Smart Meter Energy Data: Public Interest Advisory Group

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Stimulus Paper 4

Stakeholder perspectives on smart meter energy data and potential public interest use-cases

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This paper was prepared as an input to the work programme of the Public Interest Advisory Group on access to smart meter energy data.

1. Introduction

This paper reports findings from a series of interviews with public interest stakeholders to explore their views of: (a) public interest uses of smart meter data and, more specifically, the potential uses they have in mind, and; (b) their awareness and perspectives of associated approaches to data privacy and data access for smart meter data. The interviews were conducted to extend the depth and breadth of our understanding of a range of potential public interest use cases of smart meter data, principally those identified by non-academic organisations. This paper represents the findings from the first of a two part strand of background research to provide an enriched understanding of the access, privacy and data attribute requirements associated with different potential use cases. This was with the aim of supporting discussion and judgment about the public interest legitimacy – and practicality - of different use cases. This included consideration of data privacy, data handling procedures and data access. The second activity – the development of a framework for assessing how the smart meter data could be used to realise these potential uses – is reported in a separate paper.[1]

Approach to gathering stakeholder perspectives

This paper reports stakeholder views and understanding, including from a set of12 public interest stakeholder interviews conducted in person or by telephone as well as from inputs via meetings and follow-up correspondence -undertaken in the first half of 2018. Stakeholders were drawn from government bodies, consumer interest organisations, public policy making bodies, social housing providers, local authorities, smart energy 'thinkers', community energy organisations and energy sector representative bodies. However, many of those interviewed noted that some of the opinions expressed were their own and not those of their organisation. Many noted their opinion that organisational thinking in this area is in its early stages. The research builds on previous papers by Jess Britton and Simon Elam on the national and sub-national public interest uses of smart meter energy data.[2,3]

The interviews with stakeholders explored stakeholder thinking around the following:

- Policy goals or strategic priorities to which smart meter data uses could contribute
- Specific potential use cases of smart meter data
- Data requirements and potential barriers to data access and development of use cases
- Privacy, ethics and public trust issues, including the fit with the wider smart meter rollout

The interviews also provided some insight into the extent of interested stakeholders' understanding of the current extent and planned arrangements for collecting, storing and processing smart meter data.

[1] Roberts, S. (2018) Stimulus paper 5. Public interest use-cases: data attributes, data requirements, and associated privacy and access implications. Public Interest Advisor Group. Available at: https://www.smartenergydatapiag.org.uk/

[2] Britton, J., 2016, Smart Meter Data and Public Interest Issues – the sub-national perspective. Discussion paper 2.

[3] Elam, S., 2016, Smart Meter Data and Public Interest Issues –The National Perspective. Discussion paper 1.

2. Stakeholder perspectives

Policy goals /strategic priorities

A relatively strong consensus emerged in terms of the range of policy goals or strategic priorities towards which use cases of smart meter data could contribute:

- Tackling fuel poverty: Through more efficient identification, better targeting of investment and support, enabling innovative or improved efficiency of existing approaches to tackle fuel poverty
- More efficient balancing of the grid and enabling a smarter more integrated energy system, towards enabling decarbonisation and efficiency.
- Decarbonisation: Through monitoring progress, investment planning, more accurate measurement of real life impact of energy efficiency measures and enabling wide adoption of innovative consumer services, for example, which support domestic demand reduction
- Economic growth: By informing significant infrastructure investment decisions
- Public health benefits: in enabling cold homes safeguarding and prevention measures
- Support decarbonisation and economic efficiency, via widespread delivery of consumer benefits.

Examples of specific use cases which contribute towards these different policy goals or strategic priorities are presented further on. There is also recognition that smart meter data, as a form of Big Data, could be used to achieve policy goals that fall outside the traditional areas which are the primary focus of stakeholders engaged thus far.

The potential release of smart meter information for use in different ways was identified as important in supporting increased transparency in the energy market, in turn to enable more innovative beneficial services to emerge. However, this position is potentially in tension with concerns about safeguarding consumer interests, to retain control over their own data and to retain trust in the smart meter rollout – the success of which is a necessary precursor to large scale smart meter data being used in different ways.

3. Use Cases

A summary of potential public interest use cases identified and considered by stakeholders follows. This includes reporting of several suggestions which are unlikely to be realisable with the use of smart meter data: a number of such suggestions are included to fairly reflect the range and balance of use cases envisaged by stakeholders. The set of archetype public interest use cases has been informed by the previous typology outlined by Britton (2016), but moves towards describing the type of activity, rather than the sector of interest (eg community energy).

- Research for the public good
- National and sub-national energy statistics

- Local-level energy system planning
- Area-based energy programmes (targeting and monitoring)
- Data for analysis and modelling to support policy making, research and insight
- Improved intervention design and targeting
- Local electricity system 'live' monitoring to trigger reactions / interventions in real time
- Service innovations and development and testing of early stage designs / algorithms

Research for the public good

Both the government and the research community are encouraging the public sector to move away from their traditional silo focus on specific areas of public administration (eg education, health, housing) to use the powers vested in the Digital Economy Act to share, match and link different and publicly-owned administrative datasets with one another, and with other appropriate Big Data sets owned by academia and the private sector in order to exploit the 'Data Revolution' and to harness and make better use the power of data for the public good. The idea being that the merging of different datasets from across the public and private sectors will deliver completely new insights into economic, social and socio-economic issues, lead to better decision-making and thus rebound to the benefit of humanity. Smart meter data is identified as potentially an important type of Big Data which should be harnessed in this way, with applications that potentially fall outside traditional energy or housing areas.

National and sub-national domestic sector energy statistics

Stakeholders identify ways that smart meter data could aid their input to policy advice and influencing roles, including identifying opportunities to improve the accuracy and detail of national and sub-national energy statistics. Specific instances of datasets that stakeholders considered could be improved are:

- Digest of UK Energy Statistics (DUKES) and Energy Consumption in the UK (ECUK): These are sets of statistics on production, transformation and consumption of energy that are used in support of policy making. ECUK data on domestic energy consumption feeds into DUKES. DUKES was identified by some stakeholders as reflecting an increasingly outdated way of managing the energy system. The inclusion of smart meter data was identified as key to development of a modernised DUKES that is more suited for informing decision making in a future more flexible energy system.

- Energy Performance of Buildings Certificates Statistical Release: The Ministry of Housing, Communities and Local Government (MHCLG) produce experimental official statistics on the energy use of domestic properties, using data from Energy Performance Certificates. EPC energy efficiency ratings are based on estimated fuel costs. The latest statistical release includes data on the energy use of different building types (house, flat, bungalow, and maisonette) and for existing or new dwellings. Whilst stakeholders did not explicitly reference this statistical set (but did more loosely refer to EPCs), there was mention of the value of national statistics on the energy performance of different types of housing using smart meter

energy data. Stakeholders considered this could be useful at a local authority level as well as nationally.

Stakeholders identified a range of examples of new sets of statistics which they felt would be potentially useful towards improving the quality of information available to policy deliberations and planning. These included both 'pure' consumption statistics and sets of statistics which rely on joining up data from different sources.[4] Examples of new sets of statistics of interest suggested by stakeholders are:

- Non-estimated domestic energy consumption profiles at national, regional and local authority levels – with some wanting it to be available at lower level geographies. Further suggested improvements include linking actual domestic energy consumption profiles to external temperatures to produce seasonal profiles of consumption for different regions in the UK.

- Domestic peak demand data at national, regional and local authority levels

- Domestic electric vehicle charging patterns: Half hourly consumption data to identify electric vehicle charging patterns - preferably joined to data from charging networks.

- Smart meter rollout progress data on density of smart meter installation by locality.

The production of statistics was identified as useful for informing big picture understanding of progress on decarbonisation, policy design for decarbonisation and fuel poverty, strategic planning of electric vehicle expansion, to understand responses to policy changes in distributed generation, to understand the performance gap in new buildings in order to support compliance and monitoring of developers, to explore domestic consumption by heating type. Discussions regarding practical applications of smart meter data also explicitly or implicitly led to identification of useful statistics. One example is production of statistics for each local authority on domestic consumption, including consumption profiles for different dwelling types and household types. Statistics for smaller geographies could be used in geographical targeting of investment and fuel poverty initiatives. Statistics would also be useful for local authority and other local actors to inform strategic planning, monitoring progress and for benchmarking.

Regular updating and public release of statistics on the numbers of domestic smart meter installations in different parts of the UK (ie by local authority) during the ongoing smart meter rollout was identified as useful to enable actors interested in supporting the smart meter rollout to direct their own efforts to support the rollout and uptake of smart meters by households. BEIS already produces quarterly statistics based on reporting from suppliers of numbers of smart meters installed, using data provided by suppliers.[5] However, the data is not currently reported by geographic location. This

[4] See Joining Up Data for Better Statistics blog on the push from the Office for Statistics Regulation to enable increased use of data linkage for the public good. https://www.statisticsauthority.gov.uk/joining-up-data-for-better-statistics/

[5] https://www.gov.uk/government/statistics/statistical-release-and-data-smart-meters-great-britain-quarter-1-2018

suggestion does have a parallel in the statistical release on numbers of EPC certificates by local authority in each year/quarter.[6]

Local-level energy system planning

Local actors identified local system planning as an important application of smart meter data in working towards and monitoring progress against their targets for economic growth, decarbonisation, fuel poverty and public health. This included use of smart meter data in modelling tools to inform choices about targeting investment in the network to reduce costs, improve efficiency, attract inward investment and contribute towards decarbonisation. Visibility of data to non-incumbent actors (including public bodies at local and regional levels and community organisations),was viewed as desirable to increase the leverage of such bodies to engage in network planning and in holding other actors to account, including developers. This was associated with an appetite for city bodies to take on a more pro-active role in future energy system planning to deliver against the expectations of the communities they serve, including in enabling eg greater penetration of electric vehicles.

The smart city was a key area where stakeholders identified that city actors and new entrants need to be able to work more with the incumbents and where smart meter data access can support identification of opportunities and enable planning to achieve cost benefits for the area.

Stakeholders involved in the community energy sector also identified smart meter data as important to growth in the opportunities and roles available to the sector in network resilience and enabling communities to engage more with their local energy system. In some cases, access to smart meter data was envisaged as achieved via consent of participating members. However, for some planning purposes, the uses envisaged would likely require a more comprehensive set of smart meter data for a given locality (though this was not necessarily recognised by the individuals interviewed).

Examples of data sets of use for local level energy system planning are similar to sub-national uses, but seek data aggregated at lower levels of geography.

- Non-estimated domestic energy consumption profiles at local authority level and below, down to neighbourhood or street level.
- Domestic peak demand data at local authority, neighbourhood and even street level.
- Domestic electric vehicle charging patterns: Half hourly consumption data to identify electric vehicle charging patterns - preferably joined to data from charging networks, down to neighbourhood or even to street level.

[6] https://www.gov.uk/government/collections/energy-performance-of-buildings-certificates

Data for analysis and modelling to support policy making, research and insight

A wide variety of applied examples of activities that would be supported by access to large scale smart meter data , as identified by stakeholders, would require smart meter data to be used in analysis and modelling tools, both to update existing models and to create new models. Specific examples of current models which could be improved upon using smart meter data are:

- National Energy Efficiency Data-Framework (NEED)[7]: This matches annual gas and electricity consumption data with information on energy efficiency measures and data on property attributes and household characteristics. It is used to understand the effect of installing energy efficiency measures on domestic energy use.

- National Household Model (NHM): This is a simulation model for domestic energy policies, devised by CSE for BEIS. It is an open source model which allows actors to generate their own analysis without reliance on academic research. It used to project the effects of policy and other legislative changes on the energy and emission of the UK domestic housing stock.

Selected examples of how smart meter data could be used in modelling - or to remove the need for modelling - for public interest benefits, as suggested by stakeholders, are:

- Use of smart meter data to better understand the performance gap in new buildings (SAP v actual usage) for enforcement around building standards and to understand typical performance of a developer's new housing stock

- To support improved understanding of how household behaviours influence energy consumption, by using smart meter data in consumption profile analysis and to investigate how consumers respond to different time of use tariffs or other signals

- Use in modelling which links consumption data and internal temperature data to understand fuel poverty behaviours and the rebound effect

- Inputs to improve accuracy of models being developed towards achieving different carbon reduction scenarios, exploring the flexibility potential to address peak demand issues

- Use in research trials of new or very costly technical innovations, such as to establish the cost benefit value of solid wall insulation in real homes.

This background research did not fully explore the breadth of other research opportunities, in recognition that this is a focal area of activity for UCL's Smart Meter Research Portal (SMRP) project. However, a number of non-academic bodies clearly expressed their desire to be able to conduct and commission their own research, without reliance on academic researchers, in order to inform policy advice and decision making.

7 National Energy Efficiency Data-Framework (NEED) collection. https://www.gov.uk/government/collections/national-energy-efficiency-data-need-framework

Improved intervention design and targeting

Stakeholders concerned with delivery of interventions to tackle fuel poverty and improve public health identified greater insight into local domestic energy consumption as useful in planning area-based investment in such measures. Stakeholders expressed an appetite for visibility of smart meter data at a relevant geographical level of insight to enable increased accuracy and more cost-effective delivery in the context of scarce financial resources. The level of granularity required was considered as likely to be at street level (eg to identify fuel poverty hotspots) or to pinpoint p particular households with very high or very low energy usage, to target the offer of a more tailored intervention.

Possible focal areas for improved interventions include new products and services which help people have more affordable and warmer homes, innovative tariffs or other services to encourage domestic consumers to engage in network balancing, improved accuracy of affordability checks for new residents, design of safeguarding services for vulnerable consumers and design of mechanisms that allow people to act at community level to reduce peak demand, overall demand or to engage in peer to peer energy activities.

Local electricity system 'live' monitoring to trigger reactions / interventions in real time

Stakeholders with a strong interest in network balancing issues identified a need for high-frequency export and consumption data to enable both live monitoring of the local electricity system and to enable demand side response related services to be developed which are suitable for the domestic sector, particularly in the context of enabling continued growth in the market share of renewable generation and electric vehicles. Areas where 'live' data would be relevant were identified as relating to the electric vehicle market, the emergence of aggregators and peer-to-peer platforms for trading or sharing locally generated energy.
Some stakeholders recognised that the half hourly data supplied via the DCC is insufficiently granular for use in live data scenarios.

Service innovations and development and testing of early stage designs / algorithms

A variety of areas of opportunity for design of innovative services making use of smart meter data were identified by stakeholders. These included smart home services (eg digital assistants, safeguarding apps), smart city balancing services (eg remote disconnection of electric vehicles), aggregator services, demand side response services, peer to peer brokering, property/social housing asset management and fuel poverty advice service design.

Whilst the delivery of many of these services could be based on individual consumer data on an 'opt-in' consent basis, it is likely that many would require development and testing, which could require access to the smart meter data of a large sample of households.

4. Data requirements

A theme of this series of stakeholder interviews has been declarations by individuals about the limited extent to date of their personal or organisational engagement in questions of smart meter data for public interest purposes:

"In all honesty, we've only just started thinking about it and probably others are further forward than we are in their thinking"

Stakeholders varied from wholly unaware to somewhat aware of the existence of barriers to the feasibility of data being available for the use cases that they identified and discussed as of potential public value. Even those stakeholders most engaged in exploration of potential use cases admitted to limited understanding of barriers and of changes needed to enable certain use cases to be undertaken in practice. A number of stakeholders interviewed reported being actively engaged in trying to better understand potential barriers and ethical issues associated with public interest uses of smart meter data, including through the PIAG process.

The interviews explored stakeholder thinking on data requirements, in terms of time aggregation and duration, geographic aggregation and coverage and whether historic, recent or live data would be required to meet the requirements of possible use cases. Half-hourly data was widely recognised to provide much better insights into consumption patterns than is possible with current annual estimated consumption data for domestic consumers, whilst daily and actual annual consumption data was already recognised to be an improvement on current annual estimates of domestic consumption. Longitudinal data was identified as useful to establish a picture of dwelling and/or heating system performance over time as well as to understand changing behaviours.

There was widespread recognition of the need for anonymisation of data through geographic aggregation or other means, except in cases where the consumer gave consent to share their data in order to benefit from a service. Those concerned to improve the efficiency of fuel poverty targeting were keen to be able to view data for individual households, though this was tempered with recognition of the privacy issues and that street level data would already be a significant improvement in accurate identification relative to use of currently available data.

Understanding of routes and barriers to accessing data

Stakeholders varied in their confidence and knowledge of existing or planned routes to access data and the associated requirements or limitations. Potential sources of smart meter data mentioned were the DCC, energy suppliers, the SMRP or directly from consenting customers. There was also mention of becoming a registered supplier, with access to customer smart meter data an incidental benefit that could be used to inform development of services.

Most stakeholders either didn't know or were uncertain as to how or whether third parties can access data from the DCC platform, other than by entering the market as a supplier. There was some recognition of cost and regulatory barriers and some concerns about the user-friendliness of the DCC's approved third party user process to enable public interest use cases. The interviews also exposed

some concerns about the SMRP as potentially excluding access by non-academic commercial actors. Some stakeholders were alert to the potential role of platform providers, such as Facebook, Google and Apple, in making use of energy data to develop new services for consumers.

Some stakeholders expressed a desire to be able to access data via a (pay-for) online portal, whereby an intermediary service provides analysed data ready for use by eg housing/public health providers, without the need for further in-house analysis.

Others expressed an even looser idea that public bodies will be able to enter into an agreement with energy suppliers to access data, with the supplier getting customer consent for sharing data with third parties. Stakeholders seemed generally woolly in thinking about the consent requirements for suppliers to share data with third parties. One issue raised was the potential need for retrospective consents for third party sharing to be obtained, and the associated costs.

Stakeholders recognition of and ranking of the importance of consumer privacy concerns was variable. There were voices in favour of open data to enable beneficial use cases to be developed, in preference to much more restrictive access. There were also voices defending the primacy of the consumer's privacy and ability to retain control over their smart meter data. Several stakeholders were unaware that suppliers can only access half hourly data with the consent of the individual consumer.

Capacity issues and other barriers to use

From early interviews, lack of capacity and appropriate skills were identified as a barrier, notably within public sector bodies affected by cuts, though larger, better resourced bodies with existing data analysis capabilities as well as more agile smaller bodies may have appropriate skills and resources. A pay-for portal was identified as a solution that would enable public bodies to use smart meter data for decision-making purposes. One view was that the combination of austerity and energy's status as a non-statutory service makes it less likely that councils – who were typified as having a weak understanding of the potential commercial case - would invest in smart meter data related capacity.

For representative bodies (e.g. local authorities), there was some awareness of sensitivity about using smart meter data in terms of its potential political fallout (and thereby voting patterns). It was suggested that newly established combined authorities may be more willing to take that risk, as they are looking for new things to do.

Stakeholders envisaging the use of smart metering in housing asset management to tackle fuel poverty were alert to the existence of smart thermostats as an available but costly alternative that is already being increasingly used – and which is arguably more intrusive than a smart meter.

Difficulties with the smart meter rollout were identified as a challenge to the potential feasibility and value of smart meter data for public interest purposes, notably amongst fuel poverty target groups of vulnerable households and in rural areas.

Stakeholders shared a recognition of the importance of building and retaining consumer trust. Mention was made of Citizens' Advice prototype smart meter dashboard as a means of enabling consumers to retain control over who has access to their smart meter data. An associated point

concerned the importance of consumers being rewarded with new services. This is grounded in a perception that to date, the consumer benefits of smart metering have been limited.

Potential ethical issues / public trust

There is consensus amongst stakeholders that there remains low public awareness or appreciation of the potential benefits of smart meters themselves, let alone the potential value of smart meter data, and very low public engagement with the types of public benefit use cases explored. This was associated with a recognition that consumers could be mistrustful of the use of smart meter data for public interest uses. Stakeholders are alert to risks of being perceived as overly 'big brother' if they use data to design and target behavioural change messaging at households. Some stakeholders argued (self-interestedly) that residents would be more willing to share their data with public bodies if they feel they are more likely to benefit directly from rewards, such as free heating measures, rather than for more abstract 'statistical uses'. However, as discussed above, such uses are likely to be reliant in themselves on the availability of relevant statistics. Others were aware of the arguments, supported in previous consumer research, that people are potentially willing to share their data without the expectation of direct reward, in recognition of the importance of wider societal benefits, as explored in PIAG papers on data ethics and consumer research[8].

5. Conclusion

The exploration of potential use cases with stakeholders has yielded evidence of a wide range of potential applications that can be said to contribute to important policy goals, including decarbonisation, fuel poverty reduction and improved public health. It identifies a range of mechanisms by which these ends could be supported, as well as economic growth and transparency in the market.

The background research has enabled the identification of six archetype public interest use cases:

i. National and sub-national domestic sector energy statistics

ii. Local level energy system planning (for infrastructure and intervention planning and monitoring)

iii. Data for analysis and modelling to support policy making, research and insights (e.g. household energy use, distributional impacts, policy impact evaluation etc)

iv. Improved intervention design and testing eg to tackle fuel poverty

v. Local electricity system 'live' monitoring to trigger reactions/interventions in real time

vi. Service innovation and development and testing of early stage design/algorithms etc

[8] Frerk, M. (2018) Stimulus paper on consumer research on access to smart meter energy data and Frerk, M (2018) Data Ethics – A review of the landscape. Both available at: https://www.smartenergydatapiag.org.uk/

In addition, the more generic Research for Public Good represents a potential public interest use for smart meter energy data. However, as explained in PIAG Stimulus Paper 5, it is too wide to be considered 'archetypal' given the potential range of use cases such a category would include.

Stakeholders also identified a range of use cases which may be considered primarily consumer services, where the primary benefit accrues to the consumer and where the delivery of the service would involve the consumer agreeing to their smart meter data being shared as part of the realisation of the use case. These are not considered to quality as public interest use cases, even though their delivery may help deliver wider social benefits. However, to enable such services to emerge, smart meter data may need to be used in the development and testing phase. It is argued her that it is in the public interest to support the emergence of such consumer services, because of their potential to contribute towards realising wider public benefits, such as decarbonisation, through their successful development into viable services.

Stakeholder thinking on the practicalities of making use of smart meter data for public interest purposes is relatively limited to date. There is an appetite for sets of trustworthy aggregated data and for intermediary services which undertake processing so that smart meter data is ready for use by public bodies.

In further work, there will need to be continued engagement on the question of balance between consumer interests and use of 'big' smart energy data towards achievement of important public policy goals. This includes a need for continued stakeholder dialogue to move towards broad consensus over which use cases merit recognition as offering genuine added value in serving the public interest and other suggested use cases which are unrealistic or which do not merit recognition as public interest use cases. The potential for smart meter data to be used in the production of new or improved national and sub-national statistics closely fit with the current drive for data to be used and joined with other data to enable new insights to inform policy making, and other types of decision-making. The wider public interest of research for the public good leaves open the potential for smart meter data being used in ways not yet envisaged towards the achievement of public benefits outside the area of energy.