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Department of Energy and Climate Change

Preparations for the roll-out of smart meters

Summary

Introduction

1 On 30 March 2011, following the completion of the first phase of its smart metering programme, the Department of Energy and Climate Change (the Department) published its plans for installing 'smart' electricity and gas meters in all homes and smaller non-domestic premises in Great Britain by 2019. Smart meters, together with real time in-home displays, can provide consumers with detailed information on their energy use and access to a wide range of off-peak tariffs. Smart meters also allow suppliers to collect meter readings electronically, provide more accurate bills and cut costs. In the longer term, the Department expects smart meters to facilitate the development of smart electricity grids, which could allow the operators of electricity transmission and distribution networks to better manage supply and demand. In due course, the aim of smart meters and smart grids is to support reduced energy use and the maximisation of the use of low carbon energy to support the achievement of national statutory carbon budgets.

2 The roll-out of smart meters is a major national programme that will involve meter installers visiting every home and most smaller non-domestic premises in Great Britain, and the replacement of around 53 million gas and electricity meters. The Department has established a smart metering programme to oversee the creation of an organisational and regulatory framework for the roll-out. The Department is not contracting for the supply and operation of the smart metering system itself, but will place obligations on energy suppliers to supply their customers with smart meters.

3 All member states are required under European Directives to roll-out 'intelligent metering systems' to at least 80 per cent of domestic electricity consumers following an assessment of costs and benefits; and to consider the cost and timetable for installing intelligent gas metering. The Department estimates that installing smart electricity and gas meters with in-home displays will cost £11.3 billion and deliver economic benefits totalling £18.6 billion between 2011 and 2030, so achieving a discounted net present benefit of £7.3 billion. Public expenditure on smart meters will be limited to the cost of programme management and consumer engagement work. The cost of manufacturing, installing and operating the smart metering system will be determined by energy suppliers and their contractors, and the Department expects the cost and cost savings to be passed down to customers through their energy bills.

4 This report provides an early assessment of the Department's progress in preparing for the mass roll-out of smart meters and the risks to securing value for money for taxpayers and consumers. We examined the Department's management of Phase 1 of the programme, completed in March 2011, through which it developed its overall strategy for mandating the roll-out of smart meters from 2014, after the completion of the next 'foundation' stage and completing it across Britain by 2019. We also examined the Department's approach to technical design and managing the costs and benefits of the programme.

Key findings

5 The Department is developing a Government-mandated, comprehensive, electricity and gas smart metering programme, which goes beyond the EU's minimum requirements, on the strength of its cost-benefit work. It estimates the programme will deliver efficiency savings to energy suppliers; and enable energy consumers to change and reduce their energy use, resulting in savings on their bills and environmental benefits. There is, however, uncertainty over how much, and for how long, consumers will change their energy use and therefore whether the benefits will be fully realised. The Department's assessment that consumers with smart meters will annually use 2.8 per cent less electricity and 2 per cent less gas than consumers who do not have smart meters is based on estimates contained in a 2008 review of trials and international experiences, but is also informed by more recent reviews. International experiences indicate that greater reductions are possible, but may not be relevant to Great Britain due to differences in climates and cultures of energy use, and evidence on sustained behaviour change is limited. Trials of smart metering in Great Britain, which the Department and its predecessors co-funded, in part to improve the reliability of its estimates, identified reductions in demand of between 2 and 4 per cent in those trials that were statistically reliable. The results do not relate to a nationally representative sample of households and so provide limited further support for the Department's forecasts, but they have nevertheless generated useful findings, such as the effectiveness of different types of interventions, to inform the development of the programme.

6 The costs of the installation of smart meters in every home and the associated communications technology will be borne by energy suppliers and the Department expects the cost and the cost savings to be passed down to their customers. The Department's most recent estimate is that the smart metering system will cost £11.3 billion to deliver. The Department 's estimate includes adjustments for optimism bias of between 10 and 15 per cent for individual components, reflecting its assessment of project specific costs and risks. As would be expected for a large programme, the Department has sought further cost information during the planning phase and revised its estimate of the total cost of the smart metering programme. The Department followed HM Treasury guidance to set optimism bias levels using project-specific information and based its provision on its assessment that it now has a good understanding of the likely cost of the system. HM Treasury guidance cites that cost escalation in projects involving the manufacture of equipment or development of information and communications technology has historically ranged from 10 per cent to 200 per cent.

7 The Department expects smart meters to help the average dual fuel customer to save £23 a year by 2020, if they change their energy use in line with the Department's estimates. This overall benefit depends on suppliers minimising costs and passing on all their efficiency savings through their prices. The Department considers competition among suppliers gives them commercial incentives to deliver the lowest cost solution for consumers, and the Office of the Gas and Electricity Markets (Ofgem) is currently considering possible actions to strengthen competition in energy markets following the completion of its review of retail energy markets. The powers the Department is seeking in the Energy Bill 2011 to obtain information from suppliers will help it to monitor and evaluate the efficiency and effectiveness of the smart meter roll-out.

Findings on planning to date

8 Through Phase 1, the Department has developed its overall approach to installing smart meters, but now faces the considerably more challenging tasks of preparing detailed plans and delivering them. The Department has invested a considerable amount of time in consulting with industry and consumer groups, and developing the standard functions that smart meters will provide, the roll-out timetable and its approach to establishing the data and communications infrastructure. It has now provided certainty on its timetable and overall approach, which should help suppliers prepare for the roll-out. However, it has further to go to convert this into detailed delivery plans for achieving a major programme of complex and high-risk technical, regulatory and behaviour change projects to allow roll-out to start in 2014 and to deliver the benefits identified in its outline business case.

9 The Department's planning and budgeting for Phase 1 were initially insufficient to support clear monitoring and accountability. The Department outsourced the management of Phase 1 to Ofgem in July 2009. At this stage the commitment was to publish in July 2010 a 'Prospectus', setting out the overall framework for the smart metering implementation. The Department's initial agreement with Ofgem did not clearly define deliverables, priorities or how Ofgem's performance would be measured. It also did not set a budget for this Phase, but set annual budgets. As the scoping of the programme evolved and the Department gained a better understanding of the complexities, it agreed more detailed plans in April 2010 and entered an agreement with Ofgem in July 2010 that set out a budget and deliverables for an additional Phase (Phase 1a) with an expected completion date of January 2011. The Department published the Prospectus in July 2010 and completed this Phase in March 2011, by which time it had spent a total of £11.2 million on the programme, coming within its overall annual budget.

10 The Department has decided to manage the smart metering programme itself and is taking steps to strengthen its resources and approach. The Department is building its new programme management team that will have an average of around 100 full-time equivalent staff from 2011-12 to 2014-15. The Department's latest estimate of the programme budget, covering programme management and consumer engagement, is £56 million for the period 2011-12 to 2014-15. It has further work to do to develop a detailed delivery plan for the next phase of the programme and it has not set a budget for the programme beyond the current spending review period.

Findings on the remaining delivery challenges

Delivering an appropriate, safe and secure technology solution that is adaptable to change

11 The Department is responsible for decisions on technical standards for the smart metering system and uses a series of industry and expert groups to develop proposals for design and technology solutions. The Department did not have a design authority to oversee the industry working groups during Phase 1, but has established one for the foundation stage to take overall responsibility for system design and security and to maintain the ongoing voluntary participation of industry.

12 There is very little time contingency to address the risk that design approvals, procurement and testing take longer than planned, adding to costs and delaying achievement of benefits. The Department intends to finalise its draft technical specification in January 2012. In response to stakeholders' views, the Department has allowed more time to establish the communications system by deciding to start mandated roll-out of smart meters in 2014 rather than 2012 as proposed in its 2010 public consultation. It has still to develop a specification for the national communications network to which each meter must connect.

13 The system will need sufficient flexibility to minimise the risk of future obsolescence, and it may need to change to meet smart electricity grids requirements. The Department has assumed that smart meters will have a 15-year life. However, future technology developments, including smart grids could potentially change the requirements for the meter specification and the data and communications systems within a shorter timeframe. The Department has built some flexibility into its design requirements to address obsolescence risk and recognises the need to align the programme with its evolving plans for smart grids.

14 Concerns about possible security risks, on which the wider public has not yet been seriously engaged, could potentially delay or stop the programme. Collecting detailed energy consumption data from every household and transferring it to suppliers or other authorised parties through a central communications network creates risks of accidental release or theft of data, as well as cyber-attacks. The Department is developing plans for managing smart meter data access and privacy, has asked industry to establish a supporting Privacy Charter and has developed an initial security impact assessment, but more work is required on security before roll-out starts. A number of respondents to the Department's consultation also expressed concerns about perceived health impacts of installing wireless smart meter networks. The smart metering equipment will be subject to the standard requirements for wireless communications technologies and the Department plans to continue consulting the Department of Health on these perceived concerns.

Reducing uncertainty in the savings estimates

15 The Department has still to develop its benefits realisation plans and consumer engagement strategy. Since October 2010, the smart meter programme has been working with the Central Office of Information to develop a framework for behaviour change to inform its consumer engagement and benefits realisation plans. It has assumed in its cost benefits modelling that marketing and consumer engagement will cost £100 million. To inform its plans, the Department intends to work with suppliers to trial approaches and learn lessons from the initial roll-out of smart meters before mass roll-out starts in 2014.

Understanding the costs and benefits for consumers

16 The Government decided at an early stage that smart electricity and gas meters should be rolled-out to all consumers. The costs and benefits to consumers will vary between households and further work is needed to assess the impact of the smart metering programme on vulnerable consumers. The Department expects that the roll-out of smart meters will result in a wider range of tariffs. Some evidence from trials carried out in the United States indicates that time-of-use tariffs are potentially beneficial for consumers on low incomes. However, research commissioned by Ofgem suggests that vulnerable customers generally had little understanding of tariffs and are more likely to make inappropriate decisions regarding suppliers or tariffs. Lower levels of uptake among low-income or vulnerable groups would result in the costs and benefits being unevenly distributed, but the Department has yet to assess the potential impacts and whether specific action will be required to address distributional issues.

Conclusion on value for money

17 The roll-out of Smart Meters is a large complex programme. The Department expects that it will deliver reductions in energy use, efficiency savings and environmental benefits totalling £18.6 billion over the period to 2030, and that it will support the realisation of as yet unquantified benefits from smart grids in the future. The Department estimates the programme will cost £11.3 billion. In March 2011 the Department published its implementation strategy for the roll-out of smart meters.

18 On the basis of this early assessment of the Department's progress we conclude that the Department initially underestimated what would be required to deliver the first phase of the programme and that its early planning and budgeting during this phase were insufficient to support monitoring and accountability. The plans for the programme so far are not as well developed as originally intended in some areas, notably consumer engagement and benefits realisation. The Department did, however, invest a good deal of effort during this phase in developing the standard functions that smart meters will provide, its approach to establishing the data and communications infrastructure and it has now provided certainty on the overall timetable for the roll-out. The development phase of the programme, which cost £11.2 million, did not demonstrate full value for money. For a programme of this complexity it is vitally important to invest in strong planning. The Department is strengthening programme management.

19 To achieve value for money in the future, the Department needs to develop further its plans to address the substantial risks in the programme. In particular, there is uncertainty over consumer benefits, which arises because international experiences and domestic trials together provide limited evidence to support particular assumptions about how much and for how long consumer behaviour will change. There is also the risk that costs increase more than the Department has provided for; major technical and logistical challenges to delivering a fit-for-purpose and secure system; and a risk that suppliers do not pass on all the net savings to their customers. The Department must commit to keeping its estimates of costs and benefits under review and provide clear decision points at which it will judge whether to progress with the programme as originally designed or to make changes to protect public value.

Recommendations

a **Smart metering involves a complex mix of technology, regulatory and behaviour change projects and strong programme management is required to ensure that all the projects come together to realise the benefits.** The Department should identify more precisely the critical paths and review points for updating costs, ensuring a secure system and reassessing options before taking decisions that may be irreversible.

b **The rapid pace of technological change could potentially render some smart metering technology obsolescent during the life of the programme.** The Department should build sufficient flexibility and clearly-defined review points into the programme, particularly in relation to the data and communications services contracts. Doing this will allow the use of newer technology where it is cost-effective to do so.

c **The Department does not yet have a clear offering for consumers to encourage them to engage with smart metering technology and reduce their energy consumption.** The Department should develop its draft benefits realisation strategy and consumer engagement plan as a priority. It should also develop a clear plan with suppliers for further trialling of smart meters during the foundation stage to ensure valuable experience is obtained and the lessons captured, in order to inform the strategy.

d **The net benefits of the programme will be delivered by suppliers through their roll-out programmes and the Department is seeking powers to obtain information from suppliers for monitoring and evaluation of the efficiency and effectiveness of their roll-out.** The Department should determine the criteria it will use to evaluate whether suppliers are delivering smart meters efficiently and effectively. It should regularly review suppliers' progress in installing smart meters and whether there is a need for additional changes to suppliers' licence conditions to secure cost-effective completion of the roll-out and value for consumers.

e **Smart meters are intended in part to support new tariffs that encourage consumers to use energy when it is cheaper, but vulnerable groups may not take advantage of this potential benefit.** During the foundation stage, the Department should research the extent to which different socio-economic groups are likely to secure the benefits of new smart meter tariffs. It should then consider whether targeted assistance is required to prevent certain groups bearing the costs, but not obtaining the benefits of smart meters.