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

Jan 2014

Project Reference Number

NIA_NGET0130

Project Registration

Project Title

Determining a threshold for magnetophosphenes perception at 50Hz

Project Reference Number

NIA_NGET0130

Project Licensee(s)

National Grid Electricity Transmission

Project Start

March 2014

Project Duration

3 years and 1 month

Nominated Project Contact(s)

Hayley Tripp

Project Budget

£605,000.00

Summary

This project addresses one of the key weaknesses in the current literature on which EMF exposure limits (both occupational and public) are based. The scope of this research project is to establish a robust threshold for magnetophosphenes perception during exposure to 50 Hz EMF which is the acute biological response on which current guidelines are formulated.

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

National Grid recognises that the scientific evidence on which current Electric and Magnetic Field (EMF) exposure guidelines are somewhat limited and therefore supports high-quality studies into EMFs to improve knowledge. Research is needed to address this issue which will bring benefit to National Grid, Network Licensees, stakeholders and customers.

Exposure to external EMFs, such as those produced by power lines, can cause induced currents to flow within the body. The exposure guidelines in the UK are based on limiting these induced currents which can cause acute biological effects. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) who formulate the guidelines which have been adopted by UK Government, recognise that for effects on the retina specifically, magnetophosphenes are the best indicator of a biological response threshold. Phosphene perception (little flickering dots in the visual field) during magnetic field exposure (originating the name "magnetophosphenes") is explicitly mentioned as being this biological "threshold" effect in the low frequencies, which support the ICNIRP guidelines.

The data available on this phenomenon is limited and the guidelines to date are based on this limited pool of research. This is especially true at 50 Hz where the best estimate of acute biological effects is based on extrapolations of data from other frequencies. This research will provide greater clarity on the biological response threshold of EMF at 50 Hz.

Method(s)

Research

National Grid is committed to following independent exposure guidelines in all of its operations. It is important for our customers and National Grid that these guidelines are based on the most robust scientific research possible. This project will clearly establish a robust threshold of acute biological effects (magnetophosphenes) which will feed into the scientific literature on which EMF exposure guidelines are based.

Scope

This project addresses one of the key weaknesses in the current literature on which EMF exposure limits (both occupational and public) are based. The scope of this research project is to establish a robust threshold for magnetophosphenes perception during exposure to 50 Hz EMF which is the acute biological response on which current guidelines are formulated.

Objective(s)

The objectives for the project are to:

- Establish the magnetic field exposure threshold at 50 Hz at which magnetophosphenes are perceived.
- Provide preliminary data of a frequency response curve for magnetophosphene perception.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria will be a publically accessible scientific research paper published in the peer-reviewed literature detailing the experimental results.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The scale of the project will involve carrying out volunteer studies of biological effects of 50Hz to develop raw scientific data that will be presented in peer-reviewed literature.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The research will take place in London in Ontario, Canada.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The total NIA expenditure is £196,600

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:

n/a

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 (RIIO-1 projects only)

The primary saving resulting from this research project is addressing potential health issues and ensuring that safety standards are robust and reliable. The project provides key learning and accurate information which can be used by National Grid to help assess the health impact of EMF and identify any future strategies or procedural developments.

Please provide a calculation of the expected benefits the Solution

Not required for research projects.

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

This will be applicable to all Network Licensees.

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

None.

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

☐ 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

All network licensees face the same issues of health and public concern relating to electric and magnetic fields and therefore learning that is generated will be useable by them in the same way as by National Grid as the work will be published in the peer-reviewed literature.

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

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

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.

n/a

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

n/a

Relevant Foreground IPR

n/a

Data Access Details

n/a

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

activities

n/a

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

n/a

This project has been approved by a senior member of staff

☑ Yes