DEPARTMENT OF ENERGY & CLIMATE CHANGE

Smart Metering Implementation Programme:

A call for evidence on privacy and data access (August 2011)

IBM Response to Consultation

13th October 2011

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1 Introduction

IBM United Kingdom Ltd is pleased to respond to the questions raised in the 'DECC call for evidence on privacy and data access' dated August 2011, although we have limited our response to those questions for which we have a relevant point of view.

IBM has established itself as a global leader in the planning, implementation and operation of Smart Metering technology, successful in over 80 different Smart Metering programmes totalling over 80 million Smart Meters. We hope to bring the benefit of this wide experience from our many clients around the world and the different smart metering technologies that we have deployed to the benefit of the Smart Metering Implementation Programme.

We have played a lead role in many second generation programmes, including (amongst others) Southern California Edison, Oncor, CenterPoint Energy, ASM Brescia, ESB Networks and Oxxio. In the UK, we have been active in shaping the future of Smart Metering, participating in DECC consultations, the definition of the smart metering market model and advising, shaping and defining smart metering programmes for 3 of the "big 6" energy retailers in the UK.

We are pleased to continue with our contribution to the development of Smart Metering in Great Britain, drawing upon our UK and global experience to inform our views in response to the key aspects of this DECC SMIP consultation, including:Consumer attitudes to data privacy and security;

- Theft management;
- Use of anonymised, and aggregated data; and
- Further points to focus on during the Foundation Stage

In summary, our responses to the specific questions posed by the consultation highlight the following key themes:

- The benefits of extended access to, and analysis of Smart Metering data need to be clearly advertised to all stakeholders including consumers, which in turn will allow the industry to maximise potential benefits for all parties as a result;
- Standards around how Smart Metering data can be accessed securely, and how it is held to name but two examples are required at the earliest opportunity; and
- The need for the Foundation Stage to include work to further understand consumer attitudes around use of their data, and security solutions as a priority.

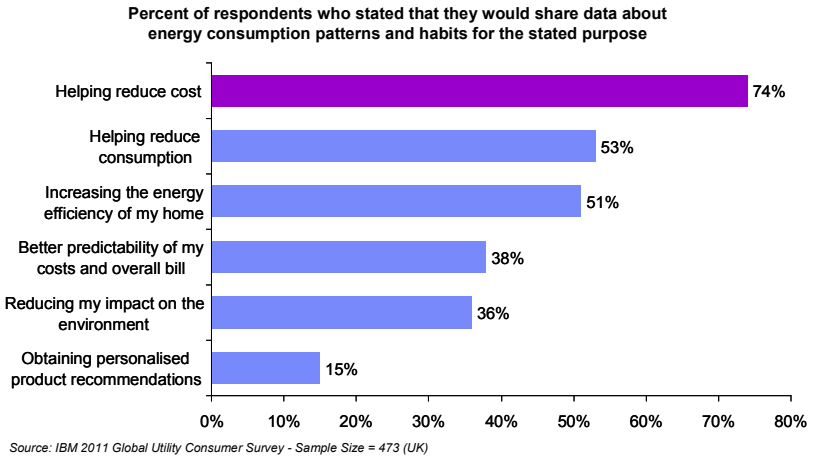
2 Responses to Consultation Questions

Q1: Please submit any further evidence, such as surveys or consumer research, regarding privacy issues and smart metering. In particular is there evidence available about the effects of the availability and aggregation levels of more granular data (for example daily)?

During 2010, IBM conducted its third global Energy and Utilities consumer survey. 8,118 consumers across 17 countries were surveyed, 473 of those from the UK. One of the areas of focus for the survey was security and privacy.

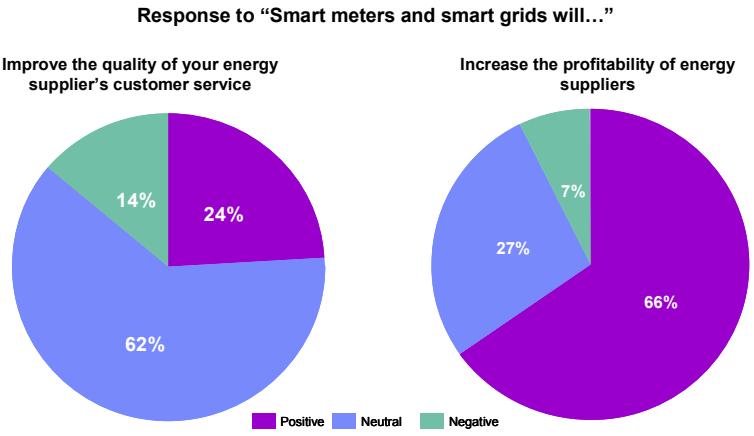
The survey found that 20% of UK respondents were concerned that Smart Metering would pose a risk to their security and privacy. Whilst this represents a significant minority, UK respondents were the least concerned of all of the 17 countries surveyed.

The survey found that 83% of the UK respondents were willing to share their information with suppliers, whilst 58% were willing to share there information with 3rd parties. In return for granting access to their data, consumers do expect to receive something in return. Receiving help from suppliers to reduce the cost of their household consumption was at the top of their list. We conclude from this, that the benefits to consumers must be clear to ensure consumers opt in, and continue to allow access to data.

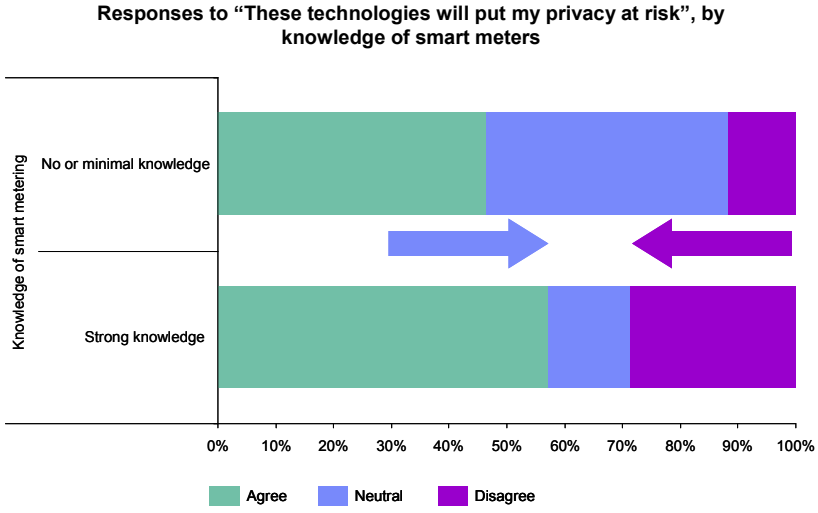


Source: IBM 2011 Global Utility Consumer Survey - Sample Size = 473 (UK)

When asked about specific benefits or concerns currently noted about smart metering programs, 40 - 50% do not yet have an opinion of whether these benefits or concerns are for them. Many however, believe the benefits will be with suppliers. Only 38% believe that Smart Metering will reduce the cost of their household energy bill, and even less, 29%, agreed that it would lower the impact on the environment.



An interesting point to note from the survey was that higher levels of knowledge amongst consumers strongly correlated with an increased belief that Smart Metering will bring benefits. More understanding and awareness also leads to a higher likelihood that new behaviours will be adopted. However, more questions are generated by consumers about energy data privacy as consumers become more knowledgeable. Once consumers are educated, they cease to be 'neutral' about issues such as data privacy. This creates more consumers who see there to be a low risk, but also more that perceive a high risk.



From analysing the overall outputs from the survey, we conclude that consumers who do not strongly feel that their privacy will be compromised by smart meters are more likely to share their data if there is evidence that controls are in place, and that there are benefits for them. This behaviour can be observed across other industries. People do not want to compromise their privacy but are willing to trade some privacy for clear benefits (e.g. credit cards, the internet, mobile phones, online banking). Concerns must be addressed, and real privacy risks minimised, but it is likely that robust and well-communicated safeguards will be sufficient. Seeking to eradicate privacy risk entirely, is neither possible nor necessary.

Q2: To what extent would different rules for access to data between suppliers and third parties be expected to impact on the development of an energy services market (in terms of product and tariff innovation and / or entry to the energy market by third parties)? What are the particular data uses to which these concerns apply?

We suggest DECC needs to ensure that current prevailing industry assumptions, philosophies, and approaches which are backed by the regulation frameworks, do not preclude innovative new mechanisms, products and services in the future. From this point of view, regulations need to be compartmentalised so that certain market functions are regulated appropriately, but new players can create new composite products and services in a way which maintains the privacy and security of personal data, but which is not hamstrung by the inertia of our existing traditional systems.

Just some of the ways data could be used are outlined as follows:

- Dramatically increasing the flexibility of switching;
- Allowing an intelligent, and interconnected property to bid into the energy market on an hourly basis for the energy it requires (for the things it needs to do e.g. washing, heating, charging of electric vehicles, etc.);
- Support of demand-side management is an obvious area - getting beneficial energy prices for doing things outside points of peak demand;
- Proactively rewarding consumers financially for using power outside points of peak demand; and
- Comparison of behaviour between households, to inform best practices.

We note that this data can be anonymised, but against profile information. We also note that thinking around how this data is held, and accessed in terms of the 'thickness' of the DCC for example, needs to be considered in line with the answers to this question, as does the cost of accessing data, and the infrastructure on which it is supported, which by definition will impact the ability to enter the market and innovate within it as required.

Q5: Should theft management be considered a regulated duty for which suppliers should have access to a certain level of smart metering data? What level of data would be required and how would this be used to manage theft? Please provide practical examples.

We agree with the point posed in this question. Suppliers (or the NRPS if the ongoing gas theft consultation changes theft responsibilities) should have access to Smart Metering data for the purposes of theft detection and investigation.

To this end, a set of approved data points should be created, including most data generated by meters, for example interval consumption data can be used for trend analysis and comparisons, meter event and alarm data can be used to spot tampers immediately, and power quality data can be used to detect abnormal loads. Such data makes it possible to identify more instances of theft, more accurately, and in a timelier manner.

Aside from theft management at recognised delivery points (i.e. meters), Smart Metering data can also be integrated with Smart Grid data as the grid matures, to identify where there may be theft at other points throughout the network.

We also believe it is important to distinguish at a more practical level between raw theft and theft by fraud. The solutions are likely to be quite different. The former is a question of looking at flows, and detecting anomalies and patterns, whereas the latter starts to

triangulate customer, utility and potentially third-parties data, as per fraud detection around eg financial trading or insurance scams. This differentiation needs to be considered when discussing the scope of regulated duties of each stakeholder, and also in terms of data access requirements to support this.

Q6: Does data need to be collected from all customers all of the time, for theft management, or could there be a trigger for accessing more detailed data (for example where theft is suspected)?

We believe data should be collected from all customers all of the time, for the purposes of theft management. The availability of a full dataset for the purposes of theft detection will make it possible to identify more instances of theft, more accurately, and in a timely manner. For example, a wide dataset enables approaches such as clustering, and trending to be performed to detect sites with anomalous consumption.

We suspect data privacy, and how much visibility is needed at the outset, is as big a topic here as the types of sampling. With regard to anomalies and patterns in electricity flows, then there is no need for customer details up front - but is necessary if theft is suspected, and needs investigating. For fraud checks, data about the customer clearly is then even more relevant at an earlier stage.

On sampling - we suggest the need to be clear between a sampling based approach that will only ever find a proportion of thefts, and sampling that is directed by probabilistic algorithms, and an analytic approach which will assess all data in increasing layers of depth and complexity of analysis. The analytics approach will be much more successful.

We suggest that the industry looks at distinguishing between analytics to get to the reasonable certainty that theft is happening / has happened with proof supplied by investigation, and proof being supplied by the analytics with corroborating evidence provided by investigation. This could be presented in terms of levels of confidence as part of a common language for the industry to use as regards theft management.

Q7: What level of take-up of time-of-use tariffs could be expected under different scenarios for access to data? What information is needed to design time of use tariffs? In particular would sample or anonymised data be sufficient?

It is our view that actual half hourly data is needed to ensure the most effective design of tariffs, and to deliver the greatest benefit to customers. This data could be anonymised for designing the tariffs alone, provided you are not designing individually tailored tariffs. In essence the focus of the question should also cover other needs for the data.'

In terms of whether data can be anonymised, as per our response to question 1, our survey shows that customers expect to receive benefits in return for sharing their data. In order to promote the use of a tariff effectively, the consumer needs to be able to understand it, which requires data at the same granularity as the tariff interval / modelling. This needs to be customer specific. As an extension of this, to be able to effectively model the savings that could be gained by a customer on an alternative tariff, data needs to be obtained at a level of granularity to fit with the variations of tariff structures; half hourly data is needed to facilitate this. An alternative, which we suggest to be less effective, could be to model a tariff for a customer segment, which could be done using anonymised Smart Metering data. To summarise, a sampling of anonymised data would be fit for purpose, but to best test the tariffs against individual customers, and ensure maximum benefit for them, actual data is needed at a granular level.

Specifically in response to the question regarding what data is needed, we need to be sure what problem needs to be solved, and what benefit will be realised from its

resolution. For example, if the intent is static demand shift (i.e. driven by discrete customer choice based on the tariff, but not dynamically based on the state of the supply), then half hourly data is sufficient. However, for tariffs that are attempting to balance dynamically by changing supply and demand conditions (e.g. modifying EV charging, or accommodating variable wind generation) in a Smart Grid context, then data at an even finer granularity, provided near real-time is needed. We suggest this data needs to be customer-specific as per the points above.

Q 12: How could smart metering data be used to identify and protect vulnerable consumers? Should such activity be considered a regulated duty and are any licence changes needed to create particular duties on suppliers in this area?

Our response focuses purely on those in Fuel Poverty. In late 2011, IBM launched the 'Smarter Cities Challenge', a competitive grant lead programme to enable up to 100 cities around the world to become more vibrant and hospitable places for those that live within them. Glasgow was selected as one of these locations, with a particular focus on Fuel Poverty, and how this can be dealt with. The conclusions are applicable to all other parts of the UK, and also globally.

Conclusions, due to be published in full over the coming months, suggest that instead of looking to alleviate Fuel Poverty as per the agreed definition, the city instead should concentrate on a concept of 'Affordable Warmth', by broadening 'the problem' past disposable income versus the cost of energy, also encompassing other social, and economic data such as that on the buildings people live in, employment statistics, environmental costs, and levels of 'energy literacy' to name but four examples. The study argues that by following this more holistic approach to providing Affordable Warmth for consumers alongside other factors that affect quality of life, levels of Fuel Poverty by definition can be tackled from multiple angles as part of a wider drive to provide a more sustainable future for city residents. This approach also represents a proactive approach that lowers numbers falling into Fuel Poverty, instead of solely dealing with those within it reactively.

On a more practical level, those in Fuel Poverty could benefit from a combination of more targeted programmes to improve insulation in their homes; better education around how to efficiently use energy; and initiatives to increase income, which in turn would take them away from Fuel Poverty as we currently understand it.

With specific reference to the question posed, the solutions discussed would require the industry, and specifically suppliers and / or DCC to share consumption data, and information derived from it more readily with external bodies such as local government agencies, property management organisations, and the range of other stakeholders with the ability to practically enable Affordable Warmth for this to become a reality. We suggest this should be incorporated into national energy policy, and implemented throughout the legal governance framework, including not only who is allowed access to consumption data, but also who is responsible for collation / provision of it in the forms required, and what other data it can be analysed alongside, including to what end this analysis is required.

Q13: Do you consider that use of data by network companies to support them in maintaining an efficient and economic network should be considered a regulated duty?

We suggest Smart Metering data, including energy consumption and power quality data, will play an important role in the development of a Smart Grid, which in turn, will help network operators plan, and operate their system more reliably, efficiently and securely.

Examples of such uses of Smart Metering data include:

- Network planning, including assessing the impact of new demand / generation, and understanding voltage quality issues;
- Network management, including controlling voltage and power flows, and system balancing;
- Outage management, identifying premises that are off supply, and verifying restoration; and
- Safety. For example detecting crossed polarity, or re-establishing gas supply following network failure.

Based on this we support the use of Smart Metering data by network companies should be considered a regulated duty – subject to a more detailed assessment of the types of data, and level of detail (e.g. monthly, daily, or half-hourly consumption data) to demonstrate that achievement of these benefits would be adversely affected if consumers were able to opt out.

The privacy framework should be flexible enough to accommodate changes in the level of detail likely to be required as the Smart Grid matures. For example, in the short-term, data is likely to be used mainly for network planning purposes. However, in the longer term, as the penetration of electric vehicles and heating increases, more frequent (near real time) data will be needed to support demand response services, and network management.

We expect that the DCC will have a key role to play in ensuring that network operators have access only to data that is required to fulfil their regulated duties.

Q14: Do you agree with the requirement for such data to be anonymised or aggregated wherever possible, and how should this be monitored?

An appropriate balance needs to be struck between the need to protect consumer privacy, and the need to ensure that the benefits gained from the dissemination of Smart Metering data are realised. The appropriate level of aggregation / anonymisation is therefore likely to vary according to the type of Smart Metering data, and how it is to be used.

Furthermore, the appropriate level of aggregation / anonymisation will change over time. In the short-term, when the focus is likely to be on more effective network planning, aggregated energy consumption data (e.g. at LV transformer level) is likely to be sufficient. But in the longer-term, more granular data is likely to be needed to support more advanced Smart Grid functionality, such as demand response services.

As set out in our response to question 14, we believe that the DCC is likely to have a key role to play in controlling, and monitoring the level of aggregation / anonymisation of data used by network operators.

Q18: What current and future technical options exist for energy consumption data minimisation / privacy enhancing technologies? How might aggregated or anonymised data be provided in practice? Would this imply additional services to be provided by DCC?

There are techniques such as Tokenisation - where key data elements in a record are given a reference number that can only be looked up by certain parties. Reference tables will need to be tightly controlled if using this technique.

IBM is developing software solutions to address anonymisation of data. One example is IBM's Optim Integrated Data Management product that provides industry leading solutions for anonymising data for testing purposes. More information is available via the following link:

http://www-01.ibm.com/software/data/data-management/optim-solutions/

We also suggest that analytical tools, such as IBM SPSS could be used to analyse Smart Metering data to provide insight into areas such as:

- National and local energy utilisation trends; and
- The correlation between awareness campaigns and energy consumption.

More information is available via the following link:

http://www-01.ibm.com/software/analytics/spss/

Q21: What practical options for authentication would provide the right balance between allowing easy access to consumer data in the home while providing the necessary privacy protection? Are there any other issues or options that the programme should be considering in developing the approach in this area?

Our response draws from other Smart Metering programmes we are involved with globally. Many of the points raise issues to be considered as opposed to providing answers at this stage. To this end we feel the industry needs to better understand constraints prior to complete resolution of this requirement as stated.

- Firstly, we suggest considering if identity of the consumer is the same across multiple channels like web and in home display. If it is, then we suggest a central authority or registrar. The idea of personal certificates has been investigated in some territories, although we feel that this may not be as good a fit within this country.
- The solution would need to consider if identity is tied in any way to a specific energy retailer, or whether it is a common identity that is maintained should the consumer change supplier. This also needs to be examined from a change of tenancy perspective.
- How does an individual person become linked to a service delivery point, and how do we determine the span of time for which that relationship is valid? For example, if a customer purchases a house in January 2011, and sells it in October 2011, are they only entitled to access the data from that service delivery point for that period of time?
- Across all the previous points, is the data the consumer is receiving on these channels informative, or authoritative with respect to the bill that they receive from their service provider for example?
- What role will the various agencies have in the process of establishing a consumer's identity? For example, we have worked with utilities that have mailed tokens that people use to register with a web presentation service for example. In addition to the token (or some other mechanism provided to the consumer) customer also provide some information that only they would know (something you know), as a weak form of two factor authentication for the initial set up of the identity.
- Once an identity has been created, the solution needs to support a structure to deal with forgotten credentials, compromised credentials, and other customer support requests.

Q22: Are there other issues that need to be considered to make using the HAN a viable route for access to data in the home, from either a process or consumer perspective?

The extent to which a device in the HAN can play a role in providing access to data in the home is determined by the convergence of a number of factors:

- The capability or functionality of the in home display device itself. Display ability can extend from the very simple (e.g. a fixed number of alphanumeric display cells), to the more complex (e.g. graphic capability to display images or render streaming data). In order to effectively exploit the capabilities of the in home device there must be either a registry of the device that is updated when the device is installed / modified, or a way to interrogate the device capability.
- Price barriers. The price point of the in home device may present a barrier to usage as a route to data access in the home. The inclusion of classes of in home devices with price points accessible to all customers will help to address this issue.
- Technical barriers: The ability of the customer to interact with the device in non-standard scenarios may present a barrier to usage as a route to data access in the home. An example of this scenario would be a situation where an in home device needs to re-establish its pairing with the meter / comms unit. If this requires a support call, or if the interactions with the in home device and other related devices are perceived as too difficult, it is likely that the usage or effectiveness of the in home device will decline. The frequency of this scenario needs to be examined with the change of supplier use cases in mind.
- Authoritative or informative? Customers may come to regard the data that is presented to them by the in home display device as authoritative as to their relationships with market participants. Effective, clear education material will be required to avoid confusion in this area that could erode the effectiveness of the in home device as an effective means to deliver information to the home.
- Customers need to be confident that the data presented to them on an in home device has been delivered to that device in a manner that protects their privacy and security. This topic has end to end solution implications. With regard to the in home device, it will be necessary to provide evidence of due diligence on the security of the links between the in home device and related devices in a manner that is accessible to all customers. It would be useful to anticipate the objections that might be raised by privacy advocacy groups, and develop material to educate stakeholders in advance of issues becoming barriers to adoption.

Agreeing on a set of standards as soon as possible for the HAN will enable consumers to integrate multiple devices that can use Smart Metering data in the home. These may include PCs, smart appliances, broadband routers, and set top boxes for example. Standards should allow this kind of functionality, without replacement of gateway devices, should the consumer move home, or the HAN technology or associated protocols are changed.

We suggest that security is another pertinent issue, and recommend the use of certified devices to embolden security when connecting in home devices to the HAN, which will also protect the HAN from rogue devices. For this to be viable, the testing needs to be both low cost as well as effective. We recommend that the IFRS (CENELEC standard CWA 50560 developed by TAHI) be used to ensure interoperability, and security testing that needs to underpin the certification scheme. A proliferation of standards will make certification of gateway devices more difficult, and error prone.

Q24: Are there other issues or options that the programme should be thinking about for the Foundation Stage or for non-domestic customers to facilitate access to data?

The overriding factors are security and user attitudes - the two major areas of development during the Foundation Stage. Apart from those discussed in this response, we do not see any other major issues requiring investigation.

We suggest non domestic customers are less likely to resist data access legislation, as long as their data cannot be used in such a way that it may give a competitor some kind of advantage. Contrary to the domestic market, many businesses actively publish 'green' statistics, including those on energy consumption at present to be compliant with legislation, or for strategic purposes to support their branding and marketing for example.

Q25: Do you have any suggestions as to how the Foundation Stage can be used to further learn about our approach to data access and privacy?

One of the key concerns about the current data access and privacy policy, is that many of the benefits of the SMIP will not be realised because customers are not disposed to giving their permission to use the data. This is not because they have strong objections to this (which clearly need to be respected), but more down to inertia.

Trials during the Foundation Stage could be used to determine the percentage of users that fall into this category and to trial different approaches to dealing with data use permission to ensure that the benefits of the wider programme can be realised.

3 Appendix: IBM's Smart Metering Experience

IBM has played a lead role in the majority of the announced second generation Smart Metering programmes globally, which includes amongst others Southern California Edison (California), Oncor (Texas) and CenterPoint Energy (Texas) in the US; ASM Brescia (Italy), ESB Networks (Republic of Ireland) and Oxxio (Netherlands) in Europe. These projects included:

- Smart Metering Systems Integration: Complete end-to-end Smart Meter implementation and programme management, including project planning and justification, management of meter deployment and communication networks, installation of Meter Data Management Systems and integration to utility back-office systems. These projects form the core of our large consulting engagements.
- Centralised Meter Data Services: Planning, developing, connecting and integrating meter data from multiple utilities into an aggregated business model. The Ontario MDM/R and Smart Meter Texas are two examples of this type of service.
- Meter Data Analytics: Applying business analytics to data collected from Smart Meters and other devices to gain insights into site interactions, Smart Meter infrastructure and grid enterprise participants. As the rich data made possible from Smart Meters becomes available, we are increasingly being asked to apply our considerable analytics capabilities to gain more business value from the data.
- Smart Meter Operations: Designing, building, and providing application management and hosting support and services to optimise the support of the Smart Meter infrastructure and related applications. Increasingly, as Smart Metering programmes mature, utilities are looking for ways to increase the efficiency of their operations.
- Metering Innovation: Identification, design, and incorporation of emerging metering capabilities as part of a Smart Grid deployment that needs to integrate with home area networks, electric vehicles, smarter buildings, renewable energy resources, micro-grids and other new grid enterprise participants.

All of this experience is recent, in either ongoing projects or in projects completed within the last two years. As a result of the extensive experience gained we participate in and contribute to a number of organisations around the world that drive policy and industry standards in defining the future of the energy industry, as well as leveraging our global Smart Metering knowledge to inform, expedite and de-risk programmes from a technical and implementation perspective.

In North America, we are the primary systems integrator for seven of the largest Smart Metering programs that are currently underway. This includes all three large utilities in Texas, the two largest investor owned utilities in California, and the lead integrator and operator of the provincial meter data service in Ontario, Canada.

Of particular relevance are ongoing engagements where IBM has managed the implementation and operation of centralised Smart Metering operations, analogous to the proposed central communications model operating within a DCC. In global Smart Metering deployments to date there are few examples of central Smart Metering service provision equivalent to the DCC Market. IBM designed, built and is now managing two such projects:

- In Ontario, IBM was selected to design, build, and manage the provincial IESO Meter Data Management Repository (MDM/R). The MDM/R system is designed to collect and validate hourly interval data from 4.5 million meters every day, then frame this into Time of Use bill determinants for use by over 90 local distributors and competitive Energy Suppliers.

- In Texas, IBM has built a Common Advanced Metering Web Portal and Data Repository that consolidates customer usage and meter data from five different network operators to provide to Energy Suppliers, end consumers, and other authorised parties via a web portal. The system will store four years of 15-minute interval data from 7 million meters, together with monthly billed usage data, and maintain current and historical views of meter attributes, premise and service point information.

A recent report from Pike Research confirmed this dominance; identifying IBM as having a 65% share of the market for Smart Grid deployments in the United States (Pike Research Smart Grid Deployment Tracker Report 4Q10, February 28, 2011).

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