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NIA Project Registration and PEA Document

Date of Submission

Oct 2024

Project Reference Number

NIA2_SGN0046

Project Registration

Project Title

RTSM - Phase 1 - Methodology Development

Project Reference Number

NIA2_SGN0046

Project Licensee(s)

SGN

Project Start

September 2024

Project Duration

0 years and 9 months

Nominated Project Contact(s)

Johana Duran Santos

Project Budget

£413,564.00

Summary

This project aims to develop an integrated solution for the processes of characterising, settling, and billing gas in a multi-gas energy system ahead of the introduction of green gases such as hydrogen and unpropanated biomethane to help decarbonise the UK's gas grid.

Beginning with market research, existing methodologies used in global networks with varying calorific values will be assessed. Using this information as a baseline, a tailored modelling solution will be created to meet UK industry requirements. Afterwards, a comprehensive feasibility study will identify the most optimal modelled solutions which will be consolidated into a new flexible settlement and billing approach. A roadmap will outline necessary implementation changes. Lastly, the requirements for a 12-month demonstration will be assessed to inform the programme's next phases.

Preceding Projects

NGGDLGN04 - Future Billing Methodology

Third Party Collaborators

Correla

BIP UK (Chaucer Group)

Xoserve Ltd

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

Green gases, such as unpropanated biomethane and hydrogen (when produced through renewable methods), could have a crucial role in the UK's transition to Net Zero by 2050 as their carbon content is significantly lower than fossil-derived natural gas. Green gases can be used as a cleaner alternative to natural gas for heating, transportation, and industrial applications, helping reduce emissions in sectors which are hard to decarbonise. Incorporating green gas into the energy mix could help to realise the country's carbon reduction goals and build a more sustainable energy system for the future. Currently, all GNOs and many key gas industry stakeholders are assessing the feasibility of utilising green gasses within the existing gas grid. Several options are being explored including full uptake of 100% hydrogen and a blended solution with the hydrogen mix ranging from 5%-20%.

In December 2023 the UK government published its response to their industry-wide Hydrogen Blending Consultation and the results highlighted that up to 20% hydrogen blending into the existing grid will be supported as the government see "strategic and economic value" in doing so. This is a significant boost for the hydrogen economy across the nation and positions hydrogen blending to support the early adoption of hydrogen technologies. Investment into the hydrogen economy via blending will facilitate the establishment of hydrogen production, storage, and transport facilities and help to form a robust hydrogen market enabling further widespread uptake. Biomethane is already actively contributing to the decarbonisation of the nation's heating through approximately 100 embedded production plants injecting renewable gas into the network. The Gas Goes Green support scheme, running from 2021 to 2028, subsidises production at new plants, paving the way for biomethane market growth. Across 2022, approximately 7 TWh of propanated biomethane was injected into the UK gas grid and it is estimated that the production of biomethane will increase four-fold reaching 33 TWh by 2030. The level of green gas uptake, whether it is biomethane blended with up to 20% hydrogen or a possible switch to 100% hydrogen on repurposed networks, will ultimately be determined by policy decisions made by the UK government.

Whilst the potential for increased injection of green gases into the UK's gas grid is directly in support of grid decarbonisation, it also poses a new challenge which needs to be overcome. The current processes and legislative frameworks that influence the way in which customers are billed for energy are governed primarily by The Gas (Calculation of Thermal Energy) Regulations (GCoTER) and The Gas Safety (Management) Regulations (GS(M)R). The GCoTER stipulates how gas consumers are billed and is based upon the Flow Weighted Average Calorific Value (FWACV) methodology. The FWACV method was introduced in an amendment to the GCoTER in 1997 to minimise the underbilling of customers using the Lowest Source CV. The FWACV method takes the average CV of daily charging areas and applies this to all customers. This introduces the possibility of variance in customer bills as some customers will be under-billed if receiving gas with a higher CV than the FWACV and some customers will be overbilled because they receive gas with a lower CV than the FWACV. To tackle this issue, the GS(M)R and GCoTER cap the value of the daily charging CV – there can be no more than 1 MJ/m³ variance above the value of the Lowest Source CV across the charging zone. Furthermore, the GS(M)R outlines that the Wobbe Index of gas being transported within the grid cannot deviate from the following specification, ≤ 51.41 MJ/m³ and ≥ 47.20 MJ/m³, and thus the volumes of hydrogen that can be injected into the grid have been historically capped at 0.1%.

Whilst the Hydrogen Blending Consultation results are positive news for the use of hydrogen across the gas grid and the Green Gas Support scheme is promoting biomethane uptake, a significant challenge still stands as to how customers will be billed fairly and equitably. What makes the continued use of the FWACV method challenging is that both unpropanated biomethane and hydrogen exhibit a lower Calorific Value (CV) (energy content) than natural gas - 37 MJ/m³ and 12 MJ/m³ respectively compared to 39 MJ/m³. In the process of transitioning to Net Zero, we will encounter a situation where gas in the network will carry a blended product, and this will become an issue when using the current method of FWACV across each Local Distribution Zone (LDZ) for billing and settlement. The propanation of biomethane (process of increasing biomethane's CV by mixing with propane (CV 96 MJ/m³)) is currently used to prevent CV capping, but it is widely agreed that propanation of hydrogen is not a feasible solution moving forward. On lower gas flow days, there will be challenges in using all of the green gas available on those days as the level of propanation required to prevent capping of the network could be uneconomical and impractical. Alternative options are expensive hydrogen and biomethane storage or releasing surplus gas into the atmosphere which is inefficient and would potentially contribute to climate change rather than mitigate which negates the low-carbon credentials of green gasses.

Further compounding the challenge at hand is that green gas uptake is expected to achieve more rapid progress in areas where hydrogen and biomethane supply is ensured. Due to the nature of low-carbon hydrogen and biomethane production, i.e., co-location with energy feedstocks and anaerobic digesters, these production areas are likely to be widely distributed across the country and embedded within existing natural gas charging areas. Furthermore, the current standpoint of the government is to support a 'free market' approach to the hydrogen economy hence the UK network will have a wide variety of transitional stages with different time horizons and green gas injection into the grid will be difficult to predict and likely to change significantly with time. Additionally, a continuous supply of green gases is not easy to ensure due to the reliance on renewable/intermittent energy and feedstock availability, thus there will be variance in supply of the gases across the network on both short (hrs/days) and long (seasonal) timescales. This will result in a wide range of CVs across the network and within each charging area due to changes in the ratio of the gas mix being supplied to customers.

These challenges highlight the need for a flexible solution that is able to respond to changes in the gas mix and subsequent CVs to

ensure that customers are not billed unfairly for the energy they consume within a multi-gas system. An alternative methodology and framework for gas billing is necessary if green gas uptake to support decarbonisation is able to realise its full potential and maximise benefits.

Method(s)

The Future Billing Methodology (FBM) programme, led by Cadent, provided insightful information regarding the applicability of the existing commercial framework in accommodating increased volumes of low-carbon and unconventional gases injected into the gas grid. The programme analysed viable options to address the challenges of achieving a decarbonised network, conducting a trial to validate and reinforce the results. Key findings revealed that (i) the existing framework is suitable for hydrogen volumes between 0% to 5% and 100% with minimal changes; (ii) a calorific value (CV) modelling system represents the best option for hydrogen volumes between 5% to 20%; and (iii) an embedded zone charging option could benefit biomethane suppliers in regions with an absence of hydrogen. The recommendations of the FBM programme included initiating the feasibility study of the CV modelling system and exploring the option of embedded zone charging options will be used to inform the development of RTSM Phase 1.

Recognising the variability of future market changes, RTSM – Phase 1 – Methodology Development aims to develop an integrated and flexible settlement methodology. The proposed solution(s) will allow flexibility across the UK market structures and connection frameworks by overcoming technical and operational challenges in a free market approach. The commission acknowledges that there are several possible paths for achieving future market changes, which is why the RTSM is expected to promote a fair billing process under a wide variety of CVs. The RTSM will also address existing challenges and multiple uncertainties such as nomination, shrinkage, and unidentified gas. The outcome should deliver the maximum benefit for the minimum outlay. Additionally, this project strives to establish an environment of certainty that fosters a positive market atmosphere. By doing so, it instils confidence in the feasibility of hydrogen and biomethane as a profitable business venture for potential investors and producers.

Phase 1 of the RTSM programme will be conducted as a desk-based study with modelling activities. The project will consist of a comprehensive market research study, the development of the Basis of Design of CV modelling solutions that will form the basis of an integrated and flexible settlement methodology that can be used in a multi-gas system, and a comprehensive feasibility study. Phase 1 will also incorporate the roadmap for implementation and roll-out strategy for a demonstration.

BIP - Data Quality Statement

BIP has extensive experience in collecting, processing, and managing data as well as collaborating with clients to update or replace systems heavy in sensitive data. Operating in the current landscape where data protection and compliance with data regulations are of paramount importance, BIP has in place a robust and comprehensive Data Protection Policy (attached below) to ensure that data is managed with the highest standards and in compliance with the General Data Protection Regulations (GDPR) and the UK Data Protection Act. BIP is strongly committed to protecting Personal Data and conducting our business in accordance with the legislation mentioned and in line with the highest standards of ethical conduct.

To ensure that all Data Protection requirements are identified and addressed when designing new systems or processes and/or when reviewing or expanding existing systems or processes, we will conduct a Data Protection Impact Assessment (DPIA), in cooperation with the relevant client functions.

For the Purposes of this project, we do not foresee the processing of any customer data, however, we have the experience and the necessary processes in place in case the collection, processing, or managing of data becomes a necessity.

- Data collection processes will be standardised and validated to ensure accuracy, completeness, and consistency. Data validation checks will be performed at the point of entry to identify and rectify any errors or inconsistencies.
- All data collected and processed will be encrypted using industry-standard encryption protocols to protect against unauthorised access and data breaches. Access controls (based on the principle of least privilege) and user authentication mechanisms will be implemented to restrict access to sensitive data.
- The approach to data collection, processing, and storage will comply with the General Data Protection Regulations (GDPR) and the UK Data Protection Act to ensure data privacy and security. Personal data will be anonymised or pseudonymised wherever possible to minimize privacy risks (Data masking and anonymisation).
- Data retention policies will be established to determine the appropriate retention periods for different types of data collected during the demonstration. Data that is no longer required will be securely disposed of in accordance with established data disposal procedures.
- We will maintain transparency and accountability in our data management practices by providing clear and accessible information to stakeholders about how their data is being collected, processed, and used. Data privacy notes and consent forms will be provided to participants to ensure informed consent.

Correlia - Measurement Quality and Data Quality Statements

All instruments and equipment used are calibrated to industry standards and regularly maintained to uphold accuracy and reliability.

The integrity and reliability of the data collected, processed, and reported are paramount to the success of this project. We implement rigorous data quality control measures to safeguard against inaccuracies and inconsistencies. Our approach encompasses comprehensive data validation checks (ideally fully automated), at data collection, entry, processing, and analysis stages, including cross-referencing against established benchmarks and protocols, to verify the accuracy and completeness of the data. Data cleansing using may be undertaken to remove outliers, address missing values and using normalisation procedures to ensure data consistency across different data sources.

We intend to leverage advanced data management tools and technologies to facilitate efficient data processing and analysis while maintaining data integrity.

Additionally, our team undergoes regular training and performance evaluation to uphold the highest standards of data quality. By prioritising data quality at every stage, we ensure that our findings and conclusions are based on reliable and trustworthy data, thereby maximising the project's impact and value. All processed data will be independently peer reviewed and / or sample checked by the Senior Data Modeller or Project Lead, with sampling levels decided by the level of processing and volume of data, to minimise human error and ensure quality.

We will assess data against the following quality dimensions, with examples of the questions to be answered in our statement:

- Data source
- Relevance to the RTSM design
Timeliness of data
Accuracy and reliability
Dependencies for interpretation
Availability for reuse

Correlia maintains robust Data security measures, ensuring that data we hold is protected from unauthorised access, loss, or corruption. Data collected for this project will be securely stored on ring-fenced, UK-hosted Cloud infrastructure with restricted access to maintain integrity and security.

We will maintain comprehensive documentation to record processes, validations, and training records to ensure traceability and transparency of our data management practices.

Correlia has adopted the Unified Controls Framework (UCF) and we can integrate the proposed solution into our Unified Control Framework, currently in effect for key systems that Correlia develops, manages, and maintains. The UCF facilitates measurement via maturity scale and aligns with industry standards such as ISO, NIST, CIS, and OWASP.

Correlia conducts frequent audits for data quality to maintain our high standards. The audits assist in maintaining compliance with the Accuracy principle of the UK GDPR, which is defined in our Data Protection Policy. Data is also protected through our Secure software development standard, Information Security Testing Standard, Information Management Policy, and Confidential Data Masking policy (Where and if applicable).

We maintain a robust Record of Processing in line with Article 30 obligations, conduct Personal Data Assessments against all processes in which personal data is processed and where medium or high-risk activities are to be undertaken, we conduct Data Protection Impact Assessments.

Our dedicated Data Governance team manage and continually improves our Data Protection framework in line with new ICO guidance or changes in the data protection landscape.

Scope

Phase 1 of the RTSM programme will be delivered through the completion of five comprehensive Work Packages (WPs) each addressing a critical aspect of the project scope. The five WPs are as follows:

WP1 – Market Research:

This work package encompasses conducting a comprehensive market research study to identify various solutions that are available globally and that have been developed to tackle billing and settlement in multi-energy systems with varying CVs.

This work package will collect publicly available data (e.g., reports, academic publications) as well as engaging directly with their existing gas industry network and reaching out to key stakeholders. Countries that have multi-energy gas systems and how the UK is positioned in relation to these countries will be assessed in terms of its transitional stage and outlook. Within these countries, the

modelling options adopted by gas networks to bill across multi-CVs will be assessed and segmented in terms of appropriateness to the UK. A fit-for-purpose analysis will be undertaken and a summary report will be produced outlining the recommendation as to what option(s), if any, are suitable for the UK and should be taken forward into WP2 for further development.

WP2 – Modelling Solution Development:

This work package will involve the development of a fit-for-purpose modelling solution(s) that addresses the requirement for application according to the input of the Central Data Service Provider (CDSP) (XoServe) while enabling flexibility for confluence migration between them.

An overview of the Basis of Design will be given that describes the required amendments in the market structures and connection frameworks, the basic architecture of new systems proposed considering key essential provisions such as changes in the Uniform Network Code and the interlink between solutions for a fluid and uncomplicated process for transition. Key steps in the initial set-up of the modelling activities include:

- **Stack ranking:** the likely stakeholders, systems, processes, and codes impacted by each of the stated outcomes desired of the RTSM model would be catalogued and stack ranked by the likely scale of the impact on each. The likely scale of benefit of each desired RTSM outcome will then be stack ranked on each over the above.
- **Solution hypotheses:** a series of solution hypotheses will then be constructed, and the service provider will logically model how well each would answer the design themes, engaging with relevant stakeholders to test assumptions, and ranking them for their potential suitability.
- **Data inputs assessment and data visualisation:** the quality, availability and relevance of datasets will be assessed including understanding where data is sourced from, general availability and data limitations. Cloud hosted tools will be used for analysis and visualisation.

Efforts within this Work Package will primarily centre on solution design, encompassing the identification of high-level dependencies and interactions with other industry systems to comprehensively address all implementation tasks.

The service provider will collaborate with the team responsible for delivering Work Package 3 to identify the inputs required to evaluate the proposed solutions within the feasibility model. Building upon the design themes established in the early stages of Work Package 2 delivery, a framework for describing the proposed solutions will be established. This framework will ensure that the output is presented in a format relevant to further delivery in Work Package 3 and facilitates discussions with stakeholders as part of ongoing engagement throughout the program.

WP3 – Feasibility Study and RTSM Roadmap:

This work package will conduct a comprehensive feasibility study that evaluates the viability of each proposed solution by assessing all factors critical to its success e.g., regulatory, technical, economic, scheduling, and operational aspects. This will facilitate the subsequent development of a comprehensive roadmap in the second part of this WP to inform the strategic implementation of the proposed solution across the UK considering all key aspects and paving the way for successful implementation with the least disruption.

A report will detail all the information generated through the stages of 'defining objectives and scope' and 'gathering of background information' including background information about the gas industry, industry trends, regulatory environment, market dynamics, existing gas settlement practices, and key stakeholders along with the insights gathered into their needs and preferences. Additional information to be outlined in reports includes the factors considered in the feasibility study covering technical, economic, operational, legal, regulatory, and risk assessment, providing a comprehensive justification for their consideration and demonstrating how they contribute to the overall feasibility of the project.

All the key aspects of the solution implementation will be outlined in a comprehensive roadmap to provide a key reference for wider industry and to help inform the requirements for required changes. Key factors that will be assessed as part of the roadmap development include:

- Assessment and Planning
- Technology Selection
- Design and Development
- Regulatory Compliance

- Deployment
- Monitoring and Optimisation
- Training and Change Management
- Continuous Evaluation and Adaptation

A summary report will be created to demarcate the feasibility study and roadmaps findings, analysis and recommendations and a webinar hosted to present the findings of WP3 to relevant stakeholders.

WP4 – Rollout Strategy for a Demonstration:

This Work Package will see the development of a Rollout Strategy for a potential demonstration of the solution developed in WP2 in subsequent phases of the RTSM programme. Using the outputs of WP1, WP2 and WP3, the most effective approach to demonstrate the solution will be selected. The criteria used to design and evaluate the models in the preceding work packages will inform the key considerations in designing the Rollout strategy and the demonstration will be designed to showcase how effectively the proposed solution addresses the challenges outlined by the selection criteria. Additionally, the assumptions and assessments made during the feasibility study in WP3 will be validated. Key considerations in the rollout strategy will include the following:

- Asset and Infrastructure Utilisation
- Site Selection
- Risk Mitigation
- Data Requirements
- Gas Supply
- Digital Twin approach
- Monitoring and Validation
- Adherence to Regulation/Regulatory Change Requirements
- Stakeholder Communication
- Safety Measures
- Alignment with Government Strategy and Policy
- Cost Estimation
- Customer Engagement

Time will be allocated for stakeholder engagement with key industry stakeholders ensuring that all eligibility criteria for RTSM demonstration site(s) selection are thoroughly reviewed and endorsed by all relevant parties. An iterative feedback loop strategy will also be implemented to factor in any design optimisation opportunities that are highlighted through the demonstration.

WP5 – Dissemination Process:

The dissemination process will ensure that all project learnings are successfully shared with all impacted stakeholders across the energy industry. This WP will produce the final report which will be the product of an iterative process in which SGN and the partners will discuss the findings and results from all work packages to be tailored into a detailed technical account that describes the work's methods, analysis, and findings.

Objective(s)

The aim of RTSM Phase 1 is to develop a comprehensive, flexible, and fit-for-purpose modelling solution to enable the settlement and billing of gas across a multi-gas grid. To do this, the objectives are to:

- Undertake a comprehensive market research review to assess solutions that have been developed globally to undertake billing and settlement in multi-gas systems with varying CVs and examine the applicability and replicability of these solutions to the UK gas grid.
- Utilizing the global learnings, develop a modelling system that can accurately define CVs and apply these to a new or altered billing and settlement framework that will bill customers based on their actual energy usage. The solution must be able to account for flexibility across the grid and be responsive to changing market conditions.
- Determine the feasibility of the proposed solution(s) by undertaking a thorough feasibility study taking into consideration key factors that will influence the solution's technical, regulatory, and operational applicability. Using these learnings, develop a roadmap to ensure seamless integration of the solution(s) across the UK network.

- Assess the requirements for a rollout strategy for a potential demonstration following RTSM Phase 1 – Methodology Development.

The overall aim of the project is to define a methodology that will enable the fair and equitable billing of gas consumers in a multi-CV gas grid and in turn facilitate the increased injection of green gasses into the UK's gas grid for decarbonisation purposes.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

An assessment of distributional impacts (technical, financial and wellbeing related) for this project has been carried out using a bespoke assessment tool, which assesses the project as having a positive, negative or neutral effect on consumers in vulnerable situations. To help inform the assessment, this tool considers the categories of consumers identified in the Priority Services Register. This project has been assessed as having a neutral impact on customers in vulnerable situations.

Success Criteria

The success of this project will depend on the production of a comprehensive final report outlining the findings of the market research, the Basis of Design for the modelling solution, feasibility study, roadmap and roll-out strategy pertaining to a flexible and fit-for-purpose solution which will enable the fair and equitable billing of consumers across a multi-gas system as the UK's gas network seeks to decarbonise.

Project Partners and External Funding

This project will be developed by two suppliers working alongside each other – BIP UK and Correla. Both of these suppliers exhibit significant capabilities in the fields of study and technical expertise required for this project, namely gas market research, regulatory analysis and an in-depth understanding of the current UK gas billing and settlement framework. Each supplier will take the lead on certain WP's and by maintaining a collaborative approach successful outputs will be ensured.

- BIP UK – WP1 (Market Research) and WP3 (Feasibility Study and RTSM Roadmap)
- Correla – WP2 (Modelling Solutions) and WP4 (Rollout Strategy for a Demonstration)
- Both – WP5 (Dissemination Process)

Additionally, this project will be developed in close collaboration with the gas networks (i.e., Wales and West Utilities, Cadent, Northern Gas Network, and National Gas Transmission) alongside the UK's Central Data System Provider, Xoserve.

Potential for New Learning

This project will design a solution for the billing and settlement of gas within a future multi-gas grid across the UK. The solution will enable the increased injection of low-carbon gases into the grid to help meet decarbonisation goals and will be applicable to all gas industry stakeholders involved in the current process. The market research element of the project (WP1) will inform stakeholders about solutions developed overseas to accurately bill and settle gas in a grid with varying CVs present. These findings will be presented in an accessible report and will highlight key areas of consideration and innovation in overseas solutions that could be applied within the UK. All of the considerations that influence the feasibility of the solution(s) generated including regulatory, technical, operational and economic will be presented in the final report to inform stakeholders on how the solution will be implemented and integrated either with the existing framework or via a new framework.

Scale of Project

The scale of this project is UK-wide and will be applicable to all Gas Networks who aim to increase their uptake of low-carbon gasses such as hydrogen and unpropanated biomethane. The project's findings will also be directly applicable to the wider gas industry and key external stakeholders who are involved in the current billing and settlement process e.g., gas Shippers and Suppliers, Regulators, Metering Equipment Managers, Producers. The scale of this project being UK wide is reflective of the importance of implementing a fair and equitable settlement and billing process to the whole country's energy transition and not just the aims of SGN. If the scale of the project was smaller, the developed solution would risk overlooking the nuances of each region of the country (e.g., capacities of green gas, embedded injection zones, charging areas) and thus the solution would risk being non-viable for the whole of the UK. Without a viable, nationwide solution, the uptake of low-carbon gasses with varying CVs to help support the decarbonisation of the nation's gas grid will be hindered. Considering the potential benefits of supporting the uptake of green gasses into the gas grid, the growth of the hydrogen and biomethane economy and any subsequent wider implications on the energy transition, the level of expenditure on this project is deemed justifiable.

Technology Readiness at Start

Technology Readiness at End

Geographical Area

This desktop-based project will cover the whole of Great Britain in its analysis and thus the findings will be applicable and usable by all GNOs and energy industry stakeholders across this area.

Revenue Allowed for the RIIO Settlement

n/a

Indicative Total NIA Project Expenditure

SGN:

Internal costs – £51,750.00

External costs - £155,250.00

Total SGN - £207,000.00

WWU:

Internal costs - £25,875.00

External costs - £77,625.00

Total WWU - £103,500.00

NGN:

Internal costs - £25,875.00

External costs - £77,625.00

Total NGN - £103,500.00

Total project expenditure - £414,000.00

Project Eligibility Assessment Part 1

There are slightly differing requirements for RII0-1 and RII0-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RII0-2 / RII0-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RII0-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

The overall aim of this project is to develop a modelling solution that will facilitate the introduction of a fair and equitable billing and settlement framework able to operate in a multi-gas system with varying CVs. Current regulations such as GS(M)R and GCoTER limit the injection of hydrogen and unpropanated biomethane into the grid due to their lower CV and the impact this would have on the FWACV and Wobbe index which limits the potential for green gasses to help meet decarbonisation targets.

Additionally, GS(M)R and GCoTER cap the value of the daily charging CV and there can be no more than 1MJ/m³ variance above the Lowest Source CV charging zone. The design and implementation of a fit-for-purpose settlement and billing framework will enable the increased uptake of green gasses into the gas network which will work towards widespread energy decarbonisation for the nation. A new framework will also help to boost the UK hydrogen and biomethane markets as producers will have assurance that higher volumes of these lower CV green gases will be able to be injected into the grid (where operational network parameters and regulation allows), providing incentive for investment.

How the Project has potential to benefit consumer in vulnerable situations:

n/a.

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RII0-1 projects only)

n/a.

Please provide a calculation of the expected benefits the Solution

Under the current FWACV framework, the average CV of daily charging areas is applied to all customers within that charging area. This introduces the possibility of variance in customer bills as some customers will be under-billed if receiving gas with a higher CV than the FWACV and some customers will be overbilled because they receive gas with a lower CV than the FWACV. Additionally, GS(M)R and GCoTER cap the value of the daily charging CV and there can be no more than 1MJ/m³ variance above the Lowest Source CV charging zone. However, if this method continues to be applied across a gas grid with increased injection of hydrogen and unpropanated biomethane then vast amounts of unbilled energy will be generated. This unbilled energy ultimately gets charged back to the customers by gas Shippers and Suppliers and is reflected in higher energy bills. Furthermore, under the current framework, due to hydrogen and biomethane's lower relative CVs consumers who live close to an embedded hydrogen or biomethane injection point may be at risk of further increase in their energy bills. These consumers will have to use a greater volume of gas to meet their energy needs compared to a customer who is being supplied by majority natural gas. The implementation of a flexible settlement and billing solution which is able to accurately bill customers across a multi-gas system will help to minimise the risk of customers paying bills that do not accurately reflect the energy they consume.

Please provide an estimate of how replicable the Method is across GB

The findings of this project will be applicable and relevant to all gas networks across GB amongst wider energy industry stakeholders.

Please provide an outline of the costs of rolling out the Method across GB.

This is a desktop-based research study thus the cost of rolling out the findings cannot be quantified at this stage.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

- ☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).
- ☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)
- ☐ A specific novel operational practice directly related to the operation of the Network Licensees system
- ☐ A specific novel commercial arrangement

RIIO-2 Projects

- ☐ A specific piece of new equipment (including monitoring, control and communications systems and software)
- ☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven
- ☒ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)
- ☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology
- ☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution
- ☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

The design of a billing and settlement methodology able to function across the UK's gas grid when varying CVs are present will allow the Gas Distribution networks to increase the injection of green gases into the grid. A flexible solution will also decrease the need to propanate biomethane prior to injection into the grid which will help to increase imbedded connections and decrease associated costs. The increased injection of these green gasses will ultimately help Network Licenses to work towards their decarbonisation goals and will help to strategically plan future low-carbon networks as injection will be unconstrained.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

n/a.

Is the default IPR position being applied?

- ☒ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

Due diligence has been conducted on all other NIA-funded projects from other GNOs and no projects of a similar scope have been

flagged thus duplication has not been highlighted as a risk. Note that this project will build on the findings of NGGDLGN04 – Future Billing Methodology (FBM), however, there will be no duplication of work and only the learnings will be applied to the context of Real-Time Settlement Methodology (RTSM).

Future Billing Methodology sought to provide a “proof of concept” for options to develop a future billing methodology that could facilitate a sustainable, cost efficient, and low-carbon future Gas Distribution billing regime. The project explored three methods to more accurately attribute CV of gas consumers (increased to 5 based on findings) and conducted a series of field trials which tested how the CVs within a LDZ could be managed to create new charging areas. A cost benefit analysis (CBA) of each option was also conducted with high, medium and low hydrogen and biomethane scenarios to assess the financial feasibility of implementing each solution. The proof-of-concept project showed that Online CV Modelling, ‘option C’ of FBMs recommendations, could be used to predict the CV at a local level and recommended the commencement of a feasibility study for option C but no further design, feasibility testing, or study was conducted.

RTSM will take forward option C, Online CV Modeling, and using input from key stakeholders, gas network operators and the Central Data Service Provider (Xoserve) will output the Basis of Design (BoD) of a network modelling option capable of modelling variable CVs within LDZ's. RTSM will assess the feasibility of the suggested model and the requirements for industry adoption taking into consideration interactions with existing systems, stakeholder processes and billing frameworks.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

This project will provide critical insights into the opportunities available considering; learnings taken from global frameworks for billing and settlement in multi-gas networks, modelling solution options, solution feasibility according to UK regulatory, technical, operational, and economic landscape, a roadmap for implementation and the rollout strategy for potential future demonstration. The project will comprehensively assess all aspects that influence the billing and settlement regime of the UK and how this could be changed moving forward to facilitate widespread green gas uptake to meet decarbonisation needs. The widespread injection of hydrogen, hydrogen blends and biomethane into the gas grid has not previously been attempted at the scale necessary for grid decarbonisation thus the findings of this project seek to enable necessary changes to facilitate increased green gas uptake. A study of this detail has not been undertaken up to this point and will provide a comprehensive report including a basis of design and roadmap for implementation to help support green gas uptake for both GNOs and the wider energy industry.

Relevant Foreground IPR

n/a.

Data Access Details

Information relating to the project will be published on the ENA Smarter Network Portal, or any other relevant platform, for public access <https://smarter.energy.networks.org/>.

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

The learnings and deliverables from this project are directly related to customer billing and settlement within a multi-gas system and will provide the design of a modelling solution and an overview of solution feasibility and implementation in the UK to impacted stakeholders. A billing and settlement framework compatible with significant CV variance across the UK's gas grid will ultimately enable the increased, unconstrained injection of low-carbon gases (hydrogen and unpropanated biomethane) into the grid. Distribution of Hydrogen/unpropanated biomethane UK wide is currently not a business-as-usual activity for SGN or any other GNO

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

Repurposing the nation's gas grid to transport low-carbon gasses such as hydrogen is crucial in supporting net-zero targets. Under the current framework, the volume of low-carbon gasses able to be injected into the grid is limited to ensure compliance with existing regulations. In order to support widespread green gas uptake and ensure the fair and equitable billing of energy for gas consumers a flexible and accurate methodology must be devised and ultimately introduced. The NIA framework can support innovative works that

build up evidence to support the design of a new methodology and facilitate the decarbonisation of the network by facilitating increased green gas injection. Increased green gas uptake is a critical component in the energy transition and will facilitate the decarbonisation of the gas grid.

This project has been approved by a senior member of staff

☒ Yes