Smart Meter Energy Data: Public Interest Advisory Group

A policy dialogue and work programme led by
Sustainability First & the Centre for Sustainable Energy

Final Report - Phase 2

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Report Status

This is the final report of Phase 2 of the PIAG project.
A draft was considered at a PIAG workshop held on 19 April 2021 and final comments taken on board.

This paper was prepared as the final input to the work programme of the Public Interest Advisory Group on access to smart meter energy data which ran from November 2017 to April 2021.

Preface

The Public Interest Advisory Group (PIAG) on access to smart meter data for a public interest purpose is independently convened by two charities, Sustainability First and the Centre for Sustainable Energy (CSE).

This paper is the outcome of Phase 2 of the three-year PIAG process. Sustainability First and CSE have worked to frame the topic in a systematic way, conduct desk research, and produce background 'stimulus' papers, enabling PIAG members to debate and explore these matters in an iterative way – both collectively via workshops and bilaterally. Through this step-by-step deliberative approach, PIAG has developed a collective understanding of the key issues and challenges.

At a PIAG workshop in April 2021, this paper was considered in draft with key PIAG participants plus project sponsors. There was broad agreement that the paper – together with its principles, conclusions and recommendations – is a fair reflection of the PIAG process. It was acknowledged that individual organisations participating in PIAG may not necessarily support each conclusion and recommendation set out in the paper but that there was support for the broad approach.

We are extremely grateful to all members of the PIAG group for their active participation, expert input and support for the work of PIAG over the past three years. Any omissions or errors are the responsibility of Sustainability First and CSE.

As at April 2021 key PIAG members include (*denotes current funding member):
BEIS
Citizens Advice
Energy Systems Catapult*
Elexon*
Electralink*
Greater London Authority*
Ofgem (Phase 1 funder)
Smart DCC (Smart Data Communications Company)*
UCL Smart Energy Research Lab (Phase 1 funder)

PIAG participants in Phase 2 include:

BEAMA
BEIS Energy Hubs (London & South East, Midlands)
Cambridge Architecture Research Ltd
CIBSE
Climate Change Committee
Delta-EE
Ecuity
Energy Networks Association
Energy Saving Trust
Energy UK
Fair by Design
Frontier Economics
Imperial College
Ministry of Housing, Communities and Local Government (MHCLG)

National Energy Action
National Grid ESO (Phase 1 funder)
National Infrastructure Commission
Northern Powergrid (Phase 1 funder)
Office for National Statistics
Ombudsman Services
Scottish Government
Smart Energy GB
TechUK
UKERC
UK Statistics Authority
University of Birmingham
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University of Exeter
University of Reading
Welsh Government
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Xoserve

Sustainability First

Sustainability First
Sustainability First is a think tank that promotes practical, sustainable solutions to improve environmental, economic, and social wellbeing. We are a registered charity that primarily works in the public utilities, and have a long, proven track record of delivering impactful projects that help shape policy, regulation, and company behaviour in the energy and water sectors.

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Centre for Sustainable Energy
The Centre for Sustainable Energy (CSE) is an independent national charity that works for a world where sustainability is second nature, carbon emissions have been cut to safe levels, and fuel poverty has been replaced by energy justice. Based in Bristol, CSE undertakes practical work to support individuals, communities, and organisations to take action on energy. CSE shares knowledge and experience to empower people to change the way they think and act about energy by giving advice, managing innovative energy projects, training and supporting others to act, and undertaking research and policy analysis.

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Annex 1: Working paper on DNO Privacy Plans (separate document)
Annex 2: Summary of workshop findings (separate document)

Executive Summary

As of 31 December 2020, there were 23.6 million smart and advanced meters installed in homes and small businesses in Great Britain, with a growing recognition of the value of this data to industry players and of the role smart meters can play in transforming the sector to meet net zero.[1] However there remains an important gap in terms of the ability for this data to be used in the public interest to support public policy making and practice, while respecting privacy concerns. Not least, there is no central repository which might facilitate access to aggregated or anonymised smart meter data. Without better demand-side data, BEIS and Ofgem risk 'flying blind' into the energy transition.

The smart meter data Public Interest Advisory Group (PIAG) was established in November 2017 by Sustainability First and the Centre for Sustainable Energy (CSE) to explore how this gap could be filled, while respecting consumers' privacy. We have managed a process of expert stakeholder roundtables to build understanding and consensus around these issues. We are grateful to our funders for Phase 2 of the project for enabling this work to proceed (the Energy Systems Catapult, the Greater London Authority, Elexon, Smart DCC and Electralink).

In Phase 1 of PIAG we considered the consumer and wider policy context, looked at international experience and potential use cases, and set out an approach – building on models from other sectors – that could be used to provide smart meter data for statistical and research purposes. We set out some recommendations for actions in the short and long term.

In PIAG Phase 2 we have bolstered the evidence base demonstrating the additional value which smart meter data could contribute to the public interest, through a series of workshops looking at the **use that could be made of aggregated / anonymised smart meter data to improve BEIS statistics, regulatory decisions, local area energy plans and heat policy**. In each workshop we sought to identify the data currently or shortly expected to be available, the gaps that leaves and how smart meter data could fill those gaps.

These workshops have strongly reinforced the message that there is a real gap in terms of consumer demand-side data and in particular that:

- Currently much of GB energy systems planning is built on a weak foundation of annual (estimated) consumption, despite the fact that when energy is used (not just how much is used) is an increasingly important factor in electricity system design, with the rise of renewables and EVs and the growing focus on heat de-carbonisation which is inherently seasonal;
- Ofgem as regulator is looking to oversee an industry that increasingly has access to this data for its own customers and hence the traditional information asymmetry is

[1] BEIS, Smart Meter Statistics in Great Britain: Quarterly Report to End December 2020.

likely to be reinforced, limiting Ofgem's ability to monitor and evaluate the effects of expected important trends such as an increased use in time-of-use tariffs;
- Local area energy planning is increasingly seen as a crucial component of the energy transition but its value is dependent, at least in part, on access to accurate and fine-grain gas and electricity consumption data at a local level;
- In developing heat policy, which is heavily dependent on consumers taking action in their homes, there is a complete paucity of demand-side data, reflecting in part the low priority that has historically been attached to understanding gas demand.

The reports from the four workshops are available at smartenergydatapiag.org.uk and are summarised in a Summary of Workshop Findings report.

In terms of the wider context, since the start of PIAG we have seen a growing focus on the use of data across government, including on energy data. The Modernising Energy Data programme which followed on from the Energy Data Taskforce includes the principle that energy system data should be 'presumed open'.[2] BEIS are expected to publish an Energy Data and Digitalisation Strategy shortly providing a clear direction. We have also seen five out of six DNOs gain approval for their Privacy Plans, enabling them to start collecting half-hourly smart meter consumption data on an aggregated or anonymised basis. Ofgem's plans for half-hourly settlement have progressed with the potential, in principle, for an eventual gateway to smart meter data.

Given all of this, our Phase 2 report argues that it is now imperative that bolder steps are taken to push forward with making use of smart meter data for public interest purposes.

In particular we recommend the following actions:

- **BEIS Energy Statistics to be expanded to respond to users' needs**: BEIS should use the existing powers they have under, for example, the Statistics of Trade Act 1947 to move to collect at least monthly metered consumption data (in place of annual) together with key metrics such as maximum demand.
- **SERL to be extended beyond 2022 and access widened**: the UCL SERL database is now up and running and represents a unique resource spanning gas and electricity and linking energy consumption to socio-demographic and other data. We recommend that funding is provided for it to continue but that as a part of that, access should be extended to accredited researchers beyond the academic community and its scope broadened.
- **De-personalised smart meter data held by DNOs to be treated as 'presumed open'**: with DNOs now starting to collect and make use of smart meter data for their own operational and planning purposes and with an obligation on them to comply with Energy Data Best Practice Guidance, it should be made clear that where smart meter data is sufficiently aggregated it can be shared in the way that other system data is expected to be.

[2] The Modernising Energy Data programme is soon to be renamed as Modernising Energy: Digitalisation.

- **Smart meter data to be used to train models to improve the accuracy of current representations of energy demand**: given the current heavy reliance on models of energy demand to forecast the impacts of policy and other interventions on energy consumption, a priority for early action is to make smart meter data available to improve the models' predictive value by providing better representations of current demand patterns and better assessments of the impact of different types of intervention.
- **Time for a major push by Ofgem, BEIS and others on gas demand data**: Recognising the importance of heat decarbonisation and the challenge it presents, more focus needs to be placed on gas demand data for analytical purposes. This includes short term opportunities to widen access to some existing data sources such as Xoserve profiles data but also the need for Ofgem and BEIS to revisit expectations about GDNs' participation in Smart DCC and the interest that DNOs will have in accessing that data to help in planning for heat electrification.
- **Keep doors open and continue to reflect on potential pathways for a longer-term comprehensive solution**: As set out in Phase 1, the long-term solution requires access by a trusted processor to a comprehensive source of granular smart meter data. In taking decisions on half-hourly settlement or on the role of an independent system operator, doors should be kept open where those bodies might facilitate access to data for a public interest purpose in the longer-term. As well as extending use of system data and metadata, all parties are urged to consider what role they might play in making aggregated and anonymised smart meter data more widely available.

With the PIAG programme now drawing to a close we are looking to Innovate UK, the ESC, BEIS and Ofgem to ensure that this stream of work is taken forward as part of the Modernising Energy Data programme. We hope that the work of PIAG and the value of smart meter data will be acknowledged in the upcoming UK Energy Data and Digitalisation Strategy.

1 Introduction

New sources of data are posing opportunities and challenges for government, business and civil society. Smart meter data is no exception. As energy is an essential service and part of the critical national infrastructure, questions around how data is used in this sector deserve particular strategic attention. This is reflected in the establishment by BEIS of the Energy Data Taskforce and subsequently the Modernising Energy Data (MED) Programme, focussed on energy systems data.[3]

The smart meter data Public Interest Advisory Group (PIAG) was established in November 2017 by Sustainability First and the Centre for Sustainable Energy (CSE) to consider how smart meter data can be put to best use to further public policy goals and aid in the energy transition, while protecting privacy.[4] Members of PIAG include a wide range of consumer, academic, government and industry players who together have considered different aspects of the issues through a series of workshops, informed by research and stimulus papers prepared by Sustainability First and CSE.

The first Phase of PIAG ran through to June 2019. This report marks the end of the second Phase aimed at providing further evidence to help BEIS, Ofgem and others in making the case for change.

This report covers:

- Section 2: A recap on the findings of Phase 1 (with the full Phase 1 report available here) and a review of progress against the recommendations.
- Section 3: Discussion of the evolving policy context and wider developments since our Phase 1 report.
- Section 4: Key findings from Phase 2 (which are covered more fully in our Consolidated Findings report and in the individual workshop reports).
- Section 5: Our recommendations:
    - BEIS Energy Statistics to be expanded to respond to users' needs.
    - SERL to be extended beyond 2022 and access widened.
    - De-personalised smart meter data held by DNOs to be treated as 'presumed open'.
    - Smart meter data to be used to train models to improve the accuracy of current representations of energy demand.
    - Time for a major push by Ofgem, BEIS and others on gas demand data.
    - Keep doors open and continue to reflect on potential pathways for a longer-term comprehensive solution.

[3] When renamed as Modernising Energy: Digitalisation, the MED acronym will still apply.

[4] The PIAG work programme has been informed by (a) two papers commissioned by CSE and SF in 2015 on household smart meter data and the public interest agenda from a national and a sub-national perspective and (b) an initial stakeholder roundtable in March 2016 exploring the issues raised by these papers.

2 Recap on Phase 1 Findings

In the first Phase of PIAG we explored the privacy rules impacting on the use of smart meter data for a public interest purpose, consumer attitudes to privacy and developments in other sectors and internationally. We talked to stakeholders to establish potential use cases for aggregated or anonymised smart meter data to support the public interest and set out potential routes for access to that data. In total 9 stimulus and research papers were produced which are available at smartenergydatapiag.org.uk.

The need for better demand-side data

The smart meter rollout is positioned as an essential pillar of the energy system transition – but it also raises new challenges for policy makers who must assess the impacts of major policy reforms and ensure that all customers, including customers in vulnerable situations, are protected and empowered in this new world. Data is key to making informed policy choices, but current provisions for access to smart meter data for a public interest purpose leave policy makers at risk of 'flying blind'.

Examples of the challenges that regulators and policy makers may face without access to half-hourly consumption meter data, suitably aggregated or anonymised, were identified including:

- Ofgem, in looking at the opportunities created by half-hourly electricity settlement, has grappled with trying to understand the distributional impacts of such a major reform. Once half-hourly settlement is implemented, unless Ofgem has access to aggregated or anonymised half-hourly consumption data with some associated socio-demographic markers, it may struggle to monitor or understand the full impact of its own reforms.
- There is a strong expectation that devolved, regional, city and local energy developments will become ever more important. Many local authorities are keen to play their part, developing local energy plans and identifying opportunities – such as where to locate public EV charging points or how to use their wider planning powers to support a more decentralised local energy system, including for lower-carbon heat. Presently however, the official energy statistics used as a data source for local plans depend on annual energy consumption data as the main data input, which is not sufficiently granular for these needs.
- Government departments (BEIS, MHCLG, DEFRA) and public advisory bodies charged with public interest duties (e.g. the Climate Change Committee, the National Infrastructure Commission) will not have access to suitably granular energy consumption and demand-side data that they will need to enable them to discharge their duties in an increasingly data-driven energy market.

Similarly, for NGOs, charities, think tanks and universities looking to participate in the wider public debate on the design and potential impacts of future energy systems, more granular consumption data (anonymised and aggregated) would provide a vital source of evidence.

For their part, energy companies are rightly looking at the opportunities presented by big data. If government (defined broadly, including at local, regional, devolved and national level) is to continue to play a strategic role in facilitating new energy markets and ensuring that these work in consumer and citizen interests, and not simply company interests, then government will need to ensure that it too has access to sufficiently granular consumption and demand-side data to do that. Without this access, information asymmetries will be further reinforced. This could increase the risk that the low carbon transition and the development of the future energy system are not seen as 'fair'.

These examples formed the basis for the deep-dive workshops that were carried out in Phase 2.

Balancing public interest and privacy concerns

This debate on the case for government to have access to data to inform public policy and to improve services was observed to be playing out across sectors and across the globe. Through the Digital Economy Act 2017 (DEA) the UK Government had given the Office for National Statistics (ONS) powers to collect data from private and public sector bodies that can then be used for statistical and research purposes. In so doing, the government had to address the principles that should be adopted to ensure privacy is suitably protected whilst enabling access to data by researchers, including linkage of datasets. In looking at how best to balance the public interest with individual protection for smart meter data we advocated adopting those same DEA principles. As a part of that, any arrangements would clearly need to comply with the General Data Protection Regulation (GDPR).

In the case of smart metering, there have been particular concerns that worries about privacy could lead to some consumers refusing smart meters. To address this and ensure that appropriate privacy safeguards were in place, a Data Access and Privacy Framework (DAPF) was put in place in 2012, giving consumers the choice over how their consumption data is accessed 'except where the data is needed to fulfil a regulated duty'. Thus the framework did not envisage customers having a choice where certain wider public interests were at stake. This thinking is reflected in the arrangements whereby the distribution networks can access half-hourly consumption data, with an obligation to aggregate or anonymise the data 'as far as is reasonably practicable', having had their Privacy Plans approved by Ofgem.

We explored through a consumer research expert workshop how consumers might be expected to view access to smart meter data for a public interest purpose looking at the evidence from consumer research into smart metering and privacy issues more widely. This exercise concluded that consumers consider smart meter data to be less sensitive than some other types of personal data, albeit they find it hard to judge the risks and benefits

involved and hence would generally expect the regulator to determine how best to protect their interests.

The approach adopted by Ofgem towards DNO data access (and indeed the ONS work in other sectors) shows how a focus on how best to protect customer data – rather than reliance on individual consumer choice – is appropriate where wider system benefits are at stake. The same argument applies to the provision of smart meter data for public interest purposes – and indeed the output data required to meet the various use cases we identified in Phase 1 should not raise privacy concerns as data would be sufficiently aggregated or anonymised.

A proposed way forward

While our argument was that the outputs proposed should not raise privacy concerns, the challenge was how to obtain the necessary input data (which has to be granular in the absence of any central database of smart meter data, such as exists in most other jurisdictions).[5] The first question to be addressed was therefore where the data might best come from recognising that a number of players currently have access to some but not all smart meter data and that other policy developments will impact on this over time.[6] Once the best source is identified (which may include options that require legislative change), there is then a need for a 'trusted processor' who could take the input data, linking it with other property and demographic data as necessary, to produce the required outputs. This is a role that the ONS fulfil in other sectors with powers and protections set out in the Digital Economy Act 2017.[7] As part of PIAG Phase 1 we set out a strawman process for how all of this might work.[8]

In our PIAG Phase 1 conclusion we recommended a phased approach to take the thinking forward:

- Initially, through a second Phase of the project, PIAG should continue to refine its understanding of the data required to support the particular public interest use cases identified and to pursue options to use existing data sources, which would also help to build evidence on the additional benefits improved data would give;
- Provided that this further work continued to support the necessity of access to this data for public interest purposes, BEIS (or ONS) should use their existing powers in the short term to start to gather more granular energy consumption data from suppliers (or their

[5] See PIAG, Stimulus Paper 2: International Experience – Smart Meter Data Access.
[6] Suppliers holds data for their customers at a level of temporal granularity reflecting consumer consents. DNOs can collect half-hourly electricity consumption data for customers in their area but have to aggregate / anonymise it immediately on receipt.
[7] And also the UK Data Service on behalf of the ONS.
[8] See PIAG, Stimulus Paper 5: Possible Routes to the Data for a Public Interest Purpose.

agents) as suppliers currently have the most complete records, albeit not comprehensive;[9]

- In the longer term, BEIS and Ofgem should take account of the wider public interest benefits of access to smart meter data as they develop proposals for enabling wider market access to data – for example, as part of electricity settlement reform. The best route for accessing more comprehensive and granular smart meter data would depend on such wider policy developments. Given rapid developments in data processing, artificial intelligence etc., we argued it was important that decisions in this area are transparent and kept under review.

We then set out a number of specific recommendations against this broad framework.

Progress since Phase 1

Annex 1 presents a summary of progress against these specific Phase 1 recommendations.

This shows that good progress has been made on some of the shorter-term recommendations. In particular there have been welcome steps by the central bodies (Elexon, Electralink and Smart DCC) in looking creatively at how to make best use of the data that they hold, including metadata.

Having evidenced the case for access to this data through the Phase 2 workshops, attention now needs to be paid to what were positioned as PIAG's medium- to longer-term recommendations that sit with government and where to date there has been less progress.

In particular, priorities that still need to be addressed from Phase 1 are:

- Planning for improvements to BEIS data collection under existing arrangements (noting there is now greater urgency on this as BEIS's current use of data aggregators as a data source will anyway have to change with the move to half-hourly settlement, ending the current role of supplier data aggregators);
- Wider access to UCL SERL data (which UCL committed to delivering but where there are practical challenges in creating an anonymised dataset at the UK Data Archive that provides relevant demographic data linked to smart meter data, but does not allow for re-identification);
- Greater focus on gas data (noting that none of the GDNs have plans to collect smart meter data and indeed in some instances are instead installing separate data loggers);
- Opening the debate regarding BEIS / ONS roles in relation to a longer-term solution (recognising that to date ONS have been fully occupied on other data matters).

[9] In particular suppliers only have half-hourly consumption data where customers have given explicit consent. Otherwise they can collect daily or, if customers opt out from that, monthly data.

These outstanding priority actions are picked up in section 5 of this report in the Phase 2 recommendations.

3 Evolving policy context and wider developments

A growing focus on data and net zero

Since the PIAG debate first started there has been a sea change in terms of where data and net zero sit in the overall public policy agenda:

- There has been recognition across Government of the materiality of economic and administrative data in service of the public interest as reflected in the Digital Economy Act 2017 and most recently the National Data Strategy.
- Linked to this there has been a particular focus on energy data which started with the review carried out by Laura Sandys and the Energy Data Taskforce which advocated the principle of energy data being 'presumed open'. This then developed into the Modernising Energy Data (MED) Programme and the production of the Energy Data Best Practice Guidance, with new licence obligations being placed on network companies. The Energy White Paper included a commitment to open up BEIS energy modelling and a UK Energy Data and Digitalisation Strategy is expected shortly.
- The imperative of meeting carbon budgets has been reinforced with the introduction of the 2050 net zero target (2045 for Scotland). The associated growth in decentralised energy, electric transport and heat decarbonisation necessitates a greater focus on demand-side analysis and the need for policy makers to have the data to manage this transition.
- This has been reinforced at a local level with metro and city mayors and local authorities declaring climate emergencies and setting highly ambitious net zero targets. The importance of a local focus and the need for Local Area Energy Plans has been highlighted by the Energy Systems Catapult and others.[10]
- The new focus on the 'levelling up' agenda points to the need for geographically disaggregated data for robust and systematic regional comparisons.
- Finally, the pandemic has demonstrated the public interest benefit of access to data including granular energy data sources – as well as magnifying the challenges of affordability and fuel poverty. For example, the OpenSAFELY initiative provides a new secure analytics platform for electronic health records allowing secure and timely access to pseudonymised patient records, facilitating urgent research on COVID-19.[11]

Potential sources of smart meter data

As noted above, one of the specific challenges we face in GB in providing wider access to smart meter data for statistical and research purposes is the absence of any comprehensive smart meter dataset from which to draw. There have been a number of developments since

[10] CSE and Energy Systems Catapult, Local Area Energy Planning: The Method (2020).
[11] See https://opensafely.org/.

PIAG Phase 1 which affect the *practicality* of pursuing particular routes for access to the data:

- The **Smart Energy Research Laboratory (SERL) is now up and running** with data being collected from 13,000 participants who have given their consent and also completed detailed questionnaires around their household demographics, heating etc. Several academic projects have now been approved and it is clear that the SERL data-base is a valuable resource drawing on smart meter data.
- **Five out of six DNOs now have their Privacy Plans approved** by Ofgem. A separate Background Paper provides a summary of the approaches that each of the companies is taking. In all cases the data is being aggregated at feeder level with a recognition that in a small number of cases where there are only one or two customers on a feeder then additional privacy protections will be required. In most cases DNOs will also be collecting other smart meter data that is not covered by the DAPF (but may still be covered by GDPR) such as monthly consumption data and maximum demand.
- Ofgem's **Target Operating Model (TOM) for reform of half-hourly settlement** recognises that submission of customer level data into settlement could eventually leave room for wider public interest uses. Ofgem has recently decided that daily data inputs will become the default in settlement for all customers if, in the long run, they opt-out of half-hourly collection.[12] Ofgem has also decided that individual-level meter data will not be aggregated before being submitted into the settlement system. Moreover, the detailed design of the TOM architecture (being progressed by Elexon) leaves open the possibility in future of a centralised source of smart meter data – which, in principle, could support public interest uses of the data. Ofgem and Elexon recognise the importance of an architecture that keeps these options open.
- As noted above**, central industry bodies responsible for energy data flows have started to promote the insights and evidence that can be obtained from the meta data and other system data that they hold.** Smart DCC have published a report Data for Good and have an ambition to create a data exchange that would enhance access to enable innovation and deliver public benefit. Electralink are leading thinking on the Flexr project promoting a common approach to data access across DNOs.
- Ofgem has provided recommendations to government on the idea of **full separation of the electricity system operator (ESO)**.[13] Although data requirements were not addressed in any detail in the report, thought will clearly have to be given to the data needs of the new body and there could be a potential role for it in relation to data governance. We have commented previously on the anomaly that the ESO currently has no rights to smart meter data under the DAPF, despite being heavily dependent on making reasonably accurate temporal and locational demand-side

[12] Ofgem, Electricity Retail Market-wide Half-hourly Settlement: Decision Document (2021).
[13] Ofgem, Review of GB Energy System Operation (2021).

projections in its network planning role, including Future Energy Scenarios production.

Privacy frameworks and technology continue to evolve

The other notable development stems from Brexit and the clear signal in the National Data Strategy that government intends to review data protection legislation to reduce the burden on companies while still providing protection for consumers (and meeting the adequacy requirements for data sharing with EU member states). The EU has recently published proposals for a new Regulation covering Artificial Intelligence (AI).[14]

More recent research carried out by Citizens Advice and by DNOs in developing their Privacy Plans has confirmed the broad findings from Phase 1, including broad support for DNO use of the data. Smart Energy GB are increasingly using messages about the system and environmental benefits of smart metering which they have found to resonate with consumers.

In parallel, technology and AI has continued to develop, increasing the potential for re-identification of individuals where data records are pseudonymised. We recognise that this creates an additional challenge for our Phase 1 strawman which included an anonymised dataset of individual records. However, this is a wider issue that impacts all of ONS's work and is also a focus of attention for the ICO.[15] The Energy Data Best Practice Guidance sets out examples of technical steps that can be taken to minimise these risks including the addition of 'noise' to the data, shifting / rotating data or randomisation.[16] There are also options around the levels of access that is provided, spanning: open; public with restrictions on usage; access limited to particular organisations with restrictions on usage; and closed. Recognising that this is an evolving game of 'cat and mouse', the arrangements for any wider sharing of smart meter data would need to be kept under review to ensure privacy remains safeguarded (which has been a strong tenet of PIAG throughout).

Reinforcing the need for action

Despite all the good work that has been undertaken through MED and the upcoming Energy Data and Digitalisation Strategy, the one available, comprehensive and accurate customer-side data source – that could significantly improve analysis, insight and policy development in the public interest – is smart meter data. However, the Data Access and Privacy Framework that was put in place to safeguard customer interests during the rollout places tight restrictions on who can gain access to that data and for what purpose. As such, this data remains locked off in what we termed in Phase 1 a 'walled garden' – while potentially more granular data collected by other smart devices (outside that walled garden) are subject simply to GDPR protections.

[14] European Commission, Proposal for a Regulation laying down harmonised rules on artificial intelligence (2021).
[15] See ICO, Anonymisation: Managing Data Protection Risk Code of Practice (2012).
[16] Funded by Innovate UK and developed by the Energy Systems Catapult. An early draft of the Data Best Practice guidance is available here.

Through PIAG we have identified a number of interim steps, 'work-arounds' and proxies – some of which, despite limitations, should prove very useful. Much creative effort has been put into improving the models and assumptions underpinning energy policy. But BEIS needs to decide whether it wants to continue to 'make do' in this way or whether the added value of better access to accurate and more granular smart meter data for a range of increasingly vital public purposes (heat decarbonisation planning, training models for better local area energy planning, regulation of a smarter energy market, improved demand-side forecasting etc.) outweighs the relatively limited risks around potential consumer concerns.

As noted above, in Phase 1 we explored consumer attitudes to privacy and smart meter data.[17] This showed that consumers in general were happy for their data to be used to deliver wider system benefits (which are dependent on having a comprehensive picture and hence the use of consent is not appropriate). Smart Energy GB have started to promote the wider system and environmental benefits of smart metering which consumers seem to resonate with and support. Privacy concerns should not be a barrier to using the data for such public interest purposes and indeed most consumers probably assume this already takes place.

[17] See Stimulus Paper 6 which summarised existing consumer research (here) and also the summary of tailored research carried out for PIAG by Ipsos Mori with experts in the area (here).

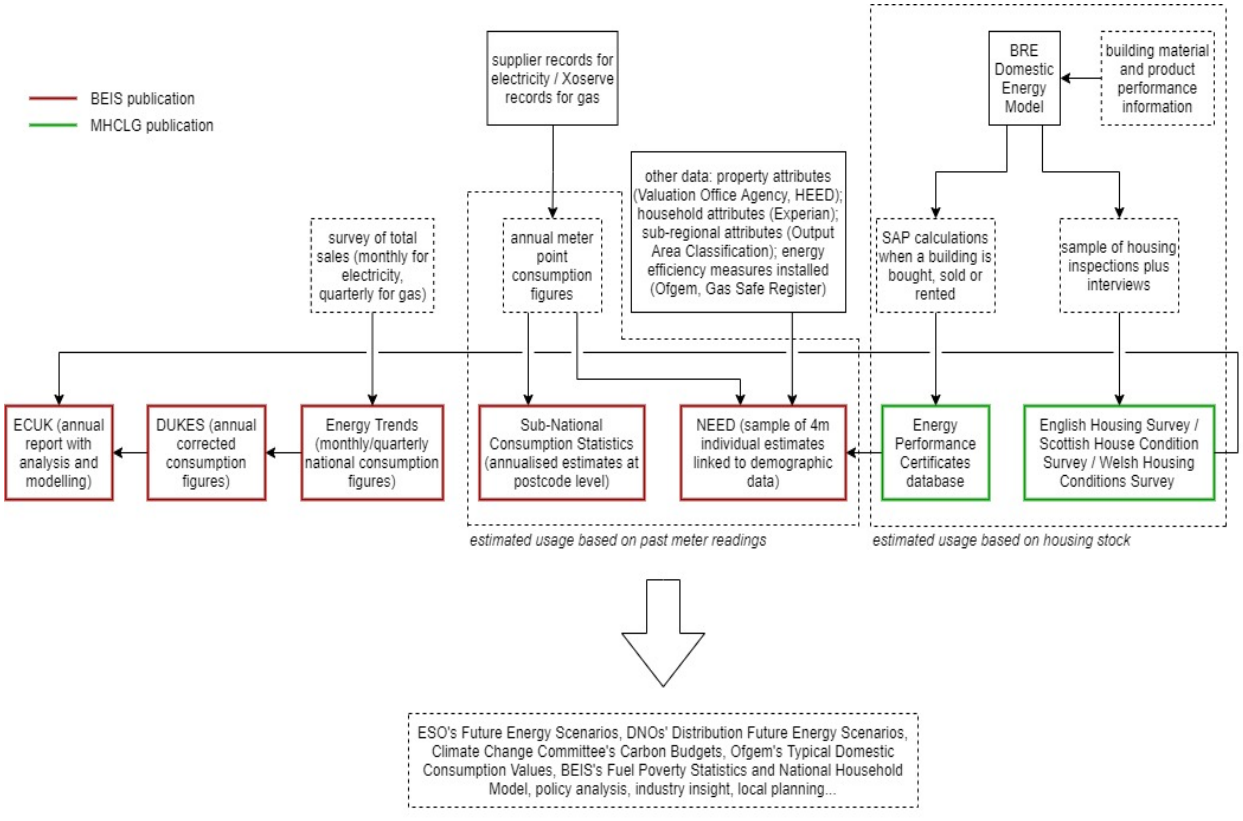
4 Summary of Phase 2 workshops

In PIAG Phase 2 we have held four workshops each aimed at exploring potential use cases in depth to clarify what data is currently (or will shortly be) available, what the gaps are and how smart meter data could fill those gaps, delivering additional public interest benefits. These workshops strongly reinforced the message from Phase 1 that there are significant gaps in our understanding of the demand side which smart meter data could fill.

Current data sources

Through the workshops we revisited the demand-side data that currently exists and that is relied on currently for the different use cases. It was clear from the workshops the extent to which a range of bodies from the ESO to the Climate Change Committee, as well as consumer bodies and academics, are very substantially dependent on the BEIS sub-national energy statistics and the NEED database – which both derive from the same source in terms of meter reads provided by suppliers.

The Summary of Findings report includes a diagram showing the various different sources of data and the connections between them. An extract from this is included in the diagram below which highlights the central role of the sub-national energy statistics and NEED.



source: Sustainability First

Compelling use cases

The individual workshop reports and the Summary of Findings provide a comprehensive picture of the additional value that smart meter data offers in relation to the different uses to which the data could be put and how this would contribute to the public interest.

In summary:

Workshop 1 – BEIS statistics: This discussion focussed on the central role played by the sub-national energy statistics and the NEED database. As shown in the figure above, at present these are derived from annualised consumption estimates.[18] While smart metering should improve the accuracy of that data the lack of temporal granularity remains a major gap. Understanding *when* energy is used is becoming at least as important as knowing how much is used. Seasonal profiles are increasingly important with the growth in renewables, uptake of EVs, and a stronger emphasis on heat decarbonisation. Even monthly data would help alongside some way of better understanding daily and within-day variations (such as maximum demand).

Workshop 2 – Regulation: It was clear from the workshop that Ofgem will increasingly be looking to oversee a market in which time of use tariffs and other forms of flexibility are important, with customers acting as prosumers or participating in the market in different ways. Ofgem's ability to make informed policy choices, monitor supplier behaviour in the market (including whether they are, as required, treating their customers fairly given what the suppliers know about their customers' demand patterns) and understand the distributional impacts of developments are all dependent on them having access to better data. Data has become a major strand of work within Ofgem as they look to make more creative use of data held by central bodies and others. However, it was clear that there was a major gap in terms of a database that links individual time-of-use consumption patterns with socio-demographic data. The SERL database does this but at 13,000 remains a relatively small sample and is only accessible to accredited university researchers.

Workshop 3 – Local Area Energy Plans: There is growing recognition of the important role that local authorities and others will play in helping plan for the transition at a local level including on transport and heat. Bodies that have committed to ambitious climate targets need to be able to monitor their progress. At present the only geographically granular data available is the annual sub-national energy statistics and for planning there is reliance on models such as BREDEM to represent the scale (though not the temporal pattern) of heat demand in individual buildings. While modellers have been creative in the use they have made of the limited data available there is a real need for the actual data to be more accessible. As a first step, a sample of more granular smart meter data (linked to socio-

[18] As set out in the NEED Quality Assurance Annex (here) these annualised estimates are based on an extrapolation of consumption between two meter readings which are at least 6 months apart to give an annual figure (which may not correspond to a specific calendar year). This draws on existing industry processes used for calculating annualised estimates for use in settlement (i.e. the AQ process in gas and the EAC / AA process in electricity).

demographic data) could be used to train models to ensure that the models' current representation of demand patterns are accurate and hence allow for more robust forecasts to feed into local area planning. Half-hourly demand data at feeder / postcode level is also seen as important. For local area planning such aggregated consumption data would only need to be linked to non-personal postcode level demographic data, avoiding privacy concerns.

Workshop 4 – Heat: From the workshop it was clear that there is a significant paucity of data about current patterns of heat usage. It is crucial that these are better understood as part of developing an effective heat decarbonisation strategy, given that heat decarbonisation is so heavily dependent on action by individual households in taking up and using low carbon heat. Again, thinking about heat policy and implementation challenges is heavily reliant on historic models of the physical properties of buildings such as BREDEM to characterise building heating needs, to model the impact on demand of different interventions and building standards, and to draw out implications for levels of fuel poverty.

There is a need for a better understanding of how *actual* consumption compares with modelled results (in terms of the thermal efficiency of the building) and also how consumption varies across households, reflecting different preferences and behaviours. Even basic facts like the proportion of gas consumption that is used for space heat versus hot water are not well understood. Historically there has been much less interest in gas data than electricity, and the gas distribution networks have shown no interest in collecting the data. With the move to electric heat pumps there is a need to understand the impact these have on the electricity network in terms of *actual* usage not simply modelled results based on technical specifications. While we have unearthed some potentially useful additional sources of data it is clear that there remains a huge gap in our understanding of heat from presently available demand-side data. A major push to improve the focus on gas data is urgently needed.

Looking across the workshops there were several common themes and in many cases the discussion spanned out to cover a range of related issues. The Summary of Workshop Findings report draws out four themes:

- **Replacing annualised meter-read based estimates with accurate (and more timely) data;**
- **Gaining insight into seasonal and time-of-use consumption patterns and other data;**
- **Validating or enhancing models on building performance and heat demand using actual data;**
- **Understanding local energy network usage patterns.**

Additional data sources identified – but gaps remain

Phase 2 has highlighted some other existing sources of data that can help improve our understanding of the demand side. These include the significant EHS Energy Follow-Up Survey (EFUS) for BEIS which is due to be published shortly, Network Innovation Competition (NIC) pilots (such as SSEN's SAVE project) and earlier Low Carbon Network Fund half-hourly data sets, academic work, data produced by the central bodies and individual projects on heat.

There are then some further potential options for improved demand data that could be provided relatively easily but that would need a further push by BEIS or Ofgem. These include Xoserve profiles, GDN NIC projects, and possibly data from boiler and heat pump manufacturers.

Phase 2 has also highlighted the opportunity to use smart meter data linked to demographics under secure conditions (e.g. through an expanded SERL) to validate existing models / develop archetypes. This would be a useful initial step with low privacy risks.

However, we are still firmly of the view that wider access to a full set of suitably aggregated / anonymised smart meter data is needed ultimately to enable:

- Local and regional analysis;
- Understanding variability around modelled values not just the 'average';
- An effective way of tracking the impacts of pilots / broader interventions, without the need to make special (and potentially expensive) arrangements for data collection.

5 Phase 2 Recommendations

The work conducted in PIAG Phase 2 points to the following high-level recommendations which we explore further below:

- BEIS Energy Statistics to be expanded to respond to users' needs;
- SERL to be extended beyond 2022 and access widened;
- De-personalised smart meter data held by DNOs to be treated as 'presumed open';
- Smart meter data to be used to train models to improve the accuracy of current representations of energy demand;
- Time for a major push by Ofgem, BEIS and others on gas demand data;
- Keep doors open and continue to reflect on potential pathways for a longer-term comprehensive solution.

1) BEIS Energy Statistics to be expanded to respond to users' needs

It is clear from the workshops the extent to which much of GB energy system planning is built on the foundations of the BEIS sub-national energy demand statistics – which in turn draw on annualised demand figures provided to BEIS by energy suppliers (or their agents). The need for a firmer foundation as demand plays an increasingly important role in the energy system has been highlighted by the ESO and the Climate Change Committee. BEIS teams working on smart energy systems and on heat recognise the need for better demand-side data.

The BEIS statistics team have highlighted that smart meters will make the annual data that is collected more robust. But our view is that there is a clear case for the data that is collected to be expanded. This could be done by the BEIS team **using their existing powers** under the Statistics of Trade Act 1947 (which they use at present to collect the annual data from suppliers or their agents) or through other routes. Such data can only be collected by BEIS where it is already collected by the company concerned for another legitimate purpose and at present only suppliers have full coverage of smart meter data across gas and electricity (albeit the level of granularity will depend on customer consent).

As an absolute minimum, stakeholders have made clear that **monthly consumption data** (which suppliers collect as a minimum once a customer has a smart meter) would add significantly to current understanding. With more renewable generation and an increased focus on heat, seasonal consumption patterns are increasingly important to understand.

As well as monthly consumption, **maximum demand data** (which is also recorded on electricity smart meters) would provide a level of additional insight on the daily and within-day variations without creating an undue data burden. **Export data** is also crucial to understanding the impact of solar PV. That said, we recognise that even this expansion would add to the volume of data collected and potentially the resources required to manage it. It is also not known at present exactly what data suppliers currently collect from

their customers or on what frequency. BEIS may therefore wish to start with a survey and / or a pilot to test the practicality of possible future arrangements.

However, we would strongly **encourage BEIS to be more ambitious** than this and to carry out a full assessment of the costs and benefits of collecting more granular (daily or half-hourly) data either on a comprehensive or a sample basis, recognising that variations in demand between days and within day are increasingly important from a system perspective. This assessment should also include further engagement with the internal and external users of BEIS statistics, building on the evidence that has been presented through PIAG. SERL and ONS may be able to advise on how best to manage the significant volumes of data which may be involved.

BEIS might also usefully consider whether there is data currently available to and / or being collected by DNOs that is not collected by suppliers (e.g. maximum demand) and whether BEIS should also **look to DNOs as a route to request smart meter data.** The range of statistical measures which some DNOs propose to derive from the data (as set out in the Background Paper on DNO Privacy Plans) may also be of value.[19]

As well as improving the **sub-national energy statistics** we would want to see BEIS linking a representative sample of the more granular energy demand data with socio-demographic data and creating **an anonymised dataset for research as exists currently with NEED** (where 4 million records are available).[20] As discussed in the context of SERL below, the risks of re-identification would need to be properly considered but unless full half-hourly data profiles were being made available this is unlikely to be any more of an issue than it is with NEED. Such a dataset would meet a similar need to our recommendations for an enhanced SERL database but offers the potential to be a larger scale, fully representative sample.[21]

The PIAG conversations have highlighted that with electricity settlement reform the practical arrangements for collecting this data from supplier agents are anyway set to change with annualised estimates ceasing to exist. BEIS should use this as a trigger to review what demand-side data it presently collects through surveys and via the Statistics of Trade Act as well as the physical routes and gateways through which it is collected.

Through the workshops and bilateral discussions key stakeholders such as the ESO, the Climate Change Committee and BEIS policy teams made clear the importance of access to better data. However, it is not clear that they have been making their needs known to the BEIS statistics team directly. We would like to see **more dialogue between the BEIS**

[19] Some DNOs are calculating metrics for each customer (e.g. half-hourly maximum, minimum, variance) to give a measure of the variability of individual demand without storing the actual half-hourly data.
[20] Anonymised energy consumption data linked to property characteristics is openly available. The ability to link the records to other demographic data is available to accredited researchers. See BEIS, National Energy Efficiency Data-Framework (NEED): Accessing Property Level Data (2020).
[21] Given the lack of any clear link between socio-demographics and demand profiles the test of representativeness cannot simply be based on socio-demographics.

statistics team and users, with users reiterating the clear messages they have given us about their data needs.

2) Smart Energy Research Laboratory (SERL) to be extended beyond 2022 and access widened

It is clear from the PIAG workshops that the SERL data portal, now covering 13,000 households, provides a unique resource linking half-hourly smart meter data with demographic and survey data which can then be used to better understand patterns of energy usage and potentially to help validate elements of models of thermal efficiency / create archetypes that could be of wider use.

SERL is currently funded by UKRI (UK Research and Innovation) which brings together the various academic and business-led research councils. **SERL's initial 5-year funding runs through to 2022** and there is a need for clarity around what will happen beyond this and **how this valuable resource can be kept running**. Having invested heavily to establish the database and research portal it would seem wasteful not to find a way to continue it.

The assumption is that as a minimum the data that has already been collected would remain accessible but there clearly is value in continuing to update the data over time which will require further funding.

That said there are limitations to the existing approach:

- Some demographics are not adequately represented (e.g. Economy 7 customers) because they were not covered by the smart meter rollout in 2020;
- The sample-size limits the potential for use at a sub-regional level;
- Access is restricted to university researchers (in contrast to other data sources such as English Housing Survey (EHS) where granular data is available through the UK Data Service, which other researchers can also access).[22]

It is important that any subsequent funding for SERL to continue beyond 2022 provides a route to addressing these limitations.

How far the size of the SERL sample needs to be extended will depend in part on progress on our other recommendations. A more granular NEED database could meet a similar need on a much larger scale and, as noted below, local authority needs may best be met by DNO data.

[22] Anonymised data from the English Housing Survey is available to anyone who registers and accepts the terms of the end user licence. The full data which can be linked to other data through geographical identifiers requires secure access and is only available to accredited researchers. See UK Data Service terms and conditions of access.

That said, if funding were to be provided to continue SERL there would seem to be a strong case for also **extending the sample to include under-represented groups and to enable more granular geographic analysis**.

The fact that access is restricted to university researchers reflects the basis on which participant consent was originally obtained by SERL. This therefore precludes other accredited researchers from accessing the data. SERL have committed to look at ways of providing an anonymised granular SERL dataset but would need to ensure there was no risk of re-identification.

While UCL plan to include a range of helpful statistics and cross-tabulations in their initial annual SERL report due out later this year, we would still like to see organisations like BEIS, Ofgem and the Climate Change Committee able to interrogate the data directly.

In the near term we would encourage **SERL to continue to explore the options for making an anonymised dataset available to at least accredited researchers** (where the risks from re-identification are low). There are also various techniques that can be used to minimise the risks of re-identification if the data were to be made more freely available.

In the absence of a route for other researchers to access such an anonymised database we would encourage **UCL to publicise and enhance the opportunity for third parties to partner with academics to solve public interest questions.** Third parties would not get direct access to the SERL database but would get to shape questions being asked of it and full access to the results. If funding were to be secured in future, then an effective approach could be to have an open competition for proposals with resourcing for both academics and, where appropriate, third parties. We would encourage SERL to include such an approach in their proposals for future funding.

If funding is to be made available to SERL for an extended sample to be collected **post 2022** then we would recommend that householder consent is obtained on the basis of **access being provided to all accredited researchers, not just university researchers.**

3) De-personalised smart meter data held by DNOs to be treated as 'presumed open'

We have now reached a position where five out of six of the electricity DNOs have had their Privacy Plans approved by Ofgem and are able to start collecting smart meter half-hourly consumption data. The Background Paper on DNO Privacy Plans provides a summary of their plans. In all cases they will be aggregating this data to feeder level (with additional privacy protections where there are only one or two customers on a feeder).

In some cases they will also be collecting other metrics such as maximum demand, voltage, export or reactive power which are not necessarily covered by the DAPF but are still covered by GDPR where they are personal data.

From reviewing the Privacy Plans and from the DNO draft Business Plans that have been published, this smart meter derived data is increasingly being seen as part of the wider

granular data the DNOs hold about their network – collected through e.g. substation monitoring – and used for network planning.[23]

As part of the MED programme, the RIIO2 price controls will introduce licence obligations on the networks:

- To publish and regularly review a Digitalisation Strategy & Action Plan in accordance with Ofgem guidance and
- For the use of data to meet the expectations of Data Best Practice (DBP) guidance, which includes the principle that data should be 'presumed open'.

However, the position of smart meter data within the MED framework is not totally clear. The Energy Data Taskforce focussed on systems data – given the sensitivities around smart meter data and acknowledging that PIAG was looking in more detail at that area.

In developing the Energy Data Best Practice Guidance, Ofgem and the ESC have sought to present an integrated framework. Thus all data is expected to be treated as 'presumed open' with a triage process to identify exceptions including in relation to privacy. In the context of privacy, the Guidance makes clear that DNOs should look to find ways to address the privacy concerns (through aggregation, anonymisation or other privacy enhancing techniques) so that data can ultimately be made available. The aim should be to find a way to share data safely, not to use privacy restrictions as a reason for not sharing.

Once suitably aggregated / anonymised, smart meter derived data would no longer be considered personal data under GDPR.

However, under the terms of the Data Access and Privacy Framework, DNOs can only use the granular consumption data they collect in accordance with their Privacy Plans, none of which foresaw any wider sharing of the data even in aggregated form.

There is therefore a lack of clarity as to where smart meter data fits into the MED framework and BEIS's initial assumption was that it was outside scope as it was not seen as 'system data'.

In our view **de-personalised smart meter data (e.g. where sufficiently aggregated) and smart meter data that is not treated as personal for the purpose of the DAPF (e.g. maximum demand, voltage data, export data) should be treated as 'presumed open'**. In general network companies have been funded by consumers, and the data that their operations generate should be seen very much as a public good. For example, feeder level data (further aggregated if necessary) would clearly be of direct relevance to the development of Local Area Energy Plans and also potentially the new Network Development Plans which the DNOs are being required to produce with stakeholder input.

[23] e.g. WPD's Draft RIIO Business Plan has 3 pages on the uses it plans to make of smart meter data.

In our view this would not require any change to the DAPF itself and it is simply a question of how far this is consistent with the existing Privacy Plans or whether they would need to be updated.

Ofgem should provide guidance to the DNOs as to the expectations around de-personalised smart meter data in the context of the proposed new data best practice licence condition and in feeding back on their Digitalisation Strategies (which do not cover smart meter data in any detail at present). In particular Ofgem's upcoming consultation on the Data Best Practice guidance and the Digitalisation Strategy and Action Plan guidance should provide an opportunity to explore these issues and clarify what is in scope.

In developing such guidance Ofgem might usefully draw on models from the US where in some states aggregation must cover a minimum of 100 households and in others a 15/15 rule applies which requires aggregated smart meter data to be made available where there are at least 15 consumers and no individual consumer accounts for more than 15% of the load.[24] It is acknowledged that the level of aggregation currently required under the Privacy Plans will not be sufficient in many cases as DNOs are allowed to retain data about feeders with only one or two customers on them where they have made the case to Ofgem about the need for that data. However further aggregation (or other privacy enhancing techniques) could address this.

An alternative way of progressing this would be for an individual DNO to lead work on this issue through an innovation project, as was done for example on WPD's Open LV project. This could develop a clearer view of the data (smart meter and other socio-demographic markers) that could most usefully inform Local Area Energy Plans.

While an individual DNO led approach might allow for quicker development, there is also a need ultimately for **a consistent approach across DNOs**. The importance of such consistency of approach has been discussed in the context of other energy data as a part of MED and Electralink's Flexr proposal. While there are challenges created by the use of different Smart DCC gateways and different approaches taken in Privacy Plans, there should still be scope for a coordinated approach to standardise data formats and any outputs. If the proposed independent system operator were to collect electricity smart meter data through DNOs in future (as recommended below) then that could help facilitate a consistent approach. The ESO might usefully start to explore the practicalities of this now.

One gap is that IDNOs do not currently have to collect smart meter data and are not covered by the same obligations. This is an issue that Ofgem may wish to reflect on going forward.

[24] See the PIAG stimulus paper 2 (here) and Lexington Institute, Balancing Smart Grid Data and Consumer Privacy (2017).

4) Use smart meter data to train models to improve the accuracy of current representations of energy demand

One of the opportunities highlighted by the workshops was the use of smart meter data to train the models that are used to project levels of energy demand based on property characteristics and broad demographics. These models play an important part in planning for heat decarbonisation and in local area energy plans more generally. Ensuring the models are as accurate as possible in how they model current energy demand will make future projections more robust. Access to smart meter data is also important is assessing the impact of interventions which would then be reflected in the models.

Even with a full set of historic smart meter data there would still be a need for these models which forecast the impacts of policy and other changes (such as the shift from gas to electric heating). As such, putting effort into improving these models is both a way to deliver short-term benefits but is also necessary even if wider access to smart meter data is also ultimately secured. Equally, even with improved models, wider access to the data would still be needed to understand behavioural differences and preferences along with other factors which can result in quite significant variations around modelled consumption patterns.

The training of models really has to be done by the model owners (e.g. the ESC's EnergyPath@Networks model, CSE's THERMOS model and BRE's BREDEM). Making progress on this is therefore dependent on other recommendations around routes to the data. However, a focus on this particular 'use case' might help identify a targeted way forward.

We would like to see **BEIS and UCL working with modellers to develop concrete proposals** for how this work could be progressed.

In particular we would like **all new customer- or publicly-funded innovation projects to be required to collect smart meter data** to provide evidence on the impacts of their trial / intervention on energy demand (at least where smart meters have already been installed). This would help in particular in building the forecasting capability in the models. For example, the valuable BEIS / ESC Electrification of Heat Demonstration Project (covering the installation of 750 heat pumps) is not collecting energy demand data from smart meters but would have benefitted from doing so. Going forward, the **UCL SERL** 'laboratory' provides a ready route for doing this for pilot project participants who give consent to share their data.[25]

5) Gas demand data – time for a major push by Ofgem, BEIS and others

The fourth workshop highlighted the significant paucity of data that exists in relation to gas demand and hence, given the dominance of gas as heating fuel, in our understanding of the patterns of GB heat demand. Given the challenges around heat decarbonisation, having a

[25] As well as the 'observatory' of 13,000 households there is the ability to separately collect data for additional households which are part of pilots or other research projects.

clearer picture of current patterns of *gas* usage is essential to understand current patterns of *heat* usage and how this varies across households and to address basic questions like the split between space-heat and hot water usage.

As highlighted in Phase 1, the options for access to gas data for the public interest are even more limited than on electricity. Neither the GDNs nor Xoserve, the central settlement body, collect gas smart meter data.

To date little attention has been paid to uses of gas smart meter data and, unlike DNOs, the GDNs are not mandated to participate in Smart DCC. Instead we are seeing GDNs install stand-alone gas loggers to collect data for innovation projects, motivated in part, it would seem, by the costs of Smart DCC participation and the restrictions in the DAPF.

As part of a major push to improve the availability of gas demand data we would want:

- **Ofgem and BEIS to set expectations around GDN membership of Smart DCC**: In the early stages of the rollout Ofgem made clear to electricity DNOs that duplicate monitoring equipment would not be funded and that they were expected to participate in Smart DCC (and that the benefits would be expected to offset the costs after a period). It is now time for Ofgem to send a similar strong message to the gas distribution networks and to push hard on how that data could both benefit the GDNs and be of wider public benefit. GDNs are reluctant because of the costs of Smart DCC participation but overall GDN participation is unlikely to add materially to Smart DCC costs and Ofgem and BEIS should consider the case from a whole system perspective.[26] DNOs should be able to share learning around the practicalities of Smart DCC access and the Privacy Plan requirements. Given the transformation that will be needed on the GDNs' networks to deliver net zero, either decommissioning them (in an electric heat future) or re-purposing them for hydrogen, it will become increasingly important for GDNs to understand the use being made of their networks.
- **Ofgem, BEIS and DNOs to consider the potential use DNOs could make of gas demand data**: Given the new obligation on DNOs to consider energy efficiency as an alternative to network reinforcement and in the context of expectations around the electrification of heat, there is a need for DNOs to start to build their understanding of heat demand. In principle, this could be done by DNOs starting to collect gas data. However, this was not envisaged at the time the DAPF was put in place and hence it only deals with DNOs' rights to collect electricity data, although it may be possible to do more in the context of an innovation project for example. Further thought should be given to the opportunities and ways forward for DNOs to gain a better understanding of heating patterns as part of a shift to whole systems thinking.

[26] Aside from data uses, Ofgem and BEIS might encourage GDNs to explore potential benefits of access to alerts and other functionality to ensure maximum benefits are being secured from the rollout of gas smart meters in managing safety and other operational issues.

- **Ofgem to set expectations around GDNs providing access to anonymised data from NIC projects**: Gas NIC (Network Innovation Competition) projects such as SGN's RealValue project are a valuable source of highly granular (6 minute) gas demand data. SGN have said this data cannot be made public because it is personal data. Ofgem should challenge this assumption and lessons should be drawn from the earlier electricity NIC and LCNF projects where anonymised datasets have been required to be made publicly available (albeit after some considerable discussion and initial pushback). As was clear from the workshops, the electricity NIC projects have for many years been a main source of understanding around profiles of granular electricity demand by demographic. The same should apply to gas innovation projects going forward.
- **Xoserve to open up access to gas profile data**: Xoserve collects a sample of half-hourly consumption data through loggers and via suppliers to create gas demand profiles, including analysing, for example, the effects of weather on gas demand. Summary profiles (and ideally anonymised data records or some means of looking beyond simple averages) should be made publicly available by Xoserve in the same way central bodies in electricity are starting to open up access to system and meta data that they hold.
- **UCL and SERL to prioritise research looking at gas demand and helping to fill some of the gaps identified**: given the limited sources available, the SERL database which includes gas demand (and links it to external temperature, property and socio-demographic data) is of particular value in this space and we would like to see researchers using the PIAG-2 Workshop 4 Report on heatas a pointer to areas where research using the SERL database could help fill evidence gaps in the near term.[27] The UCL SERL annual report due this summer should also address gas as well as electricity demand.
- **Ofgem and BEIS to encourage sharing of insights by commercial players**: Suppliers routinely collect gas smart meter data and there would be scope for them to publish insights based on aggregated / anonymised data to help inform the public debate on heat decarbonisation. Similarly, boiler manufacturers may have insights that they could share.
- **BEIS to commission a meta-study pulling together available demand-side data on gas usage / heat usage**: As part of the Workshop 4 Report we identified a number of additional data sources that could provide some insights on heat demand. There would be value in BEIS commissioning a meta study to bring together such evidence as exists on GB heat-usage, including on heat pump usage.

[27] PIAG, Phase 2 – Workshop Report 4. Heat Decarbonisation: Potential Benefits of Smart-Meter Energy-Consumption Data.

6) Keep doors open and continue to reflect on potential pathways for a longer-term comprehensive solution

In PIAG Phase 1 we identified potential routes to accessing the smart meter data, with the ONS, or an equivalent body, as a trusted facilitator using Digital Economy Act or other powers to process the data (including linking it with other data as necessary) and to produce privacy-respecting outputs in terms of statistics or an anonymised database that could be used by accredited researchers for approved projects. In the absence of a central repository of smart meter data, we envisaged that the data could come from suppliers, distribution networks or settlement bodies depending how their roles and access to data evolved. We stressed the need to keep doors open and are pleased that Ofgem has recognised this in its thinking around the half-hourly settlement Target Operating Model (TOM), albeit the TOM architecture would need to evolve to enable such access.[28]

While this paper has identified some intermediate steps that could help significantly with access to better demand data, we maintain that the long-term goal, to deliver the full benefits, should still be for this data to be accessed in line with our PIAG Phase 1 recommendations.

As such we continue to advocate a strategy of keeping doors open and looking sympathetically at the cases being made by industry players around wider access to the half-hourly data, in particular where that would facilitate access to the data for the public interest. In particular we would like to see:

- **Ofgem, BEIS and Citizens Advice** – continuing to think about the customer-side data that will be needed longer-term to oversee the market and ensure that consumers' interests are protected in a world where companies have access to big data and are able to exploit it;
- **Ofgem, BEIS and others** – continuing to bear in mind the wider public interest uses that could be made of the data as they take forward the half-hourly settlement reform proposals, the arrangements for the next DCC licence period and other initiatives;
- **Smart DCC, Electralink, Elexon and Xoserve** – continuing to be ambitious in identifying ways to make system data and metadata which they hold available in the public interest;
- **Ofgem and BEIS** – reviewing the arrangements for networks to access consumption data under the DAPF as requested by Northern Powergrid given that Ofgem has signalled that it is limited in what it can agree to in relation to Privacy Plans by the wording in the licence and given the much clearer understanding that now exists of how DNOs might make use of smart meter data in the wider public interest;
- **BEIS, Ofgem and ESO** – considering the role a new fully independent system operator should play in relation to smart meter data, noting the needs that such a

[28] See Ofgem, Electricity Retail Market-wide Half-hourly Settlement: Decision Document (2021).

body would have for access to the data itself for system planning, including for the Future Energy Scenarios, but also the role it could potentially play in facilitating access to the data by others. At a practical level the independent system operator could access electricity smart meter data via the DNOs which would also help drive a consistent approach across DNOs, as discussed above;

- **BEIS and ONS** – working to understand where responsibility should sit longer term for bringing together individual smart meter data records and other data, recognising the powers that ONS has under the Digital Economy Act 2017.

6 Conclusion

This report brings the PIAG project to a close. Sustainability First and CSE are extremely grateful to the project sponsors and to the wide range of stakeholders who have participated in the PIAG process and engaged so very willingly in the workshops for Phase 2, despite the move to a virtual environment.

We hope that the strong focus that now exists on energy data, including through the upcoming UK Energy Data and Digitalisation Strategy and the MED programme led by Ofgem, BEIS and Innovate UK will provide a channel through which the work of PIAG will now actively be taken forward.

We are reassured that BEIS and Ofgem, in particular, have acknowledged the value of the recommendations in the report and that other sponsors and supporters have signalled their readiness to help take this agenda forward.

This report will be published and shared more widely through a close-down event in June 2021.

Sustainability First & CSE

May 2021

Appendix 1: Progress against PIAG Phase 1 Recommendations

Recommendation	Progress
Developing the case for access	
BEIS and Ofgem should consider the data that they will need for effective oversight of an increasingly data driven sector – for market monitoring and for policy design and evaluation, including understanding distributional impacts	Clear recognition from Ofgem of the importance of this data reflected in the workshop 2 discussions
In addition to gas and electricity consumption data, **all parties** should reflect on the potential for other smart meter data to serve a public interest	In their privacy plans some DNOs are clearly starting to think about other data that could be used e.g. maximum demand data
BEIS should consider the role that improved use of smart meter consumption and other data could play in discharging the expectations from wider government on use of administrative data for better statistics	ONS and MHCLG working on how EPC data could be put to better use but no further thinking on smart meter data. Hopefully the outputs from Phase 2 will help with this.
PIAG members to help articulate in more detail their requirements and the benefits that could be delivered through improved access to smart meter data	Strong contributions from PIAG members to the various Phase 2 workshops have helped in articulating the benefits
BEIS or Citizens Advice (and / or other PIAG members) should commission research on how consumers would feel about access to their smart meter data for a range of different public interest purposes	Some additional consumer research undertaken by Citizens Advice which provides further insights on privacy issues but not specific to this question.
Sustainability First / CSE to work with BEIS Energy Data Taskforce colleagues to ensure their recommendations and follow-through reflect PIAG learning	PIAG findings reflected in Energy Data Taskforce report. Further focus needed to ensure smart metering embedded in MED thinking once PIAG complete.
Immediate: making best use of existing data sources	
Central bodies should identify relevant data that they hold that could help meet PIAG public interest use cases now, both to provide immediate solutions and to help inform decisions on the way forward	Strong drive from Smart DCC, Elexon and Electralink to look at the data they hold and the opportunities it provides. Xoserve now turning to this agenda
UCL and BEIS should consider how aggregated or anonymised outputs from the UCL SERL could be put to wider use outside the academic community to support public interest purposes including public policy making	Some statistical data will be provided in the UCL annual report (due in the summer) but barriers being encountered to provision of anonymised datasets. **Given the value of this resource as highlighted through Phase 2 discussions this needs urgent strategic consideration.**
BEIS and MHCLG should explore how smart meter data could be collected alongside the English Housing Survey, drawing on ONS experience as necessary	EHS Follow-up survey will collect data from a small number of households. Work ongoing between SERL and MHCLG on collecting smart meter data from EHS participants. A sample of

	EHS participants is being recruited for an initial pilot.
Short to medium term: taking forward improved data access	
BEIS and ONS to consider where responsibility should sit between them for developing smart meter data collection under existing legislative powers	No discussions have taken place that we are aware of. **With more clarity on the case for access these discussions should now start**
BEIS / ONS should open a discussion with Energy-UK and relevant central bodies about preparatory work to allow more granular data to be collected (under existing legislative provisions) as the smart meter rollout approaches completion	No discussions have taken place that we are aware of **Changes to Elexon data collection arrangements (with HHS) mean that BEIS will need to revisit its approach anyway as a matter of relative urgency**
Sustainability First / CSE to work with **DNOs** and other parties to examine at a city scale the granularity of data required in practice to meet the city energy planning use case and the benefits of having access to this level of granularity of data compared to that currently available	Workshop 3 focussed on the data requirements for local area energy planning Ongoing work by DNOs as part of MED will build on this
Long-term: Keeping options open	
Within the terms of their privacy plans **DNOs** should take steps to work collaboratively on processes for collection and storage of electricity meter data in standardised formats to facilitate potential future use of that data at a whole systems level	Project Flexr and other work by the ENA has focussed on the value of standardisation of other data sources. This should provide a foundation for thinking about smart meter data in future, as could the data requirements of ESO
In considering options for development of settlement and other system reforms for market purposes **Ofgem** should also take into account the long run opportunities to improve the availability of data for public interest purposes	We have continued to engage with Ofgem to feed PIAG learning into the settlement reform decisions. Ofgem have acknowledged the potential future role of data for public interest purposes and Elexon's choice of architecture seemingly reflects this
BEIS should work with gas distribution networks, Ofgem and others to develop a clearer view of how gas smart meter data could be expected to deliver system benefits (e.g. supporting assessment of options for heat de-carbonisation) and the potential role in the long-run of gas distribution networks in that	Workshop 4 highlighted that gas smart meter data remains a neglected resource despite the range of areas where insight is needed to inform heat policy. GDNs continue to show no interest in the data. **This needs to be urgently addressed.**
Other parties should all actively consider what future role their organisations might eventually play, if any, in enabling access to smart meter data for a regulated or for a public interest purpose	While there may have been some thinking from a commercial perspective, in general parties are waiting on a steer from BEIS or Ofgem given the tight restrictions placed on use of smart meter data
As the regulatory framework develops, policy makers in **BEIS and Ofgem** should identify what these changes entail for access to smart meter data for a public purpose and reflect this in the	No progress **With the move to 'presumed open' networks need a clear steer from BEIS / Ofgem / ICO as to how that applies to aggregated smart meter**

regulatory framework to provide a potential legal route for access to the data	**data i.e. at what level of aggregation the data ceases to be considered personal**
Wider smart meter framework	
BEIS and Smart DCC should continue to monitor the ease with which third parties can register as DCC users and access smart meter data (with the consumer's consent) given that certain public interest related uses could be delivered through that route	UCL's experience has helped clarify and improve the process. EST are understood to still be experiencing difficulties
BEIS should monitor the deployment and use of CADs and what data is being collected on what terms – and if necessary be ready to act to improve the transparency of the arrangements to consumers	Energy White Paper included planned consultation on smart appliances including privacy angles
Citizens Advice should take forward their Data Dashboard concept to a next stage to provide consumers with transparency over who has access to their data	Discussions ongoing

Appendix 2: Summary of PIAG Project papers

Phase 2

Phase 2 final report (this paper)	Final Phase 2 paper
Annex 1 to final report	Working paper on DNO Privacy Plans
Annex 2 to final report	Summary of findings of workshops 1 to 4
Workshop Paper 4	Analysis of domestic heat – possible added insight from smart-meter data
Workshop Paper 3	The potential 'public-interest' value of access to smart-meter data for devolved governments and local authorities
Workshop Paper 2	Regulatory assessments and system efficiency: potential benefits of smart-meter energy consumption data
Workshop Paper 1	Government approaches to published data and statistics for energy consumption

Phase 1

Phase 1 final report	Final Phase 1 paper (Workshop – April 2019. Publication – June 2019.)
Annex to PIAG final report	Summary of PIAG project papers
Stimulus paper 8	Capability requirements of public interest data user organisations
Stimulus paper 7	Possible routes to smart meter data for public interest uses
Ipsos MORI research report	Customer thinking on privacy in relation to smart meter data for 'public interest' use
Stimulus paper 6	Consumer research on access to smart meter energy data
Stimulus paper 5	Public interest use-cases: data attributes, data requirements, and associated privacy and access implications
Stimulus paper 4	Stakeholder perspectives on smart meter energy data and potential public interest use-cases
Stimulus paper 3	Data ethics – a review of the landscape
Stimulus paper 2	International experience – smart meter data access
Stimulus paper 1	Background to ICO Guidance on anonymisation and annex on data access privacy legal framework
Working Note	Clarifying what smart meter data could add to the public interest: public interest questions to frame PIAG's work
Kick-off stimulus paper	Initial Meeting – 30 November 2017