

Specification for research project

DECARB: 21st Century DC electrification infill - T1214-02

The draft research specification and assessment criteria that follows is subject to change following supplier engagement. It outlines RSSB's current proposed approach to enable further third rail use for infill or line extensions and develop a decision support framework to compare other infill solutions.

A pre-tender suppliers meeting has been arranged for 18 June 2020 at 10:00 – 11:30, via Microsoft Teams. The purpose of this meeting is to:

- Provide an outline of the project proposal
- Provide interested suppliers an opportunity to discuss, understand and inform the research specification

Suppliers should be prepared to discuss the following:

- What resources (track access, etc) and information would suppliers require, in order to deliver robust outcomes?
- Are the timescales sufficient to deliver quality outputs to time?
- What are the challenges and barriers to delivering this work? What enablers would support successful delivery of the project?
- What is the estimated effort to deliver this work to quality and time?

Suppliers wishing to attend the meeting must confirm the name/s and email address of attendee/s to Tanja.Odinsen@rssb.co.uk and we will then issue an invite via Microsoft Teams.

1. RSSB overview

RSSB is a membership organisation that supports the GB rail industry by:

- **Understanding risk** – Using safety intelligence with the latest risk modelling to inform members and support safe decision making.
- **Guiding standards** – Creating, reviewing and simplifying GB standards; managing the Rule Book and making it easier for the railway to deliver efficiently and safely.
- **Facilitating cross-industry collaboration** – As an independent cross-industry body, supporting activities which require collaboration such as supplier assurance schemes, confidential reporting and developing industry strategies.
- **Managing research, development and innovation** – Undertaking, commissioning and managing research and innovation programmes to address current and future needs and providing knowledge for decision making; supporting implementation and promoting step changes to deliver industry strategies.

2. Background

Third rail remains a cost-effective solution for electrification and decarbonising the railways when these railways are close or adjacent to existing 750V DC top contact third rail electrified lines, however, its further use is currently constrained by an unclear position on how to manage the system's risks through scheme design.

In the South East, the majority of passenger trains are operated by electric multiple units (EMUs) powered by an extensive 750V DC top contact third rail network. Whilst previous studies, including T950¹, found there to be an economic case for replacing third rail systems with 25kV overhead electrification, the strategic and affordability implications of such an approach make wholesale conversion unlikely in the short to medium term – particularly as there are other significant parts of the network which are not electrified. There is also a potential knowledge gap about the whole life cost and whole life carbon emissions of the other self-power technologies available such as battery and hydrogen powered trains.

There are four lines in the South East, where services are currently operated by diesel rolling stock: the Uckfield Line, the Marshlink Line, the North Downs Line and the West of England Line. Electrification with 750V DC top contact third rail would provide a range of strategic, economic and environmental benefits and would integrate with the existing electrified network and fleets. There are also several reopening candidates where electrification would be valuable and potentially an essential enabling factor, including the Isle of Grain Branch in Medway, the Fawley Branch in Hampshire and Headbolt Lane/Skelmersdale in Merseyside.

It is accepted that the installation of further Third Rail systems introduces specific safety risks to the workforce and the general public, which is reflected in the position set out by the ORR². The ORR's policy on third rail DC electrification indicates a presumption against the practicability of installing additional DC systems whilst meeting regulatory standards and requirements.

Therefore, developing a DC electrification solution introduces significant risk to project development, as it is uncertain whether the final design will be authorised. It is also possible that different projects could approach the issue in different ways, and lead to over- or under-engineering or continued reliance on fossil fuel technology.

This research is an opportunity to fill the knowledge gap that currently makes further use of third rail unclear. By exploring options to improve the DC system, there could be an opportunity to reduce the carbon footprint of railways further; removing diesel traction and potentially reducing the current losses on 750V DC top contact third rail

¹ <https://catalogues.rssb.co.uk/library/research-development-and-innovation/research-brief-T950.pdf>

² https://orr.gov.uk/data/assets/pdf_file/0017/17621/dc-electrification-policy-statement.pdf

systems. There could also be the potential for renewals to the existing DC infrastructure to achieve greater safety, capability and efficiency.

It will also enable better understanding of whether a new third rail scheme would be the most appropriate solution to remove diesel rolling stock from those “diesel islands”. By developing an economic model based on different traction options, the project will enable the industry to take decisions based on whole-life costs, safety risks and whole-life carbon emissions.

The potential benefits available from this research include:

- Traction decarbonisation: electrification would enable the removal of diesel rolling stock from the South-East;
- New rail markets: reintroduced passenger services in the South East and Merseyside would be able to better integrate with the existing network with electrification, offering lower operating costs and operational efficiencies, as well as opening up new through service opportunities;
- Modal shift: reopening lines and encouraging modal shift from road creates environmental benefits but, more importantly, reduces the risk profile of transport, by offering a safer mode to travel on;
- Safety: the public, trespassers and track workers are at ten times more risk of being electrocuted on third rail lines than by OLE systems³. By undertaking this study, it is hoped that opportunities to improve the risk profile of third rail systems for the workforce and the general public will be identified which could potentially be of the value of existing third rail installations as well as new installations.

³ https://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/Planning/nr_a_guide_to_overhead_electrification.pdf

3. Project objectives

The project aims to:

- Support the decarbonisation of traction in regions with a predominant 750V DC top contact third rail system by identifying the potential to remove diesel services by either enabling extensions to the existing electric network or appropriate alternatives
- Identify options to reduce the safety risk of 750V DC top contact third rail systems and explore how this can support the potential for approvals to appropriate extensions to the electric network
- Support decision-making on extensions to the 750V DC top contact third rail Network or other alternatives to diesel traction through a decision-making framework to consider mitigation options alongside whole transport system safety, project and economic risks

4. Project scope

The scope of the project includes:

- Understand the granularity of the safety risks to the public and workforce on current 750V DC top contact third rail electrification system compared to AC electrification and non-electric traction systems
- Identify options to mitigate the safety risks and promote sustainability of DC electrification through a mixture of technical and non-technical solutions
- Highlight in detail the implications of the options identified
- Inform and support the industry to take the appropriate decisions for the identified areas – and future opportunities - through an economic model built on all traction options practically available
- Develop a process to understand when each mitigation would be required
- Inform the industry on the hazards introduced by all alternative options through an industry HAZID
- Understand the wider risk profile from transport of not extending the Third Rail electrified railway
- Demonstrating the feasibility of further use of third rail as an infill solution and for lines reopening through the options identified, with cross-industry support including ORR

The work should seek to build on existing projects both within and outside of GB rail, engaging with projects and stakeholders.

It is expected that suppliers would build on previous relevant work (some of which can be found on www.sparkrail.org), including but not limited to:

- T633 - Study on further electrification of Britain's railway network
- T950 – Investigating the economics of the 3rd rail DC system compared to other electrification systems
- T1145 - Options for traction energy decarbonisation in rail
- Long Term Passenger Rolling Stock Strategy for the Rail Industry, 6th Edition (March 2018)
- T1172 – Hydrogen powered trains: route to enter into service

The following projects are currently in delivery, but should be in time to feed into the project:

- T1160 - Decarbonisation and air quality improvement of the freight rail industry
- T1195 – Battery powered trains: route to enter into service
- T1199 - Cost of different traction options to meet WebTAG requirements
- Traction Decarbonisation Network Strategy (TDNS)
- Skelmersdale Rail Link Traction Power Options – final report currently under NR review

The outputs requirements for the projects above are shown in Appendix 1.

In scope

- Legislations including but not limited to those listed in the attached file in Appendix 2
- ORR Third Rail policy
- Technologies and/or innovative solutions to improve 750V DC top contact third rail system safety
- CAPEX and OPEX modelling
- Environmental impact in all forms
- Safety risks assessment
- Risk assessment – industry HAZID
- Operational and management approaches (non-technical) which could reduce risks to the workforce and the general public
- Depots
- Passenger and freight rolling stock

On-going requirements

In addition to the above, the supplier will be required to undertake the following tasks during delivery:

- Attendance at project kick-off meeting at RSSB's offices (London)
- Attendance at four steering group meetings (at RSSB's offices (London) or elsewhere)
- Presentation at three client group meetings (RSSB's offices, London)
- Attendance at project closure meeting (at RSSB's offices (London) or elsewhere)
- Creation and maintenance of project management plan
- Creation and maintenance of project risk register
- Provision of monthly progress reports

RSSB's facilities can be provided to the supplier for meetings and/or workshops without cost (subject to RSSB meeting room availability). Where appropriate, meetings can be held elsewhere if RSSB considers this beneficial.

Out of scope

- Reference and ~~not~~ repeat the work of the System Operator's Traction Decarbonisation Network Strategy
- Further work to implement research outputs
- Third rail as an option for extensive new electrification schemes
- New third rail solutions which cannot integrate with the current third rail network

Suppliers should seek opportunities to deliver elements of the work streams in parallel to make the best use of the involvement of stakeholders, research and on-going projects (e.g. interviews, workshops) and that meets the timescales defined in this document.

5. Project structure

This project is structured in 2 work packages, of which **Work Package T1214-02 is subject to tender.**

Work Package T1214-01	
Title	Project development: Industry workshop, Business case and project specification development, appointment of the supplier to deliver WPO2
Delivery	RSSB
Start	December 2019
Completion	May 2020

Work Package T1214-02	
Title	T1214: 21 st Century DC electrification infill – External Delivery
Delivery	Competitive tender
Start	Stage 1: August 2020 Stage 2: May 2021
Completion	December 2021
Stage gate review	<p>The delivery of this work package is separated into two stages to allow a stage gate review to be conducted.</p> <p>A stage gate review will take place between Stage 1 and Stage 2, to enable RSSB and the project steering group to decide on priorities and any changes required to the work conducted in Stage 2. This decision will be dependent upon the findings of Stage 1.</p> <p>If RSSB and the project steering group decides that no work shall be undertaken in Stage 2, the stage gate review shall lead to early termination of the project.</p> <p>RSSB will arrange a legal opinion which is outside the scope of the consultant.</p>

6. Deliverables

This work package will provide the following deliverables:

- Stage 1

Deliverable Title	21st Century DC electrification infill – Review of potential approaches to reduce the risks associated with 750V DC top contact third rail extensions (literature survey).
Deliverable Type	Report
Description	<p>The deliverable shall provide key findings relating to:</p> <ul style="list-style-type: none"> • Conduct a literature review on third rail system. This should capture existing information and analysis of the risks and mitigation measures associated with top contact third rail systems to reduce the safety risks for workers and members of the public. • Identify emerging, innovative or international technologies compatible with the existing 750V DC top contact third rail network to improve efficiency and safety of third rail and develop for UK applications, from distribution to transmission to train. It is expected that a range of mitigation measures will be highlighted including solutions which are technical, physical or softer in nature such as information.
Publication	The deliverable is to be produced in the standard RSSB format and shall be reviewed by RSSB and the project steering group, to allow for comment. The deliverable is to be made widely available to the industry.

Deliverable Title	21st Century DC electrification infill – Review of standards, legislations and policies that would apply to Third Rail DC electrification systems.
Deliverable Type	Report
Description	<p>The deliverable shall provide key findings relating to:</p> <ul style="list-style-type: none"> • Review existing legislation and standards that would apply to any new installations including but not limited to those

	<p>listed in Appendix 2.</p> <ul style="list-style-type: none"> • Review of the ORR policy on Third Rail DC electrification systems • Understand whether the current suite of industry standards adequately deliver these requirements • Identifying legislation not well suited and areas where legislative changes may be beneficial
Publication	The deliverable is to be produced in the standard RSSB format and shall be reviewed by RSSB and the project steering group, to allow for comment. The deliverable is to be made widely available to the industry.

Deliverable Title	21st Century DC electrification infill – Risk assessment and review of ORR Policy and direction
Deliverable Type	Report and hazard log
Description	<p>The deliverable shall:</p> <ul style="list-style-type: none"> • Undertake a comprehensive CSM RA for top contact DC conductor rail infill (also at depots) and then for each identified hazard apply whatever risk elimination, reduction, assessment etc technique is relevant for the particular legislation, in order to comply with the full suite of relevant legislation, using the (safety) mitigation measures identified in deliverable No. 1 and, where appropriate, recommending these as safety requirements. Then confirm that the resulting safety requirements satisfy ORR policy. If not practicable, this should highlight what aspects would need to be changed. Write up risk assessment and the findings from this activity in a format suitable for publication, either stand-alone or as part of a GN/RIS
Publication	The deliverable is to be produced in the standard RSSB format and shall be reviewed by RSSB and the project steering group, to allow for comment. The deliverable is to be made widely available to the industry.

Deliverable Title	21st Century DC electrification infill – Assessment of level of cost, sustainability and risk mitigation that new approaches could achieve and whether systems could be suitable for introduction onto GB rail and any potential barriers
Deliverable Type	Report
Description	<p>The deliverable shall provide key findings relating to:</p> <ul style="list-style-type: none"> • Evaluate the safety risks and environment impacts of each mitigation and set out the criteria to identify when each is applicable and the level of cost. • Identify requirements for installation that could prevent the installation of the new third rail system such as infrastructure health, capability limits from the power supply, resilience etc • Evaluate the impact on passenger and freight rolling stock • Recommend changes to existing DC installation standards within the capabilities of existing technologies to ensure installation is reasonably aligned with the ORR position on Third Rail⁴, and gain ORR support for such recommendations.
Publication	The deliverable is to be produced in the standard RSSB format and shall be reviewed by RSSB and the project steering group, to allow for comment. The deliverable is to be made widely available to the industry.

Deliverable Title	21st Century DC electrification infill – Summary of findings
Deliverable Type	PowerPoint Presentation
Description	<p>Informative and engaging slides for:</p> <ul style="list-style-type: none"> • The successful supplier to present issues, risks and findings to the steering group • RSSB to use to brief the wider industry and to promote the key findings and resources that this research project has generated.
Publication	The presentation will be produced in a RSSB Power Point template

⁴ https://orr.gov.uk/data/assets/pdf_file/0017/17621/dc-electrification-policy-statement.pdf

	and will be made widely available to the industry.
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- Stage 2

Deliverable Title	21st Century DC electrification infill – Infill solutions hazard identifications
Deliverable Type	Report
Description	<ul style="list-style-type: none"> • Conduct an industry HAZID to identify the safety risks associated with each infill solution supplementing the work already undertaken as part of the literature review: <ul style="list-style-type: none"> ○ Current scenario – diesel rolling stock ○ DC third rail system in the current configuration ○ DC third rail system with recommended technologies/innovations identified in stage 1 ○ AC overhead line equipment ○ DC overhead line equipment ○ Alternative traction options • Asses the causes, and consequences of the hazards. • Build on HAZARD analysis conducted in previous projects or projects that will be delivered by the time such as: T1172 Hydrogen powered trains: route to enter into service; T1195 Battery powered trains: route to enter into service • This deliverable will inform how “safety” needs to be addressed within the decision supporting framework described in the following deliverable.
Publication	The deliverable is to be produced in the standard RSSB format and shall be reviewed by RSSB and the project steering group, to allow for comment. The deliverable is to be made widely available to the industry.

Deliverable Title	21st Century DC electrification infill – Development of a decision support framework to assess the benefits of the impacts of different suitable infill approaches that will consider safety, economics and environment
Deliverable Type	Framework
Description	<p>The deliverable shall:</p> <ul style="list-style-type: none"> • Take into consideration the work done in previous projects (see Appendix 1) • Develop a decision support framework that assesses the impact of implementation in terms of safety risk at the transport system level, capital and operational costs and the environmental impact of the following options: <ul style="list-style-type: none"> ○ Current scenario – diesel rolling stock ○ DC third rail system in the current configuration ○ DC third rail system with recommended technologies/innovations identified in stage 1 ○ AC overhead line equipment ○ DC overhead line equipment ○ Alternative traction options • Consider both economic and commercial factors to ensure that the industry can make decisions based on the costs and benefits associated with both the economic and commercial viability. The economic and commercial aspects should be separate, but also come together to provide an all-inclusive perspective. The following elements when assessing the developed scenarios could be included: <ul style="list-style-type: none"> ○ Where the funding come from ○ Utilisation density ○ Rolling stock life cycles ○ Depots ○ Energy source ○ Requirements on supporting infrastructure ○ Future passenger service demand

	<ul style="list-style-type: none"> ○ Cost of operation ○ Cost of carbon and air emissions ○ Timetable ● An acknowledgement that the work will be used by rail organisations and policymakers, therefore a simple yet configurable tool is required using a platform that is widely accessible (such as spreadsheet applications). The tool should be of a dynamic nature to allow future users control of inputs, given deviations of actual data from current forecasted data
Publication	The deliverable is to be produced in the standard RSSB format and shall be reviewed by RSSB and the project steering group, to allow for comment. The deliverable is to be made widely available to the industry.

Deliverable Title	21st Century DC electrification infill – Case study
Deliverable Type	Report
Description	<p>The deliverable shall:</p> <ul style="list-style-type: none"> ● Develop one case study demonstrating the application of the framework developed for a generic 30 km length of railway including a depot ● Understand what are the likely factors that the business decision framework would need to consider
Publication	The deliverable is to be produced in the standard RSSB format and shall be reviewed by RSSB and the project steering group, to allow for comment. The deliverable is to be made widely available.

7. Stakeholder roles and responsibilities

The key stakeholders and their responsibilities are detailed in the table below:

Role	High level description	Specific responsibilities are to:
RSSB Project Manager	<p>The RSSB Project Manager is the first point of contact for the suppliers once the contract has been put into place.</p> <p>The RSSB Project Manager is responsible for ensuring that the supplier delivers the project as agreed in their proposal.</p>	<ul style="list-style-type: none"> • Organisation, co-ordination and chair of project meetings. • Monitoring and tracking of project progress and spend • Point of contact for escalation for enquiries from supplier, steering group, or project sponsor. • Dissemination of deliverables to project steering group and client group. • Authorisation of payment within agreed project spend.
RSSB Technical Lead	<p>Throughout the project, the Technical Lead, generally a RSSB employee, ensures that technical aspects are considered and reflected accurately.</p>	<ul style="list-style-type: none"> • Provide input to the specification, either by writing it or reviewing its content, and assure it is technically sound and appropriately scoped • Assess tenders • Review and provide input to draft deliverables • Review final deliverables to ensure that they are technically sound and the conclusions defensible
RSSB Sponsor	<p>The RSSB Sponsor is a senior RSSB employee that is best placed to actively monitor the project through development and delivery, keeping the project aligned with and informed by industry's expectations and initiatives; and steers implementation facilitation activities.</p>	<ul style="list-style-type: none"> • Sponsors the RSSB business case and implementation plan, focusing on how RSSB can support industry benefiting from the findings • Advises the Project Steering Group on shaping the project and its deliverables to most effectively support industry take up and to get most value out of it • Actively monitor the project through delivery working with the Industry Sponsor to successfully navigate the project through any points of conflict between stakeholders, and decision points relating to emerging findings • Keep active awareness of the emerging findings and, as appropriate, bring them (and any related decision points) to the attention of the Industry Sponsor to jointly provide advice to the steering group • Provide advice and steer on activities required to facilitate implementation
Industry Sponsor	<p>The Industry Sponsor has a senior role in the industry and represents a stakeholder organisation that is expected to realise benefit from successful, timely delivery of the research or, as a minimum, has a strong interest in the research.</p>	<ul style="list-style-type: none"> • Advises the Project Steering Group on shaping the project and its deliverables to most effectively support industry take up • If required, facilitate access to industry data, people and equipment needed to deliver the project • Oversees the project through delivery working with the RSSB sponsor to successfully navigate the project through any points of conflict between stakeholders, and decision points

	They are expected to act as a figurehead for the research, championing its importance and its outputs, and exerting pressure on the industry to ultimately adopt its findings.	<p>relating to emerging findings</p> <ul style="list-style-type: none"> • Promote industry take up and implementation of the research beyond completion of the R&D project • Provide feedback to RSSB during project delivery and after completion
Industry Supporters	The two project supporters represent parts of industry complementary to the Industry Sponsor's organisation.	<ul style="list-style-type: none"> • Offer expertise during project development and delivery • If required, facilitate access to industry data, people and equipment needed to deliver the project • Support the implementation of findings
Project Steering Group	The Project Steering Group ensures the project is specified and delivered to consider different stakeholders' needs. The group is made up of representatives from within the rail industry and other industries where appropriate.	<ul style="list-style-type: none"> • Provides input to and reviews the 'case for research' (i.e. the business case, specification and implementation plan) • Monitors and steers the project through delivery • If required, facilitates access to industry data, people and equipment needed to deliver the project • Attends meetings with Project Team and suppliers • Reviews draft and final output(s)
Primary Client Group	The primary client group is an established industry group that has responsibility to steer and oversee activities in a specific topic area.	<ul style="list-style-type: none"> • Comment on research ideas and consider outcomes from idea review activities that RSSB undertakes • Review and endorses the 'case for research' before it goes for budget authority • Endorse the findings and support their implementation

8. Budget, timescales and responsibilities

The budget for this work is up to £200,000. If, whilst compiling a response, tenderers determine that it is not feasible to submit a quote to this budget but still wish to provide a response, they shall:

- Provide a quote for all work as requested, even if this exceeds the budget. This allows RSSB to conduct a like-for-like comparison as required by the evaluation criteria. Those who price within RSSB's budget will score more highly in line with the pricing calculation, however, higher bids will not be automatically disqualified.
- Provide a supporting explanation as to why an increase in budget is required to deliver the work to a good standard.

RSSB expects the work to start in August 2020 and be delivered at pace. We envisage this research to take less than 18 months to complete. However, these are indicative dates and RSSB will consider bids that cannot meet these expectations if the supplier includes a robust project plan and an explanation as to why they cannot meet the preferred start and end dates, while still meeting the project objectives.

9. Critical success criteria and risk management

The following critical success criteria have been identified to help ensure successful delivery and to increase likelihood of industry acceptance/implementation:

- Access to data
- Technology/innovation identified are not compatible or feasible on the current network
- A comprehensive safety risk assessment

The following initial risks have been identified to highlight where the work package may encounter issues during delivery, the supplier will be expected to propose approaches to mitigate these risks and any others they perceive:

The duration of the project will span the Summer and Christmas periods, thereby incurring a risk in limited staff availability. To mitigate this, the supplier should detail a robust project strategy:

- Engagement with Stakeholders, in particular the ORR, is essential to garner support for the scheme and ensure that the findings can be implemented confidently in future projects
- It is fundamental that the outputs of this research will anticipate decisions on other schemes
- Limited practical implementation experience to inform decisions (some worldwide, some previous RSSB work)
- Access to data and propriety information being restricted
- Regulatory aspects create an insurmountable barrier to implementation
- Technical solutions and controls to address hazards are disproportionately complex, impractical or costly to implement
- Approaches require cooperation and coordination across organisations and become a significant barrier to implementation

10. Selection and award criteria

The stated limit on the length of each response must be adhered to. Responses will only be evaluated within the stated length limit, any response exceeding the stated limit will be disregarded beyond that limit.

Selection criteria

Selection criteria	Detail	Evaluation Criteria
<p>S1 Tenderer’s organisational expertise in railway electrification systems and electrical safety</p> <p>[Max 1 page for all example projects]</p>	<p>The tenderer should provide a short description of at least 2 projects completed within the past 5 years that involved railway electrification systems and electrical safety with a short explanation of why they are relevant to this project.</p>	<p>Pass: The tenderer provides a short description of at least 2 projects completed within the past 5 years that involved railway electrification systems and electrical safety. The case study shall:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering railway electrification systems and electrical safety work • Give RSSB full confidence in the tenderer’s expertise in railway electrification systems and electrical safety <p>Fail: The tenderer either fails to provide a short description of at least 2 completed projects within the past 5 years that involved railway electrification systems and electrical safety; or the provided case study fails to achieve ANY of the following:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering railway electrification systems and electrical safety work • Give RSSB full confidence in the tenderer’s expertise in railway electrification systems and electrical safety

<p>S2 Tenderer's organisational expertise in conducting a full CSM RA.</p> <p>[Max 1 page for all example projects]</p>	<p>The tenderer should provide a short description of at least 2 completed projects within the past 5 years that involved conducting a full CSM RA.</p>	<p>Pass: The tenderer provides a short description of at least 2 completed projects completed within the past 5 years that involved conducting a full CSM RA. The case study shall:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering CSM RA • Give RSSB full confidence in the tenderer's ability to undertake a CSM RA <p>Fail: The tenderer either fails to provide a short description of at least 2 completed projects within the past 5 years that involved conducting a full CSM RA; or the provided case study fails to achieve ANY of the following:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering CSM RA • Give RSSB full confidence in the tenderer's ability to undertake a CSM RA
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<p>S3 Tenderer's organisational expertise in developing a decision support framework for railway electrification systems.</p> <p>[Max 1 page for all example projects]</p>	<p>The tenderer should provide a short description of at least 1 completed project within the past 5 years that focussed on developing a decision support framework for railway electrification systems.</p>	<p>Pass: The tenderer provides a short description of at least 1 completed project completed within the past 5 years that involved developing a decision support framework for railway electrification systems. The case study shall:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering a decision support framework for railway electrification systems • Give RSSB full confidence in the tenderer's ability to apply its knowledge on development of a decision support framework for railway electrification systems <p>Fail: The tenderer either fails to provide a short description of at least 1 completed project within the past 5 years that involved developing a decision support framework for railway electrification systems; or the provided case study fails to achieve ANY of the following:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering a decision support framework for railway electrification systems • Give RSSB full confidence in the tenderer's ability to apply its knowledge on development of a decision support framework for railway electrification systems
<p>S4 Tenderer's organisational expertise in railway operation.</p> <p>[Max 1 page for all example projects]</p>	<p>The tenderer should provide a short description of at least 2 completed projects within the past 5 years that involved railway operation.</p>	<p>Pass: The tenderer provides a short description of at least 2 completed projects completed within the past 5 years that involved railway operation. The case study shall:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering a work on railway operation • Give RSSB full confidence in the tenderer's ability to its knowledge on railway operation <p>Fail: The tenderer either fails to provide a short description of at least 2 completed projects within the past 5 years that involved railway operation; or the provided case study fails to achieve ANY of the following:</p> <ul style="list-style-type: none"> • Demonstrate a track record of successfully delivering a work on railway operation • Give RSSB full confidence in the tenderer's ability to its knowledge on railway operation

<p>S5 Insurance (Max 2 pages)</p>		<p>Please confirm whether you meet RSSB's minimum insurance requirements. Employer's (Compulsory) Liability Insurance = £5M Public Liability Insurance = £1M Professional Indemnity Insurance = £1M</p> <p>Pass: You have answered 'Yes' and provided confirmation of self-certification</p> <p>Fail: You have answered 'No' and not provided confirmation of self-certification</p>
<p>S6 Modern Slavery (Max 1 page)</p>		<p>4.1 Are you a relevant commercial organisation as defined by section 54 ("Transparency in supply chains etc.") of the Modern Slavery Act 2015 ("the Act")? YES/NO</p> <p>4.2 If you have answered yes to question 4.1 are you compliant with the annual reporting requirements contained within Section 54 of the Act 2015? YES/NO/NOT APPLICABLE</p> <p>Pass: You have answered 'NO' to 4.1; or You have answered YES to 4.1 and YES to 4.2; or You have answered YES to 4.1 and NO to 4.2 and have included evidence of 'self-cleaning' which is acceptable to RSSB against the relevant ground for exclusion to which you have answered 'NO'.</p> <p>Fail: You have answered Yes to 4.1 and NO to 4.2 and failed to provide evidence of 'self-cleaning', which is acceptable to RSSB, against the relevant ground for exclusion to which you have answered NO.</p>

Award criteria scoring

Each of the criteria set out in the weighted award criteria are scored 0-5. The below explains the scoring system used:

Grade	Definition of grade
5	<p>An Excellent Tender Response that (where applicable):</p> <ul style="list-style-type: none"> • Addresses all aspects of the question in an informed and comprehensive manner; • Demonstrates a thorough understanding of what is being asked for; • Provides evidence of how that understanding can be applied in practice; • Offers full confidence that the Tenderer will deliver the service in full; • Addresses the majority of areas of doubt and uncertainty; and • Provides certain, unambiguous commitments or statements of intent that permit reliance through translation into contractual terms
4	<p>A Good Tender Response that (where applicable):</p> <ul style="list-style-type: none"> • Addresses all aspects of the question and is generally of a good standard; • Demonstrates a good understanding of what is being asked for; • Provides a worked-up methodical approach; • Offers confidence that the Tenderer will deliver the service in full, with limited areas of doubt or uncertainty; • Addresses key areas of doubt and uncertainty; and • Provides commitments that can be translated well into contractual terms
3	<p>A Satisfactory Tender Response that (where applicable):</p> <ul style="list-style-type: none"> • Addresses the majority of the question and is generally of a good standard but lacks substance or detail in some areas; • Demonstrates an understanding of what is being asked for; • Provides a satisfactory approach; • Offers a general level of confidence that the Tenderer will deliver the service (but with room for doubt in some areas); • Address some areas of doubt and uncertainty; and • Provides some commitments that can be translated well into contractual terms.

2	<p>A Poor Tender Response that (where applicable):</p> <ul style="list-style-type: none"> • Addresses some of the question but either lacks relevant information and detail or lacks substance in a manner that would suggest the response is a “model answer”; • Demonstrates some understanding but with a lack of clarity in key areas; • Provides an approach which is not wholly appropriate or viable or lacks evidence; • Shows that the level of confidence that the supplier can deliver does not outweigh the doubt; • Does not address many areas of doubt and uncertainty; and • Does not offer sufficient commitment (with doubt as to the extent to which would translate into contractual terms).
1	<p>An Unsatisfactory Tenderer response that (where applicable):</p> <ul style="list-style-type: none"> • Does not address the question or has omissions; • Lacks understanding in significant areas: • Provides an approach which has gaps or creates concerns; • Shows that the level of confidence that the supplier can deliver is low; • Creates uncertainty; and • Displays significant lack of commitment (with doubt as to the extent to which would translate into contractual terms)
0	<p>An Unacceptable Tenderer response that (where applicable):</p> <ul style="list-style-type: none"> • Provides no response or omissions/oversights that prevent scoring; • Refuses to deliver the requirement; and • Creates concerns so significant that the response would be detrimental to the interests of RSSB

Award criteria	Detail and Evaluation Criteria	Weighting
<p>W1 Summary of proposal [Max 1 page]</p>	<p>Tenderers should outline their ability to concisely summarise key aspects of their proposal. The information will be used by RSSB to contextualise the tenderer's response.</p> <p>The tenderer's response should reflect the following criteria within the maximum stated page limit:</p> <ul style="list-style-type: none"> • The tenderer has clearly outlined their understanding of the project's objectives and outputs; • The tenderer has summarised their proposal (excluding any pricing information), outlining how it shall clearly address the project's objectives and outputs. 	<p>N/A (For information only)</p>
<p>W2 Supplier's understanding and methodology [Max 3 pages]</p>	<p>Tenderers should clearly outline their understanding and methodology to carry out the required works defined in the project specification.</p> <p>The tenderer's response shall be evaluated on the following criteria within the maximum stated page limit:</p> <ul style="list-style-type: none"> • The tenderer clearly demonstrates their understanding of the project by presenting a sound methodology to address each of the project objectives and the project outputs, detailing how it shall commit to ensuring the project and outputs are delivered to a sufficient quality; • The tenderer presents a viable and practical approach to: <ul style="list-style-type: none"> ○ Development of electrical and operational safety of the railway 	<p>20%</p>

	<ul style="list-style-type: none"> ○ Developing an economic model for scheme sponsors ● The tenderer addresses the success criteria in order to ensure successful project delivery and increased likelihood of industry implementation 	
<p>W3 Organisational experience and individual expertise</p> <p>[Max 4 pages + CVs in Appendix]</p>	<p>Tenderers should clearly outline how their organisational experience and individual expertise can directly address the required works defined in the project specification.</p> <p>The tenderer’s response shall be evaluated on the following criteria within the maximum stated page limit:</p> <ul style="list-style-type: none"> ● The tenderer outlines relevant activities undertaken by their organisation, that demonstrates suitable experience to meet the project requirements; ● The tenderer demonstrates what capabilities individual project team members will bring and how this shall contribute to successfully meeting the project’s objectives and outputs. To support RSSB’s evaluation, the tenderer shall provide a one-page CV for each key project member within an appendix. <ul style="list-style-type: none"> ○ The tenderer must not provide any team members or CVs unless that person is expected to have a role in the project 	30%
<p>W4 Project management: Planning and engagement</p> <p>[Max 3 pages]</p>	<p>Tenderers should outline the processes and resources it proposes to use in order to fulfil RSSB’s requirements.</p> <p>The tender’s response shall be evaluated on the following criteria within the</p>	15%

	<p>maximum stated page limit:</p> <ul style="list-style-type: none"> • The tenderer provides adequate allocation of resource to successfully deliver outcomes to time, cost and quality⁵. To support RSSB’s evaluation, the tenderer shall provide: <ul style="list-style-type: none"> ○ A Gantt chart detailing key tasks and timeframes ○ A resource table that details task, role, name and effort (in days). The table should include total effort (in days). • The tenderer provides a clear engagement plan detailing: <ul style="list-style-type: none"> ○ Which stakeholders it intends to engage with ○ When (and how) it intends to engage with stakeholders ○ What input it shall seek from stakeholders ○ A ranking of stakeholders by order of priority, outlining how the stakeholders will have impact on successful delivery of the project. 	
<p>W5 Risks and opportunities [Max 2 pages]</p>	<p>Tenderers should detail what risks and opportunities⁶ are foreseen in the delivery of the project.</p> <p>The tenderer’s response shall be evaluated on the following criteria within the maximum stated page limit:</p> <ul style="list-style-type: none"> • The tenderer shall provide a risk and opportunities table which at minimum details appropriate risk, opportunity, probability, mitigation, impact and 	<p>10%</p>

⁵ For clarity, ‘quality’ is defined as the delivery of robust outputs that successfully meet the project’s objectives

⁶ For clarity, ‘opportunities’ is defined as an upside, beneficial source of risk

	<p>owner.</p> <ul style="list-style-type: none"> • Through the risk and opportunities table, the tenderer shall: <ul style="list-style-type: none"> ○ Identify effective mitigation actions with regards to each risk, stating how it shall respond if the risk is realised ○ Identify approaches to maximising any opportunities through effective management. ○ Identify approaches to minimise the impact of COVID-19 during the project delivery 	
<p>W6 Cost of project</p>	<p>Tenderers should provide a fixed cost for the project and the associated cost break down.</p> <p>The tender with the lowest total cost will receive 100% of the available weighted score (25%). Other tenderers will receive a pro-rated score relative to the lowest cost according to the following formula:</p> <ul style="list-style-type: none"> • $\text{Score of other tenders} = \frac{\text{lowest tender total cost}}{\text{other tender total cost}} \times 100\%$. 	<p>25%</p>

11. Procurement timeline

	Start Date
Supplier engagement meeting (if applicable)	18 06 2020 10:00-11:30
Request for proposal issued on Delta eSourcing	[d] [m] [y]
Supplier clarification questions deadline	[d] [m] [y]; ##:## hours
Deadline for Submitting tenders	[d] [m] [y]; ##:## hours
Evaluation and moderation	[d] [m] [y]
Estimated notification of award decision	w/c [d] [m] [y]
Target contract commencement date	[d] [m] [y]

Note: RSSB reserves the right to amend these dates as business requirements demand and will communicate any changes to tenderers

12. Appendix 1

T633 - Study on further electrification of Britain's railway network

In the longer-term current fuels may become limited in supply and more expensive. Electrification has potential long-term environmental sustainability benefits because it links railway usage direct to the primary energy network and potentially reduces dependence on fossil fuels through established and mature technology. Electrification, however, adds to the infrastructure capital cost and changes the balance of complexity between the trains and other infrastructure and depot fixed assets. A previous study by RSSB Feasibility study into the use of hydrogen fuel (project T531) recommended that further consideration be given to the long-term economics of further electrification of the main line network. This project provided cost and economic models that Government and the rail industry can use in evaluation of electrification proposals versus traction energy alternatives.

T950 – Investigating the economics of the 3rd rail DC system compared to other electrification systems

This research has considered the long-term options for modification or replacement of the 750V DC third rail electrification system. This is used over a significant part of the UK main line network and this work was to determine whether there is a prima facie case on economic grounds for conversion to 25kV AC overhead electrification; and if so, over what approximate period this conversion could practicably be carried out.

T1145 - Options for traction energy decarbonisation in rail

In February 2018 the Minister for Rail challenged the rail industry to remove diesel-only trains from the railway by 2040 and to produce a vision to decarbonise rail. In response the industry set up the Rail Industry Decarbonisation Taskforce, and RSSB adapted the research scope which, in addition to technical review and advice on the traction options, was expanded to include the development of an economic decision support tool and route maps to achieve various carbon reduction scenarios.

The study was split in to three work packages:

- Assessment of different fuels/energy sources against journey requirements: An evaluation of possible traction options that would be sufficiently mature by 2040 to be able to support cost effective carbon reduction efforts.
- The economic model: Development of a decision support tool to give guidance on the carbon impacts and costs of alternative decarbonisation schemes.

- Road maps for decarbonisation: Development of a series of roadmaps of possible ways to meet a range of decarbonisation targets.

T1160 - Decarbonisation and air quality improvement of the freight rail industry

Options for replacing and/or modifying the existing diesel fleet with alternative, less carbon intensive solutions while reducing other air pollutants such as NOx and particulate matter.

- The impacts on power, range and acceleration (to operate on an intensively used mixed traffic network) capabilities any freight train require.
- The need for any solution to be safe and affordable by the industry.
- The need for any solution to enable rail freight to remain commercially competitive with road alternatives.
- The impact of decarbonising on other air pollutants and on the passenger railway sector.
- Assessment of where it may not be possible or practicable to meet the requirements of policy or current freight operational approaches, and what the impacts be. What is the closest solution to meeting the requirements if no fully compliant outcome can be achieved?

T1172 – Hydrogen powered trains: route to enter into service

Different organisations are developing hydrogen solutions to replace diesel only train and achieve the target set by the government. RSSB has been approached to help develop a non-solution specific 'route map to enter service'. This project is specifically focussed on demonstrating the safety elements of running hydrogen powered train on the GB mainline. The work builds on existing activities both within and outside the GB rail industry, engaging projects and stakeholders and will deliver the following:

- High level operation concept based on 'a day in a life of a hydrogen-powered unit'
- Hazard log by analysing any show-stopper hazard that could preclude the operation of hydrogen powered trains on the GB network and to inform specific design solution and required mitigations
- Route to market map to identify key regulatory railway specific and general obligations (where necessary) which will need to be addressed by Hydrogen Powered Trains, including compliance with relevant standards and risk management approaches

T1195 – Battery powered trains: route to enter into service

Together with hydrogen powered trains, battery powered trains have been identified as possible solution to replace diesel only trains. Battery powered trains, both in single mode and hybrid solution, are actively developed for the use on the GB mainline. The introduction of any new battery powered rolling stock will have to demonstrate appropriate levels of safety and the capability to reliably integrate with other services on a mixed traffic railway. Compared to hydrogen, battery technology has been largely used in a variety of sector, including rail. Consequently, this project builds on the existing knowledge gained from rail and other industries within and outside GB to identify different operational solutions, performing a hazard analysis, and defining the approval route and opportunities and needs for standardisation to ensure the safety elements of running battery powered trains on the GB network.

T1199 - Cost of different traction options to meet WebTAG requirements

The Rail Industry Decarbonisation Taskforce has noted the potential, within the decarbonisation programme, of unintended consequences of well-intentioned decisions, such as changes to the price of carbon creating an imbalance between the costs of rail freight and road haulage. Final decisions on the preferred combination of decarbonisation options is fundamentally dependent on costs set against a benchmark cost of electrification to achieve the lowest cost decarbonisation programme using a balanced mix of technologies. There is no single point of expertise in the rail industry to deliver an understanding of the system costs of hydrogen, batteries or more efficient thermal combustion, which are all key to implementation of the lowest cost decarbonisation pathway.

The project will deliver:

- Agreement with DfT/ Treasury/ TDNS to set the appropriate approaches in webTAG for assessing decarbonisation options, especially as WebTAG is subject to change.
- Agreement on traction costs and projections with DfT/ Treasury/ TDNS team.
- A registry of key cost elements and systems that need to be tracked to ensure that costs stay within acceptable parameters consistent with the preferred decarbonisation pathway and targets.
- Confidence levels for and ranges of estimated costs.
- A methodology for updating costs, as actual costs become more readily available, in a manner that encourages manufacturers to share cost data without compromising any agreed commercial sensitivities.

Long Term Passenger Rolling Stock Strategy for the Rail Industry, 6th Edition (March 2018)

Every year, RSSSG publishes a new edition of the Long-Term Passenger Rolling Stock Strategy. It sets out a range of forecasts for the likely size and mix of the national rolling stock fleet to accommodate future passenger numbers over 30 years.

Traction Decarbonisation Network Strategy (TDNS)

Network Rail is currently preparing a cross-industry Traction Decarbonisation Network Strategy (TDNS). This will consider where overhead electrification, battery or hydrogen trains might be most effectively deployed and is building on the Rail Industry Decarbonisation taskforce's recommendations, the existing electrification schemes underway and the research mentioned above. The TDNS will be completed during 2020.

In addition, Network Rail is actively pursuing large-scale carbon reduction activities across its estate and operations through its internal Decarbonisation Programme, aiming to improve energy efficiency, energy management practices and innovate in the areas of renewable energy, energy storage, low carbon design and transitioning the vehicle fleet to electric.

Skelmersdale Rail Link Traction Power Options – final report currently under NR review

This report presents some of the evidence which will be used by Network Rail to inform its selection of traction power system for the Skelmersdale extension to the Merseyrail network. This report collates evidence related to legal, safety and technical reviews of four traction power options for the Skelmersdale Rail Link and ranks these options against several individual criteria selected by Network Rail.

13. Appendix 2

The document attached below is a legislation and regulation register which should provide the supplier a good steer. However, the approach envisaged is that the supplier should include but not limit their work based on the legislations and regulations listed.

