SGN's Digitalisation Strategy

March 2022

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Foreword

As Chair of the Energy Digitalisation Task Force, I am passionate about both the opportunity associated with digitalisation of the UK Energy system and the necessity of acting to deliver it. It is vital that the actionable recommendations set out by the taskforce in our report in December 2021 are progressed and delivered for the benefit of all UK citizens and indeed for the future of our country.

Digitalisation is not only essential in our move to net zero, but also to enable Operational Efficiencies & to deliver Customer Value. The steps taken by both BEIS and Ofgem to deliver against this strategy are excellent and are to be applauded. But all parties within the industry have a huge amount more to do if we are to work collectively to tackle the challenge we all face. As an Independent Director of SGN and the member of the Board responsible to lead on overseeing this digitalisation strategy, I take a personal interest in the steps the company has and continues to take on this journey, guiding and challenging the team as required. I am particularly passionate about the investment in digital skills and capabilities and in an environment of reduced funding and uncertainty around energy futures, I will seek to champion the continued prioritisation of talent, skills and capability development both within SGN and across our industry.

Laura Sandys CBE – Independent Director SGN

At SGN, our digital and technology goals are to ensure that our customers and our network is safer, greener and more efficient because of what we do. We aim to be a recognised leader in digital innovation and technology adoption. As Director of IT and Innovation at SGN and the Executive responsible for overseeing and delivering our Digitalisation Strategy and Action Plan, I am both excited and passionate about driving the digital agenda and playing a part in tackling the climate emergency that we all face, whilst enabling operational efficiency and better customer value.

Our digital and technology strategy has developed over many years and will evolve further as we listen to our stakeholders, collaborate and deliver the strategy in all five years of the GD2 price control timeframe. We are committed to delivering our Digitalisation Strategy and Action Plan and the transformation in and how we operate.

Andrew Quail – Director of IT and Innovation

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Executive summary

This Digitalisation Strategy has been produced directly in response to the recommendations of the Energy Data Taskforce and more recently the Energy Digitalisation Task Force (EDiT) report entitled Delivering a Digitalised Energy System. The recommendations cover the need for improved visibility of energy data, assets and infrastructure along with the optimisation of energy sector operations and an open system design to enable the move to net zero, operational efficiencies and deliver customer value.

At SGN, Digitalisation is a continuously growing and improving capability. Our direct response to stakeholder engagement feedback and industry collaboration has enabled success stories around Ofgem's recently launched Strategic Innovation Funding. This has seen four new, exciting Digitalisation projects emerge around Digital Twins for Green Hydrogen and Gas Distribution Networks, an Intelligent Gas Grid project and working with our digital partner Fyld, to expand the use of AI and Analytics to predict and prevent safety incidents. Our intent is to build on the success we have already achieved in the year with the UK IT Automation Project of the Year award for our fatigue analytics solution, as well as the digital innovation partnership we have developed and co-founded with the award winning digital platform FYLD.AI, who recently were awarded Emerging Technology of the year by the UK IT Awards. These are just a sample of the exciting and highly innovative digital solutions described in this strategy that we look forward to developing further in the coming years with the invaluable support from UKRI and Ofgem.

Stakeholder requirements
Consumers, Regulators, Investor requirements

Digital strategy
Unlocking digital value and building future roadmaps

Operating model
Redefining our operating model for digital business

Digital transformation
Sustainable capability development aligned to our business and stakeholder expectations

Driving innovations
Realising the art-of-the possible

Developing capabilites
Developing capabilites needed for the digital business

Delivering solutions
Using new technologies to build, deploy and manage

Cyber security
Protecting and exploiting our digital business

Figure 1: SGN's digital transformation framework

Our Digitalisation Strategy has three main sections;

- **Background:** Covers the context and our digital readiness:

    Context: The drivers and needs case for change is summarised within this section in addition to the framework and environment we are currently operating within.

    Our digital readiness: The position in which our industry, and SGN in particular, finds itself with respect to digital and data maturity is defined here. We have undertaken analysis and readiness assessments with respect to our maturity as well as an assessment of our digital skills. Understanding our current position and areas in need of focus is a fundamental component to feed into our overarching strategy. It is also vital that we balance the wider digitalisation ambition with the capability of the organisation and the industry as a whole.

- **Our Digitalisation Strategy for GD2:** In this section we cover our approach and the outcomes and benefits achieved to date across seven strategic themes, each one an essential component for successful digital transformation. Our approach is summarised in the diagram above and we will cover each theme in some detail within the body of this document.

- **Conclusion and next steps:** Summary, key risks and what we will do next.

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Background

3.1 The digitalisation opportunity

The UK government has committed to cutting greenhouse gas emissions to net zero by 2050 and Scotland by 2045. Delivering a cost effective and socially acceptable low carbon transition will require significant transformation change to the existing energy infrastructure, along with the types of energy that are used with it.

Our energy system needs technology 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. Interoperable data and digital solutions are essential to move the energy network from passive to active and is key to delivering the necessary infrastructure at the least cost.

The recently published Energy Digitalisation Taskforce recommendations, re-focus the energy sector on digitalisation being a core component to achieving net zero. The future energy system will be more complex and will need to rely on a digitalised exchange of data to manage the energy network effectively.
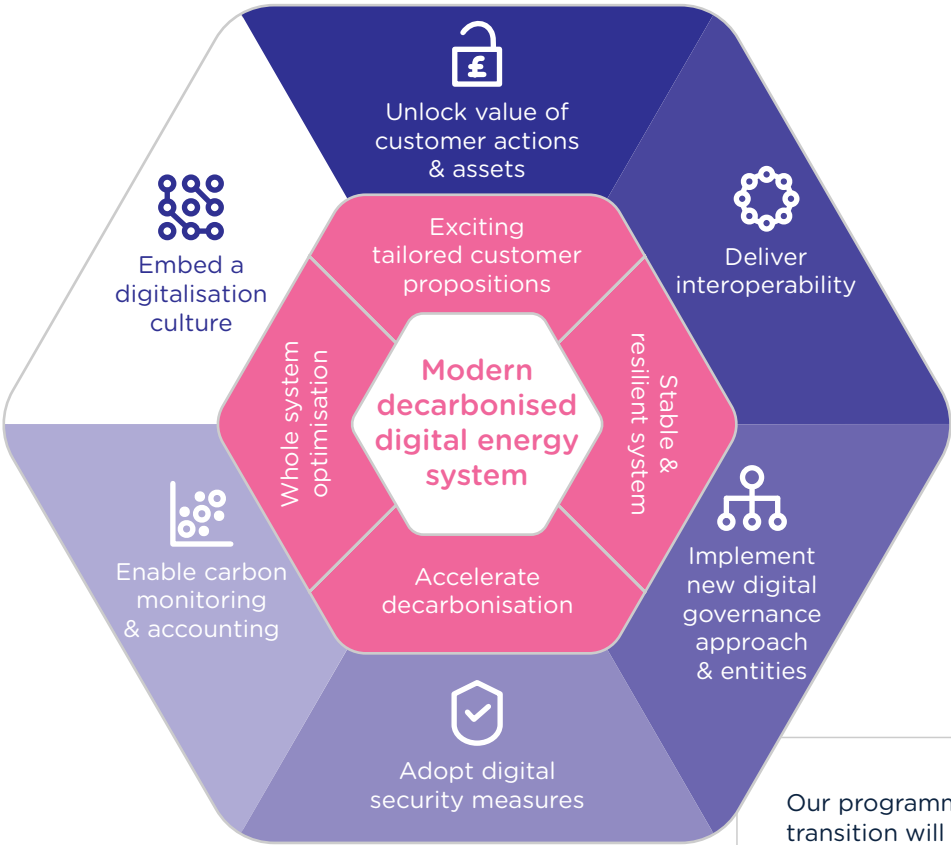

Figure 2: Energy Digitalisation Task Force key outcomes & principles

Our programme of work to deliver energy transition will demand new platforms, operating models and data sharing opportunities to be delivered and exploited. This will not only require demonstration of low/zero carbon heat sources and customer value, but the development and delivery of innovative digital and data solutions as outlined in our Digitalisation Strategy Action Plan.
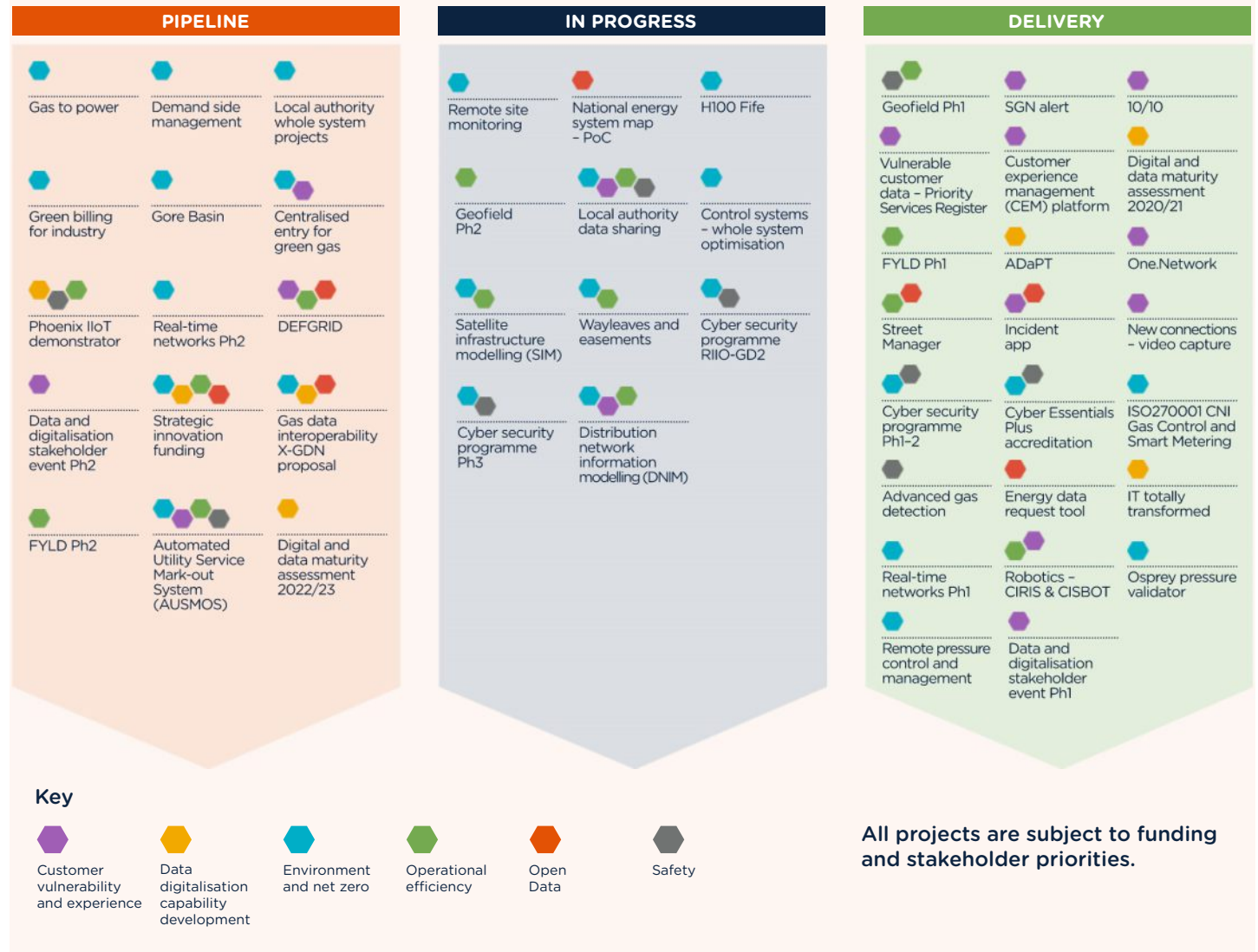
Our digital and data roadmap for 2021-22

PIPELINE		
Gas to power	Demand side management	Local authority whole system projects
Green billing for industry	Gore Basin	Centralised entry for green gas
Phoenix IIoT demonstrator	Real-time networks Ph2	DEFGRID
Data and digitalisation stakeholder event Ph2	Strategic innovation funding	Gas data interoperability X-GDN proposal
FYLD Ph2	Automated Utility Service Mark-out System (AUSMOS)	Digital and data maturity assessment 2022/23

IN PROGRESS		
Remote site monitoring	National energy system map – PoC	H100 Fife
Geofield Ph2	Local authority data sharing	Control systems – whole system optimisation
Satellite infrastructure modelling (SIM)	Wayleaves and easements	Cyber security programme RIIO-GD2
Cyber security programme Ph3	Distribution network information modelling (DNIM)	

DELIVERY		
Geofield Ph1	SGN alert	10/10
Vulnerable customer data – Priority Services Register	Customer experience management (CEM) platform	Digital and data maturity assessment 2020/21
FYLD Ph1	ADaPT	One.Network
Street Manager	Incident app	New connections – video capture
Cyber security programme Ph1–2	Cyber Essentials Plus accreditation	ISO270001 CNI Gas Control and Smart Metering
Advanced gas detection	Energy data request tool	IT totally transformed
Real-time networks Ph1	Robotics – CIRIS & CISBOT	Osprey pressure validator
Remote pressure control and management	Data and digitalisation stakeholder event Ph1	

Key

- Customer vulnerability and experience
- Data digitalisation capability development
- Environment and net zero
- Operational efficiency
- Open Data
- Safety

All projects are subject to funding and stakeholder priorities.

Figure 3: SGN Digitalisation Strategy Action Plan Dec 2022

3.2 Our digital readiness

Ofgem recognises the energy sector needs a modern, de-carbonised, digital energy system underpinned by open systems design build on data and digitisation foundations. Maturity in data sharing and digitalisation will need to continue to develop to enable this vision. SGN needs to ensure there is ability to deliver repeatable, sustainable and optimised digital and data services that provide real benefits to customers and stakeholders throughout GD2 and build solid foundations for GD3.
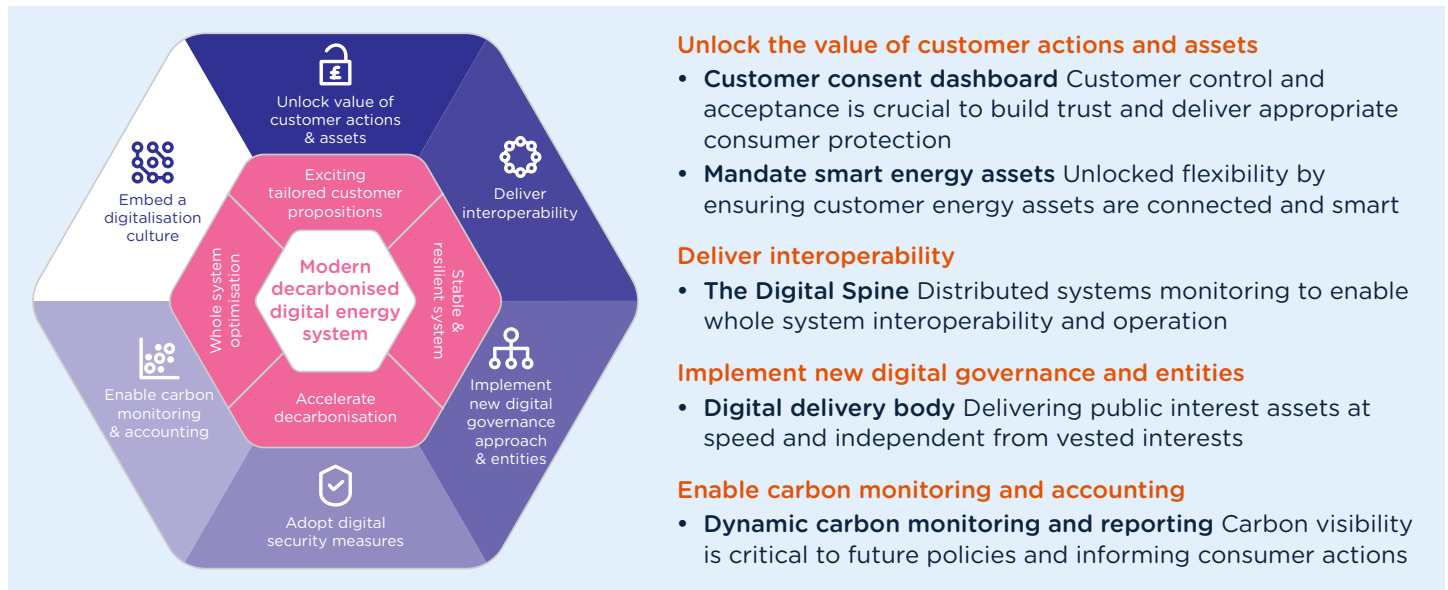

Unlock the value of customer actions and assets
- **Customer consent dashboard** Customer control and acceptance is crucial to build trust and deliver appropriate consumer protection
- **Mandate smart energy assets** Unlocked flexibility by ensuring customer energy assets are connected and smart

Deliver interoperability
- **The Digital Spine** Distributed systems monitoring to enable whole system interoperability and operation

Implement new digital governance and entities
- **Digital delivery body** Delivering public interest assets at speed and independent from vested interests

Enable carbon monitoring and accounting
- **Dynamic carbon monitoring and reporting** Carbon visibility is critical to future policies and informing consumer actions

Figure 4: Energy Digitilisation Taskforce Recommendations published January 2022

There is now a clear expectation to participate and shape the value for customers, drive sector level interoperability and enable carbon reporting. For this to be successful, new digital governance will be required. There is also significant research and evidence to bring to life how the utility industry will significantly benefit from digital business in the future. The graphic below summarises some of the key use cases and outcomes which can be achieved with digital business.

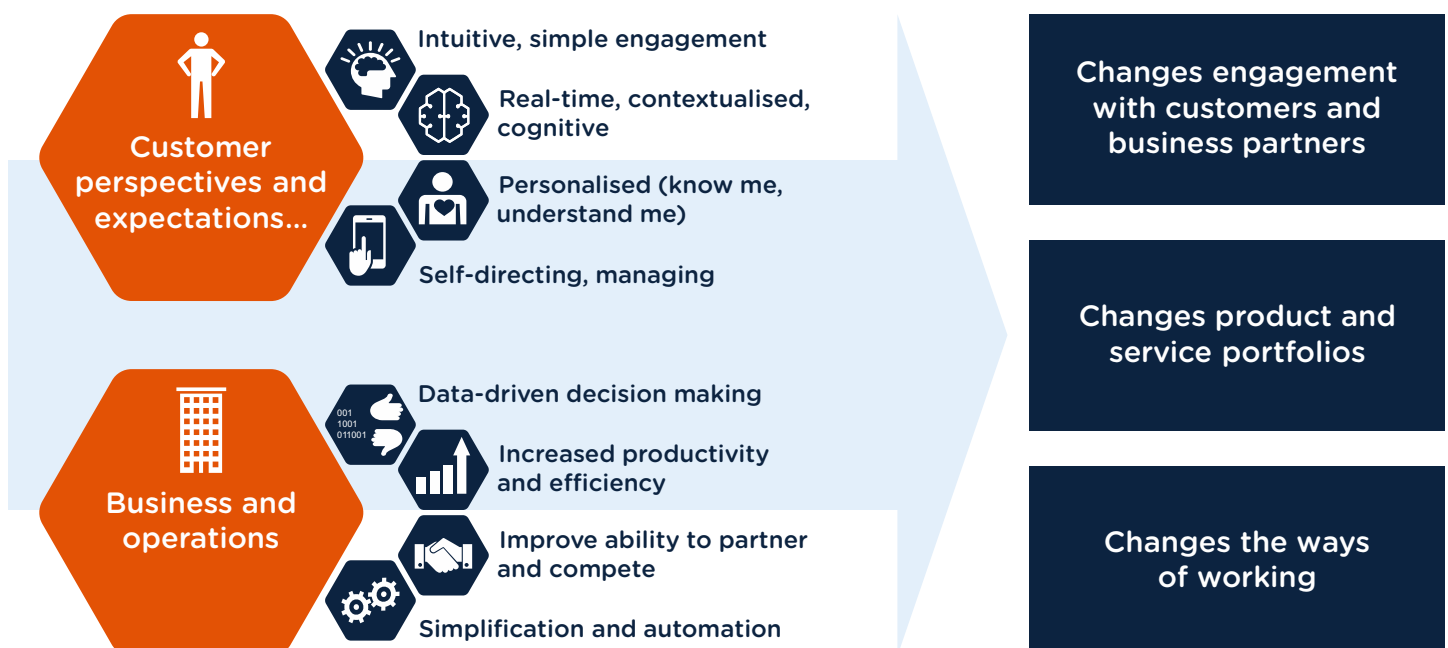## Digital business is the way to manage the utility market of the future

Figure 5: Based on Gartner 2020 - Future of digital business in utility market

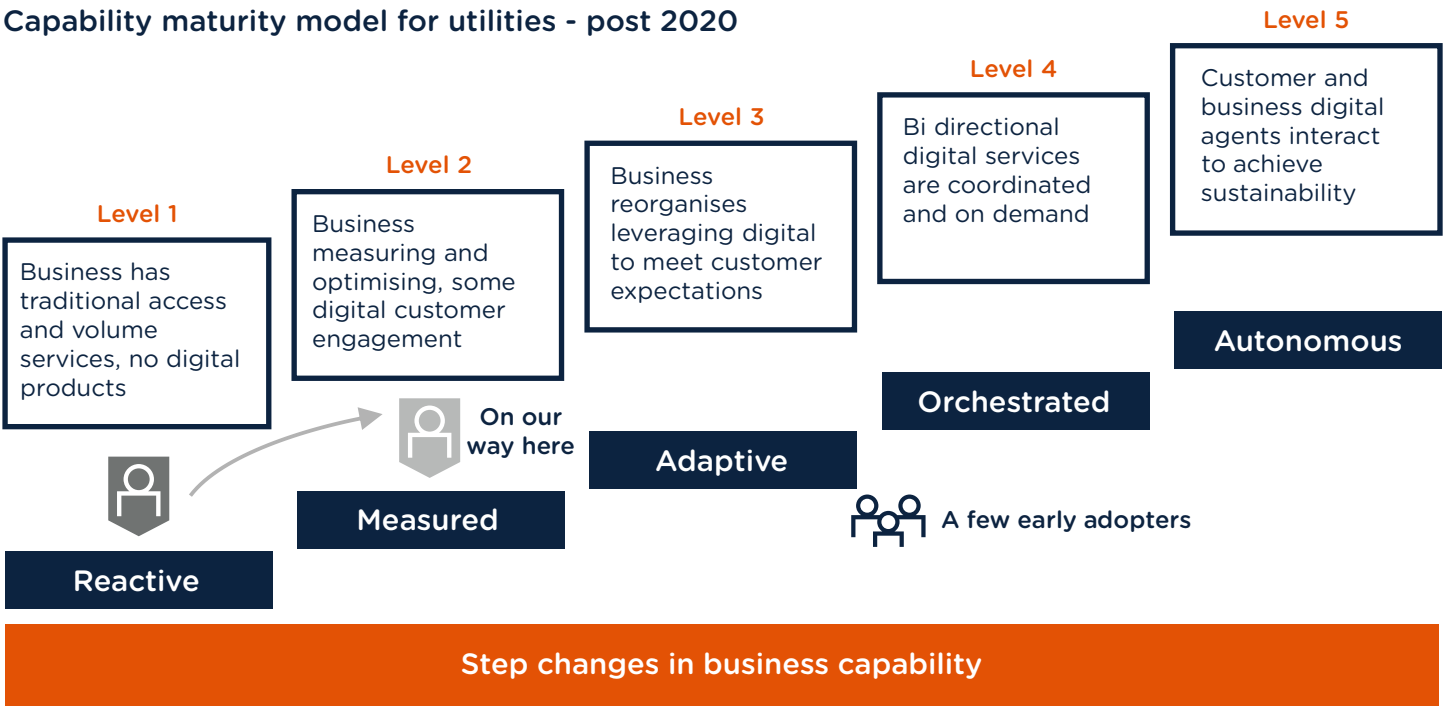## Capability maturity model for utilities - post 2020

Level 1
Business has traditional access and volume services, no digital products

Reactive

Level 2
Business measuring and optimising, some digital customer engagement

On our way here

Measured

Level 3
Business reorganises leveraging digital to meet customer expectations

Adaptive

A few early adopters

Level 4
Bi directional digital services are coordinated and on demand

Orchestrated

Level 5
Customer and business digital agents interact to achieve sustainability

Autonomous

Step changes in business capability

Figure 6a: Based on Gartner 2020 - Capability model for utilities

3.2.1   SGN's digital readiness assessment

SGN has previously undertaken a Digital Maturity assessment, and a summary of the key findings is provided below. They show that across the main digital enablers within our business, our maturity either needs significant focus or remedial work to accelerate at scale. SGN plans to revisit the Digital Maturity assessment within the next two years.

Digital execution scorecard summary heatmap

Strategic digital priorities

Generate new digital revenues	Excel in customer experience	Achieve operational excellence	Optimise asset utilisation	Minimise risks

Digital enablers

Operating model

Funding	Culture	Organisation and decision rights	Sourcing	Talent and skills	Ways of working

Technology platform

Cloud and DevOps toolchain	AI and data analytics platform	Customer platform	Ecosystems integration platform	IoT platform	Security platform

Legend:
- ⚠ Top priority*
- ▨ Not relevant*
- ● Needs focus
- ● Accelerate scale
- ● Optimise

* **Top priorities** – rated "Most important" , "Very Important"
Not relevant – rated "Not Important" in the assessment

Figure 6b: Gartner's assessment on SGN's digital readiness

This assessment has identified a number of areas where improvement would be beneficial, and these are highlighted with either a "red" or "amber" status. A more detailed description of our status against each area was previously provided.

- **Funding:** Funding across the industry is below market levels and the method of funding through a project driven approach does not provide the flexibility and agility needed for a digital business model. GD2 reopeners and Strategic Innovation Funding (SIF) routes have since been made available to the networks are viewed positively to support faster digitilisation and innovation across the sector. However there is still a significant gap in funding to support digital business that is not deemed "innovative" or capital intensive projects, which are the vast majority of digital activities and digital operations.

- **Organisation:** A truly transformed digital organisation is based on small cross-functional teams that are self sufficient and largely independent to deliver value to users and customers. SGN has implemented this in places but not at scale. SGN plans to do more in this area by investing into agile methodology to drive higher value from our data assets.

- **Ways of working:** Customer centric design and delivery methods are required in delivery approach. Greater use of personas, design thinking, and journey maps are encouraged. SGN has created process design review processes to facilitate a change in this area.

- **AI and data platforms:** Faster and federated analytics, AI and ML is recommended. SGN's use of a data lake has only a few use cases so far. SGN plans to create more capabilities what are agile in nature to further aid the use of analytics in our business.

- **Customer platforms:** Digital leaders provide customers and employees real-time data access to customer related data delivering omnichannel experiences. SGN has continuously invested and will continue to invest in our Customer Experience programmes throughout the GD2 period.

- **Ecosystem integration:** Adoption of APIs as the main drive for integration with third parties is a strategic capability. SGN has limited adoption of API architecture. There are some examples of this but it is not present at scale. SGN realises the value of API architecture in fulfilling the vision set out in the recent EDiT report. Further work is commissioned to migrate SGN's integration platform traditional interfaces to API based interfaces available to us on our chosen strategic platform – Mulesoft.

The assessment also noted areas where process is observed but further scaling is recommended, as follows:

- **Culture:** Digital operating models require new leadership models and strong commitment to change traditional behaviours and culture. We know that SGN, and our industry more generally, is a traditional and risk averse one for very good reason. Since the report, SGN has create a Data and Digitilisation workstream and is starting to monitor the influence created by this change.

- **Sourcing:** A further refinement of sourcing capabilities in line with evolving digitalisation is required. Agile working and digital supply chain drive changes required in sourcing capabilities. SGN plans to re-visit our Development and Testing partner framework agreements within the next two years with an emphasis on selecting partners who can demonstrate Agile and Digital ways of working.

- **Cloud and DevOps:** SGN has a strong story in cloud adoption but we have more to do in the delivery of automation and microservices. Since the report, SGN has created a DevOps capability by merging Centres of Excellence with IT Services functions. We will continue to monitor and improve these capabilities through out the GD2 period.

- **Security:** Achieving higher compliance with security policies significantly reduces risk but can challenge the balance of security with speed and agility. In 2021, SGN received confirmation of additional funding in Cyber Security, through GD2 re-openers, to improve our security capabilities by investing in people, process and technology. This programme will further improve our ability to secure our digital and technology services and continue to manage the ever-increasing cyber threats and risks.

- **IoT:** Exploitation of Industrial Internet of Things (IoT) to further accelerate the digitalisation opportunity, especially in developing digital twin capabilities. Since the report, SGN has secured funding to undertake feasibility studies on Digital Twin as a potential solutions for 'Network Control of the Future' and 'Hydrogen – H100 project'. During GD2, we aim to successfully enter the 'Alpha' and 'Beta' phases of the SIF programme which will enable us to demonstrate and exploit the digital technology advancements within this area.

The assessment also noted the digital skills strategy of building in-house capabilities is an area of strength that would need to be optimised going forward. Investment in our employees is key to achieving the Digitalisation Strategy. Digital enablement of the workforce, talent recruitment, skills development and upskilling our existing workforce, will all be necessary to support SGN's digital transformation. We are already beginning this journey by focusing on a number of key aspects to change and improve, as previously noted in our strategy published in December 2020.

Our GD2 plan highlights the key investment areas where additional skills will be required as part of improving our current digital capabilities as well as developing new ones. We realise that there are areas where acquiring these skills will be difficult due to the high demand, both within and outside our industry. In particular, skills associated with data analytics, cyber security and niche technologies such as Industrial IoT, are extremely hard to find, recruit and retain. The EDTF report highlights the importance of developing and acquiring skills as part of delivering a digitalisation strategy;

> "The energy sector has been slow to harness the potential that data offers and has, in some ways, been left behind" ….
> *"Organisations should focus on data talent development"* and *"It is hard to get the right combination of data, energy and engineering talent".*

It is important to highlight the risk of a misalignment between regulatory funding and investment in GD2. As set out in our response to the determination, we consider there to be current gap within our funding regime where 'investment' in digitalisation is seen as a capital funding requirement. As previously highlighted, the development of our digital capability requires ongoing and sustained investment in process, culture and most importantly, people. It is important to recognise the importance of operational resource and talent development, and the potential implications of not adequately resourcing operational resource.[1]

Regardless, we will continue with our current approach for skills development which primarily relies on internal education and training of existing employees as well as offering graduates a career path in areas such as data science, analytics, architecture, cyber security and data management. This is a slower approach to building our digital skills and we will continue to work closely with our technology partners and strategic vendors to source the digital skills we need for our programme of work.

3.2.2 Technology readiness: building the foundations for digitalisation

Over the last two years, SGN has undertaken a major IT and digital transformation programme, keeping in line with our GD2 commitments. Our primary driver is always to provide the best technology services that protect our people and our customers. These are essential foundations to us delivering digital transformations;

1. Delivering Business Value

At SGN, we have ensured that we are delivering business value through prioritised, Executive sponsored, IT and digital change linked to overarching business objectives; **Green Growth, Operational Excellence and Customer Service**. Across our IT operations and change delivery teams we continue to drive increased agility and customer focus both internally and externally.

As an example, we are digitising our field force operations through our new, real-time geospatial mapping solution called Geofield. Our work management data and digital capability is being further improved through the deployment of our new Maximo Anywhere field based mobile solution. Finally, we are transforming our field based operations with FYLD, our new award winning, digital, mobile platform, using speech and image recognition, AI and ML This solution has enabled improved performance and safety management for our field based staff and our customers.

2. Increase Optimisation and Efficiency

After several years of significant IT transformation and change, our focus now is on optimising and exploiting the new technology, architecture and organisation that has been put in place. In particular, our multi-year, all-in transition to Cloud now enables us to exploit the benefits of agile, scalable cloud platforms to enable efficiency and deliver business value. Our rebuilt architecture and organisation has been a prerequisite to support the new ways of working and operating models required for Digtalisation. This workstream has significantly reduced and will ultimately remove our technical dependency with SSE. Something that must now be expedited due to the recent sale of SGN.

3. Enhance Cyber Security

We have delivered a step change improvement in our Cyber security through a multi-year investment programme. In line with the GD2 funding approvals and Cyber security funding re-opener process , we have now initiated Phase 4 of this multi-year Security programme. We have defined in great detail, our plans for the remaining 4 years of our funding cycle and consequently, have a large and complex programme of work that we must deliver as part of licensed Price Control Deliverables (PCDs).

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[1] Please note that this is drafted prior to the publication of the final determination, We are reflecting our understanding of the draft determination and this may be addressed in final determination.

We will place an increased focus on our CNI OT security as part of this work and the corresponding threat and risk including the rebuild of our Gas Control Centre.

4. Drive Readiness and Innovation

Early in GD2 we have successfully secured funding through Ofgem's Strategic Innovation Fund (SIF) for four projects linked to the data and digitalisation theme. These will be used to investigate the role of Digital Twin technology in both our existing natural gas network and the potential for the technology within new 100% hydrogen networks, as well as evaluating the role that artificial intelligence and machine learning can play in how we manage and operate the network. The learning from these projects will help build foundational capabilities for the future digitalisation of our energy network.

5. Focus on Analytics and Insights

Over the course of last 4 years, SGN has developed a matured practise to create and maintain a data lake that provides a trusted source of data for reporting, analytics and AI and ML. In the last two years, we have created 7 key business dashboards underpinned by analytics and AI. One of these use cases is an automation of management of fatigue in the organisation that is a key HSE initiative across the sector. SGN solution for Fatigue was judged "Best Automation Project of the Year 2021' by the British Computer Society's National Awards. Our foundations in Analytics are now well established to drive better outcomes for our business and for the sector.

In support of this theme, we must continue to improve the management of data, SGN has now invested in a Data Management tool from Talend. This tool will, over time, provide significantly improved data management capabilities such as data lineage, metadata management, data tagging and cataloguing. An improvement in management of data directly contributes to SGN's ability to make better decisions, create data sharing arrangements and contribute towards the wider industry goals of open data and digitilisation across the sector.
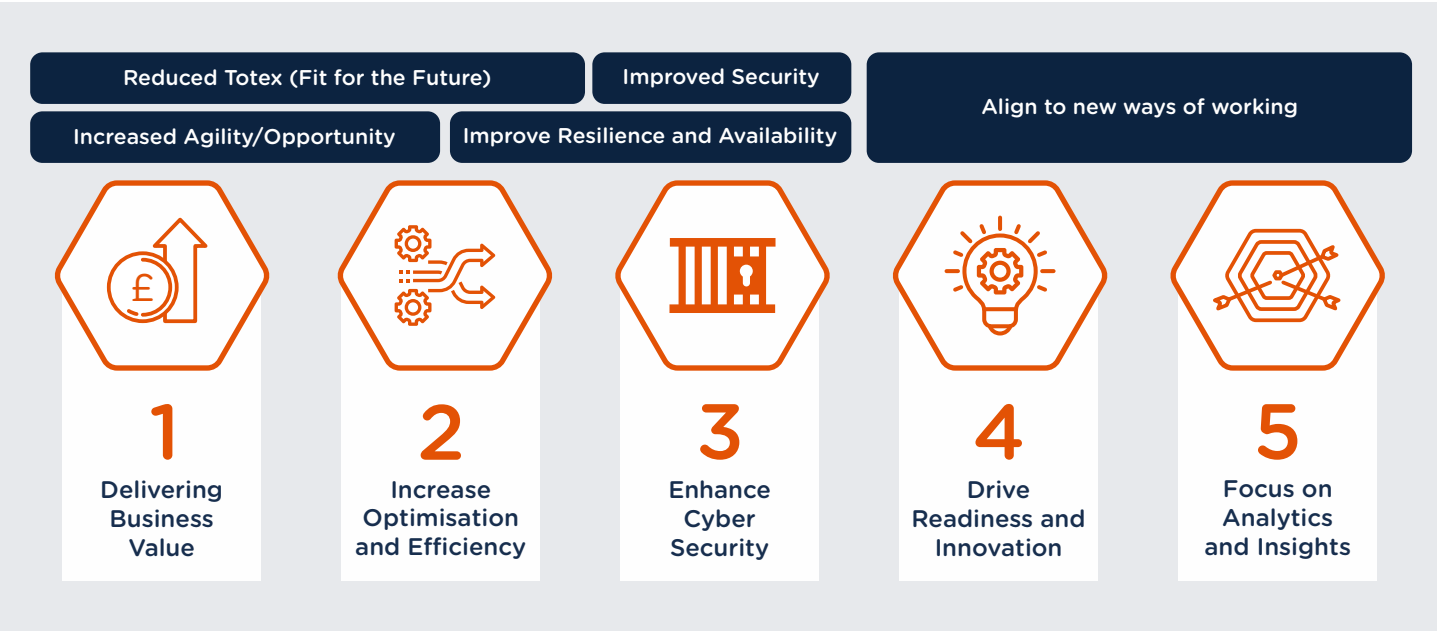

| Reduced Totex (Fit for the Future) | Improved Security | Align to new ways of working |
| Increased Agility/Opportunity | Improve Resilience and Availability | |

1 Delivering Business Value

2 Increase Optimisation and Efficiency

3 Enhance Cyber Security

4 Drive Readiness and Innovation

5 Focus on Analytics and Insights

Figure 7: IT Totally Transformed: 5 Pillars of Change

4

Digitalisation strategy for GD2

4.1 Digital strategy and transformation approach

Our overarching business strategy for the next five years is defined in detail and is included in our GD2 Business Plan: A plan for our shared future. Our plan has been created and shaped by extensive stakeholder and customer feedback which has culminated in three commitments, underpinned by seven customer priorities. These align to Ofgem's output categories of *meeting the needs of consumer and network users, maintaining a safe and resilient network* and *delivering an environmentally sustainable network.*

Our strategic commitments are:

Making a positive impact by:

- Providing excellent service to our customers
- Supporting those who are vulnerable in the community

Delivering a safe and efficient service by:

- Keeping the gas flowing
- Acting safely
- Keeping the cost down

Building a shared future by:

- Delivering energy solutions for the future
- Minimising our environmental impact

SGN's digitalisation strategy is a means to gather and fulfil the requirements and expectations set by various stakeholders and to drive innovation within our sector through digital means. Our strategy is evolving and will continue to take into account changes affecting our industry and new technology opportunities that emerge.

4.2   Our digital transformation framework

Our strategy is defined and delivered through a digital transformation framework which has been developed and is refined continuously. This framework provides the fundamental building blocks required to deliver large scale digital change and is summarised below.

Stakeholder requirements
Consumers, Regulators, Investor requirements

Digital strategy
Unlocking digital value and building future roadmaps

Operating model
Redefining our operating model for digital business

Digital transformation
Sustainable capability development aligned to our business and stakeholder expectations

Driving innovations
Realising the art-of-the possible

Developing capabilites
Developing capabilites needed for the digital business

Delivering solutions
Using new technologies to build, deploy and manage

Cyber security
Protecting and exploiting our digital business

Figure 8: SGN's digital transformation framework

This section of the document defines our approach and our achievements to date, relating to each of the seven digital building blocks.

4.3   Needs driven – stakeholder requirements

SGN has a series of well-established feedback forums involving a broad cross-section of stakeholder groups, which will provide us with insights relating to our business plans and priorities throughout GD2.

As part of our commitment to stakeholder engagement and gathering requirements on digitalisation, SGN held a specific event on digitalisation, opening up invitations to a broad cross-section of approximately 100 stakeholders with representatives from Local Authorities and Government; consumer groups; environmental organisations and representatives from the energy sector itself.

The aim of the event was to launch the conversation with our stakeholders about how SGN develops its digitalisation strategy through GD2: Opportunities that digitalisation can offer; the data consumers and disruptive thinkers to be engaged with and future expectations from SGN. The feedback primarily focused on our stakeholders' requirement for operational gas data, along with metering data, to support the development of growth and environmental plans as the UK aligns itself to net zero energy.

As part of our overall engagement plans, SGN is an active member of the Energy Networks Association (ENA) Data & Digitalisation Steering Group (DDSG), which provides a collaborative forum through which the energy sector can engage, inform, influence, and deliver on the common opportunities and challenges brought about by the major transition to a smarter digital energy system. The forum engages with key strategic stakeholders such as Ofgem, the department for Business, Energy & Industrial Strategy, and UK Research and Innovation who have and continue to develop the UK's strategy on energy system digitalisation.

In addition to actively engaging and listening to our broad set of stakeholders and their needs, SGN will work with a wider set of Digital experts to guide, inform and advise on "the art of the possible". Over the last two years year, we have worked with organisations such as Amazon, Microsoft, Gartner, IBM, and Boston Consulting Group Digital Ventures to learn from these world-leading innovative and digitally mature organisations. This enables us to proactively bring ideas and digital opportunity to customers and stakeholders and drive a digitalisation agenda in an informed and explorative manner.

Commitment

1   We will continue to seek and gather stakeholder feedback on digitalisation requirements and progress the development of these ideas in partnership with our industry peers.

4.4 Digital strategy

Our Digitalisation Strategy last published in December 2020 is still going strong. SGN's digital aspirations are driven by value creation opportunities for our customers and stakeholders. Our specific commitments to Ofgem and to our seven key customer priorities which are fundamental to our digital aspirations and the framework which we operate within. A simplified linkage between our business strategy and our digital technology strategy is illustrated in the following chart:

Our three commitments and the seven customer priorities underpin and align to Ofgem's output categories of 'meeting the needs of consumer and network users', 'maintaining a safe and resilient network' and 'delivering an environmentally sustainable network'.

We will make a positive impact by	
SGN Business Plan	**Digitalisation enabler**
Providing excellent service Supporting those vulnerable in the community	**1) Delivering business value** increased agility, customer focus and enabling business value
We will deliver a safe and efficient service by:	
SGN Business Plan	**Digitalisation enabler**
Keeping the gas flowing Acting safely Keeping costs down	**2) Increase optimisation and efficiency** **3) Enhancing cyber security**
We will build a shared future by	
SGN Business Plan	**Digitalisation enabler**
Delivering energy solutions for the future Minimising our environmental impact	**4) Drive readiness and innovation** including addressing the five key challenges outlined by the Energy data taskforce

5) Focus on	Analytics and	Insights

Figure 9: SGN's digital aspirations

4.4.1 Technology roadmap

Over the last two years, since the publication of the previous strategy document, SGN has further improved the technology footprint that enhances our readiness for using technology to drive digital transformations. Some of these initiatives are as follows:

- SGN has created a public cloud centric design to host our Gas Control systems. This design, validated by NCSC, is now being implement on Amazon Web Services (AWS). This will migrate our Gas Control applications to a highly secure, resilient and scalable platform. This is an essential move for SGN to digitalise some of our more traditional platforms, such as SCADA systems, to be utilised in digitilisation through concepts such as Digital Twins.

- SGN is in the process of deploying a technology application that provides significantly improved data management capabilities. The selected tools 'Talend' provides technology features such a scanning system to create metadata models, data lineage and data quality flags.

- SGN has secured SIF funding for trialling Digital Twins in our core areas of expertise. The first funding received for feasibility will allow SGN to exploit the data and digitilisation opportunity on the H100 project, delivering Hydrogen to Fife in Scotland, funded separately by Ofgem. The second feasibility fund received is to explore the use of Digital Twins in running our Distribution Network. In addition, we have also secured SIF funding to develop AI capabilities in predictive safety interventions, and, development of an intelligent gas grid to autonomously and intelligently monitor and control network using data.

The technology roadmap underpins our vision and strategy

Prime use case safety, training and operational efficiencies

Prime use case Asset management
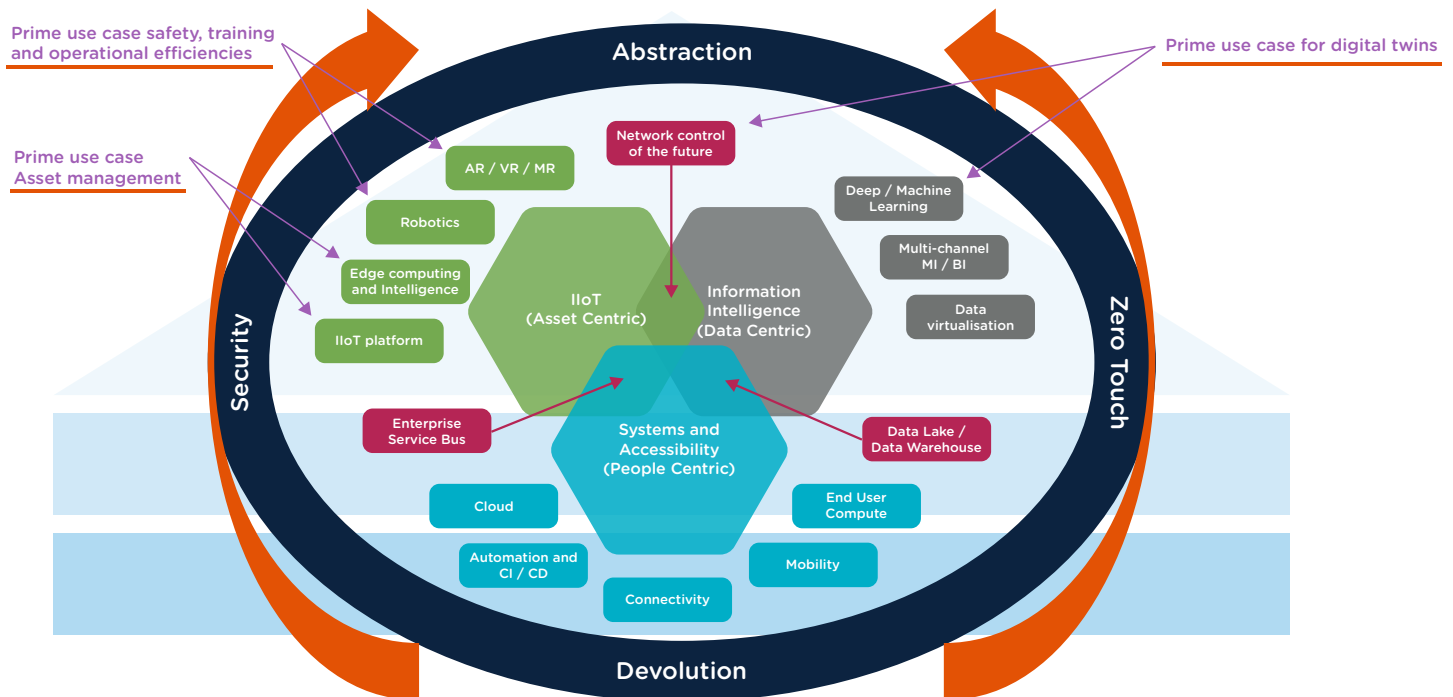
Prime use case for digital twins

Figure 10: SGN's technology roadmap on a page

Our future technology roadmap includes further capability development in connectivity, exploring and exploiting further Industrial IoT, robotics and artificial / augmented / virtual reality. The use of Digital Twin for 'Network Control of the Future' is a significant goal of SGN to drive digitilisation in our business and within our sector. SGN continues to track technology trends to evaluate the best emerging technologies that may further our cause to support the Data and Digitilisation agenda. The current top technology trends for the industry noted by Gartner are as follows:

SGN is currently exploring Data Fabric, Decision Intelligence, Total Experience, AI Engineering and Generative AI evolution as opportunities in our Analytics capabilities. As SGN is cloud ready, it opens up the opportunity to accelerate our digitilisation ambitions through procuring from a large catalogue of Cloud Native solutions, such as using the AWS Market Place offerings that become operational almost immediately. Using our access to Gartner expertise, SGN Cyber Security team tracks and manages their technology choices regularly to continuously meet and address the emerging threat landscapes.

Commitment 2

We will deliver a digital strategy that provides a direct support to delivering a safe and efficient service, creating a positive impact on the society we serve and delivers a shared future. We will revisit our strategy every two years to ensure these principles are adhered to **and continue to align with stakeholder priorities.**

4.5   Operating model

Digitalisation can require a radical re-think of how an organisation operates and is structured and, in some cases, requires a fundamental change in the operating model. The UK Energy sector is under an element of operating model disruption through decentralisation and decarbonisation requirements. The EDiT report highlights a number of emerging themes that SGN will need to further understand and align. This in turn is demanding digital solutions, products and platforms, many of which do not exist today and may result in new operating models to support delivery. SGN's digital readiness assessment, presented earlier, highlights a need for capability improvements in this area, which is consistent with our industry as a whole.

4.5.1   Energy Futures and Greening the Gas

SGN's proposed programme of work around Energy Futures and in particular, our projects to develop and demonstrate hydrogen for heat, will require completely different technology and digital architecture than available today. We already know through the growth in the number of biomethane plants across our network, that access to information about our network is essential to producers. Our need to co-manage multiple gas qualities, gas production and storage sources and a variety of new inputs and offtakes from our network will demand different digital platforms, some of which may be shared with other organisations, and the provision of data to facilitate this will be key.

4.5.2   Changing market conditions and stakeholder expectations

Stakeholder and consumer expectations, as highlighted in section 4.2, will require new products and platforms to be developed. Where these requirements are common to the industry, centralised or common operating models to deliver these products must be explored and where appropriate delivered in the best interests of consumers and stakeholders to ensure cost efficiency and market simplification.

There are also opportunities to exploit new and different types of partnerships relating to digitalisation and data sharing. We collaborated heavily with the Greater London Authority in developing the London Underground Asset register which delivered benefits around coordinated and safe working for our underground assets. We have also fed into the Modernising Energy Data Access (MEDA) innovation programme led by BEIS and UKRI with Icebreaker One and their Open Energy platform which aims to provide an easy way to find, access and share energy data. While the solution is in Beta Phase 3 of the programme, it does provide valuable insights as to what data providers and consumers require from a platform to facilitate Open Data Sharing ethos, but also raises pertinent questions around the strategic roadmap for energy data and the ongoing operation of such as solution.

The COVID-19 pandemic is an extreme illustration of the need for digital solutions to facilitate and deliver new operating models that are essential for the provision and continuity of energy services. This example has also taught us that no matter how much we plan, we must be prepared and responsive to address uncertainty and the unknown. SGN has set-up Gold and Silver command to react to these uncertainties and to adopt our operating model accordingly.

Commitment 3 We will continue to explore and develop new operating models with our energy sector peers and stakeholders.

4.6 Developing capabilities

Energy system digitalisation will require significant cultural change in SGN and across the energy sector. To achieve the specific focus of digitalisation strategy requested by our external stakeholders, we need to achieve an internal 'digital culture' that our organisation needs to embed, grow and mature.

The EDiT's report clearly highlights the need to develop digital culture and skills as part of delivering our digital strategy.

> "A digitalisation culture needs to be embedded throughout the energy sector by promoting digital leadership, valuing digital assets, and focusing on whole system user experience." And "There needs to be a much greater emphasis on digital skill throughout the sector with leaders expected to have data and digital literacy"

Investment in our highest value asset (our employees) is key to achieving the digitalisation strategy. Digital enablement of the workforce, talent recruitment, skills development and upskilling our existing workforce will all be necessary to support SGN's digital transformation.

4.6.1 Supporting digital skills development

We acknowledge that digital skills will change over time and that our approach should be shaped to anticipate this. As part of our ongoing digital skills transformation, we have accelerated delivery of electronic learning to our operational workforce as part of the COVID-19 response. As we now gradually ease back in to traditional training styles, it is easy to see our change to remote delivery in training approach will always remain a large part of our training structure. This is illustrated below as we have seen a significant and steady uptake on remote learning and access to online training content.

Digital training in numbers

10	4,466	2,500	176	17,177
talented individuals make up the IT and Digital Training Team adding value across SGN	individual training sessions run via Teams / Skype / phone or face to face	users attended Geofield eLIS classroom training	pieces online training content created by IT Training Team to be accessed on any device	views of our online training content since March 2020
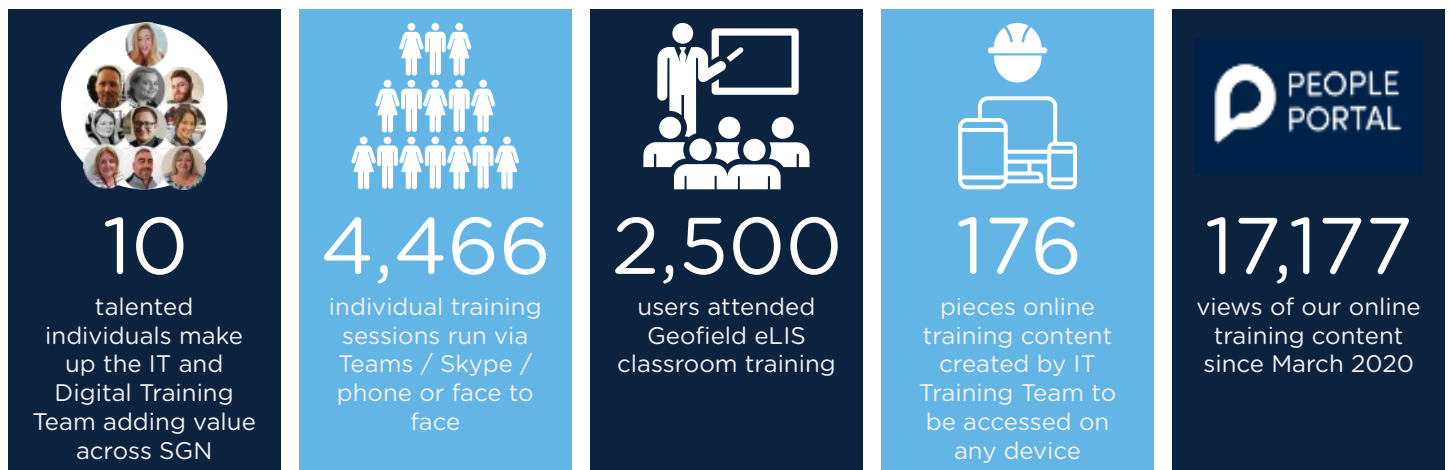
Figure 11: Digital training in numbers.

In addition to the above, SGN is working closely with a number of key partners to learn and adopt new ways of working and embed change management practices and practical skills required to improve digital maturity. Over the last two to three years, we have worked with organisations such as Amazon, Microsoft, Gartner and Boston Consulting Group Digital Ventures to learn from these world-leading innovative and digitally mature organisations. We have adopted much of their best practices within our own organisation, such as running design thinking sessions with our operational colleagues and network engineers, and exploring the possibilities of digital transformation. We will continue to leverage this wider talent pool throughout GD2 by working closely with our digital partners and technology leaders, with a specific focus on cultural and working practice changes we can embed at SGN.

Commitment 4

We will continue to improve our digital culture by developing digital talent, educating and training our people in digital skills and ways of working. We will monitor this through our digital readiness and digital skill assessments.

4.7   Cyber security

The report, Delivering and Energy System, highlights improved cyber security capability as one of its' six key recommendation areas.

Adopt digital security measures

Digital security principles and interventions need to be embedded throughout the sector to collectively enable safe digitalisation at scale.

Actions

→ Implement modern password policies and merit order of patching

→ Map cascade effects of system security zones

→ Increase frequency of regular penetration testing

→ Adopt zero trust and least privilege

→ Work towards a Just Culture

→ Run drills and threat assessment exercises

→ Leverage cross-sector collaboration

As a UK Critical National Infrastructure (CNI) provider, we consider cyber-crime and the associated disruption to be one of our greatest corporate risks, something recognised by our regulator Ofgem and our shareholders. Information Security (IS) is an integral part of our business operations and an integral part of building safe, secure and resilient digital services for other stakeholders and external parties to access.

As part of our regulatory funding regime for GD2 we have worked very closely with Ofgem in defining and improving our Cyber Security investment plans over a five-year period. This includes the rationale, context and evidence to support these plans and forms part of an ongoing dialogue, assessment reporting and audit regime overseen by Ofgem.

We fully support the recommendations made by EDIT and are progressing with the implementation of these in addition to our own specific cyber investment programme.

Commitment 5

We will continuously improve our cyber security capability. We will develop our digital security skills, train our people on cyber risk management and demonstrate this through compliance to our security accreditations and regular assessments.

4.8 Digital solutions: benefits driven digital solutions, products and services

As SGN has demonstrated over in the last 12 months through our Digitalisation Strategy Action Plan publications, there is significant progress being made across the organisation and through our various partnerships.

In addition to delivering digitalisation projects that were aligned to GD2 funding, SGN also requested subsequent funding as part of our Cyber and IT Capital re-openers. Overall, SGN has demonstrated a very strong track record when it comes to digital solution delivery and a summary of what we've achieved over the last period are highlighted through our six monthly publications of DSAP. It is important to note that some of these products and services continue to deliver digitalisation benefits that are likely to carry forward into the next price control.

FYLD is a digital platform that empowers utilities field teams and managers to make data-driven decisions in real-time, leading to enhanced safety management, productivity and quality assurance. In the last two years we have seen the evolution of our Digital skills and Design Thinking approach with our business colleagues and partners which has resulted in the launch of a completely new digital, mobile platform, using speech and image recognition and AI and ML. This solution has been designed and developed by a cross-functional SGN team in partnership with a digital venture company (BCG DV), part funded by one of our shareholders. In May 2020, this product and service was launched and is now available on the open market for other customers. This will result in financial benefit as well as improved safety performance within our business. Visit https://www.fyld.ai/ for more details on this hugely exciting and radically different digital capability.

We have created a new Analytics team recruiting highly skilled and talented individuals from local universities whilst retaining and developing previous team members. Value has already been delivered through insight dashboards for our business and we have launched our new enterprise analytics data platform (ADaPT). Since its launch, SGN has benefited with seven use cases being deployed on the platform.

Our teams are exploring the benefit of harvesting "dark data" (information collected but not used for insight or decision making) from our SCADA system which has been previously unavailable for insight or analysis to benefit high-value use cases with cross functional,

business led initiatives. For example, we delivered important company insights on fatigue and developing operations performance dashboards in partnership with our business. Building this capability is a fundamental enabler to wider digitalisation and the freeing up of benefits to stakeholders and organisations external to SGN. This project won us an industry award – "Best Automation Project of the Year 2021".

SGN is leading the industry in customer satisfaction levels, and we're always looking at ways to improve both their and our colleagues' experience. Our digital strategy is aligned to and enables our customer and stakeholder goal to ensure we are the No.1 UK Gas Distribution Network (GDN) for customer service. Throughout 2019 and 2021, we continued to achieve the number one slot in Ofgem's customer satisfaction metrics, partly due to the Customer Experience transformation programme which has heavily relied on the use of digital services. This programme, which is now in its third year, implemented new and industry leading digital platforms which enable and continuously improve customer interaction and experience.

In addition to evolving and exploiting the digital platforms and solutions highlighted above, progressing the recommendations of the EDiT report will require further work at an industry level to establish Customer Consent Dashboards, Mandating Smart Energy Assets, contributing towards The Digital Spine initiative and Enabling Dynamic Carbon monitoring and reporting. Developing the skills and secure infrastructure and governance arrangements to maintain, share and exploit large data sets will also be required.

The development of an industry specific data architecture framework, common standards and meta data models will ensure a consistent understanding of what data is to be shared and how it should be accessed. This is essential to deliver data interoperability across industry and to a wider set of stakeholders.

The security and protection requirements will have to be rigorously assessed and enforced to address the risk of data loss or privacy infringements (and lack of consumer and user trust). Digital solutions that collect, store, process or use open data will need to demonstrate appropriate levels of security and privacy arrangements to mitigate these risks whilst still fostering innovation.

Commitment

6   We will continue to deliver new digital solutions and demonstrate active progress against Ofgem's nine principles for digitalisation.

4.9   Digital innovation

We started the digital innovation journey in GD1 with introduction of feasibility projects such as Satellite Infrastructure Monitoring, Dark Data, DNIM, PC&M and the Incident Management App through NIA as well as our commitment to pushing the boundaries through technology and exploring the 'art of the possible' with the Robotic Roadwork and Excavation System (RRES) via NIC funding mechanism. This initial approach has paved the way for an increase in digital innovation within SGN which will carry on through GD2.

The shift toward data driven networks and increased levels of technology introduction and digitalisation will increase as we support energy system transition. The networks are introducing a focused approach for data and digitalisation in 2022. This enhances the scope for our innovation teams to allow us to explore, evaluate and validate new data methods and techniques to move toward digital networks that bring real value.

Early in GD2, we have successfully secured funding through Ofgem's Strategic Innovation Fund (SIF) for four projects linked to the data and digitalisation theme. These will be used to investigate the role of Digital Twin technology in both our existing natural gas network and the potential for the technology within new 100% hydrogen networks, as well as evaluating the role that artificial intelligence and machine learning can play in how we manage and operate the network. The learning from these projects will help build foundational capabilities for the future digitalisation of our energy network.

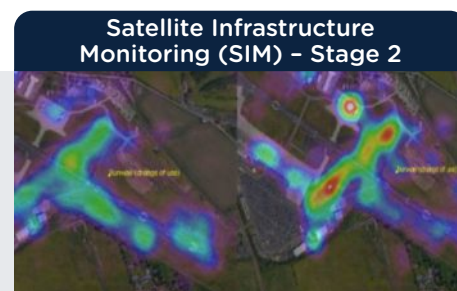| Project name	Description
Digital Twin – Exploring the societal, operational and cross industry whole system benefits on the Gas Distribution	To test and demonstrate the use of a Digital Twin to enhance decision making across a range of challenges driven by energy transition to a sustainable future.
Digital Twins: Exploring the commercial, societal and operational benefits on green hydrogen projects	To create a working green hydrogen digital twin, combined with analytical tools and machine learning, will provide a platform that changes the traditional way of how we look at the analysis of asset condition and performance.
Predictive Safety Interventions	To expand the capability of FYLD into predictive analysis, that may pose a high risk to employee safety as the day's operations unfold and enable remote, proactive safety interventions.
Intelligent Gas Grid	To autonomously and intelligently monitor and control networks, using data-driven algorithms and decision-making, and to support network digitalisation.

Some of our Ofgem Network Innovation Allowance funding projects which support a digitalised energy system are:

AUSMOS	DNIM	Satellite Infrastructure Monitoring (SIM) – Stage 2
Automated Utility Service Mark Out System transforming a traditionally analogue process to use robotics, AI and ML to identify underground energy networks	Distribution Network Information Modelling DNIM project seeks to create technologies that enable automated, periodic and cost effective internal mapping and feature analysis of the Gas Distribution Network from all inlets to all outlets. Data would be stored in a centralised data lake.	SIM seeks to enable the remote monitoring of Local Transmission System (LTS) pipelines against third party damages and the impact of climate change to ensure security of energy supply and safe pipeline operation.
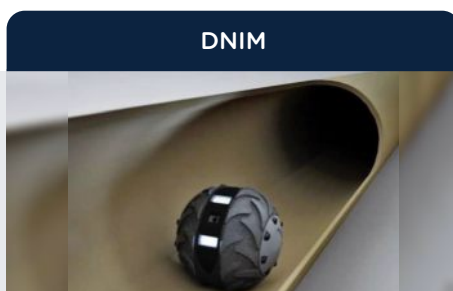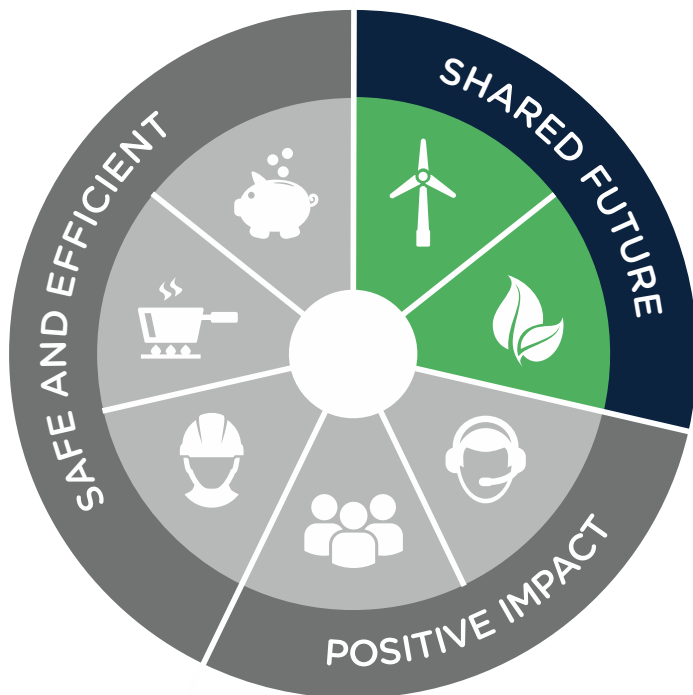
Visit our **Digital Strategy Action Plan** for more information on the projects delivering out Digitalisation Strategy.

4.9.1 Digital innovation - Energy Futures

Data is recognised as being at the foundation of enabling a successful transition to net zero. For SGN and the wider energy industry, more extensive and advanced data acquisition and management is critical in transitioning away from fossil fuel energy sources to net zero alternatives, such as hydrogen. The modern energy landscape is characterised by an everchanging energy supply to meet an ever-changing energy demand.

Change in the GB gas industry and in energy systems is accelerating, with the drive to fully transition to low carbon clean energy sources such as hydrogen and biomethane gaining pace in order to achieve net zero in the required timeframe. The industry must be able to model the gas networks of today and effectively plan, model and operate the low-carbon clean gas networks of the future. We believe that data and specifically Open Data, is a key enabler of a whole system transformation of the energy sector.

With this in mind, a key theme of SGN's Energy Futures programme in GD2 is to develop whole system solutions with the energy landscape beyond the gas sector. This is to ensure optimal low carbon solutions are implemented to our customers and emerging technologies are explored and incorporated in the network of the future.

Our Energy Futures team is structured around the following four key areas:

Energy Futures	
	H100
	Whole Systems
	Industrial Clusters
	Future of LTS
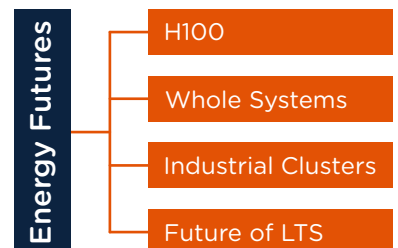
SGN has developed a Whole Systems Charter which has been signed up to by a range of key stakeholders. The Charter sets out the commitments we are making to work closely with whole system partners in the GD2 price control to optimise customer outcomes. Our approach has been ratified by stakeholders during one-to-one discussions, panel seminars and other stakeholder engagement events. They advised that we should be addressing a whole system challenge with cross-sector (transport, electricity) and cross-vector (biomethane and hydrogen, etc.) collaboration.

Early in GD2 we've successfully secured funding through Innovate UK's Strategic Innovation Fund (SIF) to investigate the role of Digital Twin technology in both our existing natural gas network and the new 100% hydrogen network we're developing through our H100 project. The learning from these projects will help build foundational capabilities for the future digitalisation of our energy network.

Our technology experts are working closely with Energy Futures teams to provide the underpinning infrastructure to support a transition to a low carbon future. This includes new SCADA monitoring systems, asset management systems, and leveraging **big data** and digital mapping tools to help inform roll-out plans.

As part of our Energy futures strategy and the projects we are progressing, our intention is to integrate digital into all that we are doing as an integral part of the project development.

Commitment 7
We will develop, deliver and demonstrate digital innovation through our approved Energy Futures programme of work.

5

Conclusions and next steps

Delivery of our digitalisation strategy is fundamental to us and our industry, being a critical component of our ability to respond to and delivery our net zero challenge, driving operational efficiency and delivery better customer value.

Our strategy and its fulfilment has sponsorship form the Executive Directors and our Board.

This document has highlighted how our Digital maturity will require continuous significant investment and improvement to address the decarbonisation challenge and in particular, the development in digital skills and training of our most valuable asset, our people. We cannot underestimate the enormous challenge we face, particularly in a climate of reduced funding, although we are committed to delivery.

We use the following five principles to guide us in demonstrating the importance of this commitment to all the relevant stakeholders.

Leading from the top:
SGN understands that strategic intent must come from the top for it to sustain and grow,. Our Non-Executive Board member Laura Sandys CBE will ensure Board responsibility and oversight of the Digitalisation Strategy and our Director of IT and Innovation will be our Executive lead. They will have the full support of our Board and Executive team in executing the strategy.

Collaboration as a priority:
We are committed to working across our industry and the whole system for energy, with other network companies, shippers, generators, regulators and innovators, to develop digitalisation across the sector. To enable this, we will actively participate in the EDTF, ENA DWG and other working groups.

Demonstrate our progress:
SGN is committed to demonstrable progress against our digitalisation strategy. A progress summary will be published to key stakeholders biennially and this will be made publicly available for all key stakeholders.
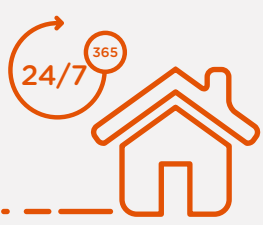
Bring benefits to consumers:
One of the most important success factors of our digitalisation strategy is to drive better value for our stakeholders and customers. We are committed to prioritising the use cases that drive value for our customers and a wider set of stakeholders.

Drive innovation:
A long-term benefit of driving digitalisation across our sector is that it will force innovation across the entire ecosystem. We will continue our strong track record in innovation as set out in our plans for GD2. Our commitment goes beyond the boundaries of SGN through sharing innovation with other network companies as well as participating in cross sector innovation projects.

5 Conclusions and next steps

5.1   Uncertainties with the strategy: Key challenges and threats

Funding: As part of the GD2 price control, the final determination issued by our regulator has not ear-marked regulated funding for the delivery of the digital transformation strategy of the gas networks. Whilst innovation funding mechanisms have been created (Strategic Innovation Fund) to stimulate data and digital innovation, there remains a dependency and risk associated with the funding required to deliver this strategy as there is currently no mechanism to support non Capital intensive Digitalisation activity.

Changing and evolving requirements: Whilst we continue to collaborate with industry in the implementation of the Energy Data Taskforce recommendations, the Energy Digitalisation Taskforce recommendations have recently been published, detailing a far-reaching vision for transforming the energy sector. At the time of writing, delivery requirements from for the sector have been outlined but details on delivery mechanisms have yet to be determined.

Digitalisation vs Business as Usual: Balancing the need to "keep the gas flowing" during digital transformation is a difficult challenge. We have numerous commitments and indeed legal and regulatory obligations to meet day-today. This is over and above the delivery of this strategy. While we see this strategy as a key enabler to running our business more effectively, prioritisation on what is tactical and essential vs strategic initiatives will be a risk to the delivery of this strategy.

Presumed Open vs Data Protection and Security: A clear message throughout GD1 and into GD2 has been the need for networks to deliver innovative consumer-centric services, along with those that expedite net zero. In developing these consumer-centric and net zero solutions, it is generally accepted that elements of consumer data hold the greatest insight as to what services provide the greatest benefit – whether they be in support of our most vulnerable members of society, or in line with the changing demand in energy consumption and indeed to collaborate on sector-wide innovation. This in turn means our industry must walk a challenging path between adhering to existing data protection legislation and society's interpretation of that legislation, alongside regulatory and broader industry expectations on delivering innovative and beneficial solutions.

5.2   Our digital commitments

In summary, we commit to deliver the following:

Commitment 1
We will continue to seek and gather stakeholder feedback on digitalisation requirements and progress the development of these ideas in partnership with our industry peers.

Commitment 2
We will deliver a digital strategy that provides a direct support to delivering a safe and efficient service, creating a positive impact on the society we serve and delivers a shared future. We will revisit our strategy every two years to ensure these principles are adhered to **and continue to align with stakeholder priorities.**

Commitment 3
We will continue to explore and develop new operating models with our energy sector peers and stakeholders.

Commitment 4
We will continue to improve our digital culture by developing digital talent, educating and training our staff in digital skills and ways of working. We will monitor this through our digital readiness and digital skill assessments.

Commitment 5
We will continuously improve our cyber security capability. We will develop our digital security skills, train our people on cyber risk management and demonstrate this through compliance to our security accreditations and regular assessments.

Commitment 6
We will continue to deliver new digital solutions and demonstrate active progress against Ofgem's nine principles for digitalisation.

Commitment 7
We will develop, deliver and demonstrate digital innovation through our approved Energy Futures programme of work.

This Digitalisation Strategy will be made available on our website sgn.co.uk. We will publish updates on a biennial basis. Any query or request for information related to this digitalisation strategy can be made through the channels available on our website.