SIF Round 3 Project Registration

Date of Submission

May 2024

Project Reference Number

10061360

Initial Project Details

Project Title

Electric Thames

Project Contact

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Challenge Area

Whole system network planning and utilisation to facilitate faster and cheaper network transformation and asset rollout

Strategy Theme

Flexibility and commercial evolution

Lead Sector

Electricity Distribution

Project Start Date

01/03/2024

Project Duration (Months)

3

Lead Funding Licensee

UKPN - London Power Networks Plc

Funding Mechanism

SIF Discovery - Round 3

Collaborating Networks

UK Power Networks

Technology Areas

Electric Vehicles

Stakeholder Engagement

Project Summary

Today, the boats, docks, and ports operating on the Thames run mostly on fossil fuels, but this is changing as the river's economy decarbonises in response to climate change. There is limited understanding how this shift will affect the electricity network and that's why we've created the Electric Thames project.

Working together with multiple stakeholders, we will map out the future of the electricity system around the Thames and explore new technologies such as Boat-to-Grid (B2G) services. The outcomes will shape a whole-system planning framework for our waterways, offering insights for decarbonisation and electrification that can be replicated across GB.

Add Third Party Collaborator(s)

Marine Zero

LCP Delta

Project Budget

£144,500.00

SIF Funding

£130,050.00

Project Approaches and Desired Outcomes

Problem statement

The Thames use will undergo substantial change as the river's economy decarbonises in support of Net-Zero as new technologies emerge, and trading patterns adjust. The Port of London Authority (PLA) has committed to achieving Net-Zero carbon emissions from its operations by 2040. Main sources of carbon emissions in the PLA include maritime transport (passenger, goods, and services) and port operations. A coordinated effort is required between UKPN, PLA and wider stakeholders to undertake strategic analysis and develop a data-driven, whole-energy system planning approach to identify the most effective route to decarbonisation.

There is a risk that insufficient grid capacity along the Thames to support extensive increases in energy demand from the inland maritime fleet could delay its decarbonisation. To deliver pathways for electrification, suitable charging infrastructure will need to be developed to support electric vessels for rapid charging at key locations during the working day and overnight charging when moored.

Limited work has been undertaken to establish the potential locations, options and requirements for electric charging infrastructure or to assess the potential for vessels to provide energy back to the network through B2G technology along the Thames. Previous planning undertaken has considered marine requirements and network requirements in isolation.

Video Description

https://www.youtube.com/watch?v=I_xcEmbX3FQ

Innovation justification

The project creates an innovative, integrated energy system and maritime decarbonisation plan, understanding the impacts of decarbonising vessels, docks and quays. The key innovations are:

Understanding the options to decarbonise the Thames traffic and operations through electrification and use of hydrogen, and assessing the impact on the distribution network including:

· Electrical loads to support vessel charging and shore power (vessels using power provided by cables from shore, rather than running engines);

· Utilising B2G technology to enable service provision and additional revenue streams;

· Optimising and speeding up network connections to accelerate B2G technology deployment.

Using the Thames to transport 'floating batteries' charging and discharging at different times and locations to manage network constraints.

Using grid-scale batteries to offer flexible, high-speed charging for vessels to ensure resilient operation.

Developing a coordinated plan to decarbonise the Thames, that works for users and reduces cost of delivering a secure and reliable network for river authorities, vessel operators, dock and quay owners, leading to a framework for decarbonisation of all waterways.

Discovery Phase will capture and leverage learnings from previous and ongoing relevant work. We are aware of early trials of B2G technologies, such as Aqua superpower and early-stage shore power, but none being widely deployed. Our whole-system approach will accelerate vessel charging, shore power and bring B2G benefits for river users and the electricity system.

For B2G technologies, we estimate IRL to be proprietary -- IRL1; CRL4; TRL3.These levels will not change during Discovery but will likely develop in future phases.

Considerable investment, engagement and innovation is required to develop a solution to decarbonise Britain's waterways in a secure and economic manner, which would not be achievable as part of business-as-usual activity, due to complexity and widespread nature of challenges and benefits. Participation in SIF will enhance opportunities for stakeholders across multiple sectors in engaging with the project. Significant groundwork, such as feasibility studies and limited scale trials, must be undertaken before any scalable or widespread deployment is carried out, which is suited to the structure of SIF phases.

Alternative approaches to decarbonising waterways but would likely involve significant build out of energy infrastructure at many exit points, with maritime and energy system planning conducted in isolation, potentially delaying decarbonisation. This view is supported by the early-stage decarbonisation plan by the PLA, that offers no clear route that understands the impact of decarbonisation of the Thames on the wider energy system.

Impacts and benefits selection (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum on energy bills for consumers

Environmental - carbon reduction – direct CO2 savings per annum

Environmental - carbon reduction – indirect CO2 savings per annum

Revenues - improved access to revenues for users of network services

New to market – processes

Impacts and benefits description

Pre-innovation baseline considers vessels, docks and quays extensively using fossil fuels and slow, poorly planned electrification of some operations.

Financial - future reductions in the cost of operating the network

Reducing peak demand from electrification of the Thames waterway through flexibility services will reduce the need for network capacity reinforcement. During peak demand periods, electric vessels can supply electricity to the distribution network, helping to balance the load.

Metric: Avoided / deferred reinforcement cost

Financial - cost savings per annum on energy bills for consumers

Lower costs of upgrading the infrastructure and operating the network will reduce the network cost element of consumer bills for all consumers.

Metric: Annual customer bill savings

Environmental -- carbon reduction -- direct CO2 savings per annum

Optimising network investment for decarbonisation of the Thames can enable faster and cheaper roll-out of low carbon river operations, displacing the existing fossil fuel-based fleet and therefore achieving immediate reduction in directCO2 emissions.

Metric: Tonnes CO2 reduction per annum

Environmental -- carbon reduction -- indirect CO2 savings per annum

Battery-electric and green hydrogen are expected to be the biggest means of decarbonisation of the PLA's operation in the long-term. Incorporating the flexible aspect of both technologies and coordinating the roll-out with the local development plans will release additional capacity for renewable generation on the distribution network, therefore achieving indirect reduction in CO2emissions.

Metric: Tonnes CO2 reduction per annum

Revenues - improved access to revenues for users of network services

Electric Thames enables vessel owners and dock operators to benefit financially by participating in grid services, such as participating in demand response programs. This can potentially generate revenue for vehicle owners, incentivising their participation in B2G programs to support the grid.

Metrics: Revenue gained from participating in flexibility markets.

New to market -- processes

Electric Thames will accelerate the technical, integration and commercial readiness of B2G solutions that make decarbonising river traffic more economic whilst also supporting economic infrastructure upgrades to support decarbonisation on the Thames.

Metric: Replication across GB to unlock wider benefits beyond UKPN area.

Teams and resources

Electric Thames brings together three partners for the Discovery phase: UKPN, LCP Delta and Marine Zero. All members of this consortium have experience of working on innovation funded projects and will combine complimentary specialist skills sets to deliver the project.

UKPN is the UK's largest electricity distributor delivering power to 8.5 million homes and businesses across London, the east and south east of England. Kunar responsible for owning and maintaining the cables and assets in their licence area.

Role: UKPN will be responsible for overall project management and dissemination of information across the industry.

LCP Delta is a leading consultancy working with energy suppliers, network operators and others to address challenges presented by the transition to a sustainable energy system. Previous work explores mitigating the impact of electrification on distribution networks as well as our ongoing engagement with energy communities, solution providers and network operators (for example in the Community DSO NIC project) will contribute to our ability to deliver this project.

Role: LCP Delta is responsible for stakeholder workshops, technology assessment, commercialisation and cost-benefit analysis. LCP Delta will project manage Discovery and lead project reporting, dissemination and exploitation of Electric Thames.

Marine Zero is a specialist in port and shore engineering design and strategy for cleaner, sustainable, rivers and oceans. They bring a wealth of experience which includes a deep understanding of the current and future clean maritime technologies available and the regulatory framework governing their adoption.

Role: Marine Zero will review UKPN's supply coverage of the Thames and establish a cohesive plan between UKPN and the PLA's decarbonisation strategies for a more sustainable Thames.

There are no planned sub-contractors, and all partners will leverage their own facilities, such as offices and IT.

Key Stakeholder

The PLA is a self-funding public trust that governs the Port of London. It maintains and supervises navigation and protects the river's environment.

PLA will expand on its recently published decarbonisation strategy to provide data and insight into its day-to-day operation of the Thames to enable the project to develop archetypes, use cases and energy demand profiles in the Discovery Phase.

The PLA's Director of Sustainability and Net Zero Transition, Grace Rawnsley, supports the project: "This is a really interesting project for us at a very opportune time. I would be very happy to meet to discuss this and collaborate". We anticipate formal partnership with PLA from Alpha Phase onwards.

Project Plans and Milestones

Project management and delivery

Project management will be led by UKPN using standard best practice methods and tools, including regular management meetings and status reporting. UKPN has an effective innovation governance procedure with robust financial and project controls in place. UKPN, LCP Delta and Marine Zero are all ready to swiftly mobilise teams. Also, LCP Delta and Marine Zero have support from senior decision makers for this project.

The Discovery work packages proposed are:

WP1: Project Management (UKPN)

Aims: Deliver the project on time, to budget, ensuring that project objectives and learnings are successfully achieved.

Success criteria: Project delivered on time, to budget and to quality.

WP2: Understanding regulatory constraints (Marine Zero*)*

Aims: Understand regulatory challenges associated with decarbonising Thames.

Success criteria: Challenges of existing regulatory framework identified.

WP4: Stakeholder engagement to understand scale of problem (LCP Delta)

Aims: Map and engage stakeholders. Understand scale of problem, challenges and opportunities.

Success criteria: Key stakeholders mapped and engaged. Scale of problem and opportunity better understood

WP4: Develop a cost benefit analysis (LCP Delta)

Aims: Develop Cost Benefit Analysis for several whole system planning scenarios.

Success criteria: CBA agreed by relevant stakeholders.

WP5: Establish modelling approach (LCP Delta)

Aims: Develop outline modelling approach to be applied in Alpha Phase.

Success criteria: Outline modelling approach defined. Customers and vessels inscape defined.

Interdependencies between work packages and milestones are detailed in the Gantt Chart.

The project will use a standard risk management approach where the Risk Register generated will be regularly maintained and reviewed by the project partners. The project has identified several risks as well as associated mitigations.

Key risks and mitigations include:

Risk: Unable to get sufficient engagement with key project stakeholders, especially the PLA.

Mitigation: Our current project partners have the required skillset to deliver Discovery and will also leverage their networks for engagement. The PLA have expressed interest to collaborate over Discovery and the formal partnership will be explored for future phases if required.

Risk: Unable to get sufficient involvement from representative river users.

Mitigation: Engage through PLA, river user groups and known contacts.

The potential for specific risks in relation to policy and regulatory challenges will be analysed in WP2.

We do not anticipate any planned or potential unplanned supply interruptions for consumers given the nature of the project. We do not anticipate any negative impact on energy consumers or their premises, either now or in future phases.

Key outputs and dissemination

The objectives of Electric Thames are to (1) enable the decarbonisation of vessels and operations on the Thames, providing a template for all riverways; (2) enable Boat-to-Grid flexibility services; and (3) to minimise the impact and cost of providing the necessary charging infrastructure to maintain economic operation of all users of the Thames.

The Discovery phase will undertake a feasibility study that will define the scale of the problem statement, undertake stakeholder mapping and initial engagement to understand and influence decarbonisation strategies of users, develop a framework to estimate the value of solving the challenge, and prepare stakeholders for later stages of the project.

Key outputs from Discovery include:

WP2: Understanding regulatory constraints (Marine Zero)

Identification of challenges within existing regulatory framework (in both the maritime and energy spaces) that could limit the benefits of this project.

WP3: Stakeholder mapping and engagement to scope requirements (LCP Delta)

Problem statement details, and stakeholder mapping along with the interests, challenges, and opportunities to decarbonise.

WP4: Establish modelling approach (LCP Delta)

Literature review, vessel archetypes defined, decarbonisation evaluation framework, data requirements for evaluation and future modelling.

WP5: Develop a cost benefit analysis (LCP Delta)

High-level Cost Benefit Analysis, including decarbonisation scenarios aligned to vessel archetypes, impacts on electricity infrastructure, and benefits from Boat-to-Grid services.

The outputs will be made available at the end of Discovery, via a combined final report summarising the key learnings.

Knowledge Dissemination

The Electric Thames partner team will collaborate to deliver the dissemination activities. We intend to leverage the connections of our consortium to effectively disseminate our learnings:

· UKPN will look to share project successes and learnings via its social media channels with the possibility of publishing external media where appropriate.

· Engagement with stakeholders identified during Discovery ecosystem mapping, sharing learnings and insights from Electric Thames; and

· Marine Zero's and LCP's networks: will leverage their networks and contacts to disseminate the outcomes ensuring wide reach and impact, including Zestas (Zero Emissions Ship Technology Association), Future Fuels working group for National Maritime, Cornwall Marine Network (providing access to the wider Maritime UK network).

All outputs will be made available to all networks and therefore does not undermine competitive markets.

Commercials

Intellectual Property Rights (IPR) (not scored)

The parties agree to adopt the default IPR arrangements for this project as set out in Section 9 of the SIF Governance document.

Value for money

The total project costs for Electric Thames are £144,500.

UK Power Networks: £22,200

LCP Delta: £84,000

Marine Zero: £38,300

Each project partner will invest 10% of total costs (labour-in-kind), being:

UK Power Networks: £2,220

LCP Delta: £8,400

Marine Zero: £3,830

The total SIF funding requested is £130,050.

There are no sub-contractor costs, nor funding from other innovation funds. Partners will leverage their own facilities (offices and IT).

Electric Thames represents good value for the SIF investment though:

Effective market engagement: Through UKPN's, LCP Delta's, and MarineZero's subject matter experts and connections to the energy and marine industries, substantial engagement with stakeholders and potential partners will be considerably easier and cheaper than partners less engaged in the industry. For example, securing time with potential partners for subsequent SIF phases may incur longer response times and potential fees. Higher whole system participation and engagement rate enables a more well-informed and developed solution for the cost. As stated above, some of this engagement has already commenced in parallel with developing this Discovery Phase funding bid.

Energy transition expertise: LCP Delta is a leading energy transition consultancy, focusing on UK, Europe and Asia. Their energy and carbon asset modelling are trusted by DESNZ, Ofgem, National Grid and CCC. This expertise and understanding of the energy system and transition, and modelling capabilities bring efficiencies to the project. LCP Delta will bring additional value by leveraging learnings from other innovation funding programmes, such as Community DSO.

Marine decarbonisation expertise: Marine Zero is a specialist in port and shore engineering design and strategy for cleaner, sustainable, rivers and oceans. Their expertise in marine decarbonisation and relationships with key stakeholders brings knowledge in vessel archetypes and efficiencies in marine stakeholder engagement.

Wider stakeholder involvement: Key stakeholders, such as Port of London Authority, have already been engaged to provide their support and insight for Discovery phase of the project as an advisory partner. This stakeholder engagement will be at no extra cost, on the basis that the project will help these organisations meet their stated aims of decarbonisation -- for which there currently is no clear view of the impacts of electrification or the ability to meet their objective.

The route to commercialisation of shore power and B2G services for river goods and services (e.g. water taxis), templates for rolling-out similar solutions across waterways, the development to business-as-usual, are key learnings from Discovery and future project phases.

Supporting documents

File Upload

Electric Thames Show and Tell ENA.pdf - 1.6 MB
Electric Thames End of Phase ENA.pdf - 2.6 MB
SIF Round 3 Project Registration 2024-07-08 10_21 - 62.4 KB
SIF Round 3 Project Registration 2024-05-13 12_49 - 62.3 KB

Documents uploaded where applicable?

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