cumulative impact on consumers;
- b. the core need to understand and reflect consumers' needs and interests throughout the programme to ensure it wins and sustains consumer acceptance, and;
- c. the nature and scale of any conflicts between measures explicitly designed to protect consumer interests (such as data privacy) with the operational and procedural requirements to optimise the benefits available to consumers individually and collectively (such as the need of the different actors in the system to have access to data).

To examine and address these concerns, *Which?* has commissioned the Centre for Sustainable Energy (CSE)⁹ to review the smart metering programme explicitly through the lens of the interests of existing and future consumers. The review's focus is domestic consumers, though its findings are likely to be applicable to small business consumers receiving smart meters over the rest of this decade.

4 E.g. As discussed in Ofgem(2011) *The Retail Market Review: Findings and initial proposals*, Ofgem, London and the supporting report of Ofgem Consumer First Panel workshops (see http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/Ofgem_OpinionLeader_Tariff_Report_Final.pdf) and as demonstrated by comments in *Which?* conversations (e.g. <http://conversation.which.co.uk/energy-home/smart-meter-stealth-sales-which-challenge/>)

5 Ofgem(2011) *The Retail Market Review: Findings and initial proposals*, Ofgem, London

6 National Audit Office (2011) *Preparations for the roll-out of smart meters*, TSO, London

7 E.g. Ofgem and DECC (2010) *Joint letter on Smart Metering Programme 9 December 2010* and DECC (2011) *Smart Metering Implementation Programme: A call for evidence on data access and privacy*, DECC, London. In contrast, FDS International reported to Ofgem "Reassuringly, there were no widespread concerns about energy companies having access to information about their energy use" (FDS International 2010, *Consumers' views of smart metering: report for Ofgem*, Ofgem, London, page 16).

8 See, for example, DECC (2011) *Smart Metering Implementation Programme: Response to Prospectus Consultation: Supporting document 2 of 5: Roll-out Strategy*, DECC, London – particularly paragraphs 4.67-4.72 – which shows some acknowledgment but limited proposed response.

9 See www.cse.org.uk

The review starts by defining consumer interests in smart metering and developing an assessment framework for the smart metering programme based on these (Section 2). The smart metering programme is then described from the perspective of consumers (Section 3) and assessed against the consumer interest assessment framework (Section 4). The key issues identified in the assessment as creating significant risks that consumer interests will be failed by the current plans are explored in Section 5, together with proposed remedies to address these risks. The 'remedied' plans are then reassessed (Section 6) against the consumer interest framework to test the potentially beneficial impact of the remedies on the risk profile of the smart metering programme. Conclusions and recommendations for the government and others are drawn together in Section 7.

2. Defining consumer interests in smart metering

In order to review the extent to which the smart metering programme reflects an understanding of the interests and needs of consumers and is designed to meet them, it is important first to develop a picture of those interests and needs. This can then provide an assessment framework for reviewing both: (a) the smart metering programme as currently designed from a consumer perspective, and; (b) any alternative proposals to address the risk of significant consumer detriment or to increase the potential for consumer benefit.

In broad terms, consumer interests in the smart meter roll-out can be defined in terms of cost, confidence, benefits, and fairness. Using evidence and understanding from their direct experiences of working with and for consumers, experts from *Which?* and CSE identified seven different consumer-oriented objectives for the UK smart metering programme:

1. Roll-out and operational costs as low as possible (given other objectives) and efficiently incurred
2. Cost recovery by energy suppliers (and other service providers) from consumers is transparent and distributed fairly across consumers (and between existing and future consumers)
3. Meter roll-out programme is trustworthy and confidence inspiring (addressing consumer concerns and avoiding costly hold ups)
4. Robust, secure and confidence-inspiring operations (once installed)
5. Full realisation of the informational benefits of smart meters for consumers through effective data provision and consumer-friendly interfaces
6. Enabling of new services which can benefit the energy system as whole and offer individual consumer benefits and choice (e.g. demand response and load shifting through time-of-day tariffs etc)
7. Benefits accruing to suppliers and others in the 'system' as a result of smart meter programme¹⁰ are shared fairly with consumers.

While this inevitably treats 'consumers' as an unrealistically homogenous group, these high level categories capture the principal areas of interest and concern to the vast majority of consumers.¹¹

¹⁰ Examples of such benefits include: lower meter reading costs; improved debt management through accurate billing; better demand forecasting and management options; avoided network investment; lower cost management of intermittent generation and gas storage etc)

To enable these objectives to be used as an assessment framework, a traffic light (or 'R-A-G') model – RED, AMBER, GREEN –was adopted. Descriptors for each of the three levels of performance are shown in Table 1 on page 12 below.

In this context, any aspect of the proposed smart metering programme which is RED carries a high risk of:

- creating significant consumer detriment either directly or indirectly and/or
- failing to deliver on the anticipated consumer benefits which underpin the case for the programme and/or
- destabilising the roll-out process and incurring significant additional cost or delay or both

On the other hand, a GREEN rating would indicate that the programme was likely to broadly meet that consumer-oriented objective, maintaining confidence in the programme and enabling anticipated consumer benefits to be realised.

An AMBER rating indicates a meaningful risk of consumer detriment and associated failure to meet the relevant consumer-oriented objective, with a likely shortfall in anticipated consumer benefits relative to predictions (and/or an increase in costs to consumers) and a risk that consumer concerns will undermine the roll-out programme.

11 Given both the likely differences in perspective across consumers and the interlinked nature of these objectives, these consumer-oriented objectives are not weighted here.

Table 1: Consumer interests R-A-G assessment framework for the smart metering programme

HIGH LEVEL CRITERIA	Consumer-oriented objective	RED Serious risk of significant consumer detriment	AMBER Some consumer detriment likely	GREEN Consumer interests protected and/or served
a. COST	<ul style="list-style-type: none"> Roll-out and operational costs as low as possible (given other objectives) and efficiently incurred 	Roll-out and operational costs largely unregulated and subject to limited competitive pressures	Roll-out and operational costs subject to limited regulatory control and/or modest competitive pressures	Roll-out and operational costs subject either to regulatory control or to strong, meaningful and lasting competitive pressures
b. TRANSPARENCY and DISTRIBUTION of costs	<ul style="list-style-type: none"> Cost recovery by energy suppliers from consumers is transparent and distributed fairly across consumers (and between existing and future consumers) 	No monitoring or reporting of supplier and system costs and no requirement on suppliers to reveal how costs recovered	Limited monitoring and reporting of supplier and system costs (but no requirement on suppliers to reveal how costs recovered)	Supplier and system costs monitored and reported routinely and suppliers required to show how costs feature in bills/tariffs
c. CONFIDENCE-INSPIRING ROLL-OUT	<ul style="list-style-type: none"> Meter roll-out programme is trustworthy and confidence inspiring (addressing consumer concerns and avoiding costly hold ups) 	Roll-out programme design and delivery left principally to market (energy suppliers) with regulatory controls which fail to understand consumer concerns and ignore current standing in consumers' eyes	Roll-out programme designed with some funded interventions to raise awareness and regulatory controls to discourage (though not necessarily prevent) poor delivery practice	Roll-out programme designed to build trust by relying on trusted intermediaries and funded supporting interventions and information to sustain confidence.
d. CONFIDENCE-INSPIRING OPERATION	<ul style="list-style-type: none"> Robust, secure and confidence-inspiring operations (once installed) 	Data security assumed to be responsibility of each party with limited industry-wide co-ordination of policies and practices to reflect common need to maintain consumer confidence	High quality data security systems established across industry but limited thinking about how industry as a whole manages any breaches or problems to maintain consumer confidence	Data systems established with high levels of security embedded across system and quick and decisive responses to suspected breaches or problems based on co-ordinated approach

HIGH LEVEL CRITERIA	Consumer-oriented objective	RED Serious risk of significant consumer detriment	AMBER Some consumer detriment likely	GREEN Consumer interests protected and/or served
e. INFORMATIONAL BENEFITS	<ul style="list-style-type: none"> Full realisation of the informational benefits of smart meters for consumers through effective data provision and consumer-friendly interfaces 	Minimal specification of in home display to provide consumption feedback with little attention to effectiveness of data provision in devices installed and very limited opportunities for supportive interventions	In home displays specified for good consumer information and delivered well in installed devices on basis of quality consumer research. Some opportunities for supportive interventions by third parties	In-home energy consumption information clear and timely, with wide range of opportunities for supportive interventions by third parties to encourage and enable consumer response (including tariff and supplier switching as well as energy saving behaviour change and appliance control integration)
f. ENERGY SYSTEM BENEFITS	<ul style="list-style-type: none"> Enabling of new services which can benefit the energy system as whole and offer individual consumer benefits and choice (e.g. demand response and load shifting through time-of-day tariffs etc) 	Limited range of new services on offer because whole system not aligned to enable benefits to be captured (e.g. trading and settlement system stuck with very limited profiles)	Range of new services and offerings emerging, though with unclear benefits and limited appeal due to complexity, unclear rationale (e.g. not clear why offered) and/or limited market choice (e.g. energy supplier only)	Wide range of easy-to-understand services from range of providers, with clear and appealing benefits to consumers and explicit system benefits
g. CONSUMERS' SHARE OF SYSTEM BENEFITS	<ul style="list-style-type: none"> Benefits* accruing to suppliers and others in the 'system' as a result of smart meter programme are shared fairly with consumers 	No intervention (regulatory or otherwise) to measure system benefits or assess extent to which they are shared with consumers	Monitoring and reporting of system benefits but assumed that 'competitive market' will deliver share to consumers	Strong regulatory approach to monitoring and capturing scale and nature of system benefits, with interventions planned to address any failures to share with consumers

* Examples of such benefits include: lower meter reading costs; improved debt management through accurate billing; better demand forecasting and management options; avoided network investment; lower cost management of intermittent generation and gas storage etc

2.1. Using the consumer interest R-A-G assessment framework

This R-A-G framework enables a high-level assessment of the government's documented proposals for the smart metering programme. While the framework's short descriptors of different levels of performance can not approach the sophistication of a full impact and risk assessment, the R-A-G framework has the advantage of being able to drawing attention quickly to areas of the programme where there exists a high risk that the programme will fail to meet consumer needs and/or will undermine their interests.

The same framework can also be used to assess the likely impact on that risk of any proposed changes or alternatives to the government's proposals.

Clearly, the assessment is not an exact quantitative exercise. Moreover, it remains difficult to understand in full the inter-relationships between different aspects of the smart metering programme and its ultimate deliverability since (a) not all aspects of the programme have been finalised and (b) some aspects of the programme work on potentially conflicting dimensions of consumer interest (e.g. data privacy and system need for data to deliver benefits).

Nevertheless, a meaningful assessment can still be undertaken using:

- detailed assessment of the government's published proposals (and possible alternatives for some aspects of the programme);
- evidence of consumer responses to large-scale domestic smart metering programmes in other countries;
- an understanding of existing UK consumer perspectives on smart meters and, more generally, how consumer perspectives tend to be formed, particularly in relation to government-driven technology diffusion.

Most importantly, the consumer interest R-A-G framework offers an assessment of the UK smart metering programme based on an understanding of consumer interests and needs from the programme. This is in stark contrast to types of assessment which have tended to dominate the official documentation to date: technological assessments (i.e. can it work?) and economic assessments (i.e. what will it cost to install and operate and what is the financial value of benefits it will deliver?).

3. Key features of the UK smart metering programme from a consumer perspective

The installation of smart electricity and gas meters in every home and business in the UK by 2019 is an enormous undertaking, involving extensive investment in technology, communications and data systems and associated logistical challenges.

In this context, it is perhaps not surprising that most descriptions of the UK smart metering programme outline the technical institutions and relationships to manage communications, oversee data flows, and set specifications for components and processes within the system – from user interfaces to data access and transfer protocols.

These are clearly important aspects of the programme and vital to successful roll-out and continuing operation. But these are also aspects of the programme which, from a consumer perspective, simply need to work.¹²

Any failure of these technical aspects would represent a fundamental flaw in the system which would quickly undermine consumer confidence in the smart metering programme as a whole. It would also undermine the consumer and system benefits potentially on offer from smart meters.

While we are not qualified to comment on whether the technical design of the programme is likely to be successful in underpinning effective performance, we recognise that the government and the energy industry's early and sustained focus on these aspects of the programme reflects a deep-seated concern that the system functions well. However, at this still relatively early stage in the programme, we note that in July 2011 the National Audit Office expressed its concerns about the extent and depth of the government's delivery planning, the adequacy of resources and expertise in DECC, and the lack of time contingency for setting appropriate technical standards in time to meet the ambitious programme delivery timetable.¹³

The focus here is instead on features of the smart metering programme which matter to consumers. As outlined in Section 2 above, the concerns of consumers can be categorised as 'costs, confidence, benefits and fairness' (and developed into an assessment framework).

To drive a description of key features of the programme from a consumer perspective (which can then be assessed against the framework), these concerns can usefully be posed as questions:

- A. What will it cost (both me and the government which spends my taxes) and how much will I have to pay?
- B. How are those costs going to be controlled so that I know I'm not paying over the odds?

12 In the KANO model of consumer satisfaction, these aspects are 'must-be' or 'basic' attributes of the smart meter system – features the system must have in order to meet basic consumer expectations for the service/system and over which there is no 'negotiation' and which is taken for granted if it works but results in significant consumer dissatisfaction if it doesn't (e.g. a milk carton that doesn't leak). These are different from 'performance' attributes, in which better performance improves consumer satisfaction (and worse performance reduces consumer satisfaction), and 'delighter' attributes, which are largely unforeseen by the consumer and which genuinely and unexpectedly 'delight' the consumer (a 'wow factor'). For an initial introduction, see http://en.wikipedia.org/wiki/Kano_model

13 NAO (2011). See Footnote 6

- C. Who will be doing what to my electricity and gas meters and when?
- D. Who will get to know what about me and my energy use?
- E. What risks are there that someone else will be able to get hold of this data and misuse it?
- F. What benefits and services will this smart meter enable me to access – and what will I have to do (or pay) to get them?
- G. Am I going to pay my fair share of the costs (and no more) and will I get my fair share of the overall benefits (and no less) of having a smarter energy system?
- H. What about everyone else – and particularly more vulnerable households?

Judging from the websites of organisations running campaigns against the installation of smart meters in other countries,¹⁴ consumers may also be encouraged by campaigning organisations (via parts of the media) to ask:

- I. Are smart meters safe?

Answering each of these questions based on the government's published proposals provides a description of the currently planned smart metering programme from a consumer perspective.

This can then be reviewed against the R-A-G framework provided in Table 1 on page 12 to assess the extent to which the current programme reflects consumer interests. The answers to the questions which follow below are therefore provided largely without comment or critique so as to focus on the proposals as presented by the government.

A. What will it cost (both me and the government which spends my taxes) and how much will I have to pay?

DECC's Impact Assessment in August 2011¹⁵ puts the total projected cost of the domestic smart meter programme at £10.92 billion. The same study estimates that the cost to install a smart electricity meter is £104 and to install a smart gas meter is £136 per dwelling, including the mandated provision of in-house displays.

The National Audit Office reported in July 2011 that government spending on the programme to July 2011 was £11.2 million and that DECC was estimating a programme budget requirement to cover its involvement and that of Ofgem of £56 million from 2011-12 to 2014-15. The Impact Assessment

14 See for example <http://stopsmartmeters.org/>. Health risks have also been raised in consumer consultation in the Australian state of Victoria, see <http://www.dtf.vic.gov.au/CA25713E0002EF43/pages/dtf-projects-review-of-the-advanced-metering-infrastructure-program>

15 DECC (2011) Smart meter roll-out for the domestic sector: Impact Assessment, DECC 18 August 2011 <http://www.decc.gov.uk/assets/decc/11/consultation/smart-metering-imp-prog/2549-smart-meter-rollout-domestic-ia-180811.pdf> These cost figures relate to the domestic sector only and therefore are lower than those quoted in Footnote 2 which cover the whole programme including business sector. As with other cost and benefit figures quoted here from the Impact Assessment, these figures are net present values (NPVs) of the total estimated costs and benefits between 2011 and 2030 (at the standard HM Treasury policy assessment discount rate of 3.5%).

uses of figure of £100 million for ‘marketing activities’ up to 2019, though this is a figure which includes industry marketing as well as government-sponsored activities.

Energy suppliers, who will lead the roll-out, will be prevented from charging upfront for smart meter installations or from levying one-off charges. DECC estimates that the smart metering programme will result in an increase in annual domestic energy and gas bills for the average dual fuel customer of £6 by 2015. As noted below, DECC also predicts that, by 2020, this will have turned into a net annual saving of £23, assuming consumers respond as predicted (in terms of curbing consumption and switching to better tariffs) and that benefits accruing to suppliers are largely passed through to consumers.

B. How are those costs going to be controlled so that I know I’m not paying over the odds?

The government has decided that the costs of the smart metering programme will be controlled by competitive market forces. This will occur initially through public procurement processes for the data communications and data services (under the ‘Data Communications Company’ or ‘DCC’) and subsequently through ‘the competitive energy supply market’. DECC explains:

“The competitive energy supply market acts as a price restraint on suppliers and creates incentives to deliver, and charge for, smart meters in a way that minimises costs to consumers and offers them value for money. Suppliers who do not minimise costs risk losing customers.”¹⁶

The government’s early decision to place the responsibility for rolling out smart meters on energy suppliers (rather than electricity and/or gas distribution companies or an independent agency) was largely driven by this belief. There are no plans for any other price or cost-pass-through regulation except that suppliers will not be allowed to charge up-front or on a one-off basis for installation of the smart meter or associated minimum specification in-house displays. To support competition in the energy supply market, DECC will be establishing and enforcing (through Ofgem) common commercial and technical interoperability requirements for smart meters in an attempt to avoid consumers being ‘locked in’ to one supplier’s smart meter package.¹⁷

In addition, the costs of the DCC – which are estimated by DECC to be about 20% of the total¹⁸ – will initially be controlled via competitive tender for an exclusive regulated license to operate for a fixed term. During operation, cost recovery from energy suppliers (and thus consumers) will be controlled through regulatory oversight by Ofgem of the DCC charging methodologies and quality of service by Ofgem.

As the NAO reported: “The Department [DECC] has concluded that competition amongst meter manufacturers and energy suppliers, with compliance backed by regulation, will provide the most appropriate protection for consumers.”

16 See p. 33 of DECC (March 2011) *Smart Metering Implementation Programme Response to Prospectus Consultation: Supporting Document 2 of 5: Rollout Strategy*, DECC, London, available from http://www.decc.gov.uk/en/content/cms/consultations/smart_mtr_imp/smart_mtr_imp.aspx

17 This said, *Which?* has identified a number of customers who have already been given smart meters by their energy supplier, prior to the interoperability standards being set , and who are subsequently being told that they will need to pay to have a new meter fitted when they say they wish to switch supplier.

18 £0.8 billion in set up and £1.4 billion in operation between 2011 and 2030 - costs are quoted as NPV – see Footnote 2 for explanation.

C. Who will be doing what to my electricity and gas meters and when?

DECC is assuming that energy suppliers will manage the roll-out timetable and delivery mechanisms and commission contractors to undertake meter switch-overs in their customer properties. At present, there is a general assumption that consumers will be able to contact their energy suppliers to ask for a smart meter from a relatively early stage in the live programme. In addition, energy suppliers will develop a phased programme to reach all their customers before 2019.

It is not yet clear how much co-ordination there will be between suppliers in programme delivery, though any co-ordination would be entirely voluntary. DECC's proposals are largely silent on how exactly this supplier-led programme will interact with current range of companies involved in meter operation and ownership (principally National Grid for gas meters and the electricity distribution companies plus a range of financial interests for electricity meters). It is for example possible that these meter-owning and operating companies may take it upon themselves to develop area-based roll-out programmes (given that these are likely to be the most cost-effective approach to installation); they may then sell these installation services to the suppliers of customers in the targeted areas.

In the home, the meter switching process will take a few hours (for both gas and electricity), though there is no requirement or explicit plans for both meters to be done simultaneously. Gas supplies will need to be switched off during the gas meter switch, producing a need to check that pilot lights are re-lit and other appliances safe when supplies are restored. Electricity supplies will also need to be switched off, which is likely to lead to a need for some clocks and other equipment to be reset afterwards.

The supplier will be required to provide in-house displays to enable the household to see their energy consumption in real time and over time. The displays – which will communicate with the smart meters through a wireless home area network – will need to meet a minimum technical specification (still to be determined); it is not yet clear whether these displays will be portable and whether they will be 'set up' as part of the installation process or simply left with the householder.

Suppliers will be required by DECC to develop a smart meter installation code of practice to include commitments to the following:

- Consumers know what to expect from installation process in advance
- Consumers are not unduly inconvenienced by the installation process and installers meet standards of conduct and service
- Customers know where to get further advice and information, and who to contact if things go wrong
- Feedback on experience of the process is gathered and used to improve the experience for other consumers
- Vulnerable consumers receive a level of service appropriate to their needs
- Customers are not subject to unwelcome sales activities on day of installation
- Customers are given information which is accurate and complete
- Customers are not charged upfront or one-off for equipment that suppliers are required to provide.

The government has indicated that, as it did during the digital switchover, it expects to make provision for additional support for vulnerable households and those with special needs (probably driven by the priority service registers maintained by gas and electricity distribution companies).

D. Who will get to know what about me and my energy use?

The government has made it clear that, without the clear consent of the customer, smart meter data will only be provided to energy suppliers and others within the energy system at sufficient level of resolution to enable them to perform their regulated duties (such as providing accurate bills). The resolution (e.g. half-hourly) level and personalisation of the data (e.g. address-specific) required to enable this is yet to be determined; there are expectations that anonymised and/or aggregated data may be sufficient for some duties (such as distribution company system management).

Beyond this, it will be for the consumer to decide how their consumption data is used and by whom, though there are still decisions to be made about whether this will be on an opt-in or an opt-out basis. Either way, it will be possible for consumers to give energy suppliers and/or third-party service providers access to their detailed half-hourly data (and potentially additional information about appliances and household occupancy) in return for services (such as tariff optimisation, demand side management support etc).

In addition, DECC has committed the industry to developing a Privacy Charter setting out how smart metering data will be used and protected.

E. What risks are there that someone else will be able to get hold of this data and misuse it?

DECC is placing considerable emphasis on the security of the data communications and systems for smart meters. It is well aware of consumer fears generated elsewhere (particularly the Netherlands), suggesting that anyone with access to smart meter data would be able to determine 'living patterns' and thus invade the privacy of the household (and also potentially alert criminal interests to when homes were unoccupied).

While its full plans to minimise the risk of data security breaches and cyber attacks are yet to be completed (since they will depend in part on institutions yet to be commissioned, such as the data communications company and its data centre), this issue has been identified as a high priority in the design and operation of the system.

F. What benefits and services will this smart meter enable me to access - and what will I have to do (or pay) to get them?

The principal benefit available to consumers will be to understand better their energy consumption and take steps to reduce it, either through behavioural change (such as reducing use of appliances or lowering thermostats) or by translating the new awareness into a stimulus to install additional energy saving or micro-generation measures.

The Government has estimated that these benefits will be worth £4.635 billion to domestic consumers between 2011 and 2030. It has recognised that there will need to be additional

consumer engagement activities to enable consumers to make the best use of the smart meters and realise these benefits, though DECC has yet to outline its plans for these activities.

It is not yet clear what other services might emerge in response to the opportunities offered by smart meters. It is likely that there will be some or all of the following available either from energy suppliers or from third-party providers:

- Time of use tariffs which reward customers for shifting their energy demand to times of day when it is less expensive to supply (and also penalise them for failing to do so)
- Demand management arrangements, in which consumers agree to allow certain appliances in their homes (such as fridges and freezers) to be controlled remotely or automatically to curb demand at peak times.
- Tariff optimisation services, in which the consumer's demand profile is matched to an optimum tariff
- Enhanced feedback and data analysis, potentially providing web-based analysis of meter data to highlight opportunities to cut or shift demand to save money and/or carbon emissions
- Specific services for consumers with particular needs, such as those with visual impairment

Some of these services may be free, or lower cost than the consumer's existing arrangements, or be subject to a fee.

The other main benefits anticipated from the smart meter programme are: (a) the benefits to suppliers of reduced operating costs for their domestic customers (e.g. in-home meter reading, customer enquiries and complaints about inaccurate bills, debt management etc) which DECC estimates at £8.567 billion over the period 2011- 2030; (b) network benefits of £0.923 billion as a result of improved data for system management and reduced losses, and; (c) generation cost reductions of £0.774 billion from lower peak demand.

DECC is assuming that these costs will be passed through to consumers as a result of the competitive pressures in the energy supply market (see Section B above for more details).

There is also an estimated £1 billion over the same period of UK-wide benefits from carbon emission reductions (which DECC has monetised) and reduced costs in the EU Emissions Trading Systems.

G. Am I going to pay my fair share of the costs (and no more) and will I get my fair share of the overall benefits (and no less) of having a smarter energy system?

As outlined in the answer to Question B above, DECC is assuming that competitive pressures in the energy supply market will ensure that consumers pay as little as possible for having smart meters installed. With the exception of acknowledging the particular needs of vulnerable consumers and those with special needs, DECC also assumes that consumers will be equally able take advantage of the benefits available from smart meters since the assumed benefits are derived from low or no direct cost changes in behaviour. Indeed, this is one of the main reasons DECC is requiring energy suppliers to provide all consumers with in-house displays, the specification of which has a particular focus on requiring a consumer-friendly interface.

H. What about everyone else – and particularly more vulnerable households?

The answer to Question G above also applies to ‘everyone else’. DECC has acknowledged that there will need to be special attention to meeting the needs of vulnerable households though as yet it has no specific proposals.

I. Are smart meters safe?

DECC’s position is that smart meters are safe. It is aware from some consultation responses of concerns regarding the safety of the proposed wireless technologies, specifically relating to electromagnetic sensitivity. DECC’s perspective is that all equipment will have to meet relevant health and safety standards (including those set by the International Commission on Non-Ionizing Radiation Protection) and that there is nothing particularly unique about smart meter technologies which require additional regulations beyond these.

4. Assessing the current smart meter programme

The description in Section 3 of the key features of the smart meter programme from a consumer perspective can be reviewed against the consumer interests assessment framework outlined in Section 2 (and specifically Table 1).

This assessment, together with a rationale for the RED, AMBER or GREEN rating given, is presented in Table 2 starting on page 22.

From this assessment a number of key issues emerge:

- The reliance on “competitive pressures in the energy supply market” to control programme costs and to ensure the benefits are passed through to consumers appears naïve given official recognition of the currently limited nature of such pressures
- The approach being taken to data privacy may conflict with the system’s need for data to optimise performance, thus undermining the full realisation of the anticipated benefits
- The choice of energy suppliers as lead delivery agents for the programme builds in consumer distrust from the beginning and limits the potential for area-based programmes which are likely to be (a) more cost-effective and (b) more likely to enable social and community interventions which can involve consumers in the roll-out and establish positive social norms regarding reactions to smart meters.
- DECC’s understanding of consumer concerns is developing but it still appears to have a limited perspective on: (a) how these concerns might play out within the media and society more widely during the roll-out process and thus create delivery risks, and (b) what types of interventions (and by whom) might be required to mitigate these risks.

These are explored in more detail in Section 5 below.

Table 2: Customer interest assessment of current smart metering programme proposals

HIGH LEVEL CRITERIA	Consumer-oriented objective	Current proposals	Assessment	Rationale for assessment
1. COST	<ul style="list-style-type: none"> Roll-out and operational costs as low as possible (given other objectives) and efficiently incurred 	To be left to competitive market pressures within energy supply market (and thereby smart meter supply chain). Some powers under Energy Act 2011 to obtain information from suppliers on costs and performance. DCC costs (c. 20% of total) subject to competitive tender.	Roll-out and operational costs largely unregulated and subject to limited competitive pressures	Ofgem's analysis for the Retail Market Review raised serious questions about the nature and extent of competitive pressures on prices in the domestic electricity and gas markets. ¹⁹ While steps are being taken to improve market information (to encourage more consumers to switch supplier) and encourage new entrants, without these steps the level of competitive pressure on cost control should be considered extremely weak.
2. TRANSPARENCY and DISTRIBUTION of costs	<ul style="list-style-type: none"> Cost recovery by energy suppliers from consumers is transparent and distributed fairly across consumers (and between existing and future consumers) 	To be left to competitive market pressures except DCC cost recovery (c. 20% of total) subject to regulatory control	Limited monitoring and reporting of supplier and system costs (but no requirement on suppliers to reveal how costs recovered)	See above, plus associated evidence that energy suppliers tend to load costs onto their 'sticky' customers who are disproportionately lower income and more vulnerable. Also not clear whether competitive pressures will be sufficient to avoid current consumers paying early and disproportionately for the programme, many benefits of which only occur after penetration levels of over 80%. ²⁰

19 Ofgem (2011) The Retail Market Review: Findings and Initial Proposals, Ofgem, London, March 2011. Available at http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/RMR_FINAL.pdf

20 According to DECC's regulatory impact assessment, the potential network and generator benefits require system-wide data-flows, processes and initiatives which themselves require a penetration of smart meters into 80% of consumers' premises to be effective and efficient. See DECC (2011) Smart meter roll-out for the domestic sector: Impact Assessment, DECC 18 August 2011 <http://www.decc.gov.uk/assets/decc/11/consultation/smart-metering-imp-prog/2549-smart-meter-rollout-domestic-ia-180811.pdf>

HIGH LEVEL CRITERIA	Consumer-oriented objective	Current proposals	Assessment	Rationale for assessment
3. CONFIDENCE-INSPIRING ROLL-OUT	<ul style="list-style-type: none"> Meter roll-out programme is trustworthy and confidence inspiring (addressing consumer concerns and avoiding costly hold ups) 	Led by energy suppliers with regulatory attention to data privacy and commitment to consumer engagement and 'marketing' programme	Roll-out programme designed with some funded interventions to raise awareness and regulatory controls to discourage (though not necessarily prevent) poor delivery practice	Research by Ofgem suggests that energy suppliers are largely distrusted by consumers to act in their interests. In addition, it is not obvious that DECC has a clear picture of the full range of possible concerns beyond data privacy which could, if highlighted by the media, be used to undermine public confidence in the technology (e.g. safety, costs and likely benefits, anti-competitive behaviours). Similarly, there are not yet signs from DECC that it has sophisticated grasp of how to ensure these concerns are effectively addressed (beyond a government-backed information campaign as with the digital TV switchover). Public distrust halted roll-outs in Netherlands and Victoria
4. CONFIDENCE-INSPIRING OPERATION	<ul style="list-style-type: none"> Robust, secure and confidence-inspiring operations (once installed) 	Data privacy and system security a strong focus of programme design but detailed security risk mitigation plan still to be developed	High quality data security systems established across industry but limited thinking about how industry as a whole manages any breaches or problems to maintain consumer confidence	Too early to be more confident in this aspect of the programme, though there are issues of trust in energy suppliers as 'honest' users of data and more general concerns about government IT systems and data security.
5. INFORMATIONAL BENEFITS	<ul style="list-style-type: none"> Full realisation of the informational benefits of smart meters for consumers through effective data provision and consumer-friendly interfaces 	Specify consumer-friendly in-home displays and require installation. Acknowledged need for additional interventions to enable consumers to realise full benefits	In home displays specified for good consumer information and delivered well in installed devices on basis of quality consumer research. Some opportunities for supportive interventions by third parties	Display specification to date is promising and government is committed to supportive interventions to enable consumers to interpret and respond appropriately. No detail yet on what these interventions might be (or how they might be developed). Also not clear how easy it will be for third parties to access data and provide services directly to consumers.

HIGH LEVEL CRITERIA	Consumer-oriented objective	Current proposals	Assessment	Rationale for assessment
6. ENERGY SYSTEM BENEFITS	<ul style="list-style-type: none"> Enabling of new services which can benefit the energy system as a whole and offer individual consumer benefits and choice (e.g. demand response and load shifting through time-of-day tariffs etc) 	Allow the market to develop and ensure access to data (with consumer consent) by third parties to enable innovative services and stronger competition	Range of new services and offerings emerging, though with unclear benefits and limited appeal due to complexity, unclear rationale (e.g. not clear why offered) and/or limited market choice (e.g. energy supplier only)	Too early to be confident in a 'green' rating, and in stated commitment to low cost third party access to data services to enable innovative services to be offered from new entrants (including non-suppliers). Evidence from Australia suggests public disquiet about inappropriate time of use tariffs being imposed on vulnerable households. Also risk that data privacy arrangements may stifle innovation by restricting data access and required changes in commercial arrangements (such as use of data in settlement system to enable time of use tariffs) may not emerge.
7. CONSUMERS' SHARE OF SYSTEM BENEFITS	<ul style="list-style-type: none"> Benefits accruing to suppliers and others in the 'system' as a result of smart meter programme are shared fairly with consumers 	To be left to competitive pressures in the market	Monitoring and reporting of system benefits but assumed that 'competitive market' will deliver share to consumers	See above for concerns about extent of competition in retail market. Also full system benefits likely to require data sharing which might fall foul of approach being taken to data privacy.

5. Key issues emerging and possible remedies

Four key issues emerge from the appraisal of the smart metering programme from a consumer interest perspective undertaken in Section 4: the real extent of competitive pressures; data privacy vs. system data needs; energy suppliers as trusted and locally effective delivery agents, and; the approach to addressing consumer concerns. These are each examined in more depth in this Section.

5.1. The reliance on “competitive pressures in the energy supply market”

DECC has a simple approach to controlling costs of the smart metering programme to consumers and to ensuring the anticipated indirect benefits (such as reduced costs to suppliers etc) are passed through to consumers; that this can be almost entirely left to competitive pressures in the energy supply market. As already quoted here in Section 3, DECC’s position is unambiguous:

“The competitive energy supply market acts as a price restraint on suppliers and creates incentives to deliver, and charge for, smart meters in a way that minimises costs to consumers and offers them value for money. Suppliers who do not minimise costs risk losing customers.”²¹

From the perspective of domestic energy consumers, DECC’s approach can only appear naïve.

This perspective is strongly reinforced by official examination of the energy supply market. Ofgem’s Retail Market Review²² detailed extensive consumer detriment within the current market arrangements and cast considerable doubt on the extent of competitive pressures in the market. The National Audit Office reinforced this in the context of the smart meter roll-out in its June 2011 report;

“[Ofgem’s findings that energy companies were pursuing similar pricing strategies] are relevant to the smart meter roll-out. For example, by increasing their prices when the mandated roll-out of smart meters starts without transparency for any increase in their costs, suppliers could seek to make profits on installing smart meters.”²³

Ofgem is taking steps to reduce anti-competitive behaviour by the ‘big 6’ energy suppliers and to encourage new entrants to increase competition. However, the main focus of Ofgem’s reforms is to reduce the risk of consumer detriment by forcing suppliers to simplify tariffs and stop predatory pricing strategies. This will enable consumers simultaneously (a) to compare tariffs more easily (thus potentially increasing currently low interest in switching supplier) and (b) to be more confident that their supplier is not over-charging them on their particular tariff (thus potentially reducing currently low interest in switching). The two effects on competition may cancel each other out, even as consumer detriment is reduced.

It is therefore unlikely that these efforts will increase competitive pressures over the next few years sufficiently to remove legitimate concerns that cost pass-through to consumers is not going to be subject to adequate constraining forces.

21 See Footnote 16

22 Ofgem (2011) *The Retail Market Review: Findings and Initial Proposals*, Ofgem, London, March 2011. Available at http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/RMR_FINAL.pdf

23 From paragraph 5.7 in NAO (2011). See Footnote 6.

Moreover, this concern about the limited competitive pressures in the energy retail market does not just apply to the pass through of the costs of installing smart meters, but also to:

- a. the pass through to consumers of a fair share of the benefits of smart meters accruing to the energy suppliers and other players in the energy system (which are more than twice those assumed to be available directly to consumers from energy saving behaviour change);
- b. the fairness of the distribution of costs and benefits between consumers (both across current consumers and between current and future consumers).

With limited competitive pressures in the energy supply markets, **what will ensure that consumers receive a reasonable proportion of the more than £10 billion benefits predicted by DECC to accrue to energy suppliers (mainly), network operators and generators?**

At present there are no proposals from DECC. This creates a significant risk of a ‘smart meter rip off’ response from consumers and their advocates, particularly given the current distrust surrounding energy suppliers and their pricing practices. The choice of energy suppliers as the delivery leads for the smart meter roll-out will not help in this regard (see Section 5.3 below).

In addition, there is already evidence that energy suppliers tend to load costs disproportionately onto the tariffs of their ‘sticky’ customers (those who have never switched or switched just once since market competition was introduced) and their less desirable customers (such as those on non-preferred payment methods or considered a credit risk). These customers are disproportionately low income and/or vulnerable.²⁴

In addition, there is ample evidence²⁵ that vulnerable consumers will be less able to take advantage of some of the beneficial services and offers likely to be enabled by smart meters. This suggests that such households will pay a disproportionately high share of the costs and reap a disproportionately low share of the benefits of smart meters.

While Ofgem’s market reforms,²⁶ specifically the introduction of standard, easily comparable tariffs, may help reduce this problem, this development is unlikely to be sufficient to ensure that costs and benefits of smart meters are shared fairly between consumers.

The lack of competitive pressures in the energy supply market also creates a risk that current consumers will pay a disproportionate share of the costs early, well in advance of the benefits which the system is expected to deliver (many of which do not occur until high penetration levels are achieved). In these circumstances, **what will prevent energy suppliers recovering smart meter roll-out costs more rapidly than anticipated than necessary, at higher levels than necessary, and sustained for longer than necessary to make a fair return on their investment?**

24 See reference Ofgem 2011 in Footnote 19 and National Audit Office, *Protecting consumers? Removing retail price controls*, HC 342 Session 2007-08, 28 March 2008, <http://www.nao.org.uk/publications/0708>

25 For example, Ofgem, 2011 *Vulnerable customer research*, Report by FDS International, March 2011, http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/Ofgem_vulnerable_customers_research_Final.pdf

26 See reference at Footnote 19

5.1.1. Possible remedies to control costs and ensure pass through of benefits

Leaving the pass through of benefits and cost control to the market is a high risk strategy by DECC. Given the weakness of competitive pressures in the market, this approach could easily give rise to significant consumer detriment in terms of paying unduly high costs and energy suppliers generating undeserved returns on their investment. Such consumer perceptions of a ‘smart meter rip off’ (which would be relatively easily generated by consumer advocates) could lead to extensive consumer rejection of the smart metering programme and expensive hold-ups in the roll-out programme.

A remedy is therefore required. The most obvious remedy would be to introduce price controls on this aspect of consumer bills. However, the government has rejected all proposals relating to the introduction of price controls, though its reasons for rejection are based in the same discredited belief that competition in metering will provide for adequate cost controls without the need for intervention.

If the government is unprepared to protect consumers through effective regulatory price controls, it should take other steps, in concert with Ofgem, to address this problem:

- i. Require that the metering costs are separated out on consumer bills and tariff quotes so that consumers have an opportunity to see directly what they are paying and how it varies across energy suppliers.
- ii. Use early, transparently and aggressively its new powers under the Energy Act 2011 to obtain information from energy suppliers so that the costs and benefits and the efficiency of delivery can be evaluated.
- iii. Have explicit plans to intervene to protect consumers in the event of evidence of consumer detriment, including threat of fines and compensation payments.
- iv. Stop assuming and publicly stating that competition in energy supply markets will be sufficiently strong to keep costs to consumers as low as possible and instead be explicit about the steps which will be taken to ensure that consumers will not get ‘ripped off’.

The impact these remedies would have on the assessment carried out in Section 4 is reviewed in Section 6.

5.2. Overplayed data privacy concerns vs under-stated system data needs?

The government is taking the risk of breaches of data privacy and security seriously within the smart metering programme. Consumer data will only be shared (without the explicit consent of the consumer) to the extent that it is required to allow licensed players in the gas and electricity generation, supply and distribution systems to perform their regulatory duties. A Privacy Charter has been promised, though its robustness and commitment to remedies for breach remain to be seen.

Since even quite recent consumer research does not suggest data privacy and security are significant consumer concerns,²⁷ it appears that the government’s position has emerged on the basis of ‘lessons’ from the smart meter roll-out in the Netherlands. While there are differences in programme design (for example, in the Netherlands consumers were originally legally obliged to accept a smart meter), it is reasonable to conclude that the Dutch programme was largely brought

²⁷ E.g. see FDS International research for Ofgem, referenced in Footnote 7

to a halt by concerns about data privacy – the smart meter as a ‘spy in the home’ – driven by consumer organisation campaigns.

However, it is likely that the concerns of the Dutch public were based on poor research. The national consumer organisation, *Consumentenbond*, commissioned the University of Tilburg to look into the privacy aspects of smart meters. The report ‘found’ that smart meter data would provide insights into a household’s living patterns “*which can affect people’s freedom to do as they please in the confines of their homes*”, and therefore the smart meter programme was a violation of the right to privacy as guaranteed under the European Convention on Human Rights.²⁸

Yet there is no evidence that anyone expert in the interpretation of energy meter readings was involved in the study and therefore drawing this conclusion. **If such an expert had been involved, they would have made it very clear just how difficult it is to interpret ‘household living patterns’ from half-hourly meter readings.**

The notion that a smart meter is a ‘spy in the home’ has strong consumer resonance. However, it is completely misleading in the context of the ability even of experts to establish meaningful relationships between energy meter data and patterns of household behaviour. To do so requires detailed knowledge of: the appliances and energy-using equipment present in the home; the building’s thermal performance, and; the habits of the building users. The latter are almost impossible to deduce just from the half-hourly data read out of a smart meter (not least because in most homes there is a level of ‘background’ energy use which continues whether the household is awake, asleep, in, or out).

Nevertheless, the ease with which such concerns can be raised amongst the public on the basis of such poorly drawn evidence does demonstrate the value of the government taking data privacy and security seriously in the design and communication of the smart metering programme.

It is a separate issue, addressed in Section 5.4 below, whether the public believe the government’s assertion that the system will be designed so that the data is managed properly. But the mere fact that consumers might not trust the data system and would be prey to scaremongering on the ‘snooping’ value of smart meter data suggests that there is work needed to avoid myths developing as they did in The Netherlands.

All this said, consumer concerns about data privacy and the risks they will be prepared to accept in this regard will also be dependent on the nature and scale of benefits available to them as a result of their data being available. If those ‘benefits’ amount only to offers from suppliers of complicated time-of-use tariffs and hard-sell ‘add-ons’ for the in-house display, then consumers may well wonder whether the risks of providing access to their data are worth taking.

A wider concern is the risk that privacy concerns will excessively constrain data flows and reduce considerably the potential ‘smartness’ of the system once smart meters have been installed. This in

28 Source: Smart Regions, *European Smart Metering Landscape Report*, February 2011, available from <http://www.smartregions.net/default.asp?SivulID=26927>

turn risks reducing the overall benefits of the smart metering programme, possibly even to the extent that the benefits become insufficient to justify the costs.²⁹

One example of a possible constraint is the flow of data to distribution network operators (DNOs) and transmission system operators (SOs) to enable them to develop more sophisticated locational demand forecasting, demand side response interventions, and network investment planning. While it is possible that these tasks could be adequately performed with aggregated data, these developments are sufficiently important to the transition to a lower carbon energy system that they should not be unduly hampered by limits on data-sharing between these regulated businesses.

Another example of a possible constraint relates to trading and settlement systems in the energy market. For time-of-use tariffs to be commercially viable for energy suppliers to offer their customers (and reward customers who respond appropriately), the benefits of shifting and/or reducing customer demand needs to be available from the energy market in which they are trading and settling. This requires the electricity and gas market trading and settlement systems to be reformed so that they are based on half-hourly data – or at least on far more sophisticated consumer half-hourly consumption profiles based on smart meter readings.³⁰

DECC has said that it will enable data sharing where it is required for parties to fulfil their regulatory duties. The analysis here would suggest that, unlike the stated preference to define these duties narrowly, Ofgem and DECC should actually take the most generous possible perspective on what does, or might in future, constitute a regulatory duty.

5.2.1. Possible remedies to manage data privacy concerns and meet system data needs

Beyond the government's current relatively high profile commitments to data privacy and security in the smart metering programme, wider lessons from the Netherlands also suggest that DECC, Ofgem and responsible consumer advocates should:

- i. Make public quickly and consistently the fact that a smart meter cannot act as a 'spy in the home' in any meaningful use of that phrase, and develop a communications and media strategy to reinforce this message.³¹
- ii. Put in place (and publicise) very harsh penalties on energy suppliers or other parties in the smart metering system for breach of data privacy.
- iii. Emphasise the benefits of smart meters, most particularly the benefit most resonant for consumers³²: accurate bills (see also Section 5.4 below).

In addition, to ensure that data sharing is sufficient to enable the smartest possible system and the full range of benefits anticipated in DECC's impact assessment, DECC and Ofgem should:

29 Though this would require a £7.1 billion reduction in benefits on the most recent DECC cost benefit analysis.

30 Whether consumers would respond positively to such offers is less the point here than that the system needs to be able to capture the benefits of a positive response for the suppliers and their customers.

31 Rather than raise the 'spy in the home' concern, it may be better first to highlight the challenge to consumers of working out which energy using appliances in their home are, at any time, causing the energy demand profile shown on their smart meter display – and how varied the causes might be.

32 Of course consumers with prepayment meters already have access to accurate data on their energy expenditure.

- iv. Take the most generous possible perspective on what does, or might in future, constitute a regulatory duty for licensed players in the energy market.
- v. Ensure that all aspects of the energy market (including trading and settlement) are using smart meter data in ways which maximise potential net benefits to consumers.

The impact these remedies would have on the assessment carried out in Section 4 is reviewed in Section 6.

5.3. The choice of energy suppliers to lead roll-out: risks of distrust and inefficiency

Energy suppliers are amongst the most distrusted companies in the UK in terms of the extent to which they are likely to act in the best interests of their customers rather than their shareholders and executives. As the Chief Executive of SSE recently said:

“Energy companies do a huge amount of good work on a day-in, day-out basis. The reality is, however, that too many customers have little or no trust in their supplier or the sector.”³³

The choice of energy suppliers as the lead delivery agents for the installation of smart meters therefore builds in consumer distrust in the process from the beginning.

DECC and Ofgem are proposing a Code of Practice (see Section 3C above) to prevent energy suppliers abusing the installation process as a sales opportunity. However, this may not be sufficient to avoid the impression being created for many consumers that (a) the new smart meter ‘belongs to’ their energy supplier which arranged the installation, and that therefore (b) switching energy supplier might be even more hassle than it is currently perceived to be.

Of course, the proposed interoperability standards mean that any supplier will be able to use any smart meter. The question is whether consumers will understand this and realise that switching remains a possibility (indeed, potentially one made quicker and more straightforward with smart meters).

In addition, the choice of energy suppliers as the lead agents may also reduce take up of services likely to be offered by energy suppliers, such as time-of-use tariffs and demand side response management. These risk being perceived as designed in the interests of the supplier rather than the customer. Low take-up of such tariffs and services would reduce the potential benefits both to consumers and the ‘system’ as a whole, calling into question the cost-benefit balance of the smart metering programme.

This consumer distrust also cuts across one of the main arguments used by DECC for choosing energy suppliers as the lead agents: they are presumed to be operating in a competitive market and are therefore more prone to innovate in response to competitive pressures and consumer demand. Yet, even if the competitive pressures were strong, consumers tend not to make demands of suppliers they do not trust.

³³ Quote from a speech by Ian Marchant, Chief Executive of SSE, to Policy Exchange, October 2011. See <http://www.sse.com/PressReleases2011/BuildingTrustInEnergyRetailing/>

Evidence from Victoria, Australia, suggests that consumer distrust in energy companies and their marketing of new tariff structures can undermine public and political confidence in a roll-out programme. As of November 2011, the roll-out programme in Victoria remained under review after consumer concerns about costs and the introduction of time-of-use tariffs, particularly in relation to their potential impact on vulnerable households.

The choice of energy suppliers as the lead delivery agents may also have a potentially profound effect on the design, cost-effectiveness and consumer impact of the smart meter roll-out process.

It is widely recognised that the most cost-effective way to manage the installation of smart meters is on a street-by-street basis, where both gas and electricity meters can be installed in tandem. This keeps costs down by improving the logistical efficiency (i.e. more installations per day per team) and minimises disruption to consumers. It also provides opportunities for street-by-street consumer engagement programmes.

A study for DECC by Baringa Partners in November 2009 confirmed this in the context of reviewing a DNO-led roll-out model (which was assumed to be street-by-street), suggesting a cost reduction of some £0.5 billion compared with a less area focused approach. However, the study also predicted that benefits would be lower than a supplier led approach because DNOs would be slower to start (thus delaying the start of benefits) and the regulatory approach to costs would fail to control them as well as the market (which, in line with DECC's perspective, was considered to be competitive).

*"The DNO-deployment Model offers a lower cost deployment through an efficient street-by-street and fully dual fuel installation strategy, but these savings are largely offset by a later roll-out start date (thus deferring benefits) and higher governance and contractual costs."*³⁴

Developments since 2009 (particularly the delay to the start of the roll-out to allow the communications system to be fully in place) and the analysis outlined here on the extent of competitive pressures on costs would question the second half of this conclusion.

The same report also highlights the additional benefits of street-by-street roll-out in terms of reduced disruption and the far higher potential (relative to other approaches) for targeted interventions to engage consumers, address their concerns more directly and support more vulnerable consumers, and help them make the most of the new smart meters.

The question is not one of whether a street-by-street approach to roll-out would be best – there seems to be widespread agreement on that. The question is how to ensure it happens. No energy supplier has enough of the market in any given area to be able to gain these street-by-street roll-out efficiencies and consumer engagement benefits on their own.³⁵ While suppliers will undoubtedly take advantage of geographical concentrations of their customers, their approach can be expected to be principally an individualised 'supplier to customer' process.

34 See Baringa Partners (2009) *Smart Meter Roll-out: Energy Network Business Market Model Definition & Evaluation Project*, report to DECC, November 2009. Available at: http://www.decc.gov.uk/assets/decc/consultations/smart%20metering%20for%20electricity%20and%20gas/1_20091202094532_e_@@_enbmarketmodelreport.pdf

35 Ironically (given DECC's insistence on the power of the competitive pressures in the market to control costs), if there are any places where such concentrations exist for certain suppliers, these are symptoms of limited competition in the energy supply market rather than opportunities which should diffuse concerns about the cost-effectiveness of roll-out processes.

As mentioned in Section 3C above, it is possible that meter-owning and operating companies may take it upon themselves to develop area-based roll-out programmes; they may then sell these installation services to the suppliers of customers in the targeted areas at a cheaper rate than suppliers would be able to deliver installations themselves. Yet, this approach will only work if all energy suppliers are involved and there are not competing street-by-street programmes causing confusion amongst consumers. And meter operators are not subject to price regulation, so this approach still relies on the same weak competitive pressures between suppliers to control costs to consumers.

This analysis suggests a need for energy suppliers to co-operate and, potentially, to procure and commission street-by-street delivery programmes. The Baringa Partners report to DECC³⁶ concurs with this view. It concludes that the cost and consumer engagement value of street-by-street roll-out is significant enough, irrespective of which companies are leading the process, to merit intervention by government “*mandating or encouraging local co-ordination between suppliers*”.

DECC has not, to date, acted on this recommendation, or indicated that it is seeking to persuade or cajole the energy suppliers to act in this way.

Moreover, DECC’s studies and impact assessments all appear to have overlooked a potentially significant additional benefit of street-by-street roll-out. **Such an area-based roll-out could serve to increase competition between energy suppliers** because it will ensure that their smart meter offerings to their customers in any given area are all exposed simultaneously to the local population. People will be able to compare with their local friends and neighbours what their suppliers are offering, particularly if there are associated interventions to encourage such comparisons and develop this neighbourly interaction.

5.3.1. Possible remedies to address distrust in energy suppliers and secure street-by-street roll-out

A street-by-street smart meter roll-out process has the potential to go a considerable way towards removing the issue of energy supplier distrust as a key risk in the smart metering programme. This is because such a process can: (a) neutralise the specific commercial interests of any individual energy supplier (through their joint involvement in a common process) and; (b) provide an opportunity for other interventions to address consumer concerns and promote consumer engagement and involvement.

As pointed out above, it may also increase competition between energy suppliers by exposing their smart meter offerings simultaneously to neighbouring homes and businesses and thereby increasing the chance to make comparisons.

To achieve this approach as standard in the roll-out, DECC needs to:

- i. Mandate energy suppliers to work in co-operation to procure and commission a national street-by-street roll-out process where all households in each neighbourhood are involved in a common enterprise on a common basis over the same period of time.

36 Ibid, see footnote 34

- ii. Develop a funded programme of interventions to maximise the value for consumers of street-by-street roll-out and ensure it addresses consumer concerns and enhances competitive comparisons between supplier offerings.

The impact these remedies would have on the assessment carried out in Section 4 is reviewed in Section 6.

Why not a DNO-led roll-out?

Given the concerns detailed here regarding:

- the inadequacy of competitive pressures between energy suppliers to control costs and ensure benefits are passed to consumers;
- consumer distrust of energy suppliers to act in consumers' interests;
- the risk that the benefits of a street-by-street roll-out will be lost;

there continues to be a strong argument for using the regulatory regime governing the Distribution Network Operators (for both electricity and gas) (DNOs) to create a price regulated, area-based approach to the roll-out driven by companies that have no direct interest in the commercial relationship between supplier and customer.

However, DECC discarded this approach at least two years ago, having reconsidered it as a result of responses to the 2009 consultation undertaken by the last government. Backed up by the Baringa Partners report (described above) and wishing to avoid the re-introduction of price controls into the metering market, DECC stuck with supplier-led model, convinced that there were additional benefits resulting from embedding the roll-out in a market assumed to be competitive

Rather than re-visit this argument, remedies outlined in this review have therefore focused on trying to ensure that the benefits of a DNO-led approach – regulated control of costs and the pass through of benefits, public trust in the process, and street-by-street roll-out – are anyway realised in the implementation programme drawn up by DECC.

5.4. DECC's limited perspective of consumer concerns in a social context

DECC's understanding of consumer concerns with respect to smart metering is developing but it still appears to have a limited perspective on: (a) how these concerns might play out within the media and society more widely during the roll-out process and thus create delivery risks, and; (b) what types of interventions (and by whom) might be required to mitigate these risks.

A good example of this limited perspective is DECC's focus in its consumer-facing activities promoting smart meters. This tends to be on the consumer benefit of being able to 'see your energy use' and respond by changing behaviours to save energy. Other beneficial features promoted by DECC include the development of a 'smart grid' and the emergence of innovative services for consumers (such as time of day tariffs, mobile phone apps to monitor energy use away from home etc).

The energy saving benefits of consumers' responding to smart meter information displays are undoubtedly the most financially valuable benefits available directly to consumers. However, there is plenty of evidence, much of it gathered by DECC and other parts of the government, that consumers are not very interested in energy saving, do not value the modest financial savings, and, in the main, are not motivated to act by either 'green' or money-saving messages.

This would suggest that DECC is promoting smart meter benefits which consumers do not recognise as such, creating a risk that consumers will simply see the costs and their other concerns about smart meters without appreciating the benefits which offset these.

Yet evidence from consumer focus groups undertaken amongst its members by *Which?*, reviews of consumer complaints to energy suppliers by Ofgem,³⁷ and experience from the smart metering programme in Sweden, suggest a much more basic potential benefit of smart meters is at the forefront of consumers' interests: **accurate bills**.

*"All members saw having accurate bills as the greatest benefit of having a smart meter."*³⁸

In Sweden, there was widespread dissatisfaction among domestic consumers about inaccurate bills and errors during switching of suppliers. In 2003 a survey showed that the tax office and customs were more popular with the public than the big three energy companies. Legislation was aimed at solving the billing issues, rather than introducing smart meters for their own sake. Legislation mandated that monthly readings for domestic customers would start in July 2009. The chosen solution – for cost reasons – was to install smart meters. Eight months after the rollout was completed, E.ON found that meter reading enquiries from customers had fallen by 70% and complaints by 60%. There are no reports from Sweden of significant consumer concerns regarding the smart meter installations, even though customers were charged an additional levy for the more accurate bills to cover the cost of the smart meter installation and operation.³⁹

This would suggest accurate bills would potentially be a far more resonant benefit to promote to consumers to support the case for smart meters. Indeed, evidence from Sweden (where there were no additional benefits associated with in-house displays since these were not provided) suggests it may be enough of a consumer benefit to trump any concerns over privacy, cost or disruption during installation.

As the roll-out of smart meters in the UK comes closer, a wide range of consumer concerns are likely to come to the fore, not least to feed media interest in developing a sense of controversy and/or conflict. Judging from experience in other parts of the world and concerns already raised in the UK, these will include: costs (and particularly impact on bills); privacy; health risks (particularly electromagnetic sensitivity); unfair impacts on vulnerable households; distrust of energy suppliers; disruption and installation problems (eg missed appointments etc).

37 See <http://www.ofgem.gov.uk/Sustainability/Cp/Cr/Documents1/Consumer%20Complaints%20Handling%20Research%20Report%202010.pdf>

38 Unpublished *Which?* focus group research on smart meters, September 2011.

39 Source: VaasaETT Global Energy Think Tank, *Evaluation of residential smart meter policies*, July 2010, Available from http://www.fydd.org/documents/ee_case_study_smart_meters.pdf. There have been some concerns raised in Sweden about unexpectedly high winter bills in the particularly cold 2009-10 winter; previously these bills would have been spread over the year on the basis of annually metered consumption. In Sweden there was no mandated provision of in-house displays linked to smart meters to enable consumers to track their own energy consumption. In the light of concerns, the Swedish government is now considering policies to develop this interactive aspect.

This is inevitable and tends to occur with any technology diffusion process. Usually the technology benefits perceived by consumers (eg mobile phone use vs mobile phone masts; digital TV services vs buying a new TV or installing a digital box) are sufficient to offset concerns and sustain the diffusion. At present, as mentioned above, consumers may not value the presented benefits with smart meters. Moreover, unlike much technology diffusion, smart metering is being mandated by the government and led by the energy suppliers, creating the potential for sustained media-friendly conflicts pitching the ‘plucky consumer’ against the ‘might of the state’ and the ‘self-serving’ energy industry. We can expect to see active campaign groups emerging, replicating approaches in California (see Figure 1 below and www.stopsmartmeters.org). These may create an impression (probably false) that the social norm is to reject rather than accept smart meters.



Figure 1: Stopsmartmeters.org activists protesting in California

DECC acknowledges the need for a communications strategy and programme on smart meters to support the roll-out. But it has yet to develop (or at least publish) the detail. It is likely that it will need to focus as much on stimulating social communication processes (potentially linked with street-by-street roll-out, promoting simple to understand benefits and user techniques, and highlighting penetration levels of successful installation and consumer engagement) as it will on central government and energy industry messaging. This will require a different approach from government to the development and delivery of a communication strategy than the centrally-driven, top-down approach typically adopted by governments of all types in the UK over the last 50 years.

5.4.1. Possible remedies to address consumer concerns effectively

A number of the other remedies outlined in this Section will help to address consumer concerns, particularly those related to data privacy and security and those related to establishing the basis for a street-by-street roll-out process. Nevertheless, it is important that DECC and the energy industry more widely develops a more sophisticated understanding of consumer concerns and potential interventions to address them. Specifically, DECC and the energy industry should:

- i. Explore the potential value of ‘bottom-up’ social communication processes to build consumer support.
- ii. Focus on the simplest, most resonant consumer benefit – accurate bills – and treat all other benefits as ‘added extras’ rather than the main event.

- iii. Establish a clear understanding of how different consumer concerns which are being identified in consumer research 'segment' across the population and the implications for how best to communicate with and engage different segments.⁴⁰
- iv. Develop their own 'anti-smart meter' campaign strategies (a) to understand how these might be established, capture media attention and secure public reaction, and (b) to test countervailing strategies to neutralise or undermine such approaches.
- v. Build a wide coalition of support, featuring principally interests from civic society who can educate their members and other communities of interest about smart meters, having understood the purpose, costs, benefits and overall value of smart meters to society and to their interests in particular.

The impact these remedies would have on the assessment carried out in Section 4 is reviewed in Section 6.

⁴⁰ From CSE's experience of communicating energy saving and climate change issues, we would suggest a value modes approach to this segmentation, rather than a more traditional socio-economic segmentation model.

6. Revised assessment following remedies

By considering how the smart metering programme would work following the application of remedies described in Section 5 above, it is now possible to revisit the assessment done in Section 4 (shown in Table 2). The results are shown in Table 3 below.

Table 3: Consumer interests assessment assuming remedies have been implemented

HIGH LEVEL CRITERIA	Consumer-oriented objective	Remedied proposals	Assessment of current plans (as from Section 4)	Assessment of 'remedied' plans (as from Section 5)
1. COST	<ul style="list-style-type: none"> Roll-out and operational costs as low as possible (given other objectives) and efficiently incurred 	Smart meter costs to be separated on bills and tariff quotes; Energy Act 2011 powers to obtain information on costs and benefits are used early and aggressively; clear and publicised plans to intervene if consumers are being 'ripped off'; mandated co-operation on street-by-street roll-out	Roll-out and operational costs largely unregulated and subject to limited competitive pressures	Roll-out and operational costs subject to limited regulatory control and/or modest competitive pressures ⁴¹
2. TRANSPARENCY and DISTRIBUTION of costs	<ul style="list-style-type: none"> Cost recovery by energy suppliers from consumers is transparent and distributed fairly across consumers (and between existing and future consumers) 	As above	Limited monitoring and reporting of supplier and system costs (but no requirement on suppliers to reveal how costs recovered)	Supplier and system costs monitored and reported routinely and suppliers required to show how costs feature in bills/tariffs

⁴¹ This assessment could potentially shift to GREEN if the street-by-street approach was mandated and interventions explicitly encouraged comparisons between energy supplier smart meter offerings and tariffs by neighbours

HIGH LEVEL CRITERIA	Consumer-oriented objective	Remedied proposals	Assessment of current plans (as from Section 4)	Assessment of 'remedied' plans (as from Section 5)
3. CONFIDENCE-INSPIRING ROLL-OUT	<ul style="list-style-type: none"> Meter roll-out programme is trustworthy and confidence inspiring (addressing consumer concerns and avoiding costly hold ups) 	Street-by-street roll-out approach creates de-commercialised process of common purpose and interest, fit for funded localised interventions; communications strategy informed by full understanding of consumer concerns and how to alleviate them and core focus on 'accurate bills' as most resonant benefit; energy suppliers explicitly being controlled in their smart meter role by DECC and Ofgem.	Roll-out programme designed with some funded interventions to raise awareness and regulatory controls to discourage (though not necessarily prevent) poor delivery practice	Roll-out programme designed to build trust by relying on trusted intermediaries and funded supporting interventions and information to sustain confidence.
4. CONFIDENCE-INSPIRING OPERATION	<ul style="list-style-type: none"> Robust, secure and confidence-inspiring operations (once installed) 	Data privacy and system security a strong focus of programme design but detailed security risk mitigation plan still to be developed. Explicit harsh penalties for breaches. Clear communication strategy focused on countering 'spy in the home' myth.	High quality data security systems established across industry but limited thinking about how industry as a whole manages any breaches or problems to maintain consumer confidence	High quality data security systems established across industry but limited thinking about how industry as a whole manages any breaches or problems to maintain consumer confidence ⁴²
5. INFORMATIONAL BENEFITS	<ul style="list-style-type: none"> Full realisation of the informational benefits of smart meters for consumers through effective data provision and consumer-friendly interfaces 	Specify consumer-friendly in-home displays and require installation. Street-by-street roll-out enables localised interventions to support understanding and interpretation of data and encourage response	In home displays specified for good consumer information and delivered well in installed devices on basis of quality consumer research. Some opportunities for supportive interventions by third parties	In-home energy consumption information clear and timely, with wide range of opportunities for supportive interventions by third parties to encourage and enable consumer response (including tariff and supplier switching as well as energy saving behaviour change and appliance control integration)

42 Post-remedy assessment on 'Confidence inspiring operation' has improved because remedied approach has more explicit and harsh penalties and communications strategy should be more focused on consumer concerns. But without security risk mitigation plan, overall assessment is that it has not yet reached GREEN standard "Data systems established with high levels of security embedded across system and quick and decisive responses to suspected breaches or problems based on co-ordinated approach."

HIGH LEVEL CRITERIA	Consumer-oriented objective	Remedied proposals	Assessment of current plans (as from Section 4)	Assessment of 'remedied' plans (as from Section 5)
6. ENERGY SYSTEM BENEFITS	<ul style="list-style-type: none"> Enabling of new services which can benefit the energy system as whole and offer individual consumer benefits and choice (e.g. demand response and load shifting through time-of-day tariffs etc) 	Allow the market to develop and ensure access to data (with consumer consent) by third parties to enable innovative services and stronger competition. Take widest possible perspective of data needs of licensed players to perform 'regulatory duties'. Reduce apparent lead role of energy suppliers through use of more commercially neutral street-by-street roll-out.	Range of new services and offerings emerging, though with unclear benefits and limited appeal due to complexity, unclear rationale (e.g. not clear why offered) and/or limited market choice (e.g. energy supplier only)	Range of new services and offerings emerging, though with unclear benefits and limited appeal due to complexity, unclear rationale (e.g. not clear why offered) and/or limited market choice (e.g. energy supplier only) ⁴³
7. CONSUMERS' SHARE OF SYSTEM BENEFITS	<ul style="list-style-type: none"> Benefits accruing to suppliers and others in the 'system' as a result of smart meter programme are shared fairly with consumers 	Energy Act 2011 powers used early and aggressively to obtain information on costs and benefits, with clear plans to intervene if benefits not being passed through in tariffs. Clear and publicised plans to intervene if consumers are being ripped off.	Monitoring and reporting of system benefits but assumed that 'competitive market' will deliver share to consumers	Strong regulatory approach to monitoring and capturing scale and nature of system benefits, with interventions planned to address any failures to share with consumers

43 Post-remedy assessment on 'Energy System Benefit' has improved due to likelihood that street-by-street roll-out will reduce dominance of suppliers and consumer perception that they 'own the meter', thus enabling market entry for more third party services. However, this is not judged to be sufficiently developed to be confident of GREEN standard: "Wide range of easy-to-understand services from range of providers, with clear and appealing benefits to consumers and explicit system benefits"

7. Conclusions and recommendations

This review of the currently proposed UK smart metering programme through the lens of the interests of existing and future consumers suggests there is a meaningful risk – in terms of both high probability and high impact - that the programme will fail consumers.

Within this assessment, the single most concerning aspect – and the one area where the assessment scored **RED** – is the reliance of DECC on competitive pressures in the energy supply market to control costs and ensure consumers receive their share of the significant benefits of smart meters which will accrue to energy suppliers. The evidence is that these pressures are weak.

Without remedy, the programme may run into deployment problems as a result of increasing consumer resistance. Alternatively, without remedy the programme may fail to deliver a full share of its benefits to consumers, instead enabling energy suppliers and others in the energy market to gain at the expense of consumers.

The review has considered four areas where remedies are needed to increase the probability that the smart metering programme will be a success for consumers:

- controlling costs and the pass-through of benefits;
- managing data privacy and security concerns while meeting system data needs;
- ensuring a street-by-street roll-out to increase consumer engagement, improve cost-effectiveness and enhance competition between suppliers on their smart meter offerings;
- understanding consumer concerns and developing interventions to assuage them.

These remedies are described in more detail in Section 5 above and summarised below. They are principally actions for DECC and Ofgem and, where relevant, responsible consumer advocates.

Controlling costs and the pass through of benefits

- i. Require that the metering costs are separated out on consumer bills and tariff quotes so that consumers have an opportunity to see directly what they are paying and how it varies across energy suppliers.
- ii. Use early, transparently and aggressively its new powers under the Energy Act 2011 to obtain information from energy suppliers so that the costs and benefits and the efficiency of delivery can be evaluated.
- iii. Have explicit plans to intervene to protect consumers in the event of evidence of consumer detriment, including threat of fines and compensation payments.
- iv. Stop assuming and publicly stating that competition in energy supply markets will be sufficiently strong to keep costs to consumers as low as possible and instead be explicit about the steps which will be taken to ensure that consumers will not get 'ripped off'.

Managing data privacy and security concerns

- v. Make public quickly and consistently the fact that a smart meter cannot act as a 'spy in the home' in any meaningful use of that phrase, and develop a communications and media strategy to reinforce this message.
- vi. Put in place (and publicise) very harsh penalties on energy suppliers or other parties in the smart metering system for breach of data privacy.

- vii. Emphasise the benefits of smart meters, most particularly the benefit most resonant for consumers: accurate bills.
- viii. Take the most generous possible perspective on what does, or might in future, constitute a regulatory duty for licensed players in the energy market.
- ix. Ensure that all aspects of the energy market (including trading and settlement) are using smart meter data in ways which maximise potential net benefits to consumers.

Delivering a cost-effective, community-engaging, competition-enhancing, street-by-street roll-out

- x. Mandate energy suppliers to work in co-operation to procure and commission a national street-by-street roll-out process where all households in each neighbourhood are involved in a common enterprise on a common basis over the same period of time.
- xi. Develop a funded programme of interventions to maximise the value for consumers of street-by-street roll-out and ensure it addresses consumer concerns and enhances competitive comparisons between supplier offerings.

Understanding consumer concerns and developing interventions to ensure they are assuaged

- xii. Explore the potential value of ‘bottom-up’ social communication processes to build consumer support.
- xiii. Focus on the simplest, most resonant consumer benefit – accurate bills – and treat all other benefits as ‘added extras’ rather than the main event.
- xiv. Establish a clear understanding of how different consumer concerns which are being identified in consumer research ‘segment’ across the population and the implications for how best to communicate with and engage different segments.
- xv. Develop their own ‘anti-smart meter’ campaign strategies (a) to understand how these might be established, capture media attention and secure public reaction, and (b) to test countervailing strategies to neutralise or undermine such approaches.

The positive impact on consumer interests of applying these remedies to the current plan is summarised in Table 4 below.⁴⁴ The remedies both reduce the risk of that the programme will fail to meet the interests of consumers and enhance the likelihood that the roll-out will be completed successfully.

Table 4: Summary of consumer interest assessments showing the impact of remedies on current plans

HIGH LEVEL CRITERIA	Consumer-oriented objective	Current plans	Remedied plans
8. COST	<ul style="list-style-type: none"> • Roll-out and operational costs as low as possible (given other objectives) and efficiently incurred 		
9. TRANSPARENCY and DISTRIBUTION of costs	<ul style="list-style-type: none"> • Cost recovery by energy suppliers from consumers is transparent and distributed fairly across consumers 		
10. CONFIDENCE-INSPIRING ROLL-OUT	<ul style="list-style-type: none"> • Meter roll-out programme is trustworthy and confidence inspiring 		
11. CONFIDENCE-INSPIRING OPERATION	<ul style="list-style-type: none"> • Robust, secure and confidence-inspiring operations (once installed) 		
12. INFORMATIONAL BENEFITS	<ul style="list-style-type: none"> • Full realisation of the informational benefits of smart meters for consumers 		
13. ENERGY SYSTEM BENEFITS	<ul style="list-style-type: none"> • Enabling of new services which benefit the energy system as whole and offer consumer benefits and choice 		
14. CONSUMERS’ SHARE OF SYSTEM BENEFITS	<ul style="list-style-type: none"> • Benefits of smart meters accruing to suppliers and others in the ‘system’ are shared fairly with consumers 		

⁴⁴ Footnotes 41 to 43 suggest how the post-remedy AMBER assessments could potentially improve to GREEN

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