Engineering Justification Paper

Open Data & Whole Energy System Analytics

Version: Final

Date: December 2019

Classification: Highly Confidential

Reference: SGN IT – 016 OpenData EJPDec19

1 Table of Contents

2 Introduction

This paper provides the architectural justification to support SGN's proposal to spend £4.5 million over five years starting in April 2021. The scope of this spend covers continued investment in SGN's data-driven innovation to ensure our ability to deliver Open Data: open sharing of our digitalised infrastructure assets - and Whole Energy System Analytics: development of options for clean energy solutions - capabilities that underpin the decarbonisation of the energy system whilst delivering better outcomes for our business and for society.

The UK government has committed to cutting greenhouse gas emissions by 80% by 2050 (against 1990 levels) and Scotland by 2045. Delivering a cost effective and socially accepted low carbon transition will require significant transformational change to the existing energy infrastructure, along with the types of energy that are used, how and when they are used.

Our energy system needs technologies and infrastructure that are both cost effective and clean, but it also needs innovation in processes, transactions and consumer offerings to realise a whole-system energy infrastructure. This is a fundamental part of the Government's Industrial Strategy and Ofgem's approach to regulation for RIIO GD2. It is widely recognised that network infrastructure needs to evolve from being passive to active and this is achieved through adoption of smart technologies (IoT), exploitation of the data they generate and utilisation of analytical insights, AI & ML solutions to deliver Whole Energy System solutions.

2.1 General Background

In our SGN stakeholder research report, Impact Utilities August 2018, 78% of our Stakeholders expect SGN to utilise the latest technology, yet in the same research, only 38% of our stakeholders believe we are performing well or excelling in utilising the latest technology.

Our customers expect us to keep pace with other companies and offer the service that they are frequently becoming more used to therefore reducing effort for them, investing in technology allows us to do this.

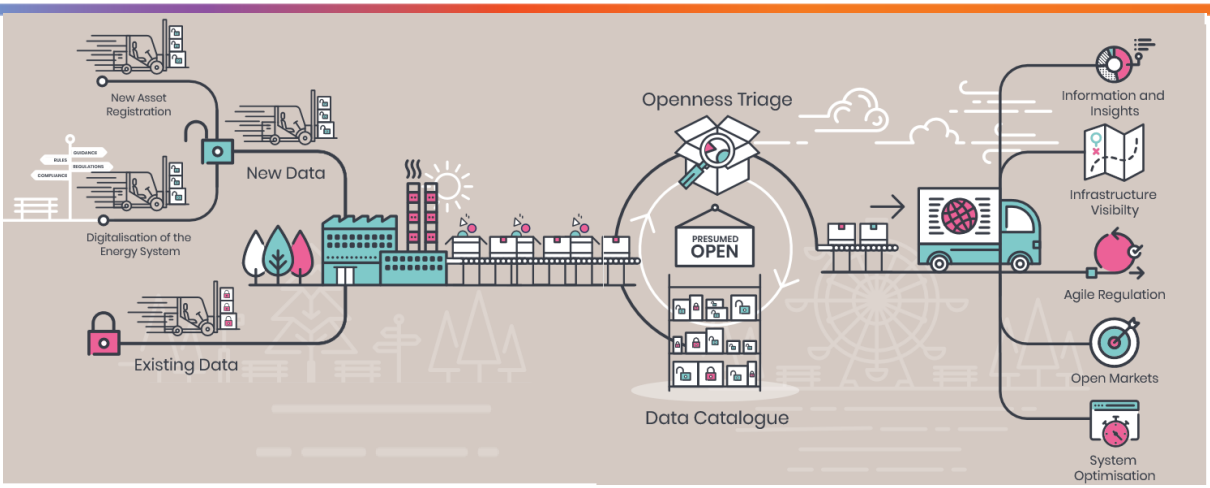
During our customer consultations for RIIO-GD2 business plan, we gained insight as to how our customers and stakeholders viewed the competing priorities we need to balance; a priority for them was investment in supporting services and environmental solutions.

Successful delivery of these outputs will, in part, be enabled through investing in data innovation and collaboration via open data sharing and whole energy system analytics which will provide unique insights into alternative and pioneering solutions across the energy sector.

Change is occurring at a rapid rate and this is being driven by interrelated factors with the move towards decarbonisation and decentralisation of energy resources and increasing customer expectations on consumer focussed services.

To deliver this future energy system, there are many functions that will require data to be gathered, transmitted, stored, analysed, interpreted, presented and disseminated in news ways. Our industry's – and SGN's - maturity in data sharing and whole energy system analytics will need to mature, whereby there is a repeatable, sustainable and optimised service delivering real benefits.

To help consolidate the approach needed, and benefits and implications for delivery, Government and Ofgem have commissioned reports: Energy Data Review, A Strategy for a Modern Digitalised Energy System; Data for the Public Good etc., from think tanks (Catapult, Energy Data Taskforce (EDTF), Energy Technologies Institute) and research organisations preponing the key role data and technologies play in delivering data-driven innovation for the energy system of the future.



EDTF: A strategy for a Modern Digitalised Energy System

Big data, open/shared data, analytics, machine learning and artificial intelligence etc., all offer transformational opportunities. Unlike our investment case for Analytics, AI, ML and DL, the need to invest in open data and whole energy system analytics is driven by the need to present and share our digitalised data externally and for purposes that we do not currently do as of today.

In response to this, SGN has defined its own Digitalisation Strategy which outlines our approach – initially – to digitalisation of our network infrastructure and assets and calls out the import of data and technologies in delivering EDTF's recommendations.

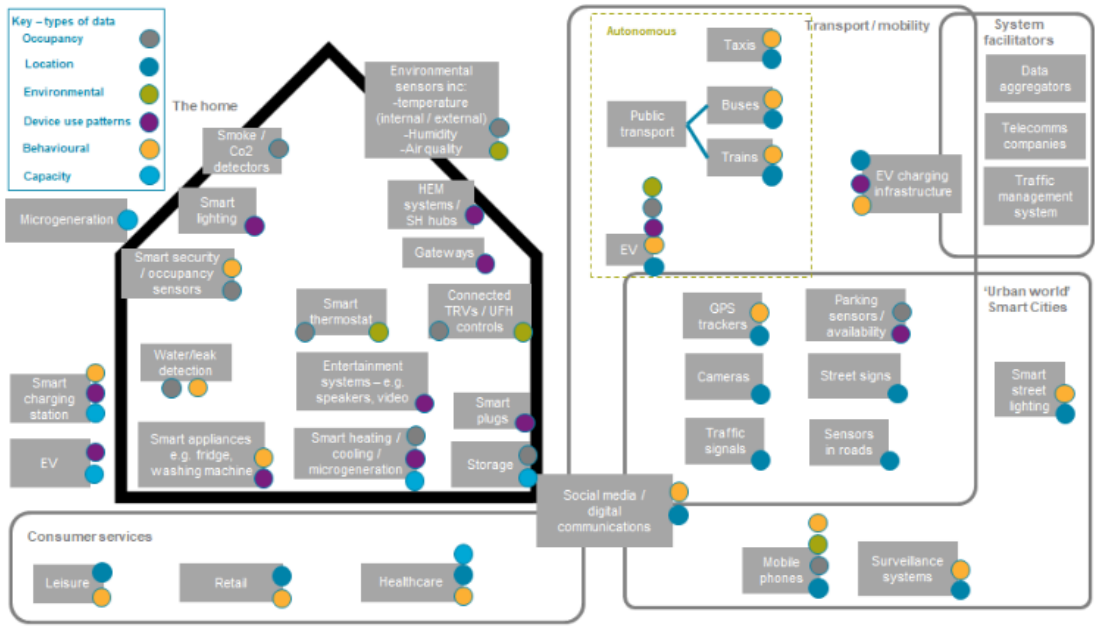
As part of our industry's continued adoption of the EDTF's recommendations, the Energy Network Association has established a Data Working Group (DWG), of which SGN is an active member. In response to Ofgem's call for a collaborative industry event to be held Spring 2020, the Data Working Group has arranged to hold this first event mid-March 2020. The specific agenda and format is under development in consultation with stakeholders and details will be issued imminently, including how stakeholders can participate.

The event will be inclusive and highly participative. The purpose will be to showcase digitalisation strategies and initiatives undertaken and in progress and enable stakeholder engagement and feedback. It is intended that this will be the first of a series of events to ensure continued engagement.

A link to the Energy Network Association webpage with details of the event is attached:
http://www.energynetworks.org/info/modernising-energy-data.html

Over and above our own digitised network data, we are very likely to need to consume additional external data to provide enrichment to that which we generate ourselves in order enhance these data outcomes, and this will require investment in data management practices to assure the data utilised in our open data sharing and analytical activities.

The diagram below provides a sample of the future data sources from outside the energy system which could inform wider system optimisation.



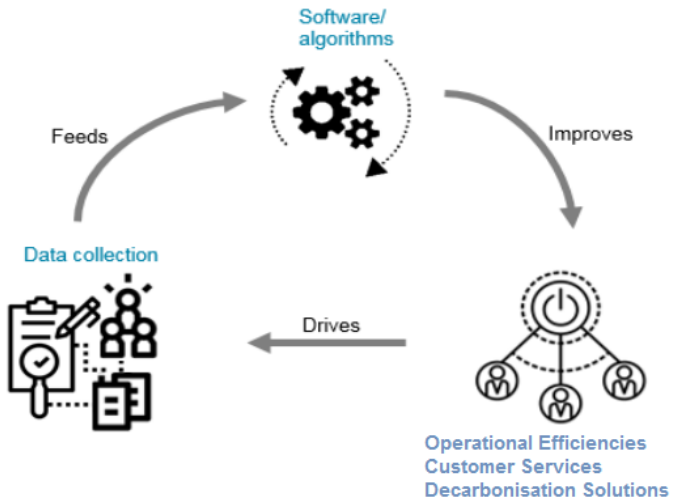
Catapult & Baringa: Energy Data Review 2018

Data science can help increase the productivity of infrastructure by extracting insights about these assets in ways unavailable to us previously. This in turn can enable decision makers in and outside of SGN to understand more about what infrastructure exist, how it interacts, how it is used and crucially how the energy system as a whole can be made more efficient and ecological. Investment and implementation of new data technologies and skills are key, and it is important to ensure that available new technologies are used for the wider benefit of industry and communities.

Underpinning the delivery of an Open Data Digital Twin will be the proliferation of new technologies such as machine learning and artificial intelligence to deliver the optimised, future-proofed energy infrastructure and consumer focused value.

This will bring a complexity in managing significantly increased volumes and variety of data which will require advanced data science/artificial intelligence technologies, methodologies and skills to govern, control and deliver. New tools and quality processes will also be needed to be developed to assure data, as well as the aggregation and anonymisation of data to overcome data privacy compliance requirements.

The continuous development of Open Data and Whole Energy System analytics will effectively require a new business model to establish and mature as an Energy Data Service which delivers a rich mix of credible data at reliable intervals to feed the realisation of innovative solutions in line with RIIO-GD2 priorities and customer expectations.



Catapult & Baringa Energy Data Review: Open Data business model

The benefits of publishing our energy system data to drive enhanced collaborative innovation through analytical insights, Artificial Intelligence & Machine Learning solutions have been well documented and in terms of impact on the economy the [1]Open Data Institute and [2]European Commission have stated that the value to UK GDP for openly sharing open data is between 0.4% - 1.4% year-on-year increase; the [3]World Bank places a conservative estimate of approximately £1.8bn p.a. Another study by the World Bank has highlighted that in the UK energy & resources data are amongst the key datasets for enabling economic growth via Open Data arrangements.

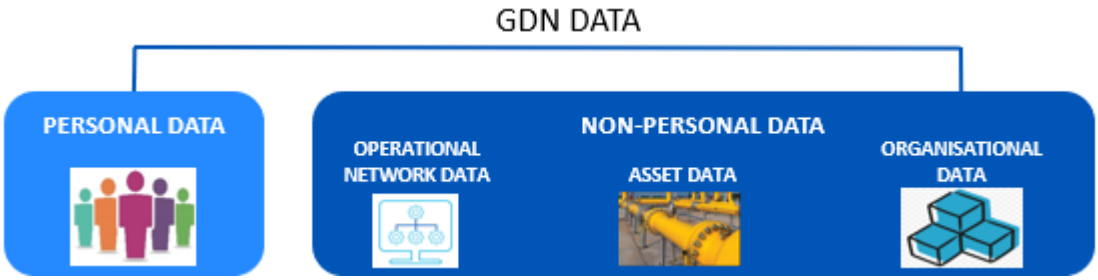
[1] ODI publications: The economic value of data assets under alternative policy regimes
[2] European data portal: Creating value through open data
[3] https://www.worldbank.org/content/dam/Worldbank/document/Open-Data-for-Economic-Growth.pdf

2.2 Site Specific Background

Unlike our network assets, our asset and infrastructure data are not site specific.

3 Equipment Summary

Our data "assets" which are typical for a distribution network fall into the following categories:



- **Personal Data:** data about individuals – customers, stakeholders and employees, etc.
- **Operational Network data**: data about our daily operations, network resilience, work scheduling, emissions, etc.
- **Network Asset data:** physical assets, condition, risk, location, material etc.

- **Organisational data**: corporate assets (buildings, fleet etc), financial, performance, internal organisation etc.

It will need to be established which types of data can fall into the "presumed Open" sharing category and that which require appropriate levels of protection (aggregation, anonymisation etc) and/or governance around access and usage.

The evolution of data centric software and hardware solutions during GD2 is extremely difficult to predict and given the rapid evolution of such technology along with Cloud and Industrial Internet of Things (IIoT) devices and technology means that consistent and appropriate investment is required to – at the very least – keep abreast of this fast-moving landscape.

4 Problem Statement

Why are we doing this work and what happens if we do nothing?

This paper has been written in direct response to BEIS and Ofgem's agreement with EDTF's strong guidance that industry must proactively adopt and progress Open Data and Whole Energy System approach in delivering decarbonisation of the network, meeting customer and network user needs and delivering a safe and sustainable network.

Our stakeholder evidence shows that customers expect us to do this. 78% of our Stakeholders expect SGN to utilise the latest technology (reference: SGN Stakeholder Research Report by Impact Utilities. August 2018) yet in the same research, only 38% of our stakeholders believe we are performing well or excelling in utilising the latest technology. At our Moving Forward Together workshops in November 2018, stakeholders were generally of the view that it is sensible to be taking steps to keep abreast of technological developments, and that as these technologies advance, the associated costs should come down. It was identified by stakeholders that as the energy system evolves in an effort to decarbonise, the application of smart technology will become increasingly important.

If there isn't consistent and appropriate investment in data technology and capabilities throughout RIIO-GD2 SGN (and arguably other utilities) will fail to meet the expectations of our customers, Ofgem and Government in delivering data-driven innovation and supporting the EDTF's recommendations, which are required to transform our energy infrastructure for a low cost, low carbon future.

What is the outcome that we want to achieve?

Realistic investment throughout RIIO-GD2 would enable SGN to mature its capabilities in smart data technologies and harness the resources needed to generate data driven insights and innovation, in order to:

- Provide objective evidence to support UK Government create a future for sustainable heating solutions.
- Deliver on our customer and stakeholder commitments and priorities: making a positive impact; delivering a safe and efficient service and creating a shared net zero future.
- Deliver Government and Ofgem requirements for Open Data and Whole Energy System strategies to meet consumer & network user needs; to have an environmentally sustainable network whilst maintaining a safe, resilient and efficient network.

How will we understand if the spend has been successful?

All investments made in relation to the continued development and utilization of Open Data and Whole Energy Systems analytics will go through a rigorous business case justification process with

parameters for ROI and values of ROI defined from the start. These projects will be managed under SGN's standard investment review and project lifecycle processes that ensure that only the highest value projects are prioritized, the returns are monitored & reported, and the benefits are realized. In line with our proposed bespoke output measures on Whole Energy Systems analytics and Open Data sharing we will measure, and evidence progress throughout the RIIO-GD2 period.

4.1 Narrative Real-Life Example of Problem

Our network consumers and wider external stakeholders are becoming more sophisticated and expect greater choices in services which are more closely tailored to their needs and to a large extent satisfying these expectations will rely on digitisation to provide the platform for delivering innovative services and solutions using open data and Whole Energy System analytics.

Our customers have stated they support increased investment in innovation to enable services in support of vulnerable communities and delivering a net zero future for the network.

The objective for Open Data Sharing and Whole Energy Systems Analytics is to bring environmental and societal benefits through data-driven innovation and collaboration. This will be enabled through the delivery of a data and data-skills pipeline which is capable of flexing and growing with the changing energy landscape.

Whilst the UK is globally viewed to be at the fore-front of data-driven innovation (Alan Turing Institute, ONS, TFL etc) ongoing investment in digitising our energy sector and exploiting our energy data is required if we are to deliver credible outputs and services, which enable these benefits to be realised.

Establishing common data sharing standards, curated digitised data as well as the skills and secure infrastructures and frameworks to manage, maintain and exploit vast data sets will require such investment.

SGN has invested in the Analytics and Data Platform (ADaPt) to provide very basic and foundational capabilities around MI, BI and analytics and the delivery of 8 use cases, which has warranted investment of £1m. Over and above this specific investment there has been the development of skills and capabilities that previously didn't exist within the organisation and this will also be required when developing an open data capability. The development and levels of investment required is a very good indicator of a proportion of the annual investment required.

The challenge across industry is keeping abreast of the rapidly evolving technologies and capabilities required to harness the aspirated benefits as stated by Energy Data Taskforce's report. Ensuring investment is commensurate to realising stated outputs is key.

4.2 Spend Boundaries

This investment paper covers the implementation of new services skills and solutions and the enhancement of existing solutions, as required, in order to keep pace with customer and stakeholder expectations throughout GD2.

Spend is on investing in new technologies, software and hardware; and skills to utilize and deliver data derived intelligence through open data and whole energy system analytics. Whilst the details of these software, hardware and skills have yet to be fully detailed, it is recognised that for the UK to retain its current top world ranking in open data along, further and ongoing investment is requisite.

5 Probability of Failure

Not applicable – this doesn't relate to asset health

5.1 Probability of Failure Data Assurance

Not applicable for data Assets. It should however be noted that data governance and data management in line with legislation, in particular GDPR, if not adhered to, could result in fines of up to 4% of total annual turnover. It should also be noted that if this funding in not available SGN will only be able to progress BEIS, Ofgem and EDTF guidelines and the digitalisation strategy published in line with Ofgem's guidance.

6 Consequence of Failure

Loss of Supply to Customers

Not applicable

Safety Impact of Failure

Not applicable

Environmental Impact

This paper refers to SGN's requirement to deliver Open Data and Whole Energy System analytics services and the consequence of failure in this context would lead to an inability to adhere to and advance Government and Regulatory strategy as outlined by the Energy Data Taskforce report. If there isn't appropriate investment in data technology and skills, SGN could fail to meet the expectations of our customers, Ofgem and Government in delivering data-driven innovation and insights to transform our energy infrastructure, low carbon future for our network consumers and users.

7 Options Considered

7.1 Option 1 - Open Data & Whole Energy System Analytics – Minimal viable investment – Recommended

SGN plans to invest up to £5.25 million on open data & whole energy system implementations spread over the 5 years of the GD2 commitments. This will be split between capex and opex driven solution investments. A high-level costing breakdown is presented below largely for illustration of how the costs are derived. An even pacing of deployment is recommended for the first three years leading to stability of process and associated operations.

Our future energy system will require more detailed, accurate and timely data to deliver the "big data" driven innovation which incorporates complex analytics, Artificial Intelligence and Machine Learning.

New sources along with more dynamic and greater volumes of data will need to be accommodated to deliver a viable platform from which to determine and deliver the insights and innovations

promised. Ensuring the availability and accessibility of open data and whole energy system analytics will be essential to providing a service which industry, network consumers and users will want to use, and which will in turn spring-board the innovation, value and growth aspired to.

The development of a data architecture framework will provide a basic structure within which data can be sourced, managed shared and accessed. In conjunction with common standards and meta data models this ensures consistent understanding of what data is to be shared, how it's to be shared and accessed are essential to deliver data interoperability across industry.

Although the concept of open data sharing points to democratic access and use of data, the security and protection requirements of the data will have to be included to mitigate risk of breaches and privacy infringements (and lack of consumer & user trust). The technical solution to support Open Data Sharing has not been defined yet, but functions to support collection, storage, processes and use of open data will need to demonstrate appropriate levels of security & privacy arrangements to mitigate risk whilst still fostering innovation.

Underpinning the delivery of Open Data will be the proliferation of new technologies such as machine learning and artificial intelligence to deliver the optimised, future-proofed energy infrastructure and consumer focused value. This will bring a complexity in managing significantly increased volumes and variety of data which will require advanced data science/artificial intelligence technologies, methodologies and skills to govern, control and deliver. New tools and quality processes will need to be developed to qualify data, as well as the aggregation and anonymisation of data to overcome data privacy compliance issues.

To ensure value for money during the GD2 period every proposed project will be assessed, and the most appropriate methodology selected to ensure the most cost effective solution delivery. SGN follows a PRINCE2-based quality gate approach to projects, ensuring rigour around governance, financial tracking and benefits realisation. At each stage gate as well as project artefacts being reviewed and checked, the business case will be revisited to ensure it still stands up. Solutions will be built in line with SGN IT Strategy whilst ensuring architectural principles and security standards are adhered to (unless a clear exemption is provided). SGN IT Strategy outlines a Cloud First, buy not build approach ensuring that the total cost of ownership of all solutions is the most appropriate for the size and scale of change.

7.2 Option 2 - Open Data & Whole Energy Systems Analytics – Enhanced investment

This option focuses on delivering increased and enhanced data capabilities and the associated technology and capability investment to drive the open data agenda more aggressively and at a faster pace; the total investment required is estimated at £6.5m. This option has been disregarded as we know from customer feedback that this is a medium priority and would result in higher costs which our stakeholders do not want.

We have based our cost estimates based on three specific use cases and high-level estimates based on historical spend associated with data governance and analytics provision. Although high level options have been outlined above, it is worth noting that detailed options analysis will still need to be conducted within the GD2 period as each item is progressed and approved to proceed.

The SGN options analysis process is designed to ensure that potential solutions are compared with each other at the point of investment and where required SGN will conduct market testing via regulated procurement events which ensure the most cost-effective solutions available in the market are utilised.

This demonstrates appropriate decision making and rigorous cost and solution assessment is undertaken over and above our internal procedures. In order to recommend the best value solution for SGN, this process considers critical factors, such as functional and technical fit, total cost of ownership, risk management and return on investment. All potential investments are subject to robust architectural, business and financial reviews before a decision can be made.

Once an investment has been made strict programme and project governance procedures are brought to bear to ensure clear financial management throughout the project life cycle. Within the processes described, SGN will validate any existing assumptions regarding the most appropriate way forward and consider any changes that have happened between now and the point of investment within GD2.

7.3 Option 3 - Do Nothing

This option is not recommended.

This paper refers to SGN's requirement to deliver Open Data and Whole Energy System analytics services and the consequence of failure in this context would lead to an inability to adhere to and advance Government and Regulatory strategy as outlined by the Energy Data Taskforce report "A Strategy for a Modern Digitalised Energy System" . The key recommendations from this report: Presumed Open Data Sharing; Digitalisation of the Energy Assets and Whole Energy System Thinking have been fully endorsed by the government department for Business Energy & Industrial Strategy and Ofgem.

If there isn't appropriate investment in data technology and skills, SGN could fail to meet the expectations of our customers, Ofgem and Government in delivering data-driven innovation and insights to transform our energy infrastructure, low carbon future for our network consumers and users.

SGN have assumed that if they do not invest in Open Data solutions they would have an inability to manage Personal Identifiable Information, which would inevitably lead to a significant breach of GDPR legislation (up to £40m fine). We assumed that this breach would occur in year 4 of GD2.

7.4 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
Implement Open Data System Change	2022	2026	10	5	5.25
Full Capability Implementation of Open Data	2022	2026	20	8	6.00

Option 1 - Open Data & Whole Energy System Analytics – Minimal viable investment – Recommended

Data capabilities and the associated digitalisation and technology investment at a relatively modest level and in line broadly with historical spend in analytics use cases within our business.

Investment type	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Open data & Whole System infrastructure	£500	£400	£400	£250	£400
Resources & Skills	£200	£200	£200	£150	£200
Project Management	£100	£75	£75	£75	£75
Selection Process	£150	£75	£75	£75	£75
Data management & maintenance	£200	£200	£200	£150	£200
Deployment & OD Service Operation	£150	£100	£100	£100	£100
Total Capex (£m)	£1.0	£0.75	£0.75	£0.50	£0.75
Total Opex (£m)	£0.30	£0.30	£0.30	£0.30	£0.30
Total Investment (£m)	£1.30	£1.05	£1.05	£0.80	£1.05

Option 2 - Open Data & Whole Energy Systems Analytics – Enhanced investment

Investment would be accelerated across RIIO-GD2 to deliver open data & whole energy system service maturity quicker.

Investment type	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Open data & Whole System infrastructure	£500	£500	£500	£500	£500
Resources & Skills	£200	£200	£200	£200	£200
Project Management	£100	£100	£100	£100	£100
Selection Process	£150	£150	£150	£150	£150
Data management & maintenance	£200	£200	£200	£200	£200
Deployment & OD Service Operation	£150	£150	£150	£150	£150
Total Capex (£m)	**£1.0**	**£1.0**	**£1.0**	**£1.0**	**£1.0**
Total Opex (£m)	**£0.20**	**£0.20**	**£0.20**	**£0.20**	**£0.20**
Total Investment (£m)	**£1.20**	**£1.20**	**£1.20**	**£1.20**	**£1.20**

7.5 Options Cost Summary Table

All options have been reviewed based on the need to keep pace with our customer and stakeholder expectations. The Baseline and option 2 have been discounted due to not being a priority for our customers.

Table 2: Option 1 Cost Summary Table

Option	Template	Cost Breakdown	Total Cost (£m)
Implement Open Data System Change	IT Capex	Resources	2.44
		Software	1.31
		Hardware	
		Contingency	
		Total	**3.75**
Implement Open Data System Change	IT Opex	Resources	1.50
		Software	
		Hardware	
		Contingency	
		Total	**1.50**

Table 3: Option 2 Cost Summary Table

Option	Template	Cost Breakdown	Total Cost (£m)
Full Capability Implementation of Open Data	IT Capex	Resources	3.25
		Software	1.75
		Hardware	
		Contingency	
		Total	**5.00**
Full Capability Implementation of Open Data	IT Opex	Resources	1.00
		Software	
		Hardware	
		Contingency	
		Total	**1.00**

*Please note, in order to minimise the cost and timeframes associated with maintaining or introducing IT assets related to open data and data sharing services, our architectural principles and IT strategy advocate a cloud first, buy not build approach. This ensures that the total cost of ownership for any solution is best value for money when comparing options that are available at the point of investment. Our programme and project governance structure will ensure that appropriate business case development and options analysis will be done at the relevant time in GD2 to ensure best value for money when it comes to delivering against the external requirements around open data and data sharing

** It is also of note that it is not possible to clearly define exactly how this investment would be utilised in GD2 based on the availability of solutions at the point of requirement. Use cases, external drivers and technology solutions are moving so fast that what may be available now is likely to be fundamentally different to what is available at the point of investment in GD2 particularly towards the latter stages of this period i.e. 2026.

8 Business Case Outline and Discussion

8.1 Key Business Case Drivers Description

With the publication of reports by National Infrastructure Commission, Energy Data Taskforce et al exponing the broad societal benefits for the Open Sharing of digitalised energy system asset data and applying Whole Energy System approach, SGN understands that this aligns with Ofgem's and government's focus on delivering an optimised energy system which also supports our societal and environmental obligations into the future.

Whilst providing Open Shared Data will invariably support these expectations, the concept of "Open Data Sharing" itself can give rise for concern around data protection: protecting the identity and rights of the individual (GDPR) through downstream access to & processing of their data.

Ongoing communication and coordinating a transparent approach to an Open Data Sharing platform with our stakeholders is key to striking the right balance between data accessibility and data protection, as is the development of a robust privacy and security framework around the platform.

The objective for Open Data Sharing and Whole Energy System analytics is to bring societal benefits through collaborative innovation of digital data assets; at the heart of this is the delivery and evidencing of those benefits. Demonstrating alignment of the initiatives and benefits identified through Open Data Sharing innovation directly back to our consumer, environmental and sustainability priorities will be key to attaining credibility of the investments made to establish the Open Data Platform in the first place.

The benefits of publishing our energy system data to drive enhanced collaborative innovation (analytical insights, Artificial Intelligence & Machine Learning solutions) have been well documented and in terms of impact on the economy, HM Treasury, Open Data Institute and European Commission have stated that the value to UK GDP for openly sharing open data is between 0.4% - 1.4% year-on-year increase; the World Bank places a conservative estimate of approximately £1.8bn p.a. Another study by the World Bank has highlighted that in the UK energy & resources data are amongst the key datasets for enabling economic growth via Open Data arrangements.

Whilst the UK is globally viewed to be at the fore-front of data-driven innovation (Alan Turing Institute, ONS, TFL, etc.) investment in digitalising our energy sector is required if we are to deliver a credible and sustainable Open Data platform and service, which engenders and enables these benefits to be realised; establishing common data sharing standards, curated digitised data as well as the skills and secure infrastructures and frameworks will require such investment.

Table 4: Summary of Key Value Drivers

Option No.	Desc. of Option	Key Value Driver
1	Open Data & Whole Energy System Analytics – minimal viable invest	• Delivery on our customer and stakeholder commitments and priorities: making a positive impact; delivering a safe and efficient service and creating a shared net zero future. • Compliance with and deliver Government and Ofgem requirements for Open Data and Whole Energy System strategies to meet consumer & network user needs; to have an environmentally sustainable network whilst maintaining a safe, resilient and efficient network.
2	Open Data & Whole Energy System Analytics – enhanced investment	• Key value driver as above, but at an accelerated rate of investment

3	Do Nothing	• Direct cost avoidance in investment in technology, resources and data service development

Table 5: 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	-40.00	-40.00	-40.00	-40.00	-40.00
1	Implement Open Data System Change **Absolute NPV**	Y	-5.25	-24.68	-5.92	-9.14	-12.15	-17.32
2	Full Capability Implementation of Open Data **Absolute NPV**	N	-6.00	-18.62	-4.77	-7.63	-9.69	-13.64
1	Implement Open Data System Change **Relative to Baseline**	Y	-5.25	-24.68	34.08	30.86	27.85	22.68
2	Full Capability Implementation of Open Data **Relative to Baseline**	N	-6.00	-18.62	35.23	32.37	30.31	26.36

8.2 Business Case Summary

This engineering justification considers the option of investing in the areas required to deliver SGN's RIIO-GD2 plans. Not investing in these areas adds significant risks and costs to SGN's obligations as a Gas Network Operator.

Table 6: Business Case Matrix

	Implement Open Data System Change	**Full Capability Implementation of Open Data**
GD2 Capex (£m)	3.75	5.00
Number of Interventions	10.00	20.00
Carbon Savings ktCO2e (GD2)	0.00	0.00
Carbon Savings ktCO2e /yr	0.00	0.00
Carbon Emission Savings (35yr PV, £m)	0.00	0.00
Other Environmental Savings (35yr PV, £m)	0.00	0.00
Safety Benefits (35yr PV, £m)	0.00	0.00
Other Benefits (35yr PV, £m)	40.00	40.00
Direct Costs (35yr PV, £m)	-19.85	-15.24

NPV (35yr PV, £m)	20.15	24.76
High Carbon Scenario		
Carbon Emission Savings (35yr PV, £m)	0.00	0.00
High Carbon NPV (35yr PV, £m)	20.15	24.76

9 Preferred Option Scope and Project Plan

9.1 Preferred option

This paper recommends Option 1 which is to invest in data capabilities and data smart technologies investment at a relatively modest level and in line broadly with historical spend in analytics use cases within our business.

9.2 Asset Health Spend Profile

The following table outlines the proposed investment (combined) in Open Data and Whole Energy System Analytics solutions throughout the GD2 period.

Table 7: Asset Health Spend Profile

Asset Health Spend Profile (£m)	2021/22	2022/23	2023/24	2024/25	2025/26	Post GD2
Implement Open Data System Change	1.30	1.05	1.05	0.80	1.05	Spend profile will continue following GD2

9.3 Investment Risk Discussion

As part of annual operating planning process, SGN management will study and prioritise the use cases for the proposed yearly investments every year to align these planned investments to optimise the investments but maximising the returns for the benefit of SGN customers. All expenditures and benefits listed in the proposed plans will be identified, monitored, controlled and reported on a periodic basis in line with legal, regulatory and financial reporting obligations that apply to SGN.

The key risk associated with Open Data & Whole Energy Systems is the maturity of technology, capabilities and identification of key use cases, along with potential external impacts (industry, societal, political) requiring decreased or increased investment – speed of desired change - in this area. A programme board for governance and a steering group for use case prioritisation will be adopted to mitigate risks and issues arising in delivering the business benefits associated with the programme.

Risk Matrix

Risk Description	Impact	Likelihood	Mitigation/Controls	Comments
Change in capital expenditure	Capex & Opex expenditure	>40% & <=60%	Investment in technology roadmaps, ensuring early sight of how the market is developing; continuous engagement with industry, network users and customers	The risk associated with Open Data & Whole Energy Systems is the maturity of technology, capabilities and identification of key use cases
Change in scope	Capex & Opex expenditure	<=20%	Continued engagement with industry and representation at ENA working group.	There is a risk of potential external impacts (industry, societal, political) requiring decreased or increased investment - speed of desired change - in this area

Table 8: CBA Sensitivities Table

	Low	Mid	High
GD2 Capex (£m)	3.38	3.75	5.63
Number of Interventions	10	10	10
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)	8.0	40.0	40.0
Direct Costs (35yr PV, £m)	-17.9	-19.9	-29.8
NPV (35yr PV, £m)	-9.9	20.1	10.2

IT believes the preferred option to implementing Open Data system change is to take a structured approach to focus on key elements rather than embarking on a rapid full Open Data implementation. For the purpose of sensitivity analysis, the following has been applied to the preferred option of pre-emptive replacement:

Low Case: SGN have applied a reduction of 10% in CAPEX costs – this can be applied if SGN achieve greater efficiencies during the design and implementation of Open Data solutions. Furthermore, an 80% reduction has been applied to a breach of GDPR Legislation on the basis that we may be fined less than 4% of turnover for a breach.

Mid Case: no changes have been applied, this is the expected output required for the GD2 time period.

High Case: SGN have applied an additional 50% on the CAPEX expenditure, as this is believed to be the potential cost increase due to the immaturity of Open Data technology and the lack of skilled

resources in this area. These two issues would result in increased spend in technology solutions and resource costs.

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 9: Capitalisation Rate Variation

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)	28.92	27.28	31.32	
NPV (35yr PV, £m)	21.33	20.15	23.04	
NPV (45yr PV, £m)	17.54	16.71	18.75	
Payback	3.00	3.00	3.00	3.00