

DATA FOR GOOD

SMART METER DATA ACCESS

October 2023



Contents

Foreword	3
Executive Summary	4
Introduction	8
Industry context	11
Case for change	14
Consumers	14
Energy system	16
Health and social care, wider public services	18
Policy interventions	19
New market innovation	21
Navigating the pathway to increased success	23
Proposals	31
Unlock smart meter system data to support fuel poor households	32
Maximise access to smart meter data through existing mechanisms	34
Establish a data institution for smart meter data	35
Maximise data access while minimising risk	38
Conclusion	40
Bibliography	41

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Foreword

Maximising appropriate access to smart meter data, in a manner that ensures and enhances consumer trust, is an urgent and critical step on the path to achieving our net zero ambitions.

In January 2022 we at Energy Systems Catapult published the Energy Digitalisation Taskforce report to support industry and government in modernising the energy system, to unlock flexibility and create the conditions for clean tech innovators to thrive. Utilising smart meter data for public good was a key recommendation within the taskforce report.

The Catapult have worked with the Data Communications Company, using the Energy Digitalisation Taskforce work and DCC's 2021 paper 'Data for good' as the foundations, to publish this follow up paper - with the aim of maintaining momentum of thought, discussion, and action around widening access to smart meter data. The current incentives and governance system in place across the energy sector do not promote the use of smart meter data to the fullest potential. This Catapult paper outlines four proposals to change this, and while some can be achieved in the short term, others require more fundamental changes. All require greater industry collaboration and support for the task.

The smart metering system built and operated by the DCC already transmits more than 1.5 billion messages every month, helping over half the homes and small businesses in Great Britain to engage directly with their energy usage. It is now incumbent upon us to urgently leverage the data passed over this network – a national asset paid for by consumers - for public good.

A wide variety of organisations, ranging from local authorities to innovative start-ups have a plethora of use cases where smart meter data has been identified as critical in enabling positive public good outcomes. From supporting health and social care challenges for the vulnerable in our society, through to doing very clever things with analytics to optimise systems and balance our grid, the opportunities for the use of smart meter data are profound – and a collection of those are laid out in this paper.

The current cost of living crisis and the challenges the energy system has faced in recent times has laid bare the impact the energy sector has on society. As an industry, we are custodians and agents of change of the energy system, and all of us are responsible for ensuring that it delivers, for this generation and next. Prioritising that data from the smart metering system is used to its fullest potential is vital, as it is one of the many critical paths to a net zero energy system. The Catapult presents this paper with the expectation that the industry and government come together and make decisions and to ensure that smart meter data access is enhanced, appropriately, in a way that enables benefits to wider society and unlocks the innovations we need.

Guy Newey, Chief Executive Officer, Energy Systems Catapult
Angus Flett, Chief Executive Officer, Data Communications Company



Access to smart meter data is a critical enabler of a just transition, consumer control and system stability. Smart meter data will help promote energy efficiency, empower consumers, and support new solutions for the energy transition.

Laura Sandys CBE,
Chair, Energy
Digitalisation
Taskforce

Executive Summary

Smart meter data is at the heart of the energy system transition. It is critical to achieving our net zero target and fundamental to alleviating cost pressures for end consumers. With over 28 million smart meters now installed, the system operated by the Data Communications Company (DCC) is already generating over 1.6 billion data transactions every month.

This unique data set is being generated by more than half of all the households in Great Britain. That's over 16 million connected homes. The data flows are enabling cost savings and carbon reduction through more accurate billing and better awareness of energy use. Combined, this constitutes over 800,000 tonnes of carbon savings per year.

But this is just starting to scratch the surface of what is possible. Greater transparency of, and easier access to, smart meter data can unleash the transformative potential of the system. It will allow existing and new organisations alike to innovate, engage consumers and deliver system benefits.



Building on the work of the Energy Digitalisation Taskforce and DCC's preceding Data for Good vision, this paper seeks to move the dial from discussion to further action, introducing proposals to the industry that can be implemented to maximise the public interest benefit of smart meter data. It explores the full array of benefits that can be unlocked through enhanced data access and sets out the considerations that need to be addressed if the true potential is to be realised, including the imperative to ensure and enhance consumer trust.

Enhancing access to smart meter data is not a straightforward task. It will take ambition and appetite for change, greater regulatory flexibility and a departure from current industry governance structures. The value of doing so is undeniable. The energy industry, collectively, owns a data set which is proven to be of help to the millions of households in fuel poverty. Society at large will also benefit if that data can be used in the battle to avoid rapid heating of the planet.

Context and the case for change

Delivering public interest outcomes and economic growth through the better use of data has been a cornerstone of government policy for many years. The impending Data Protection and Digital Information Bill re-enforces the Government's desire for a pro-innovation, pro-growth data landscape.

In the energy sector, a multitude of initiatives – policy making, market stimulation, industry-led activity - are uniting around digitalisation to enable the energy system transition and deliver a low-carbon future. Flexibility from technologies such as electricity storage, smart charging of electric vehicles, flexible heating systems and interconnection are estimated to save the UK £10 billion per year by 2050¹. Such benefits, and the broader management of a more efficient, smarter energy system will not be realisable without secure, interoperable data exchange.

In this context, attention is increasingly being focused on smart meter data and the importance of better access to it. We are seeing more and more examples of how data access can lead to innovation and public interest benefit – through greater savings and tailored support for consumers, better planning and efficiencies across the energy system and new opportunities in health, social care and other adjacent markets.

This context, and the emerging evidence of the benefit that can be derived from increased access to smart meter data, creates the rationale for further and urgent action.

The energy industry, collectively, owns a data set which is proven to be of help to the millions of households in fuel poverty

Navigating the pathway to increased access

Unlocking greater use of smart meter data requires consideration of complex, broad ranging issues which relate as much to regulatory and governance frameworks as the technical mechanisms through which data can be obtained. These issues must be tackled together.

The implications of increased data access are addressed from three key perspectives:

- **The smart metering regulatory framework** – in particular, the DCC Licence and Smart Energy Code must be adapted to facilitate trialling and development of new data-driven opportunities, maximising the value of all types of smart meter data
- **Personal data definitions and flow of obligations** – there is need for a more consistent, transparent approach to the management of consumer consent, and for tackling the complex flow of data legislation to support more public interest use cases, including those involving aggregated data.
- **Industry incentives** – better incentives and regulatory levers are needed to ensure alignment of responsibilities across and between energy suppliers and distribution networks

Proposals

Changes to the current smart metering regulatory framework and new data protection legislation must, as a minimum, retain and, ideally, enhance the trust of end consumers that their data will be used in a secure, lawful and ethical manner.

Deploying mechanisms to control access while creating the environment where public good use cases can flourish is complicated, but it is also critical. The proposals below aim to ensure that the public good benefits of smart meter data can be realised more effectively in the short, medium, and long term.

1. Unlock smart meter system data to support fuel poor households

Following a successful trial of the uZero project, support is required from Ofgem, the Department for Energy Security and Net Zero (the Department) and industry to unlock system data for this vital public interest purpose.

Timescale: Achieving this outcome by winter this year (2023/24) is imperative.

2. Maximise access to smart meter data through existing mechanisms

Improvements are needed to the current data access regime so that organisations can onboard easier and undertake early-stage trialling and testing of new data-driven propositions prior to full integration with the smart metering system.

Timescale: To be developed through SEC Modifications over the next 12 to 18 months.

3. Establish a data institution for smart meter data.

A dedicated entity should be set up to oversee the governance of, access to and use of smart meter data for public good. This will help to resolve the complex interaction between smart meter regulations and data legislation obligations.

Timescale: Two to three years (parallel to the Department's Smart Energy Data Repository² (SEDR) Programme)

4. Maximise data access while minimising risk.

It is essential to deploy new privacy-enhancing technologies for smart meter data to enable the broadest public interest use cases with the lowest possible risk.

Timescale: in alignment with development of a data institution.

Through enhancements to the access regime and governance framework, consumers and the industry will benefit from better use of smart meter data and jointly help accelerate the UK's transition to net zero. We call on all relevant organisations - the DCC, Ofgem, the Department, retailers, networks and central bodies, trade associations, think tanks and charities - to come together urgently so that we can turn the data access regime set out by this paper into a reality for the public good.



Introduction

Access to smart meter data will help to transform society and enable a broad range of services for public benefit. At completion, 33 million homes and businesses will be connected to a single, secure, smart metering network and generating data on energy consumption and more. It will be possible to measure digitally the entire output from the low-voltage electricity network that serves domestic and small non domestic consumers and so to match local supply and demand much more effectively.

Household energy consumption ('demand data') is one of the key message types that passes across the DCC network from smart meters to energy retailers, distribution networks and other users. It ensures accurate bills for consumers and enables them to make savings by flexing their usage. For society as a whole, demand data is a critical enabler of the UK's net zero ambitions.

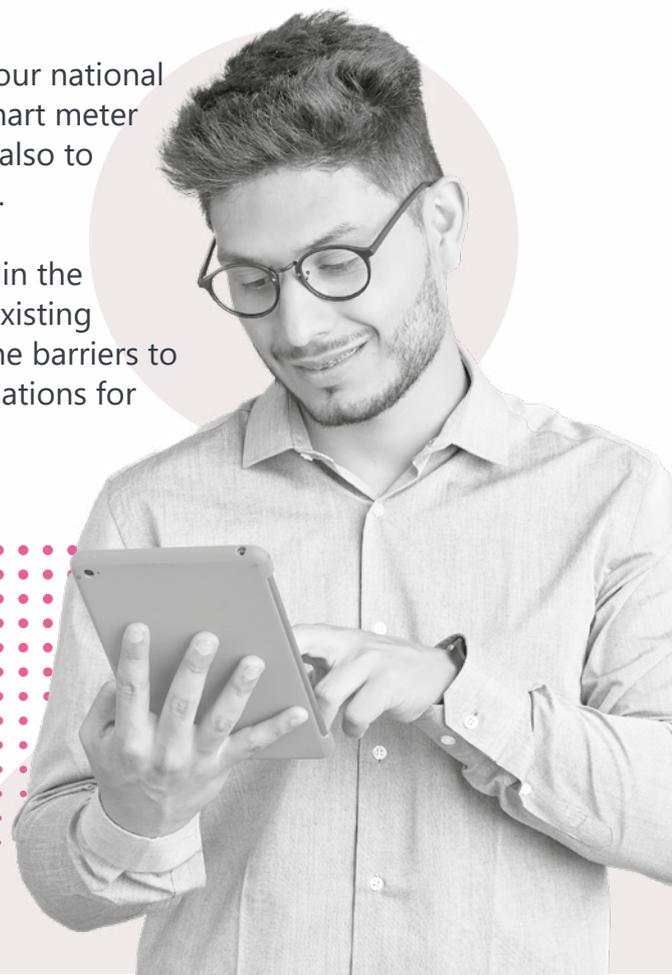
The Climate Change Committee estimates that the cost of reaching net zero by 2050 could be up to £1.6 billion a year higher if grid reinforcements, rather than flexibility, are used as the main way of adding new electricity assets to the system. Smart meters are a key enabler of that flexibility. The benefits are not only financial. The smart metering network has saved over 800,000 tonnes of CO₂ emissions over the last twelve months³.

Both carbon and cost are important metrics in assessing our national energy use. This paper sets out the case that access to smart meter data is not just necessary to reduce carbon and cost, but also to deliver public benefit outcomes, such as improved health.

We highlight many cases for the use of smart meter data in the public interest that are challenging to deliver within the existing governance and technical frameworks. We also identify the barriers to accessing smart meter data, then set out our recommendations for solving those challenges.

The smart metering network has saved over 800,000

tonnes of CO₂ emissions over the last twelve months³



In tackling the challenges that surround the use of smart meter data we have identified three key drivers:

- The climate crisis demands unprecedented urgency of action
- Ambitious policy setting and change is required to meet that urgency
- The industry must be aligned, collaborative and willing to commit to a public good vision

Together, these three drivers - aligned to the Climate Change Committee Progress report⁴, reinforce our view that there are opportunities to act immediately with policy vision and industry backing to use smart meter data for the public good.

Smart meter data defined

At the simplest level, smart meter data is commonly described as either 'message contents' or 'system data'. A letter sent by post provides a useful analogy to explain the difference:

- **The letter** – the message content sent to or from devices connected to the system within premises, e.g. the amount of energy consumed (demand data) or amount added to a pre-payment meter. This data is encrypted and only accessible to energy companies or third party users to whom consumers have given their consent.
- **The envelope** – system data or information about the message, e.g. where it was sent and to which device, at what time and whether it arrived safely. This data is retained centrally within the DCC's system and visible to manage the performance of the network. Currently, no mechanism exists for external access (except in limited circumstances where the Government can request access).

In this paper, although we discuss the importance of increasing access to both sets of data, we focus on message contents and demand data because it is the most sought-after subset of smart meter data.

Current routes to access smart meter data

At present, smart meter data can be accessed at a household level (with the explicit consent of the consumer) in two ways.

The first is through integration with the smart metering system, directly or via a third-party Managed Service Provider (MSP) where users can get half hourly consumption profiles.

Organisations that can access data in this way include energy suppliers, distribution networks and a smaller segment of 'other users' who have been on-boarded and integrated via the system directly or via an MSP.

The second way data can be retrieved is via a Consumer Access Device (CAD), a supplementary read-only device which is connected to the home area network. Connecting an Internet connected CAD can only be undertaken by a registered user of the DCC's systems.

The current Smart Meter Data and Privacy Framework, coupled with the de-centralised nature of the data, makes it extremely difficult to access aggregated data. This inhibits a broad array of public benefit applications.

To date, there is no defined access mechanism for smart meter system data. This issue is being studied as part of the DCC's public interest data access activities, developed in conjunction with the Open Data Institute, the Energy Systems and Connected Places Catapult, and with support from many industry stakeholders.

As system data is already centrally stored, this is a valuable opportunity to establish the appropriate governance structures, access controls and regulatory change that would be needed to create a future access regime for all smart meter data.

Increasing access to both system and message content would support the digital sector of the UK, valued at £141 billion⁵ in 2021, and deliver social good by enabling organisations to better understand the needs of locations, organisations, and people.

Industry context

In its response to the “Data, A New Direction” consultation⁶ the Government set out some of the expectations for changes to the wider UK General Data Protection Regulation (GDPR) regime. These changes are due to form part of the forthcoming Data Protection and Digital Information Bill⁷. As this legislation has not yet been passed, the implications for smart meter data access are not entirely clear. But it may enable a wider array of public benefit use cases in the future.

Energy sector digitalisation and a growing focus on smart meter data

Various organisations have been building the case for change in the way smart meter data can be accessed. The Energy Digitalisation Taskforce⁸ (EDiT) made several prescient points about demand data. One key recommendation was to develop a consumer consent dashboard to help households understand and manage access to their energy data.

The Retail Energy Code Company (RECCo)⁹ has recently indicated in its formal response to EDiT that it could facilitate the delivery of a consumer consent asset. Citizens Advice (CitA) has also published a note on a proof of concept that will allow greater transparency and control for consumers¹⁰.

The interests of consumers must sit at the heart of any access regime. They must have full trust that it will operate in the public interest with legitimacy. Consumer consent is one of several options to provide a lawful basis for data processing. The privacy plans approved by Ofgem, the Smart Energy Code and the Smart Meter Data Access Privacy Framework position consumer consent as the only compliant route for data access in order to maximise trust and consumer ownership of their data.

Whatever the approach to access, it is critical to ensure consumer trust through effective communication campaigns and engagement.

One key recommendation was to develop a consumer consent dashboard to help households understand and manage access to their energy data.



The EDiT report also made the case that the sector should “utilise smart meter data for public good” and therefore “adopt the [Public Interest Advisory Group] PIAG recommendations on access to depersonalised smart meter data for a public interest purpose with appropriate privacy protections”. The PIAG Phase 2 Report¹¹ made six recommendations, representing a continued push for access to system and message content for a wider range of use cases and users.

The PIAG and associated reports¹² involved stakeholder engagement over many years. This process highlighted the depth of thought leadership on issues related to smart meter data access and provided many insights into how to resolve them.

Following PIAG’s articulation of the case for change, the Modernising Energy Data Applications (MEDApps) report noted in its recommendations¹³ that “The Smart Energy Code Panel (SEC Panel) and the Office for Gas and Electricity Markets (Ofgem) should promote a mechanism to permit the DCC to de-personalise and share SMETS2 system data for public interest purposes”. This represented a change in industry discussions from ‘change should occur’ to ‘what precise changes should occur?’

Establishing potential new routes to smart meter data

The Department launched the SEDR programme in 2022. This is scoping out the technical and commercial aspects of a proposed repository which would offer a ‘simpler, more efficient and faster smart meter energy data retrieval for a range of users’. This could include all types of smart meter data, at both aggregate and household levels.

A principle of the SEDR programme is that any system must maintain or surpass existing levels of security and privacy governance. The DCC participated in a series of projects to advise on the viability of proposed solutions.

The programme is due to conclude by end 2024 after which, subject to the outcome, additional work will be required to consider the wider regulatory, legal and governance frameworks to enable data access.

As things stand, organisations such as health or care service providers and local or central government bodies seeking to access smart meter data at household or aggregated levels struggle to access due to a lack of collaboration across the sector in supporting ethical and lawful data sharing.

In practice, geographically bounded smart meter data could be obtained from the Distribution Network Operators (DNOs), who have permission to utilise aggregated demand data for their own purposes under their own Data Privacy Plans¹⁴, though so far this route has been limited.

Ofgem's consultation on Data Best Practice (DBP)¹⁵ is a mechanism which may create a route via DNO's for data access. The implication of the DBP change is a future where aggregated (de-personalised) smart meter demand data is treated as energy system data and should therefore be 'presumed open'. Ofgem consulted on and decided on proposals to mandate the provision of data in a standardised and interoperable manner via this route by February 28th 2024.

The implementation of Market-Wide Half-Hourly Settlement (MHHS)¹⁶ will enable new tariff structures and a wider range of products and services. It will also create a Data Integration Platform (DIP) governed under the balancing and settlement code (BSC) and may offer a route for access to smart meter demand data. No other smart meter data categories (e.g. alerts or system data) are expected to be available through this mechanism.

Overall, the energy industry, Ofgem and the Department are making very welcome moves to help increase data access while maintaining data privacy. However, the speed of change needs to be greatly accelerated. The case for change is a strong one, and the focus should be on enabling positive public good outcomes.



The Case for Change

Smart meter data can be a strategic resource for the energy sector and others. The location, timing and detail of message and system data can be used to deliver public good outcomes in many ways, from providing more accurate services to disengaged consumers, to enabling local authorities to intervene earlier in support of vulnerable people. Enhancing access to smart meter data is a high priority.

Consumers

Consumer engagement with the energy system has traditionally been through bill paying and meter readings. However as the transformation to a low-carbon economy accelerates, we expect more and more consumers will take an interest in their consumption, its cost, and their carbon footprint within the new system.

Support for fuel poor households

The Social Connect project¹⁷ aims to help identify consumers who are in, or at risk of, fuel poverty. It has applied machine learning techniques to numerous data sources, including anonymised smart meter system data, UK Power Networks (UKPN) network information and existing fuel poverty information to gain insights into fuel poverty and other important metrics such as EPC (Energy Performance Certificate) ratings.



Social Connect builds upon the MEDApps uZero project¹⁸ which unlocked new insights in partnership with University College London's Smart Energy Research Lab (SERL). During the project, UCL worked with the data innovation company UrbanTide to assess the accuracy of the uZero software tool in identifying fuel poverty by comparing its results against the existing SERL fuel poverty model.

Both projects aim to enable innovative uses of smart meter system data to help households which are in, or at risk of, fuel poverty so that support services including energy efficiency investment can be provided via appropriate channels.

Enabling energy savings and cost reduction

The switching site Uswitch is one of several companies (Hugo, Loop, Greenley) which have launched apps using smart meter data to help consumers save energy.

The Uswitch offering, called Utrack¹⁹, allows consumers to monitor their home energy costs and find ways to reduce their consumption and bills. This is done with consented access to smart meter data via a third party, in conjunction with some industry data flows, and supplemented by visualisations and data analytics to present information to consumers.

Self-monitoring can help consumers to see when they are using energy, to identify what energy may be wasted and to manage their demand to reduce costs and use energy when they need it most. Home energy management systems can also be used to facilitate other products and services, saving further costs and helping to reduce emissions²⁰.

The use of these types of services demonstrates growing public awareness about energy usage and demonstrates the value of smart meter data to consumers. With people also being incentivised to save energy through the National Grid ESO's Demand Flexibility Service²¹, the importance of using smart meter data in helping consumers to navigate the cost-of-living crisis and the energy transition is becoming increasingly clear.

The use of
these types
of services
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The Energy System

The move to net zero will be a major opportunity for the distribution networks. The transition to a low carbon economy will trigger a dramatic shift in the size and types of loads and generation on the network. This will require network strengthening at various levels. The cost of this can be reduced significantly by moving towards a smarter network, leveraging smart meter data. One estimate suggests that by 2050, smart grids will reduce the cost of additional distribution reinforcement by £10 billion a year²².

The potential for smart network solutions has therefore prompted significant investment. The Strategic Innovation Fund, launched in 2021, is expected to invest £450 million by 2026²³ to support networks undertaking ambitious innovation projects with a strong focus on data and digitalisation.

At the centre of a smarter network are two main technologies: storage and smart meters. Storage is a key enabler of renewable energy uptake because it allows more efficient use and distribution of power generation. Smart meters give improved visibility and oversight of the network, including storage devices.



Smart meter data also provides the basis for developing advanced analytics and machine learning algorithms which will further enable more sophisticated products and services²⁴ such as:

- Co-ordinated electric vehicle (EV) charging
- Smart solar storage control devices
- Advanced asset condition monitoring
- New network measures and metrics, for example the National Grid's recent Carbon Intensity Index
- Time of use tariffs
- Reducing industry-wide costs occurring from energy theft.

Looking ahead, smart meter data could feed ambitious digital twin and shadow projects, for example the Virtual Energy System²⁵ and the National Digital Twin Programme²⁶, to model and simulate future energy scenarios. Similarly, the creation of Distribution System Operator (DSOs) will require organisations with access to smart meter data.

To date, data privacy regulations have allowed networks to bring demand data into their digital estate and aggregate it to some level, before deleting the original data. This aggregation is of use to networks for internal purposes such as network planning activities^{27 28}.

Although it is difficult now to quantify the value of access to smart meter data, savings could extend into billions of pounds. A recent report by the Energy Networks Association (ENA)²⁹ calculated that, for various heat pump and EV scenarios, demand-side response solutions could save between £500 million and £10 billion in network reinforcement costs. This sort of saving will be more easily unlocked by using smart meter data.

Smart meter data also provides the basis for developing advanced analytics and machine learning algorithms

Health and social care, wider public services

Smart meters provide valuable opportunities for those who require priority connections or have other vulnerabilities. A recent report³⁰ commissioned by Smart Energy GB investigated some of the main ways in which smart meters can support healthcare. These were split into three main areas:

- Monitoring of health conditions
- Assessing population health
- Self-monitoring

Smart meter data, particularly if high resolution via a CAD (i.e. consumption profiles at sub-10 second intervals), can help providers to identify changing behaviour patterns among consumers with health conditions.

Differences in day-to-day interaction with energy appliances and deviation from typical routines can indicate worsening conditions or a downward trend in overall health. Healthcare professionals could use such data to decide on the best support or any changes needed to medication and care. Through earlier intervention, people who are vulnerable could be provided with effective services, allowing them to live a more independent life in their own homes.

The Peoplehood Project provides an example of how this works. High-resolution energy consumption of independent homes is monitored by connecting a home hub to sensors and smart meters. Consent is obtained using 'DCC Other User' access via an intermediary. Data is sent to and processed in the cloud. It is fed into models which can raise alarms when energy patterns and usage deviate from normal parameters.

As in all use cases, privacy, security, and consent must be prioritised and managed properly. Robust mitigation processes are needed, accompanied by clear, fair, and transparent communication with consumers. For health and social care applications, the sharing of sensitive information must be rigorously governed within appropriate best practice guidelines and privacy law (UK GDPR and common law of confidentiality).

Healthcare professionals could use such data to decide

on the best support or any changes needed to medication and care



Policy interventions

The UK Government's National Data Strategy³¹ says that data should be used to enable better delivery of policy and public services.

Policymakers and regulators may benefit from access to a range of datasets, including systems and message content data. There are some readily identifiable opportunities in this space.

The Department operates a sub-national energy statistics service, the National Energy Efficiency Database (NEED), and this was identified by the PIAG report as a key opportunity to use demand data. It noted that knowing when energy is being used is becoming at least as important as knowing the quantity of energy used and that demand data would be key in addressing this challenge.

Annex two³² of the PIAG report goes into detail about the importance of the NEED database in policy making and analysis. NEED, however, is itself dependent on annualised estimates from various other sources. The uses include but are not limited to:

- The ESO's annualised estimates in its Future Energy Scenarios (FES)
- Demand forecasting for the Climate Change Committee's (CCC) Carbon Budgets
- The Department's measurement of the effectiveness of installed energy efficiency measures



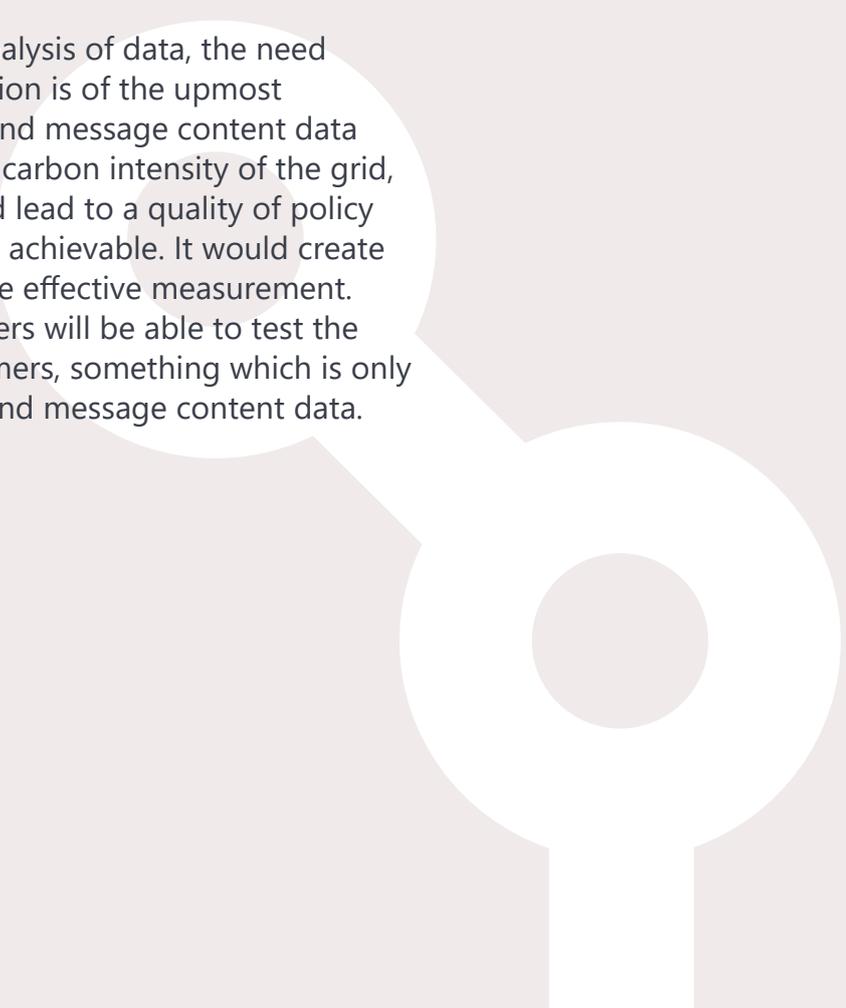
An appropriate data access regime would enable each of these policy activities to benefit from the nuanced insights that temporal energy usage can provide. It is difficult to overstate how important demand data will be in making the changes needed to achieve net zero for the UK. In particular, understanding the timing of energy demand is hugely important when trying to account for, and align with, emissions data.

The price cap³³ and any other policy interventions could also benefit from smart meter data in supporting the decision-making process and measuring impacts. Self-disconnection rates would be directly measurable using system data held by the DCC and could help to ensure effective and efficient intervention.

In developing a digital twin demonstrator project³⁴, the Department is looking to build on its own modelling capabilities to better understand the impact of national domestic decarbonisation policies at a more granular level. The project identified demand data as being the ideal source of data to facilitate this, because it reflects how household demand shifts in response to decarbonisation policies and interventions.

Within digital twin-type approaches to analysis of data, the need for regular, granular, time-series information is of the upmost importance. The combination of system and message content data with other granular information - such as carbon intensity of the grid, price signals and weather patterns - could lead to a quality of policy analysis and insight which is not currently achievable. It would create an ecosystem of deeper insights and more effective measurement. As these digital twins develop, policymakers will be able to test the impact of different hypotheses on consumers, something which is only possible through access to both system and message content data.

It is difficult to overstate how important demand data will be in making the changes needed to achieve net zero for the UK



New market innovation

New products and services which use smart technology for energy, heat and mobility all depend on understanding granular demand and generation within a complex energy system. More and more projects are being undertaken to understand the interconnectedness and dependencies of different sectors.

The Climate Resilience Demonstrator (CReDo) project is looking at the impact of flooding on energy, water, and telecoms networks³⁵ and highlights both the interconnected nature of assets and the value that smart meter data can have across multiple sectors in the face of extreme weather events.

The Government's Smart & Secure Electricity System policy work³⁶ (SSES) has identified the need for devices to be interoperable and cyber secure. The opportunity that new interoperable smart devices offer the energy system is broad ranging, spanning multiple energy smart appliances including heat pumps, electric vehicle chargers, battery storage and white goods.

Networks are looking at flexibility as a contributor or alternative to grid reinforcements and upgrades³⁷. Under the ED2 price control mechanism, Ofgem is now incentivising networks to use flexibility to defer or prevent the need for reinforcement. Organisations are also seeking commercial opportunities linked to the energy transition both for consumers and the grid. Use cases for demand data are growing faster than current regulatory structures can enable them to be implemented.

Future innovation may see further data sets generated and transported via the smart metering system.

This potential was identified at the formation of the Smart Meter Communication Licence. The Department's recently launched Smart Meter Internet of Things Innovation Competition³⁸ is exploring how new sensors for things such as temperature and humidity could be connected to the smart meter communications hub. This would securely and reliably enable data flows which would provide a far richer picture of energy efficiency performance in the home.

The Smart Meter IoT project builds on a recent DCC proof of concept called Living Pillars which explored how urban biodiversity, coupled with remote data connectivity, can help improve air quality in our towns and cities and take the UK closer to its net zero targets³⁹. By combining environmental sensors and a communications module to connect to the DCC test environment, the project can remotely manage irrigation to green lamp posts, enabling improvement of local environments and monitoring for the benefit of local communities.

These cases show what can be done now. Further innovation is expected and will be needed if we are to hit our net zero targets. But the regulatory challenges remain and must be addressed if we are to ensure that smart meter data can truly deliver public benefit.

Navigating the Pathway to Increased Access

The barriers to data sharing are more to do with governance and regulation than technical limitations. The work of the Department and Ofgem on updates to Data Best Practice and the SEDR programme show that the wider availability of smart meter data is currently being seriously considered.

The energy sector does not have a coordinated approach to enhancing data access from a wide number of sources. Data about network assets are distributed across the DNOs, so there needs to be further consideration of interoperability and common standards.



Energy suppliers, as controllers of smart meter data, rightly prioritise and ensure compliance with the UK GDPR principles and other obligations.

Within a dynamic and ever-changing sector, the requirements for data usage can at times be overly complex. There are many technical, legal, and resourcing challenges to overcome, even if anonymisation techniques can resolve some of the compliance issues involved.

Network data privacy plans are focused on security compliance, rather than enabling the greater use of smart meter data. Similarly, within retail markets, there is a lack of coordination on how consumer data is held, utilised, and shared beyond its immediate use in operations and product development.

Voluntary schemes are being developed to use smart meter data more widely, such as Energy UK's vulnerability commitment⁴⁰, but the challenges of access to data are constraining rapid progress in these areas.

In summary, neither incentives nor governance (as currently defined across the energy sector) are promoting the utilisation of smart meter data to its fullest potential. Structures such as the 'presumed open' change and the SEDR programme are being explored, but there is an opportunity to accelerate this activity and establish requirements in a more holistic manner.

The remainder of this section explores inhibitors to a broader data access regime.

The energy sector does not have a coordinated approach to enhancing data access from a wide number of sources

The DCC's Licence and the Smart Energy Code

The DCC operates under the Smart Meter Communication Licence granted by the Government. The licence enabled the DCC to establish and manage the smart metering technology infrastructure. It came into effect in September 2013 for a 12-year period, the continuation of which is currently subject to industry consultation.

The DCC is also party to the Smart Energy Code (SEC), an industry code that sets out the terms for the provision of the DCC's services and specifies other provisions to govern the end-to-end management of smart metering.

Neither the Licence nor SEC contain provisions that enable organisations to deliver innovation projects or trials that use smart meter data (both message contents and system data).

Although the DCC can seek consent from Ofgem to support projects outside the scope of their mandatory business, the time and resources involved would not allow DCC to do this on a regular basis, and Ofgem's consent cannot be presumed, which risks wasted time and effort for all parties.

This often leaves organisations in a 'Catch-22' situation, unable to demonstrate the value of the proposition and so invest to overcome the cost and complexity of accessing data via full integration or through commercial agreement with another party.

Exploratory business models, novel use cases, start-ups and public-good use cases may require risking significant capital and time to test a hypothesis that may not be viable.

Historically, much government innovation funding has been directed at better use of smart meter data (e.g. Non-Domestic Smart Energy Management Innovation, Smart Meter Enabled Thermal Efficiency Ratings, Smarter Tariffs). Very little has been invested in improving the way that data can be accessed to enable further innovation. The Smart Energy Data Repository competition is a welcome step but will not enable change for some time.

Both the Government and Ofgem have an opportunity to consider how the future smart metering Licence can be constructed in a way that overcomes these challenges and builds in the flexibility needed to ensure the realisation of opportunities as yet unforeseen.

Personal data definitions

When accessing demand data, regardless of the type of meter, retail energy suppliers are required to comply with general privacy laws, including the UK General Data Protection Regulation (GDPR) Data Protection Act 2018.

These privacy laws cover remote access meters (including smart meters). Where consumption demand data is linked to the Meter Point Administration Number (MPAN), that information is deemed to be 'personal data' by the Information Commissioner's Office (ICO), making the processing of that information subject to UK data protection laws.

Ofgem, with support from the ICO, proposed that companies transmitting from remote meters to the retailers (so called 'head-end operators') should be compelled by the regulator to filter user data in alignment with the given consent.

Consumer awareness and data privacy

Smart meters have made consumers more aware of the energy they use⁴¹ (mainly through in-home displays which show their usage), and provided them with simple, accurate, automated meter readings⁴².

But there has been little academic research into the additional services that smart meters can facilitate. One study of smart meter enabled services⁴³ showed a positive response towards more automated services if that enabled lower energy bills. However, the same study expressed concerns about control and consent, in addition to privacy concerns and suspicion of these newer initiatives.

In line with broader data legislation, the central principle of the Smart Meter Data Access Privacy Framework (DAPF) is that consumers have control over who can access their energy consumption demand data, how often and for what purposes.

Consumers must be able easily to identify and understand clearly how their data is being used, and by whom. This is a challenge for the industry to understand and resolve, particularly as the potential for data usage grows. Any changes in the data access regime, including for aggregated data, would need to be strongly framed in terms of the positive benefits and communicated very effectively.

An Ipsos Mori report⁴⁴ noted that demand data is not considered sensitive information by most people and that consumers were comfortable with DNOs accessing demand data. This indicates that public good narratives can be effective.

The success of University College London's Smart Energy Research in recruiting over 15 thousand households to provide access to their smart meter data voluntarily for research purposes indicates a degree of public willingness to participate where the public interest benefits of doing so are made clear.

Conversely, fears about vulnerable consumers relinquishing control of their data are expressed in a 2020 paper⁴⁵. While noting that the ability to override these controls could alleviate such concerns, the same paper highlights the need to consider complicated household dynamics, especially for those who are particularly vulnerable.

The importance of security and privacy in the context of smart meter data is critical. But further real world examples are needed to determine the degree to which consumers may support greater access to their data in public interest cases, provided there are appropriate controls.

Flow of Obligations

A complex web of obligations and processes currently underpins data access. As set out in the diagram below, the flow of obligations spans different legislative, regulatory and process-driven requirements for the access of data by different users.

While this complexity derives from important considerations of security and privacy, the framework does not help consumer awareness of data usage or enable the flexibility and changes needed to support new uses of data.

Data use touches many areas of the energy industry’s activities. But there is currently no formal pan-industry data governance forum designed to oversee and co-ordinate activity.

Key

- > Possible Future Changes
- > Existing Flow of obligations
- Processes to consider/follow
- Users
- Regulation
- Legislation
- Legal precedent/implications to consider
- Non-users

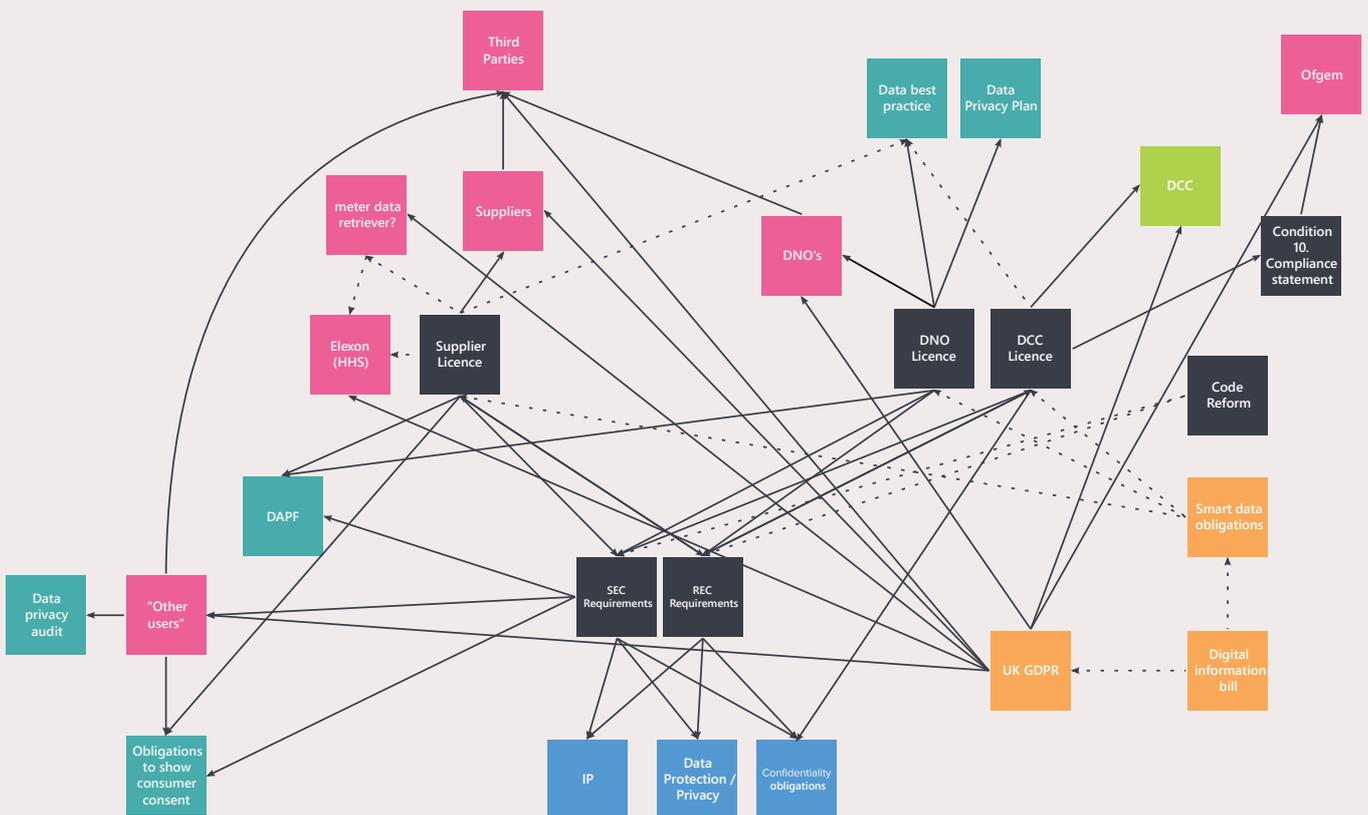


Diagram for illustrative purposes only

Retailer Incentives

To date, energy consumers and energy retailers have been the primary beneficiaries of the use of smart meter data. Retailers are in a prime position to utilise individual consumers' demand data in more interesting ways and to benefit from an aggregated view of demand across their portfolio. This consumer relationship, and the data custodian relationship, provides limited incentive for retailers to share data beyond what is absolutely required for any products and services that they support, and it certainly does not create the sense of urgency needed to help in addressing the climate crisis.

In its call for input to the Data Best Practice consultation, Ofgem noted that it was considering whether to require more organisations to follow DBP guidance, which may partially resolve the incentive question. Without change, however, data consent for the utilisation of smart meter data will only be captured by default so that retailers can provide accurate billing.

Interventions to enable the broader use of smart meter data should therefore take into account incentives for retailers. But, perhaps more importantly, they must reflect the need to build up consumer trust in the necessity of data sharing, as well as maintaining a strong commitment to ensure the security of consumer information and the appropriate use of consent.

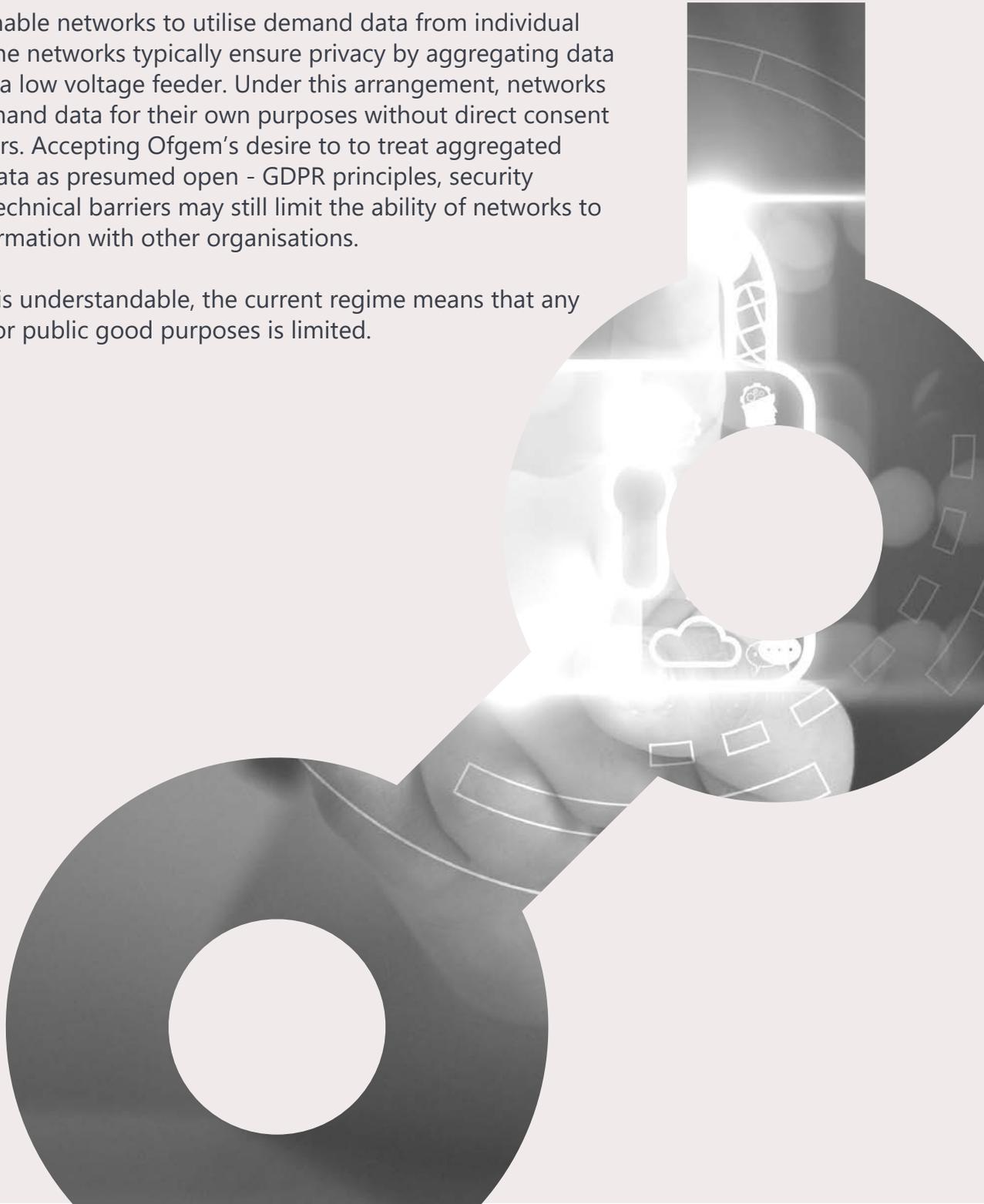
The COVID-19 pandemic demonstrated that organisations could mobilise to share data to tackle huge societal challenges. A similar mindset is required to address the climate crisis.

Data privacy plans

The distribution networks' data privacy plans and the Smart Metering Data Access and Privacy Framework (DAPF) were put in place to provide clarity about the arrangements for accessing smart meter data⁴⁶. These plans were based on the best data privacy techniques available when the matter was reviewed in 2018. Each of the DNOs now has a privacy plan approved by Ofgem.

These plans enable networks to utilise demand data from individual households. The networks typically ensure privacy by aggregating data to the level of a low voltage feeder. Under this arrangement, networks can utilise demand data for their own purposes without direct consent from consumers. Accepting Ofgem's desire to treat aggregated smart meter data as presumed open - GDPR principles, security controls and technical barriers may still limit the ability of networks to share this information with other organisations.

Although this is understandable, the current regime means that any data sharing for public good purposes is limited.



Proposals

Greater access to data is unlikely to be realised without significant changes to the current smart metering regulatory framework, particularly as new data protection legislation is enacted. It is vital that any new approach retains and enhances the trust of the end consumer that their data will be used in a secure and lawful manner.

The challenges we have identified in this paper show that appropriate governance and trust is key in enhancing access to smart meter data in a way that satisfies consumers and the energy industry. To date, multiple mechanisms have been used to control access, making it extremely difficult to enable public good use cases.

The set of proposals below seeks to enhance the governance framework in a way that increases trust so that the public good benefits of smart meter data can be realised more effectively in the short, medium, and long term.

- 1. Unlock smart meter system data to support fuel poor households**
- 2. Maximise access to smart meter data through existing mechanisms**
- 3. Establish a data institution for smart meter data**
- 4. Maximise data access while minimising risk**



1. Unlock smart meter system data to support fuel poor households

Support is required from Ofgem, the Department and the industry to unlock system data for this vital public interest purpose.

Given the scale of the impact of the energy crisis on households in the last year - with an estimated 6.7 million⁴⁷ homes being defined as 'fuel poor'⁴⁸ - urgent action is required to provide access to data that can help deliver interventions to support these households effectively. At an energy market briefing on 23 January 2023, Ofgem's CEO, Jonathan Brearley, noted that it was 'Incumbent on all participants within the energy system to do more to identify and then support vulnerable customers'.

The DCC has system data available today relating to households which are off gas, low on credit or self-disconnecting. The case studies set out earlier in this paper show the potential of this data to identify and enable further support for fuel poor and vulnerable customers.

Making this data appropriately available to organisations offering support for fuel poor homes will require regulatory changes and the alignment of data legislation obligations across industry parties.

To ensure compliance with the regulatory framework, the DCC requires approval from Ofgem to make data available. For the sake of expediency, this could take the form of a 'permitted purpose' consent (a proposal that Ofgem is currently reviewing) while longer-term regulatory solutions (e.g. Smart Energy Code Modifications or Licence change) are explored.

At the same time, changes to data governance and data legislation responsibilities would require pan-industry agreement. We urge industry parties to work together on this and Ofgem to provide support where needed to ensure the right outcomes.

Doing so would represent a significant step forward in better use of data to help fuel poor households and also prepare the ground for future public interest use cases that can be enabled through system data.

For example, system data can be a highly important source of insight to help monitor and assess how best to ensure a fair and just energy system transition. Understanding how consumers engage with a smart energy system (e.g., taking a smart meter, adopting time-of-use tariffs, engaging with flexibility incentives) is visible within smart meter system data. This can be analysed in the context of differing demographic segments, geographic areas, property typologies and more to understand who is participating and who has been left behind.

Unlike demand data, GB-wide smart meter system data is already retained in a central repository. Enabling an appropriate regulatory regime and governance framework for access to smart meter system data would provide significant learning and potentially help to accelerate a future access regime for all smart meter data.



2. Maximise access to smart meter data through existing mechanisms

It is essential to enable early-stage trialling and testing of new data-driven propositions prior to full integration with the smart metering system.

The rate of data access via the 'other user' role is growing. But the conversion rate of data-driven concepts and public interest use cases into tangible services remains very low.

Organisations seeking to access data via this mechanism regularly report frustration with the cost, complexity and timescales involved.

While the smart meter energy data repository may ultimately provide a more streamlined access mechanism (with a similar or higher degree of cybersecurity and data privacy), this is unlikely to come into effect until the later years of this decade.

In the interim, opportunities exist to maximise access via the other user role through moderate changes to the Smart Energy Code. Further research is required to explore the challenges and requirements, but potential improvements might include:

- Development and access to a live data 'sandbox' to enable organisations to undertake early-stage trialling and testing of new propositions prior to full integration
- Simplification of technical specifications and provision of support and training to help organisations develop their own integration
- Reviewing governance to establish equity of opportunity and greater collaboration across all smart metering 'user roles'

While the current funders and users of the smart metering system (energy suppliers, DNOs and existing other users – including Managed Service Providers) may support these public interest ambitions, other organisations may be unwilling to enable and fund what may amount to competitive activities. Development costs may therefore need to be met through government funding or alternative streams.

To further mitigate opposing interests, any proposed changes to the SEC could be developed in parallel with measures to tackle the constraints of the smart metering system as demand from other users grows, ensuring that equitable data access is achieved.

3. Establish a data institution for smart meter data

We recommend the establishment of a single entity to oversee the governance of, access to and utilisation of smart meter data for public good, and to overcome the complex interaction between and differing interpretations of smart meter regulations and data legislation obligations.

We urge Ofgem and the Department to review options to create a data institution that is responsible for the safe and effective access to and utilisation of smart meter data for the public good.

The purpose of such a data institution would be to steward data on behalf of others⁴⁹. Given public sensitivity about consumer data being held and used by the energy sector, it should be acknowledged that the challenge for data access is as much about organisational and political issues as the technical changes needed to policy and regulation.

Any future access regime for smart meter data will need to reset the complex interaction and interpretation of smart meter regulation, data legislation obligations, governance and engagement undertaken by multiple different organisations.

The establishment of a data institution would be an effective mechanism to enable industry-wide collaboration, establish a focal point for smart meter data governance and raise trust among consumers that their data is being used in a responsible and transparent way which maximises benefits to them as individuals, but also to society more broadly.

We believe an institution for managing access to smart meter data would need a broad outlook and governance designed to capitalise on expertise and input from a broad array of perspectives including consumer interests, local government, health, and other markets such as utilities and finance.

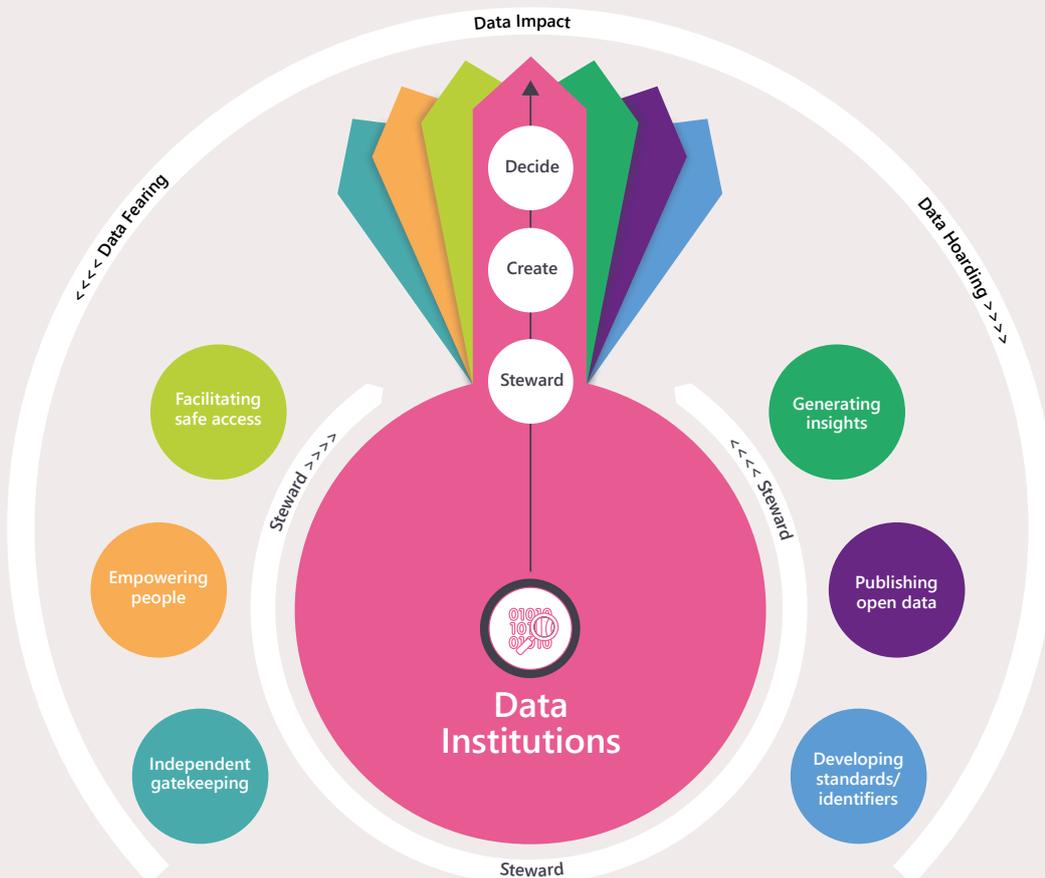
It cannot be overstated that the challenge to resolve

access is one of appropriate governance

A report by the former Department for Digital, Culture, Media and Sport (DCMS) on unlocking the value of data⁵⁰ noted a series of issues that may prevent effective data sharing. This included lack of incentives to share data, missed opportunities to use data in the public interest and a lack of knowledge.

With the above in mind, our conclusion is that a smart meter data institution should conform to the following characteristics.

- **Not for profit** – the organisation should be free of commercial interest with a mechanism for financial sustainability
- **Technically capable** – the organisation should have the capability to develop technical requirements and maintain solution(s), and have a deep knowledge of the data
- **Collaborative** – the organisation should work with stakeholders across the energy sector and beyond to ensure that smart meter data access and its governance are robust and enjoy broad support
- **Be driven by public good** – the organisation should prioritise ensuring that its work is for the public's benefit and on their behalf



While a holistic review should be conducted to scope the fuller requirements of a data institution, the principle challenge to resolve access is one of appropriate governance.

The ICO noted in its recent sandbox final report for CDD Services Ltd⁵¹ that its view of the notion of data stewardship was in its infancy. Whether a data institution should fulfil a data stewardship role or a data processor role merits exploration by the Department.

Given the scale of the climate crisis, and the UK's net zero ambitions, early action is needed to best utilise the wealth of use cases for smart meter data already set out in places such as the EDiT & PIAG reports. An expedient and achievable option would be to create a special purpose entity (data institution) from the existing governance frameworks, i.e. the DCC Licence or SEC.

Alternatively, the PIAG stimulus paper on possible routes to data for a public interest purpose⁵² makes the case for the involvement of the Office for National Statistics (ONS) in a data access regime using powers under the Digital Economy Act⁵³.

This regime could enable a further marketplace of data-driven propositions, with organisations establishing additional service offerings supporting the needs of consumers, networks and other interest groups. An opt-in model to support the development and delivery of additional services could be like the UK Biobank⁵⁴, where individuals provide data on health and genetics to provide a resource for the medical community.

This regime
could enable
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marketplace
of data-driven
propositions



4. Maximise data access while minimising risk

We recommend the deployment of privacy enhancing technologies to enable the broadest public interest use cases with the lowest possible risk

The categories of smart meter data are already broad and additional data could become available in time. Technologies to ensure privacy and manage re-identification risks and biases within the data should be a key consideration for smart meter data use. A data institution could eventually be responsible for selecting what data could be made available on aggregate for public interest use cases and establishing the best-fit selection of privacy enhancing technologies to maximise data utility whilst minimising risk. In the interim, whomever is managing access to smart meter data should be using privacy enhancing technologies to assess and triage datasets for public good.



As identified in a recent paper by Imperial College, the balancing of privacy and access to smart meter data⁵⁵ can be managed through a range of techniques, such as federated learning and differential privacy, which fit within a wider category of Privacy Enhancing Technologies⁵⁶ (PETs).

PETs is an umbrella term, covering a broad range of technologies and approaches that can help mitigate security and privacy risks⁵⁷ and, applied to smart meter data, offer a suite of opportunities to enable secure access to data in different formats.

As the energy sector develops its data and digital capabilities and utilises a wider array of sources for the purposes of transitioning to net zero, the privacy needs of individuals will play an important role in both the cultural acceptance of smart meters themselves and trust in the energy sector more broadly. A paper from the Centre for Data Ethics and Innovation (CDEI) on addressing trust in public sector data use noted that a lot of personal data is shared across and outside the public sector. While this may be for beneficial purposes, public awareness of this is generally low. This gives rise to an environment of 'tenuous trust'⁵⁸.

Maintaining high levels of trust in organisations which use smart meter data, as well as those who enable access to it, will be critical to ensure that consumers can maximise their own personal benefits, along with wider societal benefits in line with their preferences for others to see their data. The use of appropriate PETs, along with a robust consumer consent framework, will enable a governance regime that meets consumer and industry needs.

Use of data must also take account of the possibility of biases. Users of smart meter data must be driven by the use case and come to an understanding of the potential for bias and discrimination. These effects can be mitigated by audits of the processes and data itself, including considerations of accountability, transparency, and robustness (see Data Ethics and Bias Report for further detail⁵⁹).

Conclusion

Smart meter data has the potential to enable countless uses for the public good, from energy sector optimisation and the accelerated deployment of renewables, to better health and social care outcomes.

The case is clear, if complex, and the changes required to enable wider use of smart meter data for the public good have been laid out in this paper. In setting expectations on how a data institution might enable appropriate access to smart meter data and providing a pathway through regulatory change, it is now imperative for all parties to act and ensure that the energy sector can rise to the challenge by:

- Unlock smart meter system data to support fuel poor households
- Maximise access to smart meter data through existing mechanisms
- Establish a data institution for smart meter data
- Maximise data access while minimising risk

Consumers and organisations can reap the benefits of smart meter data and accelerate the UK's transition to net zero. We call on all relevant organisations - the DCC, Ofgem, the Department, retailers and networks - to come together with urgency and co-create the data access regime set out by this paper, driven by public good.

We call on all relevant organisations - the DCC, Ofgem, the Department, retailers and networks - to come together with urgency and co-create the data access regime set out by this paper, driven by public good

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