Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Aug 2024

Project Reference Number

NIA2_NGET0071

Project Registration

Project Title

Digital whole life carbon assessment (DgWLCA)

Project Reference Number

NIA2_NGET0071

Project Licensee(s)

National Grid Electricity Transmission

Project Start

August 2024

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Muhammad Shaban

Project Budget

£122,100.00

Summary

National Grid (NG) has commitments to NGET Environmental Action Plan to reduce emissions and uses carbon interface tool (CIT) for embodied carbon calculation. NG needs to move to Whole life carbon assessments to align to best practice and PAS2080. Being an Excel-based, CIT is prone to human errors, and it is challenging to update over long-term projects. This project aims to develop the UK's 1st Transmission's whole life carbon digital (DgWLCA) tool allowing NG to measure and manage carbon reduction towards our targets. Digital tool will retain use of existing databases and will be updated annually. We selected an existing Mott McDonald developed tool as a baseline and intend to do bespoke innovative modifications like AI low carbon optimization and intuitive energy-specific onboarding.

Nominated Contact Email Address(es)

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Problem Being Solved

NG has commitments to reducing the carbon footprint of its construction projects in the NGET Environmental Action Plan. As a part of this we have stated that we will work towards PAS2080. NG uses Carbon interface tool (CIT), a spread sheet for embodied carbon calculation only. This tool takes more time due to spreadsheets and databases and comes with many persistent issues. NG intends to move towards whole life carbon assessments to align to best practice and PAS2080. Being an Excel-based tool, CIT is prone to human errors, and it is challenging to update over long-term projects. The information from the assessment is limited and usually is not as helpful as it could be for delivery teams to identify action. The CIT is a tender requirement, but the data is often not very good and refined once contracts have been awarded. CIT tool does not have some vital options like alkali activated products (low carbon concrete), HVDC, and new assets. It takes longer time to update such a tool and to use it, all users should have access to associated data bases and spreadsheets. To reduce the carbon impact of our construction activities, we need to understand it first as if we have a good granularity of the schemes carbon footprint, we can focus decarbonisation efforts where the most gains can be made. We need a digital tool to identify, manage, and assist us in carbon data not only for embodied carbon but for whole life carbon assessments.

Method(s)

Mott Macdonald (MM) will act as a supplier and will provide the digital solution, Moata Carbon Portal, alongside consultancy support to make sure it works for our users and provides the outputs we need. The work will involve initial discussions between NGET and the supplier to understand the key requirements. The supplier will review the existing CIT tool and the databases like CAT and ALPACA. The supplier will include all the lifecycle stages of the assets and will use key assumptions where the project or asset-specific data is not available. The supplier will then develop a methodology for operational emissions relating to the transmission losses and fugitive emissions. This will be tested, agreed, and produce a dashboard including client overview. Initial testing will be conducted including BIM (Building information modelling) integration to demonstrate the efficacy. Further testing will be carried out within NGET and within the supply chain. Based on the feedback and regular reviews, troubleshooting of the bugs will be done and the tool will be updated based on the feedback from the pilot. The final digital tool will be launched and will replace the existing CIT tool used by NGET teams, contractors, and designers.

Scope

The scope of digital whole life carbon assessment tool will be aligned with National Grid's requirements, the supplier has in-house experience and expertise relating to the carbon tools and the development process will involve discussions between the NGET team and carbon management experts in MM. This will allow the tool developers to discuss specifics relating to the requirements and to determine whether the digital tool includes all the relevant assets/components. This is a high TRL development project which further enhances the capability of existing digital tool for bespoke solutions and recommendations provided to NGET. Over the 12-month project, the study will provide whole life carbon assessment through a digital tool allowing NGET to measure and manage carbon reduction towards our targets. The tool will retain the use of existing database and will draw on other datasets to supplement these databases, which can be updated annually. The tool will be used across project teams, designers, and contractors at different project stages. CIT has some apparent issues like prone to human errors, challenges to update over long-term project, and is time consuming due to excel-based tool however the scope of the project includes the identification of less-known limitations of existing CIT tool and address them accordingly.

Objective(s)

- Develop UK’s first transmission whole life carbon digital tool.
- Develop integrated functions for our supply chain to use and identify carbon hotspots.
- Develop benchmarks for the UK energy sector using ‘nested asset’ functionality.
- Integrate AI low carbon optimisation suggesting optimisations.
- Centralise CIT access and low carbon decision making.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Financial distributional impact:

This project ensures that NGET and the UK energy industry are at the forefront of global developments in asset management of transmission system research, enabling the industry to make decisions that could reduce the carbon emissions and thus reduce OPEX expenditure and are supported by comprehensive research and experiments. The scale of the planned development is unprecedented and there is concern that the understanding around the carbon footprint of our activities and carbon reporting is not robust enough for future decisions. With access to the latest digital tools related to carbon footprint, NGET has opportunity to replace the existing excel-based tool to manage the assets more efficiently and effectively which could deliver savings. Furthermore, the leveraged funding mechanism ensures that expensive research can be carried out at subsidised rates, thereby ensuring the best value for consumers’ money. The project will not restrict benefits delivered to vulnerable consumers based on any vulnerability class.

Technical and wellbeing impact:

There is uncertainty in the carbon database due to non-existent carbon data like alkali activated products and HVDC. With large pipeline of future developments in T3, we are unable to focus in relevant areas to address the carbon footprint unless we have centralised digital data. There are obvious environmental benefits only if we can understand our carbon hotspots and potential workstreams to decarbonise these. The outcomes from this research will inform and enable the energy industry to take appropriate measures in the best interest of consumers, particularly in the vulnerable category, as the world transitions to a Net Zero future.

Success Criteria

This project will be successful if project provides the insights to the following.

- A better methodology for whole life carbon assessments related to the construction.
- Centralise CIT access and low carbon decision making, generating significant time savings, quality assurance improvements, and common ways of working.
- Compliance of the digital tool with NGET Cyber security credentials.
- Digital tool aligned to PAS 2080, and NGET requirements.
- Provides a whole life carbon view, rather than just carbon embodied in construction materials.
- Ambitious development pipeline of AI low carbon optimisation and functionality development.
- Ability to update the background databases without having to re-issue excel tools – this removes risk of version control issues.
- Successful implementation of updated tool to existing projects.

Project Partners and External Funding

The following project partners will be supporting the project:

- Mott MacDonald will provide experience and expertise relating to digital tool development.
- NGET is providing all the funding for the project and is the lead project partner. SPEN and
- SSEN endorse and provide support to the Project with no financial contribution.

Potential for New Learning

- Improved User experience of the digital tool
- Data sourcing and facilitation for live projects.
- Be accessible to supply chain (flushing out the licencing issue).
- Allow for projects to add in their own carbon factors for assets/materials.
- Ability to link to EPD libraries, the Carbon Asset Database, and any other relevant data sources.
- Ability for templates/standard project asset lists and base assumptions for lack of information.
- An effective, interactive dashboard that shows the carbon of the project in meaningful ways eg by material, by asset, by activity.

Key findings across all deliverables will be presented in a workshop to NGET staff and internal stakeholders.

Scale of Project

This project will be delivered via desktop only with no site visits required. Any workshops or meetings will be via Microsoft Teams and these meetings are dependent on the availability of MM and NG staff. As such there is no scope to reduce the scale of the project any further.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Desktop studies will be performed remotely by MM at various geographical locations.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

£ 109,890

Project Eligibility Assessment Part 1

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

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

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

The project facilitates energy system transition by helping NGET to understand the environmental impact, in terms of reducing the carbon in construction projects. Project will develop the UK's first Transmission whole life carbon digital tool allowing us to measure and manage carbon reduction towards our targets. The tool will develop functions for our supply chain to use and identify carbon hotspots and will identify several clear opportunities for future focus to assist in commitments to reduce scope 3 emissions. We will be able to promote a consistent approach by sharing the data with other TOs benefitting the customers with concise emissions calculations and clear reporting on emissions.

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

Developing an understanding regarding carbon footprint is important to reduce the negative impact of carbon dioxide emissions arising from our construction activities. Reduction in emissions, material volume, and asset health maintenance has huge societal benefit.

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 (RIIO-1 projects only)

N/A

Please provide a calculation of the expected benefits the Solution

The benefit of this project assumes that NGET will achieve reduced emission by the implementation of this digital tool. The tool will help us in identifying the carbon hotspots and will make recommendations based on AI optimisations. If this project is successful with digital tool implementation in the business, over a 10-year period, £259k of societal value will be created by saving 100tCO2e/year will be reduced by using this tool over next 10 years. The overall financial benefit is assumed to be more as we intend to reduce 40% emissions (64700-116000tCO2e) over the T3 period. It is assumed this tool will help us in reducing some if not all the aimed emissions. The benefit ratio obtained from the project is 3:1.

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

Due to construction activities planned in T3 and beyond, this work will develop digital tool bespoke to UK energy sector and all TOs and DNOs will be able to benefit from the development. All TOs (NGET, SPEN and SSEN) support this piece of study and are keen to learn the findings.

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

N/A

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

This project will replace the existing CIT tool with a digital whole life cycle assessment tool with advanced functionalities like AI chat bot and optimisations. Relevant network licenses support this piece of work and are keen to use the similar tool once fully developed.

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.

This project will replace the existing CIT tool with a digital whole life cycle assessment tool with advanced functionalities like AI chat bot and optimisations. Relevant network licenses support this piece of work and are keen to use the similar tool once fully developed.

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

There are currently no NIA/SIF projects developing digital whole life cycle carbon assessment tools within the UK. There are significant knowledge gaps around the whole life cycle assessment, and we need to develop understanding of the whole life cycle assessment of

our construction projects to account for all related emissions. As a responsible business, NG need to cover the knowledge gap to address the issue and manage the expectation to meet the commitments of reducing the scope 3 emissions. There is no overlap between this work focusing on the digital tool development and the work currently under way in different trials and studies.

Relevant Foreground IPR

The work has not been undertaken elsewhere before and the results could have significant impact on business planning. The results will benefit other energy networks making NIA the most appropriate route.

Data Access Details

Data for this project and all other projects funded under the Network Innovation Allowance (NIA), Network Innovation Competition (NIC) or the new Strategic Innovation Fund (SIF) can be found or requested in a number of ways:

- A request for information via the Smarter Networks Portal at https://smarter.energynetworks.org, to contact select a project and click 'Contact Lead Network'. National Grid already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
- Via our Innovation website at https://www.nationalgrid.com/uk/electricity-transmission/innovation
- Via our managed mailbox box.NG.ETInnovation@nationalgrid.com

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

The nature of a research programme means it inherently carries a risk that the research may be unsuccessful and/or identify unforeseen barriers to implementation and National Grid is unable to consider research of this scale as business-as-usual. The NIA funding offers the most appropriate route for NGET to design experiments, review existing techniques, and perform well designs experiments on certain species. As relatively little is known about the technology and its low TRL level, this justifies the use of NIA.

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

The work has not been undertaken elsewhere before and the results could have significant impact on business planning. The results will benefit other energy networks making NIA the most appropriate route.

This project has been approved by a senior member of staff

☑ Yes