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

Feb 2016

Project Reference Number

NIA_NGET0180

Project Registration

Project Title

EPRI Research Collaboration on Electric & Magnetic Fields Health & Safety (P60) 2016

Project Reference Number

NIA_NGET0180

Project Licensee(s)

National Grid Electricity Transmission

Project Start

January 2016

Project Duration

1 year and 4 months

Nominated Project Contact(s)

John Swanson

Project Budget

£4,076,190.00

Summary

The nature of the program is that almost all of the individual strands take more than a single year to complete, and therefore not all the component strands are expected to report specific milestones in 2015. Among the key expected areas of progress in 2016 are:

- conclude the California Power Line Study, which uses California birth and cancer registry data and innovative GIS techniques to examine childhood leukemia incidence as relates to residential distance from transmission lines. This is a key follow-up to the sequence of studies from the University of Oxford/National Grid collaboration in the UK (preliminary results became selectively available on a confidential basis in 2015; submission of peer-reviewed publication expected in 2016);

- a pooled analysis of childhood leukemia and distance from power lines (will include data from the California Power Line Study), which is designed to bring greater clarity to the various power-line studies published recently (significant progress on assembling combined dataset in 2015, workshop of investigators (including national Grid) planned 2016, first publication either 2016 or 2017);

- assess the relationship of magnetic field exposure and personal mobility with miscarriages in subjects treated at an assisted reproductive technology clinic;

- continue a study that replicates a recently reported association between maternal exposure to magnetic fields during pregnancy and asthma in the offspring;

- implement testing of the mouse leukemia model to determine whether exposure to magnetic fields affects disease development (peer-reviewed publication delayed and now expected in 2016);

- investigate potential EMF/RF interference with active implanted medical devices (e.g., pacemakers and defibrillators, with possibility of supporting new research to extend previous results which have already proved valuable);

- complete a personal monitor that informs workers of the presence of fields that may possibly disrupt an implanted pacemaker or defibrillator;

- test for magnetophosphene thresholds in human subjects;

- evaluate the potential effects of EMF exposure on marine biota from underwater transmission cables (submission of peer-reviewed publication expected in 2016).

Nominated Contact Email Address(es)

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Problem Being Solved

National Grid recognises that there are parallel challenges within the field of electricity transmission globally which are more economically investigated and addressed through collaborative learning and knowledge generation among key industry stakeholders. The Electric Power Research Institution (EPRI), with its wide international membership, plays a valuable role in identifying and delivering innovation projects aimed at addressing many of the challenges faced by electricity industry participants, including Transmission Network Owners and System Operators. This portfolio of work is focused on research into the effects of Electric and Magnetic Fields (EMF) and seeks to address key aspects of National Grid's Innovation Strategy and an area of particular interest and concern to customers and other stakeholders with an interest in, or affected by, electricity transmission infrastructure.

New Transmission and Distribution construction (including the development of electric vehicle charging infrastructure) and capacity upgrades, and scientific reports and the publicity surrounding them, can create public concerns about possible human health risks from electric and magnetic field (EMF) exposures. Such concerns can lead to lengthy delays for new projects, and possibly cause regulatory decisions that affect project schedules and costs, and jeopardise public acceptability of existing infrastructure. Revisions to guidelines for public and worker EMF exposures could result in altered exposure limits with consequential constraints on operations and extra costs.

Method(s)

EPRI is a non-profit organization which facilitates a variety of research projects relating to substations within the electricity industry. These collaborative projects bring together scientists, engineers and academic experts in the industry to help assess recognised challenges within the field. EPRI's approach in managing collaborative projects is beneficial to National Grid and our customers, providing valuable information, learning and knowledge which would be more expensive to formulate on an individual basis.

By participating in a given project, National Grid not only contributes resource to the work and receives results, but also is able to influence the detailed content and priorities of the project, through attendance at steering groups (known as "Area Councils"). In the course of its 2015 membership of the EPRI EMF Program, national Grid has consciously become more active in the management and direction of the program, for example, being proactive and influential over changes to the management personnel.

On an annual basis National Grid's asset and system specialists review the portfolio of proposed projects for the coming year that have been identified by the expert task forces at EPRI as being of common value to members. This annual portfolio review includes an overview of the project's research value, the approach and alignment of objectives with the needs of and priorities specifically for the GB Electricity Transmission Network. Each project that is selected for National Grid to participate in is further reviewed and ultimately approved by a panel of representatives from across the main directorates within National Grid. This review has identified that membership of P60, the EMF program, in 2016 will continue to be of value.

Associated with this program are the following research projects. The project is organised in formal terms as five sub-projects:

1. EMF and RF Information Project - Project P60.001
2. Health Studies Related to EMF From Transmission and Distribution Infrastructure - Project P60.002
3. EMF Workstation - Project P60.003
4. EMF and RF Exposure Assessment Related to Emerging Technologies - Project P60.004
5. EMF and RF Occupational Health - Project P60.005

Whilst all of these are valuable to us, this structure disguises the fact that P60.002 and P60.005 each comprise a number of strands of work and it is in these that the bulk of the effort and benefit relates.

Scope

The nature of the program is that almost all of the individual strands take more than a single year to complete, and therefore not all the component strands are expected to report specific milestones in 2015. Among the key expected areas of progress in 2016 are:

- conclude the California Power Line Study, which uses California birth and cancer registry data and innovative GIS techniques to examine childhood leukemia incidence as relates to residential distance from transmission lines. This is a key follow-up to the sequence of studies from the University of Oxford/National Grid collaboration in the UK (preliminary results became selectively available on a confidential basis in 2015; submission of peer-reviewed publication expected in 2016);
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- evaluate the potential effects of EMF exposure on marine biota from underwater transmission cables (submission of peer-reviewed publication expected in 2016).

Objective(s)

The purpose of EMF and RF Health Assessment and Safety EPRI program is to provide the following outputs:

- timely, reliable EMF and RF scientific research results, communication materials, relevant background information, and analyses of key external studies;
- publicly accessible, up-to-date information on EMF and RF research, health risk evaluations, and regulatory actions;
- experimental and epidemiologic research investigating high-priority residential and occupational EMF and RF health and safety questions;
- EMF Workstation software for modelling T&D infrastructure EMF in residential and occupational settings;
- EMF and RF exposure characterization research and exposure assessment software;
- educational materials, including instructional EMF/RF DVDs, tutorials, and RF safety awareness training;
- comprehensive assessment of the potential effects of EMF on aquatic life from submerged cables; and
- investigation of potential EMF interaction with implanted medical devices

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The overall project comprises multiple strands of work. Progress should be expected on each strand during 2016, but not necessarily that each strand would be completed or produce significant publications. The success criteria are that most, if not all, the milestones listed under *Scope* above should be achieved.

Project Partners and External Funding

Each project facilitated by EPRI is funded through collaborators, including National Grid, that contribute to the development of the project portfolio and then express specific interest in being involved in a project once the portfolio is decided. Contributions from other EPRI members for 2016 are anticipated at $5.4m

Potential for New Learning

EPRI's varied program enables National Grid to generate new learning relating to EMF. Each project provides opportunities for extensive learning and knowledge generation through collaboration which would not be economically feasible if carried out independently.

Further information about the priority areas for research in 2016 and the new learning being sought can be found at:

http://www.epri.com/Our-Portfolio/Pages/Portfolio.aspx?program=025025

Scale of Project

The EMF and RF program is predominantly laboratory or desk based; as such there is no scope to reduce the scale of the project any further. Much of the value of the program comes from its scale which includes funding from other utilities, allowing it to be run as a coordinated program rather than a series of stand-alone projects.

Technology Readiness at Start

Technology Readiness at End

TRL2 Invention and Research	TRL4 Bench Scale Research

Geographical Area

The research undertaken in the EPRI EMF programme is predominantly carried out in the US, Canada, and various European countries, although the programme also reviews the latest research from across the world.

Revenue Allowed for the RIIO Settlement

None.

Indicative Total NIA Project Expenditure

The total indicative NIA expenditure is £383,000, for the EPRI 2016 calendar year funding requirements.

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)

Each project will have different financial savings based on the outcomes and potential benefits gained. Each EPRI programme that National Grid joins has been through two stages of review that consider the potential to deliver financial benefits. In the first instance, within EPRI's governance, the Research Advisory Committee provides guidance on policies and issues that impact the power industry to inform the content of the research programmes. Within National Grid, the Technical Leader for each aspect of the GB Transmission Network undertakes a review of the proposed EPRI programme relevant to their technical expertise and responsibilities and evaluates which provide potential value from a GB perspective as part of an annual review of which programmes to participate in.

The EMF program 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

Electric and magnetic fields will be present at any existing or newly built overhead lines, underground cables or substations throughout the transmission and distribution networks.

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

The direct cost of making a policy or procedure change following significant EMF research could range from as little as ten thousand to hundreds of thousands of pounds depending on the complexity of the change implications. The wider cost implications arising from such changes will be dependent on the specific outcomes generated from the project and typically will be subject to further stages of demonstration prior to roll out. Further information regarding roll out costs can be provided prior to demonstration 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

All electricity Transmission and Distribution networks give rise to EMF. Scientifically robust information about the effects of EMF is essential for all of the Network Licensees properly to inform discussion with stakeholders who may have concerns about EMF effects.

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

This project fits within the corporate responsibility value area of the Electricity Innovation Strategy.

☑ 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.

By participating in collaborative projects through EPRI National Grid can ensure that unnecessary duplication with other projects under NIA is avoided.

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

- [x] Yes