Engineering Justification Paper

# DCC Membership Justification

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Classification: Highly Confidential

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# 2 Introduction

This document has been written as a justification for SGN joining the DCC (Data Communications Company) network to allow access to some very limited gas Smart meter functions. This requirement has been highlighted as an expectation on us as part of the feedback process on our business plans. In particular, we have received feedback from the Customer Challenge Group (CCG) and the Customer Engagement Group (CEG). Both have highlighted that they expect SGN to make use of Smart Meter Data.

It should be highlighted that at the moment, SGN sees minimal benefits in joining the Data Communications Company and consuming smart meter data. This is because gas smart metering equipment (GSME) cannot provide Smart network functions unlike electricity smart metering equipment (ESME) and therefore cannot be used for Smart grids. However, it is accepted that there may be further benefits during GD2 that are as yet, unknown or unquantified that may require this future investment. It is also acknowledged that accessing this data may be beneficial as part of a wider digitalisation of the energy system (as opposed to being beneficial in isolation of any other change).

SGN currently has just over 5.9 million gas meters of which, 5.4 million domestic gas meters of a U6 type, attached to our networks that could be made Smart by the suppliers using a GSME It should be remembered that the SGN (and all GDN) network ends at the emergency control valve (ECV) and that all meters belong to a supplier and not the gas networks. We may be able to obtain some gas valve status data and gas meter consumption readings from this pool of meters that could be considered for network analysis purposes and this is the main area of focus for benefit definition.

Therefore, despite limited benefits being identified at this point in time, there is strong stakeholder feedback and expectation that SGNs will make use of smart meter data as part of the broader future proofing and “digitalisation” of the energy system.

## 2.1 General Background

The previous UK Labour government decided to implement a Smart metering roll-out across the UK to help the country comply with strict CO2 emission targets and changes to the metering accuracy requirements required under EU legislation. The roll-out was to cover gas and electric domestic meters using new smart technology already being implemented by some suppliers. To ensure consistency across all customers and suppliers, a central agency, the DCC (Data Communications Company), was envisaged to handle all the data traffic generated by 54 million gas and electric meters. DCC would control all the data messages from the DSP (Data Services Provider), CSP (Communications Services Provider), ATP (Authorised Third Parties), GSMEs, ESMEs, GDNs, DNOs and suppliers.

In every other country in the world Smart metering implementation was driven by the Network Operators (NO’s) so that economies of scale would be quickly realised. In the UK it was decided by government that each supplier would drive Smart installations to their customers and not the NO’s. This decision was partly motivated by Ofgem splitting gas meters from the NOs to the suppliers in the early 2000’s. It was decided that the programme should be a consumer led “pull” rather than a network led “push”. It was also decided that gas would be included despite some stakeholder reluctance to include gas within the cost benefit analysis, and despite their being minimal or nonexistent benefits, at that point in time relating to Gas smart meters. Large EU countries like Germany have left gas out of the smart roll-out so they can concentrate on Smart electricity grids to enhance returns on the Smart roll-out and a far quicker Smart roll out.

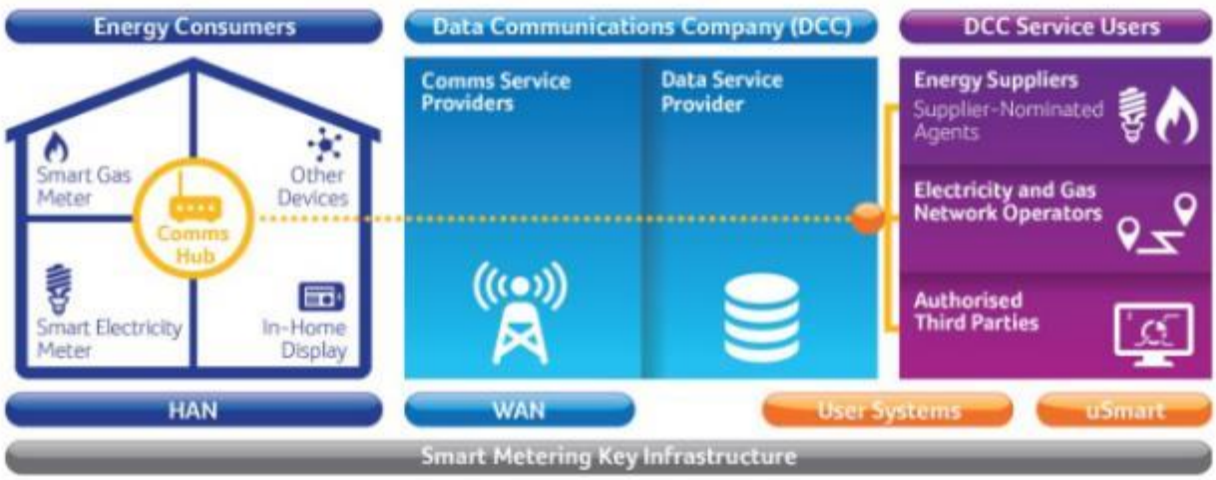
The European Commission reported that:

1. Only five EU Member States (Ireland, Italy, Luxembourg, the Netherlands and the UK) have decided to roll-out gas smart meters by 2023 or earlier;
2. Two Member States (France and Austria) have plans to proceed with a large-scale gas roll-out but have yet to take official decisions;
3. In 12 Member States (Belgium, the Czech Republic, Denmark, Finland, Germany, Greece, Latvia, Portugal, Romania, Slovakia, Spain and Sweden), the results of the CBA were negative; while
4. The other Member States have yet to conclude their assessment (please note that there are no gas networks in Cyprus or Malta).

The above information is important as it provides background and contextualises the widely held view that there's limited benefits to gas networks being associated with smart gas meters. Most countries have recognised that costs, outweigh any financial benefits.

## 2.2 Site Specific Background

The diagram below explains how data will flow from a gas meter in a consumer's home, through the DCC and on to the supplier so that a bill can be generated. A reverse flow of data will allow the supplier to top up a customers' pay as you go tariff on the meter.




The DCC concept potentially results in a single point of failure for the whole scheme, turning gas and electricity meters into CNI (Critical National Infrastructure). To mitigate against possible IT based attacks on the DCC systems, a DCCKI (Data Communications Company Key Infrastructure) and a SMKI (Smart Metering Key Infrastructure) system were put in place. SMKI uses an enhanced NSA, AES 256-bit, elliptical curve encryption, public key encryption algorithm to limit hacking attacks on the Smart metering system. Each gas meter has a set of public-private encryption keys installed that are individually assigned to various DCC users. Each key pair has a set of available service requests that the key will accept from its owner. Because each meter has unique encryption keys, any successful hack attack on a single meter cannot be quickly replicated across the whole meter population. This moves any hacking attack away from the local HAN (Home Area Network) which is seen as the easiest part of the network to attack, to other parts of the DCC systems.

GDNs (Gas Distribution Networks), as the NO (Network Operator), have an SMKI encryption key that allows us to interrogate the GPD (Gas Proxy Device) for meter consumption readings and the current gas valve status (open or closed). It does not allow us to use any other service requests or data access. This was implemented by SGN during RIIO GD1.

The GPD had to be introduced to limit the battery consumption within GSMEs. Gas meters only wake up every 30 minutes to broadcast meter readings, valve status and other alerts, to the GPD and to receive information regarding credit left on the meter and tariff instructions. Every gas meter has a battery driven gas valve that can be closed by:

I. the supplier,
II. no credit left,
III. the meter detects a tamper,
IV. if the battery power dips to low.

Commands to close the meter valve are only actioned when the meter wakes up for its 30-minute data update. You cannot remotely wake a gas meter up and ask for meter reads or valve status. If the gas meter stayed live all the time, then the batteries would be depleted within a few months. As a meter approaches battery depletion, the internal gas valve shuts off automatically and leaves the consumer without gas. Suppliers demanded this functionality so that consumers do not get any free gas once the meter stops registering. Suppliers should in theory be monitoring alerts sent by the meter giving advanced warning of the battery about to fail. If the battery fails, then the supplier needs to send a fully Gas-Safe registered installer to change the battery and re-commission all appliances after carrying out flue and ventilation checks.

SGN can only obtain an out of date meter consumption readings or valve status indications and not a current one as the GPD is always 30 minutes or more behind in readings. SGN cannot wake a meter up to obtain a reading or the status of the meter gas valve via the DCC systems. Some suppliers had suggested that GDNs should join DCC to view the gas valve status and stop visiting no-gas calls. As a GDN can only see what the GPD thinks the valve status is, this suggestion is therefore not workable and unsafe. For DCC access to give benefits to SGN, Ofgem and the HSE would both need to agree, after reviewing all safety implications, that SGN do not need to attend a no credit no-gas call. This would therefore lead to operational benefits not currently defined within our business plan. We have however, assumed that such an agreement is highly unlikely.

General Data Protection Regulations (GDPR) require that any consumption data we obtain from Smart meters must be aggregated across several meter readings to disguise the true source of the data. This would greatly reduce the value of any data obtained as it no longer applies to the premises we wish to monitor. To reinforce this point, when SGN implemented its Real Time Networks project, we were required to install separate data loggers next to the meters in order to get the granular level of information needed for this project and to monitor the individual property on a more frequent basis, i.e. every six minutes.

It should also be noted that currently with semi-smart PP (Pre-Payment) meters SGN can use a GIST (Gas Industry Service Tool) to open a gas valve and re-introduce gas to a customer. Under

Smart we cannot do this, so we will be forced to leave consumers off supply even if we had DCC membership, as we do not have access to the correct service commands to open the gas valve and turn the gas on.

# 3 Equipment Summary

SGN will need to invest in a dedicated system to allow us access into the DCC User Interface systems using the DCC User Interface Specification (DUIS). The DCC User Interface Specification (DUIS) sets out the technical details of the DCC User Interface, which is the means by which Users interact with Devices. DUIS is also used for some Service Requests that do not communicate with Devices.

The equipment required would include but not be limited to;

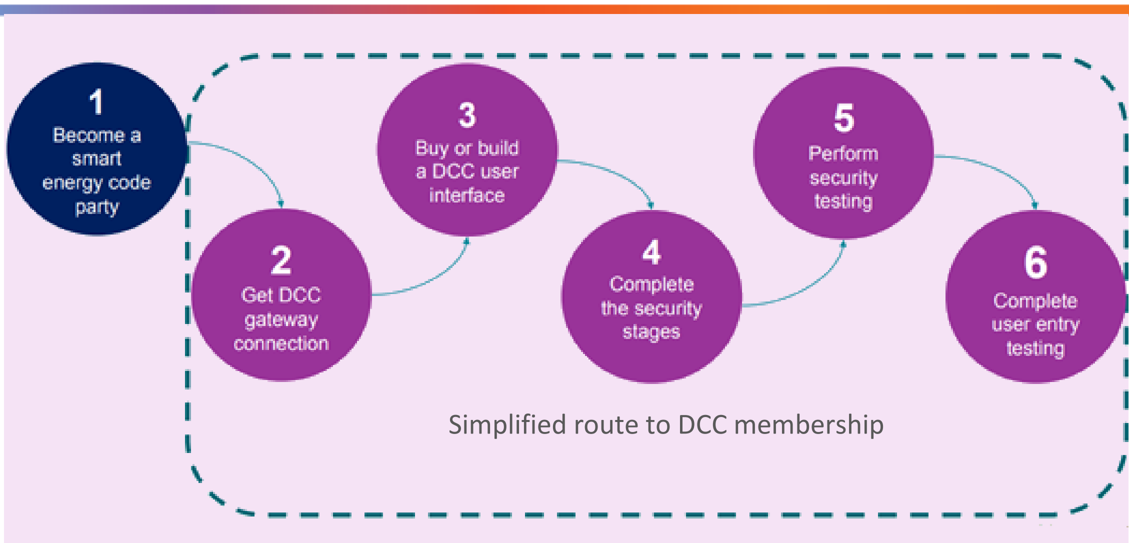
- *Secure comms equipment to link to DCC servers*
- *Enhanced fire wall provision*
- *HSM and secure racking*
- *Secure internal network which is separate from existing SGN network*
- *Separate terminals and screens for DCC interface users*
- *Security data storage modules for consumption data*
- *Secure servers for data aggregation and processing*
- *An application layer to process and present the relevant data.*

It may be possible to build a single service platform for all GDNs to utilise. This was initially explored via Xoserve during RIIO GD1. However, the initial high-level estimates were cost prohibitive therefore, for the purpose of this paper, the solution is assumed to be singular and for the sole requirements of SGN.

# 4 Problem Statement

For SGN to access GSME consumption readings we would need to become full DCC members using the SEC User Entry Process. The User Entry Process is the process each SEC Party must complete before they can become a DCC User and make use of the DCC Services and is described in the Smart Energy Code (SEC) Section H 'DCC Services'.

In simplified terms we would need to do the following:




Simplified route to DCC membership

Six key elements for full DCC membership are shown in the diagram below.

| | | |
|---|---|---|
| User ID obtained from Panel via SECAS EUI-64 Compliant Notified to DCC | Credit Cover if application, lodged with DCC | User Entry Process Tests (UEPT) In accordance with the Common Test Scenarios (CTS) |
| SMKI & Repository Entry Process Tests (SREPT) In accordance with the SR Test Scenarios | User Security Assessment Carried out by the User Independent Security Assurance Service Provider – the CIO procured by Panel Section G3-6 requirements | Privacy Audit Carried out by the Independent Privacy Auditor – the CIO procured by the Panel Section 12 requirements |

Key documents that SGN must comply with include:

- User Entry Process Guidance v1.3
- User Entry Process - Evidence Form
- Estimated DCC User Timeline
- SEC Party Contact Form
- DCC User Checklist for Small Supplier
- SREPT Testing Completions 04/09/2019
- UEPT Testing Completions 04/09/2019
- SMETS1 Eligibility Testing Completions 04/09/2019
- SMETS2 Eligibility Testing

SGN must also comply with the follow standards as a bare minimum:

ISO 27001 International Information Security Standard

ISO 27002 " "

ISO 27003 " "

ISO 27004 " "

ISO 27005 " "

BS 7854 Security vetting

Other key considerations would be:

Fully comply with the SEC-SSC CIO (Competent Independent Organisation) audits

Integration of our SMKI HSM into the wider DCC network

A dedicated DCC only IT system with no other external links

A dedicated DCC only comms links (VPN Links)

A dedicated DCC only access for OCC Team members and Network Analysis staff

Enhanced fire walls between OCC desktop users, network analysis staff, our internal DCC processing system and outbound to the DCC live environment

Remove any outside UK IT support from all DCC system links and data storage.

## 4.1 First Call Operatives (FCOs) Field Force and Systems access

We do not envisage our field force operatives, depot staff, depot management or customer services staff accessing DCC as this would entail very large IT changes for no positive gain. Our field force will not be installing or commissioning Smart meters therefore, there is no need to give them DCC service and/or data access. No FCO depot back office tasks require DCC access, so depot staff can be also be excluded.

We have therefore assumed that any access requirement would be limited to a centralised and singular team within one of our centralised support or Network management functions.

## 4.2 OCC and Network Analysis staff

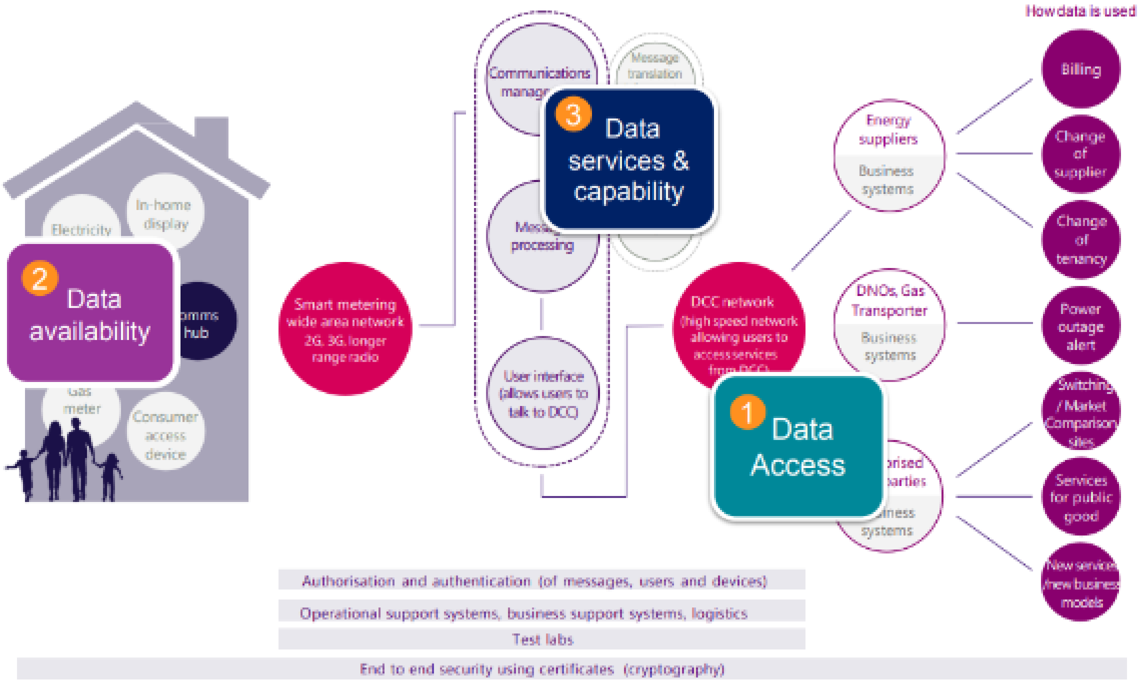
A sensible consideration would be to limit DCC access to OCC (Operational Control Centre) and Network Analysis Staff only. This means we can limit the IT expenditure to one site only and do not need to upgrade every field terminal. This approach would also limit the BS7858 checks to a small number of employees and not all our field force staff or depot staff. OCC, when dispatching a job to an FCO, could look at DCC data to see if a meter had sent an off-supply alert due to no credit. Smart gas meters do not check the supply pressure, so a true no-gas would not send an alert back to DCC. For DCC access to give SGN this benefit, Ofgem and the HSE would both need to agree, after reviewing all safety implications, that SGN do not need to attend a no credit no-gas call. We believe that this is unlikely to be the case.

Any benefit associated with network management would require Network Analysis staff to have DCC access to set up 1000s of pre-dated commands to tell DCC to gather meter reads at a pre-determined date and time. No other organisation needs to do this, so we would be unique in this use case. Suppliers do not need to do this as they automatically get a daily consumption read from every meter in their pool.

## 4.3 Use of gas meter consumption readings

SGN could in theory use consumption readings from Smart meters to adjust our network planning models by obtaining real time consumption from differing house types, differing socio-economic back grounds, differing heating apparatus and differing geographical locations. SGN currently uses many years of experience, data from live test sites and reliable data from the Building Research Establishment (BRE) to calibrate our accurate models.

Data acquisition model




Under current Smart thinking, the General Data Protection Regulations (GDPR) requires that all consumption data, obtained by NOs from Smart meters, must be aggregated across several meter readings to disguise the true source of the data. This would greatly reduce the value of any data obtained and would introduce a degree of inaccuracy to the data which would require some method of compensating the data for these inaccuracies.

Meter data could be used to calculate network pressures but a minimum of 95% of meters on a network would be required. All data from a network leg would need to be simultaneously obtained to help ensure a usable data set. There would be no point in obtaining some of the data in the morning, some at lunch time and some late in the evening as our network would be operating differently at each of these times. Even with 95%-meter access, an adjustment would need to be applied to cope with any missing data. It should be noted that meter reads would be missed if a mobile phone mast was down, a mobile base station link was down when we asked for the data, electricity supply failure resulting in HAN comms hubs failure, flat meter batteries, a MOB (Multiple Occupancy Building) not having smart connections or a larger DCC fault. All data would then need to be aggregated to disguise its origins which would again, deplete the accuracy.

SGN currently makes use of live pressure points on key network branches to calibrate models and control network governor equipment. These pressure points transmit live network pressures in real time to our back-office systems and one network point can cover 1000's of consumers and help protect our network integrity. These systems can even call out our network emergency cover operatives if they detect a problem in a network. Sections 3.4 and 3.5 give more depth to our current network models.

## 4.4 Options to improve shrinkage measurement by monitoring gas in vs. gas out.

Suppliers have often argued that Smart metering would help GDNs to monitor shrinkage by giving networks access to detailed consumption across our networks. To this end all the GDNs undertook an analysis of what might be achievable. Three options have been carefully considered by looking at the requirements, benefits and the restrictions that would apply.

| Metering level options | Requirements | Benefit | Restrictions |
|---|---|---|---|
| Offtake Metering In, Smart Metering Out – Full Coverage | Metering at offtakes – already in place.<br><br>Statistically valid sample of Smart Meters in place within each LDZ.<br><br>(GDNs have engaged independent consultants to determine a statistically valid sample size.)<br><br>Data requirements would as a minimum be an annual report of the actual demand. | Little additional cost to the Smart Metering roll out for additional meters.<br><br>Due to the requirement for a statistically valid sample of meters (with at least one full year of data) to be in place before any calculations of the gas lost could be made, it is expected that any benefit would only be realised late into the roll out programme (estimate 2019/20 roll out to representative samples + one year worth of data); however, this will become clearer once the roll out programmes are shared with the GDNs. | Smart Metering is only applied to U6 size meters therefore excluding larger domestic and commercial/industrial consumers – these consumers (excluding daily metered sites) account for approximately 40% thereby adding significant uncertainty to estimates of lost gas, including theft and own use gas. This would require some form of alternative modelling to determine what is lost gas and how much I&C customers are using.<br><br>Such an approach whereby shrinkage and leakage are measured at an LDZ rather than sub-network level would significantly impact the way in which shrinkage is managed as there will not be |

| Metering level options | Requirements | Benefit | Restrictions |
|---|---|---|---|
| | | | the same level of the granularity regarding the source of the lost gas. |
| Offtake Metering In, Smart Metering Out – Representative Networks | Metering at offtakes – already in place<br><br>Statistically valid sample of smart meters in place within each LDZ.<br><br>(GDNs have engaged independent consultants to determine a statistically valid sample size.)<br><br>Data requirements would as a minimum be an annual report of the actual demand. | As above; however, instead of waiting for statistically representative sample of Smart Meters across the LDZ before any perceived benefits may be realised, specific networks are targeted in the meter roll out allowing for statistically representative number to be achieved in these networks earlier and thus allowing the measured demand from Smart Meters in these networks to be applied to other similar networks to build an overall expected demand. | Such an approach would require that shippers / suppliers coordinate with GDNs to focus roll out of Smart Meters to specific networks if the full perceived benefits with regards to shrinkage and leakage are to be realised before the completion of the roll out programme. As yet GDNs have not had vision of the roll out plans.<br><br>GDNs have long argued that a focused network by network approach would have a significant and detrimental impact on our daily workloads and customer standards of service would suffer. Resource would end up concentrated at one network to cover all the faults left by Smart installers. |
| Offtake and Governor Metering In, Smart Metering Out | Additional meters to be fitted at each network governor. There are approximately 22,000 governors nationally and to achieve the level of metering accuracy required, it is likely to cost at least £50k-£100k per | Identify sub-network specific gas loss, allowing for investigative and targeted action to reduce loss and manage shrinkage and leakage. | This would require significant investment in flow monitoring. |

| Metering level options | Requirements | Benefit | Restrictions |
|---|---|---|---|
| | governor to include orifice meter, pressure/temperature correction, power source. Increased land purchase costs as more space would be required.<br><br>Smart Metering to measure the gas out.<br><br>Statistically valid sample (95%) of smart meters installed in individual low-pressure sub-networks with appropriate metering at the governors. | Ability to start assessing individual sub-networks as soon as statistically representative sample of smart meters are installed and meters are present at all the governors (inlets) to the sub-networks. This learning can then be applied to similar networks before they reach representative numbers of smart meters. (est. 2019/20) | |

## 4.5 Validation of the Current Shrinkage and Leakage Model (SLM)

A study was undertaken where the components and inputs to the Shrinkage and Leakage Model used by SGN were reviewed. Of the ten key inputs, two were identified as possibly being influenced by the roll out of Smart meters and the availability of smart metering data. The two inputs identified were Average System Pressures and Service Pipe Material data quality. The detailed analysis of the inputs into the Shrinkage and Leakage model are contained within the table below.

| Component reviewed | Input | Opportunity from Smart Metering | Data Required | Action | Cost | Benefit / Restrictions |
|---|---|---|---|---|---|---|
| Low Pressure Leakage | Pressure data | No impact on recorded data – Smart Meters do not have the ability to record pressure and would require a pressure sensor before the regulator for this to be of any use if they did. | NA | NA | NA | NA |
| | Average System Pressure | This is currently calculated using a combination of recorded pressures and network analysis models. Data from Smart Meters may allow minor improvements in the validation of these models | 6-minute flow data | The GDNs to continue to engage with DCC regarding 6-minute data and how would we obtain meaningful data. | Unknown | **Potential to:-**<br>• Fine tune the validation of domestic network analysis models<br>• Refine pressure management<br>• Validate the average demand used to calculate average system pressures<br>**Restrictions**<br>• Requires high coverage (90%+) of Smart Meters to provide meaningful results – aggregation of smart meter data<br>• Potentially leakage forecasts could increase<br>• Difficult to assess on medium/large networks<br>• Synchronised meter data capture at peak demand times |

| Component reviewed | Input | Opportunity from Smart Metering | Data Required | Action | Cost | Benefit / Restrictions |
|---|---|---|---|---|---|---|
| | Customer Numbers | No impact – customer numbers already known and held by Xoserve. Shipper led roll out means there is very limited opportunity to determine shipperless sites from installation of gas meters | NA | NA | NA | NA |
| | Mains pipe material / length | No impact | NA | NA | NA | NA |
| | Service pipe material | Possible opportunity to collect data on service types; however, this would require Shippers recording service pipe material during Smart Meter roll out and providing this information to the GDNs | Service pipe material to be recorded by Shippers on roll out and provided to GDNs | Engage with shippers to establish if the collection and transfer of this information is feasible as part of roll out | Unknown | Low-pressure services currently account for 16-22% of low-pressure leakage, mostly due to steel services. Populations are estimated in the shrinkage and leakage model. Improvements would be expected to be seen as soon as full roll out commences with possible benefit on completion of roll out |
| | Gas quality information | No impact - Smart Meters will not measure gas quality information | NA | NA | NA | NA |
| | MEG Concentration | No impact – Smart Meters will not have the functionality to measure MEG concentrations | NA | NA | NA | NA |

| Component reviewed | Input | Opportunity from Smart Metering | Data Required | Action | Cost | Benefit / Restrictions |
|---|---|---|---|---|---|---|
| Medium Pressure Leakage | Pipe material / length | No impact – the introduction of Smart Meters will not provide additional information on the makeup of the medium pressure network | NA | NA | NA | NA |
| AGI Leakage / Venting | AGI Numbers / Types | No impact – Smart Meters will not provide additional information with regards to AGI numbers / types and venting | NA | NA | NA | NA |
| Interference Damage | Number of Incidents | No impact – Smart Meters will not impact on the number of incidents that occur | NA | NA | NA | NA |
| Own Use Gas | | No impact as in the current model this is a factor of throughput | NA | NA | NA | NA |
| Theft of Gas | | No impact as in the current model this is a factor of throughput | NA | NA | NA | NA |

## 4.6 Electricity DNOs use of meter data

The Electricity DNOs have discovered that aggregating electricity meter data from different times of the day gives them meaningless data results. One DNO has raised a SEC (Smart Energy Code) change proposal, DP085 'Synchronisation of smart data meter voltage measurement periods.'

The expectation of DNOs during the development of the smart meter technical specification was that the average RMS voltage readings from smart meters would be measured across a consistent period. For example, with the default being for an average to be made across a 30-minute period starting on the hour and again on the half hour. This is not an explicit requirement codified in Smart Metering Equipment Technical Specifications (SMETS) or Great Britain Companion Specification (GBCS).

Without voltage measurements being made in a consistent way, Electricity Network Parties must either:

i) make conservative, less efficient analysis assumptions to account for the lack of data alignment or
ii) recreate synchronised data by downloading high granularity (for example minute resolution) data and calculating the required data.

GDNs would face similar data challenges in obtaining meaningful meter data across the peak load times of 5pm to 8 pm.

The DNOs are also facing serious problems with 'last gasp' alerts from millions of Smart meters. The 'last gasp' alert is sent by an electricity meter if it detects a loss of grid supply and this function can be used to monitor a loss of a supply line due to storm damage. However, the DNOs are plagued by false alerts caused by electricians working at a consumer's address pulling the cut-out fuse. The DNO sends an emergency resource to investigate the 'last gasp', only to find no problem. This is time consuming and an expensive waste of a valuable and finite emergency response resources which SGN would clearly want to avoid under any similar event relating to gas supply disruption.

## 4.7 Use of Meter Gas Valve

During the many years of Smart systems design it was thought that GDNs could use the internal meter gas valve for network isolation during a gas emergency event, say a sudden water ingress causing the loss of 100's of consumers. It was thought that GDNs could save money by not visiting customer premises to shut off the gas supply, but we could send a direct command to the gas valve in the meter to close instead.

This was ruled out due to:

1. Valves have a 5% let-by function therefore, they do not fully close and would allow gas to escape into the consumers pipework. The let-by is a design feature to keep the downstream pipework pressurised in the event of the valve closing due to no credit. This helps speed up the restoration of supplies by the consumers.
2. Any command to close off say a network leg or a postcode of gas valves would be a highly valuable target for hackers to allow them to cause disruption to UK energy supply. Therefore, SEC-SSC have ruled out such a command. Suppliers can only send single commands to close gas valves as a precaution. Identifying and setting up the 100s

of commands to the correct meters would take too long and our emergency response would already be on site.

## 4.8 Anomaly Threshold Detection

To protect DCC systems from hackers or disgruntled employees attacking the suppliers' ability to close gas valves, Anomaly Threshold Detection (ATD) is used. This limits the number of gas valve closure messages send in a given period from the DCC systems. This number is set in the very low and SEC-SSC do not see any need to change this. This ATD level protection would be pointless if GDNs could by-pass it to close multiple meters simultaneously.

The command to close the meter valve is regarded as a key critical command and is now limited to suppliers only.

## 4.9 BS7854

DCC requires all personnel accessing DCC systems to have been vetted to BS7858. The CIO audits that will be carried out to gain membership require all personnel involved in accessing DCC systems to hold a valid BS7858 check certificate. If any employee fails, the BS7858 checks, then they need to be removed from any DCC access. If we did not do this then we would be in breach of SEC obligations. Such certification and training would clearly come at a cost as would ongoing maintenance of this system. SGN would be required to move staff, if they fail a BS7858 check, this therefore would have wider HR implications and possibly stranded resource with the associated costs.

## 4.10 ZigBee 868 MHz

Due to the remote location of gas meters from the comms hub, a non-standard Zigbee version, 868MHz, opposed to the standard 2.4GHz, and therefore more expensive, has had to be developed. ZigBee 868MHz can penetrate thicker walls and travel greater distances than 2.4GHz but has a downside of communicating data over a narrower bandwidth, making it slower. Zigbee was never designed to operate at 868Mhz, so a new design was required and proved. This has delayed smart meters requiring ZigBee 868MHz by two years so far. The first ZigBee dual band comms hubs arrived for testing in August 2019 and hopefully they will be available for shipping mid-2020. Suppliers' installers will need to carry Zigbee 2.4 and ZigBee 868 meters as dual band meters are considered too expensive to manufacture and to stock. This leads to the potential for installers to fit the wrong meter on a site. The above issue has affected gas smart meter roll out timescales and in particular, "hard to reach" gas smart meter installation and has resulted in a "back-ending" of the most difficult installations. This is important to note as any potential benefits to SGN and GDN's would require full or near to full saturation of gas smart meters across our network (see section 4.5).

## 4.11 Alternative HAN (Alt-Han)

High rise building with remote gas and electricity meter locations are causing the programme significant headaches. Some flats have meters in a ground floor meter room but the In-Home Display (IHD) could be 15 floors up. Even ZigBee 868MHz cannot manage this type of layout distance.

To help solve remote meter location problems an Alt-Han working group was set up by BEIS to explore alternative HAN arrangements. Ideas under consideration are:

i. Plug-in plug through Power Line Carrier (PLC) devices
ii. Leaky Feeder Aerials.
iii. Larger Comms hub booster aerials

**Plug-In Plug Through Device**

For the plug-in plug through devices a ZigBee repeater would be mounted in a 13 amp plug device and plugged into a wall socket as close as possible to the gas meter. These devices would be plug through so that the consumer does not lose the use of a wall socket. The device would relay signals between the gas meter and the comms hub a bit like a home WI-FI extender. This type of device is already causing concern within the DNO's as it will send a 'last gasp' if the homeowner unplugs the device to use the socket.

**Leaky Feeder Aerial**

Leaky Feeders is a co-axial cable where the earth sheath has been partially removed which allows signals to escape or enter the central aerial core. These cables would be threaded in lift shafts to help boost comms hub signals between IHDs and gas meters. This technology has been proven to work in road tunnels where your car radio continues to work when deep underground. The downside is that if someone cuts the cable then the signal is lost and all meters talking via the now cut section no longer communicate with DCC.

**Larger Comms hub booster aerials**

The comms hub has an external port that was designed to take an external aerial connection. An external aerial would have a longer electrical equivalent length than the internal aerial and would send boosted signals, plus be more sensitive to weaker return signals. This type of device would only work in a larger house and not in flats with remote meter rooms.

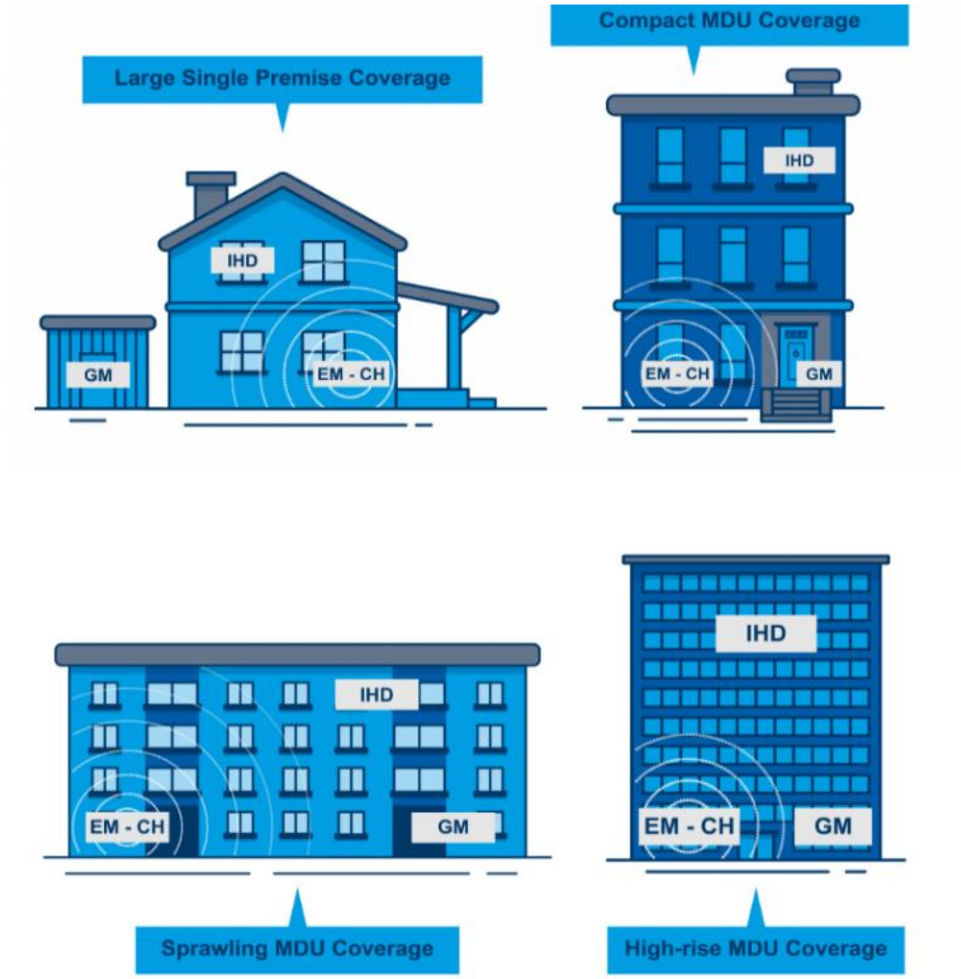
As before, these issues are important to note as they have resulted in further delays to gas smart meter roll out timescales. In the case of the above, these "hard to reach" locations such as high-rise blocks of flats often affect vulnerable consumers and has resulted in a "back-ending" of the most difficult installations which often affect some of the most vulnerable customers. This is important to note as any potential benefits to SGN and GDN's vulnerable customer groups is dependent on the above being resolved.

## 4.12 AltHANCo.

An Alt-Han company AltHANco., has been set up. The company has started to survey buildings right across the UK to gauge the size of the problem they will be facing. Once the initial building type surveys (Type 1) have been carried out, second surveys (Type 2) will be required so that surveyors can access individual dwellings to measure ZigBee signal strengths and signal to noise ratios. These Type 2 surveys will be used to determine what kind of Alt-Han solution should be used for the building type.

Even a simple bungalow type premise could require an Alt Han solution and examples of Alt-Han problem building types are shown below:

AltHanCo., Problem locations




**KEY**

**CH – Communications Hub**

**The Communications Hub is the device that enables the Smart meter to communicate to the devices in the home.**

**IHD – In home Display**

**All energy suppliers provide an IHD to all their customers when a Smart meter has been installed. This provides the customer with information regarding their energy usage.**

**EM – Electricity Meter**

**GM – Gas Meter**

Suppliers still do not have a coherent model detailing how they will service gas meters that are so remote from the comms hub that a ZigBee 868MHz SMETS2 GSME model cannot be used. The non-co-operation between suppliers also means this problem will linger for some time. In late October 2019 BEIS published “EPL Statement Final for BEIS Submission V1.0 23.10.19”, which contains the Exempt Premises List Statement and definitions of all the premises that will not be served by Smart meters. This document, once signed by the Secretary of State, will allow suppliers to discharge their obligations.

### 4.13 How will we understand if the Investment has been successful?

The move to DCC data driven network analysis will be difficult to measure until we are 100% confident that our new approach to this network modelling is producing the results we expect to see. In conversations with the water industry, who have had 100% water meters on some networks for some time, the results will be disappointing and slow to show any changes. Any miscounting in meter reading aggregation or missing meter reads will lead to miscalculations and wrong answers when trying to compute network consumptions.

# 5 Probability of Failure – Risks associated with smart meter data reliance

The probability of failure when using DCC gas meter consumption to help network accuracy is very high. The data needs to be aggregated to disguise its source in case it falls into the wrong hands and this aggregation introduces further inaccuracies to the data. Meter reads would be missed if a mobile phone mass was down when we asked for the data or during an electricity supply failure resulting in comms hubs failure or a flat meter battery etc.

It is also important to note, that any benefits would require full or mass saturation of gas smart meter installation. The historical and current roll-out timetable has continually shifted and the likelihood of mass saturation installation not being complete in GD2 is high, based on historical evidence and suppliers own predicted installation plans.

## 5.1 Internet of Things (IoT) and Denial of Service (DoS) attacks

The IoT (Internet of Things) allows various incompatible devices to talk to each other e.g. a fridge/freezer to communicate with an electricity meter to turn it off at peak load times. Suppliers are planning to introduce hourly pricing that would see energy prices increase at peak times. Manufacturers wish to build and supply third party devices that can talk to the HAN using ZigBee which would monitor usage against energy price. This introduces the possibility that hackers could attack the HAN via any unprotected IoT device and start a DoS attack on all meters on the HAN. Any DoS attack on the HAN would block access to meter reads. If the HAN is acting as a relay for other HANs, as in a mesh net configuration, then they would all be blocked from giving meter reads as well.

Gemserv publish a paper in May 2019 entitled, Vulnerabilities posed by Internet Connected Type 1 / Type 2 Devices, pointing out that connecting Smart systems to the IoT is not recommended. The first conclusion is:

*Vulnerabilities currently exist both within the ZigBee stack and at the device application layer, these vulnerabilities are currently mitigated through the closed nature of the SMHAN, i.e. if all interfaces are ZigBee only then local access is required to exploit the vulnerabilities found, and existing controls around network access and key exchange help mitigate this further. The general viewpoint from security professionals is that internet connected Type1 and Type2 devices provide a greater attack surface to exploit the vulnerabilities identified in this paper and offer the potential to impact multiples HANs.*

This paper is currently under a government Amber designation so is not widely circulated.

This risk is important to note as any potential benefits to Gas Distribution Network companies managing or being involved in gas consumption and demand management on devices beyond the meter is highly unlikely and more importantly, currently outside our current licence obligations and responsibilities.

## 5.2 Incorrect SMKI keys

Suppliers are required by SEC to insert the correct NO SMKI key when installing any meter. If the supplier inserts the wrong SMKI key, then the NO cannot read the meter as they only have access to meters with the correct NO key. As no GDN has full DCC access, we currently have no way of auditing what suppliers are putting into our NO SMKI key slots. DNOs are experiencing high numbers of wrong DNO SMKI keys being inserted by suppliers' installers rendering the meter unreadable to the DNO. This problem is particularly bad when a third-party contractor is serving several suppliers across a DNO or GDN border. This is a further risk to eroding any potential benefits to SGN.

## 5.3 Critical National Infrastructure

Under Smart metering gas meters have in effect become a piece of Critical National Infrastructure (CNI) due to interconnectivity, a single source data communications company and a gas isolation valve. Because GMSEs are now CNI they are likely to be subject to targeted organised crime, State sponsored hacks and individual hacks from various Threat Actors (TA). If Smart gas meters come under a sustained hacking attack, then consumption data will be blocked due to data network congestion. If a TA manages to change the meter CV setting or meter calibration details, then the incorrect data will be sent to GDNs. This would render all data useless for network analysis purposes. It should also be remembered that a threat can come from rouge code inserted at manufacture or a rouge employee at a supplier changing metrology parameters.

## 5.4 Inconsistent meter read timings and data aggregation

Data must be gathered at peak domestic usage times to allow us to calculate the Diurnal swing in consumption. See 4.5 for more details. The peak normally occurs around 5pm to 8pm, 7 days a week. If less than 95% of meter reads are available, then an adjustment factor would need to be employed which would introduce further inaccuracies to the data. The data also needs to be aggregated, due to GDPR restrictions, to disguise its source in case it falls into the wrong hands and this aggregation also introduces further inaccuracies to the data. Thus, further eroding and potential benefits. We already know that the DNOs are receiving data gather at differing time frames, which renders it useless for network analysis purposes. The DNOs have had to raise a SEC change request to hopefully have this data anomaly corrected over the coming years. If DCC cannot guarantee mass gas meters readings, across whole networks at peak demand times, then this whole DCC process would end up being very costly and pointless.

## 5.5 Statistically Valid Sample Size of Smart Meters

To understand what a statistically valid sample size would look like the UK GDNs commissioned Oxera, as an independent consultant, to review these sample sizes for three representative distribution networks (a city, a town and a rural network).

Initial analysis however indicates that very high coverage of smart meters within networks would be required before smart metering data could be utilised for estimating demand with any accuracy. Specifically, the coverage requirements range from 92% in a representative city to 100% coverage in rural locations. GDNs have always said that 95% coverage would be required. These sample sizes provide a 90% confidence of demand estimation to 0.1% accuracy. Whilst 0.1% may seem to be a high accuracy requirement it must be considered that at present Shrinkage is only calculated to be 0.5-0.7% of total demand and thus this represents an error of 14-20% of shrinkage. When considering the total Shrinkage volume across the UK for 2014/15, this would mean a potential error of ± 412.4 GWh – 589.2 GWh or ± £6.6m - £9.5m (based on 2014/15 prices). 2014/15 was the base year used in the Oxera data analysis.

At this point it is important to note that the above does not take into account non-coverage of smart meters from properties that contain meters bigger than a U6 and it is important to note in some networks it is estimated that these properties will account for 40% of total demand.

Given the very high coverage requirements discussed earlier, combined with the fragmented supplier led rollout it is unlikely that a statistically valid sample size of smart meters will be available until the end of the rollout programme, if at all.

## 5.6 Possible Mitigation

To mitigate against network analysis failure, when using the gas consumption reading, SGN would need 95% of simultaneous meter reads on any given network, to be available when we need them to make any sensible use of the data.

We could further mitigate the above issues by using our existing network pressure monitoring systems that are tried and tested over many years. This therefore, puts into question the overriding business case of setting up the infrastructure, organisation and processes to utilise smart meter data and DCC membership.

# 6 Consequence of Failure

If SGN uses flawed Smart meter data or has data sparsity problems, then there is potential for us to miscalculate volumes of gas consumed in a network, resulting in us setting network pressure too low. This would result in consumers with low inlet pressures at the meter or even worse, a no-gas situation.

### Loss of Supply to Customers

Any loss of supply would result from a lack of gas in any network and poor pressures at all appliances. In theory appliances with flame failures devices would shut down, but older appliances i.e. some gas cookers would not. The danger would be that these devices could flame fail but then start to pass unburnt gas into premises as pressure returned to the network. This escaping gas could build up in a premise and result in a very serious situation.

**Safety Impact of Failure**

SGN would need to declare a gas cessation and visit every customer affected to turn the supply off. Once all customers had been turned off and network pressures restored, SGN would need to visit every customer again to turn them back on. In the event of a no access SGN would need cut off the supply which may involve excavating the service to cut it off.

**Environmental Impact**

Environmental impacts if we must excavate to cut customers off and all the travel associated with any site visits.

# 7 Options Considered

## 7.1 Do Nothing

There is a very powerful 'Do Nothing' option as SGN has highly reliable and well understood systems in place to monitor the pressure integrity of our gas network. These systems are constantly being monitored and upgraded when technology offers an advantage to any changes made.  This option is also a significantly lower /zero cost option as our technology is already in place and working.

Do Nothing

Would mean that SGN could continue to use our tried and tested network analysis systems.

**The technical detail of the option i.e. capacity, system rating, availability etc.**
All existing technology is in place and has been for some time.

**The basis for the cost estimate/unit cost**
Zero as nothing new is required to be purchased over and above existing plans and all running costs are included within our plans already.

**The perceived benefits of the option**
Zero additional cost as no new kit is required over and above existing plans and we already know our systems work.

**Delivery timescales**
None, as the solution is already in place.

**Key assumptions made**
SGN will continue to use tried and well tested technology, in line with all other GDNs.

## 7.2 Join DCC and utilise smart meter data

The only way to obtain the mass number of meter readings required for sensible network analysis is to join DCC as a full member at the very end of the roll-out as there is no other way to obtain such a large meter reading data set. Xoserve, our current meter data supplier, does not hold the data sets we would require but could be asked to implement the changes required on behalf of the industry.

The GDNs did consider asking Xoserve to act as a third-party data supplier but this has been ruled out at this point in time due to the need for the GDNs to exchange gas meter NO SMKI private keys with an outside party. This is seen as too much of a risk as the GDNs would need to tolerate the costs of changing every NO SMKI private key within our footprints if a key was ever compromised. This could run into +£1m if we needed to change 5.8 million SMKI private keys. It should also be noted that initial costed estimates from Xoserve to provide a single platform for GDNs which was explored earlier in RIIO GD1, made this option cost prohibitive.

Any failure in the enrolment and adoption (E&A) project for SMETS1 meters will seriously impact SGN ability to get meaningful data from Smart meters. If the E&A fails, then 98% of all Smart meters already installed in our footprint will need to be exchanged for SMETS2 type GSMEs. This would push the full roll-out back to 2030 to 2032 and therefore into GD3/GD4.

Given the stakeholder feedback we have received, from CCG and CEG and wider stakeholder groups, this option is highlighted within this paper and the associated costs have been included within our business plan.

<u>Join DCC</u>

**The technical detail of the option i.e. capacity, system rating, availability etc.**
SGN must fully comply with the very complex DCC DUIS regulations.

**The basis for the cost estimate/unit cost**
A preliminary costing of £5.5 million has been estimated for full DCC access. This estimate has been derived from other Network companies experience and estimates in developing and delivering solutions to enable full DCC membership plus ongoing membership and data consumption charges.

**The perceived benefits of the option**
This would give SGN access to meter read data which in theory can be used for a new network analysis system that still has to be designed, built and tested but may emerge or be developed during GD2.

**Delivery timescales**
Based on the suppliers and DNOs who have signed up to DCC it would take around two years to design, build and implement a system that would comply with DUIS. The design of a new network analysis system that could use aggregated meter read data, could take between 2 to 3 years as no GDN has built such a system.

**Key assumptions made**
We have the skills available to us to design a DUIS system in the time scales, and that suppliers fit SMETS2 meters meeting the 2024 deadline set by BEIS. BEIS only require 90% of meters to be

installed but any network analysis system would need 95% to be accurate. Current installation trends are showing a 2030 100% completion date.

**Any other items that differentiate the option from the others considered**

Despite limited current benefits, there is strong stakeholder feedback and expectation that SGNs will make use of smart meter data as part of "digitalisation" of the energy system.

## 7.3 Options Technical Summary Table

Table 1: Options Technical Summary

| Option | First Year of Spend | Final Year of Spend | Volume of Interventions | Equipment / Investment Design Life | Total Cost |
|---|---|---|---|---|---|
| **Baseline - Do nothing** | 2025 | 2025 | 0 | 0 | 0.00 |
| **DCC Membership** | 2022 | 2026 | 3 | 10 | 5.50 |

- The 2022 start and 2027 finish depends on the BEIS consultation regarding a 2024 90% completion of Smart roll-out.

## 7.4 Options Cost Summary Table

Table 2: Cost Summary

| Option | Template | Cost Breakdown | Total Cost (£m) |
|---|---|---|---|
| **DCC Membership** | IT Capex | Resources | 1.3 |
| | | Software | 0.7 |
| | | Hardware | 0 |
| | | Contingency | 0 |
| | | **Total** | **5.00** |
| **DCC Membership** | IT Opex | Resources | 0.50 |
| | | Software | |
| | | Hardware | |
| | | Contingency | |
| | | **Total** | **0.50** |

# 8 Business Case Outline and Discussion

The business case outline would be to join DCC and access the gas meter consumption readings to help calibrate our network analysis models.

## 8.1 Key Business Case Drivers Description

Table 3: Summary of Key Value Drivers

| Option No. | Desc. of Option | Key Value Driver |
|---|---|---|
| 1 | Do Nothing | No increased expenditure as systems already exist |
| 2 | DCC membership | CEG, CCG and stakeholder expectation the GDNs utilise Smart Meter data |

Table 4: Summary of CBA Results

| NPVs based on Payback Periods (absolute, £m) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Option No. | Desc. of Option | Preferred Option (Y/N) | Total Forecast Expenditure (£m) | Total NPV | 2030 | 2035 | 2040 | 2050 |
| Baseline | Do Nothing / Do minimum | N | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | DCC Membership **Absolute NPV** | Y | -5.50 | -14.95 | -3.99 | -6.37 | -7.72 | -10.76 |
| 1 | DCC Membership **NPV relative to Baseline** | Y | -5.50 | -14.95 | -3.99 | -6.37 | -7.72 | -10.76 |

## 8.2 Business Case Summary

Table 5: Business Case Matrix

| | DCC Membership |
|---|---|
| GD2 Capex (£m) | 5.00 |
| Number of Interventions | 3.00 |
| Carbon Savings ktCO2e (GD2) | 0.00 |
| Carbon Savings ktCO2e /yr | 0.00 |
| Carbon Emission Savings (35yr PV, £m) | 0.00 |
| Other Environmental Savings (35yr PV, £m) | 0.00 |
| Safety Benefits (35yr PV, £m) | 0.00 |
| Other Benefits (35yr PV, £m) | 0.00 |
| Direct Costs (35yr PV, £m) | -12.56 |
| NPV (35yr PV, £m) | -12.56 |
| **High Carbon Scenario** | |
| Carbon Emission Savings (35yr PV, £m) | 0.00 |
| High Carbon NPV (35yr PV, £m) | -12.56 |

* The 2022 start depends on the BEIS consultation regarding a 2024 90% completion of Smart roll-out.

# 9 Preferred Option Scope and Project Plan

## 9.1 Preferred Option

The preferred option is to join the DCC at the latter end of the roll-out as we need 95% saturation of installations in order to get a good degree of accuracy from any meter consumption data. Currently, suppliers are claiming 68% roll-out completion by 2023 although the current run-rate of installations would question the accuracy of this prediction. We have however, based our funding requirements on this current target date.

The Smart roll-out programme only requires the suppliers to offer Smart meters to customers and not fit them before 2020. Customer resistance against Smart meters is high which could prolong the roll-out which further delays the GDNs from joining DCC for consumption data.

SGN should therefore aim for full DCC membership by the end of 2025/26 to avoid spending £millions before we can utilise the data or have 95% Smart gas meter saturation.

A BEIS consultation is currently circulating that is looking for 85% completion by 2024. However, E-UK, the voice of the suppliers, has poured scorn on the 2024 deadline. Current run rates point to 2030 for greater than 95% Smart meter installations. This would put any move to using DCC data into GD3.

## 9.2 Asset Health Spend profile

Table 6: Spend Profile

| Asset Health Spend Profile (£m) | | | | | | |
|---|---|---|---|---|---|---|
| | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Post GD2 |
| DCC Membership | 0.60 | 0.60 | 1.60 | 1.60 | 1.10 | Repeat investment planned on a 10-year investment cycle |

## 9.3 Investment Risk Discussion

**Risk Matrix**

| Risk Description | Impact | Likelihood | Mitigation/Controls | Comments |
|---|---|---|---|---|
| Change in capex expenditure | Capex expenditure | >40% & <=60% | Work closely with technology providers to understand the strategic direction of the systems that may be integrated with the DCC membership solution. | Changing technology including operating systems may impact the cost and timelines for delivery of the option. |

| | | | | |
|---|---|---|---|---|
| Change in timescales | Capex expenditure | >40% & <=60% | Engage in industry forums to understand any likely slippages. | There is a risk that the phasing of the costs associated with this CBA are incorrect. Assumptions have been made as to the most likely date that SGN would become members of the DCC, but these assumptions have been changing annually for a number of years as the gas smart meter rollout has moved a number of times. |
| Change in capex expenditure & timescales | Capex expenditure | >40% & <=60% | Work closely with industry bodies to identify any potential changes in scope and timelines. | There is a risk that as the Supplier smart metering rollout continues changes to the role of GDNs within the smart metering programme are identified that could impact SGN's ability to deliver a compliant smart metering solution on time. |
| Change in timescales | Capex expenditure | >60% & <=80% | Closely monitor the enrolment and adoption project for SMETS1 meters to avoid spending capex before it is needed. | Any failure in the enrolment and adoption (E&A) project for SMETS1 meters will seriously impact SGN ability to get meaningful data from Smart meters. If the E&A fails, then 98% of all Smart meters already installed in our footprint will need to be exchanged for SMETS2 type GSMEs. This would push the full roll-out back to 2030 to 2032 and therefore into GD3/GD4. |
| Change in capex expenditure & timescales | Capex expenditure | >60% & <=80% | There is a potential that no outside companies will bid for any tender work to build such a unique network analysis system based on meter readings only. The penalties for failure would need to be set very high as SGN cannot risk its networks to any untried network analysis systems. | Market analysis will need to be performed in advance of the tender event to ensure that we have Suppliers that have the capability and are willing to bid for the work. |

**Capex Sensitivity Results**

Table 7: Capex Sensitivity Results

| | Low | Mid | High |
|---|---|---|---|
| GD2 Capex (£m) | 3.75 | 5.00 | 7.50 |
| Number of Interventions | 3 | 3 | 3 |
| Carbon Savings ktCO2e (GD2) | - | - | - |
| Carbon Savings ktCO2e /yr | 0 | 0 | 0 |
| Carbon Emission Savings (35yr PV, £m) | 0.0 | 0.0 | 0.0 |
| Other Environmental Savings (35yr PV, £m) | 0 | 0 | 0 |
| Safety Benefits (35yr PV, £m) | 0.0 | 0.0 | 0.0 |
| Other Benefits (35yr PV, £m) | 0.0 | 0.0 | 0.0 |
| Direct Costs (35yr PV, £m) | -9.4 | -12.6 | -18.8 |
| NPV (35yr PV, £m) | -9.4 | -12.6 | -18.8 |

**Low case:** SGN have applied a reduction of 25% to the costs which could be achieved by applying less rigour to the development and testing of the solution which would lead to a greater chance of failure. This is highly unlikely to be achievable due to ongoing delays caused by supplier's failing to install Smart meters which could require multiple design and testing iterations.

**Mid case:** No changes have been applied but this may still be unlikely due to suppliers failing to install Smart meters.

**High case:** SGN have applied an increase of 50% to the costs due to the delays to the smart metering rollout. This is somewhat likely, but suppliers are still unlikely to hit the proposed 85% installs by 2024 BEIS target and SGN need to consider this whole project slipping into GD3.

Project payback has not been carried out as part of this analysis due to the effect of the Spackman approach. For a cash-flow traditional project payback period please see scenario 4 of our Capitalisation Sensitivity table.

**Capitalisation Sensitivity**

Consumers fund our Totex in two ways – opex is charged immediately though bills (fast money – no capitalisation) and capex / repex is funded by bills over 45 years (slow money – 100% capitalisation). The amount deferred over 45 years represents the capitalisation rate. Traditionally in 'project' CBA's the cashflows are shown as they are incurred (with the investment up front which essentially is a zero capitalisation rate). Therefore, we have developed scenarios that reflect both ways of looking at the investment – from a consumer and a 'project'.

The scenarios are summarised as follows:

- Scenario 1 - we have used the blended average of 65%, used in previous iterations of this analysis.
- Scenario 2 - we have represented the Capex and Opex blend for the two networks, as per guidance.

- Scenario 3 - addresses our concerns on capitalisation rates whereby Repex and Capex spend is deferred (100% capitalisation rate) and Opex is paid for upfront (0% capitalisation rate).
- Scenario 4 - this reflects the payback period in 'project' / cash-flow terms and provides a project payback.

We have taken a view of the NPV in each of the scenarios, except for scenario 4, at the 20, 35 and 45 Year points, to demonstrate the effect of Capitalisation Rate on this value.

Table 8: Capitalisation Rate Sensitivity Results

| Scenario | 1 | 2 SGN | 3 | 4 |
|---|---|---|---|---|
| Capex (%) | 65 | 41 | 100 | 0 |
| Opex (%) | 65 | 41 | 0 | 0 |
| Repex (%) | 100 | 100 | 100 | 0 |
| **Output** | | | | |
| NPV (20yr PV, £m) | -7.03 | -7.89 | -5.78 | |
| NPV (35yr PV, £m) | -11.77 | -12.56 | -10.61 | |
| NPV (45yr PV, £m) | -13.91 | -14.47 | -13.09 | |
| Payback | 50.00 | 50.00 | 50.00 | 50.00 |

## 9.4 Project Plan Outline

If we aim for late 2025 to join full DCC then we must start our DCC membership process changes by late 2024. This will ensure we prepare for and comply with all the requirements in section 3.0 above. SGN has knowledge of this process being undertaken by the supplier community where 4 of the largest suppliers took over 9 months just to navigate the CIO audits and SEC paperwork. These suppliers had already been running a working, reliable Smart metering system within their organisations for many years, so already had dedicated Smart capable IT systems and enhanced IT security in place. This, therefore, will be an equally rigorous and time-consuming process for GDNs, if not more so.

It also gives us time to fully separate any systems and networks that could be compromised, plus acquire UK only based support for any DCC systems and data handling in line with the necessary security standards.

All key personnel who will access DCC systems can be identified and checked to BS7858. Starting early in the process will allow us to ensure we have the correct staff identified and available and reduce any associated HR issues.

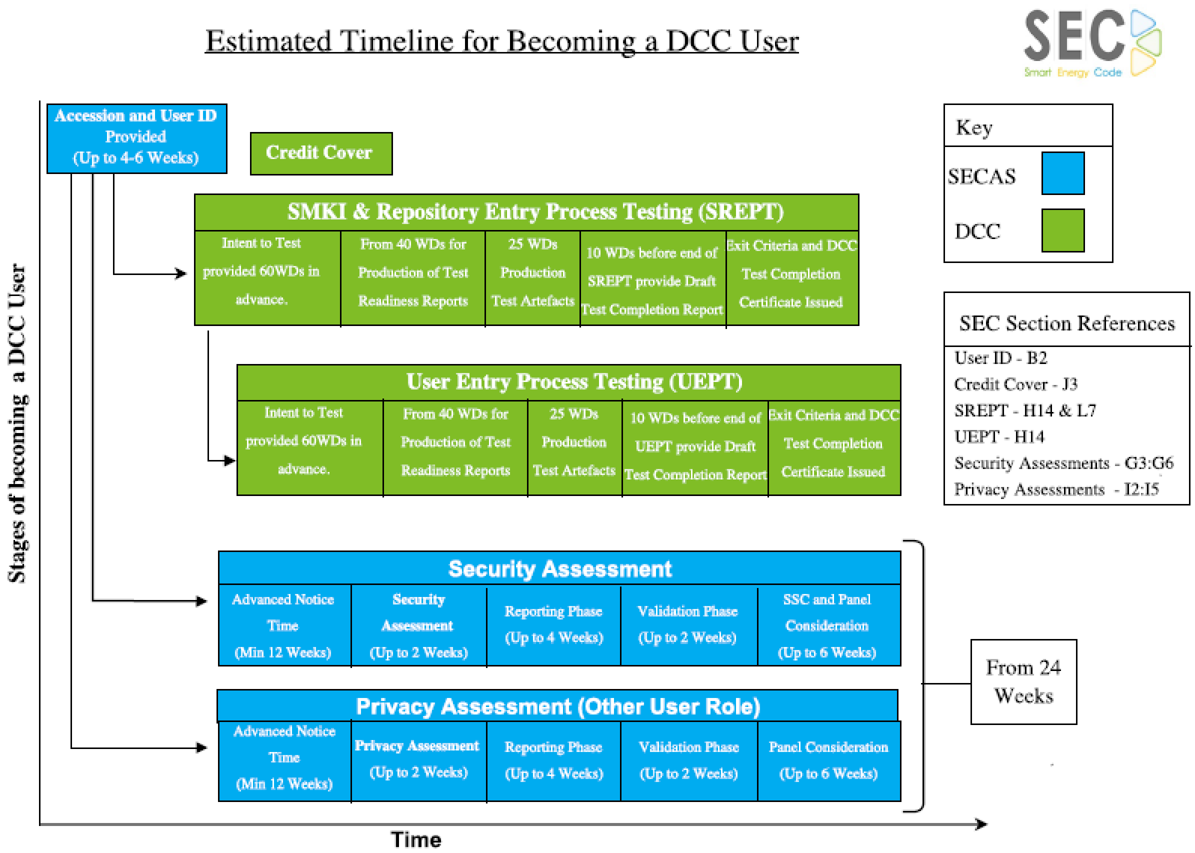
Training can be designed for OCC staff, so they can access the Read Meter Consumption command and the Gas Valve Status command. Both these commands would be used in real time.

Training for Network Analysis staff would be much more complex as they would need to set up 1000's of pre-dated meter read service commands so that network data could be gathered.

We would need to build a system to gather all the network data obtained from DCC, aggregate it to a suitable level to disguise its source, store it as required, retrieve the data once a set is complete and analysis the data to obtain network leg gas flows and ultimately pressure drops.

We would also set up more SGN NO SMKI private key pairs, say every 100,000 meters installed. This allows us to segregate our meter pool so that the loss of one SMKI key limit's our exposure to DCC rectification costs.

SEC give optimistic timeline guidance as follows:




DISCLAIMER - These timescales are indicative and are dependent upon:

1. The Credit Cover time-frame is dependent upon commercial discussions with the DCC. The DCC then reviews it each month thereon after.
2. SREPT and UEPT is dependent upon individual Parties and the time frames assumes that the DCC Gateway Connection works successfully.
3. Exit Criteria and Testing Completion:
   A) Within 2WD DCC to confirm receipt of notification of Test Complete.
   B) Within 5WD of receipt of the notification DCC review completion report.
   C) Within 2WD of successful Exit Quality Gate Review meeting, DCC to confirm Test Complete.
4. The timescale of Security and Privacy Assessments will depend upon the scale of the User System being assessed. Time required to make changes in accordance with User CIO observations will also need to be taken into account.
5. Depending on the outcome of the assessments further actions may need to be taken.

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# Appendix A - Acronyms

| Acronym | Description |
|---|---|
| **AES** | Advanced Encryption System |
| **ATD** | Anomaly Threshold Detection |
| **BRE** | Building Research Establishment |
| **CNI** | Critical National Infrastructure |
| **CSP** | Communications Services Company |
| **CV** | Calorific value |
| **DCC** | Data Distribution Company |
| **DCCKI** | Data Distribution Company Key Infrastructure |
| **DNO** | Distribution Network Operator |
| **DoS** | Denial of Service (a sustained internet attack requesting information from a node, thus blocking the node from sending information) |
| **DSP** | Data Services Provider |
| **DUIS** | DCC User Interface Specification |
| **ECV** | Emergency Control Valve (Upstream of the gas meter and end of the SGN network) |
| **EPL** | Exempt Premises Lists |
| **ESME** | Electricity Smart Metering Equipment |
| **GDN** | Gas Distribution Network |
| **GDPR** | General Data Protection Regulations |
| **GIST** | Gas Industry Service Tool (used by GDN engineers to open gas valves on PP meters. Not available for Smart meters as suppliers do not want us giving consumers gas) |
| **GPD** | Gas Proxy Device (used to save meter battery power consumption) |
| **GSME** | Gas Smart Metering Equipment |
| **HAN** | Home Area Network (Smart comms within the home) |
| **IHD** | In-Home Display |
| **IoT** | Internet of Things (Allows devices to talk to the HAN to give enhanced services) |
| **MDU** | Multiple Dwelling Unit (flats etc., and same as MOB) |
| **MOB** | Multiple Occupancy Building (flats etc., and the same as MDU) |
| **NO** | Network Operators |
| **NSA** | National Security Agency |
| **OCC** | Operational Control Centre (our emergency dispatch centre) |
| **PLC** | Power Line Carrier (uses the electricity wiring in a building to carry data signals) |

| | |
|---|---|
| **PP** | Pre-Payment (domestic meters only) |
| **SEC** | Smart Energy Code |
| **SMKI** | Smart Metering Key Infrastructure |
| **SPOTI** | Smart Portal Over the Internet |
| **WAN** | Wide Area Network (Smart comms out with the consumers home) |
| **TA** | Threat Actor |